

MODUL SEEP

SARAWAK EDUCATION ENHANCEMENT PROGRAMME

SAINS | Tingkatan 3

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CHUNG SIEW LING

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MODUL SEEP

SARAWAK EDUCATION ENHANCEMENT PROGRAMME

Ministry of Education, Innovation & Talent Development, 2025

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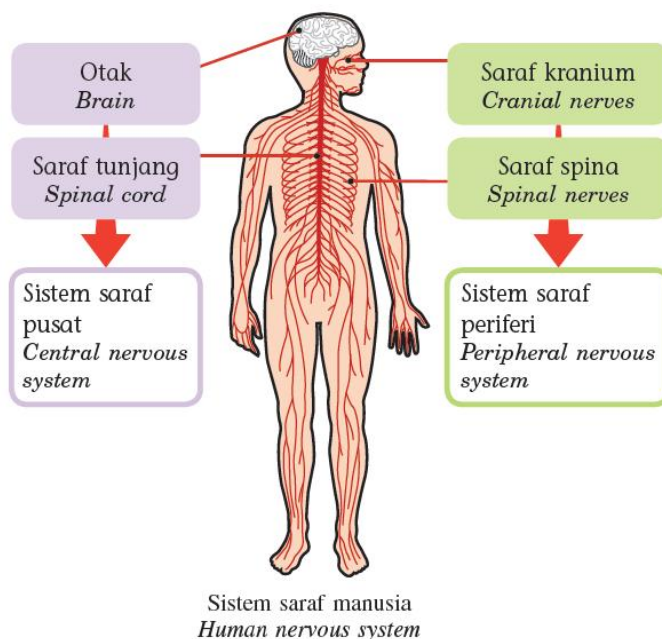
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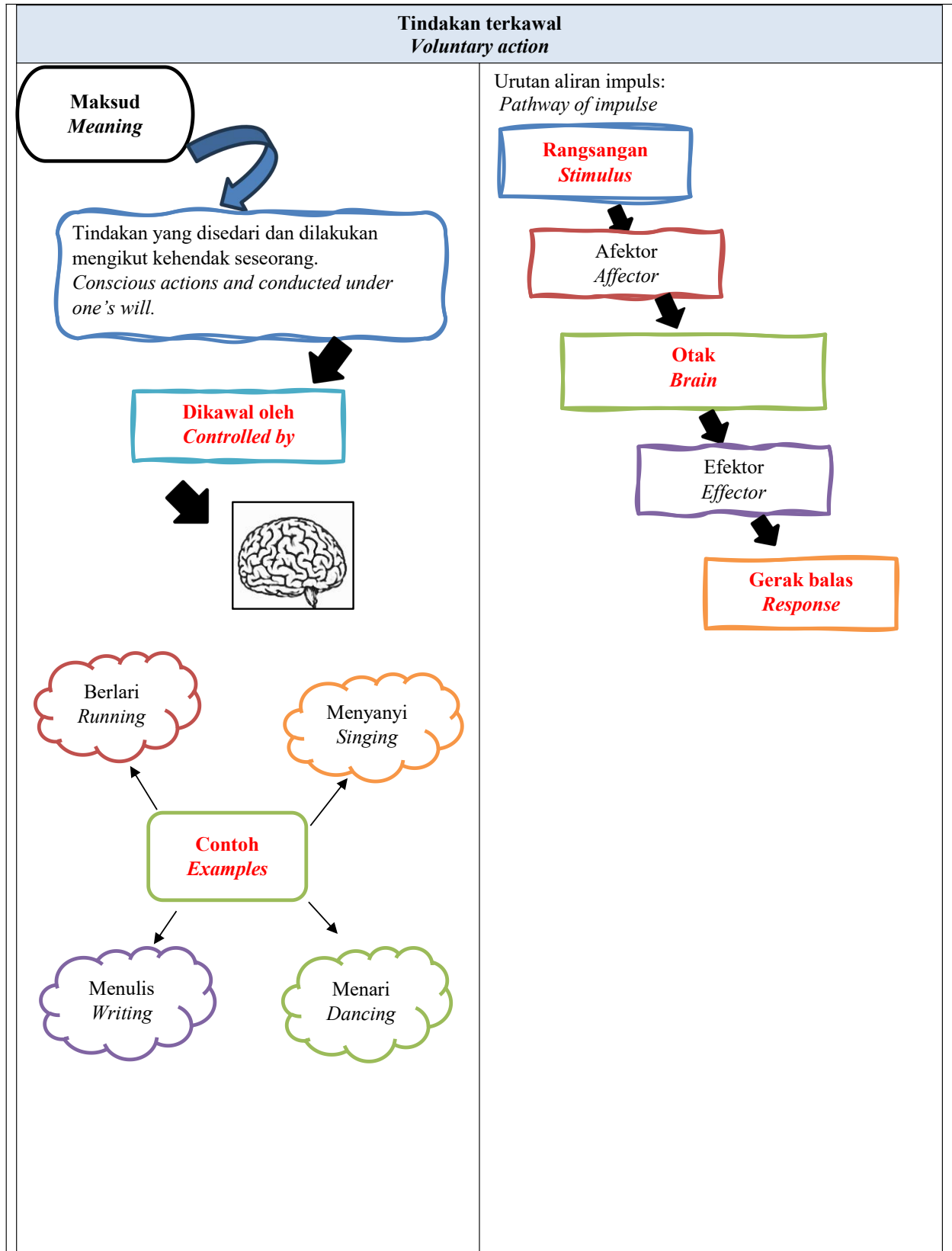
Preface

Welcome to the Sarawak Education Enhancement Programme (SEEP) Module Book. This book has been developed as part of our shared mission to strengthen education in Sarawak and to provide targeted, practical, and innovative resources for both students and teachers. SEEP reflects the Ministry of Education, Innovation, and Talent Development (MEITD)'s steadfast commitment to uplifting the quality of education through collaborative efforts, innovative teaching strategies, and holistic development opportunities. These modules are designed to meet the diverse learning needs of our students while equipping our teachers with the tools and guidance to improve learning outcomes meaningfully. We extend our highest appreciation to the Right Honourable Premier of Sarawak for his unwavering leadership and steadfast commitment to advancing education in the state. We also wish to place on record our deepest gratitude to YB Datuk Sri Roland Sagah Wee Inn, Minister for Education, Innovation and Talent Development Sarawak, for his visionary leadership and guidance in steering education towards greater heights; to YB Datuk Dr. Annuar Rapa'ee, Deputy Minister for Education, Innovation and Talent Development (Higher Education and Innovation) and Chairman of the Sarawak Education Assistance Initiatives (SEAI), for his invaluable insights and dedication throughout the module-writing process; and to YB Datuk Francis Harden Hollis, Deputy Minister for Education, Innovation and Talent Development (Talent Development), for his steadfast support in advancing our shared goals. Our sincere gratitude is extended to the dedicated teachers from all over Sarawak who served as SEEP module writers. Your time, expertise, and creativity have ensured that the content is relevant, practical, and engaging for both students and educators. We also thank the officers of the Sarawak State Education Department (JPNS), the District Education Offices (PPD), and all participating schools for their invaluable cooperation and contributions in shaping and delivering the SEEP programme. To our teachers, thank you for your dedication, passion, and tireless efforts in guiding and inspiring your students. To our students, these modules are created for you to succeed both academically and in life. It is the Ministry's hope that these modules will be fully utilised by teachers and students alike, serving as an effective tool towards achieving our goal of excellence in education. Let us continue working together—one school, one teacher, and one student at a time—to shape a future for Sarawak that is better, stronger and equitable for all.

Sesi 1 / Session 1	
Bidang Pembelajaran <i>Learning Area</i>	1.0 Rangsangan dan gerak balas <i>1.0 The stimuli and responses</i>
Standard Kandungan <i>Content Standard</i>	1.1 Sistem saraf manusia <i>1.1 Human Nervous System</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan sistem saraf manusia. <i>Students will be able to accomplish the tasks regarding the human nervous system.</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Struktur sistem saraf manusia <i>Structure of the Human Nervous System</i> 2. Urutan aliran impuls dalam aktiviti terkawal dan tindakan luar kawal <i>Pathway of impulse in a voluntary and involuntary action.</i>

L1: Nota Revisi Cepat**A1: Speedy Revision Notes**
Sistem saraf manusia
Human Nervous System

Kepentingan sistem saraf manusia
The importance of the human nervous system

- Mengesan rangsangan
Detects stimuli
- Menghantar maklumat dalam bentuk impuls
Sends information in the form of impulses
- Menghasilkan gerak balas yang sesuai
Produces appropriate responses

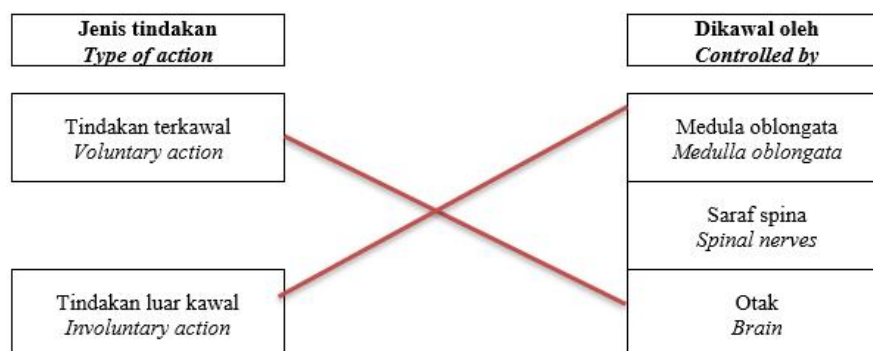


Tindakan luar kawal <i>Involuntary action</i>	
Maksud: Tindakan yang berlaku secara serta-merta Meaning: Action that occurs immediately	
Tindakan luar kawal <i>Involuntary action</i> ✓ Melibatkan medula oblongata <i>Involving medulla oblongata</i> Contoh <i>Examples</i> ● Denyutan jantung <i>Heartbeat</i> ● Pernafasan <i>Breathing</i> ● Peristalsis <i>Peristalsis</i> ✓ Melibatkan saraf tunjang (tindakan refleks) <i>Involving spinal cord (reflex action)</i> Contoh <i>Examples</i> ● Menarik tangan apabila terkena benda panas <i>Withdrawing hand from a hot object</i> ● Menarik kaki apabila terpijak benda tajam. <i>Withdrawing foot when it accidentally steps on a sharp object</i> ● Bersin apabila habuk masuk ke dalam hidung <i>Sneezing when dust enters the nose</i>	

L2: Teknik menjawab soalan**A2: Answering technique**

1. (a) Padankan jenis tindakan dan bahagian badan yang mengawal tindakan tersebut.

Match the type of action and part of the nervous system that control the action.



[2 markah/ 2 marks]

Mengingat/remember

TIPS:

Bagi soalan berbentuk padanan, sila padankan mengikut bilangan jenis (kotak kiri) dengan respon (kotak kanan)

For matching, please match the number of types (left box) with the responses. (right box)

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 1/Level 1)**

1. Antara berikut, yang manakah tindakan luar kawal?

Which of following is an involuntary action?

- A Membaca
Reading
- B Bercakap
Speaking
- C Peristalsis
Peristalsis
- D Bermain badminton
Playing badminton

[1 markah/ 1 mark]
Mengetahui/Knowing

2. Tindakan terkawal ialah tindakan yang berlaku secara sedar dan dikawal oleh organ X.

Voluntary action is an action occurs consciously and controlled by the organ X.

Apakah organ X itu?

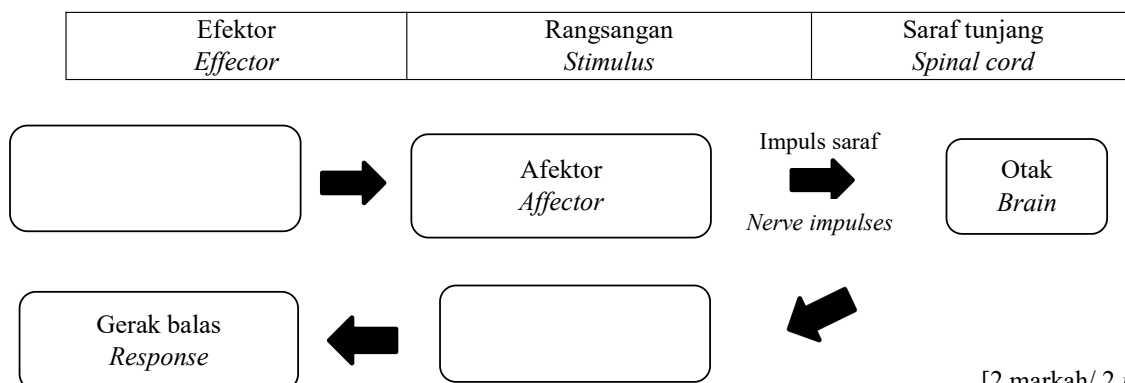
What is the organ X?

- A Otak
Brain
- B Saraf spina
Spinal nerves
- C Saraf tunjang
Spinal cord
- D Medula oblongata
Medulla oblongata

[1 markah/ 1 mark]
Mengingat/Remember

3.a) Lengkapkan urutan aliran impuls bagi tindakan terkawal.

Complete the pathway of nerve impulses for voluntary action.



[2 markah/ 2 marks]
Mengingat/Remember

- (b) Tandakan (✓) bagi tindakan luar kawal yang melibatkan saraf tunjang.

Mark (✓) for the involuntary actions that involves spinal cord.

(i) Bersin apabila hidung dimasuki habuk <i>Sneezing when dust enters the nose</i>	
(ii) Pernafasan <i>Breathing</i>	
(iii) Batuk apabila saluran tekak dimasuki bendasing <i>Coughing when a foreign object enters the throat</i>	

[2 markah/ 2 marks]

Memahami/Understand

4. Rajah menunjukkan tindakan yang dilakukan oleh seorang kanak-kanak lelaki.

The diagram shows an action carried out by a boy.



- (a) Nyatakan satu contoh tindakan manusia

State one example of human action.

[1 markah/ 1 mark]

Mengingat/Remember

- (b) Tandakan (✓) pada jenis tindakan yang dilakukan oleh kanak-kanak tersebut.

Mark (✓) the type of action that the boy is doing.

Tindakan terkawal <i>Voluntary action</i>	Tindakan luar kawal <i>Involuntary action</i>

[1 markah/ 1 mark]

Memahami/Understand

- (c) Nyatakan bahagian badan yang mengawal tindakan tersebut.

State the part of the body that controls the action.

[1 markah/ 1 mark]

Memahami/Understand

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 2/Level 2)**

1. Bersin apabila habuk masuk ke dalam hidung adalah suatu contoh tindakan luar kawal manusia. Antara berikut, organ yang manakah mengawal tindakan tersebut?
Sneezing when dust enter the nose is an example of an involuntary action. Which of the following organs controls the action?

- A Otot
Muscles
 B Saraf tunjang
Spinal cord
 C Medula oblongata
Medulla oblongata
 D Saraf periferi
Peripheral nerve

[1 markah/ 1 mark]
 Memahami/Understand

- 2 (a) Padankan jenis tindakan dan bahagian badan yang mengawal tindakan tersebut
Match the type of action and part of the nervous system that control the action.

Jenis tindakan <i>Type of action</i>	Dikawal oleh <i>Controlled by</i>
Tindakan terkawal <i>Voluntary action</i>	Medula oblongata <i>Medulla oblongata</i>
	Saraf spina <i>Spinal nerve</i>
Tindakan luar kawal <i>Involuntary action</i>	Otak <i>Brain</i>

[2 markah/ 2 marks]
 Mengingat/remember

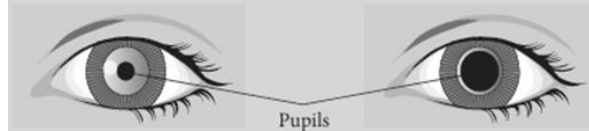
- (b) Tandakan (✓) pada fungsi sistem saraf manusia yang betul.
Mark (✓) for the correct functions of human nervous system.

Pernyataan <i>Statement</i>	Tandakan (✓) <i>Mark (✓)</i>
Mengesan rangsangan <i>Detects stimuli</i>	
Menyingkirkan bahan kumuh dari badan <i>Eliminates waste substances from the body</i>	
Menghantar maklumat dalam bentuk impuls <i>Sends information in the form of impulses</i>	

[2 markah/ 2 marks]
 Memahami/Understanding

3. Rajah menunjukkan perubahan saiz pupil pada mata.

Diagram shows changes in the size of the pupil in the eye.



(a) Nyatakan tindakan yang berlaku pada perubahan saiz pupil mata.

State the action that happens in the size of pupil in the eye.

_____ [1 markah/ 1 mark]
Mengingat/Remember

(b) Nyatakan fungsi bagi :

State the function for

(i) Afektor : _____
Affector

(ii) Efektor : _____
Effector

[2 markah/ 2 marks]
Memahami/Understand

(c) Orang yang mengalami kecederaan otak tidak dapat melakukan tindakan terkawal atau luar kawal yang melibatkan otak. Terangkan.

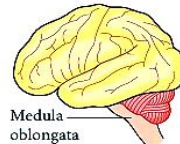
A person who sustained brain injury is unable to carry out voluntary or involuntary actions involving the brain. Explain.

[2 markah/ 2 marks]
Memahami/Understand

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 3/Level 3)**

1. Rajah menunjukkan struktur bahagian otak.

Diagram shows the structure of the brain.



Antara berikut, yang manakah tindakan yang dikawal oleh bahagian otak tersebut?

Which of the following action is controlled by that part of the brain?

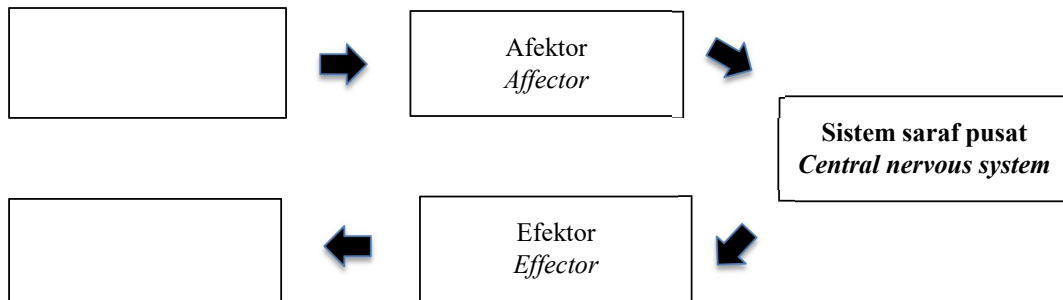
- A Rembesan air liur
Secretion of saliva
- B Menarik kaki apabila terpijak benda tajam
Withdrawing foot when accidentally steps on a sharp object
- C Bersin apabila habuk masuk ke dalam hidung
Sneezing when dust enters the nose
- D Menarik tangan apabila tersentuh benda panas
Withdrawing hand when it accidentally touches a hot object

[1 markah/ 1 mark]

Memahami/Understand

2. Rajah menunjukkan urutan aliran impuls bagi tindakan terkawal.

Diagram shows the pathway of impulse in a voluntary action.



(a) Isikan kotak di atas dengan jawapan yang betul.

Fill in the boxes above with the correct answers.

Gerak balas <i>Response</i>	Rangsangan <i>Stimulus</i>	Saraf <i>Nerve</i>
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[2 markah/ 2 marks]

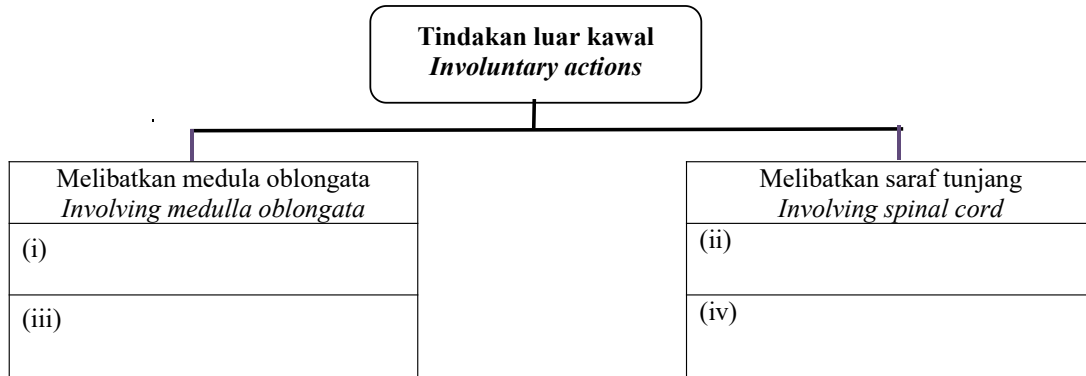
Mengingat/Remember

b) Maklumat berikut menunjukkan beberapa contoh tindakan luar kawal.

The following information shows some examples of involuntary actions.

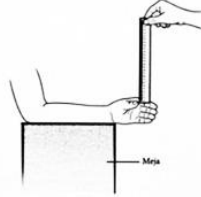
Batuk <i>Coughing</i>	Peristalsis <i>Peristalsis</i>	Denyutan jantung <i>Heartbeat</i>	Bersin <i>Sneezing</i>
--------------------------	-----------------------------------	--------------------------------------	---------------------------

Kelaskan tindakan luar kawal tersebut ke dalam kumpulan yang betul.
Classify the involuntary actions into the correct groups.



[2 markah/ 2 marks]
 Mengingat/Remember

3. Azim dan rakannya melakukan satu aktiviti menangkap pembaris yang jatuh bebas.
Azim and his friend carried out an activity to catch a free falling ruler.



- (a) Tandakan (✓) bagi tindakan terkawal.
Mark (✓) for the involuntary action.

Minum air <i>Drink water</i>	
Bernafas <i>Breathing</i>	

[1 markah/ 1 mark]
 Mengingat/Remember

- (b) Nyatakan jenis tindakan dalam aktiviti di atas. Jelaskan.
State the type of action in the activity above. Explain.

[2 markah/ 2 marks]
 Memahami/Understand

- (c) Nyatakan dua kepentingan rangsangan dan gerak balas dalam manusia.
State two importances of stimuli and responses in human.

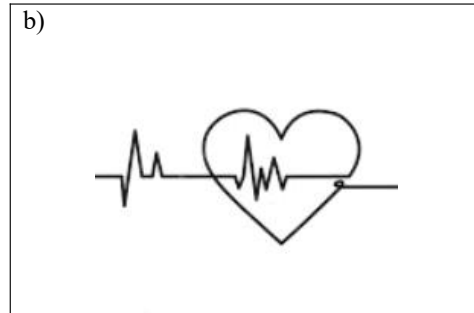
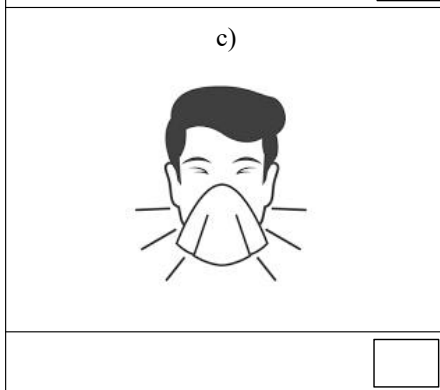
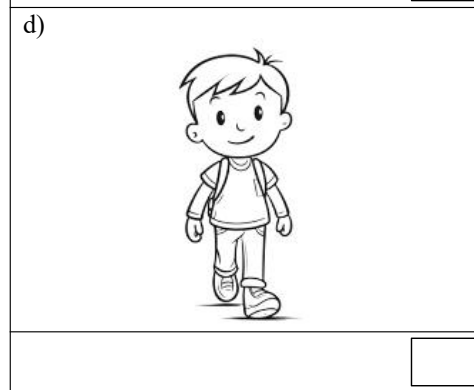
(i) _____

(ii) _____

[2 markah/ 2 marks]
 Memahami/Understand

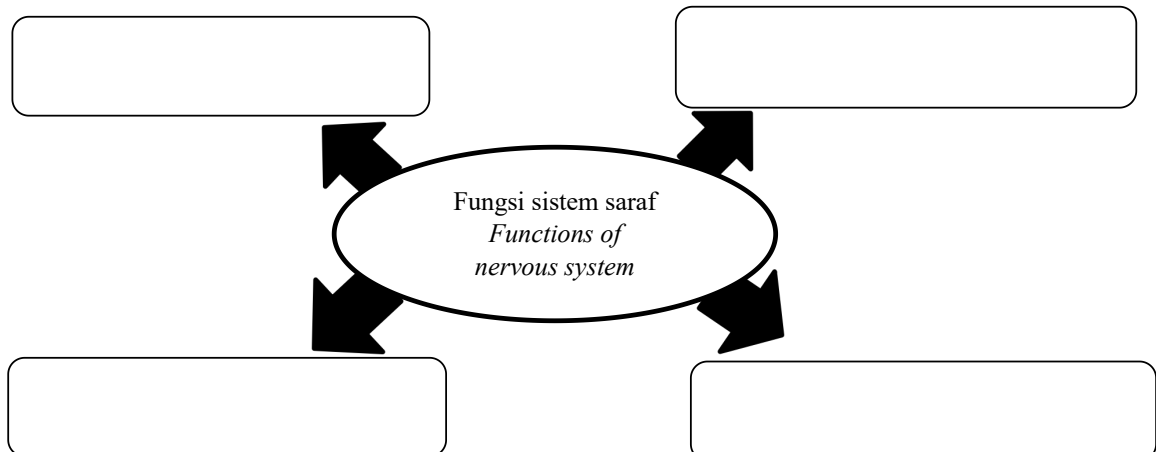
L4: Penilaian
A4: Assessment

1. Tuliskan jenis tindakan manusia berikut. Kemudian, tandakan (✓) dalam petak tindakan yang dikawal oleh otak.
Write the type of human actions below. Then, mark (✓) in the box the actions which are controlled by the brain.


☐

☐

☐

☐

(6 markah/ 6 marks)

2. Lengkapkan rajah berikut dengan fungsi sistem saraf.
Complete the following diagram with the functions of the nervous system.



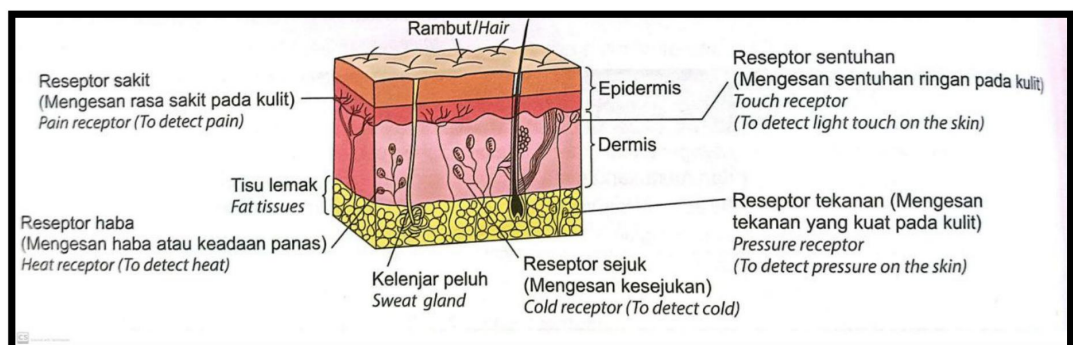
(4 markah/ 4 marks)

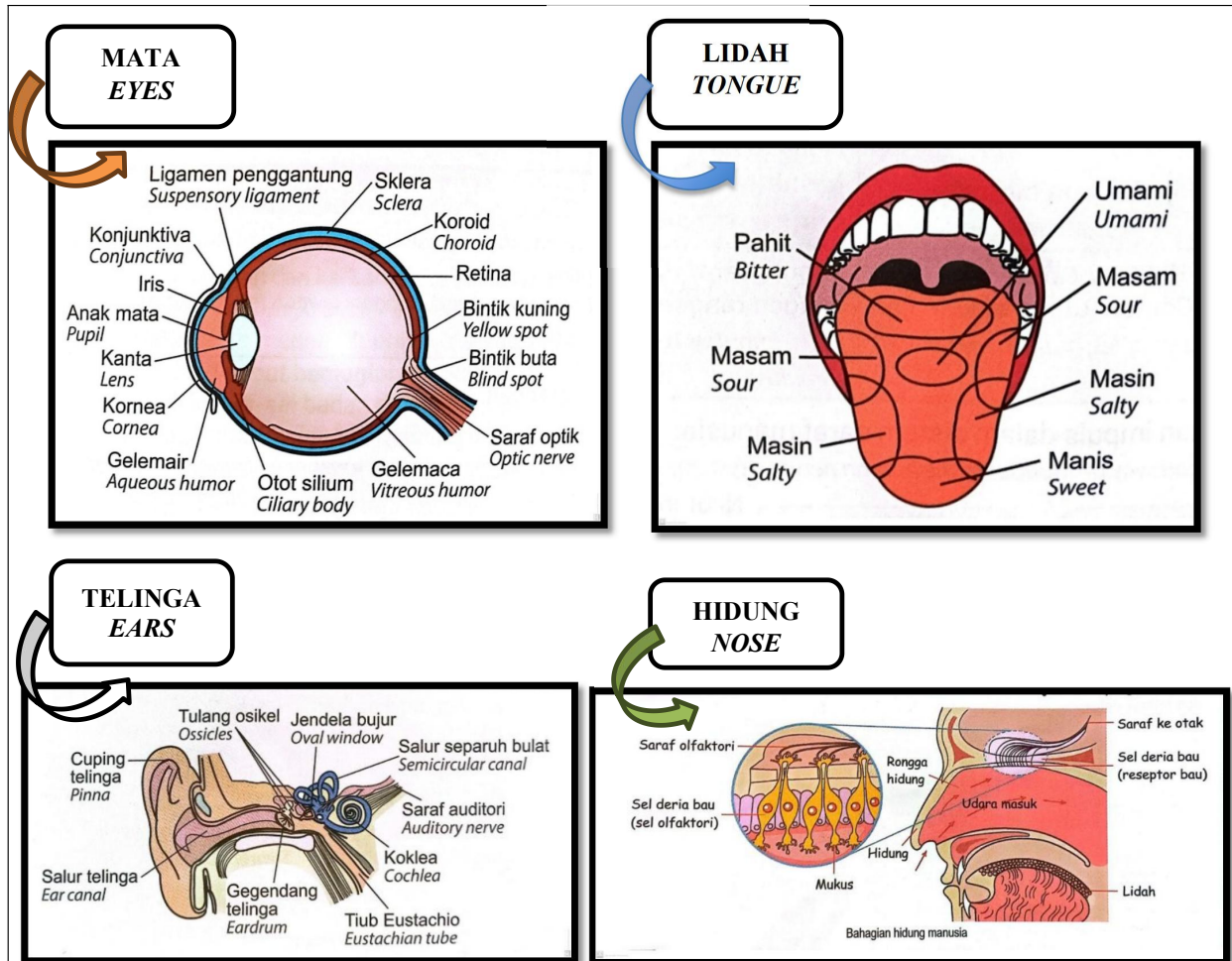
Sesi 2 / Session 2	
Bidang Pembelajaran <i>Learning Area</i>	1.0 Rangsangan dan gerak balas <i>1.0 The stimuli and responses</i>
Standard Kandungan <i>Content Standard</i>	1.2 Rangsangan dan gerak balas dalam manusia <i>1.2 Stimuli and responses in human</i> 1.4 Kepentingan gerak balas terhadap rangsangan dalam haiwan lain <i>1.4 Importance of responses towards stimuli in other animals</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan rangsangan dan gerak balas dalam manusia dan kepentingan gerak balas terhadap rangsangan dalam haiwan lain <i>Students will be able to accomplish the tasks regarding the stimuli and responses in human and the importance of responses towards stimuli in other animals</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Rangsangan dan gerak balas dalam manusia <i>Stimuli and responses in human</i> 2. Kepentingan gerak balas terhadap rangsangan dalam haiwan lain <i>Importance of responses towards stimuli in other animals</i>

L1: Nota Revisi Cepat**A1: Speedy Revision Notes**

Rangsangan dan Gerak Balas dalam Manusia
Stimuli and Response in Human

KULIT
SKIN





Sumber: Modul Aktiviti Conquer, Tingkatan 3

Kepentingan gerak balas terhadap rangsangan dalam haiwan lain

Importance of responses towards stimuli in other animals



Sumber: Nota Pintar Sains Tingkatan 3, Sasbadi

L2: Teknik menjawab soalan**A2: Answering technique**

Tandakan (✓) pada pernyataan yang **BETUL**.
 Mark (✓) for the **CORRECT** statements.

Pernyataan Statement	Tandakan (✓) Mark (✓)
(i) Pendengaran stereofonik adalah penting untuk menentukan arah bunyi. <i>Stereophonic hearing is important to determine the direction of sound.</i>	✓
(ii) Pendengaran stereofonik membolehkan haiwan menganggar kedudukan sumber bunyi. <i>Stereophonic hearing enables animals to estimate position of source of sound.</i>	✓
(iii) Pendengaran stereofonik membolehkan haiwan mengesan bunyi yang sangat perlahan. <i>Stereophonic hearing enables animals to detect very soft sound.</i>	

[2 markah/ 2 marks]
 Memahami/ Understand

TIPS:

- Tandakan (✓) pada kotak pernyataan yang betul sahaja.
Mark (✓) only the correct statement box.
- Jika pernyataan yang salah, tidak perlu ditanda.
If the statement is wrong, it does not need to be marked.

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 1/Level 1)**

1. Antara berikut, bahagian badan yang manakah kurang peka terhadap sentuhan?

Which of following body parts is less sensitive to touch?

- A Siku
Elbow
- B Bibir
Lips
- C Lidah
Tongue
- D Hidung
Nose

[1 markah/ 1 mark]
 Mengingat/Remember

2. Antara berikut, organ yang manakah mengesan cahaya?

Which of the following organs detects light?

- A Mata
Eyes
- B Kulit
Skin
- C Lidah
Tongue
- D Hidung
Nose

[1 markah/ 1 mark]
 Mengingat/Remember

3. Lengkapkan pernyataan berikut tentang deria rasa dengan perkataan yang betul.

Complete the statements below about sense of taste with the correct words.

epidermis	kulit	dermis
<i>epidermis</i>	<i>skin</i>	<i>dermis</i>

- (i) Organ bagi deria sentuhan ialah _____ yang menerima rangsangan dalam bentuk haba, sentuhan, tekanan dan kesakitan.

The sensory organ of touch is the _____ that receives stimuli in the form of heat, touch, pressure and pain.

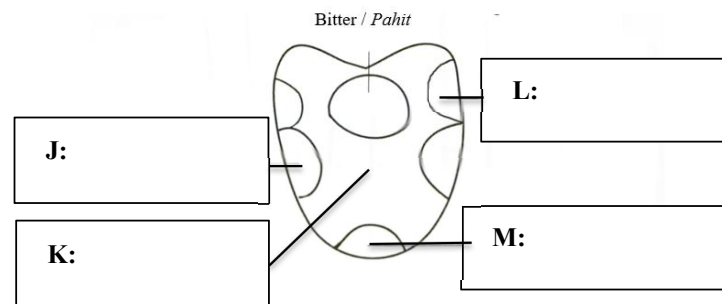
- (ii) Bahagian luar kulit dikenali sebagai _____.

The outer layer is known as _____.

[2 markah/ 2 marks]
Mengingat/Remember

4. Rajah menunjukkan struktur lidah.

Diagram shows the structure of a tongue.



- (a) Label kawasan rasa J, K, L dan M.

Label the taste area of J, K, L and M.

[4 markah/ 4 marks]
Mengingat/Remember

- (b) Nyatakan dua contoh makanan yang berlabel M

State two examples of the food that labelled as M.

[2 markah/ 2 marks]
Mengingat/Remember

- (c) Permukaan lidah mempunyai bintil-bintil kecil yang dipanggil papilla yang dilapisi oleh beratus-ratus tunas rasa. Terangkan fungsi tunas rasa tersebut.

The surface of the tongue has small bumps called the papillae that is covered by hundreds of taste buds. Explain the function of the taste buds.

[2 markah/ 2 marks]
Memahami/Understand

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 2/Level 2)**

1. Retina mengandungi sel rod. Apakah ciri sel ini?

The retina has rod cells. What is the characteristic of this cell?

- A Sel rod juga dikenali sebagai sel kon
Rod cells also known as cone cells
- B Peka terhadap warna merah, hijau dan biru
Sensitive towards red, green and blue colours
- C Peka kepada keamatan cahaya yang berbeza
Sensitive to different light intensities
- D Peka kepada warna cahaya dalam keadaan yang gelap
Sensitive to colours of light under dark conditions

[1 markah/ 1 mark]
Mengingat/Remember

2. (a) Gariskan jawapan yang betul tentang fotoreseptor.

Underline the correct answers about photoreceptors.

- (i) (Sklera / Retina) terdiri daripada dua jenis fotoreseptor iaitu sel rod dan sel kon.
(Sclera / Retina) is composed of two types of photoreceptors which are rod cell and cone cell.
- (ii) Sel rod peka kepada (warna cahaya / keamatan cahaya).
Rod cell is sensitive towards (light colour / light intensity)

[2 markah / 2 marks]
Mengingat/Remember

(b) Nyatakan **BENAR** bagi pernyataan yang betul dan **PALSU** bagi pernyataan yang salah.

*State **TRUE** for the correct statements and **FALSE** for the incorrect statements.*

Pernyataan Statement	BENAR/PALSU TRUE/FALSE
(i) Rabun dekat terjadi disebabkan oleh kanta mata yang terlalu tebal. <i>Long-sightedness is caused by the eye lens that is too thick.</i>	
(ii) Rabun dekat boleh dibetulkan dengan menggunakan cermin mata berkanta cembung. <i>Long sightedness can be corrected by using a convex lens.</i>	
(iii) Imej yang jatuh pada titik buta tidak akan kelihatan. <i>Image that falls on the blind spot would not be seen.</i>	

[2 markah/ 2 marks]
Memahami/Understand

3. Rajah menunjukkan seorang remaja mendengar musik yang terlalu kuat.
Diagram shows a teenager listening to a very loud music.



- (a) Nyatakan satu organ deria manusia.
State one human sensory organ.

[1 markah/ 1 mark]
Mengingat/Remember

- (b) Nyatakan organ deria yang akan terjejas sekiranya perbuatan ini berlarutan untuk jangka masa yang panjang.
State the sensory organ that will be affected if this act continues for a long period of time.

[1 markah/ 1 mark]
Mengingat/Remember

- (c) Bagaimanakah perbuatan ini boleh menjejaskan kesihatan organ deria yang dinyatakan dalam 3(b).
How can this act affect the health of the sensory organ mentioned in 3(b).

[2 markah/ 2 marks]
Memahami/Understand

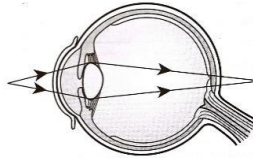
- (d) Terangkan satu contoh perbuatan lain yang boleh menjejaskan kesihatan organ deria di atas.
Explain another example of an act that can affect the health of the sensory above.

[1 markah/ 1 mark]
Memahami/Understand

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion item: UASA-format items****(Tahap 3/Level 3)**

1. Rajah menunjukkan sejenis kecacatan penglihatan.

Diagram shows a type sight defect.



Apakah jenis kecacatan penglihatan di atas?

What is the sight defect above?

- A Rabun jauh
Short-sightedness
- B Rabun dekat
Long-sightedness
- C Rabun warna
Colour blindness
- D Astigmatisme
Astigmatism

[1 markah/ 1 mark]

Memahami/Understand

2. (a) Tandakan (✓) bagi haiwan yang mempunyai jenis penglihatan stereoskopik.

Mark (✓) for animals that have stereoscopic vision.

[2 markah / 2 marks]

Mengingat/Remember

(b) Tandakan (✓) pada pernyataan yang betul.

Mark (✓) for the correct statements.

Pernyataan <i>Statement</i>	Tandakan (✓) <i>Mark (✓)</i>
(i) Pendengaran stereofonik adalah penting untuk menentukan arah bunyi. <i>Stereophonic hearing is important to determine the direction of sound.</i>	
(ii) Pendengaran stereofonik membolehkan haiwan menganggar kedudukan sumber bunyi. <i>Stereophonic hearing enables animals to estimate position of source of sound.</i>	
(iii) Pendengaran stereofonik membolehkan haiwan mengesan bunyi yang sangat perlahan. <i>Stereophonic hearing enables animals to detect very soft sound.</i>	

[2 markah/ 2 marks]

Memahami/Understand

3. Ketebalan epidermis kulit berbeza pada bahagian berbeza pada tubuh badan manusia. Jadual di bawah menunjukkan ketebalan epidermis bagi beberapa bahagian yang berbeza.

The thickness of epidermis of the skin varies in different parts of the human body. The table below shows the thickness of the epidermis.

Bahagian tubuh <i>Parts of the body</i>	Ketebalan epidermis <i>Thickness of epidermis (μm)</i>
Pipi <i>Cheek</i>	38.8
Cuping telinga <i>Earlobes</i>	30.0
Abdomen <i>Abdomen</i>	46.6
Lengan <i>Forearm</i>	74.9
Punggung <i>Buttock</i>	96.5

- (a) Tandakan (✓) faktor yang mempengaruhi kepekaan kulit.
Explain one factor that influences the sensitivity of the skin.

Ketebalan epidermis <i>Thickness of epidermis</i>	Bilangan reseptor <i>Number of receptors</i>	Tumpuan saraf <i>Concentration of nerves</i>

[2 markah/ 2 marks]
Mengingat/Remembering

- (b) Berdasarkan jadual di atas, cadangkan bahagian tubuh yang paling sesuai untuk menerima suntikan. Terangkan.
Based on the table above, suggest the part of the body which is the most suitable for injection. Explain.

[2 markah/ 2 marks]
Memahami/Understand

- (c) Orang buta menggunakan hujung jari untuk mengenal pasti huruf dan membaca Braille. Jelaskan.
Blind people use their fingertips to identify letters and read Braille. Explain.

Sebab: _____
Reason

Penerangan: _____
Explanation

[2 markah/ 2 marks]
Memahami/ Understand

L4: Penilaian**A4: Assessment**

1 (a) Padankan kecacatan penglihatan dengan kanta pembetulan yang betul.

Match the sight defects with its correction lens correctly.

Kecacatan penglihatan
Sight defects

Rabun dekat
Long-sightedness

Rabun jauh
Short-sightedness

Kanta pembetulan
Correction lens

Silinder
Cylinder

Cembung
Convex

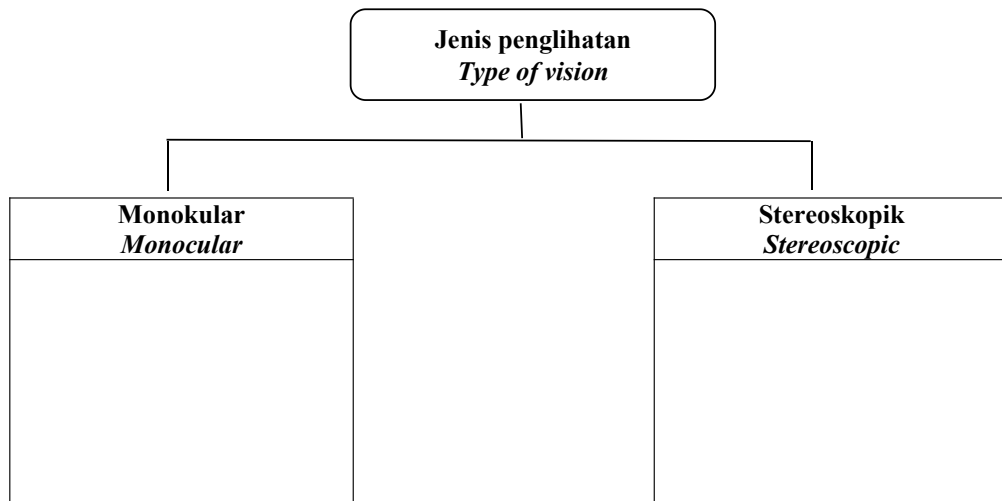
Cekung
Concave

[2 markah/ 2 marks]

(b) Kelaskan haiwan berikut mengikut jenis penglihatan dalam rajah di bawah.

Classify the following animals according to the type of vision in the diagram below.

Tikus <i>Rat</i>	Burung hantu <i>Owl</i>	Rusa <i>Deer</i>	Singa <i>Lion</i>
Kambing <i>Goat</i>	Monyet <i>Monkey</i>	Harimau <i>Tiger</i>	Arnab <i>Rabbit</i>



[8 markah/ 8 marks]

Sesi 3 / Session 3	
Bidang Pembelajaran <i>Learning Area</i>	1.0 Rangsangan dan gerak balas <i>1.0 The stimuli and responses</i>
Standard Kandungan <i>Content Standard</i>	1.3 Rangsangan dan gerak balas dalam tumbuhan <i>1.3 The Stimuli and responses in plants</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan rangsangan dan stimuli dalam tumbuhan <i>Students will be able to accomplish the tasks regarding the stimuli and responses in plants</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Jenis rangsangan dan gerak balas dalam tumbuhan <i>Types of stimuli and responses in plants</i> 2. Kepentingan rangsangan dan gerak balas dalam tumbuhan <i>The importance of stimuli and responses in plants</i>

L1: Nota Revisi Cepat**A1: Speedy Revision Notes**

1.3 Rangsangan dan Gerak Balas dalam Tumbuhan

Stimuli and Responses in Plants

Tropisme/ Tropism

Fototropisme (gerak balas terhadap cahaya)
Phototropism (response to light)

Awal
Beginning

→

Selepas beberapa hari
After several days

Pucuk tumbuhan tumbuh ke arah cahaya matahari.
The shoots of the plant grow towards sunlight.

Memperoleh cahaya Matahari untuk proses fotosintesis
Gain sunlight to carry out photosynthesis

Geotropisme (gerak balas terhadap graviti)
Geotropism (response to gravity)

Awal
Beginning

→

Selepas beberapa hari
After several days

Akar tumbuh ke arah graviti.
The roots grow towards gravity.

Akar mencengkam tanah dan memperoleh air dan mineral
Root grips soil firmly and obtains water and minerals



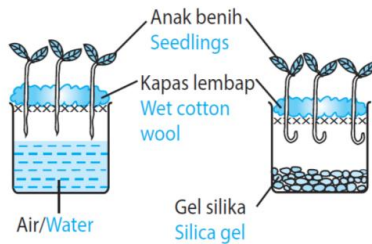
1.3 Rangsangan dan Gerak Balas dalam Tumbuhan

Stimuli and Responses in Plants



Tropisme/ Tropism

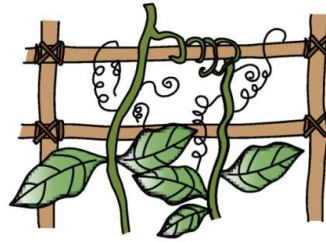
Hidrotropisme (gerak balas terhadap air) Hydrotropism (response to water)



Akar tumbuh ke arah air.
The roots grow towards water.

Akar memperoleh air dan mineral dari tanah
Root obtains water and minerals from the soil

Tigmotropisme (gerak balas terhadap sentuhan) Thigmotropism (response to touch)



Sulur paut melilit pada penyokong.
Tendrils twine around object in contact for support

Memperoleh cahaya Matahari yang cukup dan sokongan
Get sufficient sunlight and support



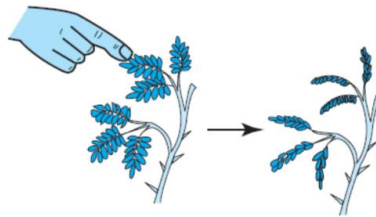
1.3 Rangsangan dan Gerak Balas dalam Tumbuhan

Stimuli and Responses in Plants



Gerak Balas Nastik/ Nastic Movement

Pergerakan nasti (gerak balas terhadap sentuhan, cahaya dan haba) Nastic movement (response towards touch, light and heat)



Daun pokok semalu tertutup apabila disentuh.
The leaves of the mimosa plant close when touched.

Berfungsi sebagai pertahanan dan perlindungan pokok daripada bahaya
Function as a defence for the plants against danger

Sumber: SPS Sains Tingkatan 3 (Nota), Pelangi

L2: Teknik Menjawab Soalan**A2: Answering Technique****Tips:**

Kata kunci <i>Keywords</i>	Rangsangan <i>Stimuli</i>	Kepentingan <i>Importance</i>
Fototropisme <i>Phototropism</i>	Cahaya <i>Light</i>	Fotosintesis <i>Photosynthesis</i>
Hidrotropisme <i>Hydrotropism</i>	Air <i>Water</i>	
Geotropisme <i>Geotropism</i>	Graviti <i>Gravity</i>	Sokongan <i>Support</i>
Tigmotropisme <i>Thigmotropism</i>	Sentuhan <i>Touch</i>	Sokongan <i>Support</i>

Positif
Positive



Ke arah rangsangan
Towards the stimuli

Negatif
Negative



Menjauhi rangsangan
Away from stimuli

Pucuk <i>Shoot</i>	Fototropisme Positif <i>Positive Phototropism</i>	Hidrotropisme Negatif <i>Negative Hydrotropism</i>	Geotropisme Negatif <i>Negative Geotropism</i>
Akar <i>Root</i>	Fototropisme Negatif <i>Negative Phototropism</i>	Hidrotropisme Positif <i>Positive Hydrotropism</i>	Geotropisme Positif <i>Positive Geotropism</i>

Contoh:**Example**

Rajah menunjukkan tropisme dalam tumbuhan.

Diagram shows tropisms in plant.



Pucuk bergerak balas terhadap cahaya
Shoot responds towards light.

Apakah gerak balas yang ditunjukkan oleh pucuk pokok?

What is the response shown by the shoot of the plant?

- A Geotropisme positif
Positive Geotropism
- B Fototropisme positif**
Positive Phototropism
- C Hidrotropisme positif
Positive Hydrotropism
- D Tigmotropisme
Thigmotropism

[1 markah/ 1 mark]

Mengingat/Remember

Sumber: MyPdp PBD Tingkatan 3 KSSM, Sasbadi

Tips:

Kemahiran proses Sains
Science Process Skills

Contoh:**Example**

Rajah menunjukkan susunan radas untuk mengkaji gerak balas anak benih.

Diagram shows apparatus set-up to study a response in seedling.



- (a) Nyatakan pemerhatian bagi eksperimen ini.

State the observation of this experiment.

Pucuk anak benih tumbuh ke arah cahaya.
The shoot of the seedling grows towards light.

Apa yang diperhatikan dalam rajah selepas 3 hari?
What can be observed in the diagram after 3 days?

[1 markah/ 1 mark]

Memerhati/Observing

- (b) Nyatakan inferens berdasarkan pemerhatian di a).

State the inference based on the observation at a).

Pucuk anak benih tumbuh ke arah cahaya kerana pucuk bergerak balas terhadap cahaya.
The shoot of the seedling grow towards light because the shoots response towards light

Inferens: Pemerhatian + Penerangan kepada pemerhatian
Inference: Observation + Explanation to the observation

[1 markah/ 1 mark]

Membuat inferens/Making inference

- (c) Kenal pasti pemboleh ubah-pemboleh ubah bagi eksperimen ini.

Identify the variables for the experiment.

- (i) Pemboleh ubah dimanipulasikan

Manipulated variable

Kedudukan arah cahaya
Position of direction of light

- (ii) Pemboleh ubah bergerak balas

Responding variable

Arah pertumbuhan pucuk anak benih
Direction of growth of shoot of the seedlings

- (iii) Pemboleh ubah bergerak balas

Responding variable

Kehadiran air/ketinggian dan jenis anak benih

Presence of water/height and type of the seedlings

Pemboleh ubah dimanipulasikan:

Manipulated variable

Aspek/faktor yang berubah secara sengaja pada radas
Aspect/factor that is purposely changed on apparatus

Pemboleh ubah bergerak balas:

Responding variable

Aspek/faktor yang diperhatikan dan direkod
Aspect/factor that is observed and recorded

Pemboleh ubah dimalarkan:

Constant variable

Aspek/faktor yang tetap/tidak berubah
Aspect/factor that is unchanged/remained

[3 markah/ 3 marks]

Mengawal pemboleh ubah/Controlling the variables

- (d) Nyatakan dua langkah berjaga-jaga yang perlu diambil semasa menjalankan eksperimen ini.
State two precautionary steps that need to be taken when conducting this experiment.

Pastikan ketinggian dan jenis anak benih adalah sama

Height and type of the seedlings are the same

Rujuk Pemboleh ubah dimalarkan

Refer to the constant variable

[2 markah/ 2 marks]

Mengeksperimen/*Experimenting*

- (e) Nyatakan kesimpulan bagi eksperimen ini.

State the conclusion of this experiment.

- (i) Pucuk anak benih menunjukkan **fototropisme positif**

*Shoot of the seedling shows **positive phototropism***

- (ii) Akar anak benih menunjukkan **fototropisme negatif**

*Root of the seedling shows **negative phototropism***

Rujuk kepada Hipotesis

- menunjukkan hubungan antara pemboleh ubah dimanipulasi and pemboleh ubah bergerak balas

Refer to the Hypothesis

- shows the relationship between manipulated variables and responding variables

[2 markah/ 2 marks]

Membuat kesimpulan/*Making conclusion*

Sumber: PDP Sains Tingkatan 3, Ilmu Bakti

L3: Soalan Perbincangan - Soalan berformat UASA**A3: Discussion Items - UASA format items****(Tahap 1/Level 1)**

1. Antara berikut, yang manakah menunjukkan gerak balas tumbuhan terhadap graviti?

Which of the following show the response in plant towards gravity?

- A Geotropisme
Geotropism
- B Fototropisme
Phototropism
- C Hidrotropisme
Hydrotropism
- D Tigmotropisme
Thigmotropism

[1 markah/ 1 mark]
Mengingat/Remember

2. Antara berikut, bahagian tumbuhan yang manakah menunjukkan hidrotropisme positif?

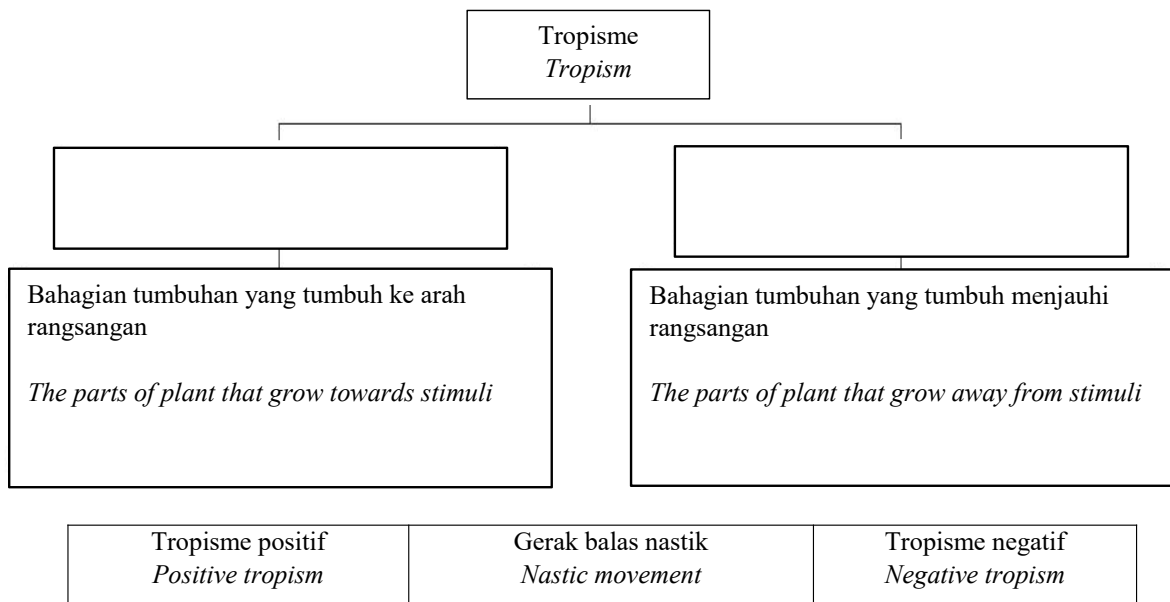
Which part of the plant shows positive hydrotropism?

- A Sulur paut
Tendrils
- B Dahan
Branch
- C Pucuk
Shoot
- D Akar
Root

[1 markah/ 1 mark]
Mengingat/Remember

3. (a) Lengkapkan rajah pokok dengan perkataan diberi.

Complete the tree map with the words given.



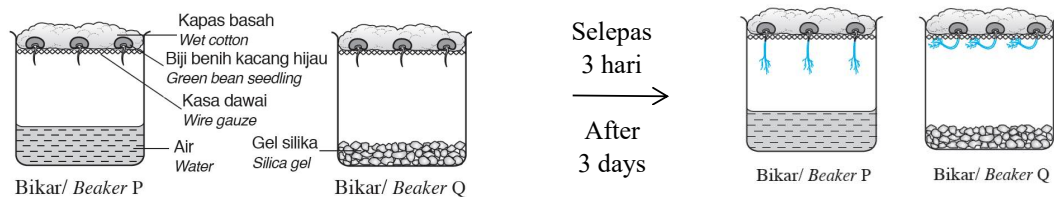
[2 markah/ 2 marks]
Mengingat/Remember

- (b) Padankan gerak balas tumbuhan dengan rangsangannya yang betul.
Match the responses in plants to the correct stimulus.

Gerak balas tropisme <i>Tropism responses</i>	Rangsangan <i>Stimuli</i>
i) 	Graviti <i>Gravity</i>
ii) 	Sentuhan <i>Touch</i>
	Cahaya <i>Light</i>

[2 markah/ 2 marks]
 Memahami/Understand

4. Rajah menunjukkan dua susunan radas dan pemerhatian untuk mengkaji tropisme dalam tumbuhan.
Diagram shows two apparatus set-up and the observation to study tropisms in plants.



- (a) Nyatakan pemerhatian bagi aktiviti ini.
State the observation for the activity.

- (b) Nyatakan inferens berdasarkan pemerhatian di 4(a).
State the inference based on the observation at 4(a).

[2 markah/ 2 marks]
 Memerhati/Observing

- (c) Kenal pasti pemboleh ubah-pemboleh ubah bagi aktiviti ini.
Identify the variables for the activity.

[1 markah/ 1 mark]
 Membuat inferens/Making inference

- (i) Pemboleh ubah dimanipulasikan
Manipulated variable

- (ii) Pemboleh ubah bergerak balas
Responding variable

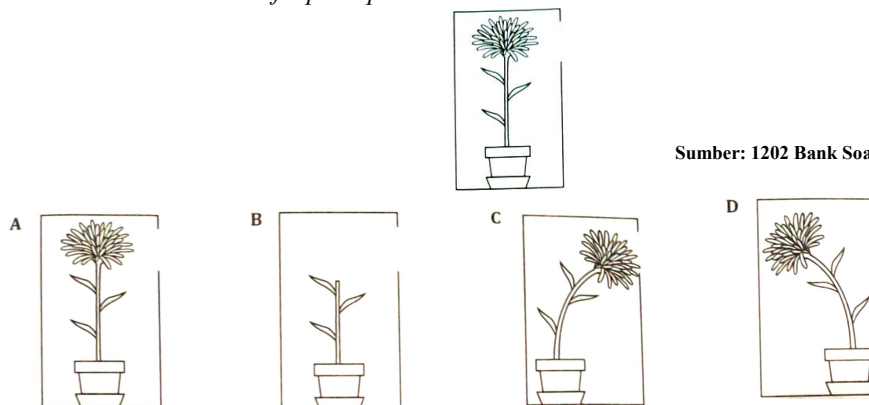
Sumber: SPS Sains Tingkatan 3, Sasbadi

[2 markah/ 2 marks]
 Mengawal pemboleh ubah/Controlling variable

L3: Soalan Perbincangan - Soalan berformat UASA**A3: Discussion Items - UASA format items****(Tahap 2/Level 2)**

1. Rajah menunjukkan keadaan tumbuhan yang diletakkan di dalam sebuah kotak yang berlubang.

Diagram shows the condition of a plant placed in a box with a hole.



Sumber: 1202 Bank Soalan Sains Tingkatan 3, Pan Asia

[1 markah/ 1 mark]

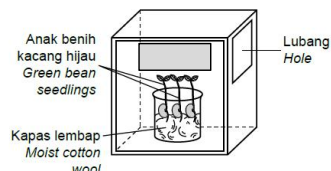
Memahami/Understand

Antara berikut, yang manakah akan berlaku pada pokok itu selepas seminggu?

Which of the following will happen to the plant after a week?

2. (a) Rajah menunjukkan susunan radas satu aktiviti untuk mengkaji tropisme dalam tumbuhan.

Diagram shows the apparatus set-up of an activity to study tropism in plant.



Sumber: Intensif Praktis Topikal Sains Tingkatan 3, Cemerlang

- i) Pada bahagian berwarna dalam rajah, lukiskan satu anak panah untuk menunjukkan arah pertumbuhan pucuk anak benih selepas 5 hari. Bulatkan jawapan yang betul untuk menjelaskan pertumbuhan tersebut.
In the coloured region in the diagram, draw an arrow to show the growth direction of the shoot of the seedlings after 5 days. Circle the correct answer to explain the growth.

Pucuk anak benih bergerak balas terhadap (udara / cahaya).

The shoot of the seedling responds towards (air / light).

[2 markah/ 2 marks]

Mengingat/Remember

- ii) Tandakan (✓) pada pernyataan yang **BETUL**.

*Mark (✓) for the **CORRECT** statements.*

Pernyataan Statements	Tandakan (✓) Mark (✓)
Gerak balas pada tumbuhan ini mengambil masa yang singkat. <i>This response in plants takes a short time.</i>	
Gerak balas pada tumbuhan ini penting untuk proses fotosintesis. <i>This response in plants is important for photosynthesis.</i>	
Gerak balas ini dipanggil fototropisme positif. <i>This response is called positive phototropism.</i>	

[2 markah/ 2 marks]

Memahami/Understand

3. Rajah menunjukkan satu gerak balas pada tumbuhan.

Diagram shows a type of response in plant.



(a) Tandakan (✓) rangsangan yang menyebabkan gerak balas positif pada akar tumbuhan.

Mark (✓) stimuli that show positive responses by the root of a plant.

Cahaya <i>Light</i>	Air <i>Water</i>	Graviti <i>Gravity</i>

[2 markah/ 2 marks]

Mengingat/Remember

(b) Berikan dua contoh tumbuhan yang menunjukkan gerak balas ini.

Give two examples of plants that show this response.

[2 markah/ 2 marks]

Mengingat/Remember

(c) Gerak balas yang ditunjukkan oleh tumbuhan dalam rajah penting untuk kemandirian tumbuhan. Jelaskan.

The response shown by the plant in the diagram is important for the survival of the plant. Explain.

[2 markah/ 2 marks]

Memahami/Understand

(d) Pak Mat mendapati pokok kacang panjang yang ditanam tumbuh menjalar di tanah dan tidak membuahkan hasil yang memuaskan. Terangkan kaedah yang dapat membantu Pak Mat mengatasi masalah tersebut.

Pak Mat found that his planted long bean plants in his garden are creeping on ground and less productive. Explain the method that can help Pak Mat in solving his problem.

Kaedah: _____

Method:

Penerangan: _____

Explanation

[2 markah/ 2 marks]

Mengaplikasi/Apply

a) Banding bezakan gerak balas yang ditunjukkan dalam rajah dengan gerak balas nastik.

Compare and contrast the response in the diagram and nastic movement.

Persamaan: _____

Similarity

Perbezaan: _____

Difference

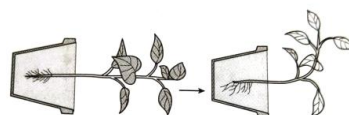
[2 markah/ 2 marks]

Menganalisis/Analyse

L3: Soalan Perbincangan - Soalan berformat UASA**A3: Discussion Items - UASA format items****(Tahap 3/Level 3)**

1. Rajah menunjukkan satu gerak balas tumbuhan.

Diagram shows a response of plant.



Selepas 4 hari

After 4 days

Antara berikut, yang manakah pernyataan adalah **BETUL** berkenaan gerak balas bahagian tumbuhan tersebut?

*Which of the following statements is **CORRECT** about the response of the part of the plant?*

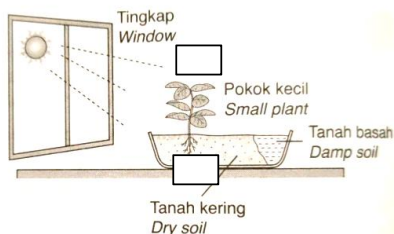
- A Akar menunjukkan geotropisme positif
Roots show positive geotropism
- B Akar menunjukkan hidrotropisme negatif
Roots show negative hydrotropism
- C Pucuk menunjukkan fototropisme negatif
Shoots show negative phototropism
- D Pucuk menunjukkan hidrotropisme positif
Shoots show positive hydrotropism

[1 markah/ 1 mark]

Memahami/Understand

2. Rajah menunjukkan satu pokok kecil diletakkan berdekatan dengan tingkap sebuah bilik yang gelap.

Diagram shows a small plant is placed near a window of a dark room.



Sumber: SPS Sains Tingkatan 3 2020, Sasbadi

- (a) Lukiskan anak panah dalam kotak pada rajah untuk menunjukkan arah pertumbuhan pucuk dan akar Pokok kecil itu selepas seminggu.

Draw arrows in the boxes on the diagram to show the growth directions of the shoot and root of the small plant a week later.

[2 markah/ 2 marks]

Memahami/Understand

- (b) Tandakan (✓) pada gerak balas yang **BETUL** yang ditunjukkan oleh pucuk dan akar pokok kecil itu.

*Mark (✓) the **CORRECT** responses shown by the shoot and root of the small plant.*

Pucuk Shoot	
Fototropisme positif <i>Positive phototropism</i>	
Geotropisme positif <i>Positive Geotropism</i>	

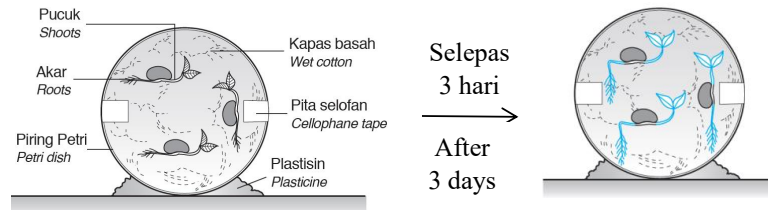
Akar Root	
Fototropisme positif <i>Positive phototropism</i>	
Hydrotropisme positif <i>Positive hydrotropism</i>	

[2 markah/ 2 marks]

Memahami/Understand

3. John menjalankan satu eksperimen untuk mengkaji gerak balas anak benih terhadap air. Susunan radas ditunjukkan seperti dalam rajah di bawah.

John carried out an experiment to study the response of seedling. The apparatus set-up is shown in the diagram below.



Sumber: SPS Sains Tingkatan 3 2020, Sasbadi

- (a) Nyatakan pemerhatian bagi eksperimen ini.
State the observation of this experiment.

[1 markah/ 1 mark]
Memerhati/Observing

- (b) Nyatakan inferens berdasarkan pemerhatian di 3(a).
State the inference based on the observation at 3(a).

[1 markah/ 1 mark]
Membuat inferens/Making inference

- (c) Kenal pasti pemboleh ubah-pemboleh ubah bagi eksperimen ini.
Identify the variables for the experiment.

- (i) Pemboleh ubah dimanipulasikan
Manipulated variable

- (ii) Pemboleh ubah bergerak balas
Responding variable

[2 markah/ 2 marks]
Mengawal pemboleh ubah/Controlling the variables

- (d) Nyatakan dua langkah berjaga-jaga yang perlu diambil semasa menjalankan eksperimen ini.
State two precautionary steps that need to be taken when conducting this experiment.

- (i) _____
(ii) _____

[2 markah/ 2 marks]
Mengeksperimen/Experimenting

- (e) Nyatakan kesimpulan bagi eksperimen ini.
State the conclusion of this experiment.

- (i) Pucuk anak benih menunjukkan _____
Shoot of the seedling shows _____

- (ii) Akar anak benih menunjukkan _____
Root of the seedling shows _____

[2 markah/ 2 marks]
Membuat kesimpulan/Making conclusion

L4: Penilaian**A4: Assessment**

1. Lengkapi peta titi di bawah.

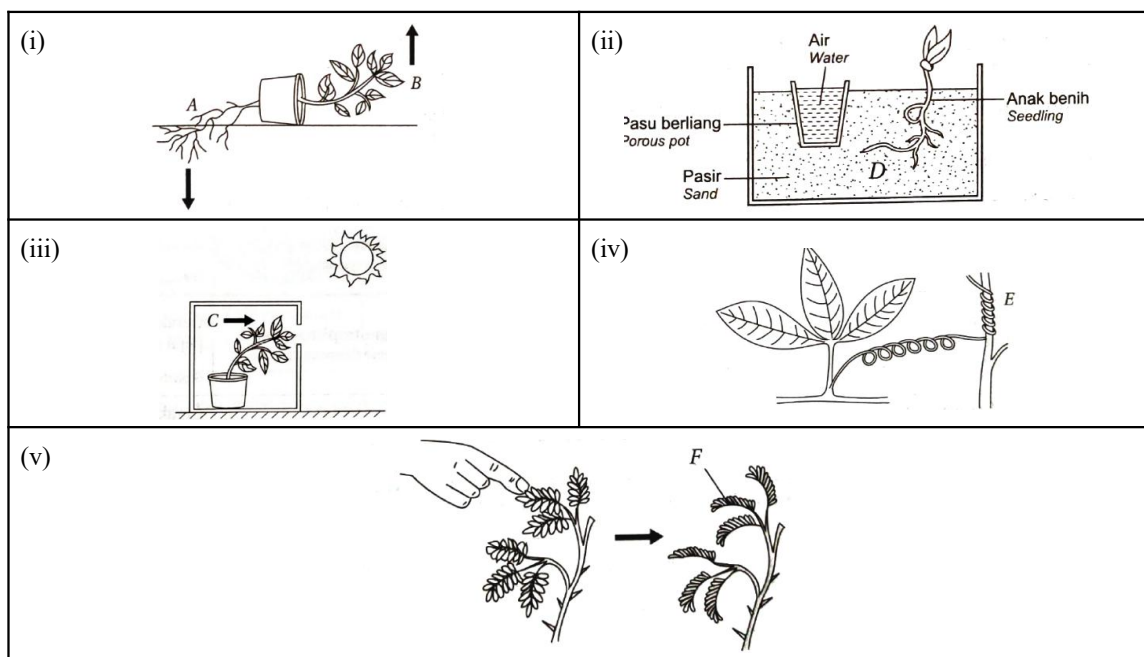
Complete the bridge map below.

Gerak balas Responses	Geotropisme Geotropism	Hidrotropisme Hydrotropism	Fototropisme Phototropism	Tigmotropisme Thigmotropism
	(a)	(b)	(c)	(d)
Rangsangan Stimuli				

[4 markah/ 4 marks]

2. Berdasarkan rajah, lengkapkan jadual di bawah dengan menuliskan huruf A, B, C, D, E atau F pada setiap gerak balas tumbuhan yang ditunjukkan.

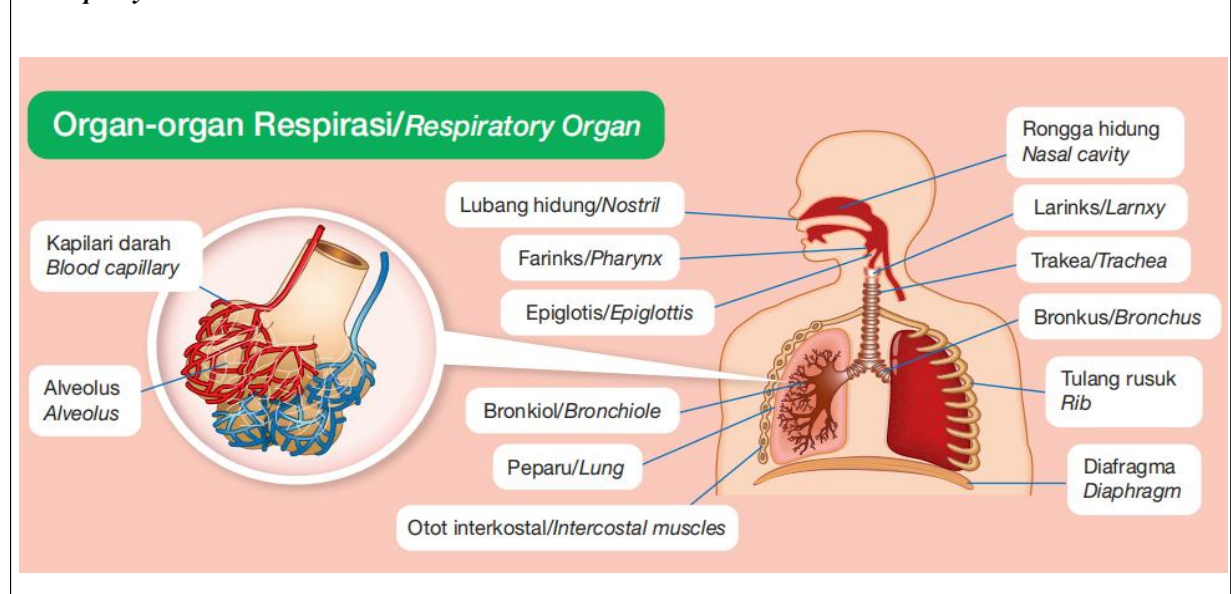
Based on the diagram below, complete the table below by writing the letters A, B, C, D, E or F on each type of plant response listed.



Gerak balas tumbuhan Plant responses	Label rajah Diagram label	Gerak balas tumbuhan Plant responses	Label rajah Diagram label
Geotropisme negatif Negative geotropism		Hidrotropisme positif Positive Hydrotropism	
Tigmotropisme positif Positive thigmotropism		Geotropisme positif Positive geotropism	
Fototropisme positif Positive phototropism		Gerak balas nastik Nastic movement	

[6 markah/ 6 marks]

Sesi 4 / Session 4	
Bidang Pembelajaran <i>Learning Area</i>	2.0 Respirasi <i>2.0 Respiration</i>
Standard Kandungan <i>Content Standard</i>	2.1 Sistem respirasi <i>2.1 Respiratory system</i> 2.2 Pergerakan dan pertukaran gas dalam badan manusia <i>2.2 Movement and exchange of gases in the human body</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan sistem respirasi dan ertukaran gas dalam badan manusia <i>Students will be able to accomplish the tasks regarding the respiratory system, and the movement and exchange of gases in the human body</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Struktur dalam sistem respirasi manusia serta memerihalkan mekanisme pernafasan <i>Structures of the human respiratory system and describe the breathing mechanism</i> 2. Perbezaan kandungan gas dalam udara sedutan dan udara hembusan <i>The differences in the content of gases in inhaled and exhaled air</i> 3. Pergerakan dan pertukaran gas oksigen dan karbon dioksida dalam badan manusia <i>The movement and exchange of oxygen and carbon dioxide in the human body</i> 4. Kepentingan adaptasi struktur alveolus untuk meningkatkan kecekapan pertukaran gas dalam badan manusia <i>The importance of adaptation of the alveolar structure to increase efficiency of gaseous exchange in the human body</i>

L1: Nota Revisi Cepat**A1: Speedy Revision Notes**

Penafasan dan Pertukaran Gas Breathing and the Exchange of Gases

Tarikan nafas/Inhalation

- Udara disedut ke dalam paru
Air is sucked into the lungs

Hembusan nafas/Exhalation

- Udara dikeluarkan dari paru
Air is expelled from the lungs

Kapilari darah
Blood capillary

Alveolus
Alveolus

Oksigen meresap masuk ke dalam kapilari darah dari alveolus
Oxygen diffuses into the blood capillary from the alveolus

Karbon dioksida meresap keluar dari kapilari darah ke dalam alveolus
Carbon dioxide diffuses out from the blood capillary into the alveolus

Tarikan Nafas dan Hembusan Nafas Inhalation and Exhalation

Tarikan nafas <i>Inhalation</i>	Bahagian yang terlibat <i>Part involved</i>	Hembusan nafas <i>Exhalation</i>
Mengecut <i>Contract</i>	Otot interkostal <i>Intercostal muscles</i>	Mengendur <i>Relax</i>
Mengecut <i>Contract</i>	Otot diafragma <i>Diaphragm muscles</i>	Mengendur <i>Relax</i>
Naik ke atas dan ke luar <i>Upwards and outwards</i>	Pergerakan sangkar rusuk <i>Movement of ribs</i>	Turun ke bawah dan ke dalam <i>Downwards and inwards</i>
Mendatar <i>Becomes flat</i>	Bentuk diafragma <i>Shape of diaphragm</i>	Melengkung ke atas <i>Curves upwards</i>
Bertambah <i>Increases</i>	Isi padu rongga toraks <i>Volume of thoracic cavity</i>	Berkurang <i>Decreases</i>
Lebih rendah <i>Lower</i>	Tekanan udara di dalam rongga toraks <i>Air pressure in the thoracic cavity</i>	Lebih tinggi <i>Higher</i>
Udara disedut <i>Air is inhaled</i>	Pergerakan udara <i>Air movement</i>	Udara dipaksa keluar <i>Air is forced out</i>

PERGERAKAN DAN PERTUKARAN OKSIGEN DAN KARBON DIOKSIDA DI DALAM BADAN MANUSIA

- Pergerakan dan pertukaran oksigen dan karbon dioksida berlaku di dalam alveolus dan kapilari darah dalam paru.
- Darah terdeoksigen mengandungi kepekatan oksigen yang rendah dan kepekatan karbon dioksida yang tinggi.
- Sel darah merah mengandungi pigmen pembawa oksigen iaitu hemoglobin.
- Darah beroksigen mengandungi kepekatan oksigen yang tinggi dan kepekatan karbon dioksida yang rendah.

Darah beroksigen

Sel darah merah

Oksigen

Karbon dioksida

Darah terdeoksigen

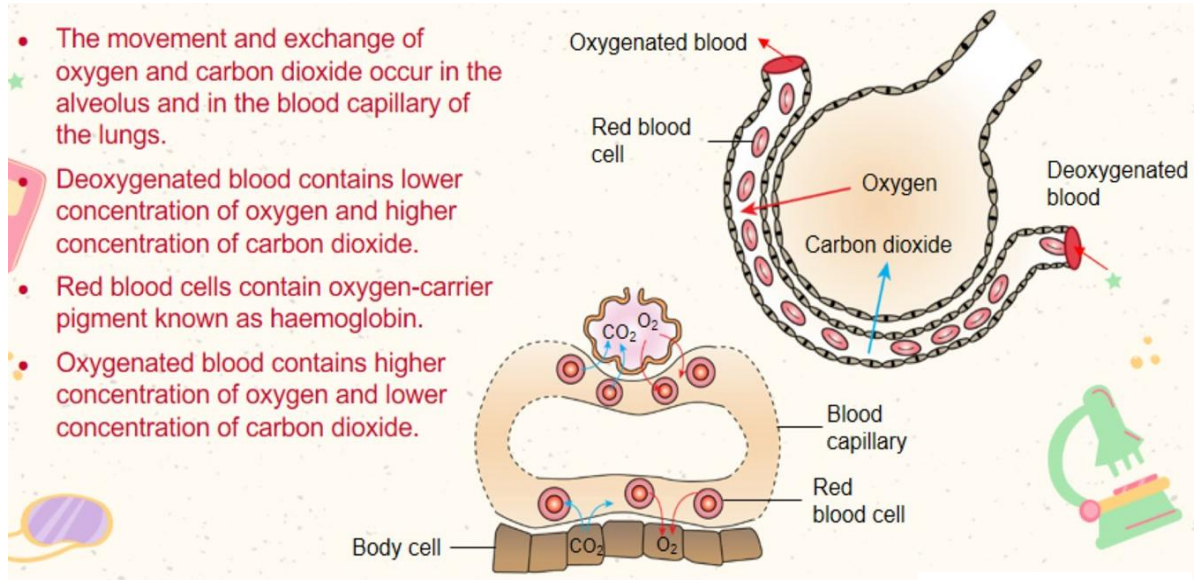
Kapilari darah

Sel darah merah

Sel badan

MOVEMENT AND EXCHANGE OF OXYGEN AND CARBON DIOXIDE IN THE HUMAN BODY

- The movement and exchange of oxygen and carbon dioxide occur in the alveolus and in the blood capillary of the lungs.
- Deoxygenated blood contains lower concentration of oxygen and higher concentration of carbon dioxide.
- Red blood cells contain oxygen-carrier pigment known as haemoglobin.
- Oxygenated blood contains higher concentration of oxygen and lower concentration of carbon dioxide.



Sumber : Sasbadi Publication

L2 : Teknik menjawab soalan

A2 : Answering Technique

1. Perhatikan **ARAH ANAK PANAH**.

Look at **THE DIRECTION OF THE ARROW**.

Arah anak panah menunjukkan **udara masuk ke dalam (Tarikan nafas)**, **udara keluar (Hembusan nafas)**.

The direction of the arrows show **air going in (Inhalation)**, **air going out (Exhalation)**.



Tarikan nafas
Inhalation



Hembusan nafas
Exhalation

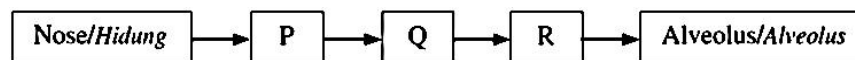
L3 : Soalan Perbincangan : Soalan berformat UASA**A3 : Discussion Items : UASA – format items****(Tahap 1/Level 1)**

1. Antara berikut, yang manakah pertukaran gas berlaku di dalam badan manusia?
Which of the following gaseous exchange occurs in human body?

- A Trakea
Trachea
 B Bronkus
Bronchus
 C Alveolus
Alveolus
 D Bronkiol
Bronchiole

[1 markah/ 1 mark]
 Mengingat/Remember

2. Peta alir menunjukkan laluan udara dalam proses tarikan nafas.
Flow map shows the air path during inhalation.



Antara berikut, yang manakah mewakili P, Q dan R?
Which of the following represents P, Q and R?

	P	Q	R
A	Bronkiol <i>Bronchiole</i>	Bronkus <i>Bronchus</i>	Trakea <i>Trachea</i>
B	Trakea <i>Trachea</i>	Bronkiol <i>Bronchiole</i>	Bronkus <i>Bronchus</i>
C	Bronkus <i>Bronchus</i>	Trakea <i>Trachea</i>	Bronkiol <i>Bronchiole</i>
D	Trakea <i>Trachea</i>	Bronkus <i>Bronchus</i>	Bronkiol <i>Bronchiole</i>

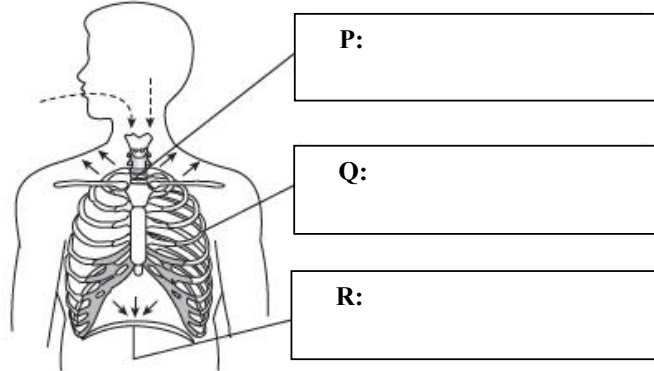
[1 markah/ 1 mark]
 Mengingat/Remember

3. Tuliskan **BENAR** pada pernyataan yang betul dan **PALSU** pada pernyataan yang salah.
*Write **TRUE** for the correct statement and **FALSE** for the incorrect statement.*

Pernyataan <i>Statements</i>	BENAR/PALSU <i>TRUE/FALSE</i>
(i) Bronkus mengangkut udara ke alveolus. <i>Bronchus transports air to the alveolus.</i>	
(ii) Sel badan menyingkirkan karbon dioksida daripada darah. <i>Body cells remove carbon dioxide from the blood.</i>	
(iii) Alveolus ialah tempat berlakunya pertukaran gas. <i>Alveolus is the place where gaseous exchange occurs.</i>	

[2 markah/ 2 marks]
 Mengingat/Remember

4. Rajah menunjukkan proses yang berlaku dalam mekanisme pernafasan manusia.
Diagram shows a process that takes place in the human breathing mechanism.



- (a) Namakan bahagian yang berlabel P, Q dan R pada rajah di atas.
Name the parts labelled P, Q and R on the above diagram.

Sumber : Telegram Cg Sains Kreatif T3

[3 markah/ 3 marks]
 Mengingat/Remember

- (b) Nyatakan proses yang berlaku dalam rajah di atas.
State the process that occurs in the above diagram.

[1 markah/1 mark]
 Memahami/Understand

- (c) Terangkan keadaan bahagian sistem respirasi manusia semasa proses ini berlaku.
Identify what happens to the volume of the thoracic cavity during the process.

- (i) Isipadu rongga toraks
Volume of thoracic cavity

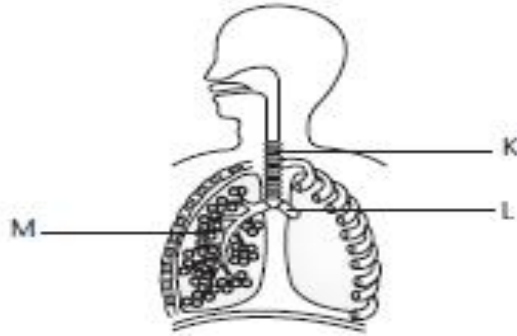
- (ii) Tekanan dalam rongga toraks
Pressure of thoracic cavity

[2 markah/2 marks]
 Memahami/Understand

L3 : Soalan Perbincangan : Soalan berformat UASA**A3 : Discussion Items : UASA – format items****(Tahap 2/Level 2)**

1. Rajah menunjukkan sistem respirasi manusia.

The diagram below shows the human respiratory system.



Apakah yang diwakili oleh struktur K, L dan M?

What do structures K, L and M represent?

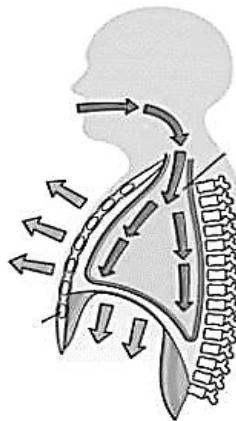
Sumber : Telegram Cg Sains Kreatif T3

	K	L	M
A	Bronkiol <i>Bronchiole</i>	Bronkus <i>Bronchus</i>	Trakea <i>Trachea</i>
B	Trakea <i>Trachea</i>	Bronkus <i>Bronchus</i>	Bronkiol <i>Bronchiole</i>
C	Bronkus <i>Bronchus</i>	Trakea <i>Trachea</i>	Bronkiol <i>Bronchiole</i>
D	Trakea <i>Trachea</i>	Bronkiol <i>Bronchiole</i>	Bronkus <i>Bronchus</i>

[1 markah/ 1 mark]
Mengingat/Remember

2. Rajah menunjukkan keadaan sangkar rusuk dan diafragma semasa proses pernafasan manusia.

Diagram shows the condition of the rib cage and diaphragm during breathing.



Sumber : Telegram Cg Sains Kreatif T3

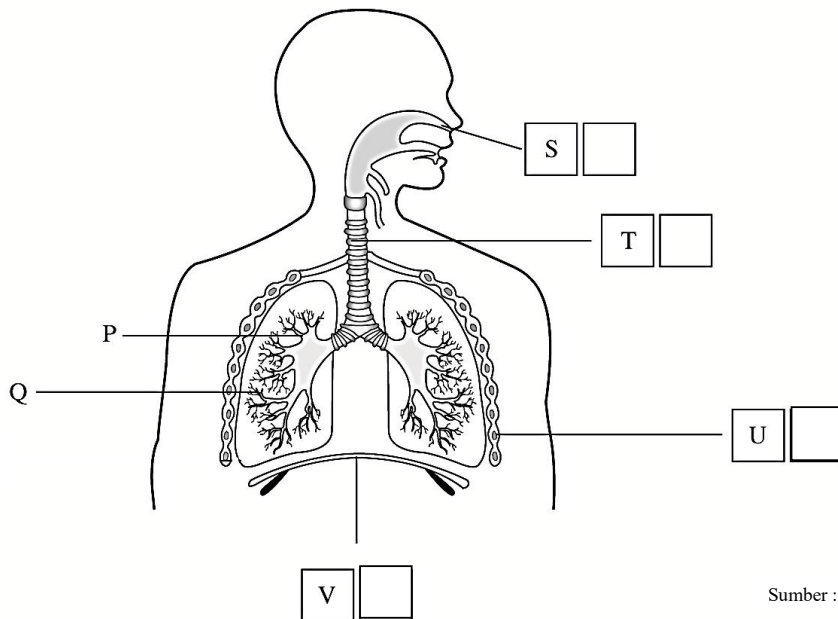
Apakah yang akan berlaku semasa sangkar rusuk dan diafragma berada dalam keadaan di atas?

What will happen when the rib cage and diaphragm are in the above state?

- A Udara dihembus keluar
The air is exhaled
- B Isi padu rongga toraks berkurang
The volume of the thoracic cavity decreases
- C Diafragma mengecut dan bergerak ke bawah
The diaphragm contracts and moves downward
- D Tekanan udara yang lebih tinggi di dalam paru-paru
Higher air pressure inside the lungs

[1 markah/ 1 mark]
Memahami/Understand

3. Rajah menunjukkan sistem respirasi manusia.
Diagram shows the human respiratory system.



Sumber : Telegram Cg Sains Kreatif T3

Pada rajah di atas:

On the above diagram:

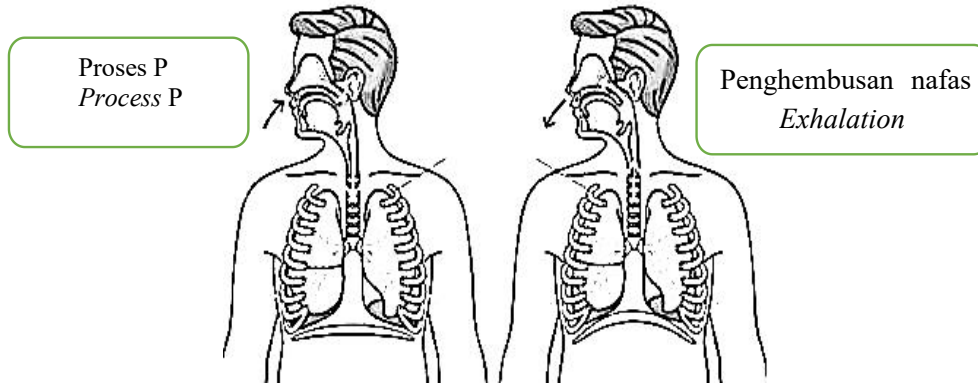
Tandakan (✓) pada jawapan yang betul untuk menunjukkan organ-organ yang terlibat dalam perubahan tekanan udara di dalam rongga toraks.

Tick (✓) the correct answers to show the organs involved in the changing of the air pressure in the thoracic cavity.

[2 markah/2 marks]
Memahami/Understand

4. Rajah menunjukkan proses pernafasan manusia.

Diagram shows human breathing process.



- (a) (i) Namakan proses P.
Name process P.

[1 markah/ 1 mark]
Mengingat/Remember

- (ii) Terangkan keadaan sangkar rusuk dan diafragma semasa proses pernafasan di atas.
Explain the position of the rib cage and diaphragm during inhalation.

[2 markah/ 2 marks]
Memahami/Understand

- (iii) Banding bezakan proses tarikan nafas dan hembusan nafas.
Compare and contrast inhalation and exhalation process.

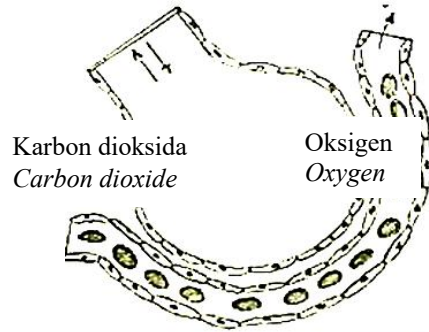
Persamaan ; _____
Similarity

Perbezaan : _____
Difference

[2 markah/ 2 marks]
Menganalisis/Analyse

(b) Rajah menunjukkan struktur alveolus di dalam paru.

Diagram below shows the structure of alveolus in the lungs.



Sumber : Telegram Cg Sains Kreatif T3

(i) Lukiskan anak panah untuk menunjukkan pergerakan karbon dioksida dan oksigen.

Draw arrows to indicate the movement of carbon dioxide and oxygen.

[2 markah/ 2 marks]

Mengingat/Remember

(ii) Nyatakan dua adaptasi struktur alveolus yang meningkatkan kadar kecekapan pertukaran gas.

State two adaptations of the alveoli structure that enhance the efficiency of gas exchange.

[2 markah/ 2 marks]

Mengingat/Remember

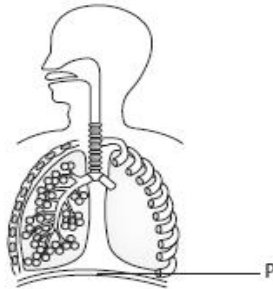
L3 : Soalan Perbincangan : Soalan berformat UASA**A3 : Discussion Items : UASA – format items****(Tahap 3/Level 3)**

1. Antara berikut, yang manakah berlaku apabila kita menghembus nafas?
Which of the following happens when we exhale?

- A Otot diafragma mengendur
Diaphragm muscle relaxes
- B Sangkar rusuk bergerak ke atas
Rib cage moves up
- C Isi padu rongga toraks meningkat
Volume of thoracic cavity increases
- D Tekanan udara di dalam rongga toraks berkurang
Air pressure in the thoracic cavity decreases

[1 markah/ 1 mark]
 Mengingat/Remember

2. Rajah menunjukkan sebahagian daripada sistem respirasi manusia.
Diagram shows part of the human respiratory system.



Sumber : Telegram Cg Sains Kreatif T3

- Antara berikut, keadaan yang manakah berlaku apabila struktur P menjadi rata?
Which of the following conditions happens when structure P becomes flat?

- A Isi padu rongga toraks bertambah
Volume of the thoracic cavity increases
- B Udara di dalam paru-paru dipaksa keluar
Air in the lungs is forced out
- C Tekanan udara di dalam rongga toraks bertambah
Air pressure in the thoracic cavity increases
- D Sangkar tulang rusuk turun dan bergerak ke dalam
The rib cage descends and goes inwards

[1 markah/ 1 mark]
 Memahami/Understand

3. Struktur manakah boleh ditemui di hujung setiap bronkiol?
Which structure can be found at the end of each bronchiole?

- A Trakea
Trachea
- B Bronkus
Bronchus
- C Alveolus
Alveolus
- D Diafragma
Diaphragm

[1 markah/ 1 mark]
 Mengingat/Remember

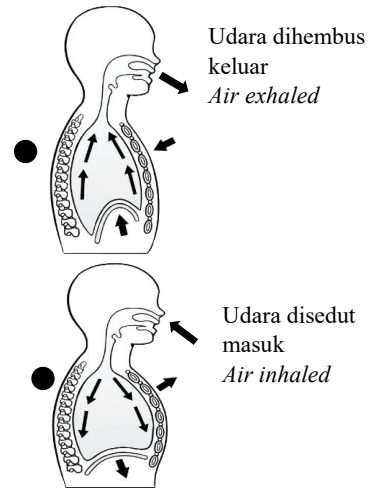
4. (a) Padankan jenis pernafasan berikut dengan pandangan sisi yang betul semasa pernafasan.
Match the following types of breathing with the correct side view during breathing.

Jenis pernafasan
Types of breathing

Pandangan sisi semasa pernafasan
Side view during breathing

(i) Penarikan nafas
Inhalation

(ii) Penghembusan nafas
Exhalation



Sumber : Telegram Cg Sains Kreatif T3

[2 markah/2 marks]
 Mengingat/Remember

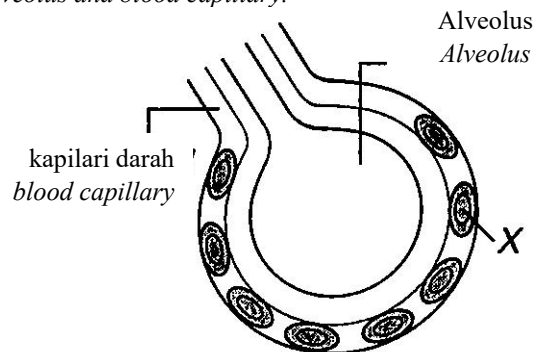
- (b) (i) Apabila seseorang sedang menarik nafas, tekanan udara di dalam rongga toraks (bertambah, berkurang).
When a person is breathing, the air pressure in the thoracic cavity (increases, decreases).

- (ii) Apabila seseorang menghembuskan nafas, rongga toraks (mengecil, membesar).
When a person exhales, the thoracic cavity becomes (smaller, bigger).

[2 markah/2 marks]
 Mengingat/Remember

5. Rajah menunjukkan struktur alveolus dan kapilari darah.

Diagram shows the structure of alveolus and blood capillary.

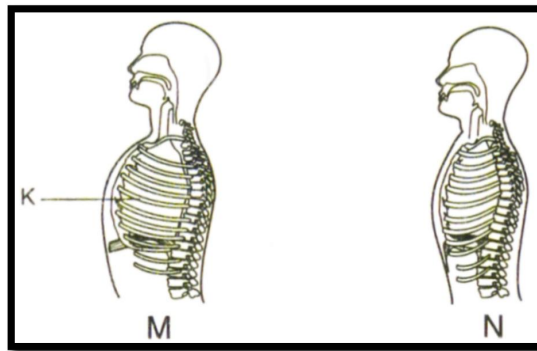


Sumber : Telegram Cg Sains Kreatif T3

- (a) Apakah X?
What is X?

[1 markah / mark]
Mengingat/Remember

- (b) Rajah menunjukkan mekanisme pernafasan manusia.
Diagram shows the human breathing mechanism.



Sumber : Telegram Cg Sains Kreatif T3

- (i) Bahagian K dibina daripada tulang. Terangkan bahagian tersebut dan fungsinya.
Part K is made up of bones. Explain about that part and its function.

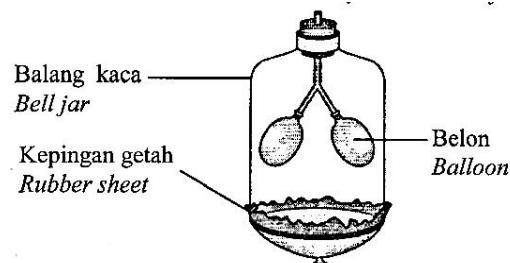
[2 markah / 2 marks]
Mengingat/Remember

- (ii) Nyatakan proses yang berlaku di
State the process that occurs in
M – _____

N – _____

[2 markah / 2 marks]
Mengingat/Remember

6. Rajah menunjukkan satu model yang digunakan untuk mengkaji tindakan diafragma.
Diagram shows a model used to study the action of the diaphragm.



- (a) Nyatakan bahagian sistem pernafasan manusia yang diwakili oleh belon dan balang kaca.
State the parts of human respiratory system that represented by the balloons and the bell jar.

- (i) Belon : _____
Balloon

(ii) Balang kaca : _____
Bell jar

[2 markah/ 2 marks]
Mengingat/*Remember*

(b) Nyatakan apa yang akan berlaku sekiranya kepingan getah itu
What will happen if the rubber sheet is

(i) ditolak ke atas :
pushed upwards

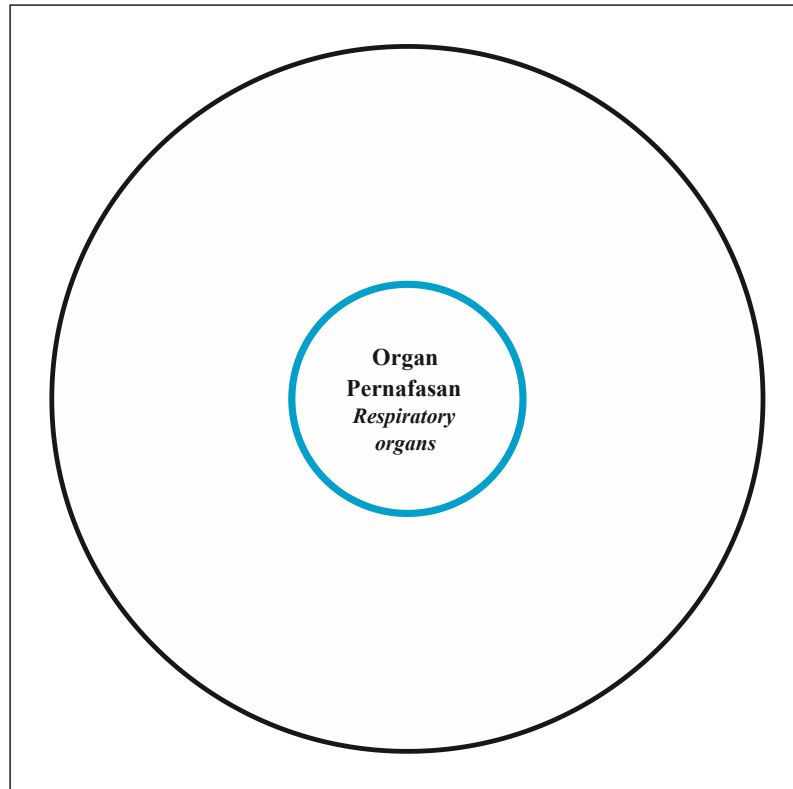
(ii) ditolak ke bawah :
pulled downwards

[2 markah/ 2 marks]
Memahami/*Understand*

L4: Penilaian**A4: Assessment**

1. Tulis **lima** organ respirasi manusia dalam **peta bulatan** di bawah.

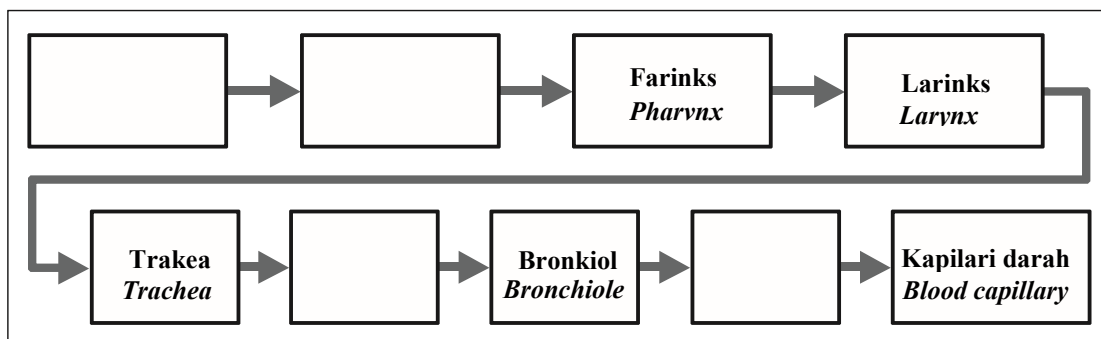
*Write **five** human respiratory organs in the **circle map** below.*



[5 markah/ 5 marks]
Mengingat/Remember

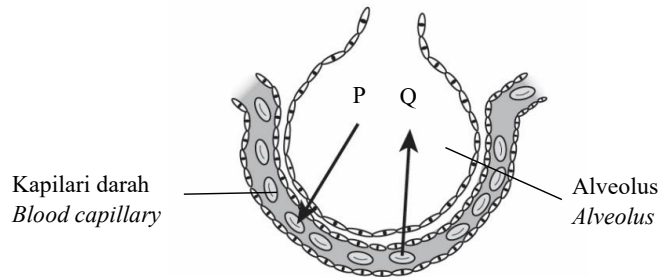
2. Lengkapi **peta alir** di bawah untuk menunjukkan pergerakan udara melalui organ-organ pernafasan.

*Complete the **flow map** below to show the movement of air through the breathing organs.*



[4 markah/ 4 marks]
Mengingat/Remember

3. Rajah di bawah menunjukkan sebahagian daripada struktur paru.
Diagram below shows the part of the lung structure.



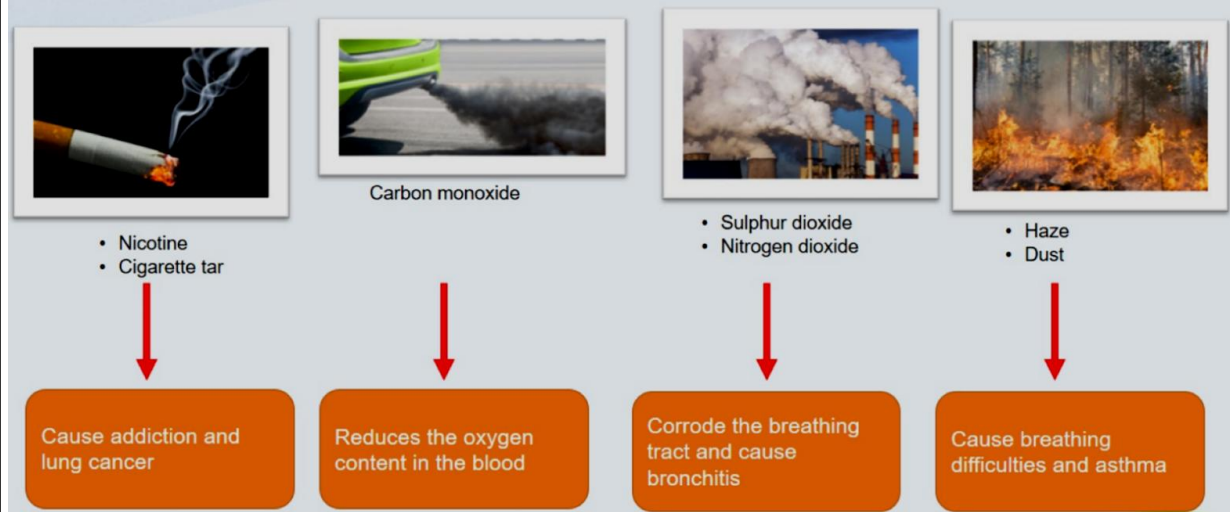
Antara yang berikut, yang manakah mewakili gas P dan Q?
Which of the following represents gases P and Q?

Sumber : Telegram Cg Sains Kreatif T3

	P	Q
A	Oksigen <i>Oxygen</i>	Hidrogen <i>Hydrogen</i>
B	Karbon dioksida <i>Carbon dioxide</i>	Nitrogen <i>Nitrogen</i>
C	Karbon dioksida <i>Carbon dioxide</i>	Oksigen <i>Oxygen</i>
D	Oksigen <i>Oxygen</i>	Karbon dioksida <i>Carbon dioxide</i>

[1 markah/ 1 mark]
 Memahami/*Understand*

Sesi 5 / Session 5	
Bidang Pembelajaran <i>Learning Area</i>	2.0 Respirasi <i>2.0 Respiration</i>
Standard Kandungan <i>Content Standard</i>	2.3 Kesihatan sistem respirasi manusia <i>2.3 Health of human respiratory system</i> 2.4 Adaptasi dalam sistem respirasi <i>2.4 Adaptation in respiratory system</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan kesihatan sistem respirasi manusia dan adaptasi dalam sistem respirasi <i>Students will be able to accomplish the tasks regarding the health of human respiratory system and the adaptation in respiratory system</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Bahan yang memudaratkan sistem respirasi beserta penyakit dan simptomnya <i>Substances that are harmful to the respiratory system as well as diseases and their symptoms</i> 2. Kesan merokok terhadap paru-paru <i>The effects of smoking on the lungs</i> 3. Bagaimana sistem respirasi beradaptasi dalam situasi berbeza <i>How the respiratory system adapts in different situations</i>

L1: Nota Revisi Cepat**A1: Speedy Revision Notes****Bahan yang Memudaratkan Sistem Respirasi Manusia****Substances that are Harmful to the Human Respiratory System**

SISTEM RESPIRASI BERADAPTASI DALAM PERSEKITARAN YANG BERBEZA

Tiga ciri struktur respirasi untuk memastikan pertukaran gas yang cekap dengan persekitaran



Permukaan struktur respirasi yang lembap seperti permukaan alveolus yang lembap



Struktur respirasi yang nipis seperti dinding alveolus dan kapilari darah setebal satu sel



Luas permukaan struktur respirasi yang besar seperti luas permukaan berjuta-juta alveolus

THE RESPIRATORY SYSTEM ADAPTS IN DIFFERENT SURROUNDINGS

Three features of the respiratory structure to ensure an efficient gaseous exchange with the surroundings



Moist surface of respiratory structures for instance the moist surface of alveoli

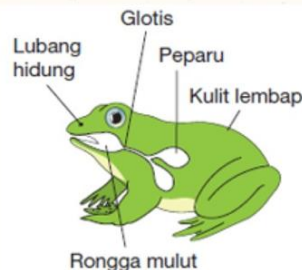
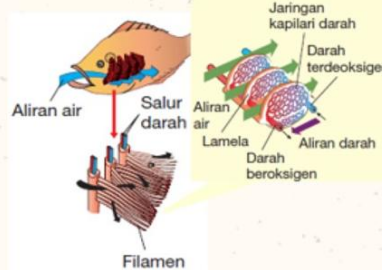
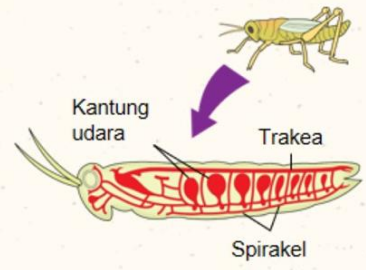


Thin respiratory structure such as the wall of alveolus and blood capillaries are one cell thick

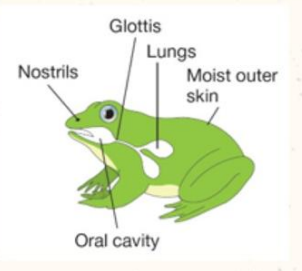
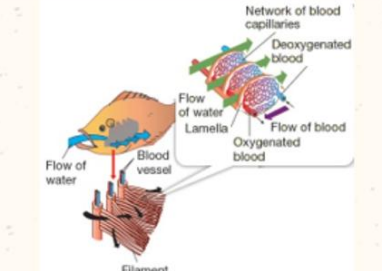
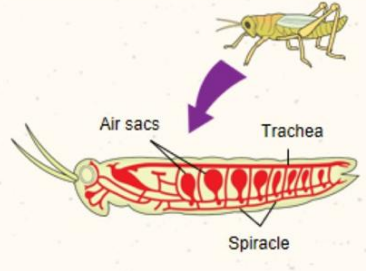


Large surface area of respiratory structure for example the surface area of millions of alveoli

ADAPTASI DALAM SISTEM RESPIRASI HAIWAN

Kulit luar lembap	Insang	Trakea
 - Kulit luar nipis dan telap kepada gas, lembap dan diselaputi mukus untuk memudahkan gas melarut dan meresap - Jaringan kapilari darah yang padat meningkatkan kadar resapan gas	 - Terbina daripada dua baris filamen yang halus dan unjuran yang nipis dan pipih dikenali sebagai lamela - Insang dikelilingi air yang memudahkan gas respirasi melarut dan meresap	 - Terdapat daripada tiub udara (trakea), liang pernafasan (spirakel) dan injap - Terbahagi kepada trakeol yang ber dinding nipis, lembap dan mempunyai luas permukaan yang besar - Kantung udara akan meningkatkan kecekapan pertukaran gas

ADAPTATION IN ANIMAL RESPIRATORY SYSTEM

Moist outer skin	Gills	Trachea
 - The outer skin is thin and permeable to gas, always moist as it is covered with mucus to facilitate gas to dissolve and diffuse - Dense network of blood capillary to increase rate of gas diffusion	 - Made up of two rows of fine filaments and flat and thin projections known as lamellae - Gills are surrounded by water which facilitate respiratory gases to dissolve and diffuse	 - Made up of air tube (trachea), breathing pores (spiracle) and valve - Divided into tracheoles with thin and moist wall, and have large surface area - Air sac will increase the efficiency of gaseous exchange

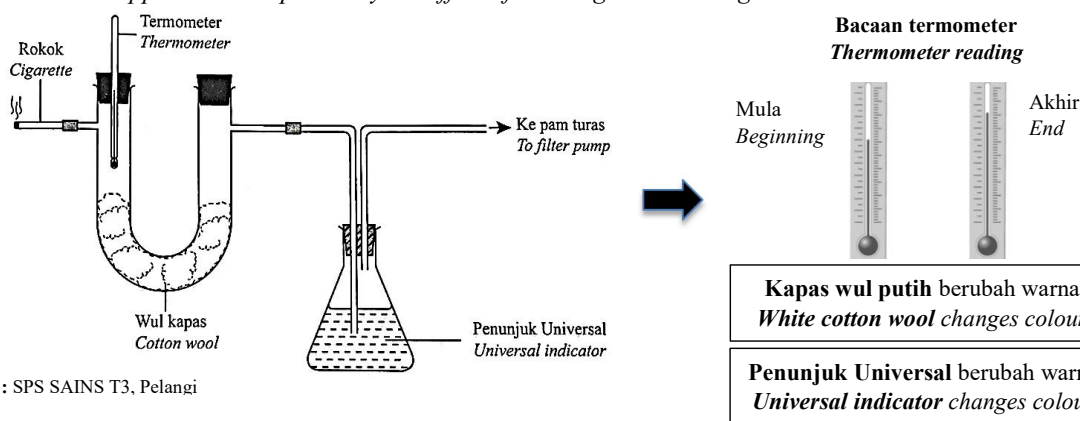
L2 : Teknik menjawab soalan**A2 : Answering Technique**

Sumber : SPS SAINS T3, Sasbadi

Kemahiran proses Sains**Science Process Skills**

Rajah menunjukkan susunan radas untuok menunjukkan keadaan paru-paru ketika seseorang merokok.

Diagram shows the apparatus set-up to study the effect of smoking towards lungs.



Sumber : SPS SAINS T3, Pelangi

(a) Pada akhir eksperimen di atas, nyatakan pemerhatian pada

At the end of the experiment, state the observation on

(i) Warna kapas wul

Colour of wool cotton

Menjadi kuning keperangan

Becomes brownish yellow

Pemerhatian berdasarkan maklumat dalam rajah
Observation based on the information in the diagram

[1 markah / 1 mark]

Memerhati / Observing

(ii) Bacaan termometer

Thermometer reading

Meningakat

Increase

[1 markah / 1 mark]

Memerhati / Observing

(iii) Warna penunjuk universal

Colour of universal indicator

Berubah dari hijau ke kuning

Changes from green to yellow

[1 markah / 1 mark]

Memerhati / Observing

(b) Nyatakan inferens berdasarkan pemerhatian di (a) (i).

State the inference based on the observation at (a) (i).

Kapas wul menjadi kuning keperangan kerana asap rokok mengandungi tar.

Cotton wool becomes brownish yellow because cigarette smoke contains tar.

[1 markah/ 1 mark]

Membuat inferens/Making inference

Inferens: Pemerhatian + Penerangan kepada pemerhatian
Inference: Observation + Explanation to the observation

L3 : Soalan Perbincangan : Soalan berformat UASA**A3 : Discussion Items : UASA – format items****(Tahap 1/Level 1)**

1. Antara berikut, bahan manakah menyebabkan kapas putih bertukar kepada kuning gelap apabila asap rokok melaluinya?

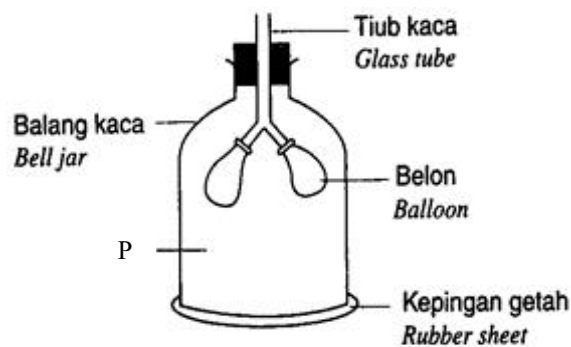
Which of the following substances causes white cotton wool to turn darkish-yellow when cigarette smoke passes through it?

- A Nikotin
Nicotine
- B Tar rokok
Cigarette tar
- C Karsinogen
Carcinogen
- D Gas berasid
Acidic gases

[1 markah/ 1 mark]
Mengingat / Remember

2. Rajah menunjukkan model sistem respirasi manusia.

Diagram shows a model of the human respiratory system.



Apakah yang akan berlaku kepada P semasa menarik nafas?

What happens to the P during inhalation?

Sumber : Model kertas SAINS T3, Pelangi

- A Mengecut
Contract
- B Mengembang
Expand
- C Isipadu bertambah
The volume increases
- D Tekanan udara bertambah
The air pressure increases

[1 markah/ 1 mark]
Memahami / Understand

3. (a) Tandakan (✓) penyakit yang berkaitan dengan sistem respirasi.

Tick (✓) the disease associated with the respiratory system.

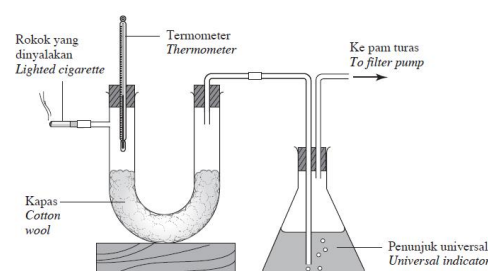
Bronkitis <i>Bronchitis</i>	Asma <i>Asthma</i>	Hipertensi <i>Hypertension</i>

[2 markah / 2 marks]

Mengingat / *Remember*

- (b) Rajah menunjukkan susunan radas untuk mengkaji kesan rokok ke atas sistem pernafasan manusia.

Diagram shows the arrangement of apparatus to study the effect of smoking on human respiratory system.



Tuliskan **BENAR** pada pernyataan yang betul dan **PALSI** pada pernyataan yang salah.

*Write **TRUE** for the correct statements or **FALSE** for the incorrect statements.*

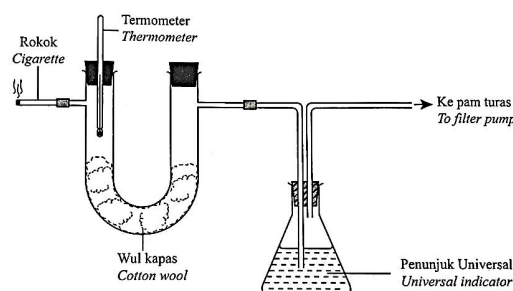
	Pernyataan <i>Statements</i>	BENAR atau PALSU <i>TRUE or FALSE</i>
(i)	Penunjuk Universal berubah warna dari hijau ke kuning <i>The Universal indicator changes from green to yellow</i>	
(ii)	Asap rokok mengandungi nikotin untuk menghitamkan kapas <i>Cigarette smoke contains nicotine to blacken the cotton wool</i>	
(iii)	Asap rokok mengandungi gas berasid menyebabkan perubahan warna pada Penunjuk Universal <i>Cigarette smoke contains acidic gas to change the colour of Universal indicator</i>	

[2 markah / 2 marks]

Memahami / *Understand*

4. Rajah menunjukkan aktiviti untuk mengkaji keadaan dalam paru-paru ketika seseorang merokok.

Diagram shows the activity to study the effect of smoking on lungs when a person smokes.



- (a) Nyatakan tujuan aktiviti ini.

State the aim of this activity.

[1 markah / 1 mark]

Mengingat / Remember

- (b) Lengkapkan jadual berikut tentang hasil aktiviti tersebut.

Complete the table below about the results of the activity.

Bahan <i>Materials</i>	Hasil aktiviti <i>Results of the activity</i>
Kapas <i>Cotton wool</i>	
Bacaan termometer <i>Reading of thermometer</i>	
Warna penunjuk universal <i>Colour of universal indicator</i>	

[3 markah / 3 marks]

Memahami / Understand

- (c) Nyatakan fungsi pam penapis dalam aktiviti itu.

State the function of the filter pump in this activity.

[1 markah / 1 mark]

Memahami / Understand

- (d) Nyatakan bahan dalam rokok yang menyebabkan seseorang itu ketagihan merokok.

State the substance in cigarette which makes people addicted to smoking.

[1 markah / 1 mark]

Mengingat / Remember

- (e) Nyatakan kesimpulan bagi aktiviti ini.

State the conclusion of the activity.

Asap rokok mengandungi _____ yang boleh menghitamkan paru-paru, _____ untuk meningkatkan suhu paru-paru dan _____ untuk mengakis paru-paru.

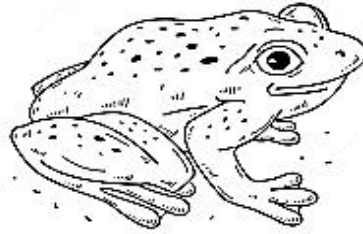
Cigarette smoke contains _____ to blacken the lungs, _____ to increase the temperature of the lungs and _____ to corrode the lungs.

[3 markah / 3 marks]

Mengingat / Remember

L3 : Soalan Perbincangan : Soalan berformat UASA**A3 : Discussion Items : UASA – format items****(Tahap 2/Level 2)**

1. Rajah menunjukkan sejenis haiwan vertebrata .
The diagram shows a type of vertebrate.



Sumber : Telegram Cg Sains Kreatif T3

Apakah struktur respirasi haiwan tersebut?
What is the respiratory structure of the animal?

- A Insang
Gill
- B Sistem trakea
Trachea system
- C Kulit lembap
Moist skin
- D Sistem tertutup
Closed system

[1 markah/ 1 mark]
 Mengingat / Remember

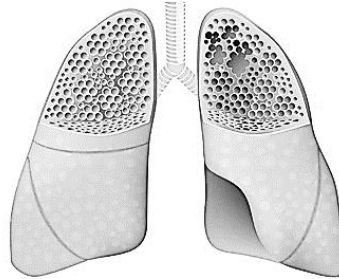
2. (a) Padankan penyakit respirasi yang berikut dengan penerangan dan gejala yang tepat.
Match the following respiratory diseases with the correct descriptions and symptoms.

Penyakit respirasi <i>Respiratory diseases</i>
(a) Asma <i>Asthma</i>
(b) Bronkitis <i>Bronchitis</i>

Penerangan dan gejala <i>Description and symptoms</i>
Radang bronkus disebabkan oleh bahan perengsa seperti asap rokok. <i>Inflammation of the bronchus caused by irritants such as cigarette smoke.</i>
Disebabkan karsinogen (bahan kimia penyebab kanser) dalam bahan pencemar seperti asap rokok. <i>Caused by carcinogens (cancer causing chemicals) in pollutants such as cigarette smoke.</i>
Radang salur pernafasan, menyempit apabila dirangsang oleh bahan perengsa. <i>The inflamed breathing channel, becomes narrow when stimulated by irritants.</i>

[2 markah/ 2 marks]
 Mengingat/Remember

- (b) Rajah menunjukkan keadaan alveolus akibat merokok. Berdasarkan rajah, gariskan jawapan yang betul.
The diagram shows the condition of alveoli resulting from smoking. Based on the diagram, underline the correct answers.



Peparu sihat
Healthy lung

Damaged alveoli
Alveoli termusnah

Sumber : Telegram Cg Sains Kreatif T3

- (i) Kerosakan alveolus adalah disebabkan oleh (karsinogen, bahan perengsa) dalam asap rokok.
The damage of the alveolus due to the (carsinogens, irritants) in cigarette smoke.
- (ii) Pesakit berasa sesak nafas dan (sakit dada, tidak dapat tidur).
The patients suffer from breathing difficulty and (chest pain, insomnia),

[2 markah/ 2 marks]

Memahami / *Understand*

3. Nyatakan empat faktor yang mempengaruhi keberkesanan alveolus untuk memaksimumkan pertukaran gas di dalam badan manusia.

State four factors that affect the efficiency of the alveolus to maximise gaseous exchange in human body.

[4 markah/ 4 marks]

Mengingat / *Remember*

4. Siti ialah seorang pesakit asma. Dia dinasihatkan oleh doktor supaya mengurangkan kekerapan melawat ke taman botani pada musim bunga. Terangkan.

Siti is an asthma patient. She is advised by the doctor to reduce her visit to botanical garden during spring. Explain.

[3 markah/ 3 marks]

Memahami / *Understand*

5. Tempat menunggu kenderaan awam seperti stesen LRT dan perhentian bas dilabel sebagai tempat larangan merokok. Jelaskan.

Waiting area for public transport such as LRT stations and bus stands be designated as non-smoking areas? Explain.

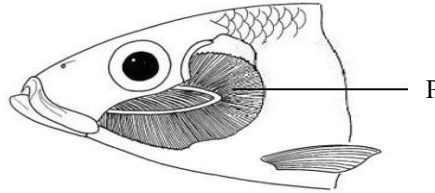
[2 markah/ 2 marks]

Memahami / *Understand*

L3 : Soalan Perbincangan : Soalan berformat UASA**A3 : Discussion Items : UASA – format items****(Tahap 3/Level 3)**

1. Rajah menunjukkan satu struktur respirasi bage sejenis haiwan.

Diagram shows a respiratory structure of an animal.



Apakah fungsi struktur P?

What is the function of structure P?

Sumber : Buku Teks Sains T3

- A Menghasilkan luas permukaan yang besar
Produces a large surface area
- B Memudahkan gas respirasi melarut dan meresap
To ease the respiratory gases to dissolve and diffuse
- C membenarkan udara keluar dan masuk ke dalam badan
Allow air to leave and enter the body
- D Meningkatkan kadar resapan gas antara kulit dengan kapilari darah
Increase the diffusion rate of gases between the skin and the blood capillaries

[1 markah/ 1 mark]
Memahami / Understand

2. Antara berikut, bahan yang manakah berbahaya kepada sistem pernafasan manusia?

Which of the following substances harmful to the human respiratory system?

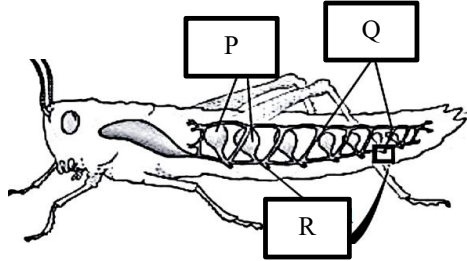
- I Nikotin
Nicotine
- II Sulfur dioksida
Sulphur dioxide
- III Hidrogen sulfide
Hydrogen sulphide

- A I and II sahaja
I dan II only
- B I and III sahaja
I dan III only
- C II and III sahaja
II dan III only
- D I, II and III
I, II, dan III

[1 markah/ 1 mark]
Mengingat / Remember

3. Rajah menunjukkan struktur respirasi bagi sejenis organisma.

The diagram shows the respiratory structure of an organism



(a) Namakan bahagian-bahagian berlabel seperti yang ditunjukkan di atas.

Name the labelled parts as shown above.

Trakeol	Spirakel	Kantung udara	Trakea
<i>Tracheol</i>	<i>Spiracle</i>	<i>Air sac</i>	<i>Trachea</i>

(i) P - _____

(ii) Q - _____

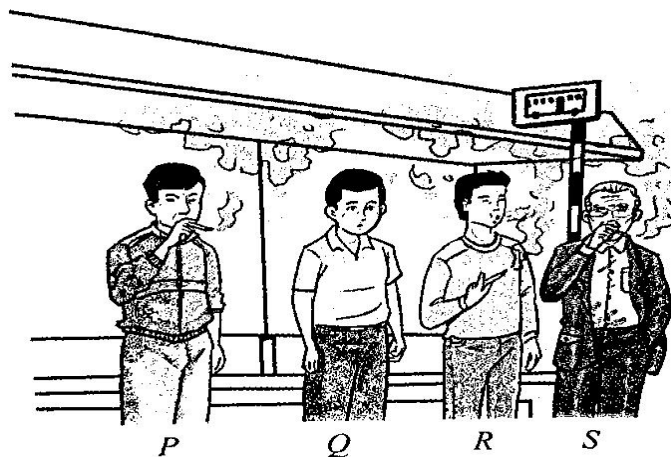
(2) R - _____

[3 markah / 3 marks]

Mengingat / Remember

(b) Rajah menunjukkan suasana di sebuah perhentian bas.

Diagram shows the atmosphere at a bus stop.



Kenal pasti dan bulatkan huruf yang mewakili perokok pasif yang terdapat di perhentian bas itu.

Identify and circle the letter that represents the passive smokers found at the bus stop.

[1 markah / 1 mark]

Memahami / Understand

4. (a) Lengkapkan jadual untuk menunjukkan sumber bahan berbahaya ke atas paru-paru manusia.
Complete the table that shows the sources of the harmful substances towards the human lungs.

	Bahan berbahaya <i>Harmful substances</i>	Sumber <i>Sources</i>
(i)	Nikotin dan tar <i>Nicotine and tar</i>	
(ii)	Sulfur dioksida <i>Sulphur dioxide</i>	
(iii)	Karbon monoksida <i>Carbon monoxide</i>	
(iv)	Jerebu <i>Haze</i>	

[4 markah / 4 marks]
 Mengingat / Remember

- (b) Jelaskan dua kesan jangka panjang bahan pencemar ke atas sistem respirasi manusia.
Explain two long-term effect of pollutants on the human respiratory system.

[2 markah / 2 marks]
 Memahami/Understand

- (c) Rekod hospital mencatatkan peningkatan kes penyakit respirasi dalam kalangan penduduk sekitar kilang papan. Terangkan dua cara yang boleh digunakan oleh penduduk tersebut untuk menangani masalah itu.
A hospital record shows an increase of respiratory diseases cases among the residents near sawmill. Explain two ways can be apply to solve the problem.

- (i) _____
- (ii) _____

[2 markah / 2 marks]
 Mengaplikasi/Apply

- (d) Jelaskan dua penyakit yang mungkin mempengaruhi sistem respirasi penduduk di sekitar kilang papan itu.
*Explain **two** diseases that will affect the respiratory system of the residents near the sawmill area.*

- (i) _____
- (ii) _____

[2 markah / 2 marks]
 Memahami / Understand

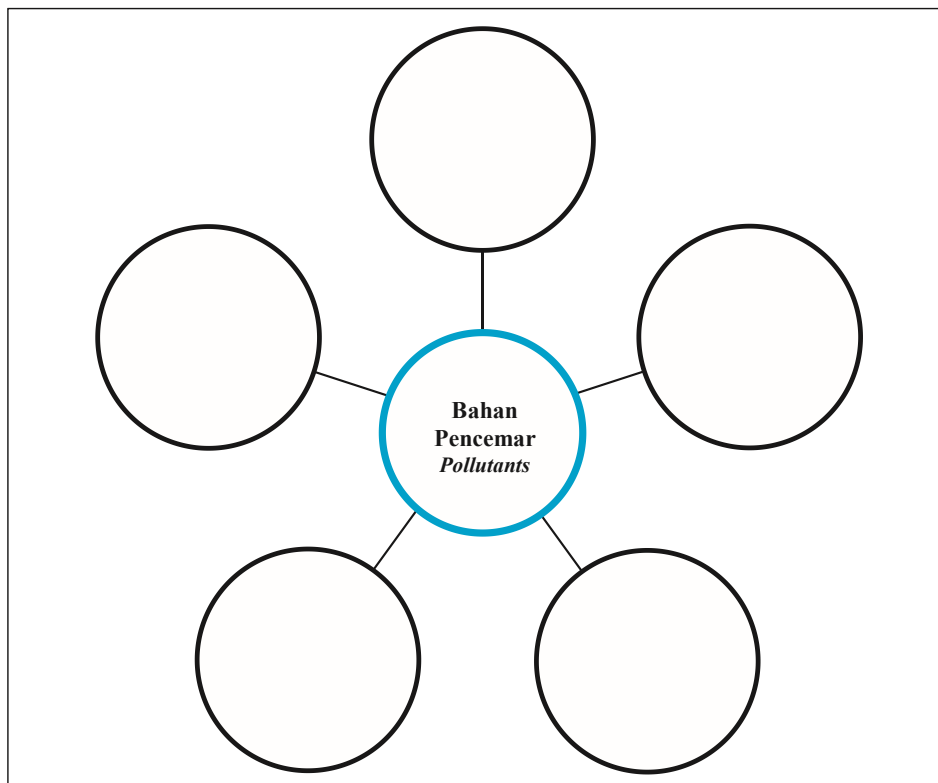
L4: Penilaian**A4: Assessment**

1. Lengkapi **peta dakap** dengan menuliskan penyakit sistem respirasi yang disebabkan oleh asap rokok.
*Complete the **brace map** by writing the diseases of respiratory system caused by cigarette smoke.*

Penyakit sistem respirasi <i>Diseases of the respiratory system</i>	{	
---	---	-------------------------

[4 markah/ 4 marks]
 Mengingat/Remember

2. Lengkapi **peta buih** dengan menulis bahan cemar yang berbahaya kepada sistem respirasi.
*Complete the **bubble map** by writing the pollutants that are harmful to the respiratory system.*



[5 markah/ 5 marks]
 Mengingat/Remember

3. Kesan bahan pencemar kepada sistem respirasi boleh dibahagikan kepada kesan jangka masa pendek dan kesan jangka masa panjang. Antara berikut, yang manakah kesan jangka masa pendek kepada sistem respirasi?

Effects of pollutant on respiratory system can be divided into short term effects and long-term effects. Which of the following is the short-term effect of pollutants on respiratory system?

- A Kanser peparu
Lung cancer
- B Penyakit respirasi kronik
Chronic respiratory disease
- C Kemusnahan peparu kekal
Permanent lung damage
- D Radang kepada sistem respirasi
Irritation to the respiratory system

[1 markah/ 1 mark]
Memahami/Understand

4. Antara berikut, penyakit manakah yang mempengaruhi sistem respirasi manusia?
Which of the following are diseases that can affect the human respiratory system?

- I Tibi
Tuberculosis
- II Bronkitis
Bronchitis
- III Pneumonia
Pneumonia

- A I dan II sahaja
I and II only
- B I dan III sahaja
I and III only
- C II dan III sahaja
II and III only
- D I, II dan III
I, II, and III

[1 markah / mark]
Mengingat / Remember

5. Maklumat berikut menerangkan sejenis penyakit respirasi.

The information shows the description of a type of respiratory disease.

- Disebabkan oleh rokok yang mengandungi bahan karsinogenik
Caused by smoke that contains carcinogenic substances
- Pertumbuhan sel yang tidak normal
Abnormal growth of cells
- Boleh membawa maut
Can lead to death

Antara berikut, penyakit sistem respirasi manakah yang diuraikan di atas?
Which of the following is the respiratory disease that described above?

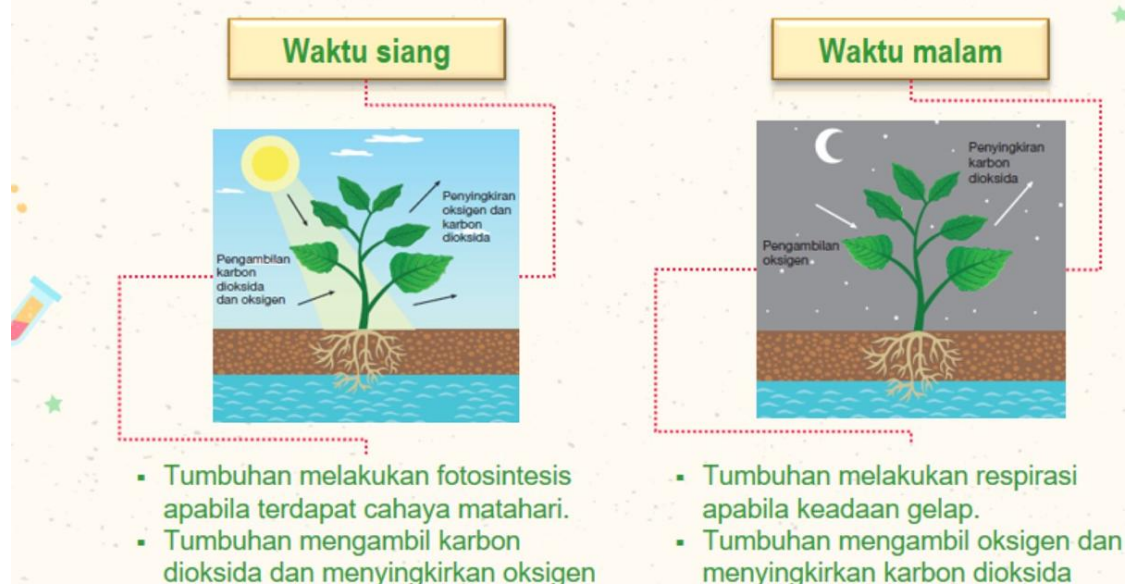
- A Tibi
Tuberculosis
- B Bronkitis
Bronchitis
- C Emfisema
Emphysema
- D Kanser peparu
Lung cancer

[1 markah/ 1 mark]
Memahami/Understand

Sesi 6 / Session 6	
Bidang Pembelajaran <i>Learning Area</i>	2.0 Respirasi <i>2.0 Respiration</i>
Standard Kandungan <i>Content Standard</i>	2.5 Pertukaran gas dalam tumbuhan <i>2.5 Gaseous exchange in plants</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan pertukaran gas dalam tumbuhan <i>Students will be able to accomplish the tasks regarding the gaseous exchange in plants</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Mekanisme pertukaran gas dalam tumbuhan. <i>The mechanism of gaseous exchange in plants.</i> 2. Kepentingan persekitaran yang tidak tercemar untuk tumbesaran dan kemandirian tumbuhan. <i>The importance of an unpolluted environment for the growth and survival of plants.</i>

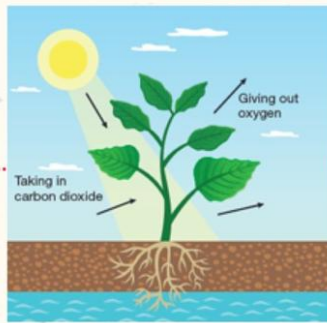
L1: Nota Revisi Cepat
A1: Speedy Revision Notes

MEKANISME PERTUKARAN GAS DALAM TUMBUHAN



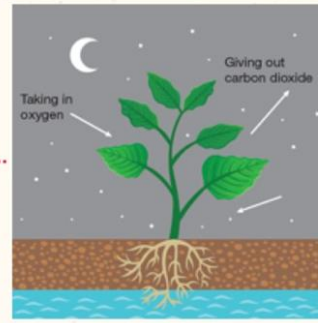
MECHANISM OF GASEOUS EXCHANGE IN PLANTS

During the day



- Plants carry out photosynthesis when there is sunlight.
- Plants absorb carbon dioxide and release oxygen.

During the night



- Plants carry out respiration in dark condition.
- Plants absorb oxygen and release carbon dioxide.

Sumber : Sasbadi Publication

KEPENTINGAN PERSEKITARAN YANG TIDAK TERCEMAR UNTUK KEMANDIRIAN TUMBUHAN

Bahan pencemar udara

Kesan terhadap kemandirian tumbuhan

Akibat

Jerebu, habuk dan debu

- Menurunkan kadar pertukaran gas antara tumbuhan dan persekitaran
- Menurunkan kadar fotosintesis
- Memudaratkan tumbesaran dan kemandirian tumbuhan

Gas berasid (sulfur dioksida dan nitrogen dioksida)

- Membunuh sel tumbuhan termasuklah sel pengawal
- Menghasilkan hujan asid
- Hujan asid menyebabkan tanah berasid dan kurang subur
- Mengurangkan hasil pengeluaran pertanian

IMPORTANCE OF UNPOLLUTED ENVIRONMENT FOR THE SURVIVAL OF PLANTS

Air pollutants	Haze, dust and pollen	Acidic gases (sulphur dioxide and nitrogen dioxide)
Effects on survival of plants Consequences	- Reduce the rate of gaseous exchange between plants and surroundings - Reduce the rate of photosynthesis - Harmful to the growth and survival of plants	- Destroys plant cells including guard cells - Forms acid rain - Acid rain causes soil to become acidic and less fertile - Reduce the yield of agriculture

Sumber : Sasbadi Publication

L2 : Teknik menjawab soalan

A2 : Answering Technique

- Fahamkan soalan sebelum menjawab dan merancang bagaimana hendak menerangkan jawapan dengan teratur dan mudah difahami.
Understand the question before answering and plan how to explain the answers in an orderly manner for a better understanding.
- Pastikan soalan yang diminta untuk tuliskan **BENAR** atau **PALSU**, tidak ditulis dengan **BETUL** atau **SALAH** dan (✓) atau (X).
*Ensure that questions requiring for writing **TRUE** or **FALSE**, are not written as **CORRECT** or **WRONG** and (✓) or (X).*

Pernyataan <i>Statements</i>	Tuliskan BENAR / PALSU Write <i>TRUE / FALSE</i>
(i) Pembukaan dan penutupan stoma dikawal oleh sel pengawal. <i>The opening and closing of stomata is controlled by guard cells.</i>	BENAR TRUE
(ii) Pertukaran gas hanya berlaku di stoma. <i>Gas exchange only occurs at the stoma.</i>	PALSU FALSE
(iii) Transpirasi berlaku melalui liang stoma. <i>Transpiration occurs through the stoma.</i>	BENAR TRUE

Penting!
Important!

1. **STOMA TERBUKA** pada hari siang apabila dirangsang oleh cahaya Matahari untuk tumbuhan menjalankan proses fotosintesis.
Plants carry out photosynthesis when sunlight present to stimulate the opening of stoma. **STOMA OPENS**
2. **STOMA TERTUTUP** pada **STOMA CLOSES** during
 - a. **Waktu malam:** Proses fotosintesis tidak berlaku. Kandungan glukosa berkurang, air meresap keluar dari sel melalui osmosis. Membran sel dan dinding sel melekat rapat.
Night: Photosynthesis does occur. Glucose concentration decreases, water diffuses out from the cells through osmosis. Cell membrane and cell wall attach together.
 - b. **Hari yang panas** bagi mengelakkan kehilangan air.
Hot day to avoid excessive water loss.

L3 : Soalan Perbincangan : Soalan berformat UASA

A3 : Discussion Items : UASA – format items

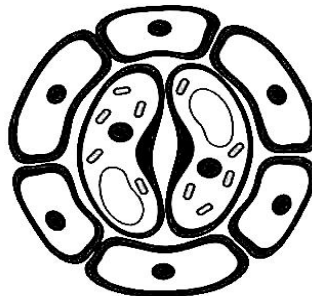
(Tahap 1/Level 1)

1. Apakah proses yang membolehkan air meresap ke dalam sel daun?
What is the process that allows water to diffuse into the leaf cell?

- A Osmosis
Osmosis
- B Respirasi
Respiration
- C Transpirasi
Transpiration
- D Fotosintesis
Photosynthesis

[1 markah/ 1 mark]
Mengingat/Remember

2. Rajah menunjukkan sejenis sel dalam tumbuhan.
Diagram shows a cell in plants.



Apakah perubahan bentuk sel pengawal pada waktu siang?
What is the change in shape of guard cells during the daytime?

- A Segah dan lurus
Turgid and straight
- B Flacid dan lurus
Flaccid and straight
- C Segah dan membengkok
Turgid and curved
- D Flacid dan membengkok
Flaccid and curved

[1 markah/ 1 mark]
Memahami/*Understand*

3. Lengkapkan jadual dengan perkataan yang diberi.
Complete the table below using the words given.

Fotosintesis <i>Photosynthesis</i>	Penghasilan <i>Production</i>	Pertukaran <i>Exchange</i>	Transpirasi <i>Transpiration</i>	Pertumbuhan <i>Growth</i>
---------------------------------------	----------------------------------	-------------------------------	-------------------------------------	------------------------------

Kepentingan persekitaran yang tidak tercemar terhadap tumbuhan <i>The importance of unpolluted environment to plants</i>	(a) Melancarkan proses _____ gas dalam tumbuhan. <i>Facilitates the _____ of gaseous processes in plants.</i>
	(b) Meningkatkan kadar _____ makanan oleh tumbuhan. <i>Increase the rate of _____ of food in plants.</i>
	(c) Meningkatkan kadar _____ tumbuhan. <i>Increase the rate of _____ in plants.</i>
	(d) Meningkatkan _____ tumbuhan. <i>Increase _____ rate in plants.</i>

[4 markah/4 marks]
Memahami/*Understand*

4. Pertukaran gas antara tumbuhan dengan udara berlaku melalui liang yang sangat kecil.
Gaseous exchange between plants and the air occurs through tiny pores.

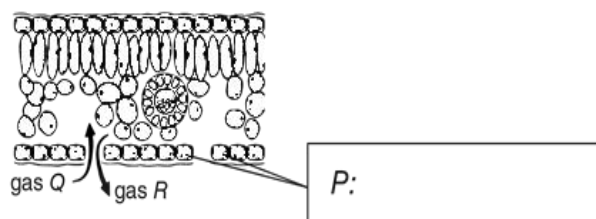
- (a) Namakan dua struktur liang tersebut dan kenal pasti kedudukannya pada tumbuhan.
Name the two pore structures and identify their positions in the plant.

Struktur 1: _____ Kedudukan: _____
Structure 1 Position

Struktur 2: _____ Kedudukan: _____
Structure 2 Position

[2 markah/2 marks]
Mengingat/*Remember*

- (b) Rajah menunjukkan keratan rentas sehelai daun.
The diagram shows the cross-section of a leaf.



[1 markah/1 mark]
Mengingat/*Remember*

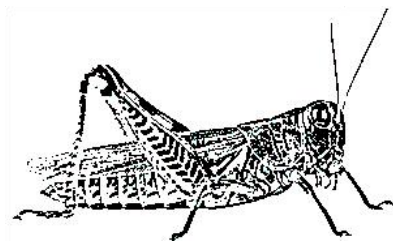
- (i) Namakan struktur P.
Name the structure P.
- (ii) Kenalpasti gas berikut:
Identify the following gases

Gas Q : _____

Gas R : _____

[2 markah/ 2 marks]
Memahami/Understand

5. Rajah menunjukkan dua jenis organisma, P dan Q.
The diagram shows two types of organisms, P and Q.



Organisma P
Organism P



Organisma Q
Organism Q

- (a) Berikan **satu** persamaan dalam pertukaran gas dua jenis organisma tersebut.
*Give **one** similarity in the gaseous exchange of two organisms.*

[1 markah/ 1 mark]
Menganalisis/Analyse

- (b) Bandingkan keberkesanan sistem respirasi pada manusia dengan Organisma P. Terangkan jawapan anda.
Compare the effectiveness of respiratory system in humans and organism P. Explain your answer.

[3 markah/3 marks]
Analisis/ Analyse

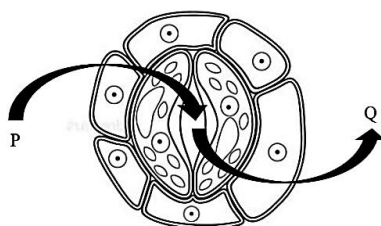
L3 : Soalan Perbincangan : Soalan berformat UASA**A3 : Discussion Items : UASA – format items****(Tahap 2/Level 2)**

1. Antara berikut, yang manakah tabiat tidak bertanggungjawab yang boleh menyebabkan pencemaran udara?
Which of the following is an irresponsible habit to cause air pollution?

- A Tidak merokok
Do not smoke
- B Mengamalkan perkongsian kereta
Practice car-pooling
- C Membakar sampah yang dikumpul
Burning the collected rubbish
- D Menanam pokok-pokok di sekitar rumah
Plant trees around the house

[1 markah/ 1 mark]
Meningat/Remember

2. Rajah menunjukkan pertukaran gas yang berlaku di liang stoma semasa proses fotosintesis.
The diagram shows the gas exchange that occurs at the stomata during the photosynthesis process.

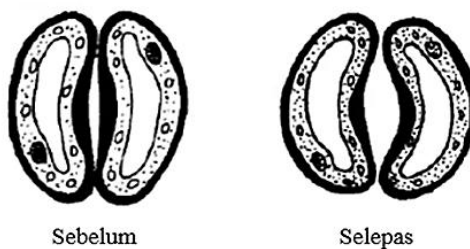


[1 markah/1 mark]
Meningat/Remember

Apakah gas P dan Q?
What are gases P and Q?

	P	Q
A	Nitrogen <i>Nitrogen</i>	Oksigen <i>Oxygen</i>
B	Karbon dioksida <i>Carbon dioxide</i>	Oksigen <i>Oxygen</i>
C	Oksigen <i>Oxygen</i>	Karbon dioksida <i>Carbon dioxide</i>
D	Nitrogen <i>Nitrogen</i>	Oksigen <i>Oxygen</i>

3. Rajah menunjukkan struktur di bawah daun pokok sawi.
Diagram shows the structure under the leaves of a mustard plant.



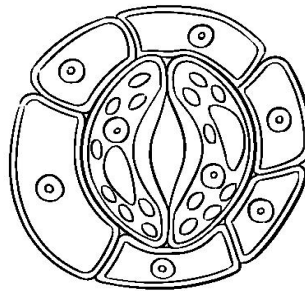
Bagaimanakah keadaan struktur ini terjadi?
How does this condition of the structure occur?

- A Air meresap keluar dari sel pengawal.
Water diffuses out of the guard cells.
- B Air meresap masuk ke dalam sel pengawal.
Water diffuses in the guard cells.
- C Mengeluarkan air berlebihan dalam tumbuhan.
Removes excessive water in plants.
- D Kepekatan glukosa di dalam sel pengawal menurun.
The concentration of glucose in the guard cells decreases.

[1 markah/1 mark]

Memahami/Understand

4. Rajah menunjukkan satu struktur sel yang dijumpai pada permukaan daun tumbuhan.
Diagram shows a cell structure found on the surface of a leaf.



- (a) Apakah bahan-bahan yang bergerak masuk dan keluar dari daun melalui struktur sel tersebut? Bulatkan jawapan yang betul.

What are the substances that enters or leave the leaf through the cell structure? Circle the correct answer.

Wap air <i>Water vapour</i>	Hidrogen <i>Hydrogen</i>	Karbon dioksida <i>Carbon dioxide</i>
--------------------------------	-----------------------------	--

[2 markah/ 2 marks]

Mengingat/Remember

- (b) Tuliskan **BENAR** atau **PALSU** bagi pernyataan berikut tentang faktor-faktor yang mempengaruhi saiz stoma pada tumbuhan.

*Write **TRUE** or **FALSE** for the following statements about the factors affecting the size of stoma on plants.*

Pernyataan Statements	BENAR atau PALSU TRUE or FALSE
(i) Saiz stoma akan menjadi lebih besar apabila kelembapan udara semakin meningkat. <i>The size of stoma will become bigger when the air humidity increases.</i>	
(ii) Semakin rendah keamatan cahaya matahari, semakin mengecil saiz stoma. <i>The lower the intensity of the sunlight, the smaller the size of stoma.</i>	
(iii) Apabila sel pengawal menjalankan fotosintesis, saiz stoma akan membesar. <i>When the guard cells undergo photosynthesis, the size of stoma will become bigger.</i>	

[2 markah/2 marks]

Memahami/Understand

5. Lukiskan keadaan liang stoma pada waktu siang dan waktu malam dalam ruangan disediakan.

Draw the conditions of the stoma during the day and at night in the spaces provided.

Siang Day	Malam Night

[2 markah/2 marks]

Mengingat/Remember

6. Jelaskan kesan jerebu dan habuk terhadap kemandirian tumbuhan.

Explain the effect of haze and dust on the survival of plants.

[2 markah/2 marks]

Memahami/Understand

L3 : Soalan Perbincangan : Soalan berformat UASA**A3 : Discussion Items : UASA – format items****(Tahap 3/Level 3)**

1. Antara berikut, situasi manakah yang akan menyebabkan liang stoma terbuka?

Which of the following situations will cause the stoma to open?

- A Apabila suhu di sekeliling terlalu tinggi
When the temperature is too high
- B Apabila kadar transpirasi adalah rendah
When the transpiration rate is low
- C Apabila indeks pencemaran udara adalah tinggi
When the air pollution index is high
- D Apabila keamatan cahaya adalah tinggi untuk menjalankan proses fotosintesis
When the light intensity is high enough to carry out the photosynthesis

[1 markah/ 1 mark]

Memahami/Understand

2. (a) Nyatakan proses yang membenarkan gas oksigen meresap ke dalam sel daun berlaku.

State the process that allows oxygen to diffuse into the leaf cells.

[1 markah/1 mark]

Mengingat/Remember

- (b) Terangkan mekanisme pertukaran gas pada daun.

Explain the mechanism of gaseous exchange in leaves.

[3 markah/3 marks]

Memahami/Understand

- (c) Lengkapkan persamaan perkataan untuk menunjukkan proses respirasi yang berlaku dalam tumbuhan.

Complete the word equation to show the respiration process that occurs in plants.

Glukosa + oksigen
Glucose + oxygen



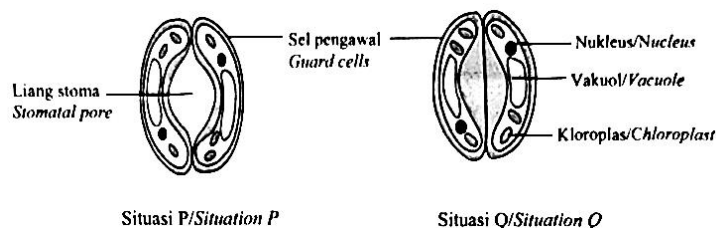
+ wap air +
+ water vapour +

[2 markah/2 marks]

Mengingat/Remember

3. Rajah menunjukkan satu sel yang terdapat pada epidermis daun.

The diagram shows a cell found in the epidermis of a leaf.



(a) Nyatakan bila situasi P dan Q berlaku

State when situations P and Q occur

Situasi P: _____

Situation P

Situasi Q: _____

Situation Q

[2 markah/ 2 marks]

Mengingat/Remember

(b) Jelaskan mengapa liang stoma terbuka pada situasi P.

Explain why the stoma is opened in the situation of P.

[2 markah/ 2 marks]

Mengingat/Remember

(c) Berikan sebab liang stoma tertutup pada situasi Q.

Give the reason why the stoma is closed in situation of Q.

[2 markah/ 2 marks]

Mengingat/Remember

(d) Nyatakan satu contoh gas berasid yang membawa kesan terhadap tumbesaran dan kemandirian tumbuhan.

State an example of acidic gases in the air that affects the growth and survival of plants.

[2 markah/ 2 marks]

Mengingat/Remember

(e) Nyatakan dua langkah pencegahan pencemaran yang boleh mempengaruhi kemandirian tumbuhan.

State two pollution prevention measures against plant survival.

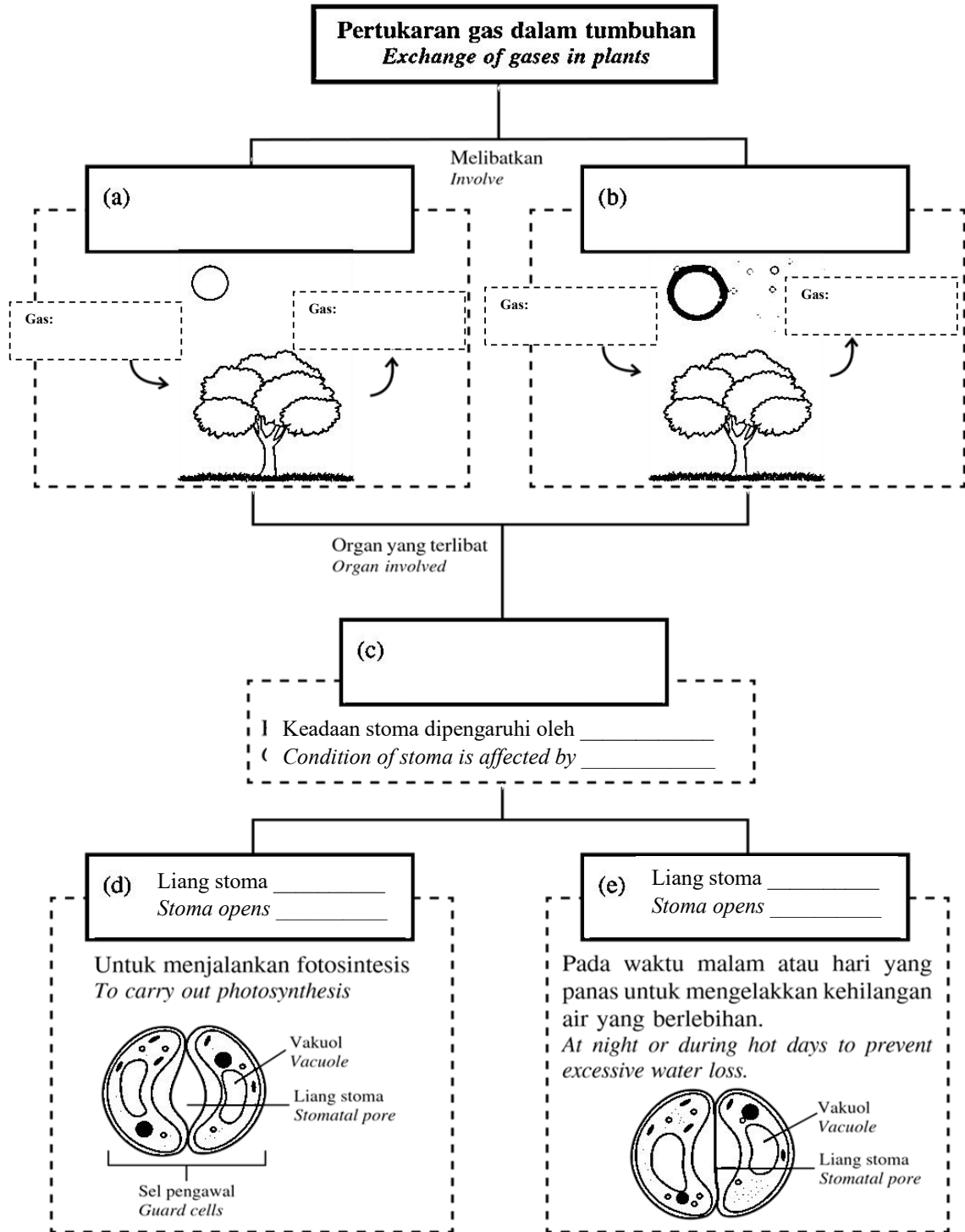
[2 markah/ 2 marks]

Mengingat/Remember

L4: Penilaian**A4: Assessment**

1. Lengkapi rajah tentang pertukaran gas dalam tumbuhan.

Complete the diagram about the exchange of gases in plants.



(10 markah/ 10 marks)

Memahami/Understand

Sesi 7 / Session 7	
Bidang Pembelajaran <i>Learning Area</i>	3.0 Pengangkutan <i>3.0 Transportation</i>
Standard Kandungan <i>Content Standard</i>	3.1 Sistem Pengangkutan Organisma <i>3.1 Transport system in organisms</i> 3.2 Sistem Peredaran Darah <i>3.2 Blood Circulatory System</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan sistem pengangkutan organisma dan sistem peredaran darah. <i>Students will be able to accomplish the tasks regarding the transport system in organisms and the blood circulatory system.</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Sistem pengangkutan dalam organisma <i>Transport system in organisms</i> 2. Struktur jantung, struktur salur darah dan fungsi. <i>Structure of the heart, structure of blood vessel and function</i> 3. Perubahan kadar denyutan nadi manusia ketika melakukan aktiviti fizikal. <i>Changes in human pulse rate when doing physical activities.</i>

L1: Nota Revisi Cepat

A1: Speedy Revision Notes

Sistem Pengangkutan Dalam Organisma

Transport System in Organisms

Organisma unisel (Organisma ringkas)
Unicellular organisms (Simple organisms)

-Tidak mempunyai sistem pengangkutan khusus
Do not have a specialised transport system

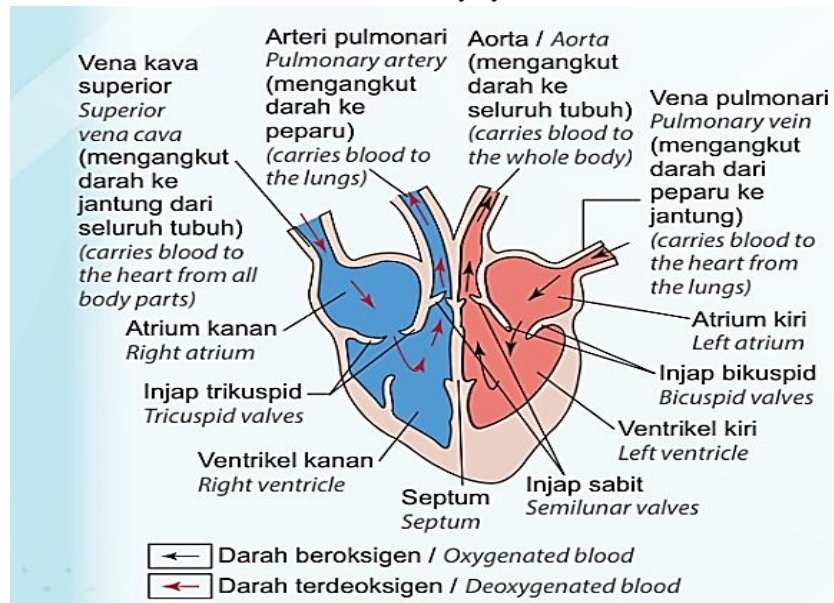
-Bagi organisma unisel seperti **Amoeba sp.** dan **Paramecium sp.**, bahan keperluan sel masuk terus ke dalam sel secara **resapan** melalui membran sel.
For unicellular organisms such as Amoeba sp. And Paramecium sp., substances needed by the cells enter directly into the cells via diffusion through the cell membrane

Organisma Multisel (Organisma Kompleks)
Multicellular organisms (Complex organisms)

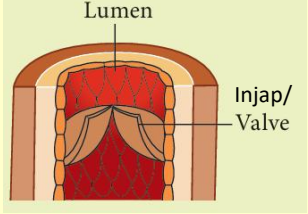
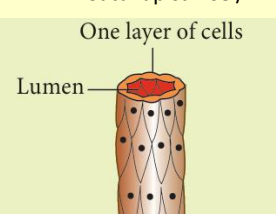
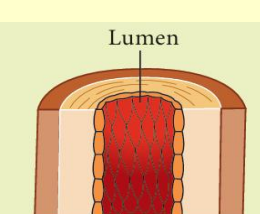
Mempunyai sistem pengangkutan khusus
Have a specialised transport

Organisma Organisms	Jenis system pengangkutan Type of transport system
Pokok Bunga Raya <i>Hibiscus plant</i>	Berkas vascular <i>Vascular system</i>
Manusia <i>Human</i>	Sistem Peredaran Darah <i>Blood circulatory system</i>

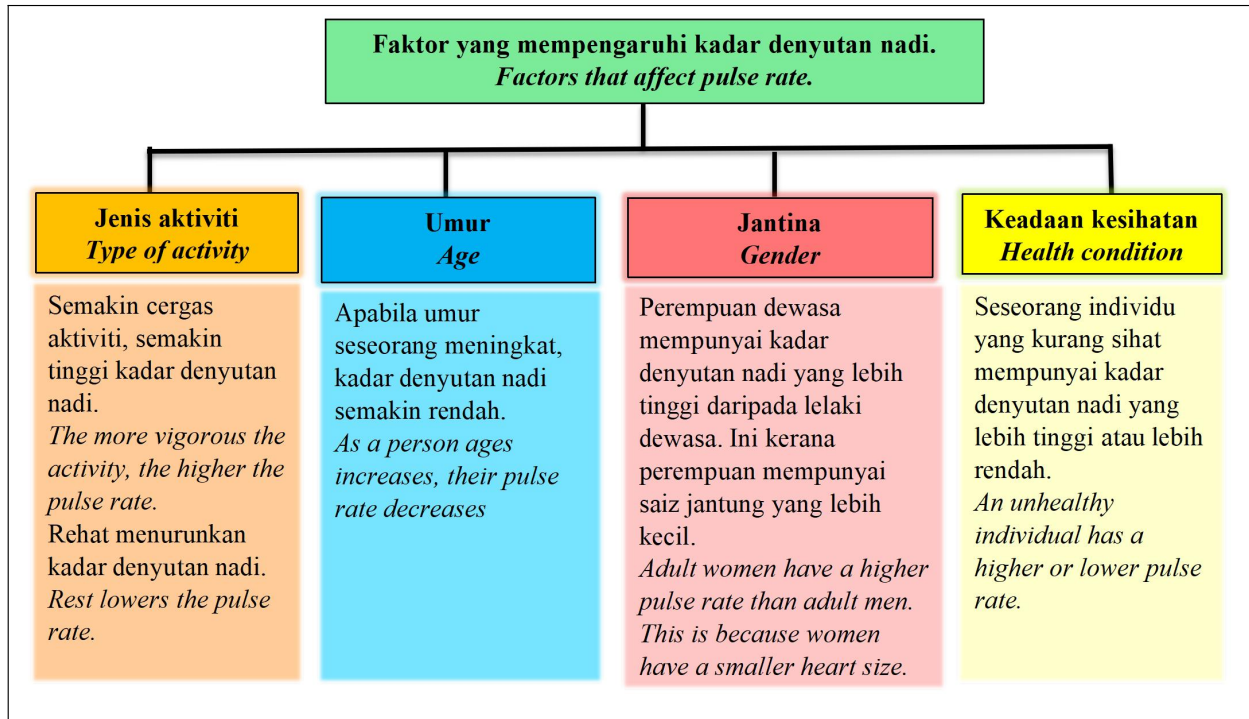
Sistem Peredaran Darah Blood Circulatory System



(SUMBER: Modul Aktiviti Strategi A+ Sains Tingkatan 3, Ilmu Bakti Sdn. Bhd, Muka Surat: N6)

Jenis Salur Darah Types of Blood Vessel	Vena Vein 	Kapilari Capillary 	Arteri Artery 
Struktur Structure	- Dinding yang nipis, sedikit berotot dan elastik untuk memudahkan pengaliran darah pada tekanan darah yang rendah Thin, less muscular and less elastic wall to facilitate blood flow under low blood pressure - Ada injap Has valves - Lumen besar Large lumen	- Dinding paling nipis (setebal satu sel) Thinnest wall (one-cell thick) - Tidak berotot Not muscular - Tidak elastik Not elastic - Tiada injap No valves - Lumen paling kecil Smallest lumen	- Dinding yang tebal, berotot dan banyak tisu elastik adalah untuk menahan tekanan darah yang tinggi Thick and muscular wall with a lot of elastic tissues to withstand high blood pressure - Tiada Injap No valves - Lumen kecil Small lumen

(SUMBER: Buku Teks Sains Tingkatan 3, Sasbadi Sdn. Bhd., muka surat: 88)



L2: Teknik Menjawab Soalan

A2: Answering Technique

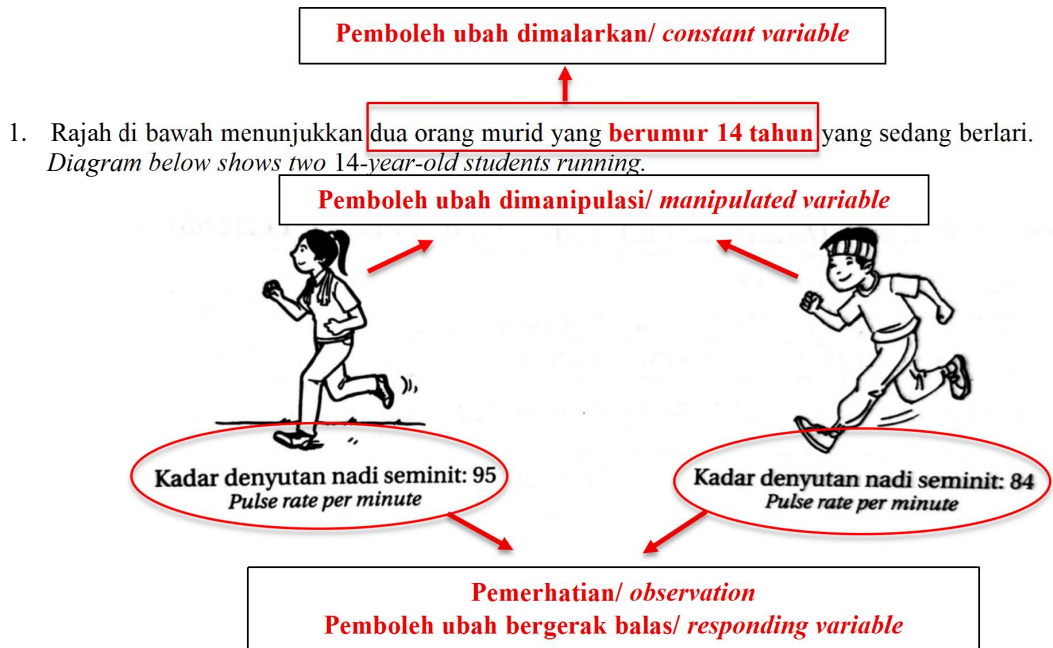
A. Langkah-langkah menjawab soalan/ *Steps for answering the question.*

- Baca arahan soalan/ *Read the instructions*
- Fahamkan soalan/ *Understand the question*
- Gariskan kata kunci/ *Underline the key words*
- Rujuk peruntukan markah soalan/ *Refer to the marks allocated*
- Tentukan jawapan/ *Determine the answer*

B. Teknik menjawab soalan yang berkaitan dengan Kemahiran Proses Sains
Technique of answering the items involving Science Process Skills

Contoh:

Example



(SUMBER: UASA Sains Tingkatan 1,2 & 3, Ilmu Bakti Sdn. Bhd., muka surat: T3-53)

- a) Nyatakan satu **pemerhatian**.
State one observation.

Kadar denyutan nadi murid perempuan lebih tinggi daripada murid lelaki.
The pulse rate of female student is higher than the male student.

[1 markah/ 1 mark]
 Memerhati/Observing

Teknik Menjawab:

- Pemerhatian – Jawapan boleh didapati daripada rajah atau jadual.

Answering Technique:

- Observation – The answer can be found directly from the diagram or table.

- b) Kenal pasti pemboleh ubah-pemboleh ubah dalam aktiviti ini.
Identify the variables for the activity.

- i. **Pemboleh ubah dimanipulasikan : Jantina**
Manipulated variable : Gender
- ii. **Pemboleh ubah bergerak balas : Kadar denyutan nadi**
Responding variable : Pulse rate
- iii. **Pemboleh ubah dimalarkan : Umur**
Constant variable : Age

[3 markah/ 3 marks]

Mengawal pemboleh ubah/*Controlling the variable*

Teknik Menjawab: (Rujuk rajah di atas)

- Pemboleh ubah dimalarkan – Kenal pasti apa yang **sama** sepanjang eksperimen.
- Pemboleh ubah dimanipulasi – Tentukan apa yang **berbeza** dalam eksperimen/ gambar rajah/ jadual.
- Pemboleh ubah bergerak balas – Perhatikan **apa yang berubah** atau **hasil di akhir eksperimen**

Answering Technique: (Refer to the diagram above)

- *Constant variable* – Identify what is the **same** throughout the experiment.
- *Manipulated variable* – Determine what is **different** in the experiment/diagram/table
- *Responding variable* – Observe **the changes or the ends product of an experiment**.

c) Nyatakan satu **inferens** untuk aktiviti ini.

*State an **inference** for this activity.*

Kadar denyutan nadi murid perempuan lebih tinggi daripada murid lelaki kerana perempuan mempunyai saiz jantung yang lebih kecil berbanding lelaki.

The pulse rate of female student is higher than the male student because female has a smaller heart size compares to the male.

[2 markah/ 2 marks]

Membuat inferens/Making inference

Teknik Menjawab:

- Inferens – Membuat **kesimpulan awal** berdasarkan pemerhatian, **memberi penerangan logik dan menyatakan sebab**

Pemerhatian: **Kadar denyutan nadi murid perempuan lebih tinggi daripada murid lelaki**

Kerana: **Perempuan mempunyai saiz jantung yang lebih kecil berbanding lelaki**

Inferens: **Kadar denyutan nadi murid perempuan lebih tinggi daripada murid lelaki kerana perempuan mempunyai saiz jantung yang lebih kecil berbanding lelaki.**

Answering Technique:

- *Inference* – Make **initial conclusions** based on the observation, **provide logical explanations and state reasons**

*Observation: **The pulse rate of female student is higher than the male student***

*Because: **Female has smaller heart size compare to the male.***

*Inference: **The pulse rate of female student is higher than the male student because female has smaller heart sizes compares to the male.***

d) Adakah eksperimen yang dijalankan adil? Terangkan.

Is the experiment conducted fair? Explain.

Ya, kerana aktiviti ini hanya melibatkan satu pemboleh ubah dimanipulasi, iaitu jantina

Yes, because this activity only involves one manipulated variable, which is the gender.

[1 markah/ 1 mark]

Mengeksperimen/ Experimenting

Teknik Menjawab:

- Adil – eksperimen/ penyiasatan ini **hanya mempunyai satu pemboleh ubah dimanipulasi** iaitu _____.

Answering Technique:

- Fair – this experiment/ investigation **only has one manipulated variable**, which is _____.

- e) Nyatakan kesimpulan bagi aktiviti ini.

State the conclusion for this activity.

Kadar denyutan nadi murid perempuan lebih tinggi berbanding murid lelaki.

The pulse rate of female student is higher than the male student.

[1 markah/ 1 mark]

Mentafsir data/Interpret data

Teknik Menjawab:

- Kesimpulan – rujuk **tujuan** aktiviti/eksperimen atau nyatakan **hubungan antara pemboleh ubah dimanipulasi dengan pemboleh ubah bergerak balas**.
– Tulis dalam bentuk **pernyataan** tentang hasil penyiasatan.

Answering Technique:

- Conclusion – refer to the **aim** of the activity/experiments or state the **relationship between the manipulated variable and the responding variable**.
– Write in the form of a **statement** about the results of the investigation.

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 1/Level 1)**

1. Apakah kaedah yang digunakan oleh organisma ringkas untuk menyingkirkan bahan kumuh?
What is the method used by simple organisms to eliminate waste products?

- A Osmosis
Osmosis
B Resapan
Diffusion
C Penyejatan
Evaporation
D Pelembakan (gutasi)
Exudation (guttation)

[1 markah/ 1 mark]

Mengingat/Remember

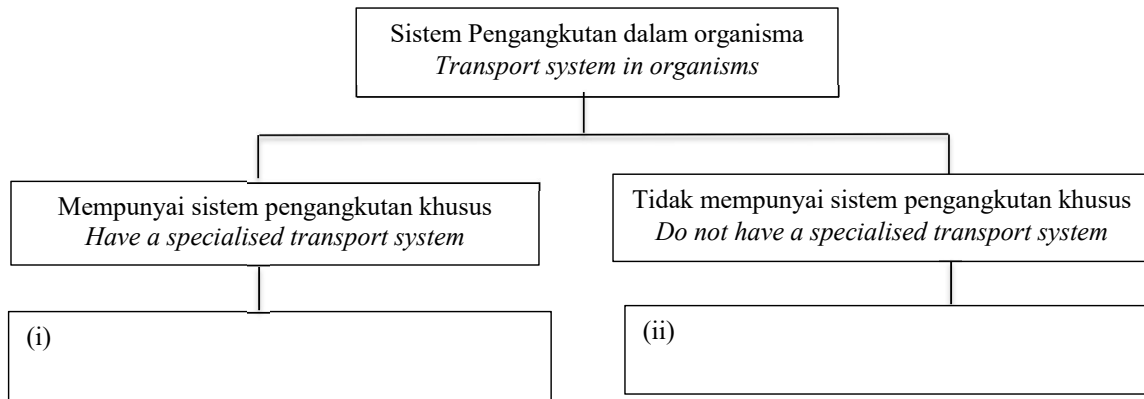
2. Antara berikut, yang manakah komponen dalam sistem peredaran darah manusia?
Which of the following is a component of the human blood circulatory system?

- A Hati
Liver
B Peparu
Lungs
C Trakea
Trachea
D Salur darah
Blood vessels

[1 markah/ 1 mark]

Mengingat/Remember

3. a) Rajah menunjukkan peta pokok tentang sistem pengangkutan dalam organisma.
Diagram shows a tree map of transport system in organisms.

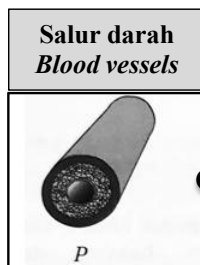


Kelaskan organisma di bawah berdasarkan peta pokok dalam rajah di atas.
Classify the organisms below based on the tree map above.

Berudu <i>Tadpole</i>	Amoeba <i>Amoeba</i>	Burung <i>Bird</i>	Paramecium <i>Paramecium</i>
--------------------------	-------------------------	-----------------------	---------------------------------

[2 markah/ 2 marks]
 Mengingat/Remember

- b) Padankan salur darah berikut dengan nama yang betul.
Match the following blood vessels with their functions.



Fungsi Functions
Mengangkut darah di antara arteri dan vena <i>Transport blood between artery and vein</i>
Mengangkut darah beroksigen pada tekanan yang tinggi <i>Transport oxygenated blood at high pressure</i>
Mengangkut darah terdeoksigen pada tekanan yang rendah <i>Transport deoxygenated blood at low pressure</i>

[2 markah/ 2 marks]
 Memahami/Understand

4. Jadual menunjukkan keputusan eksperimen untuk mengkaji kesan aktiviti fizikal terhadap kadar denyutan nadi.

Table shows the results of an experiment to study the effect of physical activities on the pulse rate.

Jenis aktiviti <i>Type of activity</i>	Kadar denyutan nadi (bilangan denyutan nadi per minit) <i>Pulse rate</i> <i>(number of pulse rate per minute)</i>
Berehat <i>Resting</i>	65
Melompat 30 kali <i>Jumping 30 times</i>	91

- a. Nyatakan aktiviti lain yang lebih cergas daripada melompat 30 kali.

State another activity which is more vigorous than jumping 30 kali.

[1 markah/ 1 mark]

Memahami/*Understand*

- b. Nyatakan satu pemerhatian berdasarkan jadual di atas.

State one observation based on the table above.

[1 markah/ 1 mark]

Memerhati/*Observing*

- c. Kenal pasti pemboleh ubah-pemboleh ubah bagi eksperimen ini.

Identify the variables for the experiment.

- i. Pemboleh ubah dimanipulasikan

Manipulated variable

- ii. Pemboleh ubah bergerak balas

Responding variable

[2 markah/ 2 marks]

Mengawal pemboleh ubah/*Controlling the variable*

- d. Nyatakan kesimpulan yang boleh dibuat berdasarkan eksperimen ini.

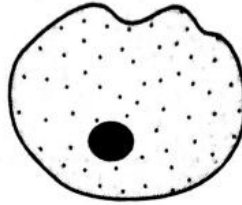
State the conclusion that can be made from this experiment.

[1 markah/ 1 mark]

Membuat kesimpulan/*Making conclusion*

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 2/ Level 2)**

1. Rajah menunjukkan satu organisma ringkas.
Diagram shows a simple organism.

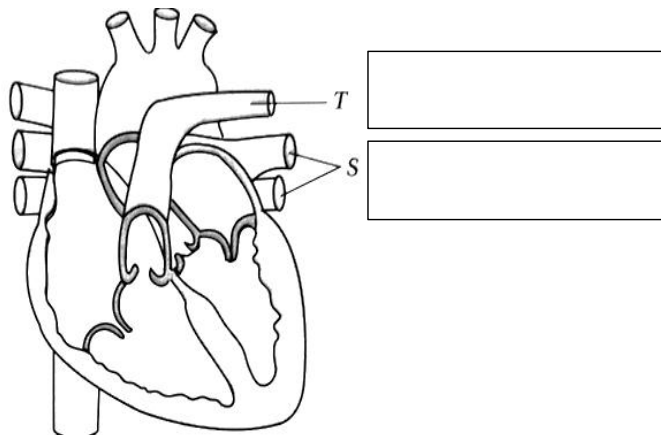


Antara berikut, kaedah manakah digunakan untuk menyingkirkan bahan kumuh?
Which of the following methods is used to remove excretory substances?

- A Resapan
Diffusion
- B Osmosis
Osmosis
- C Pencernaan
Digestion
- D Penyahtinjaan
Defecation

[1 markah/ 1 mark]
 Memahami/Understand

2. a) Rajah menunjukkan satu organ manusia.
Diagram shows a human organ.



(SUMBER: Praktis Topikal UASA Sains Tingkatan 3, Ilmu Bakti Sdn. Bhd., muka surat:

Labelkan struktur S dan T menggunakan perkataan yang diberikan.
Label structures S and T using the words given.

Vena pulmonari <i>Pulmonary vein</i>	Aorta <i>Aorta</i>	Arteri pulmonari <i>Pulmonary artery</i>
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[2 markah/ 2 marks]
 Mengingat/Remember

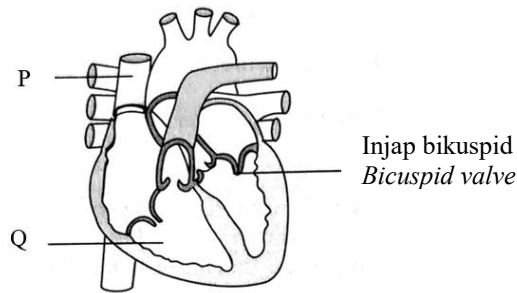
- b) Tulis **BENAR** pada pernyataan yang betul dan **PALSU** pada pernyataan yang salah bagi struktur jantung manusia.

Write **TRUE** on the correct statement and **FALSE** on the incorrect statement regarding the human heart structure below.

Pernyataan Statement	BENAR atau PALSU TRUE or FALSE
i. Darah beroksigen dari paru-paru memasuki atrium kiri melalui vena pulmonari. <i>Oxygenated blood from the lungs enters the left atrium through the pulmonary vein.</i>	
ii. Aorta ialah salur darah untuk membawa darah beroksigen ke paru-paru. <i>Aorta is the blood vessel that brings the oxygenated blood to the lungs.</i>	
iii. Darah terdeoksigen dari paru-paru memasuki atrium kanan melalui vena kava <i>Deoxygenated blood from the lungs enters the right atrium through the vena cava</i>	

[2 markah/ 2 marks]
Memahami/Understand

3. Rajah menunjukkan keratan membujur jantung manusia
Diagram shows a longitudinal section of the human heart.



(SUMBER: Praktis Topikal UASA Sains Tingkatan 3, PENERBIT: ILMU BAKTI SDN. BHD., MUKA SURAT: 18)

- a) Tanda (✓) pada vena yang terbesar dalam sistem peredaran darah manusia.
Tick (✓) the biggest vein in the human blood circulatory system.

☐	Vena kava <i>Vena cava</i>
--------------------------	-------------------------------

☐	Vena Pulmonari <i>Pulmonary veins</i>
--------------------------	--

[2 markah/ 2 marks]
Mengingat/Remember

- b) Nyatakan fungsi struktur P.
State the function of structure P.

[1 markah/ 1 mark]
Memahami/Understand

- c) Rajah menunjukkan satu alat yang dikenali sebagai sfigmomanometer.
Diagram shows a device called sphygmomanometer.



(SUMBER: Praktis Topikal UASA Sains Tingkatan 3, Ilmu Bakti Sdn. Bhd., muka surat: 19)

- i) Nyatakan fungsi alat tersebut.
State the function of the device.

[1 markah/ 1 mark]
Memahami/Understand

- ii) Terangkan masalah kesihatan yang mungkin dialami oleh individu dalam rajah di atas.
Explain the health problem that may faced by the individual in diagram above.

[2 markah/ 2 marks]
Memahami/Understand

- iii) Lengkapkan jadual berikut untuk menunjukkan perbezaan antara bacaan sistolik dan diastolik bagi seorang pemuda yang sihat. Terangkan jawapan anda.
Complete the table to show the differences between systolic and diastolic pressure reading of a healthy young man. Explain your answer.

	Sistolik Systolic	Diastolik Diastolic
Bacaan sfigmomanometer <i>Sphygmomanometer reading</i>	203mmHg	114mmHg
Bacaan normal <i>Normal reading</i>	120mmHg	75mmHg
Penerangan <i>Explanation</i>	Bacaan tekanan sistolik _____ _____ daripada bacaan sistolik normal. <i>Systolic pressure reading is</i> _____ <i>than normal systolic</i> <i>readings.</i>	Bacaan tekanan diastolik _____ _____ daripada bacaan diastolik normal <i>Diastolic pressure reading is</i> _____ <i>than normal</i> <i>diastolic readings</i>

[2 markah/ 2 marks]
Menganalisis/ Analyse

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 3/Level 3)**

1. Pernyataan berikut menerangkan fungsi satu sistem dalam suatu organisma.

The following statements explain the function of a system in an organism.

- Mengangkut bahan keperluan sel seperti oksigen dan nutrien yang digunakan untuk menghasilkan tenaga melalui proses respirasi sel.
Carries substances needed by the cells such as oxygen and nutrients that are used to produce energy through cellular respiration process.
- Menyingkirkan bahan kumuh yang bertoksik keluar dari sel organisma ke persekitaran.
Eliminates toxic waste substances from the cells of organisms to the environment.

Antara berikut, sistem manakah berkaitan dengan penerangan di atas?

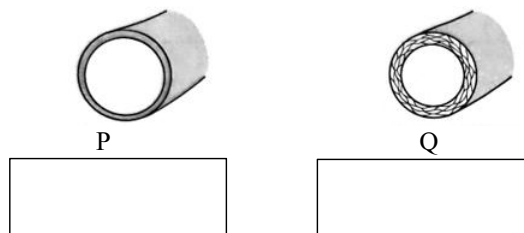
Which of the following systems is related to the above explanation?

- A Sistem respirasi dalam tumbuhan
Respiratory system in plants
- B Sistem pencernaan dalam haiwan
Digestive system in animals
- C Sistem perkumuhan dalam tumbuhan
Excretory system in plants
- D Sistem pengangkutan dalam organisma
Transport system in organisms

[1 markah/ 1 mark]
Memahami/Understand

2. a) Rajah menunjukkan dua jenis salur darah.

Diagram shows two types of blood vessels.



Labelkan P dan Q dengan perkataan yang diberi.

Label P and Q with the given words.

Arteri <i>Artery</i>	Vena <i>Vein</i>	Kapilari <i>Cappilary</i>
-------------------------	---------------------	------------------------------

[2 markah/ 2 marks]
Mengingat/Remember

- b) Tuliskan **BENAR** pada pernyataan yang betul dan **PALSU** pada pernyataan yang salah bagi salur darah manusia.

Write **TRUE** for the correct statements and **FALSE** for the wrong statements about the human blood vessels.

Pernyataan Statements	BENAR atau PALSU TRUE or FALSE
i. Kapilari mempunyai dinding yang paling nipis. <i>Capillary has the thinnest wall</i>	
ii. Vena tidak mempunyai injap. <i>Veins do not have valve.</i>	
iii. Arteri mempunyai lumen yang besar <i>Arteries have large lumen.</i>	

[2 markah/ 2 marks]

Memahami/Understand

3. Jadual menunjukkan keputusan eksperimen untuk mengkaji kesan aktiviti fizikal terhadap kadar denyutan nadi.

Table shows the results of an experiment to study the effect of physical activities on the pulse rate.

Jenis aktiviti Type of activity	Kadar denyutan nadi (bilangan denyutan nadi per minit) Pulse rate (number of pulse rate per minute)
Berehat <i>Resting</i>	65
Berjalan <i>Walking</i>	74
Melompat 30 kali <i>Jumping 30 times</i>	91

- a) Nyatakan satu pemerhatian berdasarkan jadual di atas.

State an observation based on the table above.

[1 markah/ 1 mark]

Memerhati/Observing

- b) Nyatakan satu inferens.

State an inference.

[1 markah/ 1 mark]

Membuat inferens/Making inference

- c) Kenal pasti pemboleh ubah-pemboleh ubah bagi eksperimen ini.

Identify the variables for the experiment.

- (i) Pemboleh ubah dimanipulasikan

Manipulated variable

- (ii) Pemboleh ubah bergerak balas

Responding variable

[2 markah/ 2 marks]

Mengawal pemboleh ubah/Controlling the variables

- d) Berdasarkan eksperimen di atas, nyatakan definisi secara operasi bagi kadar denyutan nadi.
Based on the experiment above, state the operational definition of pulse rate.

[1 markah/ 1 mark]

Mendefinisi secara operasi/ *Defining operationally*

- e) Adakah eksperimen yang dijalankan adil? Terangkan.
Is the experiment conducted fair? Explain.

[2 markah/ 2 marks]

Mengeksperimen/ *Experimenting*

- f) Nyatakan kesimpulan bagi eksperimen ini.
State the conclusion for this experiment.

[1 markah/ 1 mark]

Mentafsir data/ *Interpret data*

L4: Penilaian**A4: Assessment**

1. Gariskan jawapan yang betul

Underline the correct answer.

- (a) Bagi organisma unisel seperti *Amoeba sp.* dan *Paramecium sp.*, bahan keperluan sel masuk terus ke dalam sel secara (respirasi / resapan) melalui membran sel.

For unicellular organisms such as Amoeba sp. and Paramecium sp., substances needed by the cells enter directly into the cells via (respiration / diffusion) through the cell membrane.

- (b) Organisma (ringkas / kompleks) mempunyai sistem pengangkutan khusus untuk mengangkut bahan keperluan sel ke semua sel badan dan menyingkirkan bahan kumuh dari semua sel badan.

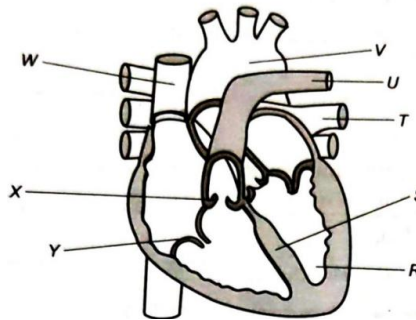
(Simple / Complex) organisms have a specialised transport system to transport the substances needed by cells to all the body cells and remove waste products from all the body cells.

[2 markah/ 2 marks]

Memahami/Understand

2. Lengkapkan jadual di bawah berpandukan rajah di bawah.

Complete the table below based on the diagram below.



(SUMBER:Modul Aktiviti STRATEGI A+ Sains Tingkatan 3, ILMU Bakti Sdn. Bhd., Muka Surat: 38)

Struktur berlabel <i>Labelled structure</i>	Struktur jantung <i>Structure of heart</i>
	Aorta <i>Aorta</i>
U	Arteri Pulmonari <i>Pulmonary Artery</i>
T	Vena Pulmonari <i>Pulmonary Vein</i>
	Vena Kava <i>Vena Cava</i>
X	Injap Sabit <i>Semilunar Valve</i>
	Injap Trikuspid <i>Tricuspid Valve</i>
R	Ventrikel Kiri <i>Left Ventricle</i>
	Septum <i>Septum</i>

[4 markah/ 4 marks]
Mengingat/Remember

3. Jadual menunjukkan ringkasan perbezaan ciri-ciri vena, kapilari dan arteri. Lengkapkan jadual.
Table shows a summary of the differences in the characteristics of veins, capillaries and arteries.
Complete the table.

Ciri-ciri Characteristics	Vena Vein	Kapilari Capillary	Arteri Artery
a) Ketebalan dinding <i>Thickness of wall</i>	Nipis <i>Thin</i>	Setebal satu sel <i>One cell thick</i>	
b) Injap <i>Valve</i>	Ada <i>Present</i>		Tiada <i>None</i>
c) Saiz Lumen <i>Lumen size</i>	Besar <i>Large</i>		Kecil <i>Small</i>
d) Tekanan darah <i>Blood pressure</i>		Menurun <i>Decreases</i>	Tinggi <i>High</i>

[4 markah/ 4 marks]
Mengingat/Remember

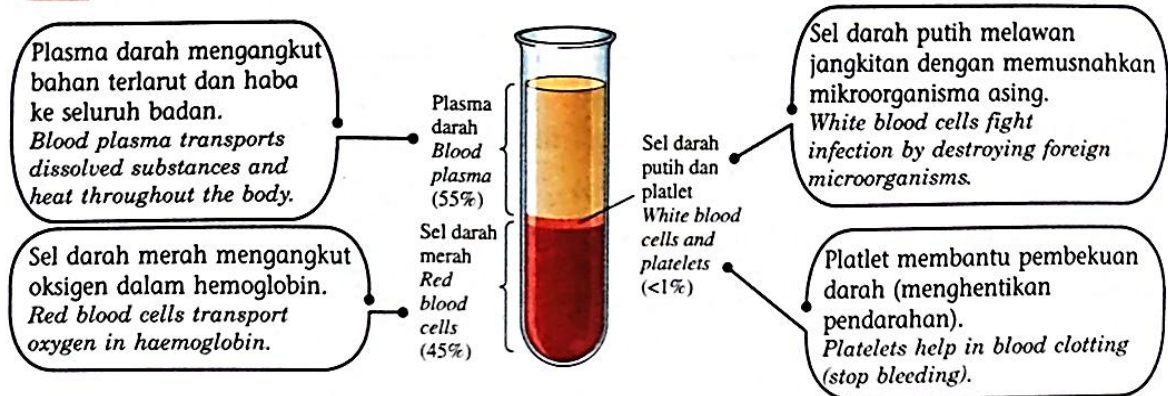
Sesi 8 / Session 8	
Bidang Pembelajaran <i>Learning Area</i>	3.0 Pengangkutan <i>3.0 Transportation</i>
Standard Kandungan <i>Content Standard</i>	3.3 Darah Manusia <i>3.3 Human Blood</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan darah manusia. <i>Students will be able to accomplish the tasks regarding the human blood.</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Komponen darah manusia <i>Components of human blood</i> 2. Antibodi dalam plasma darah <i>Antibodies in blood plasma</i> 3. Keserasian Kumpulan Darah Penderma dan Penerima <i>Compatibility of Blood Groups of Donors and Recipients</i>
Aktiviti <i>Activities</i>	1. Perbincangan fokus pembelajaran. (rujuk L1) <i>Discussion on learning focus. (refer to A1)</i> 2. Penekanan teknik menjawab soalan. (rujuk L2) <i>Focus on the technique of answering. (refer to A2).</i> 3. Pengukuhan dengan membuat latihan soalan berformat UASA (rujuk L3) dari aspek: <i>Emphasize the learning by answering the UASA-format items (refer to A3) in the aspect of:</i> - Fakta/ilmu pengetahuan (kandungan) <i>Fact/knowledge (content)</i> - Kemahiran proses sains <i>Science process skills</i>
Bahan Bantu Mengajar <i>Teaching Aids</i>	L1: Nota Revisi Cepat (BM & BI) <i>A1: Speedy Revision Notes (BM & BI)</i> L2: Teknik menjawab soalan. <i>A2: Answering Technique.</i> L3: Soalan Perbincangan: Soalan berformat UASA <i>A3: Discussion items: UASA-format items</i> L4: Penilaian <i>A4: Assessment</i>

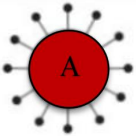
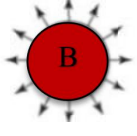
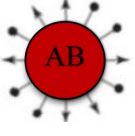
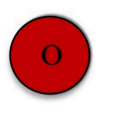
L1: Nota Revisi Cepat

A1: Speedy Revision Notes

3.3 Darah Manusia

(SUMBER: MODUL AKTIVITI MYPDP NOTA PINTAR SAINS TINGKATAN 3)



Kumpulan Darah Blood type				
Jenis antigen Type of antigen	Antigen A <i>A antigen</i>	Antigen B <i>B antigen</i>	Antigen A dan B <i>A and B antigen</i>	Tiada antigen <i>No antigen</i>
Jenis antibody Type of antibody	Anti-B	Anti-A	Tiada antibodi <i>No antibody</i>	Anti-A dan Anti-B <i>Anti-A and Anti-B</i>
Kumpulan darah penderma Donor's blood group	Kumpulan darah penerima Recipient's blood group			
	A	B	AB	O
A	✓	×	✓	×
B	×	✓	✓	×
AB	×	×	✓	×
O	✓	✓	✓	✓

Kunci/ Key:

(✓) Serasi/Compatible

(×) Tidak serasi/ Incompatible

Nota/ Notes:

Antibodi akan menyerang antigen yang sepadan dengannya.**Antibody will attack their corresponding antigens.****Serangan ini menyebabkan penggumpalan darah berlaku, pengaliran darah menjadi tidak lancar dan boleh menyebabkan kematian.****This attack causes blood coagulation, blood cannot flow efficiently and can lead to death.**

L2: Teknik Menjawab Soalan.**A2: Answering Technique.****A. Langkah-langkah menjawab soalan/ Steps for answering the question.**

- a) Baca arahan soalan/ *Read the question instructions*
- b) Fahamkan soalan/ *Understand the question*
- c) Gariskan kata kunci/ *Underline the key words*
- d) Rujuk markah soalan/ *Refer to question marks*
- e) Tentukan jawapan/ *Determine the answer*

Contoh/Example:

1. Jessica telah terlibat dalam suatu kemalangan jalan raya yang mengakibatkan dia kehilangan banyak darah. Doktor memaklumkan bahawa Jessica boleh menerima darah daripada kumpulan darah A dan O. Nyatakan jenis kumpulan darah Jessica. Wajarkan jawapan anda.

Jessica was involved in a road accident which resulted in her losing a lot of blood. The doctor informed that Jessica can receive blood from blood group A dan O. State Jessica's type of blood group. Justify your answer.

Jenis A, Darah A mempunyai antibodi Anti-B. Antibodi Anti-B boleh menyerang jenis darah lain yang mempunyai antigen B.

Type A, Blood A has antibodies Anti-B. Antibodies Anti-B can attack other blood types that have antigens B.

[2 markah/ 2 marks]

Menilai/ *Evaluate*

Teknik Menjawab:

Menilai – rujuk kepada **jumlah markah, 2 markah = 2 penerangan**

Kenal pasti fakta pernyataan, beri **2 penerangan** berdasarkan fakta mengenai pernyataan diberi.

Answering Technique:

Evaluating – refer to the total allocated marks, **2 marks = 2 explanations**

– Identify the fact from the given statement, give **2 explanations** based on the fact regarding the given statement

- a) Terangkan apa yang berlaku sekiranya Jessica menerima darah selain darah A dan O.

Explain what would happen if Jessica received blood other than type A and O blood.

Penggumpalan darah akan berlaku. Darah tidak dapat mengalir dengan lancar. Boleh menyebabkan kematian.

Coagulation of blood occur. Blood cannot flow efficiently. Can cause death.

[3 markah/ 3 marks]

Mengaplikasi/ *Apply*

Teknik Menjawab:

Menganalisis – rujuk jumlah markah, **3 markah = 3 penerangan / penyelesaian masalah**

– Kenal pasti **masalah** yang diberi, beri **3 penerangan** / penyelesaian / langkah / kaedah berdasarkan masalah tersebut.

Answering Technique:

Analyzing – refer to the total allocated marks, **3 marks = 3 explanations / problem solution**

– Identify the **given problem**, give **3 explanation** / solution / steps / ways / method regarding the given problem.

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 1/Level 1)**

1. Bagaimanakah komponen darah diasingkan?
How are the components of blood separated?

- A Melalui kaedah resapan
By diffusion method
- B Melalui kaedah emparan
By centrifugal method
- C Melalui kaedah elektrolisis
By electrolysis method
- D Melalui kaedah penyulingan
By distillation method

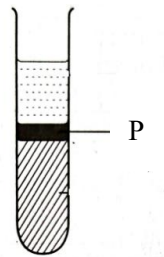
[1 markah/ 1 mark]
 Mengingat/Remember

2. Komponen darah yang manakah mengangkut oksigen?
Which blood components transport oxygen?

- A Platlet
Platelets
- B Plasma darah
Blood plasma
- C Sel darah putih
White blood cell
- D Sel darah merah
Red blood cell

[1 markah/ 1 mark]
 Mengingat/Remember

3. Rajah menunjukkan sampel darah seorang pesakit yang diasingkan dengan menggunakan kaedah emparan.
Diagram shows blood sample of a patient that is separated using the centrifugal method.



- a. Bulatkan komponen darah yang terdapat pada lapisan P.
Circle the blood components found in layer P.

Platlet <i>Platelets</i>	Plasma darah <i>Blood plasma</i>	Sel darah merah <i>Red blood cell</i>	Sel darah putih <i>White blood cell</i>
-----------------------------	-------------------------------------	--	--

[2 markah/ 2 marks]
 Memahami/Understand

- b. Tuliskan **BENAR** bagi pernyataan yang betul dan **PALSU** bagi pernyataan yang salah berkenaan kumpulan darah manusia.

*Write **TRUE** for the correct statement and **FALSE** for the incorrect statement regarding human blood groups*

<i>Pernyataan Statements</i>	<i>BENAR atau PALSU TRUE or FALSE</i>
i. Darah AB mempunyai antigen A dan antigen B. <i>Blood group AB has antigen A and antigen B.</i>	
ii. Darah O tidak mempunyai antibodi Anti-A dan Anti-B. <i>Blood group O does not have Anti-A and Anti-B antibodies.</i>	
iii. Darah A mempunyai antigen A. <i>Blood group A has antigen A.</i>	

[2 markah/ 2 marks]
Mengingat/Remember

4. Masniah mempunyai kumpulan darah A

Masniah has a blood group of A.

- a. Nyatakan antigen dan antibodi yang terdapat dalam darahnya.

State the antigen and antibody found in her blood.

Antigen/ *Antigen* : _____

Antibodi/ *Antibody* : _____

[2 markah/ 2 marks]
Mengingat/Remember

- b. Pemindahan darah perlu dijalankan ke atas Masniah. Nyatakan kumpulan darah yang boleh diterima oleh Masniah.

A blood transfusion is required for Masniah. State the blood group that can be received by Masniah.

[1 markah/ 1 mark]
Mengingat/Remember

- c. Jika Masniah menderma darahnya, nyatakan kumpulan darah bagi penerima darah tersebut.

If Masniah donates her blood, state the blood group of the recipient.

[1 markah/ 1 mark]
Mengingat/Remember

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 2/Level 2)**

1. Pemindahan darah dijalankan antara pasangan penderma dan penerima berikut. Pasangan yang manakah mempunyai darah yang serasi?

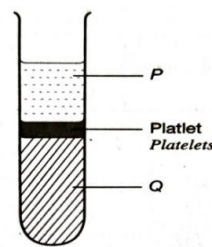
A blood transfusion is performed between the following pairs of donors and recipients. Which pair has compatible blood?

	Kumpulan darah penderma <i>Donor's blood group</i>	Kumpulan darah penerima <i>Recipient's blood group</i>
A	A	B
B	B	AB
C	AB	O
D	B	O

[1 markah/ 1 mark]
Mengingat/Remember

2. a) Rajah menunjukkan komponen darah manusia.

Diagram shows the human blood components.



Tandakan (✓) pada fungsi komponen P dan Q .

Tick (✓) the functions of P and Q respectively.

Fungsi <i>Function</i>	P	Q
Mengangkut bahan kumuh <i>Transports excretory products</i>		
Mengangkut makanan tercerna ke sel badan <i>Transports digested food to the body cell</i>		
Membawa oksigen dalam darah <i>Carries oxygen in blood</i>		

[2 markah/ 2 marks]
Memahami/Understand

- b) Gariskan perkataan yang betul tentang darah manusia.

Underline the correct words about the human blood.

- i) Individu yang mempunyai darah jenis (AB / O) boleh menerima semua jenis darah.

Individual who has (AB / O) blood type can receive all types of blood.

- ii) Kebolehan seseorang untuk menerima darah bergantung pada kehadiran (antibodi / antigen) dalam plasma darahnya

The ability of a person to receive blood depends on the presence of (antibodies/ antigens) in his blood plasma.

[2 markah/ 2 marks]
Mengingat/Remember

3. Rajah menunjukkan tiga mangsa kemalangan dan jenis kumpulan darah mereka.
Diagram shows three victims of an accident and their blood groups respectively.



Lim
AB



Tina
O



Mia
A

(SUMBER: KERTAS MODEL UASA Sains Tingkatan 3)

- a. Tina ialah penderma universal. Terangkan.
Tina is a universal donor. Explain.

[1 markah/ 1 mark]
 Memahami/Understand

- b. Nyatakan siapa yang serasi untuk menerima kumpulan darah A.
State who is compatible to receive blood group A.

[1 markah/ 1 mark]
 Memahami/Understand

- c. Nyatakan antigen dan antibodi Mia.
State the antigen and antibody present in Mia blood.

[2 markah/ 2 marks]
 Mengingat/Remember

- d. Pengumpulan darah akan berlaku apabila Mia menerima darah daripada Lim. Terangkan jawapan anda.
Coagulation of blood occur when Mia receives blood from Lim. Explain your answer.

[2 markah/ 2 marks]
 Memahami/Understand

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 3/Level 3)**

1. Rajah menunjukkan Lim dengan kumpulan darahnya.
Diagram shows Lim and his blood group.



(SUMBER: KERTAS MODEL UASA SAINS TINGKATAN 3)

Antara pernyataan berikut, yang manakah **BETUL**?
*Which of the following statement is **CORRECT**?*

- A Lim ialah penderma universal.
Lim is universal donor.
- B Lim boleh menderma darah kepada kumpulan darah A.
Lim can donate blood to A blood group.
- C Lim mempunyai semua jenis antigens dalam darahnya.
Lim has all types of antigens in his blood.
- D Lim tidak mempunyai antigen pada permukaan sel darah merah.
Lim does not have antigens on the surface of red blood cells.

[1 markah/ 1 mark]
 Memahami/Understand

2. a) Padankan komponen darah dengan fungsinya.
Match the blood components to its function.

Komponen darah <i>Blood components</i>
Plasma darah <i>Blood plasma</i>

Platlet <i>Platelets</i>

Fungsi <i>Function</i>
Terlibat dalam pembekuan darah <i>Involve in blood clotting</i>
Mengangkut bahan perkumuhan dari tisu <i>Transports excretory products from tissues</i>
Mengangkut karbon dioksida dari sel badan ke paru-paru <i>Transports carbon dioxide from body cells to the lungs</i>

[2 markah/ 2 marks]
 Mengingat/Remember

- b) Rajah menunjukkan Ahmad yang mempunyai kumpulan darah O.
The diagram shows Ahmad who has blood group O.



Kumpulan darah O
Blood group O

Tuliskan **BENAR** bagi pernyataan yang betul dan **PALSU** bagi pernyataan yang salah tentang kumpulan darah Ahmad.

Write **TRUE** for the correct statement and **FALSE** for the incorrect statements about Ahmad's blood group.

Pernyataan Statement	BENAR atau PALSU TRUE or FALSE
i. Ahmad mempunyai antibodi Anti-A boleh menerima darah jenis A dan AB. <i>Individuals who have Anti-A antibodies can receive type A and AB blood.</i>	
ii. Ahmad mempunyai antibodi anti-A dan anti-B dan boleh menderma darah kepada semua kumpulan darah yang lain. <i>Ahmad has anti-A and anti-B antibodies and can donate blood to all other blood groups.</i>	
iii. Ahmad mempunyai antibodi Anti-B boleh menerima darah jenis O sahaja. <i>Ahmad has antibodies Anti-B and can only receive blood from group O.</i>	

[2 markah/ 2 marks]

Memahami/Understand

3. a) Rahman telah terlibat dalam suatu kemalangan jalan raya yang mengakibatkan dia kehilangan banyak darah. Doktor memaklumkan Rahman hanya boleh menerima darah jenis O sahaja.
Rahman was involved in a road accident that caused him to losing a lot of blood. The doctor informed that Rahman can only receive type O blood.

- i) Nyatakan kumpulan darah Rahman. Wajarkan jawapan anda.
State Rahman's blood group. Justify your answer.

[2 markah/ 2 marks]

Menilai/ Evaluate

- ii) Terangkan apa yang berlaku sekiranya Rahman menerima darah selain darah O.
Explain what would happen if Rahman received blood other than type O blood.

[3 markah/ 3 marks]

Memahami/Understand

- b) Hospital Balingian telah menganjurkan Kempen Menderma Darah. Darah yang diterima akan melalui ujian saringan sebelum digunakan. Wajarkan mengapa ujian saringan perlu dilakukan.

Balingian Hospital has organized a Blood Donation Campaign. The blood received will go through a screening test before being used. Justify why screening test should be performed.

[1 markah/ 1 mark]

Menilai/ Evaluate

L4: Penilaian

A4: Assessment

1. Padankan setiap komponen darah berikut dengan fungsi yang betul.

Match each of the following blood components with their correct functions.

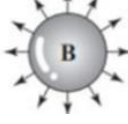
Komponen darah <i>Blood components</i>	Fungsi <i>Functions</i>
a) Platlet <i>Platelets</i>	Mengangkut oksigen dalam hemoglobin <i>Transports oxygen in hemoglobin</i>
b) Sel darah merah <i>Red blood cell</i>	Melawan jangkitan dengan memusnahkan mikroorganisma <i>Fights infections by destroying microorganisms</i>
c) Sel darah putih <i>White blood cell</i>	Membantu dalam pembekuan darah <i>Helps in blood clotting</i>

[3 markah/ 3 marks]

Mengingat/Remember

2. Lengkapkan jadual di bawah mengenai empat kumpulan darah.

Complete the table below about the four blood groups.

Sel darah merah <i>Red blood cell</i>				
Kumpulan darah <i>Blood group</i>	A	B	AB	O
Antigen dalam sel darah merah <i>Antigen in red blood cell</i>	Antigen A <i>A antigen</i>	_____	_____	_____
Antibodi dalam plasma darah <i>Antibody in blood plasma</i>	_____	_____	_____	_____

[7 markah/ 7 marks]

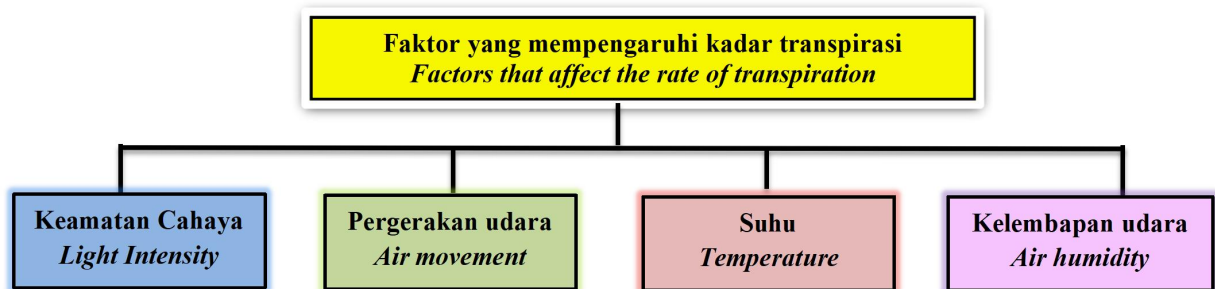
Mengingat/Remember

Sesi 9 / Session 9	
Bidang Pembelajaran <i>Learning Area</i>	3.0 Pengangkutan <i>3.0 Transportation</i>
Standard Kandungan <i>Content Standard</i>	3.4 Pengangkutan dalam tumbuhan <i>3.4 Transport system in plants</i> 3.5 Sistem peredaran darah dalam haiwan dan sistem pengangkutan dalam tumbuhan <i>3.5 Blood circulatory system in animals and transport system in plants</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan pengangkutan dalam tumbuhan dan membanding beza sistem peredaran darah dalam haiwan dan sistem pengangkutan dalam tumbuhan <i>Students able to solve questions related to transport in plants and comparing between the blood circulatory system in animals and the transport system in plants.</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Pengangkutan dalam tumbuhan <i>Transport system in plants</i> 2. Membanding beza sistem peredaran darah dalam haiwan dan sistem pengangkutan dalam tumbuhan. <i>Comparing between the blood circulatory system in animals and the transport system in plants.</i>

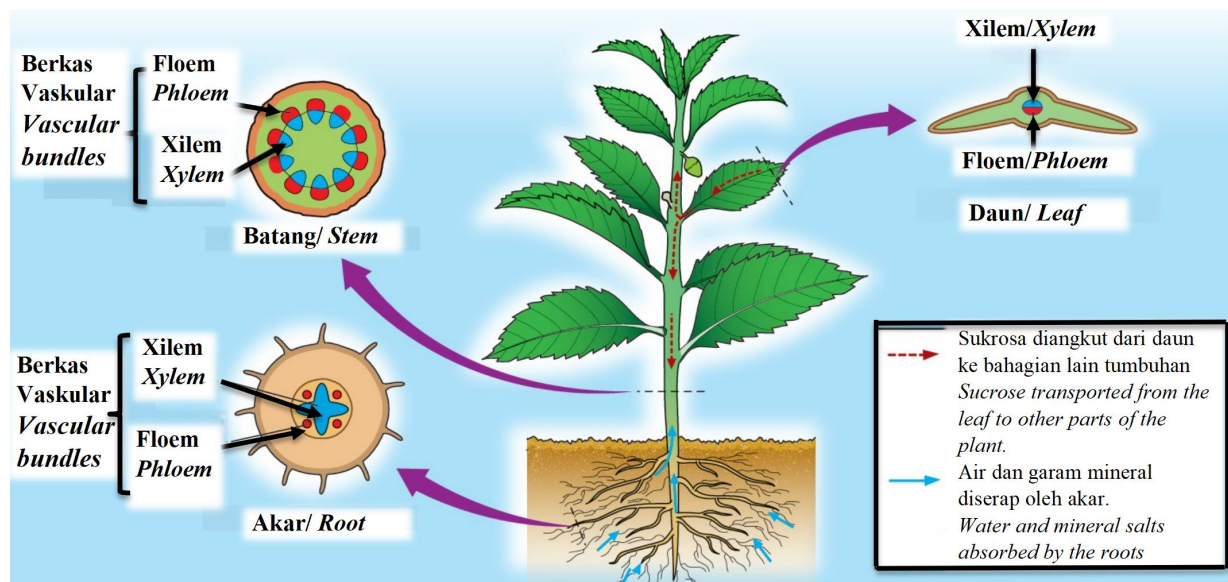
L1: Nota Revisi Cepat

A1: Speedy Revision Notes

- 1) Transpirasi ialah satu **proses tumbuhan kehilangan air daripada daun dalam bentuk wap air melalui stoma secara penyejatan.**
Transpiration is a process in which plants lose water from leaves in the form of water vapour through stomata by evaporation.
- 2) Transpirasi **berlaku dengan lebih cepat jika tumbuhan mempunyai banyak stoma.**
Transpiration occurs faster if the plant has many stomata.
- 3) Faktor-faktor lain yang mempengaruhi kadar transpirasi:
Other factors that affect rate of transpiration:



Struktur dan Fungsi Komponen dalam Berkas Vaskular Tumbuhan

Structures and Functions of the Components in Vascular Bundles of Plants

(SUMBER: BUKU TEKS SAINS TINGKATAN 3)

- ❖ **Xilem mengangkut air dan garam mineral terlarut** dari akar ke daun melalui batang untuk menjalankan fotosintesis dan menggantikan air yang hilang semasa transpirasi.
Xylem transports water and dissolved mineral salts from the roots to the leaves through the stem to carry out photosynthesis and to replace water lost during transpiration.
- ❖ **Floem mengangkut sukrosa** yang dihasilkan oleh daun semasa fotosintesis ke bahagian lain tumbuhan itu.
Phloem transports sucrose produced by leaves during photosynthesis to other parts of the plant.

Sistem Peredaran Darah dalam Haiwan dan Sistem Pengangkutan dalam Tumbuhan

Blood Circulatory System in Animals and Transport System in Plants

Sistem Peredaran darah dalam haiwan <i>Blood circulatory system in animals</i>	Sistem Pengangkutan dalam tumbuhan <i>Transports in plants</i>	
Persamaan/ Similarities		
- Kedua-duanya adalah sistem pengangkutan. <i>Both are transport systems.</i> - Kedua-duanya mengangkut air, nutrien dan bahan terlarut. <i>Both transport water, nutrients and dissolved substances.</i> - Kedua-duanya wujud dalam organisma kompleks <i>Both exist in complex organisms</i>		
Perbezaan/ Differences		
Sistem bertiub dengan jantung (pam) dan injap. <i>Tubular system with heart (pump) and valves</i>	Struktur <i>Structure</i>	Sistem bersalur tanpa pam atau injap <i>System of vessels without pump or valve</i>
Tiga jenis: Arteri, Kapilari dan Vena <i>Three types: Artery, Capillary, Vein</i>	Jenis salur darah <i>Type of blood vessel</i>	Dua jenis: Floem dan Xilem <i>Two types: Phloem and Xylem</i>
Arteri, Kapilari dan Vena bersambung <i>Arteries, Capillaries and Vein connected</i>	Sambungan antara salur pengangkutan <i>Connection between transport vessels</i>	Xilem dan floem tidak bersambung <i>Xylem and Phloem not connected</i>

L2: Teknik Menjawab Soalan.**A2: Answering Technique.****A. Langkah-langkah menjawab soalan/ Steps for answering the question.**

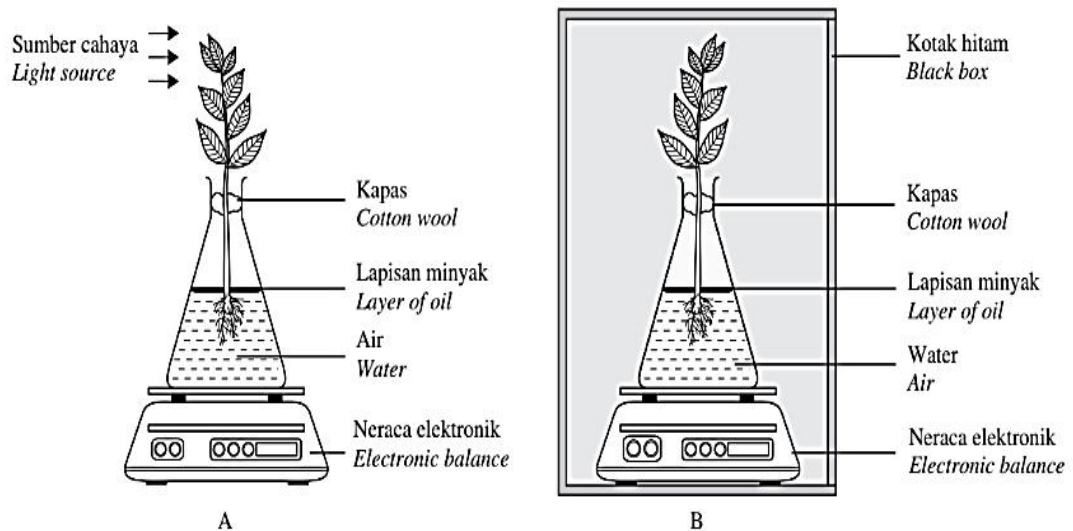
- Baca arahan soalan/ *Read the question instructions*
- Fahamkan soalan/ *Understand the question*
- Gariskan kata kunci/ *Underline the key words*
- Rujuk markah soalan/ *Refer to question marks*
- Tentukan jawapan/ *Determine the answer*

B. Penerangan cara menjawab soalan Kemahiran Proses Sains

Explanation for answering the Science Process Skills questions.

Contoh/ Example:

- Rajah menunjukkan satu susunan radas untuk mengkaji kesan keamatan cahaya terhadap kadar transpirasi.
Diagram shows the set-up of apparatus for an experiment to study the effect of light intensity on the rate of transpiration.



Susunan radas <i>Apparatus set-up</i>	A	B
Jisim sebelum eksperimen (g) <i>Mass before the experiment (g)</i>	350	350
Jisim selepas 3 jam eksperimen (g) <i>Mass after 3 hours of the experiment (g)</i>	315	335

Keputusan eksperimen direkodkan dalam jadual.

The result of this experiment is recorded in the table.

- a) Nyatakan satu **hipotesis** bagi eksperimen ini
State one hypothesis for this experiment

Semakin tinggi keamatan cahaya, semakin tinggi kadar transpirasi.
The higher the light intensity, the higher the rate of transpiration

[1 markah/ 1 mark]

Membuat hipotesis/*Making hypothesis*

Teknik Menjawab:

- Hipotesis – Hubungan antara pembolehubah dimanipulasi (PM) dan pembolehubah bergerak balas (PB).
- Guna ayat Semakin tinggi/ rendah (PM) semakin tinggi/rendah (PB).

Answering Technique:

- Hypothesis – Relationship between manipulated variable (MV) and responding variable (RV).
- Use the sentence *The higher/lower the (MV), the higher/lower (RV).*

- b) **Hitung** kadar transpirasi bagi kedua-dua susunan radas, dan lengkapkan jadual.
Calculate the rate of transpiration for both sets of apparatus, and complete the table.

$$\text{Set A} = \frac{(350-315)}{(3 \times 60)} \\ = 0.19$$

$$\text{Set B} = \frac{(350-335)}{(3 \times 60)} \\ = 0.08$$

[2 markah/ 2 marks]

Mengukur dan menggunakan nombor/ *Measuring and using numbers*

Teknik Menjawab:

- Membuat pengiraan menggunakan rumus
- Kadar transpirasi = $\frac{(\text{Jisim sebelum}(g) - \text{Jisim selepas}(g))}{\text{masa}(minit)}$

Answering Technique:

- Make calculations using formulas.
- Rate of transpiration = $\frac{(\text{Mass before}(g) - \text{Mass after}(g))}{\text{masa}(minutes)}$

- c) Nyatakan satu **inferens** daripada eksperimen ini.
State one inference from this experiment.

Kadar transpirasi set A lebih tinggi berbanding set B kerana set A terdedah kepada keamatan cahaya yang lebih tinggi.

The rate of transpiration for set A is higher than set B because set A is exposed to a higher light intensity

[2 markah/ 2 marks]

Membuat inferens/*Making inference*

Teknik Menjawab:

- Inferen – Membuat kesimpulan awal berdasarkan pemerhatian, memberi penerangan logik dan menyatakan sebab

Pemerhatian: **Kadar transpirasi set A lebih tinggi berbanding set B**

Kerana: **set A terdedah kepada keamatan cahaya yang lebih tinggi.**

Inferens: **Kadar transpirasi set A lebih tinggi berbanding set B kerana set A terdedah kepada keamatan cahaya yang lebih tinggi.**

Answering Technique:

- Inference – Make initial conclusions based on observations, provide logical explanations and state reasons

Observation: **The rate of transpiration for set A is higher than set B.**

Because: **set A is exposed to a higher light intensity.**

Inference: **The rate of transpiration for set A is higher than set B because set A is exposed to a higher light intensity.**

- d) Nyatakan **pemboleh ubah- pemboleh ubah** bagi eksperimen ini.

State the **variables** in this experiment.

- (i) Pemboleh ubah dimanipulasikan: **Keamatan Cahaya**

Manipulated variable: **Light intensity**

- (ii) Pemboleh ubah bergerak balas: **Kadar transpirasi**

Responding variable: **Rate of transpiration**

[2 markah/ 2 marks]

Mengawal pemboleh ubah/Controlling the variable

Teknik Menjawab: (Rujuk gambar rajah di atas)

- Pemboleh ubah dimalarkan – Kenal pasti apa yang **sama** sepanjang eksperimen.
- Pemboleh ubah dimanipulasi – lihat apa yang **berbeza** dalam eksperimen/ gambar rajah/ jadual.
- Pemboleh ubah bergerak balas – perhatikan apa **berubah** atau hasil di akhir eksperimen

Answering Technique: (Refer to the diagram above)

- Constant variable – Identify what is the **same** throughout the experiment.
- Manipulated variable – see what is **different** in the experiment/diagram/table
- Responding variable – observe the **changes** or the ends product of an experiment.

- e) Nyatakan **definisi secara operasi** bagi kadar transpirasi.

State the **operational definition** of transpiration rate

Kadar transpirasi ialah perbezaan jisim radas set A dan set B apabila set A dan set B diletakkan di bawah keamatan cahaya yang berbeza.

The rate of transpiration is the difference in the mass of apparatus set A and set B when set A and set B are placed in different light intensity.

[1 markah/ 1 mark]

Mendefinisi secara operasi/ Defining operationally

Teknik Menjawab:

- Definisi secara operasi –
- (Definisi yang diminta) + ialah + (apa yang kamu perhatikan) + apabila (apa yang kamu buat) (Kadar transpirasi) + ialah + (perbezaan jisim set A dan set B) + apabila (set A dan set B diletakkan di bawah keamatan cahaya yang berbeza)

Answering Technique:

- Operational definition –
- (Definition requested) + is + (what you notice) + when (what you do) (The transpiration rate) + is + (the difference in the mass of the apparatus set A and set B) + when + (set A and set B are placed in different light intensity)

- f) **Ramalkan** apakah yang akan berlaku jika radas set B diletakkan di hadapan kipas yang bergerak.

Predict what will happen if the apparatus sets B is placed in front of a moving fan.

Kadar transpirasi bagi radas set B meningkat.

The rate of transpiration for apparatus sets B increases.

[1 markah/ 1 mark]

Meramal/ Predicting

Teknik Menjawab:

- Meramal – Jika data melibatkan nombor, jawapan perlu ditulis dalam bentuk nombor dengan melihat kepada perubahan pola.
- – Jika data buka bentuk nombor jawapan boleh ditulis dalam bentuk perkataan
Contoh: Bertambah/ Meningkat/ Berkurang/ Menurun/ Tiada perubahan

Answering Technique:

- Predict – If the data involves numbers, the answer needs to be write in number form by looking at changing patterns.
- – If the data is in the form of numbers, the answer can be written in word form
Example: Increase/ Increase/ Decrease/ Decrease/ No change

- g) Adakah eksperimen yang dijalankan ini **adil**? Terangkan.

Is this experiment conducted fair? Explain.

Ya, kerana eksperimen ini hanya mempunyai satu pemboleh ubah dimanipulasi iaitu keamatan cahaya.

Yes, because this experiment only has one manipulated variable, which is the light intensity.

[1 markah/ 1 mark]

Mengeksperimen/ Experimenting

Teknik Menjawab:

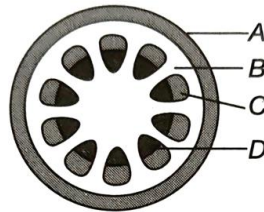
- Adil – eksperimen/ penyiasatan ini hanya mempunyai satu pemboleh ubah dimanipulasi iaitu_____.

Answering Technique:

- Fair – this experiment/ investigation only has one manipulated variable, which is_____.

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 1/Level 1)**

1. Rajah menunjukkan suatu keratan rentas bagi batang pokok bunga raya.
Diagram shows the cross section of the stem of a hibiscus plant.



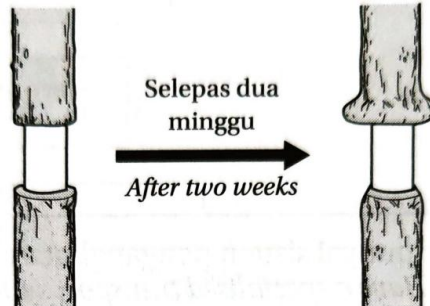
[1 markah/ 1 mark]
 Memahami/Understand

(SUMBER:PENTAKSIRAN TOPIK DEMI TOPIK KSSM SAINS TINGKATAN 3)

Bahagian yang manakah A, B, C, atau D mengangkut makanan yang dibina dalam daun ke bahagian lain tumbuhan itu?

Which part A, B, C, or D transports food built in the leaves to other parts of the plant?

2. Rajah menunjukkan keadaan satu pokok selepas satu gegelang lengkap pada kulit dibuang.
Diagram shows the condition of a plant after a complete ring of bark is removed.



(SUMBER:PENTAKSIRAN TOPIK DEMI TOPIK KSSM SAINS TINGKATAN 3)

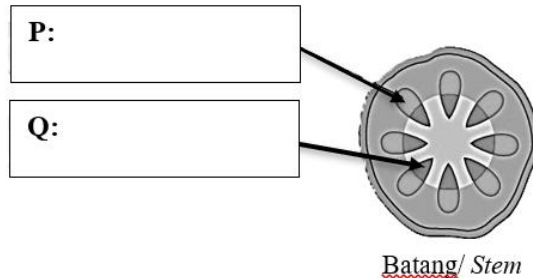
Struktur manakah telah dibuang yang menyebabkan keadaan itu?

Which structure was removed that caused the condition?

- A Xilem
Xylem
- B Floem
Phloem
- C Stoma
Stomata
- D Berkas vaskular
Vascular bundle

[1 markah/ 1 mark]
 Memahami/Understand

3. a) Rajah menunjukkan suatu keratan rentas bagi batang tumbuhan.
Diagram shows the cross section of plant stem.



(SUMBER: BUKU TEKS SAINS TINGKATAN 3)

Lengkapkan rajah dengan perkataan diberi.
Complete the diagram with the given words.

Xilem <i>Xylem</i>	Berkas Vaskular <i>Vascular bundle</i>	Floem <i>Phloem</i>
-----------------------	---	------------------------

[2 markah/ 2 marks]
 Mengingat/Remember

- b) **Bulatkan** pilihan jawapan yang betul bagi pernyataan di bawah.
Circle the correct answer for the following statement.

i) Semakin

rendah	tinggi
<i>lower</i>	<i>higher</i>

 suhu persekitaran, semakin tinggi kadar transpirasi.
The

<i>lower</i>	<i>higher</i>
--------------	---------------

the surrounding temperature, the higher the rate of transpiration.

ii) Semakin

rendah	tinggi
<i>lower</i>	<i>higher</i>

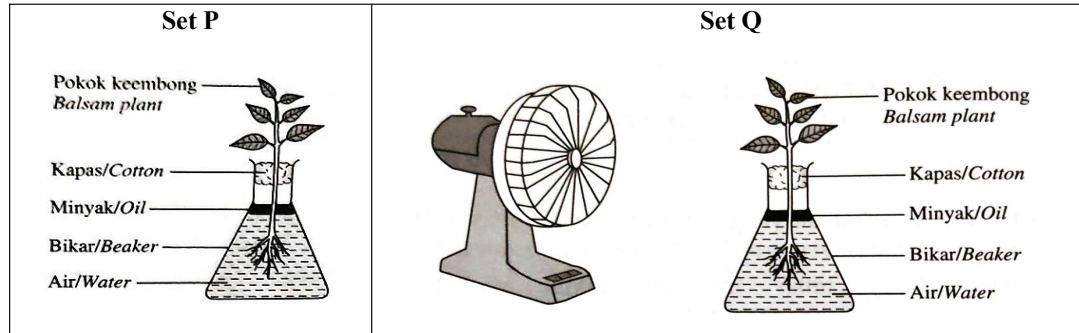
 kelembapan udara, semakin rendah kadar transpirasi.
The

<i>lower</i>	<i>higher</i>
--------------	---------------

the air humidity, the lower the rate of transpiration.

[2 markah/ 2 marks]
 Memahami/Understand

4. Rajah menunjukkan satu eksperimen untuk mengkaji kesan pergerakan udara terhadap kadar transpirasi.
Diagram shows an experiment to study the effect of air movement on the rate of transpiration.



(SUMBER:MODUL AKTIVITI MYPDP SAINS TINGKATAN 3)

- a) Tandakan (✓) faktor yang mempengaruhi kadar transpirasi dalam eksperimen ini.
Tick (✓) the factors that affect the rate of transpiration in this experiment.

Keamatan Cahaya <i>Light Intensity</i>	Kelembapan udara <i>Air humidity</i>	Pergerakan udara <i>Air movement</i>

[1 markah/ 1 mark]
 Memahami/Understand

- b) Nyatakan pemboleh ubah dimalarkan bagi eksperimen ini.
State the constant variable for this experiment.

[1 markah/ 1 mark]
 Mengawal pemboleh ubah/Controlling the variables

- c) Nyatakan kesimpulan bagi eksperimen ini.
State the conclusion for the experiment.

[1 markah/ 1 mark]
 Membuat kesimpulan/Making conclusion

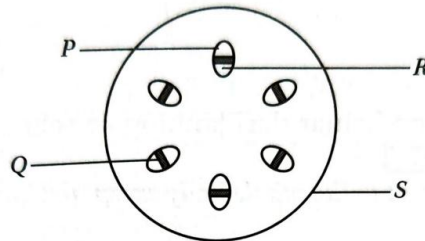
- d) Adakah eksperimen yang dijalankan ini adil? Terangkan.
Is this experiment conducted fair? Explain.

[2 markah/ 2 marks]
 Mengeksperimen/Experimenting

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 2/Level 2)**

1. Rajah menunjukkan keratan rentas batang tumbuhan.

Diagram shows a cross section of a plant stem



(SUMBER:MODUL AKTIVITI STRATEGI A+ SAINS TINGKATAN 3)

Struktur manakah merupakan tisu pengangkut dalam tumbuhan?

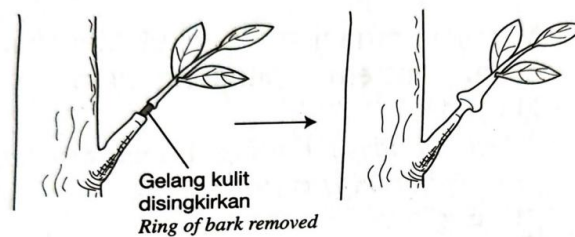
Which structure is a transport tissue in plants?

- A P dan Q
P and Q
- B Q dan R
Q and R
- C P dan R
P and R
- D R dan S
R and S

[1 markah/ 1 mark]
Memahami/Understand

2. Rajah menunjukkan perubahan yang berlaku pada batang suatu pokok selepas tiga minggu.

Diagram shows the changes that occur in the trunk of a tree after three weeks.



(SUMBER:PENTAKSIRAN TOPIK DEMI TOPIK KSSM SAINS TINGKATAN 3)

Manakah antara pernyataan berikut adalah benar mengenai situasi di atas?

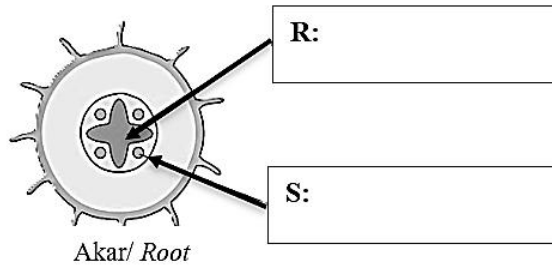
Which of the following statements is true about the above situation?

- A Tisu floem mengangkut makanan.
Phloem tissues transport food.
- B Tisu floem mengangkut air.
Phloem tissues transport water.
- C Tisu xilem mengangkut makanan.
Xylem tissues transport food.
- D Tisu xilem mengangkut mineral.
Xylem tissues transport mineral.

[1 markah/ 1 mark]
Memahami/Understand

3. a) Rajah menunjukkan keratan rentas akar suatu tumbuhan.

Diagram shows a cross section of a root in plant.



(SUMBER: BUKU TEKS SAINS TINGKATAN 3)

Labelkan R dan S dengan perkataan yang diberi.

Label the structures R and S with the given words.

Xilem <i>Xylem</i>	Berkas Vaskular <i>Vascular bundle</i>	Floem <i>Phloem</i>
-----------------------	---	------------------------

[2 markah/ 2 marks]

Mengingat/Remember

b) Padankan tisu pengangkut dalam tumbuhan dengan fungsinya yang betul.

Match the transport tissues in plants to the correct function.

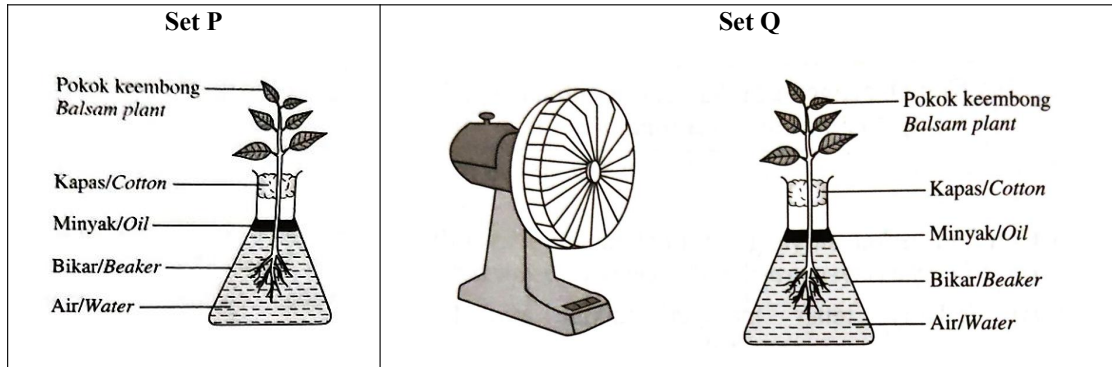
Tisu Pengangkut dalam tumbuhan <i>Transport tissues in plant</i>	Fungsi <i>Function</i>
R	- Mengangkut sukrosa (makanan) <i>Transport sukrosa(food)</i> - Mengangkut sukrosa (makanan) dan air <i>Transport sukrosa(food) and water</i> - Mengangkut air dan garam mineral <i>Transport water and mineral salts</i>
S	

[2 markah/ 2 marks]

Memahami/Understand

4. Rajah menunjukkan satu aktiviti yang dijalankan oleh sekumpulan murid untuk mengkaji kesan pergerakan udara terhadap kadar transpirasi.

Diagram shows an activity carried out by a group of students to study the effect of air movement on the rate of transpiration.



(SUMBER:MODUL AKTIVITI MYPDP SAINS TINGKATAN 3)

- a) Tulis satu hipotesis bagi eksperimen ini.

Write a hypothesis for this experiment.

[1 markah/ 1 mark]

Membuat hipotesis/*Making hypothesis*

- b) Nyatakan pemboleh ubah-pemboleh ubah berikut:

State the following variables.

- i. Pemboleh ubah dimanipulasi : _____

Manipulated variable : _____

- ii. Pemboleh ubah bergerak balas: _____

Responding variable : _____

[2 markah/ 2 marks]

Mengawal pemboleh ubah/*Controlling the variables*

- c) Jadual menunjukkan keputusan yang diperolehi selepas 30 minit eksperimen dijalankan.

Table shows the results obtained after 30 minutes of experiment.

Set	P	Q
Jisim awal susunan radas (g) <i>Initial mass of apparatus set-up (g)</i>	98	98
Jisim akhir susunan radas (g) <i>Final mass of apparatus set-up (g)</i>	96	91
Kadar transpirasi (g/min) <i>Rate of transpiration (g/min)</i>	0.067	0.233

Berdasarkan keputusan dalam jadual di atas, nyatakan satu inferens.

Based on the results in the table above, state an inference.

[1 markah/ 1 mark]

Membuat inferen/*Making inference*

- d) Ramalkan kadar transpirasi jika set P diletakkan di luar makmal sewaktu cuaca panas.

Predict the rate of transpiration if set P is placed outside the laboratory during a hot weather.

[1 markah/ 1 mark]

Meramal/*Predicting*

- e) Nyatakan definisi secara operasi bagi kadar transpirasi.

State the operational definition of rate of transpiration.

[1 markah/ 1 mark]

Mendefinisi secara operasi/ *Defining operationally*

- f) Adakah eksperimen yang dijalankan ini adil? Terangkan.

Is this experiment conducted fair? Explain.

[2 markah/ 2 marks]

Mengeksperimen/ *Experimenting*

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 3/Level 3)**

1. Antara berikut, keadaan yang manakah akan mengurangkan kadar transpirasi bagi suatu tumbuhan?

Which of the following conditions will reduce the rate of transpiration in plant?

	Suhu <i>Temperature</i>	Kelembapan <i>Humidity</i>	Keamatan Cahaya <i>Light intensity</i>
A	Tinggi <i>High</i>	Kering <i>Dry</i>	Malap <i>Dim</i>
B	Tinggi <i>High</i>	Kering <i>Dry</i>	Terang <i>Bright</i>
C	Rendah <i>Low</i>	Lembap <i>Moist</i>	Malap <i>Dim</i>
D	Rendah <i>Low</i>	Lembap <i>Moist</i>	Terang <i>Bright</i>

[1 markah/ 1 mark]

Mengingat/Remember

2. Apakah persamaan antara sistem peredaran darah dalam haiwan dengan sistem pengangkutan dalam tumbuhan?

What are the similarities between the blood circulatory system in animals and the transport system in plants?

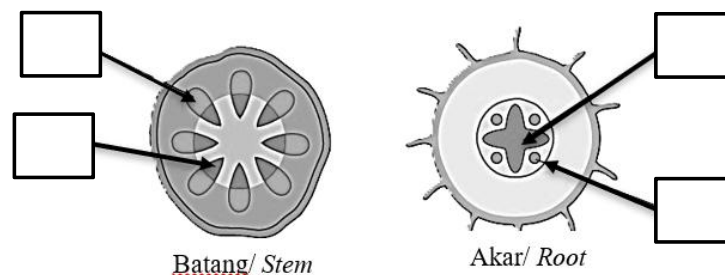
- A Kedua-dua mempunyai dua jenis salur pengangkut.
Both have two types of transport vessels.
- B Kedua-dua mengangkut air, nutrient dan bahan terlarut.
Both transport water, nutrients and dissolved substances.
- C Salur-salur tidak bersambung antara satu sama lain.
The transport vessels are not connected to each other.
- D Kedua-dua wujud dalam organisma kompleks dan organisma ringkas.
Both exist in complex organisms and simple organisms.

[1 markah/ 1 mark]

Mengingat/Remember

3. a) Rajah menunjukkan keratan rentas bagi batang dan akar tumbuhan.

Diagram shows the cross-section of the stem and roots of a plant.



(SUMBER:BUKU TEKS SAINS TINGKATAN 3)

Tandakan (✓) pada bahagian tumbuhan yang mengangkut air dan garam mineral.

Tick (✓) the part of the plant that transport water and mineral salts

[2 markah/ 2 marks]

Memahami/Understand

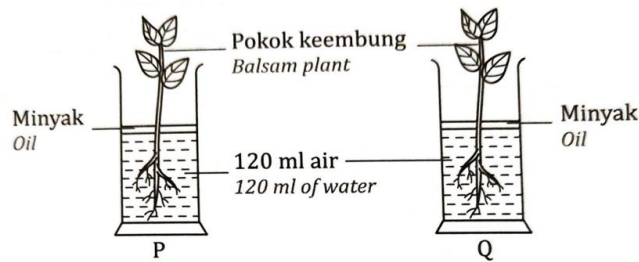
- b) Tulis BENAR bagi pernyataan yang betul dan PALSU bagi pernyataan yang salah.
Write TRUE for the correct statement and FALSE for the incorrect statement.

	Pernyataan Statement	BENAR atau PALSU TRUE or FALSE
i)	Kadar transpirasi meningkat apabila udara di sekeliling adalah lembap <i>Rate of transpiration increases when the surrounding air is humid.</i>	
ii)	Keamatan cahaya mempengaruhi saiz stoma dan seterusnya kadar transpirasi. <i>Light intensity affects the size of the stoma and subsequently the rate of transpiration.</i>	
iii)	Garam mineral yang larut dalam air diserap oleh akar dan diangkut ke batang dan daun pokok. <i>Mineral salts that dissolve in water are absorbed by the roots and transported to the tree's stem and leaves.</i>	

[2 markah/ 2 marks]

Mengingat/Remember

4. Rajah menunjukkan susunan radas yang digunakan untuk mengkaji faktor yang mempengaruhi kadar transpirasi.
Diagram shows the arrangement of the apparatus used to study the factor affect the rate of transpiration.



(SUMBER:OMG MODUL 9.0 SAINS TINGKATAN 3)

P diletakkan di dalam makmal sains dan Q diletakkan di luar makmal dan di bawah cahaya matahari. Jadual di bawah menunjukkan keputusan selepas tiga jam.

P is placed in the science laboratory and Q is placed outside the laboratory and under sunlight. The table shows the results after three hours.

Radas Apparatus	Isipadu air (ml) Volume of water (ml)		Kadar transpirasi (ml/min) Rate of transpiration (ml/min)
P	120.0	99.4	R
Q	120.0	95.2	S

- a) Nyatakan fungsi bagi minyak dalam eksperimen ini.
State the function of oil in this experiment.

[1 markah/ 1 mark]

Mentafsir data/ Interpreting data

b) Hitung nilai R dan S untuk eksperimen ini.

Calculate the values of R and S for this experiment.

[2 markah/ 2 marks]

Mengukur dan menggunakan nombor/ *Measuring and using numbers*

c) Nyatakan satu hipotesis bagi eksperimen ini.

State a hypothesis for this experiment.

[1 markah/ 1 mark]

Membuat hipotesis/ *Making hypothesis*

d) Kenal pasti pemboleh ubah-pemboleh ubah bagi eksperimen ini.

Identify the variables for the experiment.

(i) Pemboleh ubah dimanipulasikan
Manipulated variable

(ii) Pemboleh ubah bergerak balas
Responding variable

[2 markah/ 2 marks]

Mengawal pemboleh ubah/ *Controlling the variables*

e) Ramalkan apa yang berlaku kepada tumbuhan jika suhu adalah terlalu tinggi.

Predict what happens to plants if the temperature is too high.

[1 markah/ 1 mark]

Meramal/ *Predicting*

f) Nyatakan satu langkah berjaga-jaga yang perlu diambil dalam eksperimen ini.

State one precaution step that should be taken in this experiment.

[1 markah/ 1 mark]

Mengeksperimen/ *Experimenting*

L4: Penilaian
A4: Assessment

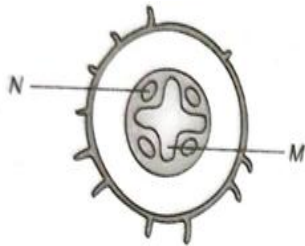
1. Bulatkan pilihan jawapan yang betul bagi pernyataan di bawah supaya menjadi satu pernyataan yang benar.
Circle the correct answer choice for the statement below so that it becomes a true statement.

- a) Kelembapan hujan udara / Rain Air Humidity
- b) Pergerakan udara masa / Movement of air time
- c) Keamatan kuasa cahaya / Power Light intensity
- d) Suhu Tekanan persekitaran / Surrounding temperature pressure

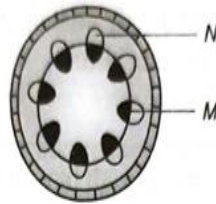
[4 markah/ 4 marks]

2. Rajah di bawah menunjukkan keratan rentas batang, akar dan daun tumbuhan.
The diagram below shows a cross-section of the stem, roots and leaves of a plant.

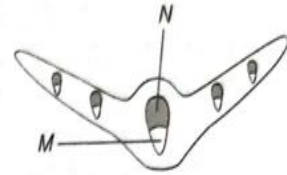
- a. Tentukan bahagian tumbuhan yang berlabel P, Q dan R.
Determine the parts of the plant labelled P, Q and R.



P: _____



Q: _____



R: _____

[3 markah/ 3 marks]

(SUMBER:MODUL AKTIVITI STRATEGI A+ SAINS TINGKATAN 3)

- b. M dan N ialah tisu dalam berkas vaskular tumbuhan. Lengkapkan jadual di bawah.
M and N are tissues in the vascular bundles of plants. Complete the table below.

Tisu Tissue	Nama tisu Name of tissue	Fungsi Function
M		i) ii)
N		

[3 markah/ 3 marks]

Sesi 10 / Session 10	
Bidang Pembelajaran <i>Learning Area</i>	4.0 Kereaktifan Logam <i>4.0 Reactivity Of Metals</i>
Standard Kandungan <i>Content Standard</i>	4.1 Kepelbagaian Mineral <i>4.1 Variety of minerals</i> 4.2 Siri Kereaktifan Logam <i>4.2 Reactivity series of Metals</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan kepelbagaian mineral dan siri kereaktifan logam. <i>Students will be able to accomplish the tasks regarding the variety of minerals and reactivity series of metals</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Contoh mineral wujud di kerak Bumi <i>Examples minerals that are found in the Earth's crust.</i> 2. Contoh ciri-ciri mineral semula jadi dan kegunaanya. <i>Examples the characteristics of natural minerals and its uses in daily life</i> 3. Siri kereaktifan logam berdasarkan kereaktifannya terhadap oksigen dan menulis persamaan perkataan bagi tindak balas. <i>Reactivity series of metals based on its reactivity with oxygen and write the word equation for the reactions.</i> 4. Kedudukan karbon dan hidrogen di dalam siri kereaktifan logam. <i>The position of carbon and hydrogen in the reactivity series of metals</i>
Aktiviti <i>Activity</i>	1. Perbincangan fokus pembelajaran. (rujuk L1) <i>Discussion on learning focus. (refer to A1)</i> 2. Penekanan teknik menjawab soalan. (rujuk L2) <i>Focus on the technique of answering. (refer to A2).</i> 3. Pengukuhan dengan membuat latihan soalan berformat UASA (rujuk L3) dari aspek: <i>Emphasize the learning by answering the UASA-format items (refer to A3) in the aspect of:</i> - Fakta/ilmu pengetahuan (kandungan) <i>Fact/knowledge (content)</i> - Kemahiran proses sains <i>Science process skill</i>
Bahan Bantu Mengajar <i>Teaching Aids</i>	L1: Nota Revisi Cepat (BM & BI) A1: <i>Speedy Revision Notes</i> (BM & BI) L2: Teknik Menjawab Soalan kepelbagaian mineral dan siri kereaktifan logam. A2: <i>Answering Technique of the variety of minerals and reactivity series of metals</i> L3: Soalan Perbincangan: Soalan Berformat UASA A3: <i>Discussion Items: UASA-format items</i> L4: Penilaian A4: <i>Assessment</i>

L1: Nota Revisi Cepat**A1: Speedy Revision Notes**

1. Mineral boleh ditemui dalam kerak Bumi
Minerals can be found in the Earth's crust.
2. Mineral wujud dalam bentuk unsur atau sebatian
Minerals exist in the form of element or compound
3. Contoh mineral wujud sebagai sebatian
Examples of mineral exist as compound

Mineral <i>Minerals</i>	Nama saintifik <i>Scientific name</i>	Unsur yang hadir <i>Elements present</i>
Bauksit <i>Bauxite</i>	Aluminium oksida <i>Aluminium oxide</i>	Aluminium, oksigen <i>Aluminium, oxygen</i>
Hematit <i>Hematite</i>	Besi (III) oksida <i>Iron (III) oxide</i>	Besi, oksigen <i>Iron, oxygen</i>
Kalsit <i>Calcite</i>	Kalsium karbonat <i>Calcium carbonate</i>	Kalsium, karbon, oksigen <i>Calcium, carbon, oxygen</i>
Magnesit <i>Magnesite</i>	Magnesium karbonat <i>Magnesium carbonate</i>	Magnesium, karbon, oksigen <i>Magnesium, carbon, oxygen</i>
Galena <i>Galena</i>	Plumbum sulfida <i>Lead sulphide</i>	Plumbum, sulfur <i>Lead, sulphur</i>

4. Kegunaan mineral
Uses of minerals
 - i. Silika: membuat kaca
Silica: produce glass
 - ii. Kalsium oksida; meneutralkan keasidan tanah
Calcium oxide: neutralise the acidic soil
 - iii. Kalsium karbonat (marmar): membuat Jubin / barangan perhiasan
Calcium carbonate (marble): produce tiles / decorative items



Galena
Galena



Bauksit
bauxite



Magnetit
magnetite

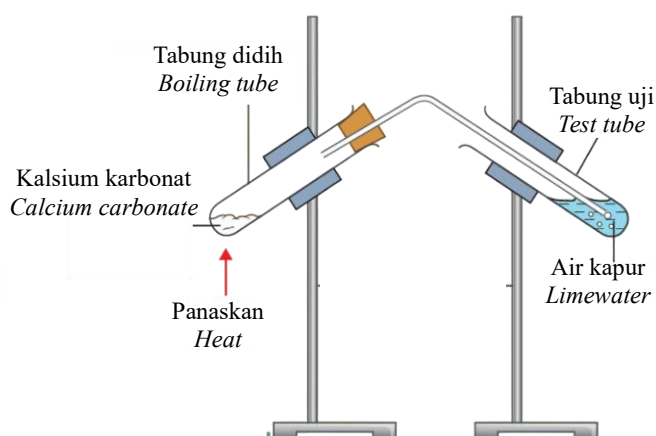
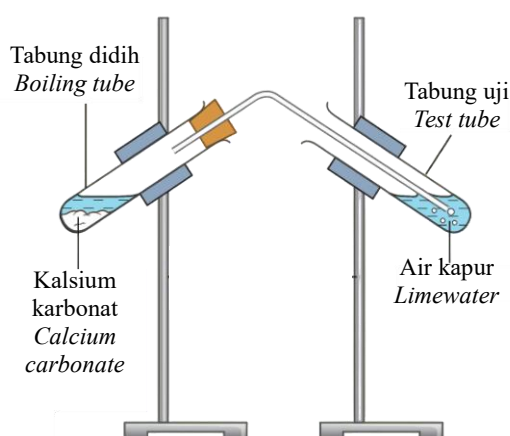
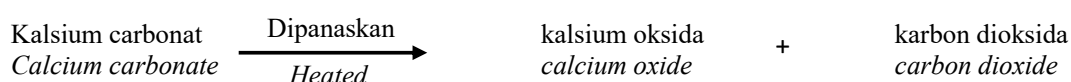
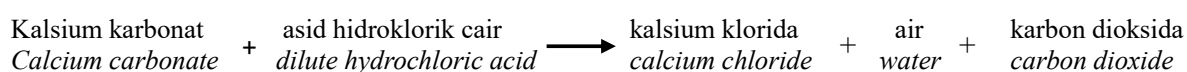


hematit
hematite



ferum pirit
iron pyrite

5. Aktiviti berikut menunjukkan sebatian semula jadi adalah kombinasi beberapa unsur.
Activity below shows a natural compound is a combination of several elements

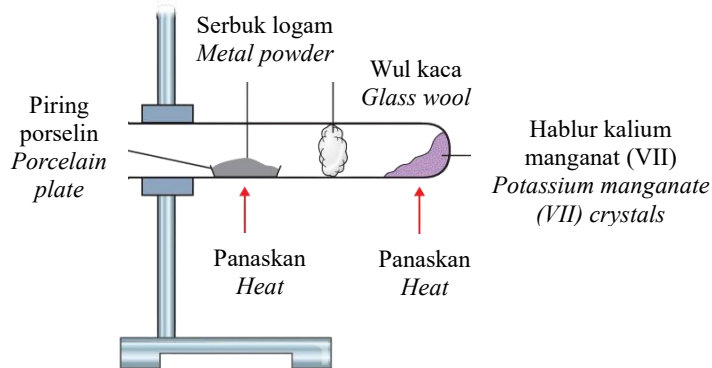


[Sumber: [T3B4_1.jpg \(1276x586\)](#)]

Pemerhatian: Air kapur menjadi keruh
Observation: Limewater turns cloudy

Inferens: Karbon dioksida dibebaskan
Inference: Carbon dioxide is released

6. Aktiviti berikut menunjukkan tindak balas logam dengan oksigen
Activity below shows the reaction between metals and oxygen

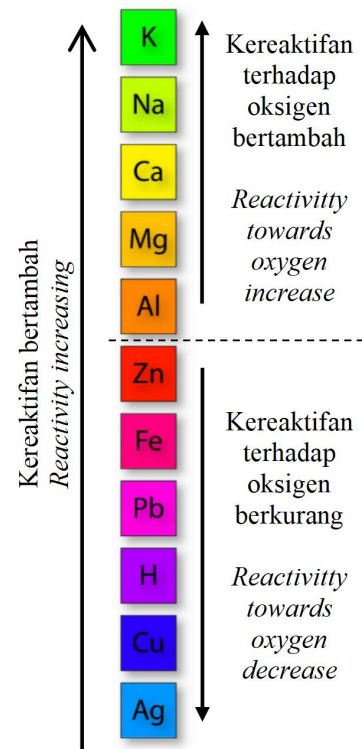


[Sumber: https://quizizz.com/_media/quizzes/32784555-a162-4e08-9d9b-315987e0efac]

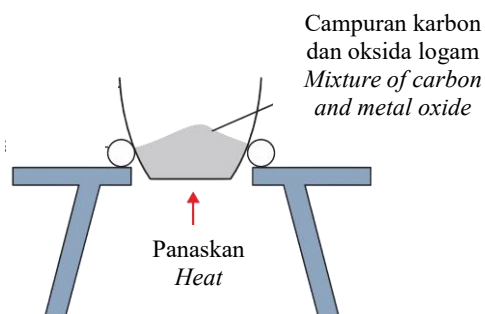
Persamaan perkataan umum : Logam + oksigen → oksida logam

General word equation : Metal + oxygen → metal oxide

Contoh tindak balas <i>Example of reaction</i>	Pemerhatian <i>Observation</i>
Plumbum + oksigen → plumbum oksida <i>Lead + oxygen → lead oxide</i>	Berbara dengan malap <i>Glow dimly</i>
Besi + oksigen → besi oksida <i>Iron + oxygen → iron oxide</i>	Berbara dengan terang <i>Glow brightly</i>
Zink + oksigen → zink oksida <i>Zinc + oxygen → zinc oxide</i>	Bernyala dengan perlahan <i>Burn slowly</i>
Aluminium + oksigen → aluminium oksida <i>Aluminium + oxygen → aluminium oxide</i>	Bernyala dengan cepat dan terang <i>Burns quickly and brightly</i>
Magnesium + oksigen → magnesium oksida <i>Magnesium + oxygen → magnesium oxide</i>	Bernyala dengan sangat cepat dan terang <i>Burns very quickly and brightly</i>



7. Aktiviti berikut menunjukkan tindak balas bagi menentukan kedudukan karbon dan hidrogen dalam siri kereaktifan logam.
Activity below shows the reaction to determine the position of carbon and hydrogen in the reactivity series of metal.



[sumber: [44b1eb57-8a6a-482d-a737-66c9e2148cae \(686x457\)](https://www.gutenberg.org/files/686/686-h/686-h.htm)]

Pemerhatian tindak balas:

Observation of reaction:

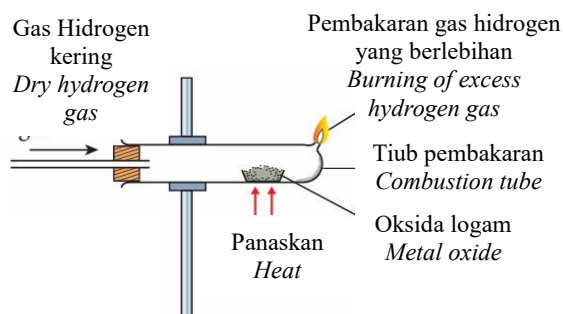
- Campuran zink oksida dan karbon:
Mixture of zinc oxide and carbon:
Campuran berbara dengan terang
the mixture glows brightly
- Campuran aluminium oksida dan karbon:
Mixture of aluminium oxide and carbon:
Tiada tindak balas berlaku
No reaction occurs
- Campuran besi oksida dan karbon:
Mixture of iron oxide and carbon:
Campuran bernyala dengan terang
The mixture burns brightly

Kesimpulan

Karbon berada di antara aluminium dengan zink dalam siri kereaktifan logam

Conclusion:

Carbon is located between aluminium and zinc in the reactivity series of metals.



[sumber: https://quizizz.com/_media/quizzes/8b3bad5d-320e-44ab-8c63-84a9fb20a96d]

Pemerhatian tindak balas:

Observation of reaction:

- Campuran zink dan hidrogen:
Mixture of zinc oxide and hydrogen:
Tiada tindak balas berlaku
No reaction occurs
- Campuran kuprum oksida dan hidrogen:
Mixture of copper oxide and hydrogen:
Campuran bernyala dengan sangat terang. Serbuk hitam bertukar menjadi perang.
The mixture burns very brightly. Black powder turns brown
- Campuran besi oksida dan hidrogen:
Mixture of iron oxide and hydrogen:
Campuran berbara dengan terang. Serbuk perang kemerahan bertukar menjadi kelabu berkilat.
The mixture glows brightly. Reddish brown powder turns shiny grey

Kesimpulan

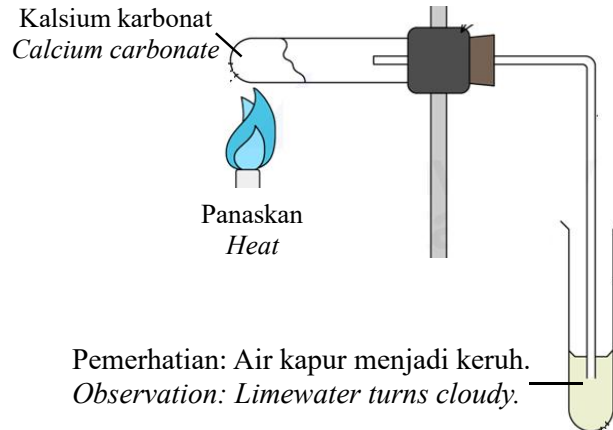
Hidrogen berada di antara zink dengan besi dalam siri kereaktifan logam

Conclusion:

Hydrogen is located between zinc and iron in the reactivity series of metals.

L2: Teknik Menjawab Soalan**A2: Answering Technique**

1. Rajah menunjukkan aktiviti untuk mengkaji sifat kalsium karbonat.
Diagram shows an activity to study the property of calcium carbonate.



[Sumber: [cRYIRJ5vIW8VTa68dBmLZg.png \(500×367\)](https://www.shutterstock.com/image-vector/500x367-cRYIRJ5vIW8VTa68dBmLZg.png)]

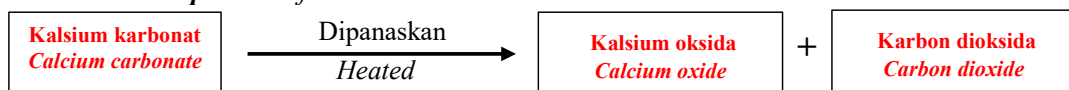
- a) Nyatakan **inferens** berdasarkan pemerhatian.
*State the **inference** based on the observation.*
Air kapur menjadi keruh kerana gas karbon dioksida dibebaskan
Limewater turns cloudy because carbon dioxide gas is released.

[1 markah / 1 mark]

KPS: Membuat inferens / Making Inference

Teknik Menjawab Soalan: 2 komponen jawapan
 tuliskan pemerhatian diikuti **kerana** penerangan yang menyebabkan pemerhatian tersebut berlaku.
Answering Technique: 2 components of answers
 write observation follow by **because** explanation of the cause of the observation to occur.

- b) Tuliskan **persamaan perkataan** bagi tindak balas kalsium karbonat
*Write the **word equation** of the calcium carbonate reaction.*



[1 markah / 1 mark]

Mengaplikasi / Apply

Teknik Menjawab Soalan: 2 komponen jawapan,
 tuliskan **bahan tindak balas** (di sebelah kiri $\rightarrow$), tuliskan **hasil tindak balas** (di sebelah kanan $\rightarrow$), diasingkan dengan “+” apabila mempunyai lebih daripada 1 hasil tindak balas.
Answering Technique: 2 components of answer,
 Write the **reactant** (left side of the $\rightarrow$), write the **products** (right side of the $\rightarrow$), separated by “+” when has more than 1 product.

- c) Nyatakan **kesimpulan** bagi aktiviti ini.

*State the **conclusion** of this activity.*

Kalsium karbonat mengandungi unsur-unsur kalsium, karbon dan oksigen

Calcium carbonate contains elements calcium, carbon and oksigen

[1 markah / 1 mark]

Mengeksperimen / *Experimenting*

Teknik Menjawab Soalan: rujuk semula tujuan aktiviti / eksperimen,
tuliskan dalam bentuk "**pernyataan**" tentang hasil penyiasatan.

Answering Technique: *refer to the aim of activity / experiment*

*write in "**statement**" regarding the outcome of the investigation.*

- d) Jadual menunjukkan pemerhatian tindak balas logam dengan oksigen

Table shows the observation of the reaction between metal and oxygen.

Logam <i>Metal</i>	Pemerhatian tindak balas logam dengan oksigen <i>Observation of the reaction between metal and oxygen</i>
Kuprum <i>Copper</i>	Membara dengan lambat dan malap. <i>Glow slowly and dimly.</i>
Aluminium <i>Aluminium</i>	Aluminium bernyala dengan cepat dan terang <i>Aluminium burns quickly and brightly.</i>
Logam P <i>Metal P</i>	Logam P bernyala dengan perlahan <i>Metal P burns slowly.</i>

Nyatakan tertib menaik bagi kereaktifan ketiga-tiga logam di atas

State in ascending order the reactivity of the metal above.

Kuprum P Aluminium
Copper P Aluminium

Kereaktifan menaik →

Reactivity increasing

[1 markah / 1 mark]

Berkomunikasi / *Communicating*

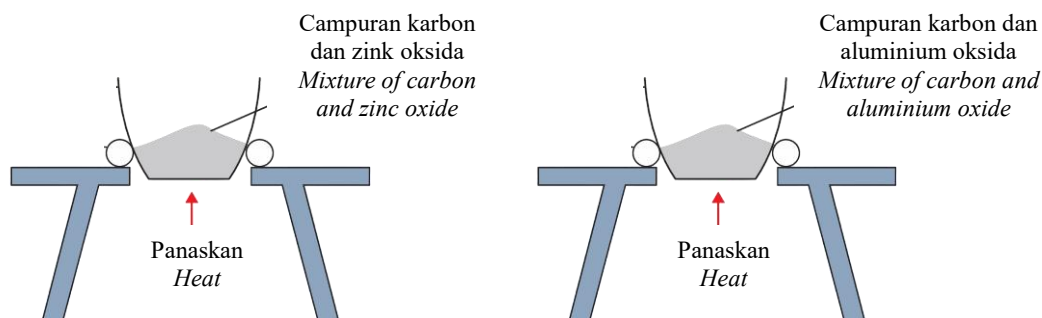
Teknik Menjawab Soalan: tertib menaik ialah dari kurang reaktif ke lebih reaktif
tuliskan nama logam, diikuti "koma"

Answering Technique: *ascending order is from less reactive to more reactive*

Write the name of metal, follow by "comma"

- e) Rajah menunjukkan sebuah eksperimen mengkaji kedudukan karbon dalam siri kereaktifan logam.

Diagram shows an experiment to study the position of carbon in the reactivity series of metal.



Nyat

akan logam yang akan menghasilkan campuran berbara dengan terang. Terangkan
State the metal which produces the mixture glowing brightly. Explain

Zink

Zinc

Penerangan:

**Penurunan zink oksida dengan karbon
atau**

Karbon adalah lebih reaktif daripada zink terhadap oksigen.

Explanation:

Reduction of zinc oxide by carbon

or

Carbon is more reactive than zinc towards oxygen

[2 markah / 2 marks]

Menganalisis / *Analyze*

Teknik Menjawab Soalan: 2 komponen jawapan,
Nyatakan “pilihan jawapan” terlebih dahulu
[pilihan jawapan = 1 markah]
Kemudian, terangkan pilihan jawapan anda.
[1 penerangan = 1 markah]

Answering Technique: 2 components of answer

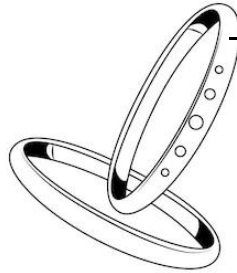
State the “choice answer” first. [choice answer=1 mark]

Then, explain your choice answer. [1 explanation = 1 mark]

L3: Soalan Perbincangan: Soalan Berformat UASA**A3: Discussion Items: UASA-Format Items****(TAHAP 1 / Level 1)**

1. Rajah menunjukkan sebentuk cincin diperbuat daripada mineral.

Diagram shows a ring made up of a mineral.



Diperbuat daripada mineral
Made up of a mineral

[Sumber: <https://images.app.goo.gl/cy4Dp1jqdv4EL8tf8>]

Antara berikut, pernyataan yang manakah **BENAR** tentang mineral ini?

*Which of the following statements is **CORRECT** regarding this mineral?*

- A. Ia ialah suatu unsur semula jadi
It is a natural element
- B. Ia ialah suatu sebatian semula jadi
It is a natural compound
- C. Ia sangat reaktif terhadap oksigen
It is highly reactive towards oxygen
- D. Ia perlu diekstrak daripada bijihnya.
It need to be extracted from its ores.

[1 markah / 1 mark]
Mengingat / Remember

2. Apakah kandungan hematit?
What does hematite contain?

- A. Besi dan oksigen
Iron and oxygen
- B. Plumbum dan sulfur
Lead and sulphur
- C. Aluminium dan oksigen
Aluminium and oxygen
- D. Kalsium, karbon dan oksigen
Calcium, carbon and oxygen

[1 markah / 1 mark]
Mengingat / Remember

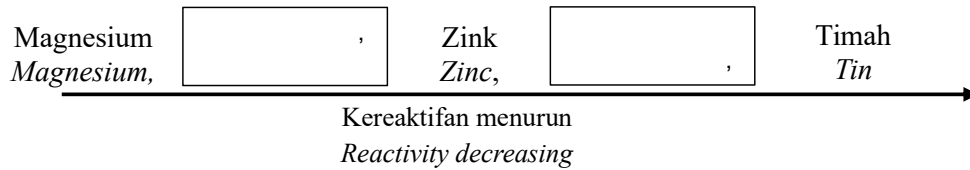
3. a) Padankan kegunaan mineral dalam kehidupan harian
Match the uses of mineral in daily life.

Mineral <i>Minerals</i>	Kegunaan <i>Uses</i>
Silikon oksida <i>Silicon oxide</i>	Membuat kaca <i>Make glass</i>
Aluminium oksida <i>Aluminium oxide</i>	Meneutralkan tanah berasid <i>Neutralize acidic soil</i>
	Untuk membuat skrin pelindung matahari dan kertas pasir. <i>To make sunscreen and sandpaper</i>

[2 markah / 2 marks]
Mengingat / Remember

- b) Rajah menunjukkan sebahagian logam dalam siri kereaktifan logam.

Diagram shows certain metals in the reactivity series of metals.



Lengkapkan siri ini dengan kedudukan “**karbon**” dan “**hidrogen**”

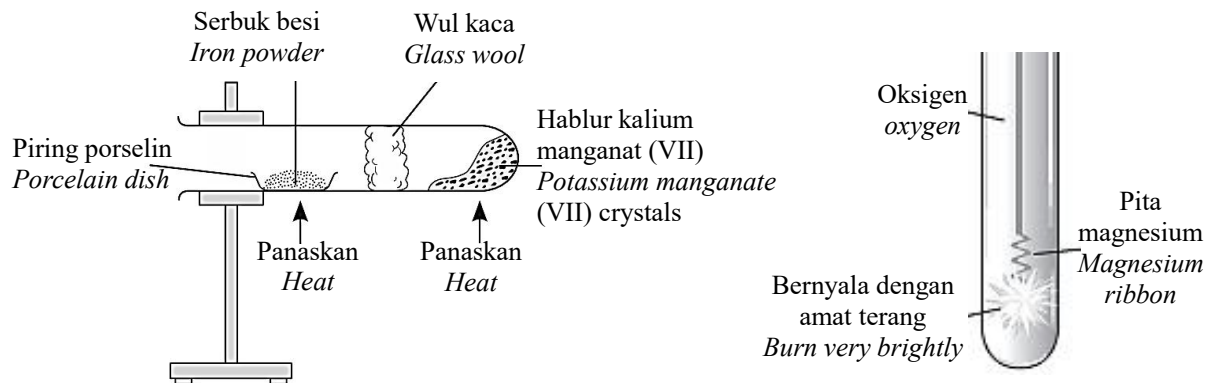
Complete this series with the position of “carbon” and “hydrogen”

[2 markah / 2 marks]

Memahami / Understand

4. Rajah menunjukkan satu eksperimen untuk menyiasat kereaktifan logam dengan oksigen.

Diagram shows an experiment to study the reactivity of metals with oxygen.



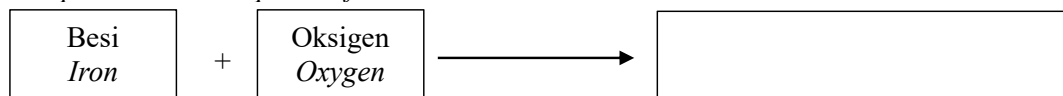
[Sumber: Buku Kerja myteach: OMGM 6.0 Sains Tingkatan 3]

- a) Nyatakan fungsi bagi hablur kalium manganat (VII)
State the function of potassium manganate (VII) crystals.

[1 markah / 1 mark]

Mengingat / Remember

- b) Lengkapkan persamaan perkataan bagi tindak balas ini.
Complete the word equation for this reaction.



[1 markah / 1 mark]

Mengingat / Remember

- c) Tindak balas pita magnesium terhadap oksigen mempunyai pemerhatian yang berbeza dengan serbuk besi. Jelaskan.

The reaction of magnesium ribbon towards oxygen has a different observation with iron powder. Explain it.

[1 markah / 1 mark]

Memahami / Understand

L3: Soalan Perbincangan: Soalan Berformat UASA**A3: Discussion Items: UASA-Format Items****(TAHAP 2 / Level 2)**

1. Maklumat berikut menerangkan sejenis mineral.
The following information explains a type of mineral.

- Terdiri daripada dua atau lebih jenis atom
Made up of two or more types of atoms
- Bergabung secara kimia
Combined chemically

Apakah jenis mineral ini?
What is this type of mineral?

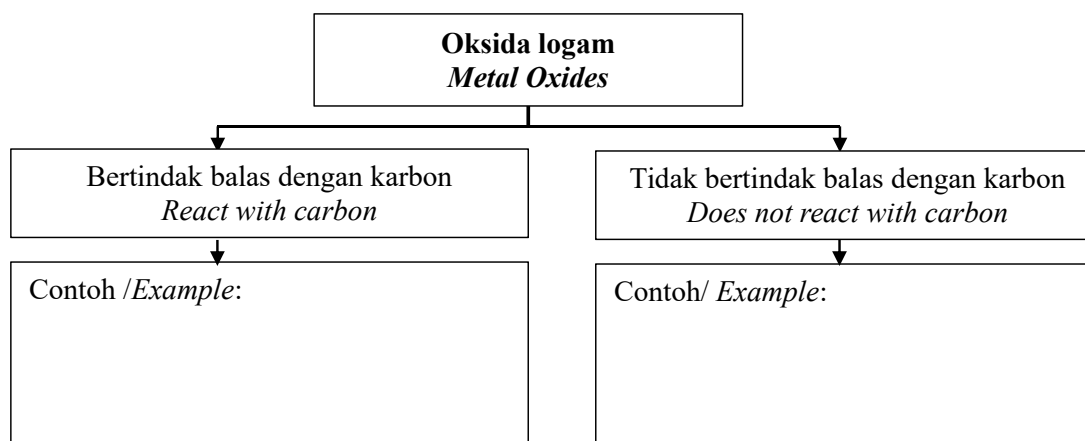
- A. Atom
Atom
- B. Unsur
Element
- C. Sebatian
Compound
- D. Campuran
Mixture

[1 markah / 1 mark]
 Memahami / Understand

2. a) Berikut menunjukkan beberapa oksida logam.
The following shows several metal oxides.

Kuprum oksida <i>Copper oxide</i>	Magnesium oksida <i>Magnesium oxide</i>	Natrium oksida <i>Sodium oxide</i>	Plumbum oksida <i>Lead oxide</i>
--------------------------------------	--	---------------------------------------	-------------------------------------

Kelaskan oksida logam di atas kepada bertindak balas dan tidak bertindak balas dengan karbon apabila dipanaskan
Classify the metal oxides above that react with carbon and do not react with carbon when heated up.



[2 markah / 2 marks]
 Mengingat / Remember

- b) Rajah menunjukkan kegunaan beberapa mineral dalam kehidupan harian.

Diagram shows the use of minerals in daily life.

[Sumber rajah: <https://images.app.goo.gl/zVDng5BcTa9aQHe28>] [<https://images.app.goo.gl/Jmx589ype2gUbDMBA>]

Kegunaan dalam kehidupan harian <i>Use in daily life</i>		
Contoh mineral <i>Example of mineral</i>	Silikon dioksida <i>Silicon dioxide</i> Kalsium oksida <i>Calcium oxide</i>	Produk kosmetik <i>Cosmetic products</i> Aluminium oksida <i>Aluminium oxide</i> Stanum (IV) oksida <i>Tin (IV) oxide</i>

Bulatkan contoh mineral yang betul ditunjukkan dalam rajah.

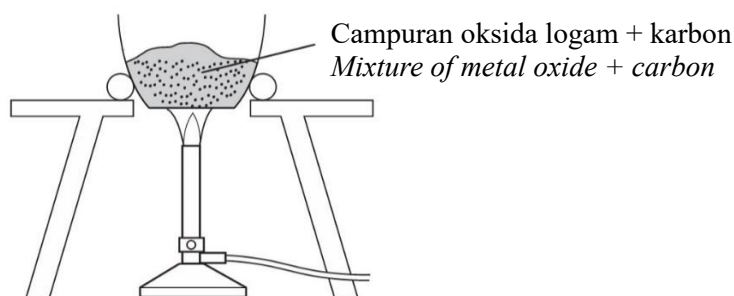
Circle the correct examples of mineral shows in the diagram.

[2 markah / 2 marks]

Memahami / *Understand*

3. Jadual menunjukkan pemerhatian bagi sebuah eksperimen untuk menentukan kedudukan karbon dalam siri kereaktifan logam.

Table shows the observation of an experiment to determine the position of carbon in the reactivity series of metals.



[Sumber: Buku Kerja myteach: OMGM 6.0 Sains Tingkatan 3]

Campuran <i>Mixture</i>	Pemerhatian <i>Observation</i>
Oksida P + karbon <i>P oxide + carbon</i>	Bernyala dengan amat terang <i>Burns very brightly</i>
Oksida Q + karbon <i>Q oxide + carbon</i>	Tiada perubahan yang diperhatikan <i>No observation can be detected</i>
Oksida R + karbon <i>R oxide + carbon</i>	Membara dengan malap <i>Glows dimly.</i>

- a) Nyatakan satu oksida logam yang bertindak balas dengan karbon.
State a metal oxide which will react with carbon.

[1 markah / 1 mark]
Mengingat / Remember

- b) Jelaskan pemerhatian bagi tindak balas oksida Q.
Explain the observation of the reaction of Q oxide.

[1 markah / 1 mark]
Memahami / Understand

- c) Nyatakan satu contoh logam yang menunjukkan pemerhatian seperti oksida Q
State an example of metal which shows the observation like Q oxide.

[1 markah / 1 mark]
Memahami / Understand

- d) Tuliskan persamaan perkataan bagi oksida R.
Write the word equation of R oxide.

[1 markah / 1 mark]
Mengaplikasi / Apply

- e) Nyatakan tertib menurun bagi kereaktifan logam P, Q, R dan kedudukan karbon
State in descending order the reactivity of metal P, Q, R and the position of carbon.

_____→
Kereaktifan menurun
Reactivity decreasing

[1 markah / 1 mark]
Memahami / Understand

- f) Berikut menunjukkan pemerhatian bagi eksperimen lain, oksida T dengan karbon
Below shows the observation of another experiment, T oxide and carbon.

Oksida T bernyala dengan terang.
T oxide burns brightly

Nyatakan kedudukan logam T di antara P, Q dan R dalam tertib menurun. Terangkan jawapan anda.

State the position of metal T among metals P, Q and R in descending order. Explain your answer.

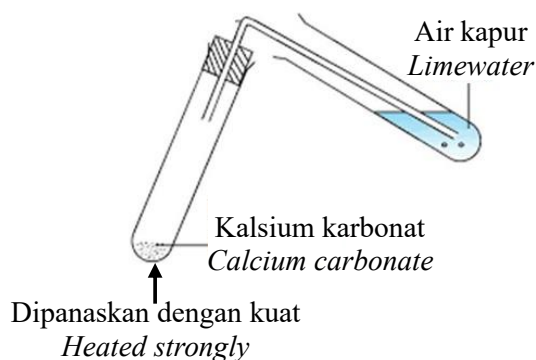
Penerangan / Explanation:

[2 markah / 2 marks]
Menganalisis / Analyze

L3: Soalan Perbincangan: Soalan Berformat UASA**A3: Discussion Items: UASA-Format Items****(TAHAP 3 / Level 3)**

1. Rajah menunjukkan tindak balas kalsium karbonat.

Diagram shows the reaction of calcium carbonate.



<https://images.app.goo.gl/vtST6ES6JQeVntB59>

Apakah gas yang dihasilkan?

What is the gas produced?

- A. Oksigen
Oxygen
- B. Hidrogen
Hydrogen
- C. Sulfur dioksida
Sulphur dioxide
- D. Karbon dioksida
Carbon dioxide

[Sumber:

[1 markah / 1 mark]

Memahami / *Understand*

2. a) Padankan nama umum mineral berikut dengan nama saintifiknya yang betul

Match the common name of the following minerals to their correct scientific name.

Nama umum
Common names

Bauksit
Bauxite

Hematit
Hematite

Nama saintifik
Scientific names

Plumbum (II) oksida
Lead (II) oxide

Besi (III) oksida
Iron (III) oxide

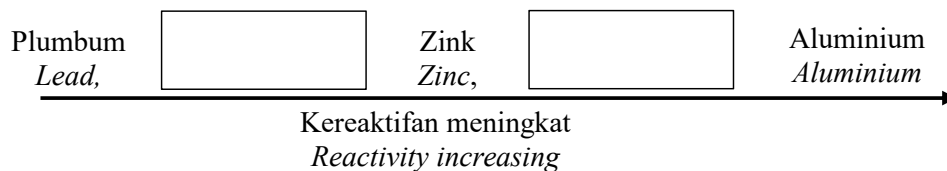
Aluminium oksida
Aluminium oxide

[2 markah / 2 marks]

Mengingat / *Remember*

- b) Rajah menunjukkan sebahagian logam dalam siri kereaktifan logam.

Diagram shows certain metals in the reactivity series of metals.



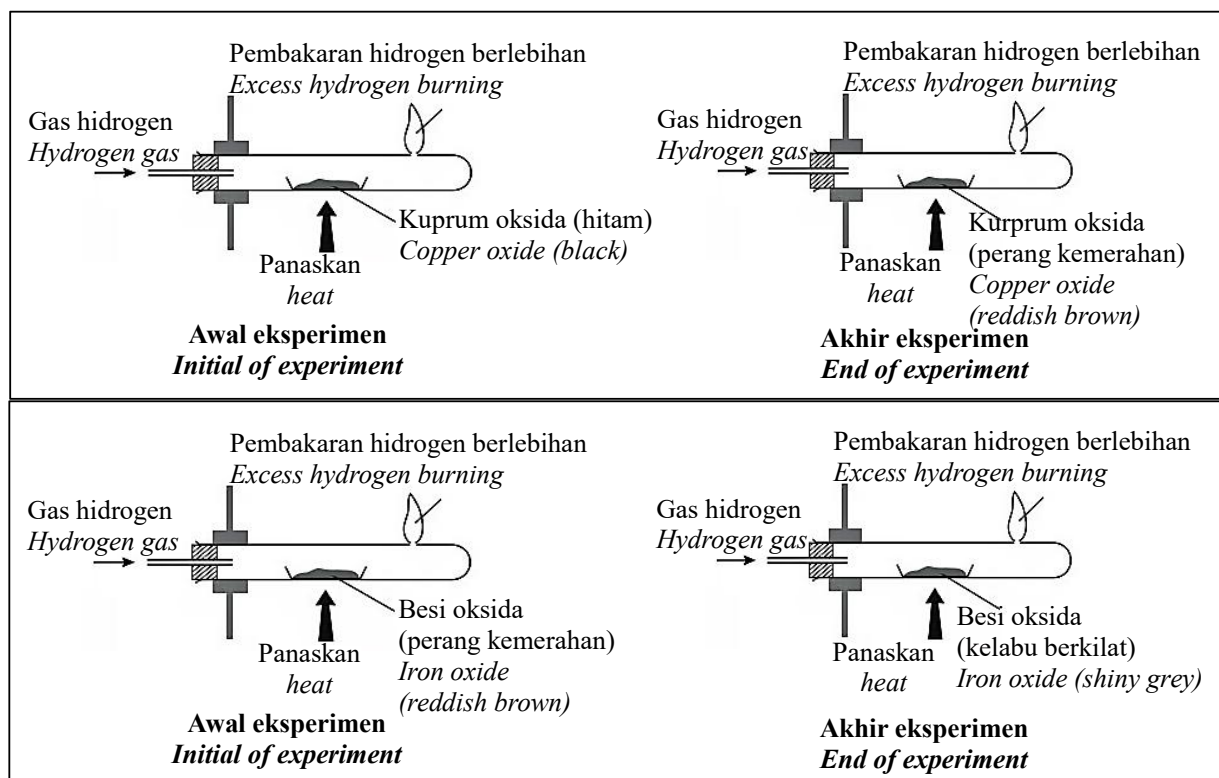
Lengkapkan siri ini dengan kedudukan “karbon” dan “hidrogen”

Complete this series with the position of “carbon” and “hydrogen”

[2 markah / 2 marks]

Memahami / *Understand*

3. Rajah menunjukkan satu eksperimen menentukan kedudukan hidrogen di dalam siri kereaktifan logam.
Diagram shows an experiment determine the position of hydrogen in the reactivity series of metal.



- a) Nyatakan dua pemerhatian bagi eksperimen ini.
State two observations of this experiment.

Pemerhatian 1: _____
Observation 1

Pemerhatian 2: _____
Observation 2

[2 markah / 2 mark]
Memerhati / Observing

- b) Nyatakan inference berdasarkan pemerhatian di (a)
State the inferens based on the observation at (a).

Inferens 1: _____
Inference 1

Inferens 2: _____
Inference 2

[2 markah / 2 mark]
Membuat Inferens/ Making Inference

- c) **Kenal pasti** pemboleh ubah- pemboleh ubah bagi eksperimen ini
Identify the variables for this experiment.

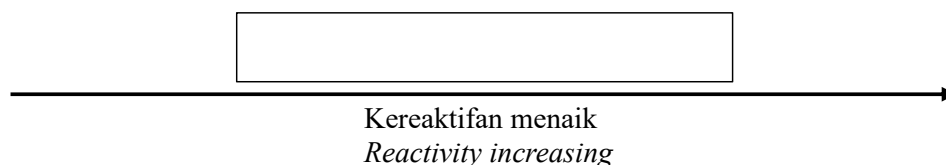
Pemboleh ubah dimanipulasikan : _____
Manipulated variable

Pemboleh ubah bergerak balas: _____
Responding variable

[2 markah / 2 marks]

Mengawal pemboleh ubah / *Controlling the Variables*

- d) Susunan kereaktifan logam dalam tertib menaik apabila bertindak balas dengan hidrogen.
Arrange the reactivity of metals in ascending order when reacting with hydrogen.


Kereaktifan menaik
Reactivity increasing

[1 markah / 1 mark]

Berkomunikasi / *Communicating*

- e) Nyatakan satu langkah berjaga-jaga yang perlu diambil semasa menjalankan eksperimen ini.
Jelaskan jawapan anda dengan menggariskan jawapan yang tepat
State one precaution step that must be taken when conducting this experiment. Explain your answer by underline the correct answer.

- i. Semua (udara, karbon dioksida) di dalam tabung didih mesti disingkirkan terlebih dahulu sebelum sebarang pemanasan.
All the (air, carbon dioxide) in the combustion tube must be eliminated first before any heating.
- ii. Ini untuk mengelakkan campuran gas hydrogen dan (udara, karbon dioksida) yang akan (terpadam, meletup) apabila pemanasan.
This is to prevent the mixture of hydrogen gas and the (air, carbon dioxide) will (extinguish, explode) when heated up.

[2 markah / 2 marks]

Mengeksperimen / *Experimenting*

L4: Penilaian**A4: Assessment**

Jawab semua soalan berikut:

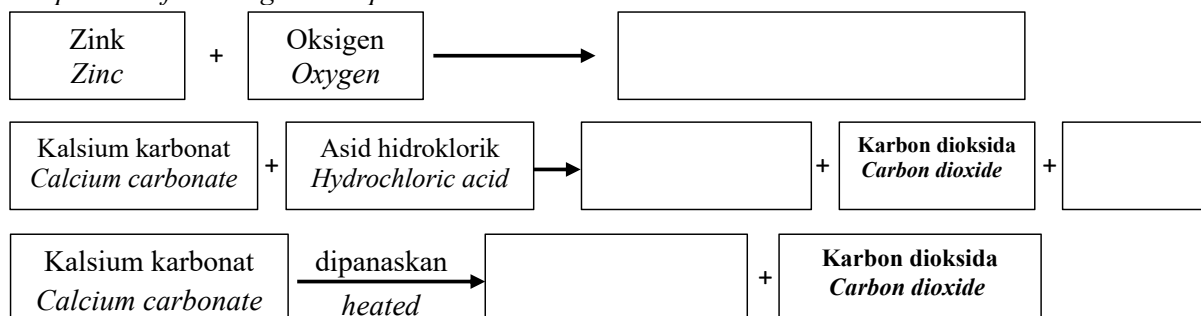
Answer all the following questions:

- _____ ialah unsur atau sebatian yang wujud secara semula jadi dalam kerak Bumi.
_____ *are elements or compounds that are found naturally in the Earth's crust.*
- Emas, perak, platinum dan merkuri ialah ____ semula jadi yang wujud secara bebas dalam kerak. Bumi.
Gold, silver, platinum and mercury are natural _____ that exist freely in the Earth's crust.
- Marmar dan galena ialah mineral yang wujud dalam bentuk _____ dalam kerak Bumi.
Marble and galena are minerals that exist in the form of _____ in the Earth's crust.

(3 markah/ 3 marks)

- Lengkap persamaan perkataan yang berikut.

Complete the following word equations.



(4 markah/ 4 marks)

- Kalsium karbonat terdiri daripada unsur-unsur _____, _____ dan _____

Contoh- contoh kalsium karbonat ialah kapur, cangkerang telur dan batu karang.

Calcium carbonate consists of _____, _____ and _____ elements.

Examples of calcium carbonate are eggshell and coral.

(6 markah/ 6 marks)

- Lengkapkan siri kereaktifan logam di bawah.

Complete the reactivity series of metals below.

Plumbum <i>lead</i>	emas <i>gold</i>	kuprum <i>copper</i>	besi <i>iron</i>	magnesium <i>magnesium</i>	karbon <i>carbon</i>	hidrogen <i>hydrogen</i>
------------------------	---------------------	-------------------------	---------------------	-------------------------------	-------------------------	-----------------------------

Kalium <i>Potassium</i>	Natrium <i>Sodium</i>	Kalsium <i>Calcium</i>		Aluminium <i>Aluminium</i>		Zink <i>Zinc</i>			Stanum <i>Tin</i>			Merkuri <i>mercury</i>	Argentum <i>Silver</i>	
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Kereaktifan berkurang / *reactivity decreasing* →

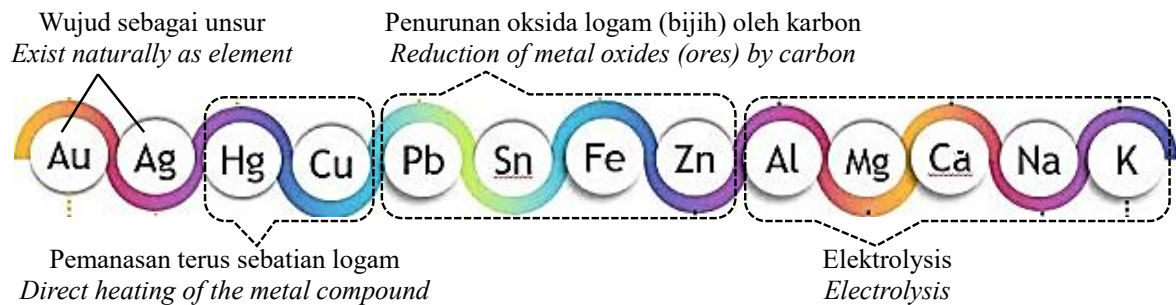
(7 markah/ 7 marks)

Sesi 11 / Session 11	
Bidang Pembelajaran <i>Learning Area</i>	4.0 Kereaktifan Logam <i>4.0 Reactivity of Metals</i>
Standard Kandungan <i>Content Standard</i>	4.3 Pengekstrakan Logam daripada Bijihnya <i>4.3 Extraction of metals from its ore.</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan pengekstrakan logam daripada bijihnya. <i>Students will be able to accomplish the tasks regarding the extraction of metals from its ore.</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Pengekstrakan logam daripada bijihnya. <i>Extraction of metals from its ore</i> 2. Cara menyelesaikan masalah daripada aktiviti perlombongan tidak terkawal. <i>Way to solve problems from unplanned mining activities</i>

L1: Nota Revisi Cepat**A1: Speedy Revision Notes**

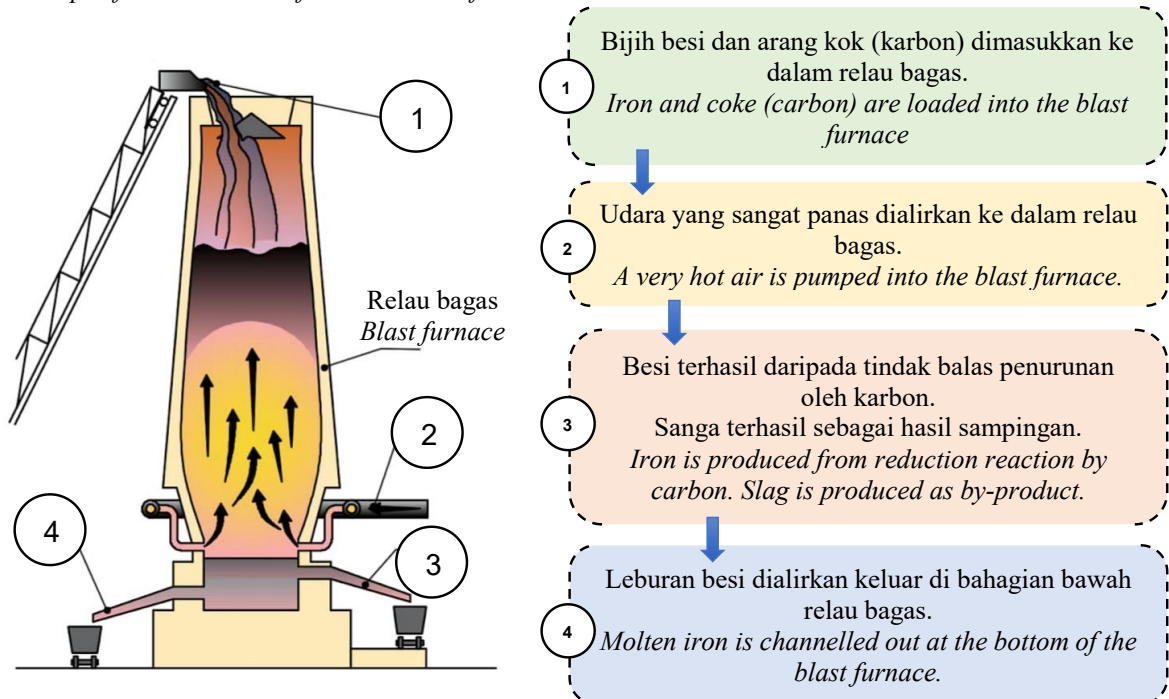
1. Rajah di bawah menunjukkan kaedah pengekstrakan logam.

Diagram shows the extraction method of metal.



2. Langkah-langkah proses pengekstrakan besi di dalam relau bagas.

The steps of the extraction of iron in a blast furnace.



[Sumber: [blast-furnace-2.jpg](#) (1600×900)]

Isu perlombongan di Malaysia <i>Mining issues in Malaysia</i>	Pencemaran udara disebabkan pembakaran bahan api <i>Air pollution due to burning of fuels</i>
	Pencemaran udara disebabkan gas yang dibebaskan dari relau bagas <i>Air pollution by gases released from blast furnaces</i>
	Pencemaran air disebabkan pencucian bijih <i>Water pollution due to cleaning of ore</i>
	Pencemaran bunyi disebabkan mesin perlombongan <i>Sound pollution from mining machinery</i>
	Hakisan tanah disebabkan perlombongan bijih galian <i>Soil erosion due to mining of ore</i>
	Pemusnahan habitat disebabkan pembinaan lombong <i>Destruction of habitat due to construction of mines</i>
	Penggunaan tenaga elektrik yang banyak <i>Usage of large amount of electrical energy</i>

L2: Teknik Menjawab Soalan

A2: Answering Technique

- Rajah menunjukkan aktiviti perlombongan di Malaysia.

Diagram shows the mining activity in Malaysia.



- Aktiviti perlombongan yang tidak terancang menyebabkan kemusnahan alam sekitar.

Terangkannya

Unplanned mining activity cause destruction on environment. Explain it

Pencemaran bunyi disebabkan mesin perlombongan

Sound pollution from mining machinery

Pemusnahan habitat flora dan fauna disebabkan pembinaan lombong

Destruction of habitat of fauna and flora due to the construction of mines

[2 markah / 2 marks]

Mengaplikasi / Apply

Teknik Menjawab Soalan: rujuk kepada jumlah markah, 2 markah = 2 penerangan / penyelesaian masalah

Kenal pasti **masalah** yang diberi, beri 2 penerangan / penyelesaian / langkah / kaedah berdasarkan masalah tersebut.

Answering Technique: refer to the total marks allocated,

2 marks = 2 explanations / problem solution

Identify the **given problem**, give 2 explanation / solution / steps / ways method regarding to the given problem.

- b) Bijih perlombongan dapat diekstrak melalui elektrolisis atau penurunan oleh karbon.

Banding dan bezakan kedua-dua kaedah ini.

Ore from the mining can be extracted by electrolysis or reduction by carbon.

Compare and contrast these two methods.

Persamaan: **Kedua-dua kaedah menghasilkan logam tulen dalam bentuk leburan**

Similarity *Both methods produce pure metal in molten form.*

Perbezaan:

Differences:

- i. **Elektrolisis digunakan untuk mengekstrak logam yang lebih reaktif daripada karbon manakala penurunan oleh karbon digunakan untuk mengekstrak logam yang kurang reaktif daripada karbon.**
Electrolysis is used to extract metal which is more reactive than carbon while reduction by carbon is used to extract metal which is less reactive than carbon.
- ii. **Elektrolisis untuk mengekstrak logam yang mempunyai kedudukan yang lebih tinggi daripada karbon dalam siri kereaktifan logam manakala penurunan oleh karbon untuk mengekstrak logam yang mempunyai kedudukan yang lebih rendah daripada karbon dalam siri kereaktifan logam.**
Electrolysis extracts the metal that is positioned higher than carbon in the reactivity series of metal while reduction by carbon extracts the metal that is positioned lower than carbon in the reactivity series of metal.

[3 markah / 3 marks]
Menganalisis / Analyze

Teknik Menjawab Soalan: rujuk kepada jumlah markah,
3 markah = 1 persamaan + 2 perbezaan atau
3 markah = 2 persamaan + 1 perbezaan
 Cara penulisan Persamaan:
 i. boleh mula dengan “kedua-dua ialah / mempunyai”
 ii. tuliskan: fakta / ciri sepunya pada kedua-dua aspek perbandingan.
 Cara penulisan Perbezaan:
 i. mesti menyatakan kedua-dua pihak
 contoh: **P** ialah **manakala Q** ialah
 ii. tuliskan: fakta / ciri/ fungsi/ sifat / kepentingan untuk membezakan kedua-dua

Answering Technique: refer to the total marks allocated,
3 marks = 1 similarity + 2 differences or
3 marks = 2 similarities + 1 difference
 Way to write Similarity:
 i. may start with “ Both are / have ”
 ii. write: fact / common characteristics between the two aspect of comparisons.
 Way to write Difference:
 i. must state the involved two party
 example: **P** is while **Q** is
 ii. write: fact / characteristic / function / property / importance to differentiate the involved two party

- c) Rajah menunjukkan sejenis mineral galena, plumbum sulfida.
Diagram shows a mineral galena, lead sulphide.



Galena ini dapat diekstrak daripada bijihnya dengan karbon. **Wajarkan**

Galene can be extracted from its ore by carbon. Justify it.

Plumbum ialah logam yang kurang reaktif daripada karbon.

Plumbum mempunyai kedudukan yang lebih rendah daripada karbon dalam siri kereaktifan logam.

Lead is less reactive than carbon.

Lead is positioned lower than carbon in the reactivity series of metal.

[2 markah / 2 marks]

Menilai / Evaluate

Teknik Menjawab Soalan: rujuk kepada jumlah markah, **2 markah = 2 penerangan**
 Kenal pasti **fakta** pernyataan, beri 2 penerangan berdasarkan fakta mengenai pernyataan diberi.

Answering Technique: refer to the total marks allocated, **2 marks = 2 explanations**

*Identify the **fact** from the given statement, give 2 explanations based on the fact regarding the given statement.*

L3: Soalan Perbincangan: Soalan Berformat UASA

A3: Discussion Items: UASA-Format Items

(TAHAP 1 / Level 1)

1. Logam yang manakah boleh diekstrak daripada bijihnya secara pemanasan dengan karbon?

Which metal can be extracted from its ore by heating it with carbon?

- A. Timah
Tin
- B. Kalsium
Calcium
- C. Natrium
Sodium
- D. Magnesium
Magnesium

[1 markah / 1 mark]

Mengingat / Remember

2. Kalium dan aluminium boleh diekstrak dengan kaedah elektrolisis leburan bijih galian dengan menggunakan elektrod karbon. Mengapa?

Potassium and aluminium can be extracted by electrolysis of molten mineral ores using carbon electron. Why?

- A. Oksida logamnya adalah lembut dan mudah terurai.
The metal oxide is soft and easily decomposed.
- B. Unsur logamnya tidak terikat kuat dengan unsur oksigen
The metal element is not strongly bonded to the oxygen element.
- C. Kedudukan logam-logam di bahagian bawah karbon dalam siri kereaktifan logam.
Position of the metals are at the bottom of carbon in the reactivity series of metals.
- D. Logam-logam ini lebih reaktif daripada karbon dan kedudukannya di atas karbon dalam siri kereaktifan logam.
These metals are more reactive than carbon and lie above carbon in the reactivity series of metals.

[1 markah / 1 mark]

Mengingat / Remember

3. a) Logam yang berbeza dapat diekstrak dengan kaedah pengekstrakan yang berbeza.
Tandakan (✓) pada ciri-ciri oksida logam yang dapat diekstrakkan melalui elektrolisis.
Different metals can be extracted with different method of extraction.

Tick (✓) the characteristics of metal oxide which extract by electrolysis

☐	Kedudukan logam adalah lebih tinggi daripada karbon dalam siri kereaktifan logam. <i>Position of metal is higher than the carbon in the reactivity series of metal</i>
☐	Oksida logam yang tidak dapat diturunkan oleh hidrogen atau karbon <i>Those metal oxide can not be reduced by hydrogen or carbon</i>
☐	Oksida logam wujud dalam keadaan pepejal <i>Metal oxide exists in solid state.</i>

[2 markah / 2 marks]

Memahami / Understand

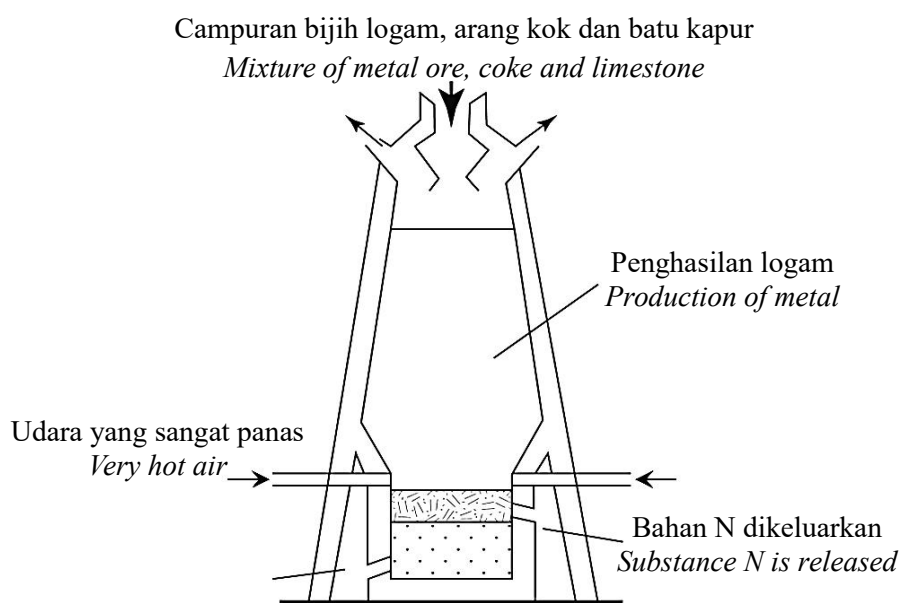
- b) Padankan kesan pengekstrakan logam dengan cara penyelesaian yang betul
Match the effect of extraction of ore with the correct way to overcome it.

Kesan <i>Kesan</i>	Cara penyelesaian <i>Way to overcome</i>
Pencemaran udara <i>Air pollution</i>	Menggunakan bahan kimia alternatif seperti hidrofluorokarbon (HFCs) <i>Adopt alternative chemicals like hydrofluorocarbons (HFCs)</i>
Pelupusan bahan buangan <i>Disposal of waste products</i>	Memerangkap dan menyimpan karbon dioksida <i>Capturing and storing carbon dioxide (CCS)</i>
	Mengamalkan amalan kitar semula logam. <i>Practice recycling metals</i>

[2 markah / 2 marks]

Mengingat / Remember

4. Rajah menunjukkan pengekstrakan logam daripada bijihnya.
Diagram shows the extraction of metal from its ore.



- a) Bulatkan logam tulen yang dapat diekstrak dengan menggunakan kaedah ini
Circle the pure metal that can be extracted by this method.

Stanum oksida <i>Tin oxide</i>	ferum (III) oksida <i>iron (III) oxide</i>	aluminium oksida <i>aluminium oxide</i>
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[2 markah / 2 marks]
 Mengingat / Remember

- b) Tanda (✓) keadaan dalam relau bagas yang membolehkan tindak balas berlaku untuk menghasilkan logam tulen.
Tick (✓) the condition inside the blast furnace to enable the reaction to occur to produce pure metal.

☐	Suhu tinggi <i>High temperature</i>
☐	Tekanan tinggi <i>High pressure</i>
☐	Arus elektrik tinggi <i>High electric current</i>

[1 markah / 1 mark]
 Mengingat / Remember

- c) Tuliskan susunan penghasilan logam tulen dengan betul
Write the sequence of production of pure metal in the correct order.

☐	Karbon dioksida bertindak balas dengan arang kok yang selebihnya. <i>Carbon dioxide reacts with the rest of the hot coke.</i>
☐	Arang kok atau karbon bertindak dengan oksigen di dalam udara panas <i>Coke or carbon reacts with oxygen in the hot air</i>
☐	Karbon monoksida dan karbon menurunkan oksida logam kepada logam tulen. <i>Carbon monoxide and carbon reduces the metal oxide into pure metal</i>

[2 markah / 2 marks]
 Mengingat / Remember

- d) Tandakan (✓) pada bahan yang terhasil di N dan fungsinya.
Tick (✓) the substance that produced at N and its use.

Bahan N <i>Substance N</i>		Kegunaan bahan N <i>Use of substance N</i>	
Sanga <i>Slag</i>		Menghasilkan barangan kemas <i>To make jewellery</i>	
Leburan logam tulen <i>Pure molten metal</i>		Membuat tapak jalan raya <i>To make the base of roads</i>	

[2 markah / 2 marks]
 Memahami / Understand

L3: Soalan Perbincangan: Soalan Berformat UASA**A3: Discussion Items: UASA-Format Items****(TAHAP 2 / Level 2)**

1. Apakah kaedah yang digunakan untuk mengekstrak aluminium daripada bijih bauksit?

What is the method used to extract aluminium bauxite ore?

- A. Elektrolisis
Electrolysis
- B. Penurunan dengan karbon
Reduction with carbon
- C. Penurunan dengan gas hidrogen
Reduction with hydrogen gas
- D. Tindak balas dengan gas oksigen
Reaction with oxygen

[1 markah / 1 mark]
Mengingat / Remember

2. a) Tuliskan **BENAR** bagi pernyataan yang benar dan **PALSI** bagi pernyataan yang salah tentang pengekstrakan bijih logam.

Write TRUE for correct statement and FALSE for the wrong statement regarding to the extraction of ore.

Pernyataan Statement	BENAR / PALSI TRUE / FALSE
Perak perlu diekstrak melalui elektrolisis. <i>Silver needs to be extracted through electrolysis.</i>	
Plumbum boleh diekstrak daripada bijihnya dengan menggunakan kaedah yang sama seperti pengekstrakan bijih besi. <i>Lead can be extracted from its ore by using the same method as extraction of iron ore.</i>	
Zink yang lebih reaktif daripada hidrogen dalam siri kereaktifan logam diekstrak daripada bijih galianya menggunakan hidrogen <i>Zinc that is more reactive than hydrogen in the reactivity series of metals is extracted from its ores by using hydrogen.</i>	

[2 markah / 2 marks]
Mengingat / Remember

- b) Aktiviti perlombongan yang tidak terancang akan mendatangkan kesan buruk semasa dan selepas perlombongan. Tandakan (✓) jawapan yang betul.

Unplanned mining activities will cause adverse effects during and after the mining. Tick (✓) the correct answer.

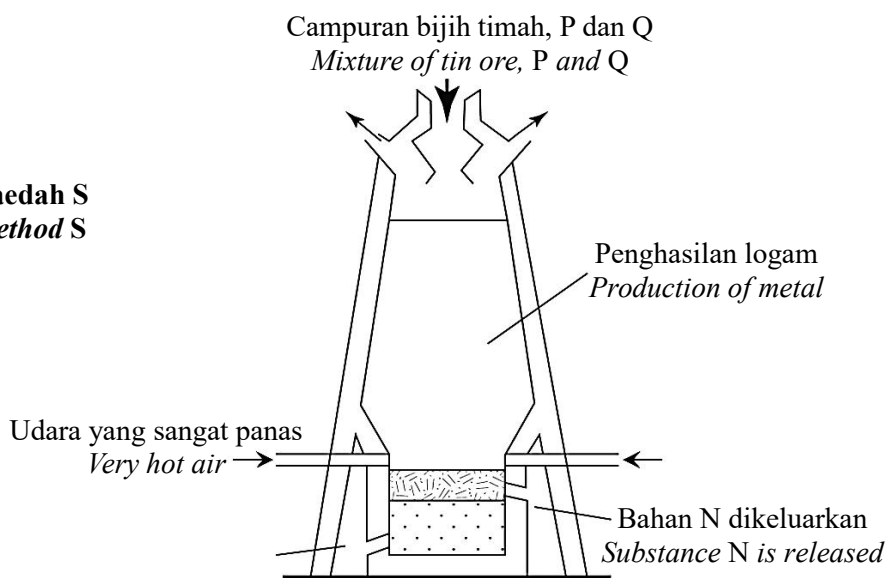
Pernyataan Statement	Semasa perlombongan During mining	Selepas perlombongan After mining
Kehilangan biodiversiti <i>Loss of biodiversity</i>		
Pencemaran air, udara dan bunyi <i>Water, air and sound pollution</i>		

[2 markah / 2 marks]
Memahami / Understand

3. Rajah menunjukkan relau bagas digunakan untuk pengekstrakan timah.

Diagram shows a blast furnace used in tin extraction

Kaedah S
Method S



- a) Tandakan (✓) pada bahan P dan Q yang ditambah ke dalam campuran bijih timah

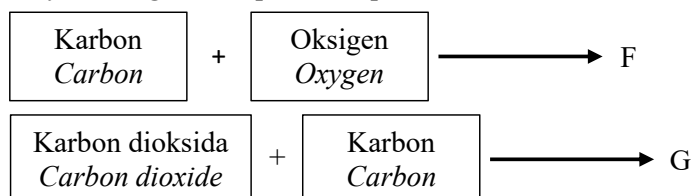
Tick (✓) the substance P and Q which is added into the mixture of tin ore.

P	sanga	
	slag	
	Arang kok	
	Coke	

Q	Batu kapur	
	limestone	
	bauksit	
	bauxite	

[2 markah / 2 marks]
Mengingat / Remember

- b) Persamaan perkataan berikut mewakili tindak balas yang berlaku di dalam relau bagas.
The following word equation represents the reactions that take place in a blast furnace.



Nyatakan F dan G

State F and G

F: _____

G: _____

[2 markah / 2 marks]
Memahami / Understand

- c) Terangkan sebab udara yang sangat panas dibekalkan ke dalam relau bagas.

Explain why the very hot air is supplied into the furnace.

- i. Membolehkan _____ untuk berlaku

To enable the _____ to occur.

- ii. Menghasilkan _____ dalam bentuk leburan.

To produce the _____ in molten form.

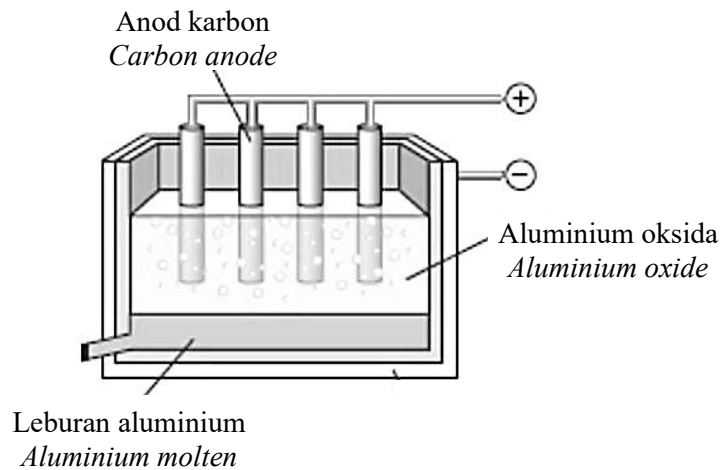
[2 markah / 2 marks]
Memahami / Understand

- d) Sanga yang dihasilkan terapung di atas leburan timah. Terangkan
The produced slag floats on the top of tin molten. Explain it.

[1 markah / 1 mark]
 Mengaplikasi / Apply

- e) Rajah menunjukkan satu kaedah lain pengekstrakan logam.
Diagram shows another method of extraction of metal

Kaedah T
Method T



[Sumber: 10f91541af413cc921686c2fd3c92f30.jpg (640×521)]

Banding dan bezakan kaedah S dan T

Compare and contrast the method S and T

Persamaan: Kedua-dua kaedah menghasilkan _____ dalam bentuk _____

Similarity: Both methods produce _____ in _____ form.

Perbezaan: Kaedah S melibatkan _____ manakala kaedah T
 melibatkan _____

*Difference: Method S involves the _____ while method T involves the
 _____*

[2 markah / 2 marks]
 Menganalisis / Analyze

L3: Soalan Perbincangan: Soalan Berformat UASA**A3: Discussion Items: UASA-Format Items****(TAHAP 3 / Level 3)**

1. Antara berikut, yang manakah benar mengenai proses pengekstrakan besi daripada bijih besi?

Which of the following is true about the process of extracting iron from iron ore?

- A. Batu kapur digunakan untuk mengasingkan bendasing daripada besi.
Limestone is used to separate impurities from iron
- B. Besi diekstrak daripada bijih besi melalui penurunan oleh gas hidrogen.
Iron is extracted from iron ore through reduction by hydrogen.
- C. Sanga dan besi dikeluarkan daripada relau bagas secara serentak.
Slag and iron ore are removed from the blast furnace simultaneously.
- D. Campuran leburan besi dan sanga dikenali sebagai besi tuangan.
The mixture of molten iron and slag is known as cast iron.

[1 markah / 1 mark]

Mengingat / Remember

2. a) Padankan logam dengan kaedah pengekstrakannya.

Match the metal with its method of extraction

Logam Metal	Kaedah pengekstrakan Extraction method
Natrium <i>Sodium</i>	• Elektrolisis leburan sebatian logam <i>Electrolysis of molten compound</i>
Kuprum <i>Copper</i>	• Penurunan campuran bijih dengan karbon <i>Reduction of mixture of ore by carbon</i>
	• Pemanasan terus sebatian logam <i>Direct heating the metallic compound.</i>

[2 markah / 2 marks]

Mengingat / Remember

- b) Gariskan jawapan yang betul bagi ayat di bawah.

Underline the correct answer of the following sentences

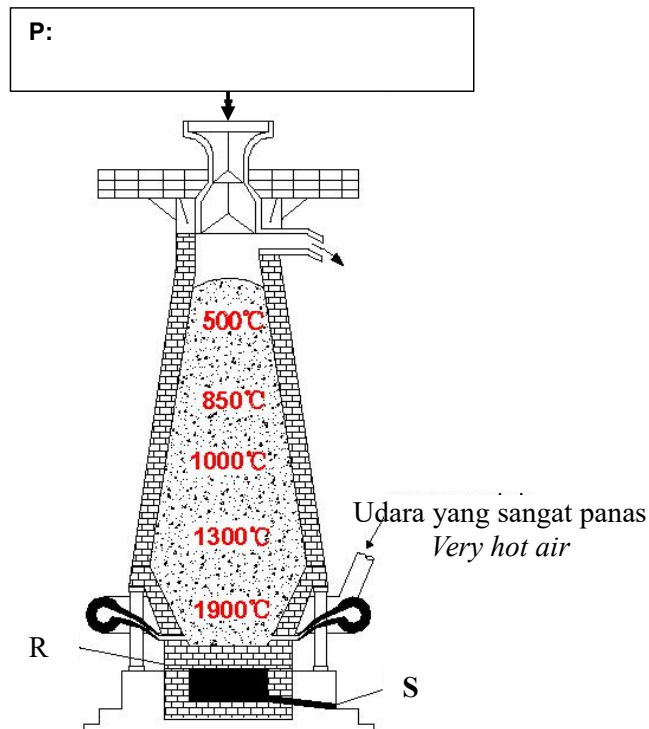
- i. Siri kereaktifan logam boleh diaplikasikan dalam (pengekstrakan, peleburan) logam daripada bijihnya.
Reactivity series of metals is applied in the (extraction, melting) of metals from its ore.
- ii. Terdapat banyak isu perlombongan di Malaysia seperti pencemaran (udara, air) disebabkan pembersihan bijihnya
Lots of mining issues in Malaysia such as (air, water) pollution due to the cleaning of ore.

[2 markah / 2 marks]

Mengingat / Remember

3. Rajah menunjukkan relau bagas digunakan dalam pengekstrakan besi.

Diagram shows a blast furnace used to extract iron.



[Sumber: A-schematic-diagram-of-a-typical-blast-furnace-ironmaking-process.ppm (457×591)]

- a) Nyatakan contoh logam lain yang dapat diekstrak menggunakan relau bagas.

State one other example of metal that is extracted using the blast furnace.

[1 markah / 1 mark]
Mengingat / Remember

- b) Nyatakan satu bahan yang ditambahkan ke dalam relau bagas melalui bahagian P. Tuliskan jawapan anda di dalam rajah.

State a substance that is added into the blast furnace through part P. Write your answer into the diagram.

[1 markah / 1 mark]
Mengingat / Remember

- c) Nyatakan bahan yang disingkirkan dari R. Terangkan bagaimana ia terbentuk.

State the substance that is tapped off from R. Explain how does is formed.

R terbentuk daripada _____ yang bertindak dengan _____ seperti pasir atau silicon dioksida.

R is formed from _____ which reacts with the _____ such as sand or silicon dioxide

[2 markah / 2 marks]
Memahami / Understand

- d) Tuliskan satu persamaan perkataan berkaitan untuk menghasilkan bahan S.
Write one related word equation that can obtain substance S.

[1 markah / 1 mark]
Mengaplikasi / *Apply*

- e) Karbon yang digunakan dalam proses pengekstrakan ini. Wajarkan jawapan anda.
Carbon is used in this extraction process. Justify your answer.

Kedudukan _____ adalah _____ daripada besi dalam siri kereaktifan logam.

Maka, _____ adalah _____ daripada besi _____ dapat _____ besi daripada bijihnya.

The position of _____ is _____ than iron in the reactivity series of metals.

Thus, _____ is _____ than iron.

_____ can _____ iron from its iron ore.

[2 markah / 2 marks]
Menilai / *Evaluate*

L4: Penilaian**A4: Assessment**

1. Rajah menunjukkan siri kereaktifan logam.

Diagram shows the reactivity series of metal.

Kalium <i>Potassium</i>	}	Pengekstrakan melalui _____ <i>Extraction through: _____</i>
Natrium <i>Sodium</i>		Penerangan / <i>Explanation:</i> Logam-logam ialah _____ reaktif daripada karbon. (kedudukannya lebih tinggi daripada karbon di dalam siri kereaktifan logam) <i>These metals are _____ reactive than carbon.</i> (<i>positioned higher than the carbon in the reactivity series of metals</i>)
Kalsium <i>Calcium</i>		
Magnesium <i>Magnesium</i>		
Aluminium <i>Aluminium</i>		
Karbon <i>Carbon</i>		Pengekstrakan melalui _____ <i>Extraction through: _____</i>
Zink <i>Zinc</i>	}	Penerangan / <i>Explanation:</i> Logam-logam ialah _____ reaktif daripada karbon. (kedudukannya lebih rendah daripada karbon di dalam siri kereaktifan logam) <i>These metals are _____ reactive than carbon.</i> (<i>positioned lower than the carbon in the reactivity series of metals.</i>)
Ferum <i>Iron</i>		
Stanum <i>Tin</i>		
Plumblum <i>Lead</i>		
Hidrogen <i>Hydrogen</i>		Pengekstrakan melalui _____ <i>Extraction through: _____</i>
Kuprum <i>Copper</i>	}	Penerangan / <i>Explanation:</i> Logam-logam ialah _____ reaktif daripada karbon. (kedudukannya lebih rendah daripada karbon di dalam siri kereaktifan logam) <i>These metals are _____ reactive than carbon.</i> (<i>positioned lower than the carbon in the reactivity series of metals</i>)
Merkuri <i>Mercury</i>		
Perak <i>Silver</i>		
Emas <i>Gold</i>		

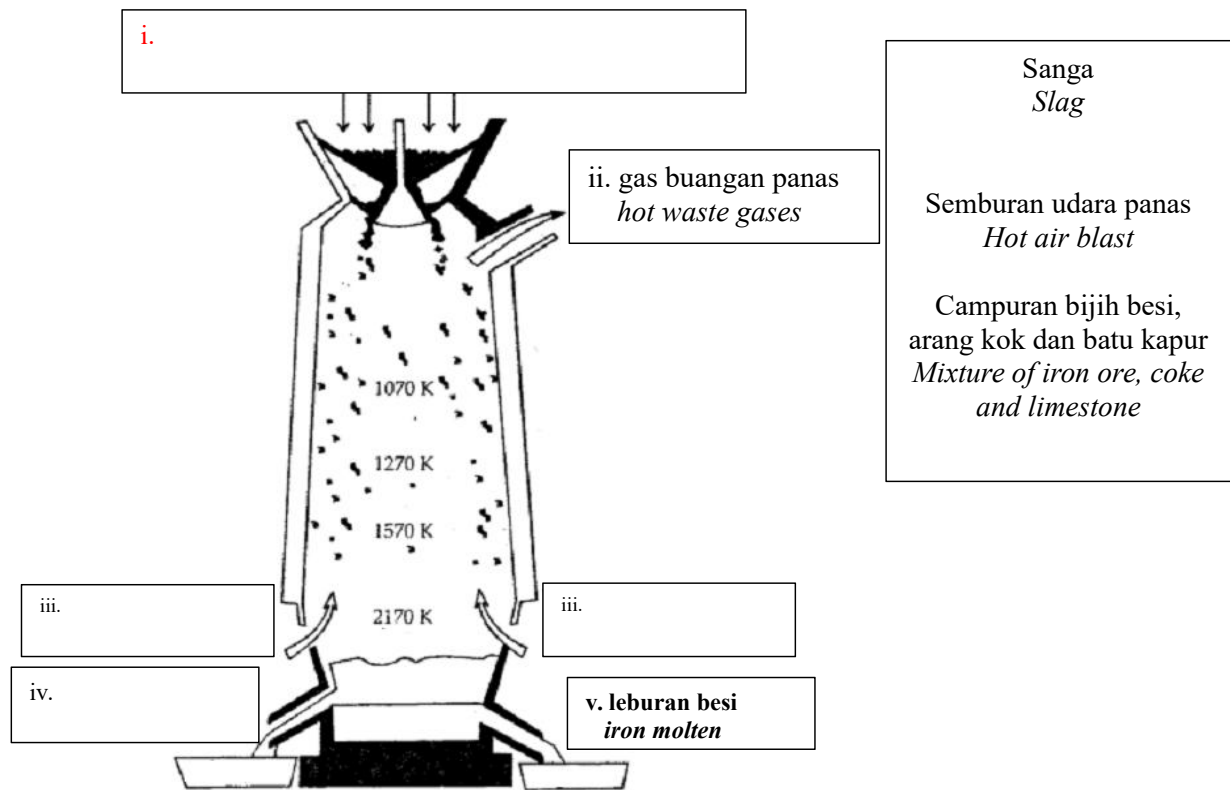
Lengkapkan pernyataan di atas dengan perkataan yang diberi di bawah

Complete the statement above with the given words below.

Pemanasan terus <i>direct heating</i>	penurunan oksida logam melalui karbon <i>reduction of metal oxide by carbon</i>	elektrolisis <i>electrolysis</i>
lebih <i>more</i>	kurang <i>less</i>	karbon <i>carbon</i>
	lebih tinggi <i>higher</i>	lebih rendah <i>lower</i>

[6 markah/ 6 marks]

2. Labelkan rajah pengekstrakan besi dengan perkataan yang diberi
Label the diagram of extraction of iron ore with the given word.



[Sumber: [General Principles and Processes of Isolation of Elements Class 12 Notes Chemistry Chapter 6](#)]

[4 markah/ 4 marks]

3. Lengkapkan persamaan perkataan yang bertindak balas di dalam relau bagas.
Complete the following word equation that represent the reactions in the blast furnace.

- Karbon + oksigen → karbon dioksida
Carbon + oxygen → carbon dioxide
- Karbon dioksida + karbon → karbon monoksida
Carbon dioxide + carbon → carbon monoxide
- Ferum (III) oksida + karbon → _____ + _____
Iron (III) oxide + carbon → _____ + _____
- Ferum (III) oksida + karbon monoksida → _____ + _____
Iron (III) oxide + carbon monoxide → _____ + _____

[4 markah/ 4 marks]

Sesi 12 / Session 12	
Bidang Pembelajaran <i>Learning Area</i>	5.0 Termokimia <i>5.0 Thermochemistry</i>
Standard Kandungan <i>Content Standard</i>	5.1 Tindak balas endotermik dan eksotermik <i>5.1 Endothermic and exothermic reactions</i>
Objektif Pembelajaran <i>Learning Objective</i>	1. Murid boleh mendefinisikan tindak balas endotermik dan tindak balas eksotermik. <i>Student is able to define endothermic and exothermic reaction.</i> 2. Murid boleh menghubungkan haba yang diserap atau dibebaskan dalam tindak balas kimia kepada tindak balas endotermik dan tindak balas eksotermik. <i>Student is able to relate heat absorbed or released in a chemical reaction to endothermic and exothermic reactions.</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Maksud tindak balas endotermik dan tindak balas eksotermik. <i>Endothermic and exothermic terms.</i> 2. Perkaitan haba yang diserap atau dibebaskan dalam tindak balas kimia kepada tindak balas endotermik dan eksotermik. <i>Relation of the heat absorbed or released in a chemical reaction to endothermic and exothermic reactions.</i>

L1: Nota Revisi Cepat

A1: Speedy Revision Notes

TERMOKIMIA / THERMOCHEMISTRY

Termokimia - Kajian tentang perubahan haba semasa tindak balas kimia berlaku.

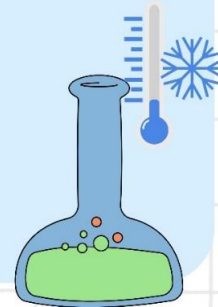
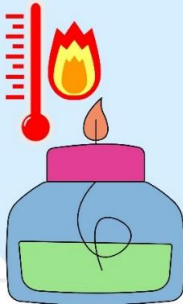
Thermochemistry - The study of heat changes during chemical reactions.

Alat yang digunakan untuk mengukur tindak balas eksotermik dan endotermik adalah **termometer**.

The instrument used to measure exothermic and endothermic reactions is a **thermometer**.

Aplikasi termokimia dalam kehidupan harian

- Pek panas/ Hot pack
- Pek sejuk/ Cold pack

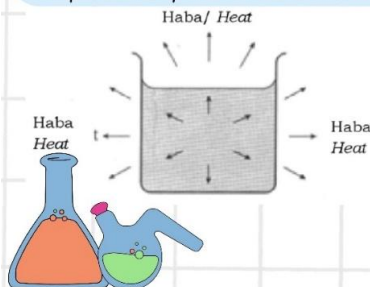
**Tindak Balas Eksotermik / Exothermic Reaction**

ialah tindak balas kimia yang **membebaskan** haba **ke persekitaran**.

It is a chemical reaction that **releases** heat **to the surroundings**.

Apabila tenaga **dibebaskan** semasa tindak balas kimia, **persekitaran akan menjadi panas** dan suhu campuran akan **naik**.

When energy is **released** during a chemical reaction, **the surroundings will heat up** and the temperature of the mixture will **rise**.



**Contoh tindak balas eksotermik/
Example of exothermic reactions**

- Letupan/ Explosion
- Pengaratan besi/ Rusting of iron
- Pembakaran/ Combustion
- Respirasi/ Respiration
- Peneutralan/ Neutralization
- Natrium + Air

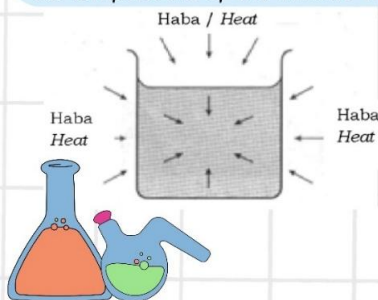
Tindak Balas Endotermik / Endothermic Reaction

ialah tindak balas kimia yang **menyerap** haba **dari persekitaran**.

It is a chemical reaction that **absorbs** heat **from the surroundings**.

Apabila tenaga **diserap** semasa tindak balas kimia, **persekitaran akan menjadi sejuk** dan suhu campuran akan **menurun**.

When energy is **taken** during a chemical reaction, **the surroundings will become cold** and the temperature of the mixture will **fall**.



**Contoh tindak balas endotermik/
Example of endothermic reactions**

- Fotosintesis/ Photosynthesis
- Menggoreng telur/ Frying an egg
- Garam ammonium + Air / Ammonium salt + water
- Membakar roti/ Baking bread
- Penyejatan air/ Evaporation of water

L2: Teknik menjawab soalan**A2: Question answering techniques**

TIPS MENJAWAB SOALAN BAHAGIAN C
TIPS FOR ANSWERING SECTION C QUESTIONS

NYATAKAN/BERIKAN/ SENARAIKAN – Nyatakan dengan ringkas apa yang diminta soalan.
STATE/GIVE/LIST – Briefly state what the question asks.

Contoh:

Example:

Nyatakan satu contoh tindak balas eksotermik? (1 markah)

Give an example of an exothermic reaction? (1 mark)

Respirasi

Respiration

TERANGKAN/JELASKAN: 1 faktor atau penerangan = 1 markah

EXPLAIN: 1 fact or explanation = 1 mark

Contoh:

Example:

Bekas larutan menjadi panas apabila natrium dicampurkan dengan air. Terangkan. (2 markah)

The solution container becomes hot when sodium is mixed with water. Explain. (2 marks)

Tindak balas eksotermik berlaku apabila natrium dicampurkan dengan air menyebabkan haba dibebaskan ke persekitaran dan bekas larutan menjadi panas.

An exothermic reaction occurs when sodium is mixed with water, causing heat to be released into the surroundings and the container of the solution become hot.

BANDING BEZA: 1 persamaan + 1 perbezaan

COMPARE THE DIFFERENCES: 1 similarity + 1 difference

Contoh: Bandingkan bezakan tindak balas dalam respirasi dan fotosintesis. (2 markah)

Example: Compare and contrast the reactions in respiration and photosynthesis. (2 marks)

Persamaan: Melibatkan tenaga haba

Similarity: Involve heat energy

Perbezaan: Respirasi menyerap haba dari persekitaran manakala fotosintesis membebaskan haba ke persekitaran.

Difference: Respiration absorbs heat from the surrounding while photosynthesis releases heat to the surrounding.

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 1/ Level 1)**

1 Antara berikut, yang manakah contoh tindak balas endotermik?

Which of following is an example of an endothermic reaction?

- A Respirasi
Respiration
- B Fotosintesis
Photosynthesis
- C Pengaratan besi
Rusting of iron
- D Pembakaran kertas
Burning of paper

[1 markah/ 1 mark]

Mengingat/Remember

2 Antara berikut, yang manakah merupakan kesan tindak balas eksotermik kepada suhu persekitaran?

Which of the following is the effect of an exothermic reaction on the surroundings temperature?

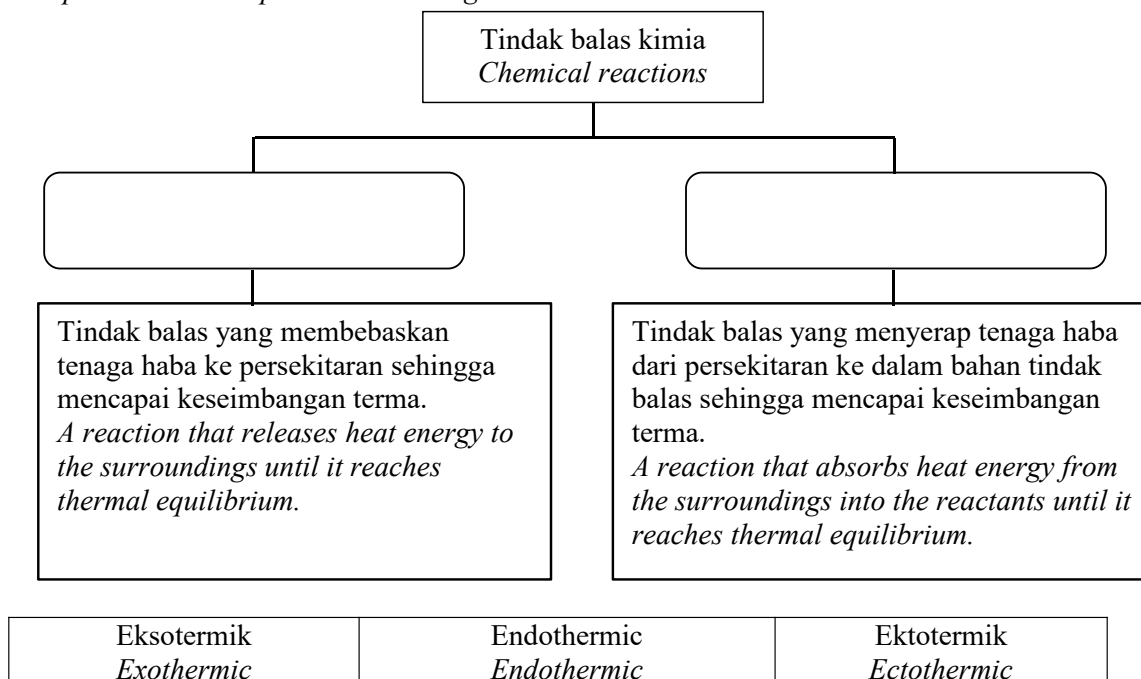
- A Menurun
Decrease
- B Meningkatkan
Increase
- C Malar
Constant
- D Tidak tetap
Not constant

[1 markah/ 1 mark]

Mengingat/Remember

3 (a) Lengkapkan peta pokok dengan perkataan diberi.

Complete the tree map with the words given.

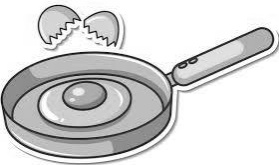


[2 markah/ 2 marks]

Mengingat/Remember

(b) Tandakan (✓) bagi tindak balas endotermik.

Mark (✓) for endothermic reactions.

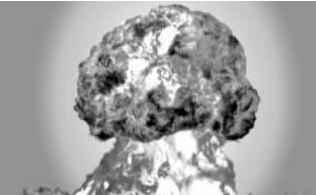
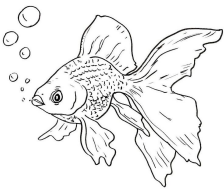
 Menggoreng telur <i>Frying egg</i>	 Pengaratan besi <i>Rusting of iron</i>	 Fotosintesis <i>Photosynthesis</i>

[2 markah/ 2 marks]

Mengingat / Remember

4 Rajah menunjukkan beberapa contoh tindak balas berlaku dalam kehidupan harian.

Diagram shows some examples of reactions occur daily.

 Membakar kek <i>Baking a cake</i>	 Letupan <i>Explosion</i>	 Respirasi <i>Respiration</i>

(a) Tandakan (✓) bagi tindak balas eksotermik.

Mark (✓) for exothermic reactions.

[2 markah/ 2 marks]

Mengingat/Remember

(a) Pembakaran kertas ialah satu tindak balas eksotermik. Jelaskan.

Burning of papers is an exothermic reaction. Explain.

[2 markah/ 2 marks]

Memahami/ Understand

(b) Haba diserap semasa menggoreng telur. Terangkan.

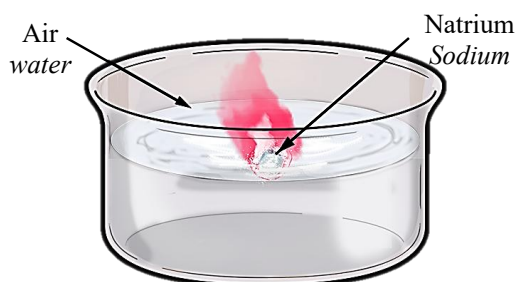
Heat is absorbed when frying eggs. Explain.

[2 markah/ 2 marks]

Memahami/ Understand

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 2/ Level 2)**

- 1 Rajah menunjukkan satu susunan radas untuk mengkaji termokimia.
 Diagram shows an apparatus set-up to study about thermochemistry.



Antara padanan berikut, yang manakah **BENAR** tentang tindak balas dalam rajah di atas?

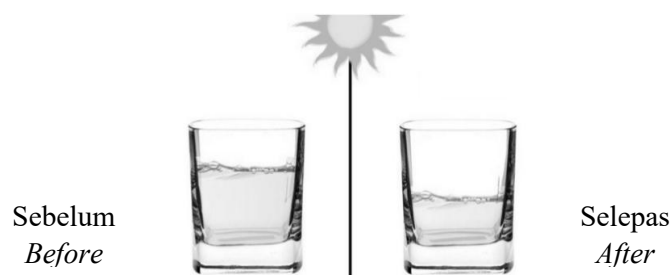
Which of the following is matched **CORRECTLY** about the reaction in the diagram above?

	Perubahan suhu <i>Change in temperature</i>	Jenis tindak balas <i>Type of reaction</i>
A	Meningkat <i>Increased</i>	Eksotermik <i>Exothermic</i>
B	Meningkat <i>Increased</i>	Endotermik <i>Endothermic</i>
C	Menurun <i>Decreased</i>	Eksotermik <i>Exothermic</i>
D	Menurun <i>Decreased</i>	Endotermik <i>Endothermic</i>

[1 markah/ 1 mark]

Memahami/Understand

- 2 (a) Rajah menunjukkan proses penyejatan air selepas terdedah kepada cahaya matahari.
 The diagram shows the evaporation process of water after exposure to sunlight.



Tandakan (✓) pada pernyataan yang **BETUL**.

Mark (✓) for the **CORRECT** statements.

Pernyataan <i>Statement</i>	Tandakan (✓) <i>Mark ✓</i>
Haba diserap semasa proses penyejatan air berlaku. <i>Heat is absorbed during the evaporation process of water.</i>	
Proses penyejatan air merupakan tindak balas endotermik. <i>Evaporation of water is an endothermic reaction.</i>	
Suhu persekitaran meningkat selepas proses penyejatan air berlaku. <i>The surroundings temperature increases after the evaporation process of water occurs.</i>	

[2 markah/ 2 marks]

Memahami/Understand

(b) Gariskan jawapan yang betul tentang tindak balas eksotermik.

Underline the correct answers about exothermic reaction.

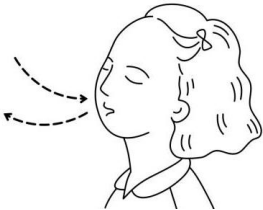
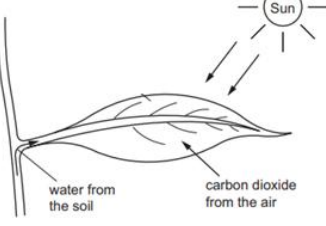
- Pembakaran lilin ialah tindak balas eksotermik kerana haba (dibebaskan / diserap).
Burning a candle is an exothermic reaction because heat is (released / absorbed).
- Tindak balas eksotermik diaplikasikan dalam pek (sejuk / panas) segera.
Exothermic reactions are applied in an immediate (cold / hot) pack.

[2 markah/ 2 marks]

Mengingat/Remember

3 Rajah menunjukkan tindak balas yang berlaku dalam kehidupan harian.

The diagram shows reaction that occur in daily life.

 Respirasi Respiration	 Pengarat besi Rusting of iron	 Fotosintesis Photosynthesis

(a) Tandakan (✓) bagi tindak balas eksotermik.

Mark (✓) for exothermic reactions.

[2 markah/ 2 marks]

Mengingat/Remember

(b) Proses respirasi amat penting bagi kemandirian hidup manusia. Jelaskan.

Respiration process is very important for human survival. Explain.

[2 markah/ 2 marks]

Memahami/Understand

(c) Berikan dua contoh tindak balas endotermik dalam kehidupan.

Give two examples of endothermic reactions in life.

[2 markah/ 2 marks]

Mengingat/Remember

(d) Kaki Rosnah bengkak akibat tersepak batu besar. Terangkan satu kaedah yang boleh digunakan

untuk mengurangkan bengkak pada kakinya.

Rosnah's leg was swollen due to accidentally kicked a large rock. Explain one method can be used to reduce the swollen leg.

Kaedah: _____

Method: _____

Penerangan: _____

Explanation: _____

[2 markah/ 2 marks]

Mengaplikasi/*Apply*

(e) Banding bezakan tindak balas dalam pek panas dan pek sejuk.

Compare and contrast reactions in hot pack and cold pack.

Persamaan: _____

Similarity _____

Perbezaan: _____

Differences _____

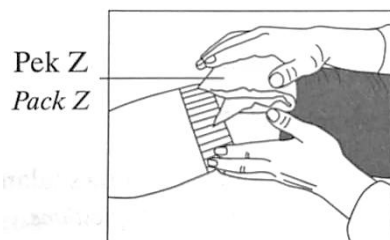
[2 markah/ 2 marks]

Menganalisis/*Analyse*

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 3/ Level 3)**

- 1 Rajah menunjukkan tindakan Ahmad ke atas lututnya bengkak.

Diagram shows Ahmad's action toward his swollen knee.



Apakah bahan kimia yang terkandung dalam pek Z?

What is the chemical substance contained in pack Z?

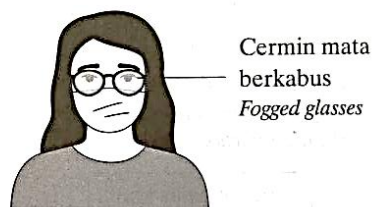
- A Asid sulfurik
Sulphuric acid
- B Kalsium klorida
Calcium chloride
- C Magnesium sulfat
Magnesium sulphate
- D Ammonium nitrat
Ammonium nitrate

[1 markah/ 1 mark]

Memahami/*Understand*

- 2 Rajah menunjukkan dua contoh tindak balas termokimia.

Diagram shows two examples of thermochemistry reactions.



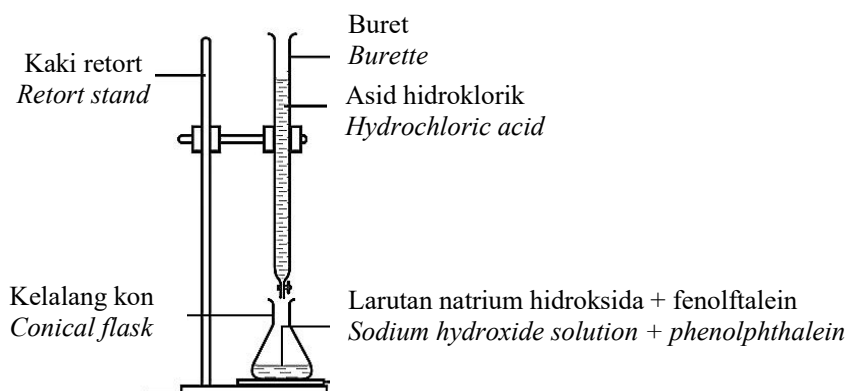
- (a) Nyatakan jenis tindak balas tersebut ke dalam ruang yang disediakan

State the type of the reactions in the space provided above.

[2 markah/ 2 marks]

Mengingat/*Remember*

- (b) Rajah menunjukkan tindak balas antara natrium hidroksida dan asid hidroklorik.
The diagram shows the reaction between sodium hydroxide and hydrochloric acid.



Tandakan (✓) pada pernyataan yang **BENAR**.

*Tick (✓) on the **CORRECT** statement.*

Pernyataan <i>Statement</i>	Tandakan (✓) <i>Tick (✓)</i>
Menghasilkan tenaga haba yang banyak <i>Generates a lots of heat energy</i>	
Suhu akhir adalah lebih rendah daripada suhu awal <i>The final temperature is lower than the initial temperature</i>	
Campuran bahan tindak balas dan bekas menjadi panas <i>The mixture of reactants and the container are heated</i>	

[2 markah/ 2 marks]

Memahami/*Understanding*

3. Rajah menunjukkan suatu perubahan jirim.

Diagram shows a change in a matter.



Pembentukan ais kiub
Formation of ice cube

- (a) Nyatakan jenis tindak balas termokimia yang berlaku dalam rajah.

State the type of thermochemistry reaction that occurs in the diagram.

 [1 markah/ 1 mark]
 Mengetahui/*Knowing*

- (b) Proses kondensasi ialah satu tindak balas eksotermik. Terangkan.

Condensation process is an exothermic reaction. Explain

 [2 markah/ 2 marks]
 Memahami/*Understanding*

- (c) Ramli berpeluh selepas menjalankan aktiviti kokurikulum di sekolah. Terangkan satu cara yang boleh digunakan untuk menyejukkan badannya.

Ramli sweating after doing extracurricular activities at school. Explain one method to cool his body

Kaedah: _____

Method: _____

Penerangan: _____

Explanation: _____

[2 markah/ 2 marks]

Mengaplikasi/*Apply*

- (d) Ramli menggunakan pek panas segera untuk mengurangkan kekejangan otot akibat melakukan aktiviti lasak. Wajarkan tindakan Ramli.

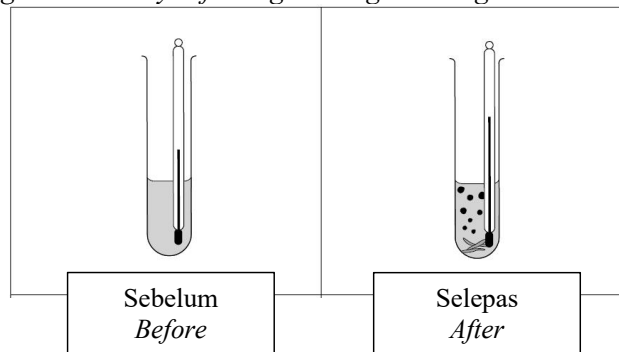
Ramli used an instant hot pack due to reduce muscle cramps due to vigorous activities. Justify Ramli's action.

[2 markah/ 2 marks]

Menilai/*Evaluate*

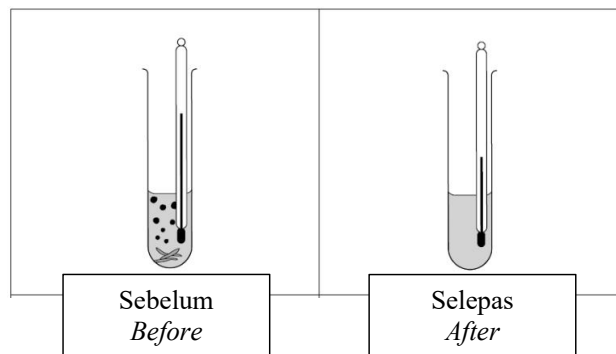
L4: Penilaian**A4: Assessment**

- 1 Lengkapkan ayat-ayat berikut dengan merujuk rajah yang diberikan.
 Complete the following sentences by referring to the given diagram.



Dalam tindak balas _____, bacaan termometer akan _____

In the _____ reaction, the reading of the thermometer will _____

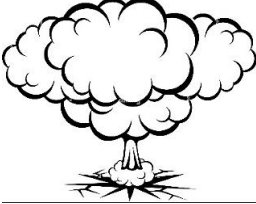
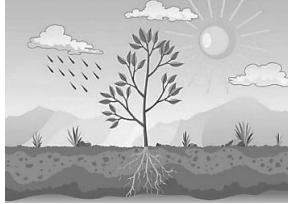
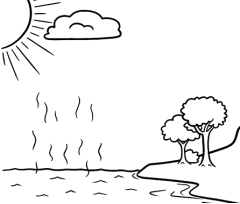
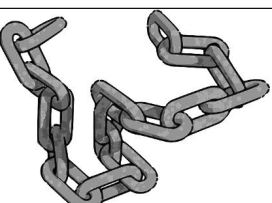


Dalam tindak balas _____, bacaan termometer akan _____.

In the _____ reaction, the reading of the thermometer will _____

[4 markah / 4 marks]

- 2 Berdasarkan rajah, lengkapkan jadual di bawah dengan menuliskan tindak balas eksotermik atau endotermik berdasarkan rajah yang diberi.
 Based on the diagram, complete the table below by writing the exothermic or endothermic reaction based on the diagram given.

[6 markah / 6 marks]

Sesi 13 / Session 13	
Bidang Pembelajaran <i>Learning Area</i>	5.0 Termokimia <i>5.0 Thermochemistry</i>
Standard Kandungan <i>Content Standard</i>	5.1 Tindak balas endotermik dan eksotermik <i>5.1 Endothermic and exothermic reactions</i>
Objektif Pembelajaran <i>Learning Objective</i>	1. Murid boleh menjalankan eksperimen untuk membanding dan membeza tindak balas eksotermik dengan tindak balas endotermik. <i>Students can conduct experiments to compare and contrast exothermic reactions with endothermic reactions.</i> 2. Murid boleh menjelaskan dengan contoh tindak balas eksotermik dan tindak balas endotermik. <i>Students can explain with examples of exothermic reactions and endothermic reactions.</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Mengaplikasikan eksperimen kepada teknik menjawab soalan kemahiran proses sains melibatkan tindak balas kimia dan mampu membezakan tindak balas eksotermik dan tindak balas endotermik. <i>Apply experiments to techniques for answering science process skills questions involving chemical reactions and be able to distinguish between exothermic and endothermic reactions.</i> 2. Penjelasan beserta contoh tindak balas eksotermik dan tindak balas endotermik. <i>Explanation and examples of exothermic reactions and endothermic reactions.</i>

L1: Nota Revisi Cepat
A1: Speedy Revision Notes
Tindak Balas Eksotermik / Exothermic Reaction
**CONTOH TINDAK BALAS EKSOTERMIK/
EXAMPLE OF EXOTHERMIC REACTION**

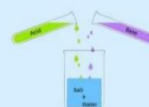
Pembakaran: Pembakaran kayu api, gas, atau minyak akan membebaskan haba dan cahaya.

Combustion: Combustion of firewood, gas, or oil will provide heat and light.



Peneutralan: Tindak balas antara asid dan bes akan membebaskan haba.

Neutralization: The reaction between an acid and a base will release heat.



Pemanas tangan: Bahan yang digunakan menghasilkan tindak balas eksotermik untuk menjana haba.

Hand warmer: The material used produces an exothermic reaction to generate heat.



Tindak Balas Eksotermik / *Exothermic Reaction*

CONTOH TINDAK BALAS EKSOTERMİK/ EXAMPLE OF EXOTHERMIC REACTION

Respirasi: Proses di mana penguraian bahan makanan untuk menghasilkan tenaga serta haba.

Respiration: The process by which food is broken down to produce energy and heat.



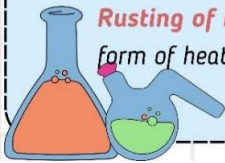
Kondensasi: Apabila wap air terkondensasi untuk membentuk hujan atau salji, ia membebaskan haba.

Condensation: When water vapor condenses to form rain or snow, it releases heat.



Pengaratan besi: Tindak balas kimia antara besi, oksigen, dan air membebaskan tenaga dalam bentuk haba, membentuk oksida besi (karat).

Rusting of iron: The chemical reaction between iron, oxygen, and water releases energy in the form of heat, forming iron oxide (rust).



Tindak Balas Endotermik / *Endothermic Reaction*

CONTOH TINDAK BALAS ENDOTERMİK/ EXAMPLE OF ENDOTHERMIC REACTION

Fotosintesis: Tumbuhan menggunakan cahaya matahari untuk menukar karbon dioksida dan air kepada gula serta menyerap tenaga dalam proses itu.

Photosynthesis: Plants use sunlight to convert carbon dioxide and air into sugars and Co_2 absorb energy in the process.



Membakar roti: Haba dari ketuhar diserap oleh bahan-bahan untuk memasak makanan.

Baking bread: Heat from the oven is absorbed by the ingredients to cook the food.



Penyejatan: Air menyerap haba daripada persekitaran untuk menjadi wap.

Evaporation: Water absorbs heat from its surroundings to become steam/vapor.



Tindak Balas Endotermik / Endothermic Reaction

CONTOH TINDAK BALAS ENDOTERMİK/ EXAMPLE OF ENDOTHERMIC REACTION

Pencairan: Ais menyerap haba daripada persekitaran untuk berubah menjadi air.

Melting: Ice absorbs heat from the environment to turn into water



Pek ais segera: Tindak balas endotermik berlaku untuk menyerap haba dan menyejukkan badan.

Instant ice pack: Endothermic reactions occur to absorb heat and cool the body.



Ammonium nitrat + air: Ammonium nitrat (garam) menyerap haba apabila dilarutkan di dalam air menyebabkan bekas larutan menjadi sejuk.

Ammonium nitrate + water: Ammonium nitrate (salt) absorbs heat when dissolved in water, causing the solution to cool.



L2: Teknik menjawab soalan

A2: Question answering techniques

CARA UNTUK MENGENALI PEMBOLEH UBAH: HOW TO IDENTIFY VARIABLES:

Dimanipulasi: Apa yang diubah/ ditukar/ berlainan/ berbeza

Manipulated: What is changed/exchanged/different/different

Bergerak balas: Apa yang diperhatikan/ dilihat/ diukur di akhir eksperimen

Responding: What is observed/seen/measured at the end of the experiment

Dimalarkan: Apa yang sama dan kekal sepanjang eksperimen

Constant: What is the same and remains the same throughout the experiment

Nota: Pemboleh ubah dimanipulasi (PM), Pemboleh ubah bergerak balas (PB)

Note: Manipulated variable (MV), Responding variable (RV)

Bahan Substance	Suhu awal (°C) Initial temperature (°C)	Suhu akhir (°C) Final temperature (°C)
Natrium + Air Sodium + water	30	52
Ammonium nitrat + Air Ammonium nitrate + water	30	16

PM
MV

PM: Kebiasaan di sebelah kiri atau bahagian atas
MV: Usually on the left or top

PB: Kebiasaan di sebelah kanan atau bahagian bawah
RV: Usually on the right or bottom

PB
RV

TIPS MENJAWAB SOALAN PEMERHATIAN**Cara jawab:**

Mulakan ayat menggunakan pembolehubah bergerak balas (PB) dan buat perbandingan maklumat / data jika ada.

Start a sentence using a responding variable (RV) and compare the information / data of any.

Contoh:

Nyatakan satu **pemerhatian** berdasarkan rajah.

State one observation based on the diagram.

Suhu akhir bahan tindak balas antara natrium dan air **lebih tinggi** berbanding **suhu awal** bahan tindak balas.

The final temperature of the reaction between sodium and water is higher than the initial temperature of the reactants.

TIP MENCARI POLA / CORAK (BERDASARKAN JADUAL)**Kata kunci:****Keywords:**

- Meningkatkan/ Bertambah
Increase
- Menurun/ Berkurang
Decrease
- Mendatar/ Tiada perubahan
No change

TIPS MENJAWAB SOALAN HIPOTESIS/ HUBUNGAN/ KESIMPULAN

Contoh:

Example:

- 1 Nyatakan hipotesis bagi eksperimen ini.
State the hypothesis for this experiment.
- 2 Nyatakan kesimpulan yang dapat dibuat berdasarkan eksperimen yang dijalankan.
State the conclusions that can be drawn based on the experiment conducted.
- 3 Nyatakan kesimpulan bagi penyiasatan ini.
State conclusions for this investigation.

Bentuk Jawapan:

Answer:

Contoh 1:

Example 1:

Semakin pola (PM), semakin pola (PB).

The more pattern (MV), the more pattern (RV).

Contoh 2:

Example 2:

Jika (PM) pola, maka (PB) pola

If (MV) pattern, then (RV) pattern.

L3: Soalan Perbincangan UASA (Teknik menjawab soalan)**A3: Discussion Questions UASA (Answering technique)****(Tahap 1/Level 1)**

1. Antara berikut, yang manakah contoh tindak balas membebaskan haba?

Which of the following is an example of a reaction that releases heat?

- A Penyejatan
Evaporation
- B Fotosintesis
Photosynthesis
- C Pengaratan besi
Rusting of iron
- D Larutan garam ammonium
Ammonium salt solution

[1 markah/ 1 mark]
Mengingat/Remember

2. Antara berikut, yang manakah suatu tindak balas endotermik?

Which of the following is an endothermic reaction?

- A Pendidihan air
Boiling of water
- B Pembakaran bahan api fosil
Burning of fossil fuels
- C Tindak balas antara zink dengan air
Reaction between zinc and water
- D Natrium hidroksida melarut di dalam air
Sodium hydroxide dissolves in water

[1 markah/ 1 mark]
Mengingat/Remember

3. a) Rajah menunjukkan bahan yang menghasilkan tindak balas termokimia.

The diagram shows the substances that produce a thermochemistry reaction.



Bulatkan bagi rajah yang menunjukkan tindak balas eksotermik.

Circle the diagram that shows an exothermic reaction.

[2 markah/ 2 marks]
Mengingat/Remember

b) Rajah menunjukkan tindak balas termokimia dalam kehidupan harian

Diagram shows a thermochemistry reaction in daily life.



Tandakan (✓) pada ciri-ciri jenis tindak balas termokimia ini.

Mark (✓) for the characteristics of this type of thermochemistry reaction.

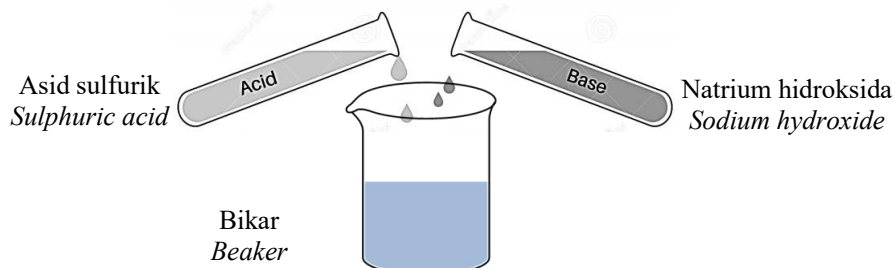
Pernyataan <i>Statements</i>	Tandakan (✓) <i>Mark (✓)</i>
Tenaga haba → Tenaga kimia <i>Heat energy → Chemical energy</i>	
Memecahkan ikatan antara zarah <i>Breaks bond between particles.</i>	
Membebaskan haba ke persekitaran <i>Releases heat to the surrounding</i>	

[2 markah/ 2 marks]

Memahami/Understand

4 Rajah menunjukkan tindak balas termokimia di dalam makmal.

Diagram shows a thermochemistry reaction in the laboratory.



(a) Nyatakan jenis tindak balas termokimia.

State the type of thermochemistry reaction.

[1 markah/ 1 mark]

Mengingat/Remember

(b) Nyatakan alat pengukur yang digunakan untuk merekod perubahan tenaga haba.

State the measuring instrument used to record the heat energy change.

[1 markah/ 1 mark]

Mengingat/Remember

(c) Bekas larutan menjadi sejuk apabila garam ammonium dilarutkan di dalam air. Terangkan

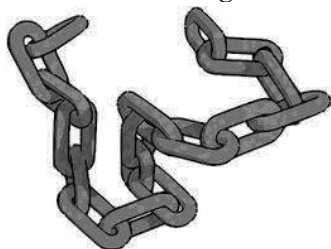
The container becomes cold when ammonium salt is dissolved in water. Explain.

[2 markah/ 2 marks]

Memahami/ Understand

L3: Soalan Perbincangan UASA (Teknik menjawab soalan)**A3: Discussion Questions UASA (Answering technique)****(Tahap 2/Level 2)**

- 1 Rajah menunjukkan bahan yang mengalami pengoksidaan.
The diagram shows a substance that undergoes oxidation.



Antara yang berikut, yang manakah **BENAR** mengenai pemerhatian ini?

*Which of the following is **CORRECT** regarding to this observation?*

	Perubahan suhu <i>Change in temperature</i>	Jenis tindak balas <i>Type of reaction</i>
A	Meningkat <i>Increased</i>	Eksotermik <i>Exothermic</i>
B	Meningkat <i>Increased</i>	Endotermik <i>Endothermic</i>
C	Menurun <i>Decreased</i>	Eksotermik <i>Exothermic</i>
D	Menurun <i>Decreased</i>	Endotermik <i>Endothermic</i>

[1 markah/ 1 mark]

Memahami/*Understand*

- 2 a) Gariskan jawapan yang betul tentang tindak balas eksotermik.

Underline the correct answer about exothermic reactions.

- (i) Tindak balas eksotermik berlaku semasa proses pengaratan besi menyebabkan suhu persekitaran (meningkat / menurun).

Exothermic reactions occur during the rusting process of iron, causing the surrounding temperature to (increase / decrease).

- (ii) Pek sejuk (membebaskan / menyerap) haba dari sekeliling untuk memberikan rasa sejuk.

Cold packs (release / absorb) heat from the surroundings to provide a feeling of coolness.

[2 markah/ 2 marks]

Mengingat/*Remember*

- b) Rajah menunjukkan pek sejuk segera yang digunakan untuk mengurangkan bengkak.
Diagram shows an instant cold pack used to reduce swelling.



Tandakan (✓) pada pernyataan yang **BETUL**.

Mark (✓) for the **CORRECT** statements.

Pernyataan Statement	Tandakan (✓) Mark (✓)
Haba diserap semasa pek sejuk segera digunakan. <i>Heat is absorbed when the instant cold pack is used.</i>	
Tindak balas endotermik berlaku di dalam pek sejuk segera. <i>An endothermic reaction occurs inside the instant cold pack.</i>	
Pek sejuk segera membebaskan haba ke persekitaran untuk memberikan sensasi sejuk. <i>Instant cold pack release heat from to the surrounding to provide a cooling sensation..</i>	

[2 markah/ 2 marks]
 Memahami/Understand

- 3 Rajah menunjukkan sejenis tindak balas termokimia yang berlaku dalam kehidupan harian.
Diagram shows a type of the thermochemistry reaction that occurs in daily life.



- (a) Nyatakan dua contoh jenis tindak balas termokimia ini.
State another two examples of this type of thermochemistry reaction.

[2 markah/ 2 marks]
 Memahami /Understand

- (b) Terangkan jenis tindak balas termokimia yang ditunjukkan di dalam rajah.
Explain the type of thermochemistry reaction shown in the diagram.

[2 markah/ 2 marks]
 Memahami/Understanding

- (c) Fotosintesis merupakan tindak balas endotermik. Jelaskan.
Photosynthesis is an endothermic reaction. Explain.

[2 markah/ 2 marks]
 Memahami/Understand

- (d) Rajah menunjukkan pek makanan panas sendiri.
The diagram shows a self-heating food pack.



Pek makanan panas sendiri
 Self-heating food pack

Ahmad membawa pek makanan panas sendiri semasa perkhemahan sekolah. Terangkan satu kaedah untuk membantu Ahmad memanaskan makanan yang dibawa.

The self-heating hot food pack contains a heating pack. Ahmad brought his own self-heating hot food pack during the school camp. Explain a method to help Ahmad heat the food he brought.

Kaedah: _____

Method: _____

Penerangan: _____

Explanation: _____

[3 markah/ 3 marks]
 Mengaplikasi/Apply

- (e) Banding dan bezakan tindak balas dalam respirasi dan fotosintesis.
Compare and contrast the reactions in respiration and photosynthesis.

Persamaan: _____

Similarity: _____

Perbezaan: _____

Difference: _____

[2 markah/ 2 marks]
 Menganalisis/Analyse

L3: Soalan Perbincangan UASA (Teknik menjawab soalan)**A3: Discussion Questions UASA (Answering technique)****(Tahap 3/Level 3)**

- 1 Rajah menunjukkan suatu contoh tindak balas kimia dalam kehidupan seharian.
Diagram shows an example of reaction occurs in daily life.

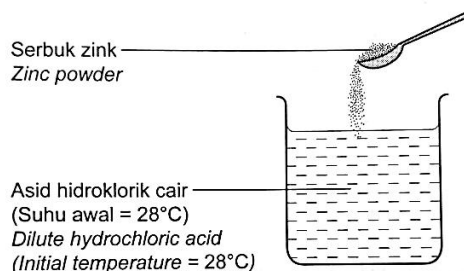


Antara berikut, yang manakah menunjukkan jenis tindak balas termokimia yang sama seperti di atas?
Which of the following show the same type of thermochemistry reaction as above?

- A Pek sejuk
Cold pack
- B Pek panas
Hot pack
- C Penyejatan
Evaporation
- D Fotosintesis
Photosynthesis

[1 markah/ 1 mark]
 Memahami/Understand

- 2 (a) Rajah menunjukkan tindak balas antara serbuk zink dan asid hidroklorik
Diagram shows the reaction between zinc powder and hydrochloric acid.



Tandakan (✓) pada pernyataan yang **BETUL** tentang tindak balas ini.
*Tick (✓) on the **CORRECT** statement regarding to this reaction.*

Pernyataan <i>Statement</i>	Tandakan (✓) <i>Tick (✓)</i>
Tindak balas kimia membebaskan haba ke persekitaran. <i>Chemical reactions release heat to the surroundings.</i>	
Suhu akhir adalah lebih tinggi daripada suhu awal. <i>The final temperature is higher than the initial temperature.</i>	
Tindak balas endotermik terhasil. <i>An endothermic reaction occurs.</i>	

[2 markah/ 2 marks]
 Memahami/Understand

- (b) Rajah menunjukkan dua tindak balas kimia yang berlaku dalam kehidupan harian.

Diagram shows two reactions that occur in daily life.



Nyatakan sama ada situasi di atas melibatkan tindak balas eksotermik atau tindak balas endotermik.

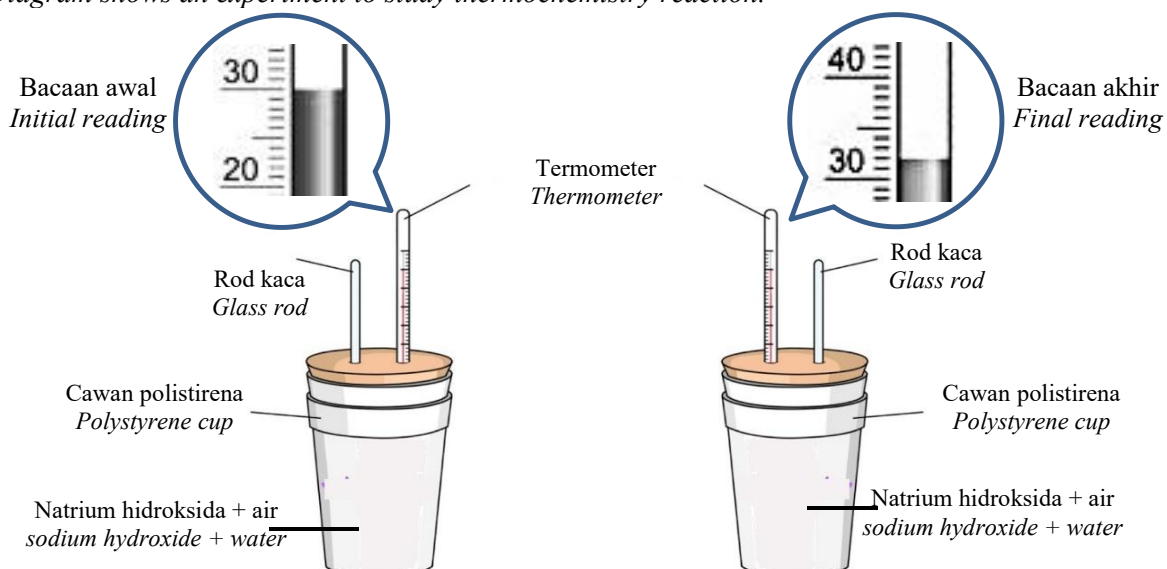
State whether the situation above involves exothermic reaction or endothermic reaction.

[2 markah/ 2 marks]

Mengingat/Remember

- 3 Rajah menunjukkan sebuah eksperimen untuk mengkaji tindak balas termokimia.

Diagram shows an experiment to study thermochemistry reaction.



- (a) Nyatakan satu pemerhatian berdasarkan rajah.

State one observation based on the diagram.

[1 markah/ 1 mark]

Memerhati/Observing

- (b) Nyatakan inferens berdasarkan pemerhatian di 3(a)

State the inference based on the observation at 3(a)

[1 markah/ 1 mark]

Membuat inferens/Making inference

- (c) (i) Nyatakan pemboleh ubah dimanipulasikan.
State the manipulated variable.

- (ii) Nyatakan cara mengawal pemboleh ubah dimanipulasikan.
State a way to control manipulated variable.

[2 markah/ 2 marks]

Mengawal pemboleh ubah/*Controlling the variables*

- (d) Nyatakan jenis tindak balas termokimia.
State the type of thermochemistry reaction.

[1 markah/ 1 mark]

Memahami / *Understand*

- (e) Nyatakan definisi secara operasi bagi tindak balas eksotermik
State the operational definition of exothermic reaction.

Tindak balas eksotermik ialah _____ apabila

Exothermic reaction is _____ *when*

[1 markah / 1 mark]

Mendefinisi secara operasi / *Operational Definition*

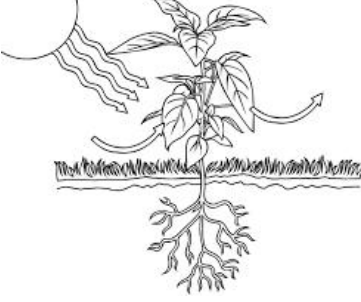
- (f) Nyatakan satu langkah berjaga-jaga yang perlu diambil dalam eksperimen ini.
State one precaution that should be taken in this experiment.

[1 markah/ 1 mark]

Mengeksperimen/*Experimenting*

L4: Penilaian**A4: Assessment**

- 1 Berdasarkan rajah, lengkapkan jadual di bawah dengan menuliskan tindak balas eksotermik atau endotermik berdasarkan rajah yang diberi.
Based on the diagram, complete the table below by writing the exothermic or endothermic reaction based on the diagram given.

Tindak Balas Kimia <i>Chemical Reaction</i>	Pernyataan <i>Statement</i>
	Proses: _____ <i>Process : _____</i> Penerangan/<i>Explanation:</i> Tumbuhan _____ tenaga haba daripada _____ untuk menghasilkan glukosa dan oksigen. <i>Plants _____ heat energy from the _____ to produce glucose and oxygen.</i>
	Proses: _____ <i>Process : _____</i> Penerangan/ <i>Explanation:</i> Pembakaran bahan seperti kayu yang mengandungi karbon _____ karbon dioksida, air dan _____ yang banyak. <i>The burning such as wood which carbon-containing _____ carbon dioxide, water and lots of _____</i>
	Proses: _____ <i>Process : _____</i> Penerangan/ <i>Explanation:</i> Adunan kek _____ tenaga haba daripada ketuhar yang membolehkan kek mengembang dan masak. <i>Cake batter _____ heat energy from the oven which allows the cake to rise and be baked.</i>
	Proses: _____ <i>Process : _____</i> Penerangan/ <i>Explanation:</i> Proses pengoksidaan merupakan tindak balas kimia di mana paku besi bertindak balas dengan _____ di udara. <i>The oxidation process is a chemical reaction where iron nails react with _____ in the air.</i>

[10 markah / 10 marks]

Sesi 14 / Session 14	
Bidang pembelajaran <i>Learning area</i>	6.0 Elektrik dan kemagnetan <i>Electricity and magnetism</i>
Standard Kandungan <i>Content Standard</i>	6.1 Penjanaan Tenaga Elektrik <i>Generation of Electricity</i> 6.2 Transformer <i>Transformer</i>
Objektif pembelajaran <i>Learning objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan sumber tenaga, proses penjanaan elektrik dan membina transformer <i>Students can solve questions related to energy sources, the process of generating electricity and building transformer</i>
Fokus pembelajaran <i>Learning Focus</i>	1 Jenis-jenis sumber tenaga boleh baharu dan tidak boleh baharu <i>Types of renewable and non-renewable energy sources</i> 2 Proses dan perubahan tenaga berlaku pada stesen jana kuasa elektrik. <i>The process and energy changes occur at electrical power stations</i> 3 Transformer injak naik dan injak turun <i>Step-up and step-down transformer</i>

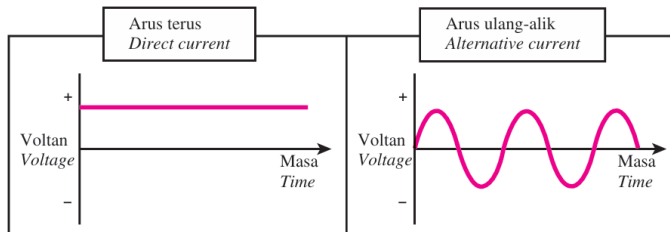
L1 : Nota Revisi Cepat**A1: Speedy Revision Notes****6.1: Penjanaan Tenaga Elektrik**
Generation of Electricity

1. Sumber tenaga untuk penjanaan tenaga elektrik terdiri daripada sumber tenaga boleh baharu dan sumber tenaga tidak boleh baharu.

The sources of energy for generation of electricity can be derived from renewable energy sources and non renewable energy sources.

2. Dua jenis arus elektrik:
Types of electric current:

- a) Arus terus
Direct current
b) Arus ulang-alik
Alternating current



3. Penjanaan tenaga elektrik oleh stesen jana kuasa melibatkan generator.

Generation of electricity by the power station involves generators.

4. Kebanyakan stesen jana kuasa menghasilkan arus ulang alik kecuali penjanaan elektrik dari tenaga solar yang menghasilkan arus terus.

Most power stations produce alternating current except generation of electricity from solar energy that produces direct current.

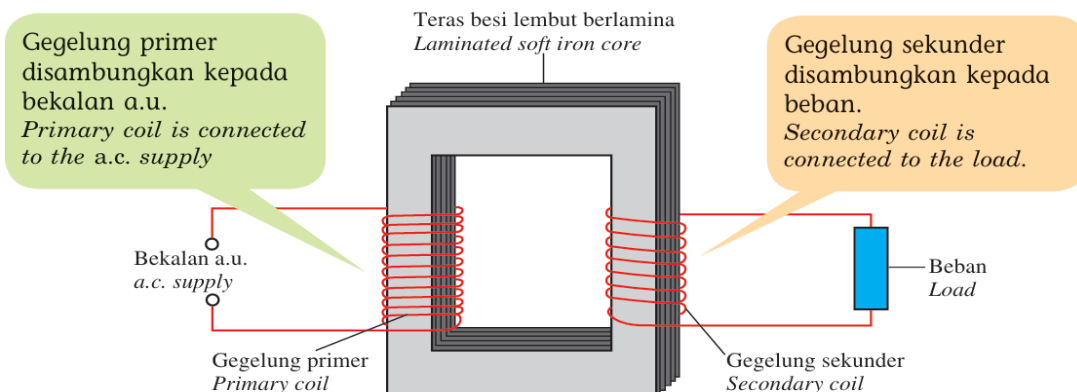
**6.2: Transformer**
Transformer

- 1 Transformer merupakan alat yang terdiri daripada sepasang gegelung dawai bertebat yang dililit pada teras besi.

Transformer is a device consists of a pair of insulated wire wound on an iron core.

- 2 Transformer boleh mengubah voltan arus ulang-alik bergantung kepada jenis transformer.

A transformer can change the voltage of an alternating current depending on the type of transformer.



Sumber : SPS Sains Tingkatan 3, Sasbadi

Transformer

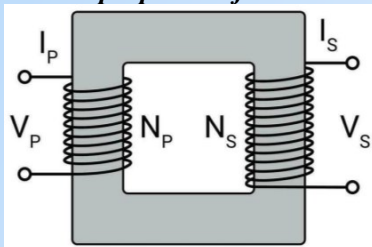
Transformer

Persamaan *Similarities*

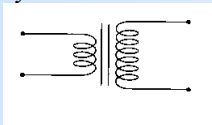
- ✓ Berfungsi hanya pada sambungan arus ulang-alik
Functioning when connected with alternating current
- ✓ Mengubah voltan arus ulang-alik
Change the voltage of alternating current

Perbezaan *Differences*

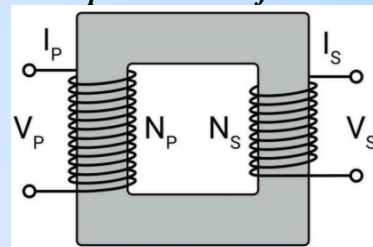
Transformer Injak Naik *Step-up Transformer*



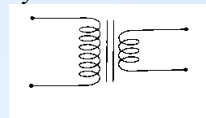
- Menaikkan voltan output
Increase output voltage
- Voltan input lebih rendah daripada voltan output
Input voltage is lower than output voltage
- Bilangan lilitan gegelung primer < bilangan lilitan gegelung sekunder.
Number of turns of the primary coil < number of turns of the secondary coil.
- Simbol :
Symbol



Transformer Injak Turun *Step-down Transformer*



- Menurunkan voltan output
Decrease output voltage
- Voltan input lebih tinggi daripada voltan output
Input voltage is higher than output voltage
- Bilangan lilitan gegelung primer > bilangan lilitan gegelung sekunder.
Number of turns of the primary coil > number of turns of the secondary coil.
- Simbol :
Symbol



L2 : Teknik menjawab soalan**A2: Answering Technique****1. Soalan Aneka Pilihan :***Multiple Choice Questions:*

Baca dan fahami soalan termasuk pilihan jawapan, kemudian buat pilihan paling tepat mengikut kehendak soalan, menghitamkan pilihan tepat.

Read and understand the question including the answer options, blacken the correct option according to the requirements of the question.

2. Soalan Pelbagai Bentuk :*Multiple Response Questions:*

Baca soalan dan ikut arahan seperti memadan, menggaris, menanda, bulatkan dan lain-lain. Perlu padankan satu dengan satu (1:1) saja, sesuai dengan markah.

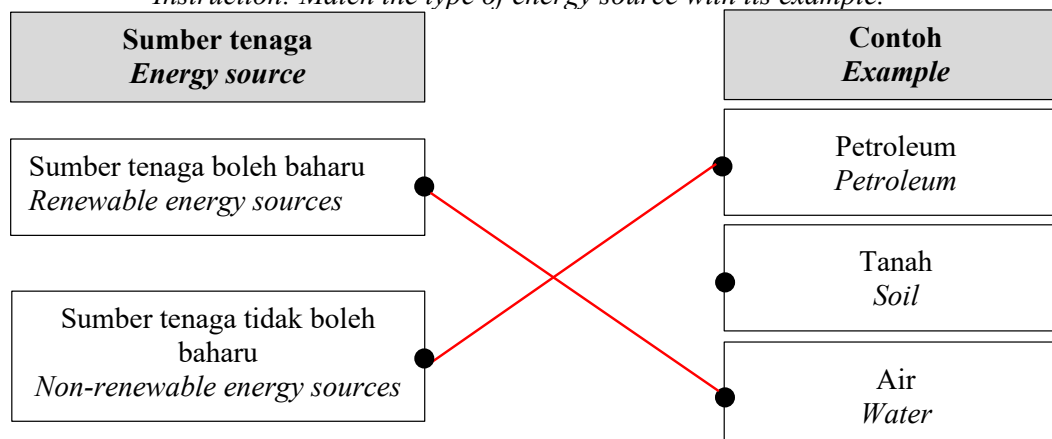
Read the question and follow the instruction such as matching, underlining, marking, circling.

Only match one to one (1:1), according to the allocated marks.

Contoh/example:

Arahan: Padankan jenis sumber tenaga dengan contohnya.

Instruction: Match the type of energy source with its example.

**3. Soalan berstruktur: Memberi penerangan/penjelasan**

*Structured question: **Provide explanations /clarifications***

Fahami kehendak soalan dan isi kandungan fakta sains.

Perlu menyatakan fakta/cara/pemerhatian dan kemudian menerang / menjelaskannya.

Understand the requirements of the question and the content of the science facts.

Need to state the facts/methods/observations and then be able to explain.

Contoh:

Gerakkan magnet bar dengan pantas ke dalam dan ke luar dari gegelung dawai dapat menghasilkan arus aruhan. Jelaskan.

Rapid movement of a bar magnet in and out of the wire loop produces an induced current. Explain.

Medan magnet dipotong oleh gelung dawai untuk menghasilkan arus aruhan.

The magnetic field lines to be cut by the wire loop to produce induced current.

[1 markah / 1 mark]

Mengaplikasi / Apply

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 1/ Level 1)**

- 1 Antara berikut, yang manakah **BETUL** tentang ciri-ciri sumber tenaga boleh baharu?
*Which of the following is **CORRECT** about the characteristics of renewable energy sources?*

- A. Tidak boleh habis
Can not be depleted
- B. Mempunyai sumber yang terhad
Have limited sources
- C. Boleh menyebabkan pencemaran alam sekitar
Can cause environmental pollution
- D. Mengambil masa berjuta-juta tahun untuk terbentuk
Takes millions of years to be formed

[1 markah/1 mark]

Mengingat/Remember

- 2 Antara berikut, padanan yang manakah **BETUL** tentang bendalir yang memutarakan turbin dengan jenis stesen jana kuasanya?

*Which of the following is matched **CORRECTLY** about the fluid that spins the turbine and their power station?*

	Bendalir <i>Fluid</i>	Stesen jana kuasa <i>Power station</i>
A	Air pada tekanan tinggi <i>High- pressure water</i>	Nuklear <i>Nuclear</i>
B	Stim pada tekanan tinggi <i>High-pressure steam</i>	Terma <i>Thermal</i>
C	Udara pada tekanan tinggi <i>High-pressure air</i>	Tenaga angin <i>Wind energy</i>
D	Campuran gas panas dan udara <i>The mixture of hot gas and air</i>	Hidroelektrik <i>Hydroelectric</i>

[1 markah/1 mark]

Mengingat/Remember

- 3 (a) Tandakan (✓) pada sumber tenaga tidak boleh baharu.

Mark (✓) for the non-renewable energy source.

Tenaga tidak boleh Baharu <i>Non-renewable energy source</i>	Tandakan (✓) <i>Mark (✓)</i>
Biojisim <i>Biomass</i>	
Gas asli <i>Natural gas</i>	
Arang batu <i>Coal</i>	

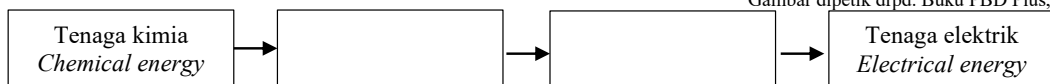
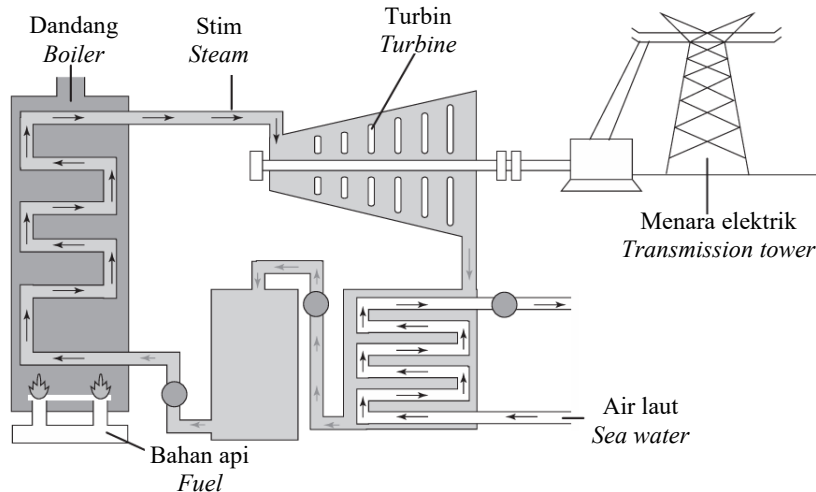
(2 markah/2 marks)

Mengingat/Remember

- (b) Lengkapkan peta alir bagi perubahan tenaga pada stesen di bawah dengan menggunakan perkataan yang diberikan.

Complete the flow chart for energy changes at the station below by using the words given.

Tenaga solar <i>Solar energy</i>	Tenaga kinetik <i>Kinetic energy</i>	tenaga haba <i>Heat energy</i>
-------------------------------------	---	-----------------------------------



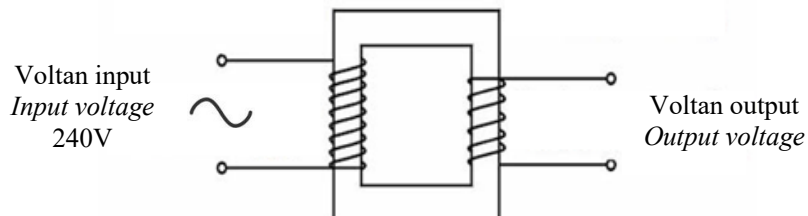
Gambar dipetik drpd. Buku PBD Plus, Pelangi.

[2 markah / 2 marks]

Memahami / *Understand*

- 4 Rajah menunjukkan sejenis transformer.

Diagram shows a type of transformer.



- (a) Nyatakan jenis transformer ini.

State the type of transformer.

[1 markah / 1 mark]

Mengingat / *Remember*

- (b) Nyatakan jenis arus yang digunakan dalam transformer.

State the type of current used in this transformer.

[1 markah/1 mark]

Mengingat/Remember

- (c) Labelkan gegelung primer dengan huruf 'P' pada rajah di atas.
Label the primary coil with the letter 'P' in the diagram above.

[1 markah/1 mark]
Memahami/Understand

- (d) Nyatakan bilangan gegelung sekunder sekiranya gegelung primer mempunyai 30 lilitan.
State the number of turns in the secondary coil if the primer coil has 30 turns.

[1 markah/1 mark]
Memahami /Understand

- (e) Hitungkan voltan output bagi transformer ini apabila gegelung primer dan sekunder mempunyai 400 dan 80 lilitan masing-masing
Calculate the output voltage of this transformer when the primary and secondary coils have 400 and 80 turns respectively.

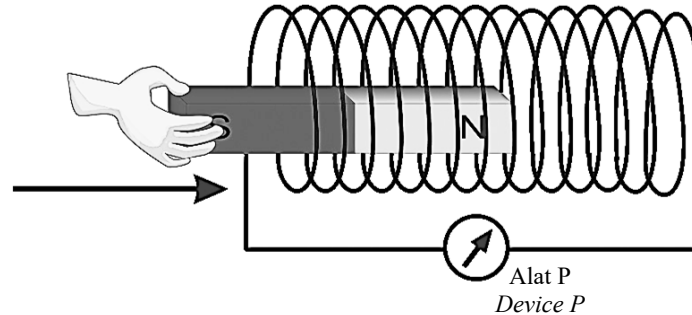
Formula: $\frac{N_s}{N_p} = \frac{V_s}{V_p}$

[2 markah/2 marks]
Mengaplikasi /Apply

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 2/ Level 2)**

- 1 Rajah menunjukkan sebuah penjana ringkas.

Diagram shows a simple generator.



Antara berikut, pernyataan yang manakah adalah **BETUL**?

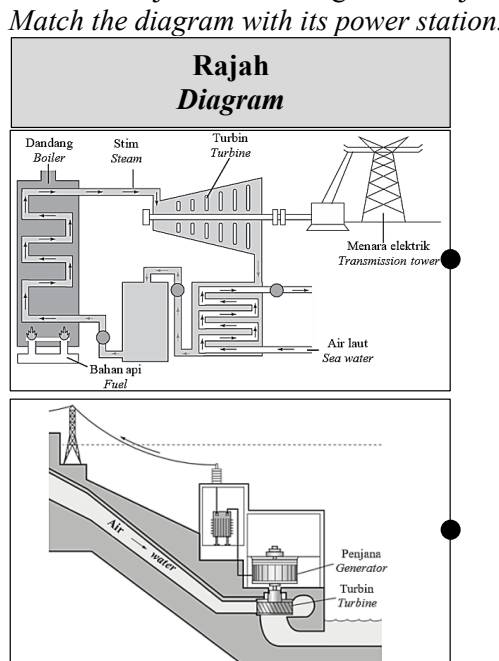
*Which of the following statements is **CORRECT**?*

- A. Alat P ialah ammeter
Device P is ammeter
- B. Arus ulang alik dihasilkan apabila garis medan magnet dipotong
Alternating current is produced when magnetic field lines is cut
- C. Pemesongan jarum penunjuk alat P berlaku apabila magnet bar pegun
Deflection of pointer of device P occurs when bar magnet is static
- D. Mentol LED akan menyala sekiranya alat P digantikan dengan mentol LED
The LED bulb will light up if the device P is replaced with LED bulb

[1 markah/ 1 mark]

Memahami / *Understand*

- 2 (a) Padankan rajah berikut dengan stesen jana kuasa.



Stesen jana kuasa
Power station

● Hidroelektrik
Hydroelectric

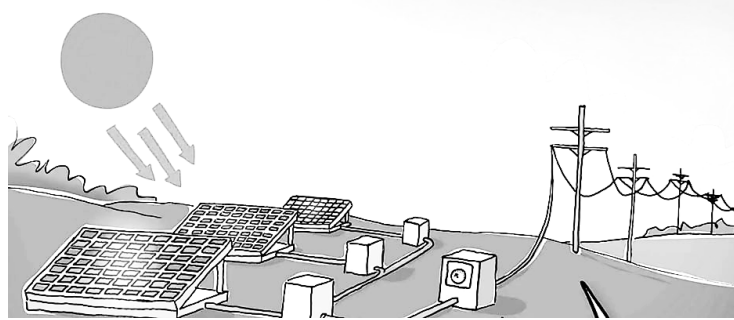
● Terma
Thermal

● Nukleus
Nuclear

[2 markah / 2 marks]

Mengingat / *Remember*

- (b) Rajah menunjukkan sejenis sumber tenaga.
Diagram shows a type of source of energy.

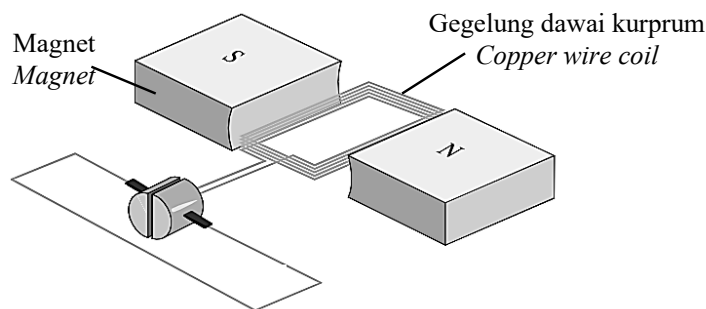


Tandakan **BENAR** bagi pernyataan yang benar dan **PALSU** bagi pernyataan yang salah.
*Mark **TRUE** for correct statement and **FALSE** for the wrong statement.*

Pernyataan <i>Statements</i>	BENAR / PALSU <i>TRUE / FALSE</i>
Boleh diganti secara berterusan. <i>Can be constantly replaced.</i>	
Sumber yang boleh habis digunakan. <i>Sources will be depleted.</i>	
Tenaga biojisim dan tenaga geoterma adalah contoh sumber boleh baharu. <i>Biomass energy and geothermal energy are examples of renewable energy.</i>	

[2 markah / 2 marks]
 Memahami / *Understand*

- 3 Rajah menunjukkan sebuah penjana ringkas.
Diagram shows a simple generator.



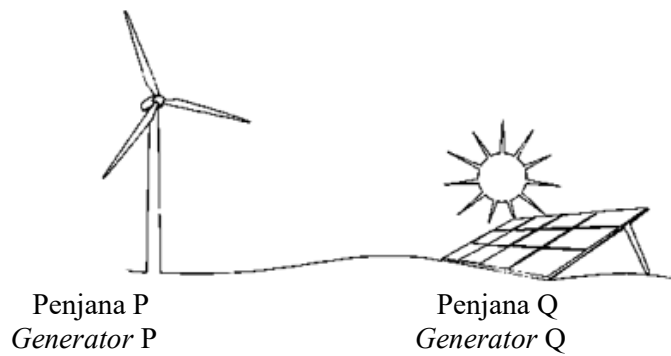
- (a) Nyatakan cara penjana ini menghasilkan arus elektrik.
State the way of this generator to produce electric current.

[1 markah / 1 mark]
 Mengingat/ *Remember*

- (b) Gerakan pantas gegelung dawai kurpum dalam medan magnet dapat menghasilkan suatu arus. Jelaskan
Rapid movement of copper wire coil in magnetic field can produce a current. Explain

[1 markah / 1 mark]
 Mengaplikasi / *Apply*

- (c) Rajah menunjukkan dua jenis penjana elektrik.
Diagram shows two type of generator.



- i. Nyatakan jenis sumber tenaga.
State type of energy source.

[1 markah / 1 mark]
 Mengingat / Remember

- ii. Banding dan bezakan penjana P dan Q.
Compare and contrast the generator P and Q.

Persamaan: _____

Similarity: _____

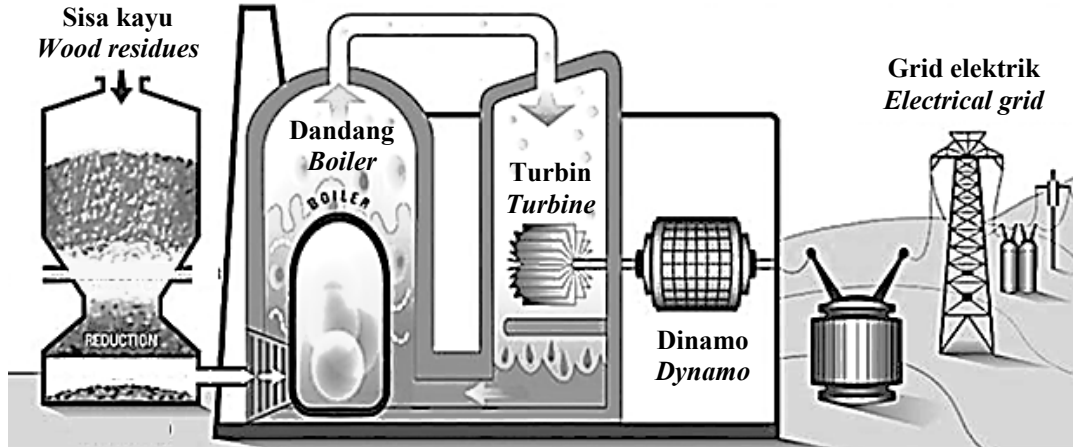
Perbezaan: _____

Difference: _____

[2 markah / 2 marks]
 Menganalisis / Analyze

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 3/ Level 3)**

1 Rajah menunjukkan sebuah stesen jana kuasa.

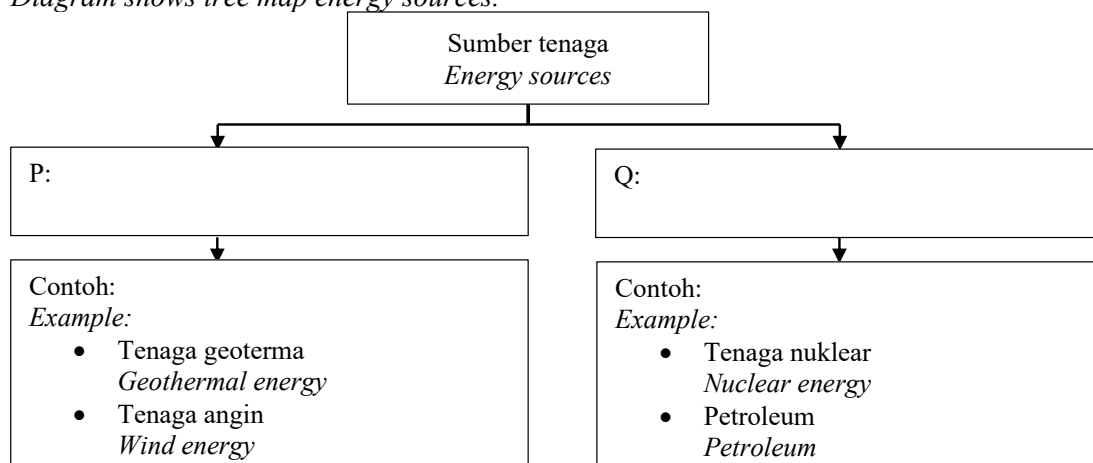
Diagram shows a power station.Antara berikut, pernyataan yang manakah adalah **BETUL**?*Which of the following statement is **CORRECT**?*

- A. Stim memutarakan turbin
Steam rotates the turbine
- B. Sisa kayu mengandungi tenaga kimia.
Wood residues contains chemical energy
- C. Putran turbin menghasilkan tenaga elektrik.
Rotation of turbine produces electricity
- D. Tindak balas nuklear membebaskan tenaga haba.
Nuclear reaction releases heat energy

[1 markah/ 1 mark]

Memahami / Understand

2 (a) Rajah menunjukkan peta pokok bagi sumber tenaga.

Diagram shows tree map energy sources.

Lengkapkan rajah peta pokok di atas.

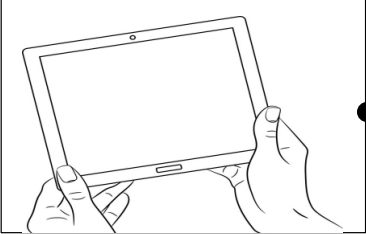
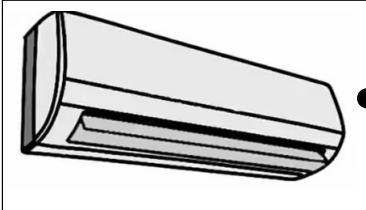
Complete the tree map above.

[2 markah / 2 marks]

Mengingat / Remember

(b) Padankan peralatan elektrik berikut dengan jenis arus yang digunakan.

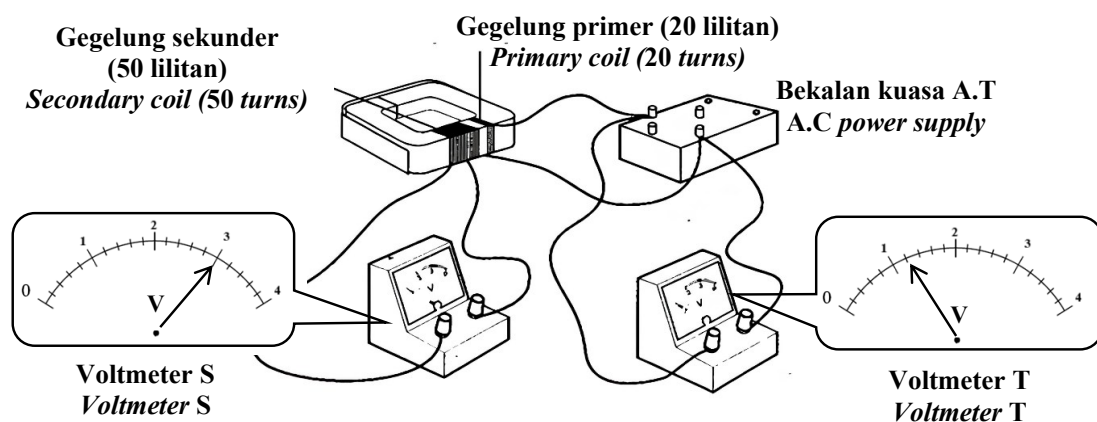
Match the electrical device with the type of current used

Peralatan elektrik <i>Electrical device</i>	Jenis arus <i>Type of current</i>
	☐ Arus aruhan <i>Induced current</i>
	☐ Arus ulang alik <i>Alternating current</i>
	☐ Arus terus <i>Direct current</i>

[2 markah / 2 marks]
Memahami / *Understand*

3 Rajah menunjukkan sebuah eksperimen untuk mengkaji transformer dan fungsinya.

Diagram shows an experiment to study the transformer and its function.



(a) Nyatakan satu pemerhatian berdasarkan rajah.

State an observation based on the diagram.

[1 markah / 1 mark]
Memerhati / *Observing*

(b) Nyatakan inferens berdasarkan pemerhatian pada (a).

State the inference based on the observation in (a).

[1 markah / 1 mark]
Membuat inferens / *Making inference*

- (c) (i) Nyatakan pemboleh ubah dimanipulasikan.
State the manipulated variable.

- (ii) Nyatakan cara mengawal pemboleh ubah dimanipulasikan.
State a way to control the manipulated variable.

[2 markah / 2 marks]

Mengawal pembolehubah / *Controlling variable*

- (d) Ramalkan kecerahan mentol apabila voltmeter S dan T diganti dengan mentol P dan Q.
Predict the brightness of bulb when voltmeter S and T is replaced with bulb P and Q.

[1 markah / 1 mark]

Meramal / *Predicting*

- (e) Nyatakan hubungan antara bilangan lilitan pada gegelung sekunder dengan kecerahan mentol.
State the relationship between the number of turns on the secondary coil and the brightness of bulb.

[1 markah / 1 mark]

Menggunakan hubungan ruang-masa/ *Using Space- Time Relationship*

- (f) Nyatakan definisi secara operasi bagi transformer injak naik.
State the operational definition of step up transformer.

Transformer injak naik ialah _____ apabila

Step up transformer is _____ when

[1 markah / 1 mark]

Mendefinisi secara operasi / *Defining Operationally*

- (g) Nyatakan satu langkah berjaga-jaga yang perlu diambil dalam eksperimen ini.
State one precaution that should be taken in this experiment.

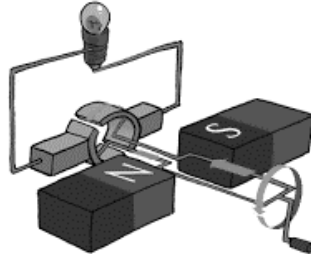
[1 markah / 1 mark]

Mengeksperimen / *Experimenting*

L4 : Penilaian**A4 : Assessment**

- 1 Tenaga daripada Matahari, air dan angin dikelaskan sebagai sumber tenaga _____.
Energy from the Sun, water and wind is classified as _____ energy source.
 [1 markah / 1 mark]

- 2 Rajah menunjukkan sebuah penjana ringkas
Diagram shows a simple generator.



Sumber : Buku Modul 360° Efisien, Cemerlang

Tulis **BENAR** atau **PALSI** bagi pernyataan berikut.
Write TRUE atau FALSE for the following statements.

Pernyataan Statements	BENAR / PALSI TRUE / FALSE
i. Pemotongan garis medan magnet di dalam penjana menghasilkan arus ulang-alik. <i>Cutting of magnetic lines in the generator produces alternating current.</i>	
ii. Lampu LED menyala apabila gegelung dawai diputar dengan cepat. <i>The LED lights up when the wire coil is rotated rapidly.</i>	
iii. Jarum galvanometer akan terpesong apabila gegelung wayar diputar selalu. <i>The galvanometer needle will deflect when the coil of wire is rotated continuously.</i>	

[2 markah / 2 marks]

- 3 Lengkapkan jadual di bawah
Complete the table below.

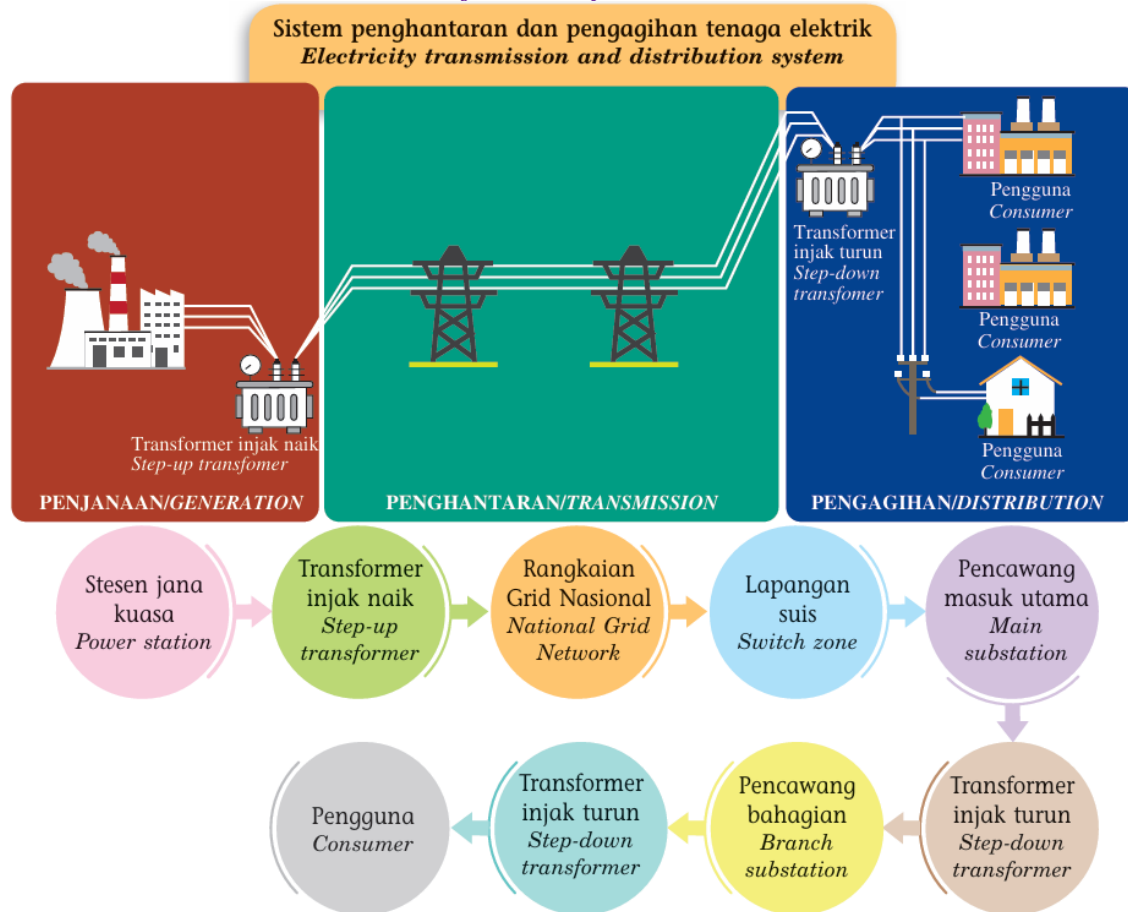
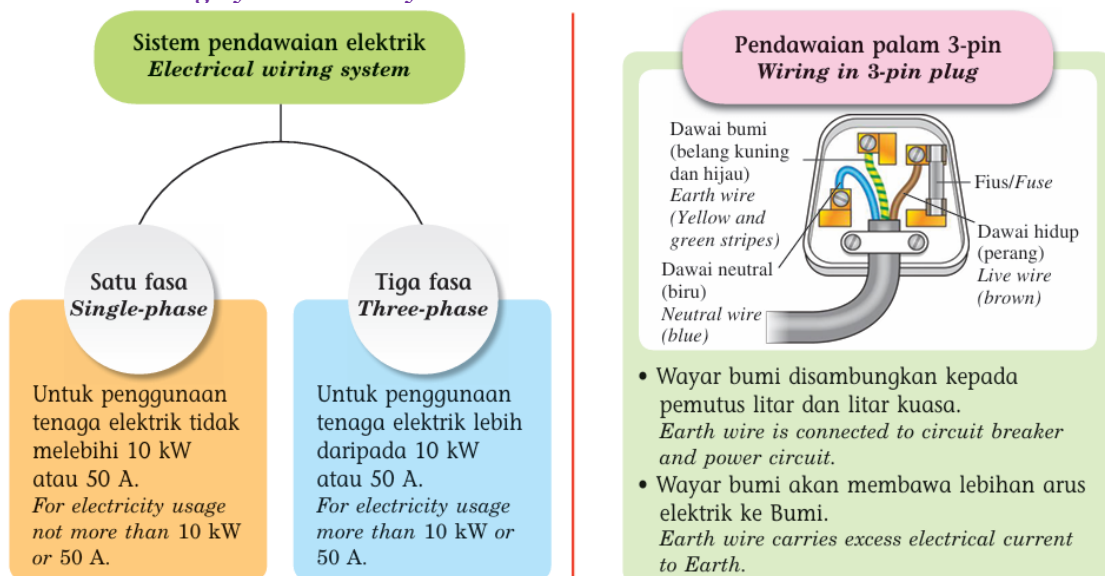
Transformer <i>Transformer</i>		
Fungsi <i>Function</i>	_____ voltan output bagi arus ulang alik _____ the output voltage of alternating current	_____ voltan output bagi arus ulang alik _____ the output voltage of alternating current
Perbandingan voltan input dengan voltan output <i>Comparison between input voltage and output voltage</i>	Voltan input lebih _____ daripada voltan output <i>Input voltage is _____ than output voltage</i>	Voltan input lebih _____ daripada voltan output <i>Input voltage is _____ than output voltage</i>

[6 markah / 6 marks]

- 4 Formula persamaan transformer:
Transformer equation formula:

[1 markah / 1 mark]

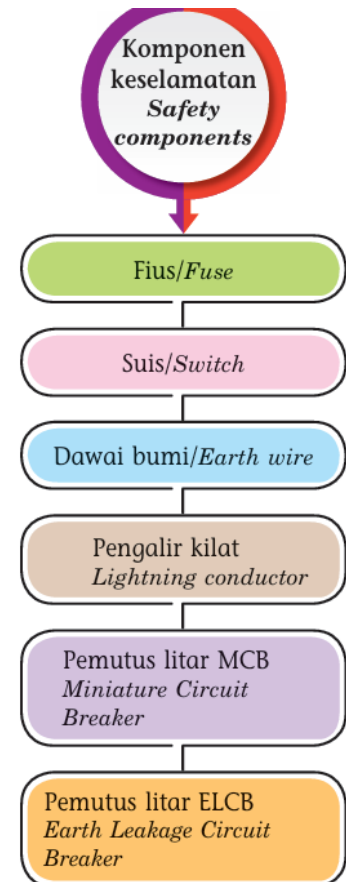
Sesi 15 / Session 15	
Bidang pembelajaran <i>Learning area</i>	6.0 Elektrik dan kemagnetan <i>Electricity and magnetism</i>
Standard Kandungan <i>Content Standard</i>	6.3 Penghantaran dan Pengagihan Tenaga Elektrik <i>Transmission and Distribution of Electricity</i>
Objektif pembelajaran <i>Learning objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan penghantaran dan pengagihan tenaga elektrik. <i>Students can solve questions related to the transmission and distribution of Electrical Energy.</i>
Fokus pembelajaran <i>Learning focus</i>	1 Fungsi komponen dalam sistem penghantaran dan pengagihan tenaga elektrik. <i>Function of components in the electrical energy transmission and distribution system.</i> 2 Pembekalan elektrik dan sistem pendawaian elektrik di rumah. <i>Electricity supply and wiring systems in homes</i> 3 Membezakan komponen keselamatan dalam sistem penghantaran dan pengagihan tenaga elektrik. <i>Distinguish between safety components in electrical energy transmission and distribution system.</i>

L1 : Nota Revisi Cepat**A1: Speedy Revision Notes****A. Sistem Penghantaran Dan Pengagihan Tenaga Elektrik*****The Transmission and Distribution of Electricity*****B. Sistem Pendawaian Elektrik di Malaysia*****Electrical Wiring System in Malaysia***

C. Komponen dan Fungsi Pendawaian Elektrik *Components and Function of Electrical Wiring*

1. Pendawaian elektrik di rumah melibatkan pelbagai **komponen keselamatan** untuk memastikan keselamatan pengguna.
*The electrical wiring at houses involve various **safety components** to ensure consumers safety.*
2. Pendawaian daripada **kabel utama** hanya melibatkan **dawai hidup** dan **dawai neutral** manakala dawai bumi disambungkan kepada pemutus litar dan litar kuasa.
*Wiring from the **main cable** involves only the **live wire** and **neutral wire** while the earth wire is connected to the circuit breaker and power circuit.*

Komponen <i>Component</i>	Fungsi <i>Function</i>
Kotak fius utama <i>Main fuse box</i>	Mengawal aliran masuk arus dari kabel utama <i>Control incoming flow of current from main cable</i>
Suis utama <i>Main switch</i>	Memutuskan litar apabila arus berlebihan mengalir melaluinya <i>Breaks the circuit when excessive current flows through it</i>
Meter elektrik <i>Electric meter</i>	Menyukat jumlah unit tenaga elektrik yang digunakan <i>Measures the total units of electricity used</i>
Pemutus litar <i>Circuit breaker</i>	Mengawal jumlah arus pada litar di dalam rumah <i>Controls the total current of the circuit in the house</i>



Sumber : Nota Pintar, Sasbadi

L2 : Teknik menjawab soalan

A2: Answering Technique

1. Soalan berbentuk Struktur : **Melabel dan menanda**

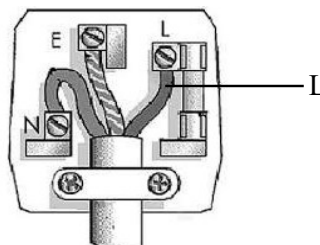
*Structured question: **Labelling and marking.***

Gunakan **garis lurus** sahaja untuk melabelkan bahagian yang dikehendaki.

Use **straight lines** only to label the part correctly.

Contoh: Label dan tandakan 'L' bagi wayar hidup pada rajah di bawah.

Example: Label and mark "L" in the diagram below.



L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 1/ Level 1)**

1 Antara berikut, sistem yang manakah untuk mengagihkan tenaga elektrik di negara kita?

Which of the following is the system to distribute electricity in our country?

- A. Sistem pendawaian
Wiring system
- B. Sistem pengangkutan
Transportation system
- C. Sistem penghantaran tenaga
Power transmission system
- D. Sistem penghantaran dan pengagihan tenaga elektrik
Electrical transmission and distribution system

[1 markah/1 mark]

Mengingat /Remember

2 Antara berikut, yang manakah menggunakan pendawaian satu fasa?

Which of the following uses single-phase wiring?

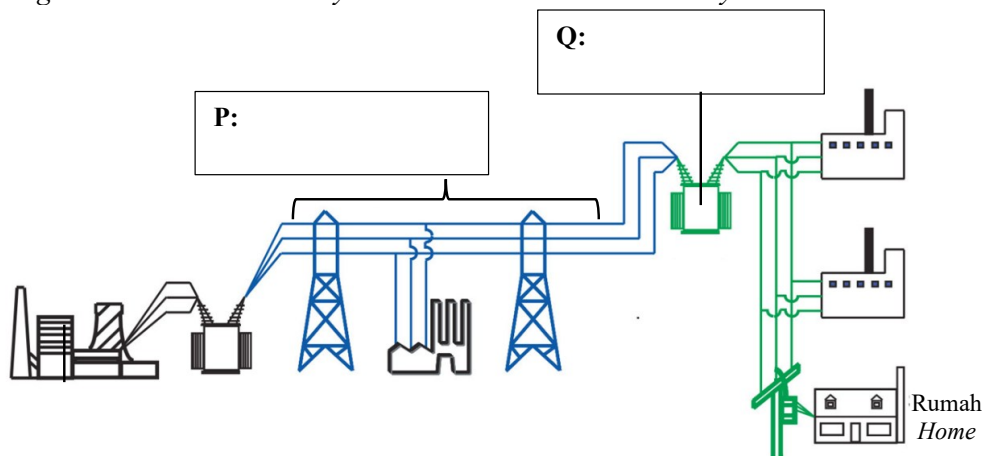
- A. Hotel
Hotel
- B. Kawasan industri
Industrial area
- C. Rumah tumpangan
Homestay
- D. Pusat membeli belah
Shopping mall

[1 markah/1 mark]

Mengingat /Remember

3 Rajah menunjukkan sistem penghantaran dan pengagihan tenaga elektrik.

Diagram shows the electricity transmission and distribution system



(a) Labelkan P dan Q pada rajah menggunakan perkataan yang diberikan.

Label P and Q on the diagram using the words given.

Stesen jana kuasa
Power station

Rangkaian Grid Nasional
National Grid Network

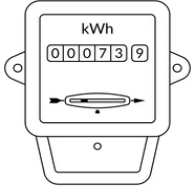
Transformer injak turun
Step down transformer

[2 markah/2 mark]

Mengingat / Remember

(b) Padankan komponen elektrik berikut dengan fungsinya.

Match the electrical components with its function.

Komponen elektrik <i>Electrical components</i>	Fungsi <i>Function</i>
	Memutuskan litar apabila arus berlebihan mengalir melaluinya <i>Breaks a circuit when excessive current flows through it</i>
	Mengukur jumlah unit tenaga elektrik yang digunakan <i>Measuring the number of units of electrical energy used</i>
	Mengawal pengaliran arus elektrik bagi semua litar di dalam rumah <i>Controls the flow of electrical current in all circuits in the house</i>

[2 markah / 2 marks]

Memahami / *Understand*

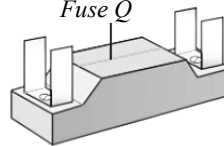
4 Rajah menunjukkan satu komponen dalam litar elektrik

Diagram shows a component in electrical circuit.

Fius P
Fuse P



Fius Q
Fuse Q



(a) Tandakan (✓) pada fungsi fius.

Mark (✓) for the function of fuse.

☐	Memutuskan semua litar dalam rumah jika arus yang dibekalkan berlebihan <i>Breaks all circuits in the house if current is supplied excessively</i>
☐	Memutuskan litar apabila arus yang terlalu banyak mengalir melalui litar <i>Breaks the circuit when too much current flows through the circuit</i>

[1 markah/1 mark]

Mengingat / *Remember*

(b) Nyatakan fius yang digunakan dalam palam 3-pin.

State the fuse which used in 3-pin plug.

[1 markah/1 mark]

Mengingat / *Remember*

(c) Nyatakan nilai fius yang sesuai digunakan oleh peralatan elektrik berikut.

State the suitable value of fuse which is used by the following electrical appliances.

Peralatan elektrik <i>Electrical appliances</i>	Cerek elektrik <i>Electric kettle</i>	Periuk nasi <i>Rice cooker</i>	
Nilai arus elektrik <i>Value of electric current</i>	8.3 A	2.7 A	5.0 A
Nilai fius <i>Value of fuse</i>			10.0 A
			13.0 A

[2 markah/2 marks]

Memahami / *Understand*

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 2/ Level 2)**

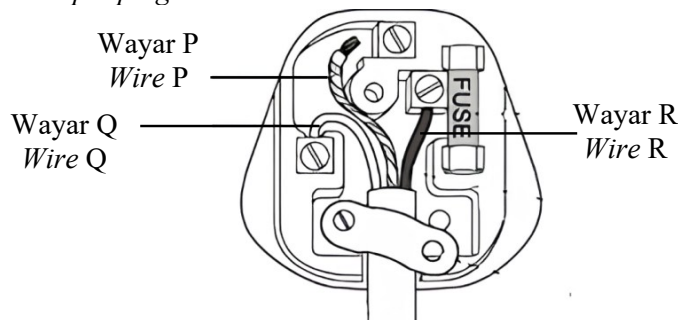
- 1 Antara berikut, pernyataan yang manakah adalah **BENAR** tentang sistem pendawaian 3 fasa?
Which of the following statement is **TRUE** regarding the three-phase wiring system?

- I. Membekalkan voltan 415 V
Supply a voltage of 415V
 - II. Dipasang di kawasan komersial
Installed in commercial area
 - III. Sesuai bagi kawasan perumahan
Suitable for residential housing area
 - IV. Membekalkan voltan 240V dengan arus 50A
Supply a voltage of 240V with electric current 50A
- A. I dan II
I and II
- B. III dan IV
III and IV
- C. II dan III
II and III
- D. I dan IV
I and IV

[1 markah / 1 mark]

Memahami / Understand

- 2 (a) Rajah menunjukkan palam 3-pin.
Diagram shows a 3-pin plug.



Tuliskan **BENAR** bagi pernyataan betul dan **PALSU** bagi pernyataan yang salah berkenaan wayar palam 3-pin.

Write **TRUE** for the correct statements and **FALSE** for the incorrect statements regarding the 3-pin plug.

Pernyataan Statements	BENAR / PALSU TRUE / FALSE
Wayar P mengalirkan arus elektrik daripada peralatan terus ke Bumi. <i>Wire P conducts electric current from appliances directly to the Earth.</i>	
Wayar Q membawa arus dari substesen ke peralatan elektrik. <i>Wire Q carries current from the substation branches to electrical appliances</i>	
Wayar R berwarna biru <i>Wire R is blue in colour</i>	

[2 markah / 2 marks]

Memahami / Understand

(b) Gariskan jawapan yang betul dalam pernyataan di bawah.

Underline the correct answer in the statement below

- i. Sistem pendawaian elektrik (fasa tunggal / tiga fasa) membekalkan voltan sebanyak 240V.

Electrical wiring system (single phase / three phase) supplies 240 V voltage.

- ii. Transformer pertama dalam sistem penghantaran dan pengagihan tenaga adalah untuk (meningkatkan / menurunkan) voltan arus elektrik.

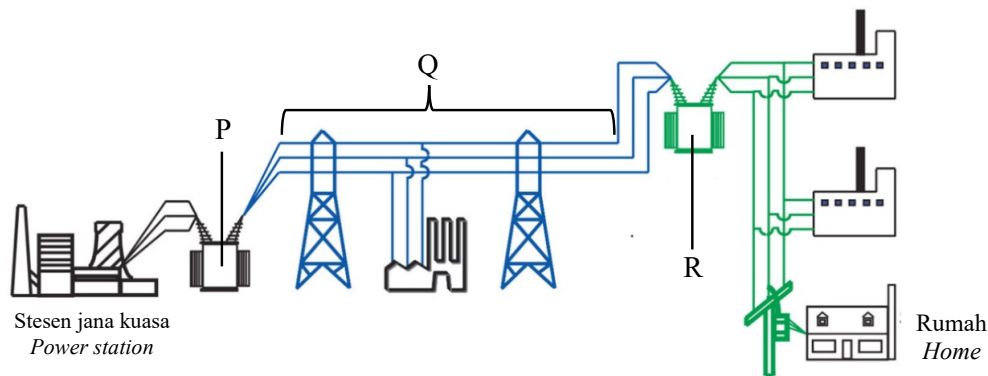
The first transformer in the energy transmission and distribution system to (increase / decrease) the voltage of electric current.

[2 markah / 2 marks]

Mengingat / Remember

3 Rajah menunjukkan sistem penghantaran dan pengagihan tenaga elektrik.

Diagram shows the system of transmission and distribution of electricity.



(a) Tandakan (✓) pada masalah yang dihadapi semasa penghantaran tenaga elektrik.

Mark (✓) on the problem faced during the transmission of electrical energy.

	Kehilangan tenaga dalam bentuk tenaga haba. <i>Loss of energy in the form of heat energy</i>
	Rintangan yang rendah pada kabel melambatkan proses penghantaran tenaga elektrik. <i>Low resistance of the cable delays the process of transmission of electrical energy.</i>

[1 markah / 1 mark]

Mengingat / Remember

(b) Nyatakan jenis transformer yang terdapat dalam P.

State the type of transformer found in P.

_____ [1 markah / 1 mark]

Mengingat / Remember

(c) Nyatakan fungsi komponen Q.

State the function of component Q.

_____ [1 markah/1 mark]

Memahami / Understand

- (d) Nyatakan satu perbezaan antara komponen P dan R.
State a difference between component P and R.

[1 markah/1 mark]
Menganalisis/ *Analyze*

- (e) Meter elektrik dipasang di luar rumah. Jelaskan
Electric meter is installed outside the house. Explain

[1 markah/1 mark]
Memahami / *Understand*

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 3/ Level 3)**

- 1 Antara berikut, pernyataan yang manakah merupakan langkah keselamatan untuk mengelakkan kemalangan elektrik di rumah?

Which of the following are the safety measures to avoid electrical accidents at home?

- I. Menyemak selalu semua kabel dan palam
Check regularly all the cables and plugs.
- II. Menggunakan kadar fuis yang betul dalam peralatan elektrik.
Use the correct fuse rating in electrical appliances.
- III. Mencabut terus wayar apabila menanggalkan palam dari soket.
Pull the wires directly when removing plug from the socket.
- IV. Melakukan pembaikan sendiri apabila peralatan elektrik rosak.
Do self-repair when electrical appliance damage.

- A. I dan II
I and II
- B. III dan IV
III and IV
- C. II dan III
II and III
- D. I dan IV
I and IV

[1 markah / 1 mark]

Mengingat / Remember

- 2 (a) Padankan komponen dalam sistem pendawaian di rumah dengan fungsinya.

Match the components in the wiring system in home with their functions.

Komponen elektrik <i>Electrical components</i>	Fungsi <i>Functions</i>
Pemutus litar ELCB <i>ELCB circuit breaker</i>	Membekalkan arus kepada lampu <i>Supplies current to the lights</i>
Litar pencahayaan <i>Lighting circuit</i>	Membekalkan arus kepada soket <i>Supplies current to the socket</i>
	Memutuskan litar apabila arus berlebihan mengalir melaluinya <i>Break the circuit when excessive current flows through it.</i>

[2 markah / 2 marks]

Mengingat / Remember

- (b) Bulatkan nilai fuis yang sesuai bagi peralatan elektrik berikut.

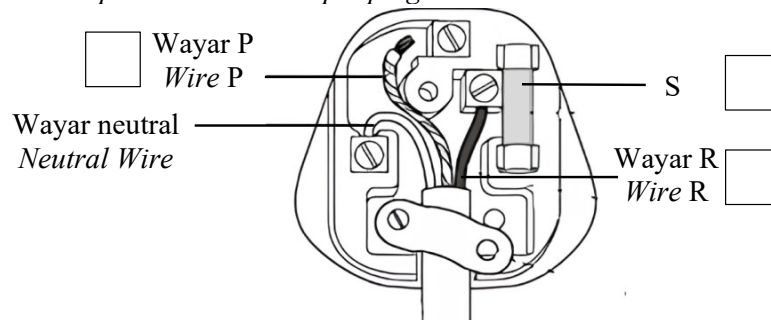
Circle the suitable fuse rating for each electrical appliance below.

Peralatan elektrik dan arus normal <i>electrical appliance and normal current</i>	Nilai fuis <i>Fuse rating</i>	Peralatan elektrik dan arus normal <i>electrical appliance and normal current</i>	Nilai fuis <i>Fuse rating</i>
Televisyen <i>Television</i> 0.58 A	1 A 5 A	Seterika <i>Electric iron</i> 10.87 A	10 A 13 A

[2 markah / 2 marks]

Memahami / Understand

- 3 Rajah menunjukkan komponen-komponen di dalam palam 3-pin.
Diagram shows components inside a 3-pin plug.



- (a) Tandakan (✓) pada komponen keselamatan di dalam palam.
Mark (✓) on the safety component in the plug.

[2 markah / 2 marks]
 Mengingat / Remember

- (b) Nyatakan warna wayar P
State the colour of wire P.

 [1 markah / 1 mark]
 Mengingat / Remember

- (c) Nyatakan fungsi bagi komponen S.
State the function of the component S.

 [1 markah/ 1 mark]
 Memahami/Understand

- (d) Ketuhar ialah contoh peralatan elektrik yang menggunakan palam 3-pin. Wajarkan.
Oven is an example of electrical appliances which uses 3-pin plug. Justify.

 [2 markah/ 2 marks]
 Menilai/ Evaluate

- (e) Rajah menunjukkan satu palam 3-pin yang belum dipasang dengan wayar.
Diagram shows a 3-pin plug which is not being installed with wire.



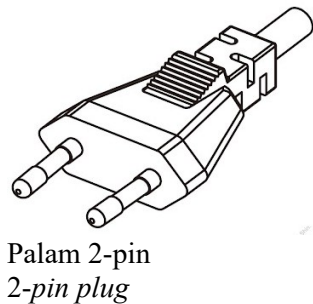
Tuliskan huruf T, U dan V untuk menunjukkan warna wayar yang akan dipasangkan ke dalam palam.

Write the letter T, U and V to show the colour of wires to be installed into the plug.

Warna wayar <i>Wire colour</i>	Dipasang pada tamatan <i>Installed at the point</i>
Biru <i>Blue</i>	
Perang <i>Brown</i>	
Kuning dengan jalur hijau <i>Yellow with green strips</i>	

[1 markah/ 1 mark]
 Mengaplikasi/Apply

- (f) Rajah menunjukkan dua jenis palam.
Diagram shows two types of plugs.



Banding dan bezakan kedua-dua jenis palam ini.
Compare and contrast these types of plugs.

Persamaan: _____

Similarity: _____

Perbezaan: _____

Difference: _____

[2 markah/ 2 marks]
 Menganalisis/ Analyze

L4 : Penilaian
A4 : Assessment

Lengkapkan pernyataan di bawah.
Complete the following statement.

- 1 Jenis arus yang mengalir dalam sistem penghantaran dan pengagihan tenaga ialah

The type of current that flows in energy transmission and distribution systems

[1 markah / 1 mark]

- 2 Nyatakan masalah yang timbul semasa penghantaran arus elektrik dari sistem jana kuasa ke seluruh negara.

State the problems that arise during the transmission of electricity from the power generation system throughout the country.

Kehilangan tenaga elektrik dalam bentuk _____

Loss of electrical energy in the form of _____.

[1 markah / 1 mark]

- 3 Apakah voltan minimum tenaga elektrik yang dibawa oleh pendawaian tiga fasa?

What is the minimum voltage of electrical energy carried by three-phase wiring?

[1 markah / 1 mark]

- 4 Terdapat 2 jenis palam yang digunakan di rumah, iaitu _____ dan _____

There are 2 types of plug used at home, that is _____ and _____.

[2 markah / 2 marks]

- 5 Pendawaian dari kabel utama ke rumah hanya melibatkan _____ dan _____

Wiring from the main cable to homes involves only the _____ and _____.

[1 markah / 1 mark]

- 6 Fungsi dawai bumi: membawa _____ ke _____.

The function of Earth wire: carries _____ to _____.

[2 markah / 2 marks]

- 7 Komponen keselamatan di rumah termasuklah:

Safety components in homes includes:

i. _____

ii. _____

[2 markah / 2 marks]

Sesi 16 / Session 16	
Bidang Pembelajaran <i>Learning Area</i>	7.0 TENAGA DAN KUASA <i>7.0 ENERGY AND POWER</i>
Standard Kandungan <i>Content Standard</i>	7.1 Kerja, Tenaga dan Kuasa <i>Work, Energy and Power</i> 7.2 Tenaga Keupayaan dan Tenaga Kinetik <i>Potential Energy and Kinetic Energy</i>
Objektif Pembelajaran <i>Learning Objective</i>	Di akhir pengajaran dan pembelajaran, murid dapat <i>At the end of teaching and learning, students will be able to</i> 1 mendefinisikan kerja dan menyelesaikan masalah berkaitan tenaga dalam kehidupan harian <i>define work and solve problems related to energy in daily life</i> 2 Menyatakan hubungan antara kerja dengan kuasa serta menyelesaikan masalah dalam konteks kehidupan harian. <i>State the relationship between work done and power and solve problems in the context of daily life.</i> 3 Menerangkan contoh bagi tenaga keupayaan graviti dan menyelesaikan masalah dalam konteks kehidupan harian. <i>Explain with examples gravitational potential energy and solve problems in the context of daily life</i> 4 Menghitung dan menyelesaikan masalah tentang tenaga keupayaan kenyal dalam konteks kehidupan harian. <i>Calculate and solve the problem of elastic potential energy in the context of daily life.</i>
Fokus Pembelajaran <i>Learning Focus</i>	1 Formula bagi kerja, kuasa, tenaga keupayaan graviti, tenaga keupayaan kenyal, dan tenaga kinetik <i>Formulae for work, power, gravitational potential energy, elastic potential energy and kinetic energy</i> 2 Menyelesaikan masalah yang berkaitan dengan pengiraan kerja, kuasa, tenaga keupayaan graviti tenaga keupayaan kenyal, dan tenaga kinetik <i>Solve problems related to calculating work, power, gravitational potential energy, elastic potential energy and kinetic energy</i>

L1 : Nota Revisi Cepat**A1: Speedy Revision Notes****A. Kerja, Tenaga dan Kuasa****Work, Energy and Power**

Tenaga ialah **keupayaan** untuk **melakukan kerja**.
*Energy is the **ability** to **do work**.*

Kerja
Work

Kerja = Daya $\times$ Sesaran
 Work = Force $\times$ Displacement

$W = Fs$

Unit S.I
 S.I unit
 Joule (J)

Kuasa
Power

Kuasa = $\frac{\text{Kerja}}{\text{Masa}}$
 Power = $\frac{\text{Work}}{\text{Time}}$

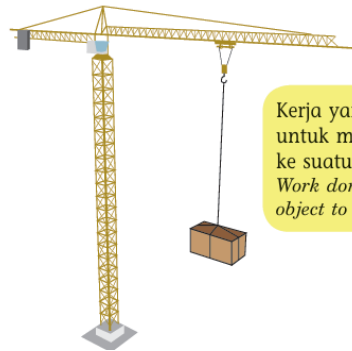
$P = \frac{W}{t}$

Unit S.I
 S.I unit
 Watt (W)

B. Tenaga Keupayaan dan Tenaga Kinetik**Potential Energy and Kinetic Energy****1. Tenaga Keupayaan Graviti**
Gravitational Potential Energy

Kerja = mgh
 Work = mgh

m : Jisim objek dalam unit kg
m: Mass of object in kg
 g : Pecutan graviti dalam unit m s^{-2}
g: Gravitational acceleration in m s^{-2}
 h : Ketinggian dalam unit m
h: The height in m



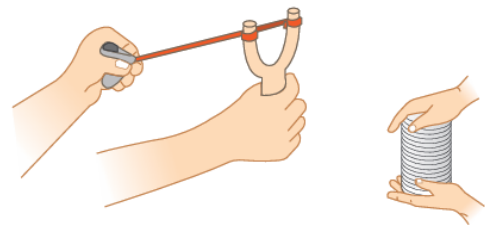
Kerja yang dilakukan untuk mengangkat objek ke suatu ketinggian.
Work done to lift an object to a height.

2. Tenaga Keupayaan Kenyal
Elastic Potential Energy

Tenaga keupayaan kenyal = $\frac{1}{2} Fx$
 Elastic potential energy = $\frac{1}{2} Fx$

F : Daya regangan atau mampatan dalam unit N
F: Stretching or compression force in N
 x : Sesaran dari kedudukan keseimbangan dalam unit m
x: Displacement from the equilibrium position in m

Kerja yang dilakukan untuk memampat atau meregang suatu bahan kenyal.
Work done to compress or stretch an elastic substance.

**3. Tenaga Kinetik**
Kinetic Energy

Tenaga kinetik = $\frac{1}{2} mv^2$
 Kinetic energy = $\frac{1}{2} mv^2$

m : Jisim objek dalam unit kg
m: Mass of object in kg
 v : Halaju dalam unit m s^{-1}
v: Velocity in m s^{-1}



Dimiliki oleh objek yang sedang bergerak.
Possessed by a moving object.

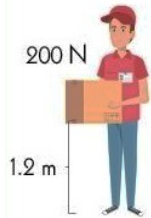
Contoh Pengiraan Example of Calculation:

Contoh 1

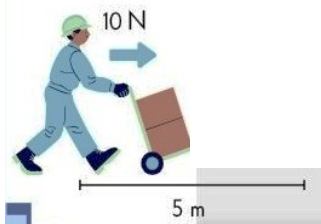
Example 1

Kirakan kerja yang dilakukan ditunjukkan dalam rajah di bawah.

Calculate the work done shown in the diagram



$$\begin{aligned}\text{Kerja} &= \text{Daya} \times \text{Sesaran} \\ &= 200 \text{ N} \times 1.2 \text{ m} \\ &= 240 \text{ J} \\ \text{Work done} &= \text{Force} \times \text{Displacement} \\ &= 200 \text{ N} \times 1.2 \text{ m} \\ &= 240 \text{ J}\end{aligned}$$



$$\begin{aligned}\text{Kerja} &= \text{Daya} \times \text{Sesaran} \\ &= 10 \text{ N} \times 5 \text{ m} \\ &= 50 \text{ J} \\ \text{Work done} &= \text{Force} \times \text{Displacement} \\ &= 10 \text{ N} \times 5 \text{ m} \\ &= 50 \text{ J}\end{aligned}$$

Contoh 2

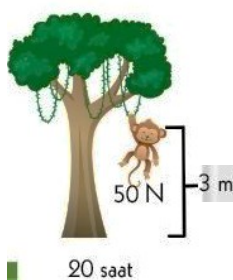
Example 2

Kirakan kuasa yang dilakukan ditunjukkan dalam rajah di bawah.

Calculate the power shown in the diagram



$$\begin{aligned}\text{Kuasa (w)} &= \frac{\text{kerja dilakukan (J)}}{\text{masa (s)}} \\ &= \frac{2000 \text{ J}}{5 \text{ s}} \\ &= 400 \text{ watt} \\ \text{Power (w)} &= \frac{\text{Work done (J)}}{\text{time (s)}} \\ &= \frac{2000 \text{ J}}{5 \text{ s}} \\ &= 400 \text{ watt}\end{aligned}$$



$$\begin{aligned}\text{Kuasa (w)} &= \frac{\text{kerja dilakukan (J)}}{\text{masa (s)}} \\ &= \frac{50 \text{ N} \times 3 \text{ m}}{20 \text{ s}} \\ &= 7.5 \text{ watt} \\ \text{Power (w)} &= \frac{\text{Work done (J)}}{\text{time (s)}} \\ &= \frac{50 \text{ N} \times 3 \text{ m}}{20 \text{ s}} \\ &= 7.5 \text{ watt}\end{aligned}$$

Contoh 3

Example 3

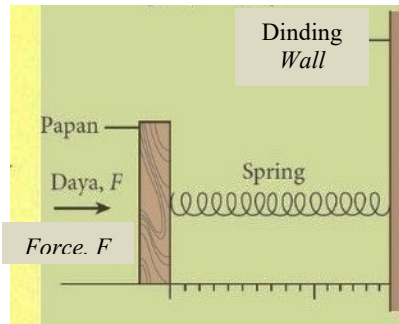
Seekor burung helang berjism 2.5 kg terbang pada ketinggian 150 m. Kira tenaga keupayaan graviti burung itu.
A hawk with a mass of 2.5 kg flies at a height of 150 m. calculate the gravitational potential energy of the bird.

Penyelesaian / Solution:

$$\begin{aligned}\text{Tenaga keupayaan graviti / Gravitational potential energy} \\ &= mgh \\ &= 2.5 \text{ kg} \times 10 \times 150 \text{ m} \\ &= 3750 \text{ J}\end{aligned}$$

Contoh 4

Example 4



Diberi panjang asal spring ialah 50 cm, panjang akhir ialah 30 cm dan daya akhir yang dikenakan pada spring itu ialah 20 N. Berapakah tenaga keupayaan kenyal bagi spring termampat itu?

Given the original length of the spring is 50 cm, the final length is 30 cm and the final force applied to the spring is 20 N. What is the elastic potential energy of the compressed spring?

Penyelesaian / Solution

Jarak mampatan spring / displacement of spring

$$= (50 - 30) \text{ cm}$$

$$= 0.2 \text{ m}$$

Tenaga keupayaan kenyal / Elastic potential energy

$$= \frac{1}{2} Fx$$

$$= \frac{1}{2} \times 20 \text{ N} \times 0.2 \text{ m}$$

$$= 2 \text{ J}$$

Contoh 5

Example 5

Seorang lelaki sedang berjogging dengan halaju 5 ms^{-1} . Lelaki itu mempunyai jisim 55 kg. Cari tenaga kinetiknya.

A man is jogging with a velocity of 5 ms^{-1} . The man has a mass of 55 kg. Find his kinetic energy.

Penyelesaian / Solution

Tenaga kinetik / Kinetic energy

$$= \frac{1}{2} mv^2$$

$$= \frac{1}{2} \times 55 \text{ kg} \times (5)^2$$

$$= 687.5 \text{ J}$$



Istilah dan Formula penting

Importance Keyword and Formula

	Simbol Symbol	Penerangan Description
Kerja = Daya $\times$ Sesaran <i>Work = Force $\times$ Displacement</i>	$F \times s$	Kerja yang dilakukan apabila daya menggerakkan objek <i>Work done when a force moves an object</i>
Kuasa = $\frac{\text{Kerja}}{\text{Masa}}$ <i>Power = $\frac{\text{Work}}{\text{Time}}$</i>	$P = \frac{W}{t}$	Kadar melakukan kerja <i>Rate of work done</i>
Tenaga kinetik <i>Kinetic energy</i>	$\frac{1}{2} \times m \times v^2$	Melibatkan halaju objek <i>Involves the velocity of the object</i>
Tenaga keupayaan gravity <i>Gravitational potential energy</i>	$m \times g \times h$	Melibatkan kedudukan tinggi dan rendah objek <i>Involves the high and low positions of objects</i>
Tenaga keupayaan kenyal <i>Elastic potential energy</i>	$\frac{1}{2} \times F \times x$	Melibatkan getah atau spring yang bergerak dari kedudukan asal <i>Involves rubbers or springs to move from their original positions</i>

L2: Teknik menjawab soalan**A2: Answering technique**

1. Fahamkan soalan sebelum menjawab dan rancang bagaimana hendak menerangkan jawapan dengan teratur dan mudah difahami oleh pemeriksa
Understand the question before answering and plan how to explain the answer in an orderly manner that is easy for the examiner to understand.
2. Pastikan soalan yang diminta untuk menandakan (✓), tandakan pada jawapan yang betul sahaja dan tidak perlu tandakan (×) pada jawapan yang salah
Make sure the questions you are asked to mark (✓), mark only the correct answer and do not need to mark (×) the wrong answer

Contoh

Example

Kuhing <i>Cat</i>	✓
Meja <i>Table</i>	
Harimau Malaya <i>Harimau Malaya</i>	✓
Kerusi <i>Chair</i>	

3. Gunakan rumus yang diberi, tuliskan langkah pengiraan dengan betul.
Use the given formula, write the correct working step.

Contoh

Shahrizan mengangkat sebuah kotak **berjisim 15 kg** dari lantai ke atas meja **setinggi 1.5 m**. Berapakah kerja yang dilakukan?

$$\text{Sesaran} = 1.5 \text{ m}$$

$$\begin{aligned} \text{Daya} &= (15 \times 10) = 150 \text{ N} \\ \text{Sesaran} &= 1.5 \text{ m} \\ \text{Kerja} &= \text{Daya} \times \text{Sesaran} \\ \text{Kerja} &= 150 \text{ N} \times 1.5 \text{ m} \\ &= 225 \text{ Nm/J} \end{aligned}$$

Example

Shahrizan lifts a box of **mass 15 kg** from the floor to a table **1.5 m high**. How much work is done?

$$\begin{aligned} \text{Force} &= (15 \times 10) = 150 \text{ N} \\ \text{Work} &= \text{Force} \times \text{Displacement} \\ \text{Work} &= 150 \text{ N} \times 1.5 \text{ m} \\ &= 225 \text{ Nm/J} \end{aligned}$$

$$\begin{aligned} \text{Displacement} \\ &= 1.5 \text{ m} \end{aligned}$$

4. $1 \text{ kg} = 10 \text{ N}$

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 1/ Level 1)**

- 1 Antara berikut, yang manakah boleh mempengaruhi kerja yang dilakukan?

Which of the following can influence the work done?

- A. Sesaran objek dan masa yang diambil
Displacement of an object and time taken
- B. Daya yang dilakukan dan sesaran objek
Force exerted and displacement of the object
- C. Jisim beban dan daya untuk mengangkatnya
The mass of the load and the force to lift it
- D. Jisim beban dan masa yang diambil untuk mengangkatnya
The mass of the load and the time taken to lift it

[1 markah/ 1 mark]
Mengingat / Remember

- 2 Apakah tenaga bagi spring yang dimampatkan?

What is the energy of the compressed spring?

- A. Tenaga kinetik
Kinetic energy
- B. Tenaga mekanik
Mechanical energy
- C. Tenaga keupayaan kenyal
Elastic potential energy
- D. Tenaga keupayaan graviti
Gravitational potential energy

[1 markah/ 1 mark]
Mengingat / Remember

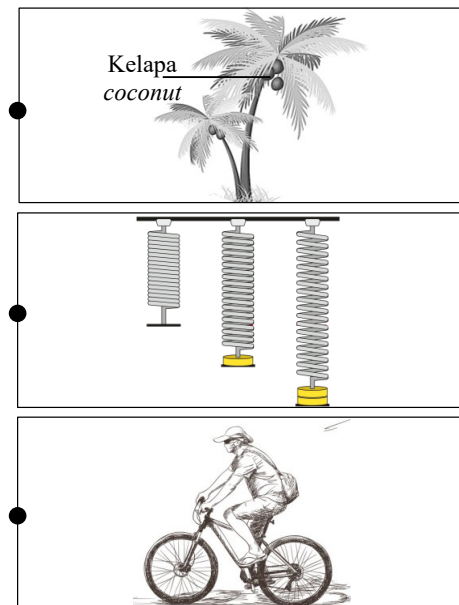
- 3 (a) Padankan jenis tenaga dengan situasi yang betul.
Match the types of energy with the correct situations.

Jenis tenaga
Type of energy

Tenaga keupayaan kenyal
Elastic potential energy

Tenaga keupayaan graviti
Gravitational potential energy

Situasi
Situations



[2 markah/ 2 marks]
Mengingat / Remember

(b) Gariskan jawapan yang betul bagi pernyataan berikut.

Underline the correct answer for the following statement.

i. _____ (Kuasa, Tenaga) ialah kadar melakukan kerja

_____ (Power, Energy) is the rate of work done.

ii. _____ (Kuasa, Tenaga) didefinisikan sebagai keupayaan untuk melakukan kerja.

_____ (Power, Energy) is defined as the ability to do work.

[2 markah/ 2 marks]

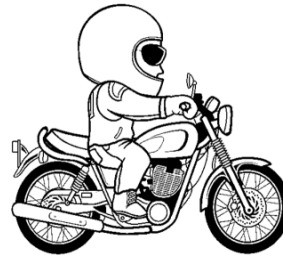
Mengingat / Remember

4 Rajah menunjukkan dua aktiviti P dan Q.

The diagram shows two activities P and Q.



Aktiviti P
Activity P



Aktiviti Q
Activity Q

(a) Tandakan (✓) pada unit S.I tenaga kinetik.

Mark (✓) on the S.I unit of kinetic energy.

	Watt
--	------

	Joule
--	-------

[1 markah / 1 mark]

Mengingat / Remember

(a) Nyatakan keadaan yang mempunyai tenaga kinetik yang lebih tinggi. Terangkan.

State the condition which has higher kinetic energy. Explain

[2 markah/ 2 marks]

Menganalisis/Analyse

(b) Nyatakan satu faktor yang boleh dikawal oleh penunggang Q agar jumlah tenaga kinetik antara mereka adalah sama.

State a factor which can be controlled by rider Q to enable both of them with the same amount of kinetic energy.

[1 markah / 1 mark]

Memahami / Understand

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 2/ Level 2)**

- 1 Antara berikut, pernyataan yang manakah adalah benar tentang kerja?

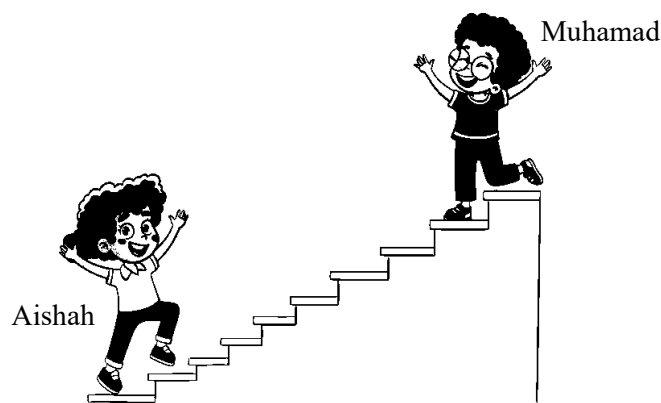
Which of the following statements is correct about work?

- A. Kerja menghitung kuasa sesuatu objek
Work on calculating the power of an object
- B. Kerja menghitung pemindahan tenaga yang berlaku
Work calculates the energy transfer that occurs
- C. Kerja ialah untuk menghitung kecekapan sesuatu peralatan
Work is to calculate the efficiency of an equipment
- D. Kerja menghitung daya yang bertindak ke atas sesuatu objek
Work on calculating the forces acting on an object

[1 markah/ 1 mark]
Mengingat / Remember

- 2 (a) Rajah menunjukkan kedudukan 2 orang pelajar di atas tangga.

The diagram shows the position of 2 students on a stairs.



Tuliskan **BENAR** bagi pernyataan betul dan **PALSU** bagi pernyataan yang salah berkenaan situasi di atas.

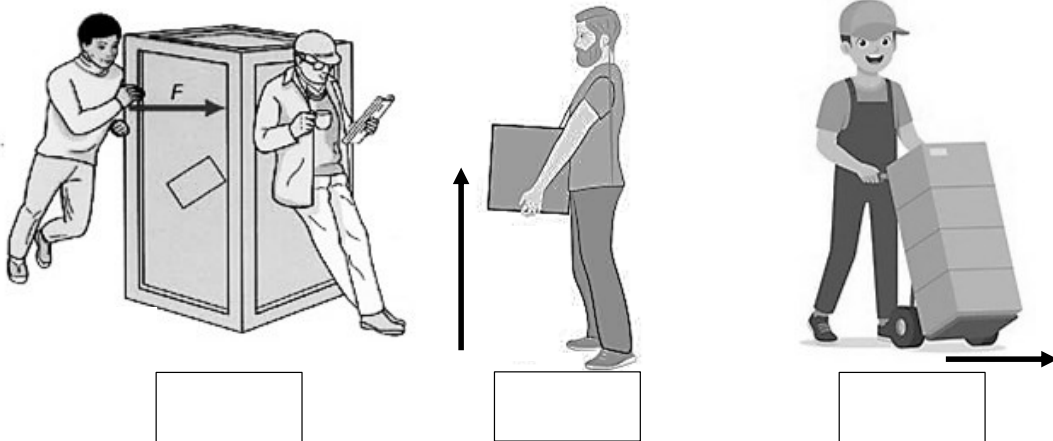
Write TRUE for the correct statement and FALSE for the incorrect statement regarding the situation above.

Pernyataan Statement	BENAR / PALSU TRUE / FALSE
Muhamad mempunyai tenaga keupayaan graviti yang lebih tinggi daripada Aishah. <i>Muhamad possesses higher gravitational potential energy than Aishah</i>	
Aishah mempunyai tenaga keupayaan kenyal yang lebih tinggi daripada Muhamad. <i>Aishah possesses higher elastic potential energy than Muhamad</i>	
Kedua-dua mempunyai sifar tenaga kinetik. <i>Both have zero kinetic energy.</i>	

[2 markah / 2 marks]
Memahami / Understand

(b) Tandakan (✓) pada contoh yang menunjukkan kerja dilakukan.

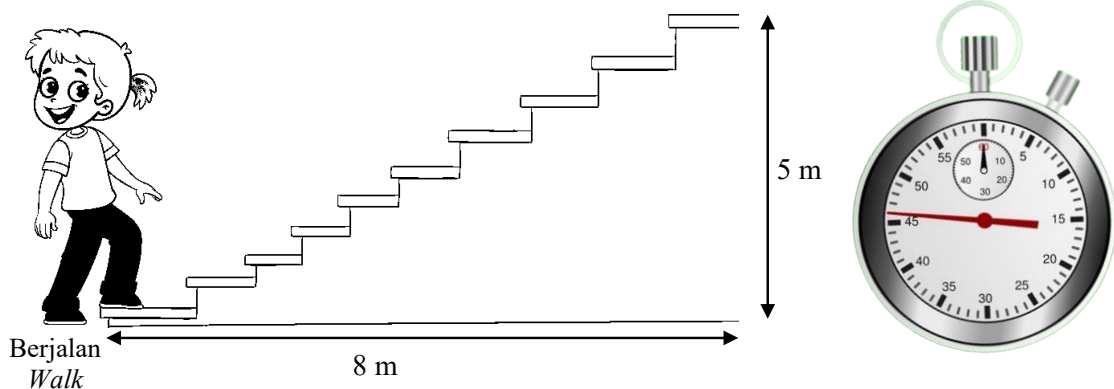
Mark (✓) on the example of work done.



[2 markah/ 2 marks]
Mengingat / Remember

- 3 Rajah menunjukkan Aishah berjalan untuk menaiki tangga dan jumlah masa yang diambil ditunjukkan oleh jam randik.

Diagram shows Aishah is walking up the stairs and the total time taken is shown by the stopwatch.



Sumber: www.vecteezy.com

- (a) Nyatakan masa yang diambil untuk menaiki tangga
State the time taken to climb up the stairs.

[1 markah/ 1 mark]
Mengingat / Remember

- (b) Hitung kerja yang dilakukan oleh Aishah untuk menaiki tangga jika jisim Aishah ialah 45 kg.
(Anggap daya graviti yang bertindak ke atas objek berjisim 1 kg ialah 10 N)
Calculate the work Aishah does to climb the stairs if Aishah's body mass is 45 kg,
(Assume the force of gravity acting on an object with a mass of 1 kg is 10 N)

Kerja = Daya $\times$ Sesaran
Work = Force $\times$ Displacement

[2 markah/ 2 marks]
Mengaplikasi / Applying

(c) Hitung kuasa Aishah semasa dia menaiki tangga

Calculate the Aishah's power as she climbs the stairs.

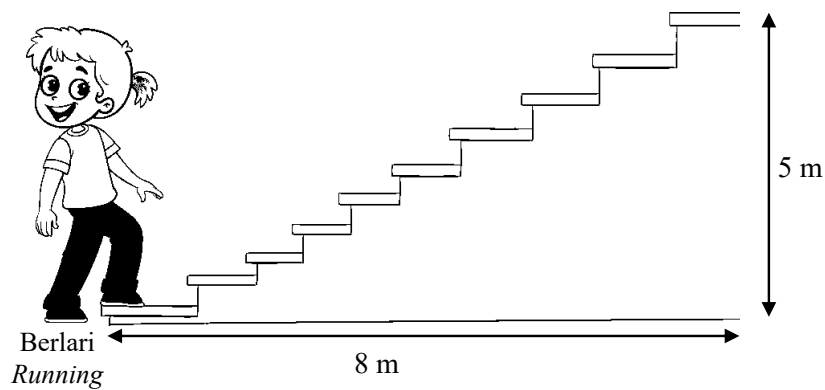
$$\text{Kuasa} = \frac{\text{Kerja dilakukan}}{\text{Masa}}$$

$$\text{Power} = \frac{\text{Work done}}{\text{Time}}$$

[2 markah/ 2 marks]
Mengaplikasi /Applying

(a) Rajah menunjukkan Aishah berlari naik tangga yang sama dan jumlah masa yang diambil untuk menaikinya ditunjukkan oleh jam randik.

Diagram shows Aishah is running up the same stairs and the total time taken to climb them is shown by the stopwatch.



Sumber: www.vecteezy.com

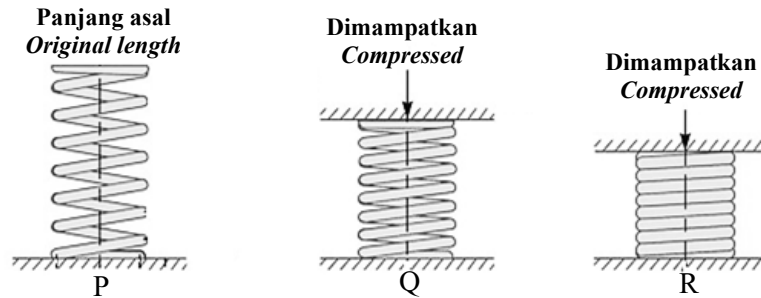
Nyatakan satu cara menghasilkan kuasa yang lebih tinggi semasa naik tangga. Terangkan.

State a way to produce higher power when climbing up the stairs. Explain

[2 markah/ 2 marks]
Menganalisis /Analyse

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 3/ Level 3)**

- 1 Rajah menunjukkan spring P yang dimampatkan kepada dua keadaan, Q dan R.
Diagram shows spring P is being compressed into two condition, Q and R.



Antara berikut, pernyataan yang manakah adalah **BENAR**?

*Which of the following statement is **CORRECT**?*

- A. Daya yang sama dikenakan dalam situasi Q dan R
Same force is applied in the situation Q and R
- B. Jarak mampatan R adalah lebih besar daripada Q
The compress distance of R is bigger than Q
- C. Tekanan yang lebih tinggi dikenakan dalam situasi R berbanding Q
Higher pressure is applied in situation R than Q
- D. Tenaga keupayaan kenyal adalah lebih tinggi dalam situasi Q berbanding dengan R
The elastic potential energy in situation Q is higher than in situation R

[1 markah / 1 mark]

Memahami / Understand

- 2 (a) Gariskan jawapan yang betul.

Underline the correct answer.

- i. Tenaga keupayaan adalah tenaga yang tersimpan dalam sesuatu objek disebabkan oleh _____ (kedudukan, kelajuan) objek tersebut.

Potential energy is the energy stored in an object due to the _____ (position, speed) of the object.

- ii. Tenaga kinetik adalah tenaga yang dimiliki oleh suatu objek yang _____ (pegun, bergerak).

Kinetic energy is the energy possessed by _____ (static, moving) object.

[2 markah/ 2 marks]

Mengingat / Remember

- (b) Tandakan (✓) pada faktor-faktor yang mempengaruhi tenaga kinetik dan tenaga keupayaan graviti.

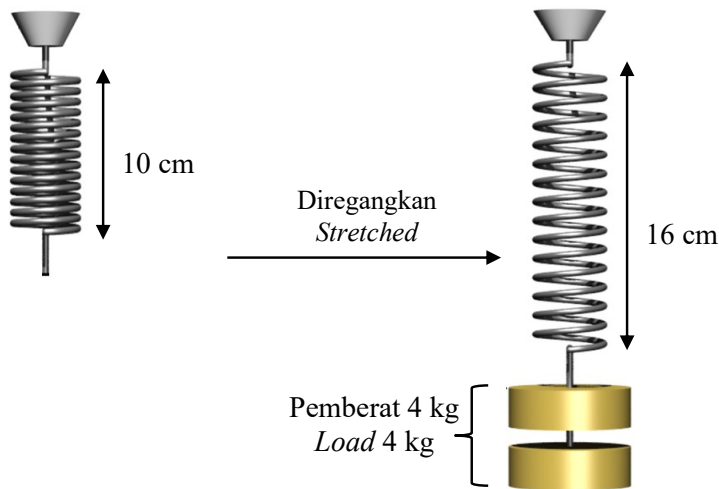
Mark (✓) on the factors which affect the kinetic energy and gravitational potential energy.

Faktor <i>Factor</i>	Tenaga kinetik <i>Kinetic energy</i>	Tenaga keupayaan gravity <i>Gravitational potential energy</i>
Jisim <i>Mass</i>		
Ketinggian <i>Height</i>		
Halaju <i>Velocity</i>		

[2 markah / 2 marks]

Memahami / Understand

- 3 Rajah menunjukkan satu spring yang panjangnya 10 cm diregangkan dengan menggunakan pemberat 4 kg sehingga panjangnya bertambah kepada 16 cm. [1kg = 10 N]
 Diagram shows a spring with the length 10 cm is stretched by using 4 kg load until the length increases to 16 cm. [1kg = 10 N]



- (a) Nyatakan daya yang dikenakan terhadap spring.
 State the force that applied towards the spring.

[1 markah / 1 mark]
 Memahami / Understand

- (b) Nyatakan sesaran dari kedudukan keseimbangan.
 State the displacement from the equilibrium position.

[1 markah / 1 mark]
 Memahami / Understand

- (c) Hitungkan kerja yang dilakukan untuk meregangkan spring.
 Calculate the work done to stretch the spring.

$$\text{Kerja (J)} = \text{Daya (N)} \times \text{Sesaran (m)}$$

$$\text{Work (J)} = \text{Force (N)} \times \text{Displacement (m)}$$

[2 markah / 2 marks]
 Mengaplikasi / Apply

- (d) Hitungkan tenaga keupayaan kenyal spring.

Calculate the elastic potential energy.

$$\text{Tenaga keupayaan kenyal (J)} = \frac{1}{2} \times \text{Daya (N)} \times \text{sesaran spring (m)}$$

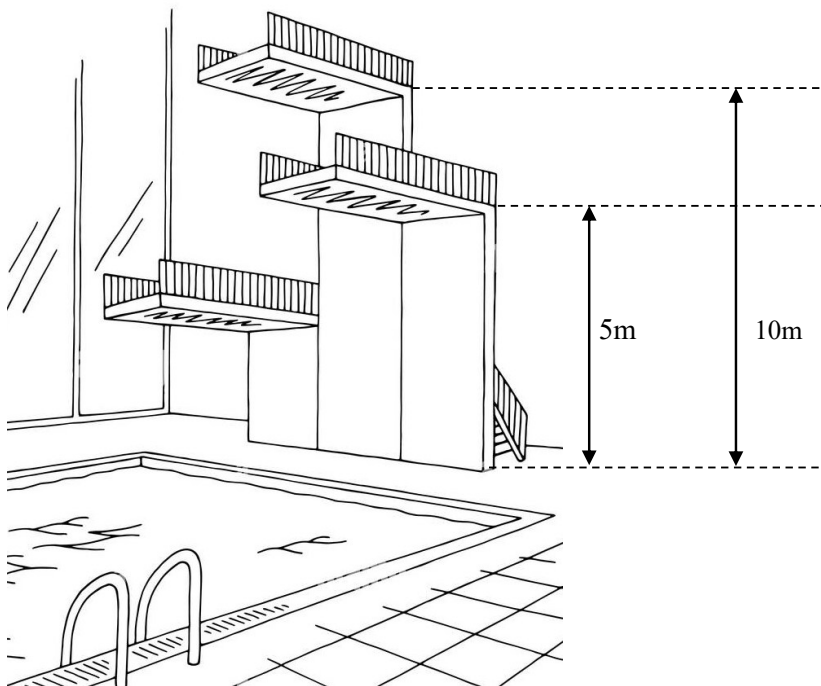
$$\text{Elastic potential energy (J)} = \frac{1}{2} \times \text{Force (N)} \times \text{spring displacement (m)}$$

[2 markah / 2 marks]

Mengaplikasi / Apply

- (b) Rajah menunjukkan papan terjun 5m dan 10 m di atas kolam renang.

Diagram shows the diving board 5m and 10m above the swimming pool.



Nyatakan kedudukan papan terjun yang menghasilkan tenaga keupayaan gravity yang lebih tinggi apabila penerjun 45 kg menjalani latihan. Terangkan.

State the position of diving board that produce higher gravitational potential energy when a diver of 45 kg undergoing practice. Explain.

[2 markah/ 2 marks]

Menganalisis / Analyse

L4: Penilaian**A4: Assessment****1 Lengkapi jadual dengan memberi dua contoh yang sesuai.***Complete the table with two suitable examples.*

Kerja dilakukan <i>Work done</i>	Tiada kerja dilakukan <i>No work done</i>

[4 markah / 4 marks]

2 Lengkapi pernyataan di bawah.*Complete the statement below.*

- i. Kerja ialah _____ (tenaga, daya) menggerakkan sesuatu objek melalui suatu _____ (jarak, masa)
Work done is a _____ (energy, force) to moves an object through a _____ (distance, time)
- ii. Kuasa ialah kadar perubahan _____ (tenaga, kerja) terhadap masa.
Power is the rate of change of _____ (energy, work done) regarding to time.
- iii. Semakin _____ (rendah, tinggi) kedudukan sesuatu objek, semakin banyak tenaga keupayaan graviti.
The _____ (lower, higher) the position of an object, the more the gravitational potential energy.
- iv. Semakin _____ (pendek, panjang) sesaran dari kedudukan keseimbangan sesuatu objek, semakin tinggi tenaga keupayaan kenyal.
The _____ (shorter, longer) the displacement from the equilibrium position of an object, the higher the elastic potential energy.
- v. Semakin _____ (lambat, pantas) sesuatu objek bergerak, semakin banyak tenaga kinetik.
The _____ (slower, faster) the movement of an object, the more the kinetic energy.

[6 markah / 6 marks]

Sesi 17 / Session 17	
Bidang Pembelajaran <i>Learning Area</i>	7.0 TENAGA DAN KUASA <i>7.0 ENERGY AND POWER</i>
Standard Kandungan <i>Content Standard</i>	7.3 Prinsip Keabadian Tenaga 1.3 <i>7.3 Principle of Conservation of Energy</i>
Standard pembelajaran <i>Learning standard</i>	7.3.1 Menerangkan dengan contoh Prinsip Keabadian Tenaga. <i>Explain with examples The Principle of Conservation of Energy.</i> 7.3.2 Menyelesaikan masalah kualitatif dan kuantitatif yang melibatkan perubahan tenaga kinetik dan tenaga keupayaan di dalam sistem tertutup. <i>Solve qualitative and quantitative problems involving the transformation of kinetic energy and potential energy in a closed system.</i>
Objektif Pembelajaran <i>Learning Objective</i>	Di akhir pengajaran dan pembelajaran, murid dapat <i>At the end of the teaching and learning, students will be able to</i> i. menerangkan dengan contoh Prinsip Keabadian Tenaga <i>explain with examples the Principle of Conservation of Energy</i> ii. menyelesaikan masalah kualitatif dan kuantitatif yang melibatkan perubahan tenaga kinetik dan tenaga keupayaan di dalam sistem tertutup <i>solve qualitative and quantitative problems involving the transformation of kinetic energy and potential energy in a closed system</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Konsep Keabadian tenaga <i>Concept of the Conservation of Energy</i> 2. Menyelesaikan masalah pengiraan yang berkaitan dengan keabadian tenaga <i>Solve calculation problems related to conservation of energy.</i>

L1 : Nota Revisi Cepat**A1: Speedy Revision Notes****A. PRINSIP KEABADIAN TENAGA****PRINCIPLE OF CONSERVATION OF ENERGY**

- 1 Jumlah tenaga dalam sistem tertutup adalah malar. Tiada tenaga diperoleh atau hilang dalam sesuatu proses.
The total energy in a closed system is constant. No energy is gained or lost in a process.
- 2 Tenaga boleh dipindahkan atau diubah dari satu bentuk ke bentuk yang lain, tetapi ia tidak boleh dicipta atau dimusnahkan.
Energy can be transferred or changed from one form to another, but it cannot be created or destroyed.



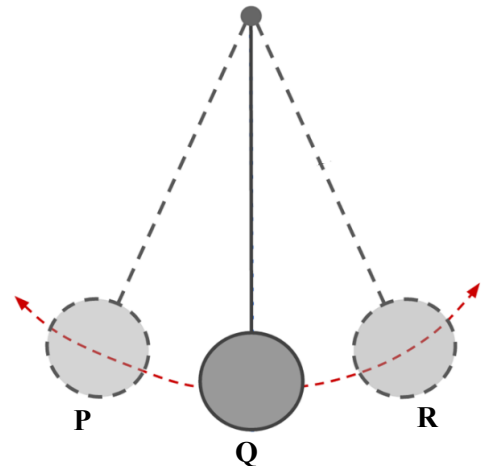
Berdasarkan Prinsip Keabadian Tenaga, perubahan bentuk tenaga adalah seperti berikut:

Based on the Principle of Conservation of Energy, the change of form of energy is as following:

Tenaga kinetik → tenaga keupayaan graviti
→ tenaga kinetik

Kinetic energy → gravitational potential energy → kinetic energy

Kedudukan bandul <i>Pendulum Position</i>	Perubahan tenaga <i>Energy changes</i>
P	T.K.G = maksimum, T.K = sifar <i>G.P.E = maximum, K.E = zero</i>
P ke Q <i>P to Q</i>	T.K.G = berkurang, T.K = bertambah <i>G.P.E = decrease, K.E = increase</i>
Q	T.K.G = minimum, T.K = maksimum <i>G.P.E = minimum, K.E = maximum</i>
Q ke R <i>Q to R</i>	T.K.G = bertambah, T.K = berkurang <i>G.P.E = increase, K.E = decrease</i>
R	T.K.G = maksimum, T.K = sifar <i>G.P.E = maximum, K.E = zero</i>
R ke Q <i>R to Q</i>	T.K.G = berkurang, T.K = bertambah <i>G.P.E = decrease, K.E = increase</i>
Q	T.K.G = minimum, T.K = maksimum <i>G.P.E = minimum, K.E = maximum</i>
Q ke P <i>Q to P</i>	T.K.G = bertambah, T.K = berkurang <i>G.P.E = increase, K.E = decrease</i>
P	T.K.G = maksimum, T.K = sifar <i>G.P.E = maximum, K.E = zero</i>



T.K.G = Tenaga Keupayaan Graviti
T.K = Tenaga kinetik
G.P.E = Gravitational potential energy
K.E = Kinetic energy

Contoh 1
Example 1

Sebiju epal jatuh dari pokok dengan halaju 8 ms^{-1} apabila ia mencecah tanah. Hitung nilai h.
An apple falls from a tree with a velocity of 8 ms^{-1} when it hits the ground. Calculate the value of h.

Penyelesaian / *Solution:*

$$\begin{aligned}\frac{1}{2}mv^2 &= mgh \\ \frac{1}{2}v^2 &= gh \\ \frac{1}{2}(8)^2 &= 10 \times h \\ h &= 3.3 \text{ m}\end{aligned}$$

Contoh 2
Example 2

Sebuah kereta mainan dilepaskan menggunakan spring dengan daya 25N dan memanjang 0.6m. Cari halaju jika kereta mainan itu mempunyai berat 0.6kg.
A toy car is released using a spring with a force of 25N and extends 0.6m. Find the velocity if the toy car weighs 0.6kg.

Penyelesaian / *Solution:*

$$\begin{aligned}\frac{1}{2}Fx &= \frac{1}{2}mv^2 \\ 25 \times 0.6 &= 0.6 \times v^2 \\ v^2 &= \frac{25 \times 0.6}{0.6} \\ v &= 5 \text{ ms}^{-1}\end{aligned}$$

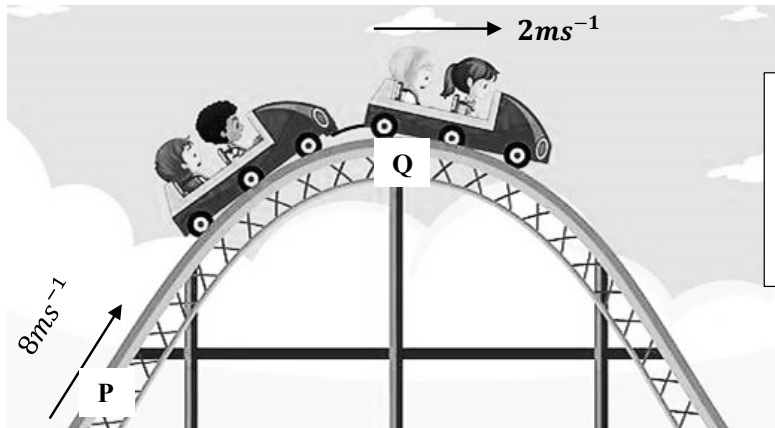
L2: Teknik menjawab soalan**A2: Answering technique**

Cara menjawab soalan **penghitungan**
Calculation answering technique.

1. Gunakan rumus yang diberi, tuliskan langkah pengiraan dengan betul.
Use the given formula, write the correct working step.

Contoh:**Example:**

Rajah menunjukkan sebuah roller coaster berjisim 200kg dan perubahan halajunya sepanjang landasa.
Diagram shows a roller coaster with mass 200 kg and the velocity change along the rail.



Formula:
 Tenaga kinetik
 $= \frac{1}{2} \times \text{jisim} \times (\text{halaju})^2$
 Kinetic energy
 $= \frac{1}{2} \times \text{mass} \times (\text{velocity})^2$

- a) Hitung tenaga kinetik di titik P dan Q
Calculate the kinetic energy at point P and Q.

PenyelesaianSolutionTitik P

$$\begin{aligned} \text{Tenaga kinetik} &= \frac{1}{2} \times \text{jisim} \times (\text{halaju})^2 \\ &= \frac{1}{2} \times 200 \text{ kg} \times (8\text{ms}^{-1})^2 \\ &= 6400 \text{ J} \end{aligned}$$

Point Q

$$\begin{aligned} \text{Kinetic energy} &= \frac{1}{2} \times \text{mass} \times (\text{velocity})^2 \\ &= \frac{1}{2} \times 200 \text{ kg} \times (2\text{ms}^{-1})^2 \\ &= 400 \text{ J} \end{aligned}$$

Teknik Menjawab:

1 m = gantikan semua nilai dalam formula
 1 m = jawapan akhir dengan unit yang betul

Answering Technique:

1 m = substitute the all the value into the formula

1 m = final answer with correct unit

[4 markah / 4 marks]

Mengaplikasi / Apply

- a) Tenaga kinetik roller coaster berkurangan apabila menaiki cerun ke titik Q. Terangkan.
The kinetic energy of the roller coaster is reducing when going up to point Q. Explain.

F1: Tenaga kinetik berkurangan kerana halaju berkurang.

F2: Tenaga kinetik telah bertukar menjadi tenaga keupayaan graviti untuk mengatasi daya tarikan graviti.

F1: Kinetic energy is reducing due to the velocity of the roller coaster decreases /

F2: The kinetic energy of the roller coaster has been converted into gravitational potential energy to overcome the gravitational pull acting on the roller coaster

Teknik Menjawab: 2 markah = 2 penerangan tentang masalah yang ditanya

Answering Technique: 2 marks = 2 explanations regarding the given problem

[2 markah / 2 marks]

Mengaplikasi / Apply

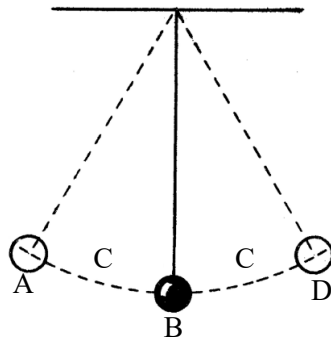
L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 1/ Level 1)**

- 1 Antara yang berikut, pernyataan yang manakah menerangkan Prinsip Keabadian Tenaga dengan tepat?
Which of the following statements accurately explains the Principle of Conservation of Energy?

- A. Tenaga boleh dicipta dan boleh dimusnahkan
Energy can be created and can be destroyed
- B. Tenaga boleh dicipta tetapi tidak boleh dimusnahkan
Energy can be created but cannot be destroyed
- C. Tenaga tidak boleh dicipta tetapi boleh dimusnahkan
Energy cannot be created but can be destroyed
- D. Tenaga tidak boleh dicipta dan tidak boleh dimusnahkan
Energy cannot be created and cannot be destroyed

[1 markah/ 1 mark]
 Mengingat / Remember

- 2 Rajah menunjukkan ayunan bandul yang mematuhi Prinsip Keabadian Tenaga.
Diagram shows an oscillation of a simple pendulum obeys the Principle of Conservation of Energy.



Di kedudukan manakah bandul berada pada tenaga kinetik yang tinggi?
At which position does the pendulum have high kinetic energy?

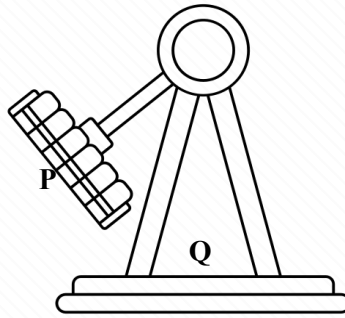
[1 markah/ 1 mark]
 Memahami/Understand

- 3 (a) Tandakan (✓) pada pernyataan yang betul tentang Prinsip Keabadian Tenaga
Mark (✓) on the correct statements about the Principle of Conservation of Energy.

Pernyataan Statements	Tandakan (✓) Mark (✓)
Tenaga tidak boleh dicipta <i>Energy cannot be created.</i>	
Tenaga boleh dimusnah. <i>Energy can be destroyed.</i>	
Tenaga boleh berubah-ubah bentuknya <i>Energy can change form.</i>	

[2 markah/ 2 marks]
 Mengingat/ Remember

- (b) Rajah menunjukkan sejenis permainan di sebuah taman tema
The diagram shows a game at a home park.



Gariskan jawapan yang betul

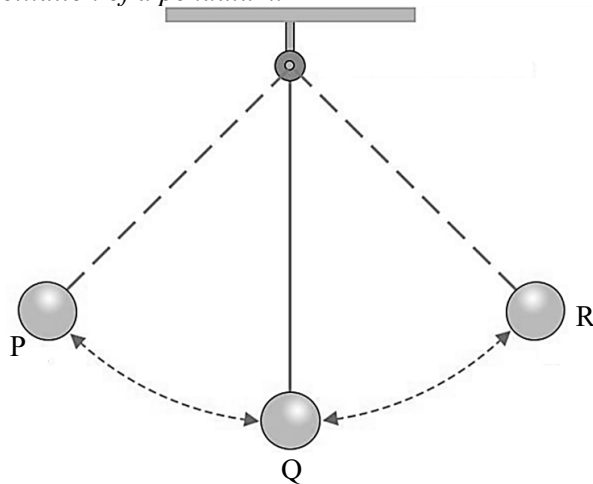
Underline the correct answer.

- i. Pada kedudukan P, tenaga keupayaan graviti adalah (minimum / maksimum)
At position P, the gravitational potential energy is (minimum / maximum)
- ii. Apabila kapal bergerak dari P ke Q, tenaga kinetik kapal semakin (menaik, menurun).
When the ship moves from P to Q, the kinetic energy of the ship (increases, decreases).

[2 markah/ 2 marks]

Memahami/ Understand

- 4 Rajah menunjukkan satu ayunan bandul,
Diagram shows an oscillation of a pendulum.



- (a) Berdasarkan rajah, tandakan (✓) pada jenis tenaga yang terlibat semasa ayunan bandul.

Based on the diagram. mark (✓) on the types of energy involved during the oscillation of pendulum.

✓	Tenaga kinetik <i>Kinetic energy</i>
	Tenaga keupayaan kenyal <i>Elastic potential energy</i>
✓	Tenaga keupayaan gravity <i>Gravitational potential energy</i>

[2 markah/ 2 marks]

Mengingat / Remember

(b) Nyatakan kedudukan di mana tenaga keupayaan graviti adalah

State the position which the gravitational potential energy is

- i. Maksimum:
Maximum: _____
- ii. Sifar:
Zero: _____

[2 markah/ 2 marks]
Memahami / Understand

(c) Nyatakan kedudukan di mana tenaga kinetik adalah maksimum dan sifar.

State the position which the kinetic energy is maximum and zero.

- i. Maksimum:
Maximum: _____
- ii. Sifar:
Zero: _____

[2 markah/ 2 marks]
Memahami / Understand

(d) Tandakan dengan symbol $<$, $>$ atau $=$ untuk menerangkan hubungan antara jumlah tenaga kinetik dan tenaga keupayaan graviti.

Mark with symbol $<$, $>$ atau $=$ to show the relationship between the total amount of kinetic energy and gravitational potential energy.

Jumlah tenaga kinetik di titik Q <i>Total amount of kinetic energy at position Q</i>		Jumlah tenaga keupayaan graviti di titik R <i>Jumlah gravitational potential energy at position R</i>
---	--	--

[1 markah/ 1 mark]
Memahami / Understand

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 2/ Level 2)**

- 1 Rajah menunjukkan sebiji bola yang dibaling menegak ke atas sehingga kedudukan P sebelum ia jatuh semula

The diagram shows a ball thrown vertically upwards to position P before it falls back down.



Apakah perubahan bentuk tenaga yang terlibat apabila bola dibaling sehingga ke kedudukan P?

What is the change in form of energy involved when the ball is thrown to position P?

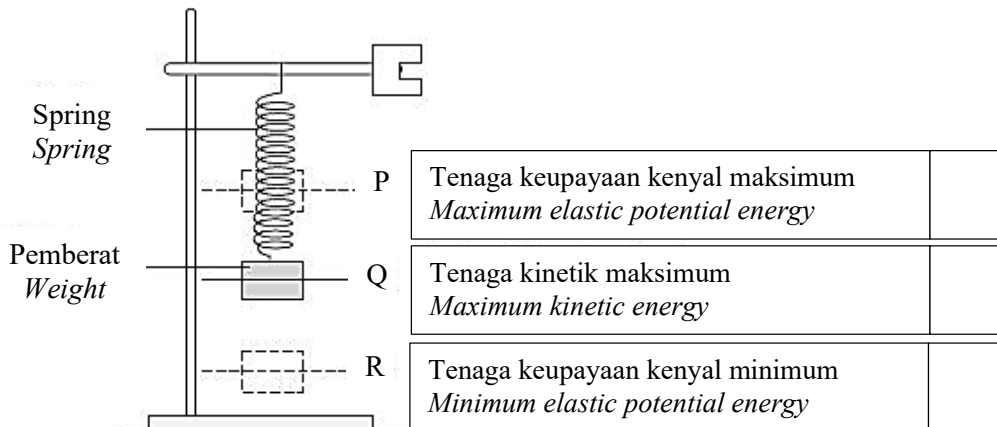
- A. Tenaga keupayaan graviti → Tenaga kinetik
Gravitational potential energy → kinetic energy
- B. Tenaga kinetik → Tenaga keupayaan graviti
Kinetic energy → gravitational potential energy
- C. Tenaga keupayaan graviti → Tenaga keupayaan kenyal
Gravitational potential energy → elastic potential energy
- D. Tenaga keupayaan kenyal → Tenaga keupayaan graviti
Elastic potential energy → Gravitational potential energy

[1 markah/ 1 mark]

Memahami / Understand

- 2 Rajah menunjukkan ayunan spring yang mematuhi Prinsip Keabadian Tenaga.

Diagram shows an oscillation of spring which obey Principle of Conservation of Energy.



- (a) Tandakan (✓) pada maklumat yang dilabel dengan betul tentang ayunan spring berbeban.

Mark (✓) on the information which is labelled correctly about the loaded spring swing.

[2 markah/ 2 marks]

Memahami / Understand

- (b) Tuliskan dengan huruf P, Q atau R tentang maklumat yang diberi mengenai ayunan spring.

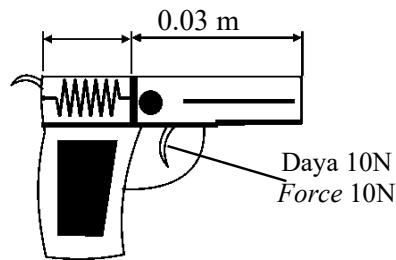
Write the letter P, Q or R regarding to the given information about the oscillation of spring.

	Titik keseimbangan <i>Point of equilibrium</i>
	Tenaga kinetik ialah sifar <i>Zero kinetic energy</i>

[2 markah/ 2 marks]

Mengingat / Remember

- 3 Rajah menunjukkan sebuah pistol mainan yang mempunyai spring.
The diagram shows a toy gun that has a spring.



- (a) Tandakan (✓) pada pernyataan yang betul tentang sistem tertutup.

Mark (✓) on the correct statements regarding the closed system.

☐	Tiada daya luar bertindak ke atas sistem ini. <i>No external force acting on the system</i>
☐	Tenaga haba dan tenaga geseran akan terbentuk <i>Heat energy and friction will be produced.</i>
☐	Jumlah tenaga keupayaan kenyal dan tenaga kinetik adalah malar. <i>The total energy of the elastic potential energy and kinetic energy is constant.</i>

[2 markah/ 2 marks]

Memahami / Understand

- (b) Spring dimampatkan 0.03m dengan menggunakan daya 10 N. Hitungkan tenaga keupayaan kenyal spring.

The spring is compressed to 0.03 m using a force of 10 N. Calculate the elastic potential energy of the spring.

Diberi

Given:

Tenaga keupayaan kenyal $= \frac{1}{2} \times \text{Daya} \times \text{jarak mampatan}$

Elastic potential energy $= \frac{1}{2} \times \text{Force} \times \text{distance of compression}$

[2 markah/ 2 marks]

Mengaplikasi/Apply

- (c) Hitungkan halaju peluru yang berjisim 0.01kg apabila ditembak keluar
Calculate the velocity of a bullet with a mass of 0.01 kg when it is fired.

Diberi

Given:

Tenaga kinetik $= \frac{1}{2} \times \text{jisim} \times (\text{halaju})^2$

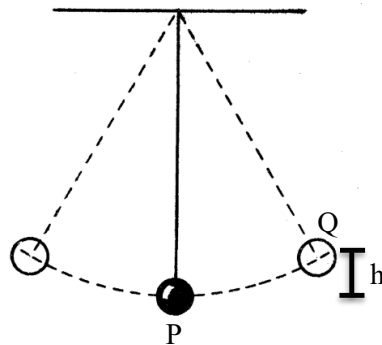
Kinetic energy $= \frac{1}{2} \times \text{mass} \times (\text{velocity})^2$

[2 markah/ 2 marks]

Mengaplikasi/Apply

L3: Soalan Perbincangan : Soalan berformat UASA**A3: Discussion items : UASA – format items****(Tahap 3/ Level 3)**

- 1 Rajah menunjukkan ayunan bandul ringkas.
The diagram shows the oscillation of a simple pendulum.



Formula:
 $mgh = \frac{1}{2}mv^2$

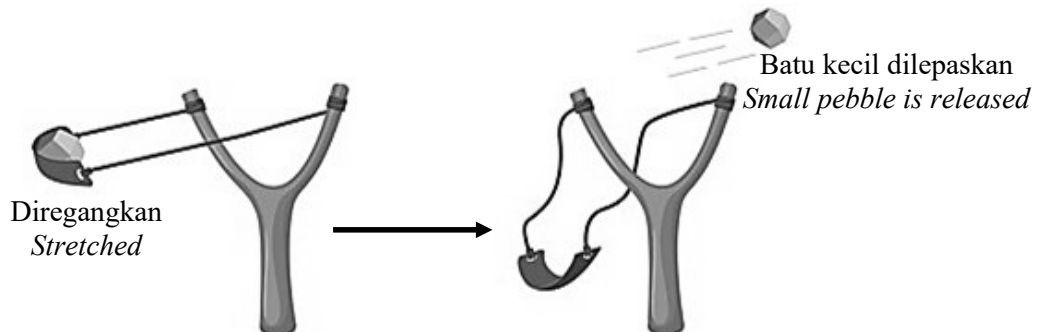
Jika bandul mempunyai kelajuan 2 ms^{-2} di P, berapakah ketinggian h?

If the pendulum has a speed of 2 ms^{-2} at P, what is the height h? [$g = 10 \text{ ms}^{-2}$]

- A. 0.2 m
- B. 0.4 m
- C. 0.8 m
- D. 1.0 m

[1 markah/ 1 mark]
 Mengaplikasi / Apply

- 4 Rajah menunjukkan lastik yang diregangkan dengan sebiji batu kecil di dalamnya.
Diagram shows a slingshot which is stretched with a small pebble inside.



- (a) Tuliskan perubahan tenaga ke dalam ruang yang disediakan
Write the energy change into the space provided.

→

[2 markah/ 2 marks]
 Memahami / Understand

- (b) Tuliskan **BENAR** bagi pernyataan betul dan **PALSU** bagi pernyataan yang salah berkenaan keadaan lastik.

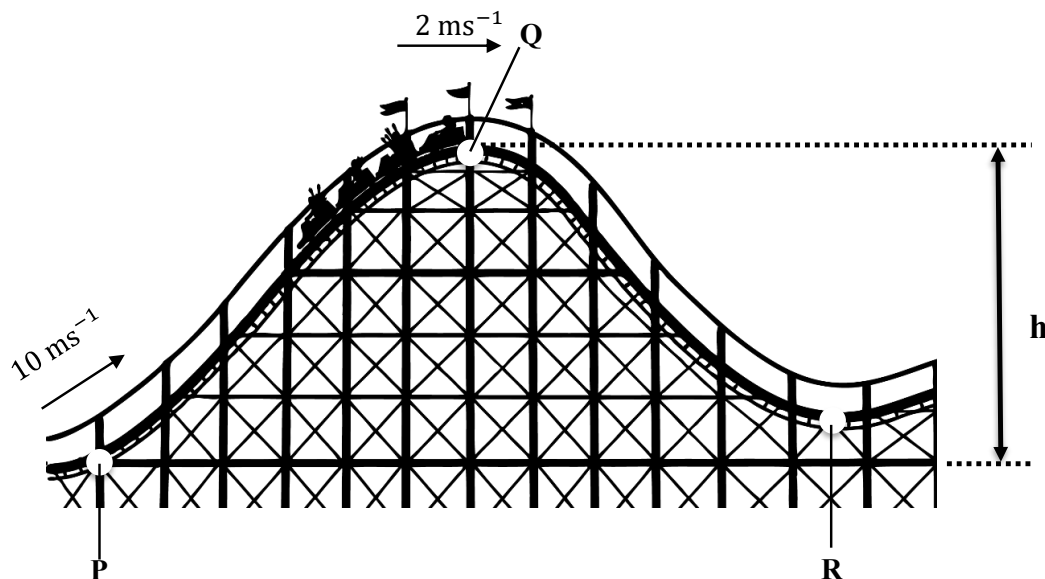
Write **TRUE** for the correct statements and **FALSE** for the incorrect statements regarding the condition of slingshot.

Pernyataan Statements	BENAR / PALSU TRUE / FALSE
Tenaga keupayaan kenyal adalah maksimum sebelum beban dilepaskan . <i>The elastic potential energy is maximum before the load is released.</i>	
Tenaga kinetik adalah minimum sebelum beban dilepaskan . <i>The kinetic energy is minimum before the load is released.</i>	
Lastik adalah salah satu contoh sistem yang mematuhi Prinsip Keabadian Tenaga. <i>Slingshot is an example of system obeys the Principle of Conservation of Energy.</i>	

[2 markah / 2 marks]
Memahami / Understand

- 5 Rajah menunjukkan *roller coaster* berjisim 500 kg bergolek menaiki cerun licin dengan halaju 10 ms^{-1} . Apabila *roller coaster* sampai di puncak cerun, halaju *roller coaster* berkurangan kepada 2 ms^{-1} sebelum bergolek menuruni cerun semula.

The diagram shows a roller coaster with a mass of 500 kg rolling up a smooth slope at a velocity of 10 ms^{-1} . When the roller coaster reaches the top of the slope, the velocity of the roller coaster decreases to 2 ms^{-1} before rolling down the slope again.



- (a) Tuliskan perubahan bentuk tenaga yang berlaku pada *roller coaster* dari titik P ke Q.

Write change in form of energy that occurs on the roller coaster from the P to Q.

Tenaga kinetik Kinetic energy	→		+	
----------------------------------	---	--	---	--

[2 markah / 2 marks]
Mengingat / Remember

- (b) Namakan prinsip yang terlibat dalam perubahan bentuk tenaga yang berlaku di (a).

Name the principle involved in the change in form of energy that occurs in (a).

[1 markah/ 1 mark]

Memahami/Understand

- (c) Tandakan (✓) pada bentuk tenaga yang dimiliki oleh roller coaster di titik R.

Mark (✓) on the form of energy possessed by roller coaster at point R.

	Tenaga kinetik <i>Kinetic energy</i>
	Tenaga keupayaan kenyal <i>Elastic potential energy</i>
	Tenaga keupayaan graviti <i>Gravitational potential energy</i>

[2 markah/ 2 marks]

Memahami / Understand

- (d) Tenaga kinetik roller coaster berkurangan apabila menaiki cerun. Terangkan

The kinetic energy of a roller coaster decreases as it goes up a slope. Explain.

[2 markah/ 2 marks]

Mengaplikasi/Apply

- (e) (i) Hitungkan pengurangan tenaga kinetik roller coaster apabila sampai di puncak cerun.

Calculate the reduction in kinetic energy of the roller coaster when it reaches the top of the slope.

$$\text{Tenaga kinetik} = \frac{1}{2} \times \text{jisim} \times (\text{halaju})^2$$

$$\text{Kinetic energy} = \frac{1}{2} \times \text{mass} \times (\text{velocity})^2$$

Tenaga kinetik roller coaster pada awal <i>The kinetic energy of the roller coaster at the beginning</i> = =	Tenaga kinetik roller coaster di puncak cerun <i>Kinetic energy of the roller coaster at the top of the slope</i> = =
Pengurangan tenaga kinetik <i>Reduction of kinetic energy</i> = =	

[3 markah/ 3 marks]

Mengaplikasi/Apply

- (ii) Gunakan jawapan di (e)(i) untuk menentukan ketinggian h dalam rajah.

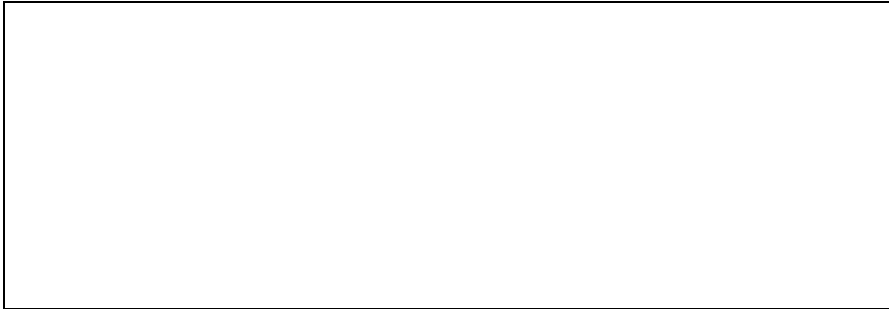
Use the answer in (e)(i) to determine the height h in the diagram.

Tenaga keupayaan graviti = jisim $\times$ pecutan graviti $\times$ tinggi

Gravitational potential energy = mass $\times$ gravitational acceleration $\times$ height

[pecutan graviti = 10 ms^{-2}]

[*gravitational acceleration = 10 ms^{-2}*]



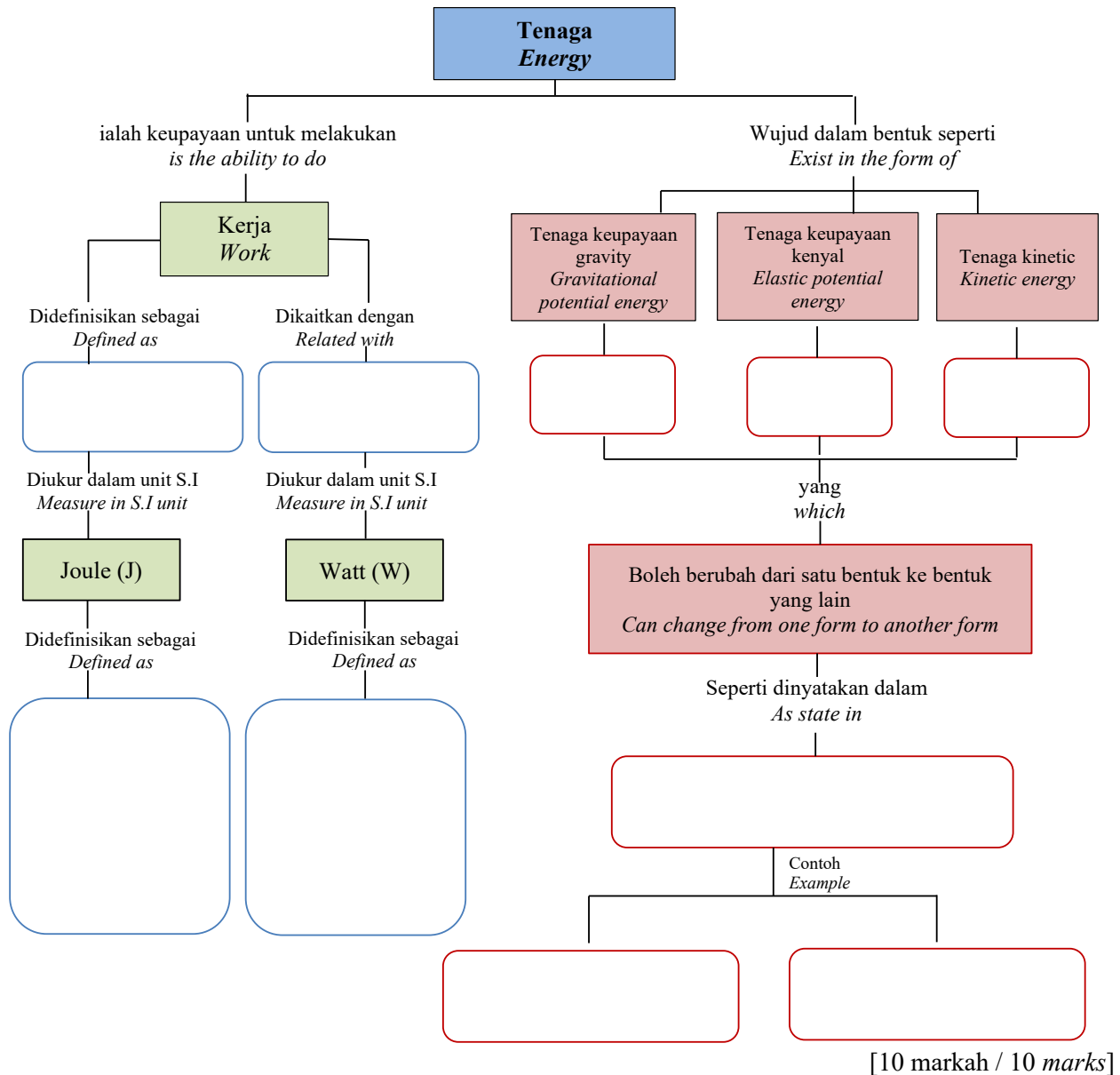
[2 markah/ 2 marks]

Mengaplikasi/*Apply*

L4: Penilaian**A4: Assessment**

Lengkapkan carta di bawah dengan perkataan yang diberi.

Complete the chart below with the given words.



Kerja = Daya × Sesaran
Work = Force × Displacement

Prinsip Keabadian Tenaga
Principle of Conservation of Energy

$$mgh$$

Kadar kerja yang dilakukan dalam satu unit masa.
Rate of work done in a unit of time.

Daya 1 N menggerakkan objek sejauh 1 m dalam arah daya
A force of 1 N moves an object 1 m in the direction of the force.

$$\frac{1}{2}mv^2$$

$$\frac{1}{2}Fx$$

$$\text{Kuasa} = \frac{\text{Kerja}}{\text{Masa}}$$

$$\text{Power} = \frac{\text{Work}}{\text{Time}}$$

Ayunan bandul
Oscillation of pendulum

Ayunan spring berbeban
Oscillation of a loaded spring

L1: Nota Revisi Cepat

A1: Speedy Revision Notes

8.1 Sejarah Penemuan Keradioaktifan

Discovery of Radioactivity

Sejarah penemuan keradioaktifan

Discovery of radioactivity



Wilhelm Conrad Roentgen
(1845 – 1923)

- Menemukan sinar-X pada 1895
Discovered X-ray in 1895
- Menerima Hadiah Nobel bagi penemuan sinar-X pada 1901
Received Nobel Prize for the discovery of X-ray in 1901



Antoine Henri Becquerel
(1852 – 1908)

- Menemukan keradioaktifan pada 1896
Discovered radioactivity in 1896
- Menerima Hadiah Nobel bagi penemuan keradioaktifan pada 1903
Received Nobel Prize for the discovery of radioactivity in 1903



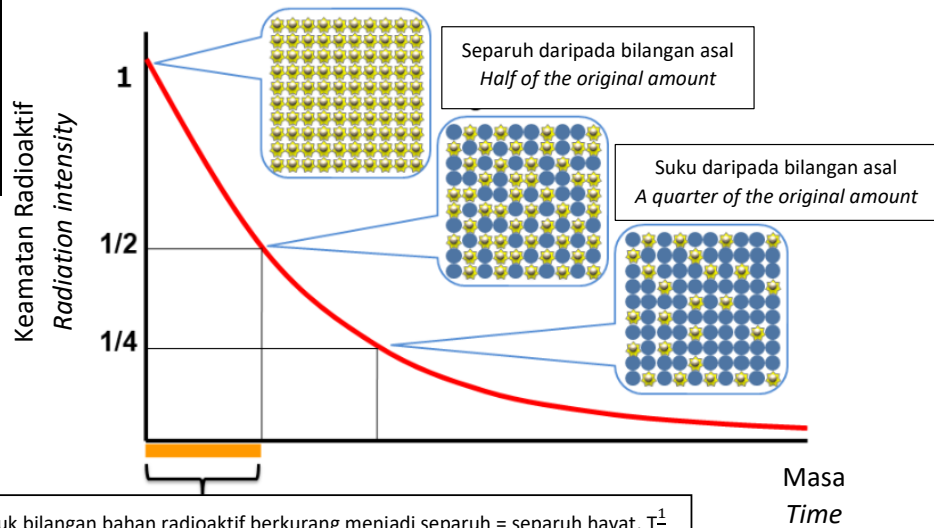
Marie Curie (1867 – 1934)
Pierre Curie (1859 – 1906)

- Menemukan polonium dan radium pada 1897
Discovered polonium and radium in 1897
- Menerima Hadiah Nobel bagi penemuan keradioaktifan pada 1903
Received Nobel Prize for the discovery of radioactivity in 1903

Contoh Unsur Radioaktif:
Examples of Radioactive
elements:

Karbon-14 (C-14) Carbon-14(C-14)
Radon-222 (Rn-222) Radon-222 (Rn-222)
Torium-234 (Th-234) Thorium-234 (Th-234)
Uranium-238 (U-238) Uranium-238 (U-238)

8.1.2 Separuh Hayat Pereputan Radioaktif Half-Life of Radioactive Decay

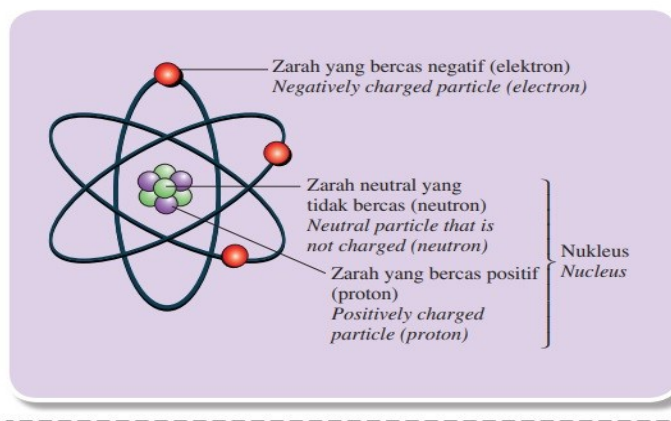


Masa diperlukan untuk bilangan bahan radioaktif berkurang menjadi separuh = separuh hayat, $T_{\frac{1}{2}}$
Time required for the amount of the radioactive materials to reduce to half= half- life, $T_{\frac{1}{2}}$

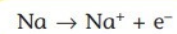
8.2 Atom dan Nukleus

Struktur atom terdiri daripada tiga zarah subatom iaitu proton, neutron dan elektron.

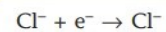
Structure of an atom consists of three subatomic particles which are proton, neutron and electron.



- Atom yang **menderma elektron** membentuk **ion positif** (kation).
Atom that **donates electron** forms a **positive ion** (cation).



- Atom yang **menerima elektron** membentuk **ion negatif** (anion).
Atom that **receives electron** forms a **negative ion** (anion).



PEMBENTUKAN ION POSITIF (KATION)

- Atom yang menderma elektron membentuk **ion positif** dikenali sebagai **kation**.
- Contoh pembentukan ion magnesium (Mg^{2+})

Atom magnesium, Mg			Ion magnesium, Mg^{2+}		
Zarah subatom	Bilangan	Cas	Zarah subatom	Bilangan	Cas
Neutron, n	12	0	Neutron, n	12	0
Proton, p	12	+12	Proton, p	12	+12
Elektron, e	12	-12	Elektron, e	10	-10
Cas pada atom magnesium, Mg	0		Cas pada ion magnesium, Mg^{2+}	+2	

Buang $2e^-$

- Persamaan yang mewakili pembentukan ion magnesium, Mg^{2+}

$$\text{Mg} \rightarrow \text{Mg}^{2+} + 2e^-$$

PEMBENTUKAN ION NEGATIF (ANION)

- Atom yang menerima elektron membentuk **ion negatif** yang dikenali sebagai **anion**.
- Contoh pembentukan ion klorida (Cl^-)

Atom klorin, Cl			Ion klorida, Cl^-		
Zarah subatom	Bilangan	Cas	Zarah subatom	Bilangan	Cas
Neutron, n	18	0	Neutron, n	18	0
Proton, p	17	+17	Proton, p	17	+17
Elektron, e	17	-17	Elektron, e	18	-18
Cas pada atom klorin, Cl	0		Cas pada ion klorida, Cl^-	-1	

Terima $1e^-$

- Persamaan yang mewakili pembentukan ion klorida, Cl^-

$$\text{Cl} + e^- \rightarrow \text{Cl}^-$$

FORMATION OF POSITIVE ION (CATION)

- Atom that donates electron to form **positive ion** is known as **cation**.
- For example, the formation of magnesium ion (Mg^{2+}).

Magnesium atom, Mg			Magnesium ion, Mg^{2+}		
Subatomic particle	Number	Charge	Subatomic particle	Number	Charge
Neutron, n	12	0	Neutron, n	12	0
Proton, p	12	+12	Proton, p	12	+12
Electron, e	12	-12	Electron, e	10	-10
Charge on magnesium atom, Mg	0		Charge on magnesium ion, Mg^{2+}	+2	

Donates $2e^-$

- The equation that represents the formation of magnesium ion, Mg^{2+}

$$\text{Mg} \rightarrow \text{Mg}^{2+} + 2e^-$$

FORMATION OF NEGATIVE ION (ANION)

- Atom that receives electron to form **negative ion** also known as **anion**.
- For example, the formation of chloride ion (Cl^-)

Chlorine atom, Cl			Chloride ion, Cl^-		
Subatomic particle	Number	Charge	Subatomic particle	Number	Charge
Neutron, n	18	0	Neutron, n	18	0
Proton, p	17	+17	Proton, p	17	+17
Electron, e	17	-17	Electron, e	18	-18
Charge on chlorine atom, Cl	0		Charge on chloride ion, Cl^-	-1	

Receives $1e^-$

- The equation that represents the formation of chloride ion, Cl^-

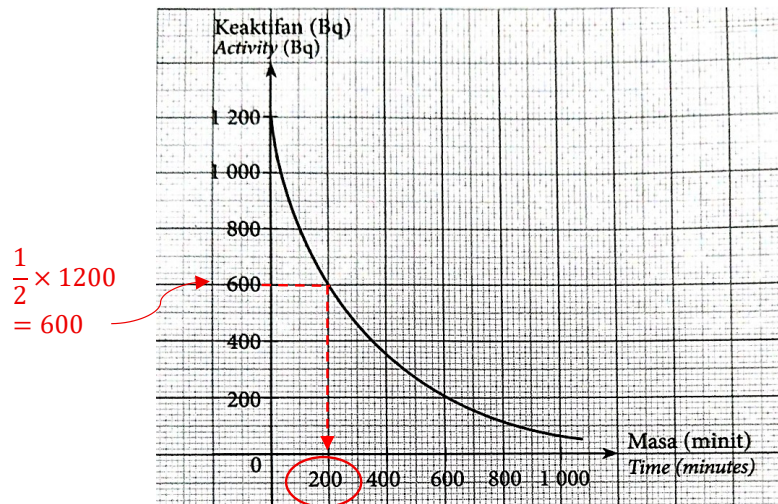
$$\text{Cl} + e^- \rightarrow \text{Cl}^-$$

L2: Teknik Menjawab Soalan**A2: Answering Technique****Tips**

Contoh/Examples:

1. Rajah menunjukkan graf keaktifan melawan masa bagi bahan radioaktif P.

Diagram shows a graph of activity against time for radioactive substance P.



Berapakah separuh hayat bagi bahan radioaktif P?

What is the half-life of radioactive substance P?

200 minit/ minutes

Teknik Menjawab:

- Separuh hayat- **Masa** diperlukan untuk **bilangan bahan radioaktif berkurang menjadi separuh**
- Jawapan boleh dijumpai terus daripada graf.
- Langkah 1: Jumlah bilangan bahan radioaktif didarab dengan $\frac{1}{2}$.

$$\frac{1}{2} \times 1200 = 600$$
- Langkah 2: Tandakan jawapan bilangan radioaktif di graf dengan garis putus-putus (rujuk graf)
- Langkah 3: Cari masa untuk bilangan bahan radioaktif berkurang menjadi separuh daripada graf.

Jawapan: **Separuh hayat = 200 minit**

Answering Technique:

- Half-life – **Time** required for the **amount of the radioactive materials to reduce to half**
- The answer can be found directly from the graph.
- Step 1: Total amount of radioactive activity is multiple by $\frac{1}{2}$.

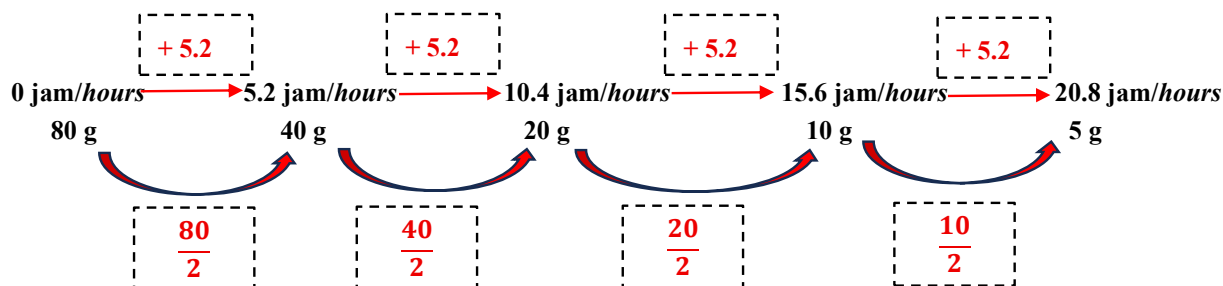
$$\frac{1}{2} \times 1200 = 600$$
- Step 2: Mark the answer of the radioactive number on the graph with a dotted line (refer to the graph)
- Step 3: Find the time required for the amount of the radioactive reduce to half from graph.

Answer: **Half-life = 200 minutes**

2. Protaktinium-234 mereput menjadi Uranium-234 dengan separuh hayat, $T_{\frac{1}{2}}$, 5.2 jam. Hitung jisim Protaktinium-234 selepas 20.8 jam dengan jisim asalnya 80 g.

Protactinium-234 decay to Uranium-234 with half-life, $T_{\frac{1}{2}}$, 5.2 hours. Calculate the mass of Protactinium-234 after 20.8 hours with the original mass of 80 g.

Penyelesaian/Solution:



Maka, jisim Protaktinium-234 yang tinggal selepas 20.8 jam ialah 5g.

Thus, the remaining mass of Protactinium-234 after 20.8 hours is 5g.

3. Jadual menunjukkan bilangan proton dan elektron bagi zarah P, Q dan R.
Table shows the number of protons and electrons for particles P, Q and R.

Zarah Particle	Bilangan proton Number of protons	Bilangan elektron Number of electrons
P	32	33
Q	16	16
R	22	20

- a. Nyatakan zarah neutral.
State the neutral particle.

Q

- b. Nyatakan zarah kation.
State the cation.

R

- c. Nyatakan zarah anion.
State the anion.

P

Teknik Menjawab:

- Neutral – bilangan proton sama dengan bilangan elektron
- Kation – bilangan proton melebihi bilangan elektron (ion positif)
- Anion – bilangan elektron melebihi bilangan proton (ion negatif)

Answering Technique:

- Neutral – the number of protons same as the number of electrons
- Cation – the number of protons is more than the number of electrons (positive ion)
- Anion – the number of electrons is more than the number of protons (negative ion)

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA – format items****(Tahap 1/Level 1)**

1. Siapakah yang menjumpai sebatian radioaktif Uranium?

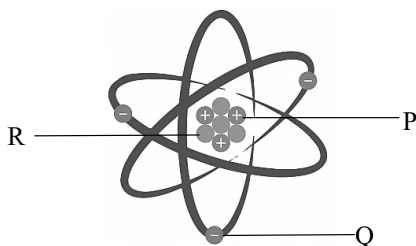
Who discovered the radioactive compound, Uranium?

- A Marie Curie
Marie Curie
- B Pierre Curie
Pierre Curie
- C Henry Becquerel
Henry Becquerel
- D Wilhelm Roentgen
Wilhelm Roentgen

[1 markah/ 1 mark]
Mengingat/Remember

2. Apakah bahagian P, Q dan R dalam struktur atom?

What are P, Q and R in the structure of an atom?



	P	Q	R
A	Elektron <i>Electron</i>	Neutron <i>Neutron</i>	Proton <i>Proton</i>
B	Proton <i>Proton</i>	Elektron <i>Electron</i>	Neutron <i>Neutron</i>
C	Neutron <i>Neutron</i>	Proton <i>Proton</i>	Elektron <i>Electron</i>
D	Proton <i>Proton</i>	Neutron <i>Neutron</i>	Elektron <i>Electron</i>

[1 markah/ 1 mark]
Mengingat/Remember

3. Antara berikut, yang manakah merupakan simbol bagi separuh hayat?

Which of the following is the symbol of half-life?

- A Ci
Ci
- B 0.5 hayat
0.5 life
- C $T_{\frac{1}{2}}$
- D Minit
Minutes

[1 markah/ 1 mark]
Mengingat/Remember

4.a) Padankan saintis berikut dengan sumbangannya.

Match the following scientists to their contribution.

Saintis <i>Scientists</i>
Marie dan Pierre Curie <i>Marie and Pierre Curie</i>

Wilhelm Conrad Roentgen <i>Wilhelm Conrad Roentgen</i>

Sumbangan <i>Contributions</i>
Menemui keradioaktifan <i>Discovered radioactivity</i>
Menemui Sinar-X <i>Discovered X-rays</i>
Menemukan Polonium dan Radium <i>Discovered Polonium and Radium</i>

[2 markah/ 2 marks]
Mengingat/Remember

b) Tuliskan **BENAR** atau **PALSU** berdasarkan pernyataan berikut.

Write TRUE or FALSE based on the following statements.

Pernyataan <i>Statements</i>	BENAR atau PALSU <i>TRUE or FALSE</i>
Unit Radioaktiviti adalah Curie,Ci dan Becquerel,Bq. <i>The unit of radioactivity are Curie,Ci and Becquerel,Bq.</i>	
Marie dan Pierre Curie menemui sinar gama yang dipancarkan daripada nukleus radium dan polonium. <i>Marie and Pierre Curie discovered gamma rays emitted from the nuclei of radium and polonium.</i>	
Radiasi Radioaktif terdiri daripada zarah alfa, α , zarah beta, β , dan sinaran omega, ω . <i>Radioactive radiation consists of alpha particle,α , beta particle,β and omega ray,ω.</i>	

[2 markah/ 2 marks]
Memahami/Understand

5. Rajah-rajah menunjukkan dua jenis pembentukan ion.

Diagrams show two types of ions formation.

Zarah subatom <i>Subatomic particle</i>	Bilangan <i>Number</i>	Cas <i>Charge</i>
neutron,n <i>neutron,n</i>	45	0
proton,p <i>proton,p</i>	35	+35
elektron,e <i>electron,e</i>	35	-35
Cas bagi atom L <i>The charge on atom L</i>		0

Terima elektron,e
Gained electron,e

Zarah subatom <i>Subatomic particle</i>	Bilangan <i>Number</i>	Cas <i>Charge</i>
neutron,n <i>neutron,n</i>	45	0
proton,p <i>proton,p</i>	35	+35
elektron,e <i>electron,e</i>	36	L
Cas bagi ion, L <i>The charge on ion, L</i>		-1

Zarah subatom <i>Subatomic particle</i>	Bilangan <i>Number</i>	Cas <i>Charge</i>
neutron,n <i>neutron,n</i>	20	0
proton,p <i>proton,p</i>	19	+19
elektron,e <i>electron,e</i>	19	-19
Cas bagi atom M <i>The charge on atom M</i>		0

Hilang elektron,e
loses electron, e

Zarah subatom <i>Subatomic particle</i>	Bilangan <i>Number</i>	Cas <i>Charge</i>
neutron,n <i>neutron,n</i>	20	0
proton,p <i>proton,p</i>	19	+19
elektron,e <i>electron,e</i>	17	M
Cas bagi ion, M <i>The charge on ion, M</i>		+2

(a) Nyatakan cas bagi ion L? Jelaskan.

State the charge of ion L? Explain.

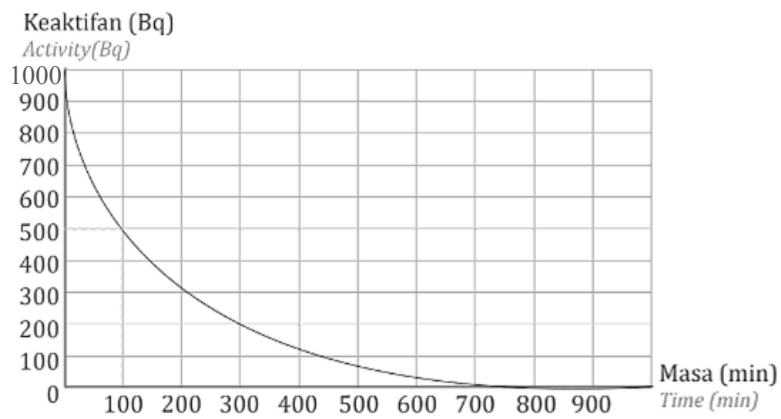
[2 markah/ 2 marks]
Memahami/Understand

(b) Nyatakan cas bagi ion M? Jelaskan.

State charge of ion M? Explain.

[2 markah/ 2 marks]
Memahami/Understanding

6. Graf menunjukkan keaktifan melawan masa bagi bahan radioaktif P.
Graph shows the activity against time for radioactive substance P.



Nyatakan separuh hayat bahan radioaktif P.
State the half-life of radioactive P.

[1 markah/ 1 mark]
Memahami/*Understand*

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA – format items****(Tahap 2/Level 2)**

1. Apakah maksud separuh hayat pereputan radioaktif mengalami proses pereputan?

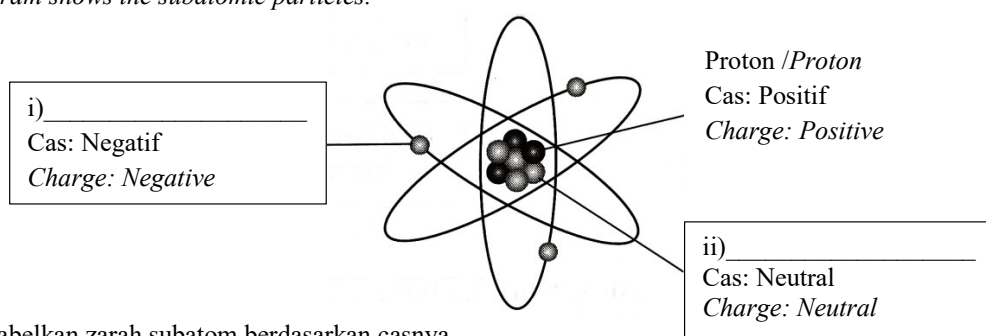
What is the definition of half-life of radioactive decay?

- A Masa yang diambil oleh nukleus yang belum mereput untuk mereput sepenuhnya
The time taken by the undecayed nuclei to decay completely
- B Masa yang diambil oleh nukleus yang belum mereput untuk menjadi lebih stabil
The time taken by the undecayed nuclei to become more stable
- C Masa yang diambil oleh nukleus yang belum mereput untuk menjadi lebih matang
The time taken by the undecayed nuclei to become more mature
- D Masa yang diambil oleh nukleus yang belum mereput untuk menjadi separuh daripada bilangan asalnya
The time taken by the undecayed nuclei to become half of its original number.

[1 markah/ 1 mark]
Mengingat/Remember

2. a) Rajah menunjukkan zarah subatom.

Diagram shows the subatomic particles.



Labelkan zarah subatom berdasarkan casnya.

Label the subatomic particles based on their charge.

[2 markah/ 2 marks]
Memahami/Understand

b) Tandakan (✓) pada pernyataan yang betul.

Tick (✓) the correct statements.

Pernyataan Statements		
i)	Ion negatif dikenali sebagai anion. <i>Negative ions are known as anions.</i>	
ii)	Ion positif ialah atom yang menerima elektron daripada atom lain. <i>Positive ions are atoms that receive electrons from another atom.</i>	
iii)	Ion negatif ialah atom yang menerima elektron daripada atom lain. <i>Negative ions are atoms that receive electrons from another atom.</i>	

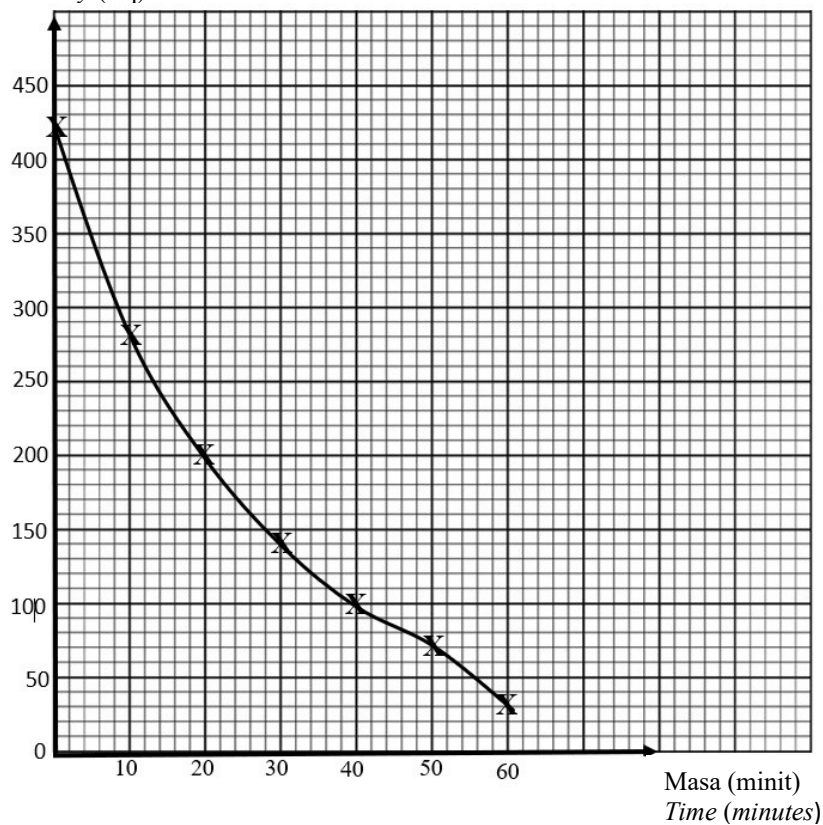
[2 markah/ 2 marks]
Mengingat/Remember

3. Graf menunjukkan keaktifan bahan radioaktif V dengan masa.

Graph shows the activity of radioactive substance V with time.

Keaktifan (Bq)

Activity (Bq)



- (a) Nyatakan separuh hayat bahan radioaktif V.
State the half-life of radioactive substance V.

[1 markah/ 1 mark]

Memahami/Understand

- (b) Hitung keaktifan bahan radioaktif V pada separuh hayat 90 minit.
Calculate the half-life of the activity of radioactive substance V after 90 minutes.

[3 markah/ 3 marks]

Mengaplikasi/Apply

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA – format items****(Tahap 3/Level 3)**

1. Pada awalnya, suatu sampel Q mengandungi 8400 nukleus. Bilangan nukleus berkurangan kepada 1050 selepas 24 jam. Apakah separuh hayat bagi Q?

Initially a sample of Q contains 8400 nuclei. The number of nuclei decreases to 1050 after 24 hours. What is the half-life of Q?

- A 4 jam
4 hours
- B 8 jam
8 hours
- C 10 jam
10 hours
- D 12 jam
12 hours

[1 markah/ 1 mark]

Mengaplikasi/Apply

2. (a) Padankan unit keradioaktifan berikut kepada kadar pereputan yang betul.

Match the following units of radioactivity to their correct rate of decays.

Unit Keradioaktifan <i>Units of Radioactivity</i>
(i) 1 Becquerel (Bq)

(ii) 1 Curie (Ci)

Kadar Pereputan <i>Rate of decays</i>
3.7 x 10 ¹⁰ pereputan/ s 3.7 x 10 ¹⁰ decays/s
1 pereputan/ saat 1 decay/ second
1 mikroSievert/ tahun 1 microSievert/year

[2 markah/ 2 marks]

Mengingat/Remember

- (b) Jadual menunjukkan bilangan proton dan elektron bagi zarah P, Q dan R.

Table shows the number of protons and electrons for particles P, Q and R.

Zarah <i>Particles</i>	Bilangan proton <i>Number of protons</i>	Bilangan elektron <i>Number of electrons</i>
P	36	38
Q	11	10
R	8	8

Kelaskan P, Q dan R mengikut pernyataan yang betul.

Classify P, Q and R according to the correct statement.

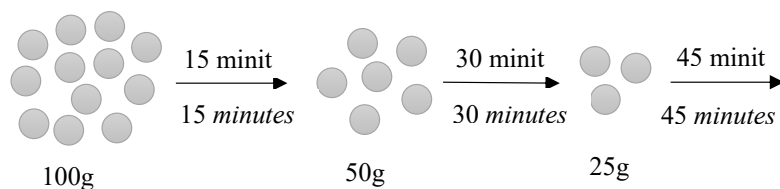
Pernyataan <i>Statements</i>	P/Q/R
Zarah neutral <i>Neutral particle</i>	
Kation <i>Cation</i>	
Anion <i>Anion</i>	

[2 markah/ 2 marks]

Memahami/Understand

3. Berdasarkan rajah berikut, jawab soalan di bawah.

Based on the diagram, answer the question given.



(a) Tandakan (✓) menunjukkan proses yang berlaku dalam rajah.

Mark (✓) show process that happen in the diagram.

Separuh hayat pereputan radioaktif <i>Half-life of radioactive decay</i>	Pembentukan ion <i>Formation of ion</i>

[1 markah/ 1 mark]

Mengingat/Remember

(b) Nyatakan separuh hayat bahan radioaktif.

State the half-life of radioactive substance.

[1 markah/ 1 mark]

Memahami/understand

(c) Berikan jisim bahan radioaktif berbaki selepas 45 minit.

Give the value of remaining mass for the radioactive substance after 45 minutes.

[2 markah/ 2 marks]

Mengaplikasi/Apply

(d) Kirakan masa yang diambil untuk jisim bahan radioaktif menurun sehingga 6.25g.

Calculate the time taken for the mass of the radioactive substance to decrease to 6.25g.

[2 markah/ 2 marks]

Mengaplikasi/Apply

L4: Penilaian
A4: Assessment

1. Lengkapkan jadual.
Complete the table.

Tahun Year	Ahli Sains Scientist	Penemuan Discovery
1895	(a) _____	Menemukan Sinar-X semasa mengambil foto sinar-X tangan isterinya <i>Discovered the X-ray while taking an X-ray photograph of his wife's hand</i>
1896	Antoine Henri Becquerel	Menemukan (b) _____ yang dipancarkan daripada nukleus (c) _____-238. <i>Discovered (b) _____ emitted from the nucleus of (c) _____-238</i>
1897	(d) _____	Menemukan sinar gama yang dipancarkan daripada nukleus radium dan polonium <i>Discovered gamma rays emitted from the nuclei of radium and polonium</i>

[4 markah/ 4 marks]

2. Isi tempat kosong di bawah berdasarkan maklumat yang berikut.
Fill in the blanks below based on the following information.

$$1 \text{ Ci} = 3.7 \times 10^{10} \text{ pereputan/s}$$

$$1 \text{ Ci} = 3.7 \times 10^{10} \text{ decays/s}$$

$$1 \text{ Bq} = 1 \text{ pereputan/s}$$

$$1 \text{ Bq} = 1 \text{ decay/s}$$

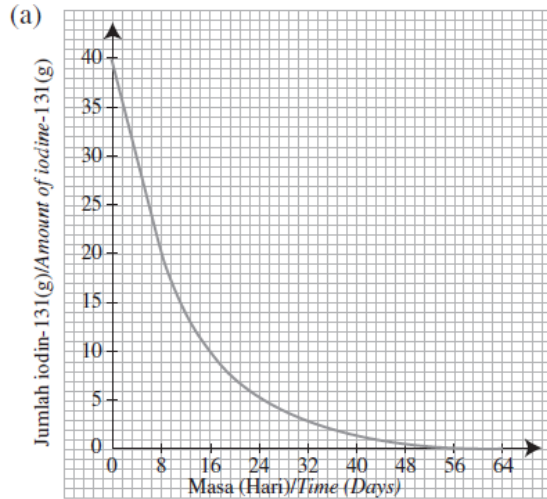
(a) $1 \text{ Ci} = \boxed{} \text{ Bq}$

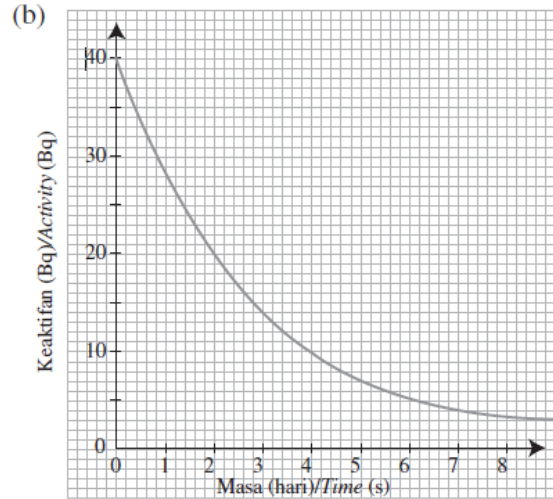
(b) $1 \text{ Bq} = \boxed{} \text{ Ci}$

[2 markah/ 2 marks]

3. Tentukan separuh hayat bahan radioaktif berikut.

Determine the half-life of the following radioactive substance.





(c)

Masa (minit) <i>Time (minutes)</i>	0	30	60	90
Jisim (g) <i>Mass (g)</i>	150	115	98	75

(d)

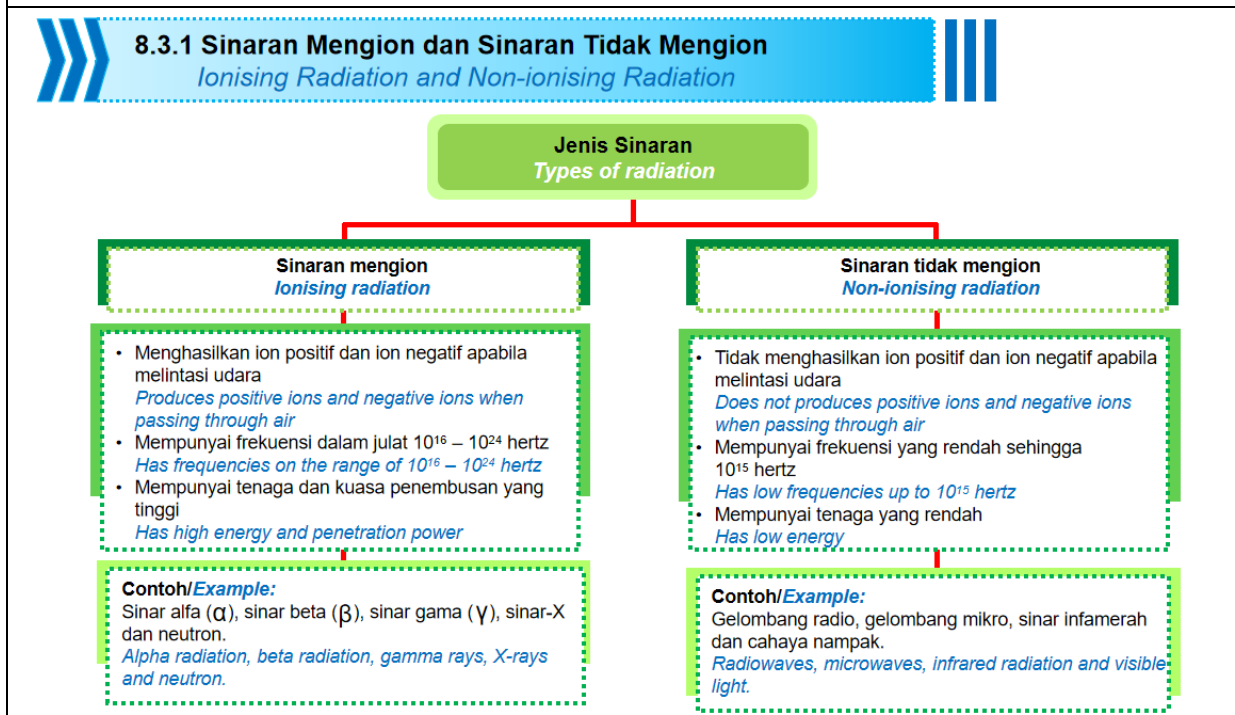
Masa (tahun) <i>Time (years)</i>	0	12	24	48
Peratus jisim (%) <i>Mass percentage (%)</i>	100	75	50	25

[4 markah/ 4 marks]

Sesi 19 / Session 19	
Bidang Pembelajaran <i>Learning Area</i>	8.0 Keradioaktifan <i>8.0 Radioactivity</i>
Standard Kandungan <i>Content Standard</i>	8.3 Sinaran Mengion dan Sinaran Tidak Mengion <i>8.3 Ionising Radiation and Non-ionising Radiation</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan soalan yang berkaitan dengan sinaran mengion, sinaran tidak mengion, perbezaan tiga jenis sinaran mengion, sumber sinaran mengion dan cara menguruskan risiko dari pendedahan kepada sumber sinaran. <i>Students will be able to accomplish the tasks regarding the ionising radiation, non-ionising radiation, differentiate the three types of ionising radiation, sources of ionising radiation and the ways to manage the risks from exposure to radiation.</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Sinaran mengion dan sinaran tidak mengion <i>Ionising radiation and non-ionising radiation</i> 2. Jenis sinaran mengion <i>Types of ionising radiation</i> 3. Sumber sinaran mengion dalam alam sekitar. <i>Sources of ionising radiation in the environment.</i> 4. Risiko terdedah kepada sinaran mengion semulajadi <i>Risks from exposure to natural ionising radiation</i>

L1: Nota Revisi Cepat

A1: Speedy Revision Notes





8.3.2 Tiga Jenis Sinaran Mengion Three types of Ionising Radiation



Perbezaan antara Ketiga-tiga Sinaran Mengion / Differences between the Three Types of Ionising Radiations

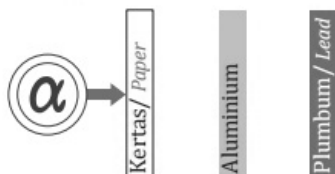
Jenis sinaran/Types of radiation	Alfa (α)/Alpha (α)	Beta (β)/Beta (β)	Gama (γ)/Gamma (γ)
Cas/Charge	Positif/Positive (+2e)	Negatif/Negative (-1e)	Neutral/Neutral
Kuasa penembusan Ionising power	Tinggi/kuat (menghasilkan banyak ion) High/strong (produces many ions)	Sederhana (menghasilkan bilangan ion yang sederhana) Moderate (produces moderate number of ions)	Rendah/lemah (menghasilkan bilangan ion yang paling sedikit) Low/weak (number of ions produced is very less)
Kelajuan Speed	Perlahan (10% daripada halaju cahaya) Slow (10% of the speed of light)	Laju (90% daripada halaju cahaya) Fast (90% of the speed of light)	Sama dengan halaju cahaya At the speed of light ($3 \times 10^8 \text{ m s}^{-1}$)
Kuasa penembusan Penetration power	Paling rendah, boleh dihalang dengan sekeping kertas atau udara setebal 1 – 5 cm Very low, can be blocked by a piece of paper or air with a thickness of 1 – 5 cm	Tinggi, boleh dihalang dengan kepingan aluminium setebal 5 mm High, can be blocked with a sheet of aluminium with a thickness of 5 mm	Sangat tinggi, hanya boleh dihalang dengan bongkah plumbum setebal 10 cm Very high, can be stopped with a block of lead with a thickness of 10 cm
Julat pancaran di udara Range of emission in the air	Beberapa sentimeter A few centimetres	Beberapa meter A few metres	Beberapa ratus meter A few hundreds of metres
Pemesongan dalam medan elektrik Deflection by electric field	Dipesongkan ke arah plat negatif Deflected towards negative plate	Dipesongkan ke arah plat positif Deflected towards positive plate	Tidak dipesongkan No deflection
Pemesongan dalam medan magnet Deflection by magnetic field	Dipesongkan ke atas Deflected upwards	Dipesongkan ke bawah Deflected downwards	Lurus Straight



Kuasa pengionan
Ionising power



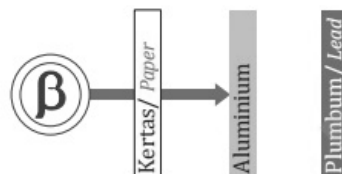
Kuasa penembusan
Penetration power



Kuasa pengionan
Ionising power



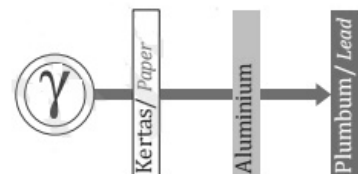
Kuasa penembusan
Penetration power



Kuasa pengionan
Ionising power



Kuasa penembusan
Penetration power



SINARAN MENGION IONISING RADIATIONS

PEMESONGAN DALAM MEDAN ELEKTRIK DEFLECTION OF ELECTRIC FIELD

Sumber Sinaran Radioaktif
Radioactive radiation source

Medan Elektrik
Electric field

Sinaran **Beta** (β) (Cas negatif)
Beta ray (β) (*Negative charge*)

Sinaran **Gama** (γ) (neutral)
Gamma ray (γ) (*neutral*)

Sinaran **Alfa** (α) (Cas positif)
Alpha ray (α) (*Positive charge*)

- Sinaran **Alfa** (α) bercas positif. Memesong menjauhi plat positif medan elektrik.
Alpha ray (α) *positively charged. Deflected away from positive plate of electric field.*
- Sinaran **Beta** (β) bercas negatif. Memesong menjauhi plat negatif medan elektrik.
Beta ray (β) *negative charged. Deflected away from negative plate of electric field.*
- Sinaran **Gama** (γ) adalah neutral. Tidak memesong dalam medan elektrik.
Gamma ray (γ) *is neutral. Does not deflected in electric field.*

8.3.3 Sumber Sinaran Mengion dalam Alam Sekitar *Sources of Ionising Radiation Source in the Environment*

Sumber sinaran mengion
Sources of ionising radiation

Semula jadi
Natural

Contoh/Examples:

- Sinaran kosmik
Cosmic rays
- Sinaran latar belakang, iaitu daripada bahan radioaktif yang wujud semula jadi dalam tanah dan batuan
Background radiation, which comes from radioactive substances that exists naturally in soil and rocks

Buatan manusia
Man-made

Contoh/Examples:

- Kemalangan nuklear
Nuclear accidents
- Ujian nuklear
Nuclear tests
- Penggunaan radioisotop bagi tujuan perubatan dan industri
Use of radioactive isotopes for medical and industrial purposes



8.3.4 Langkah Keselamatan Mengurangkan Risiko Terdedah kepada Sinaran Mengion

Safety Measures to Reduce the Risks of Exposure to Ionising Radiation

Sumber sinaran mengion <i>Sources of ionising radiation</i>	Langkah keselamatan <i>Safety measures</i>
Sinaran latar belakang <i>Background radiation</i>	Memakai alat perlindungan seperti kaca mata dan payung yang dilapisi dengan filem antiultraungu. <i>Wear protective devices such as spectacles and umbrellas fitted with anti-ultraviolet film.</i>
Sinar-X <i>X-ray</i>	- Foto sinar-X hanya boleh diambil selepas sekurang-kurangnya enam bulan untuk mengelakkan pendedahan yang berlebihan. <i>X-ray photos can only be taken after at least six months to avoid overdose exposure.</i> - Tidak membenarkan penggunaan sinar-X ke atas wanita hamil. <i>Do not allow the use of x-rays on pregnant women.</i>
Sinaran kosmik <i>Cosmic rays</i>	Krew penerbangan disarankan untuk tidak terdedah melebihi 20 mSv sinaran setahun dengan mengurangkan waktu bekerja bagi penerbangan jauh pada altitud tinggi dan berhampiran kutub Bumi. <i>Flight crews are advised not to be exposed to more than 20 mSv rays per year by reducing working hours for distant flights at high altitudes and near the Earth's pole.</i>
Televisyen <i>Television</i>	Pastikan jarak antara televisyen dengan anda sekurang-kurangnya 2 meter ketika menonton televisyen. <i>Make sure the distance between the television and you is at least 2 metres while watching television.</i>
Makanan yang tercemar oleh bahan radioaktif <i>Food contaminated by radioactive substances</i>	Makanan yang telah dicemari bahan radioaktif haruslah dibuang dan tidak dimakan. <i>Foods that have been contaminated with radioactive substances should be thrown away and not eaten.</i>

Risiko terdedah kepada sinaran mengion

Risks of exposure to ionising radiation

- Menyebabkan kematian/ *Causes death*
- Menyebabkan mutasi genetik/ *Causes genetic mutation*
- Meningkatkan risiko kanser/ *Increases the risks of cancer*
- Kerosakan pada tisu dan organ badan/ *Damages the body tissues and organs*

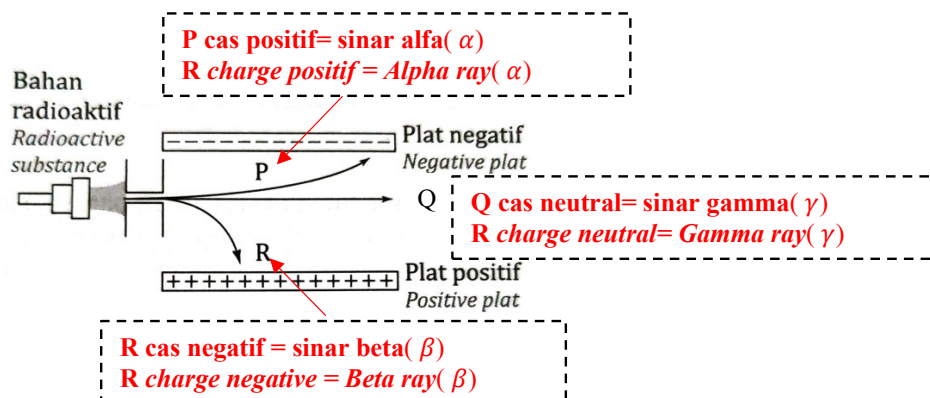
L2: Teknik Menjawab Soalan**A2: Answering Technique**

Tips

Contoh/Example:

1. Rajah menunjukkan pemesanan sinaran radioaktif dalam medan elektrik.

Diagram shows the deflection of radioactive rays in the electrical field.



Berdasarkan rajah namakan sinaran P, Q dan R.

Based on the diagram, name radiations P, Q and R.

- P : **Sinar alfa/ Alpha ray (α)**
- Q : **Sinar gama/ Gamma ray (γ)**
- R : **Sinar beta/ Beta ray (β)**

Teknik Menjawab:

- Ingat cas zarah sinar alfa, sinar beta dan sinar gama.

Sinar alfa	Sinar beta	Sinar gama
Cas (+)	(-)	Neutral

Cas berlawanan- tertarik kepada satu sama lain,

Cas yang sama- menjauhi satu sama lain.

- Cas positif pesong ke plat negatif
- Cas negatif pesong ke plat positif
- Cas neutral tidak memesonng

Answering Technique:

- Remember the particle charge of alpha radiation, beta radiation and gamma radiation.

Alpha Ray	Beta Ray	Gamma Ray
Charge (+)	(-)	Neutral

Difference charge- Attract to each other,

Same charge- away from each other.

- Positive charged deflect to negative plate
- Negative charged deflect to positive plate
- Neutral charge does not deflect.

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA – format items****(Tahap 1/Level 1)**

1. Antara yang berikut, yang manakah sinaran tidak mengion?

Which of the following is a non-ionising radiation?

- A Sinaran X
X-ray
- B Inframerah
Infrared
- C Sinaran Beta
Beta ray
- D Sinaran Gama
Gamma ray

[1 markah/ 1 mark]
Mengingat/Remember

2. Apakah perlindungan terbaik daripada bahaya sinaran gama?

What is the best protection from the danger of gamma rays?

- A Kayu
Wood
- B Kulit
Skin
- C Kertas
Paper
- D Plumbum
Lead

[1 markah/ 1 mark]
Mengingat/Remember

3. Apakah kuasa penembusan bagi sinaran alfa, sinaran beta dan sinaran gama ?

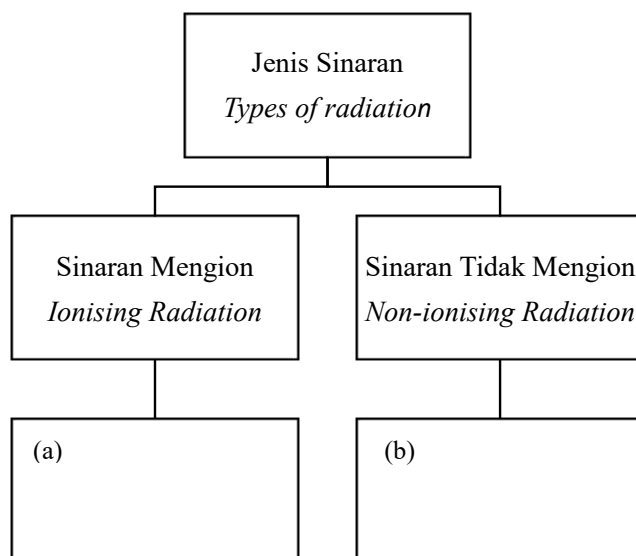
What is the penetration power for alpha ray, beta ray and gamma ray?

	Alfa <i>Alpha</i>	Beta <i>Beta</i>	Gama <i>Gamma</i>
A	Rendah <i>Low</i>	Sederhana <i>Moderate</i>	Tinggi <i>High</i>
B	Tinggi <i>High</i>	Rendah <i>Low</i>	Sederhana <i>Moderate</i>
C	Sederhana <i>Moderate</i>	Tinggi <i>High</i>	Rendah <i>Low</i>
D	Tinggi <i>High</i>	Sederhana <i>Moderate</i>	Rendah <i>Low</i>

[1 markah/ 1 mark]
Mengingat/Remember

4. a) Kelaskan sinaran berikut kepada sinaran mengion dan sinaran tidak mengion menggunakan jawapan yang diberikan.

Classify the following radiations into ionising radiation and non-ionising radiation.



Sinaran Beta <i>Beta Radiation</i>	Gelombang Mikro <i>Microwave</i>	Atom <i>Atom</i>
---------------------------------------	-------------------------------------	---------------------

[2 markah/ 2 marks]
Mengingat/Remember

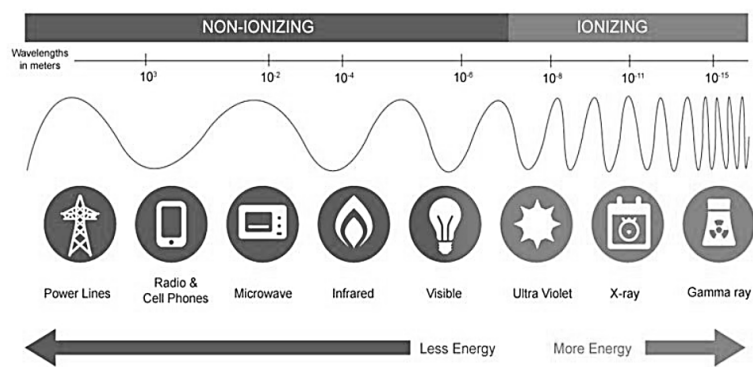
- b) Gariskan jawapan yang betul bagi pernyataan yang berikut.

Underline the correct answer for the statement given.

- Sinaran Mengion akan menghasilkan ion (positif / neutral) dan ion negatif apabila melintasi udara.
Ionising radiation produced (positive / neutral) ion and negative ion when passing through air.
- Sinaran Beta memesong menjauhi plat (positif / negatif) dalam medan eletrik.
Beta ray deflected away (positive / negative) plate in electric field.

[2 markah/ 2 marks]
Mengingat/Remember

5. Gambar menunjukkan sinaran mengion dan sinaran tidak mengion.
Diagram shows ionising radiation and non-ionising radiation.



Sumber: <https://waveguard.com/electromagnetic-spectrum/>

- (a) Tandakan (✓) bagi unit sinaran mengion yang betul.
Mark (✓) for the correct unit for ionising radiation.

milliSievert	Curie
☐	☐

[1 markah/ 1 mark]
 Mengingat/Remember

- (b) Nyatakan dua risiko terdedah kepada sinaran mengion.
State two risks of exposure towards ionising radiation.

[2 markah/ 2 marks]
 Memahami/Understand

- (c) Nyatakan langkah keselamatan yang perlu diambil apabila terdedah kepada sinaran mengion daripada televisyen.
State safety measures must be taken when exposed to ionising radiation come from television.

[1 markah/ 1 mark]
 Memahami/Understand

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA – format items****(Tahap 2/Level 2)**

1. Kuasa menembusan bagi sinaran gama boleh disekat menggunakan?

The penetration power for gamma ray can be blocked by using?

- A Bongkah plumbum setebal 10 cm
A block of lead with a thickness of 10 cm
- B Kepingan aluminium setebal 5 mm
Sheet of aluminium with a thickness of 5 mm
- C Tiga keping kertas berketebalan 9 cm
Three pieces of paper with a thickness of 9 cm
- D Sekeping kertas dan udara setebal 1 cm – 5 cm
A piece of paper or air with thickness of 1 cm – 5 cm

[1 markah/ 1 mark]
Mengingat/Remember

2. Julat pancaran di udara yang manakah betul bagi sinaran alfa?

Which one is the correct range of emission in the air for alpha radiation?

- A Beberapa meter
A few metres
- B Beberapa sentimeter
A few centimeters
- C Beberapa kilometer
A few kilometers
- D Beberapa ratus meter
A few hundred meters

[1 markah/ 1 mark]
Mengingat/Remember

3. a) Isikan tempat kosong dengan pilihan jawapan yang betul.

Fill in the blank with the correct choices of answer.

Sinaran kosmik <i>Cosmic rays</i>	Gelombang radio <i>Radiowaves</i>	Ujian nuklear <i>Nuclear test</i>
--------------------------------------	--------------------------------------	--------------------------------------

- i. Antara contoh sumber sinaran mengion buatan manusia adalah kemalangan nuklear, _____ dan penggunaan radioisotop bagi tujuan perubatan dan industry.

The following examples are the ionising radiation nuclear accidents, _____ and radioisotope usage for medical and industrial purposes.

- ii. Sumber sinaran mengion semula jadi adalah _____ dan sinaran latar belakang.
Natural ionising radiation sources are _____ and background radiation.

[2 markah/ 2 marks]
Mengingat/Remember

- b) Bulatkan sinaran mengion yang akan mengalami pemelotan dalam medan magnet.

Circle the ionizing radiation that will deflect in magnetic field.

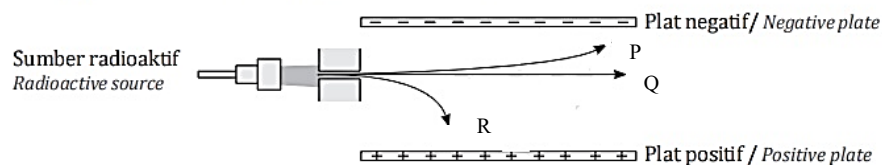
Sinaran alfa <i>Alpha radiation</i>	Sinaran Beta <i>Beta radiation</i>	Sinaran Gama <i>Gamma radiation</i>
--	---------------------------------------	--

[2 markah/ 2 marks]
Mengingat/Remember

4. Rajah menunjukkan pemesanan disebabkan oleh medan lektrik.

The diagram shows a deflection caused by electric field.

Pemesongan oleh medan elektrik/ Deflection by electric field



(a) Nyatakan nama sinaran radioaktif Q.

State the name of radioactive radiation Q.

[1 markah/ 1 mark]
Mengingat/Remember

(b) Huraikan sebab sinaran radioaktif Q tidak terpesong ke arah plat negatif dan plat positif.

Describe the reason radioactive radiation Q does not deflect towards negative plate and positive plate.

[2 markah/ 2 marks]
Memahami/Understand

(c) Berikan dua lagi contoh sinaran mengion.

Give another two examples of ionising radiation.

[2 markah/ 2 marks]
Mengingat/Remember

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA – format items****(Tahap 3/Level 3)**

1. Apakah unit bagi mengukur kesan sinaran mengion beraras rendah terdedah pada badan manusia?

What is the unit to measure the effect of exposed low level ionising radiation towards human body?

- A Curie
Curie
- B Hertz
Hertz
- C Sievert
Sievert
- D Becquerel
Becquerel

[1 markah/ 1 mark]

Mengingat/Remember

2. (a) Padankan sumber sinaran mengion dengan langkah keselamatan yang betul.

Match the source of ionising radiation with the correct safety measures.

Sumber sinaran mengion <i>Source of ionising radiation</i>
(i) Sinaran latar belakang <i>Background radiation</i>

(ii) Sinar X <i>X- ray</i>

Langkah keselamatan <i>Safety measures</i>
● Memakai alat perlindungan seperti kaca mata atau payung yang dilapisi lapisan filem antiultraungu <i>Wear protective device such as spectacles and umbrellas coated with anti-ultraviolet film</i> ● Foto sinar -X hanya boleh diambil sekurang-kurangnya selepas enam bulan daripada foto sinar-X yang sebelum untuk mengelakkan pendedahan yang berlebihan <i>X-ray photo can only be taken at least six months after the previous X-ray photo to avoid overdose exposure</i> ● Makanan yang telah dicemari oleh sinaran radioaktif haruslah dibuang dan tidak dimakan <i>Food that has been contaminated with radioactive radiation must be throwed away and not be eaten.</i>

[2 markah/ 2 marks]

Mengingat/Remember

(b) Tulis **BENAR** atau **PALSU** bagi pernyataan berikut.

Write **TRUE** or **FALSE** for the following statement.

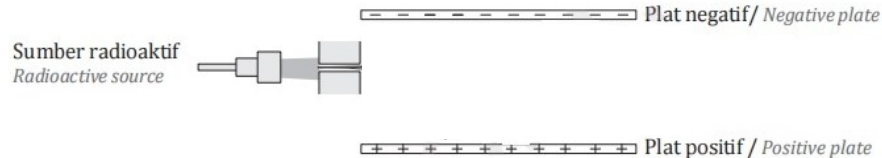
Pernyataan Statements	BENAR atau PALSU TRUE or FALSE
(i) Sinaran tidak mengion mempunyai kuasa yang rendah <i>Non-ionising radiation has low energy</i>	
(ii) Kelajuan sinaran beta adalah sama dengan halaju cahaya <i>The speed of beta radiation is same as the speed of light</i>	
(iii) Gelombang mikro, gelombang radio, sinaran inframerah dan cahaya nampak adalah contoh sinaran tidak mengion. <i>Microwave, radiowave, infrared light and visible light are examples of non-ionising radiation.</i>	

[2 markah/ 2 marks]

Mengingat/Remember

3. Berdasarkan rajah berikut, jawab soalan di bawah.

Based on the diagram, answer the question given.



(a) Tandakan (✓) menunjukkan proses yang berlaku dalam rajah menggunakan medan yang betul.
Mark (✓) show process that happen in the diagram use which kind of correct field.

Medan elektrik <i>Electric field</i>	Medan magnet <i>Magnetic field</i>

[1 markah/ 1 mark]

Mengingat/Remember

(b) Lukis dan label tiga sinaran mengion pada rajah di atas.

Draw and label three ionising radiation in the diagram above.

[3 markah/ 3 marks]

Memahami/Understand

(c) Berikan kesan pendedahan terhadap sinaran mengion yang mempunyai simbol tersebut kepada ibu mengandung.

Give the effect of exposure towards the ionising radiation that have the hazardous symbol on pregnant mother.



[2 markah/ 2 marks]

Mengaplikasi/Apply

L4: Penilaian**A4: Assessment**

1. Tandakan (✓) pada sinaran mengion dan tandakan (✗) pada sinaran tidak mengion

Tick (✓) on the ionising radiation and tick (✗) on the non-ionising radiations.

(a) Sinaran ultraungu
Ultraviolet rays

☐

(b) Gelombang radio
Radio waves

☐

(c) Sinar gama
Gamma rays

☐

(d) Sinar-X
X-rays

☐

(e) Inframerah
Infrared

☐

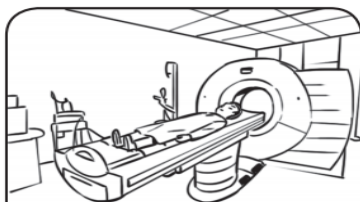
(f) Gelombang mikro
Microwaves

☐

[6 markah/ 6 marks]

2. Isi tempat kosong sama ada sumber sinaran mengion tersebut wujud secara semula jadi atau buatan manusia.

Fill in the blanks either the following ionising radiations sources exist naturally or man-made.



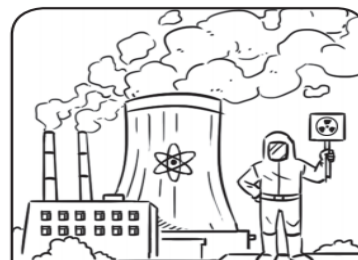
Radioisotop dalam mesin
X-ray
*Radioisotopes in X-ray
machine*

(a)



Sinaran kosmik
Cosmic radiation

(b) Semula jadi
Naturally



Kemalangan nuklear
Nuclear accidents

(c)

[2 markah/ 2 marks]

3. Tuliskan tindakan yang perlu diambil untuk memastikan dos sinaran mengion yang diterima tidak melebihi tahap selamat.

Write the action needed to be taken to ensure that the ionising radiation dose received does not exceed the safe level.

(a) Mengambil gambar
Foto sinar-X:
Taking X-ray:

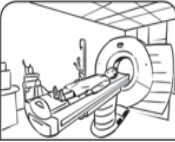
(b) Menonton televisyen:
Watching television:

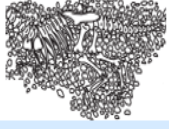
[2 markah/ 2 marks]

Sesi 20 / Session 20	
Bidang Pembelajaran <i>Learning Area</i>	8.0 Keradioaktifan <i>8.0 Radioactivity</i>
Standard Kandungan <i>Content Standard</i>	8.4 Kegunaan Sinaran Radioaktif <i>8.4 Uses of Radioactive Radiation</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menjelaskan tentang kegunaan sinaran radioaktif dan mewajarkan kepentingan pengendalian bahan radioaktif dan sisa radioaktif dengan betul. <i>Students will be able to explain the uses of radioactive radiation and able to justify the importance of proper and safe handling of radioactive substances and radioactive waste.</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Kegunaan sinaran radioaktif dalam kehidupan seharian <i>Uses of radioactive radiation in daily life</i> 2. Cara pengendalian bahan radioaktif dan sisa radioaktif dengan betul <i>Safe and proper handling of radioactive substances and radioactive waste</i>

L1: Nota Revisi Cepat

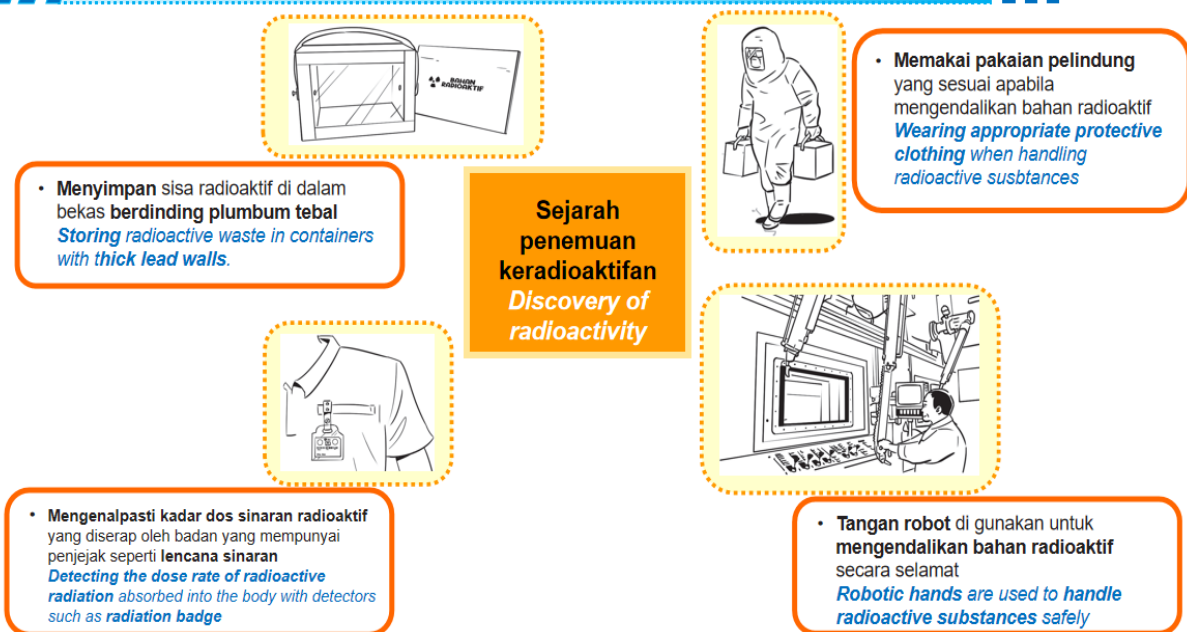
A1: Speedy Revision Notes

 8.4.1 Kegunaan Sinaran Radioaktif dalam Kehidupan Seharian <i>Uses of Radioactive Radiation in Daily Life</i> 	
Bidang/Field	Kegunaan/Uses
Perubatan <i>Medicine</i> 	- Sinar-X digunakan untuk mengesan keretakan tulang dan pneumonia pada peparu. <i>X-rays are used to detect bone fracture and checking the lungs for pneumonia.</i> - Sinar gama dari kobalt-60 atau Sesium-137 digunakan untuk membunuh sel-sel kanser dalam rawatan radioterapi. <i>Gamma rays from cobalt-60 or caesium-137 are used to kill cancerous cells in the radiotherapy treatment.</i> - Sinar gama juga digunakan untuk mensterilkan peralatan perubatan dan alat pembedahan. <i>Gamma rays are also used to sterilise medical equipment and surgical instruments.</i> - Radioisotop natrium-24 digunakan untuk mengesan kedudukan salur darah yang tersumbat akibat pembekuan darah. <i>Sodium-24 radioisotopes are used to detect the location of blocked blood vessels due to blood clotting.</i> - Radioisotop iodin-131 digunakan untuk merawat kanser tiroid dan hipertiroidisme. <i>Iodine-131 radioisotopes are used to treat thyroid cancer and hyperthyroidism.</i> - Technetium-99 di gunakan dalam merawat ketumbuhan dalam otak. <i>Technetium-99 is used to treat tumours in the brain.</i>
Pertanian <i>Agriculture</i> 	- Sinar gama dalam dos yang kecil digunakan untuk memandulkan serangga perosak supaya populasinya dapat dikawal. <i>Gamma rays in small doses are used to sterilise insect pests so that their populations can be controlled.</i> - Radioisotop fosforus-32 dan nitrogen-15 digunakan untuk mengkaji kadar penyerapan baja. <i>Phosphorus-32 and nitrogen-15 are used to study the absorption rate of fertilisers in plants.</i>
Industri <i>Industry</i> 	- Radioisotop natrium-24 digunakan untuk mengesan rekahan dan kebocoran paip air bawah tanah. <i>Sodium-24 radioisotopes are used to detect cracks and leakages in underground pipes.</i> - Sinar beta digunakan bagi mengawal dan menentukan ketebalan kepingan logam, kertas dan plastik dalam industri. <i>Beta rays are used to control and determine the thickness of metal sheets, papers and plastics in industries.</i>

Arkeologi <i>Archeology</i> 	Karbon-14 digunakan untuk menganggarkan umur artifak arkeologi atau fosil. <i>Carbon-14 is used to determine the age of artefacts and fossils.</i>
Pengawetan makanan <i>Food Preservation</i> 	Sinar gama digunakan untuk membunuh bakteria, serangga dan kulat penyebab kerosakan makanan dalam pengawetan makanan <i>Gamma rays are used to kill bacteria, insects and fungi that cause food spoilage in food preservation.</i>
Keselamatan <i>Security</i> 	- Pengimbas keselamatan lapangan terbang menggunakan sinaran rendah untuk mengesan objek yang mungkin disembunyikan oleh penumpang. <i>Airport security scanners use low-level radiation to detect objects that might be hidden by passengers.</i> - Bahan radioaktif boleh digunakan dalam bidang pertahanan seperti bom nuklear yang memusnahkan hampir semua benda hidup. <i>Radioactive substances can be used in the field of defence such as the nuclear bomb that destroys almost all living things.</i>

8.4.2 Pengendalian Bahan Radioaktif dan Sisa Radioaktif yang Selamat dan Betul

Safe and Proper Handling of Radioactive Substances and Radioactive Waste



L2: Teknik Menjawab Soalan**A2: Answering Technique****TIPS**

Contoh/ *Examples*:

1. **Nyatakan** bahan radioaktif berikut yang digunakan dalam bidang perubatan.

State the following radioactive substances used in medical field.

- i. Disuntik ke dalam vena pesakit untuk mengesan kedudukan darah beku.
Injected into veins to detect the position of blood clot.
Natrium-24/ Sodium-24
- ii. Mengesan perubahan dalam kelenjar tiroid.
To detect the changes in thyroid gland.
Iodin-131/ Iodine-131

Teknik Menjawab:

- **NYATAKAN/BERIKAN/ SENARAIKAN** – Nyatakan jawapan yang betul tanpa penerangan.

Answering Technique:

- **STATE/GIVE/LIST** – Briefly state the correct answer without giving explanation.

2. **Cadangkan** satu cara untuk menyimpan bahan radioaktif. **Justifikasikan** jawapan.

Suggest one way to store radioactive substances. Justify your answer.

- Gunakan bekas yang diperbuat daripada plumbum.
- Sinar radioaktif tidak dapat menembusi kepingan plumbum.
- use a container made of lead.
- Radioactive radiation cannot penetrate lead sheets.

Teknik Menjawab:

- **CADANGKAN** – Nyatakan satu cadangan berdasarkan kehendak soalan.
- **JUSTIFIKASI** – Memberi alasan/ penerangan mengikut apa yang dicadangkan.

Answering Technique:

- **SUGGEST** – Briefly give a suggestion based on the question.
- **JUSTIFY** – Give reasons/explanation according to the suggestion given.

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA – format items****(Tahap 1/Level 1)**

1. Bahan radioaktif yang manakah yang digunakan untuk mengukur usia bahan fosil berikut?

Which of the following radioactive substance can be used to determine the age of the animal in the diagram?



- A Kobalt-60
Cobalt-60
- B Karbon-14
Carbon-14
- C Natrium-24
Sodium-24
- D Fosforus-32
Phosphorus-32

[1 markah/ 1 mark]
Mengingat/Remember

- 2 (a) Tuliskan **BENAR** atau **PALSU** berdasarkan pernyataan berikut.

*Write **TRUE** or **FALSE** based on the following statements.*

Pernyataan <i>Statements</i>	BENAR atau PALSU <i>TRUE or FALSE</i>
(i) Tangan robot digunakan untuk memegang dan mengalihkan bahan radioaktif. <i>Robotic hands are used to hold and transfer radioactive substances.</i>	
(ii) Lencana sinaran boleh digunakan untuk mengesan kadar dos bahan radioaktif yang diserap oleh badan. <i>Radiation badge can be used to detect the dose rate of radioactive substances absorbed by the body.</i>	
(iii) Sumber radioaktif atau sisa radioaktif boleh dibuang ke sungai. <i>Radioactive sources or radioactive waste can be dumped into rivers.</i>	

[2 markah/ 2 marks]
Memahami/Understand

- 2 (b) Gariskan jawapan yang betul untuk menerangkan kegunaan sinaran radioaktif.

Underline the correct answer to explain the uses of radioactive radiation.

- (i) Sinaran dari natrium-24 digunakan untuk mengenalpasti (kapilari darah / darah beku) dalam arteri.

Radiation from sodium-24 is used to locate (blood capillary/ blood clots) in arteries.

- (ii) (Sinaran gama/ sinaran beta) digunakan untuk membunuh mikroorganisma di dalam makanan.

(Gamma rays/ beta rays) are used to kill microorganisms inside the food.

[2 markah/ 2 marks]

Mengingat/Remember

3. Rajah menunjukkan seorang pesakit yang sedang menerima rawatan.

Diagram shows a patient receiving a treatment.



Nyatakan sinaran radioaktif yang digunakan dalam mesin tersebut. Terangkan kesan sinaran radioaktif ke atas pesakit itu.

State the radioactive rays used in the machine. Explain the effect of the radioactive rays on the patient.

Sinaran radioaktif: _____

Radioactive radiation: _____

Kesan: _____

Effect: _____

[2 markah/ 2 marks]

Memahami/Understand

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA – format items****(Tahap 2/Level 2)**

1. Kotak jenis apa paling sesuai digunakan untuk menyimpan bahan radioaktif?

What type of box is the most suitable for keeping radioactive substance?

- A Plumbum
Lead
- B Aluminium
Aluminium
- C Gentian kaca
Fibreglass
- D Keluli diperkukuh
Reinforced steel

[1 markah/ 1 mark]
Mengingat/Remember

2. Rajah menunjukkan logo Radura.

Diagram shows a Radura logo.



Apakah maksud logo tersebut?

What is the meaning of the logo?

- A Makanan yang boleh membunuh sel kanser.
Food that can kill cancer cells.
- B Makanan yang boleh disimpan untuk beberapa tahun.
Food that can be stored for several years.
- C Makanan yang dihasilkan dengan penggunaan bahan kimia
Food produced by using chemical substances.
- D Makanan yang diawet dengan sinaran radioaktif seperti sinar gama.
Food preserved using radioactive radiation such as gamma ray.

3. (a) Tandakan (✓) pada langkah keselamatan yang betul semasa mengendalikan bahan radioaktif.

Mark (✓) on the correct safety precaution when handling radioactive substances.

(i) Simpan bahan radioaktif di dalam bekas plumbum tebal <i>Store radioactive substances in a thick lead container</i>	
(ii) Guna tangan yang terdedah ketika mengendalikan bahan radioaktif <i>Use bare hands when handling radioactive substances</i>	
(iii) Pakai pakaian pelindungan khas untuk melindungi badan <i>Wear special protective clothes to protect the body</i>	

[2 markah/ 2 marks]
Memahami/Understand

(b) Lengkapkan pernyataan tersebut dengan menggunakan perkataan yang diberikan.

Complete the following statements using the words given.

Beta <i>Beta</i>	Fosforus-32 <i>Phosphorus-32</i>	Gama <i>Gamma</i>	Karbon-14 <i>Carbon-14</i>
---------------------	-------------------------------------	----------------------	-------------------------------

(i) Sinaran _____ digunakan untuk mengawal ketebalan kepingan logam.

_____ ray is used to control the thickness of metal sheets.

(ii) _____ digunakan untuk menentukan usia fosil.

_____ is used to determine the age of fossils.

[2 markah/ 2 marks]

Mengingat/Remember

4. Rajah menunjukkan sebuah kotak berdinding tebal yang diperbuat daripada bahan Y. Kotak itu digunakan untuk menyimpan bahan radioaktif dan bahan buangan radioaktif.

Diagram shows a thick-walled box made of material Y. The box is used to store radioactive substances and waste.



Cadangkan satu bahan Y yang sesuai. Terangkan jawapan.

Suggest a suitable material Y. Explain your answer.

[2 markah/ 2 marks]

Mengaplikasi/Apply

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA – format items****(Tahap 3/Level 3)**

1. Apakah tujuan utama penggunaan sinar gama dalam pengawetan makanan?

What is the primary purpose of using gamma rays in food preservation?

- A Untuk menukar warna makanan
To change the colour of food
- B Untuk meningkatkan rasa makanan
To enhance the taste of food
- C Untuk Membunuh mikroorganisma
To kill microorganisms
- D Untuk menambah nilai pemakanan kepada makanan
To add nutritional value to food.

[1 markah/ 1 mark]

Mengingat/Remember

2. a) Padankan radioisotop berikut dengan kegunaannya yang betul.

Match the following radioisotopes to their correct uses.

Radioisotop <i>Radioisotopes</i>
(i) Karbon-14 <i>Carbon-14</i>

(ii) Fosforus-32 <i>Phosphorus-32</i>
--

Kegunaan <i>Uses</i>
Mengesan kedudukan darah beku dalam arteri seorang pesakit <i>Detects the positions of blood clots in the arteries of a patient</i>
Menentukan kadar penyerapan baja oleh tumbuhan <i>Determine the rate of fertilisers absorption by plants</i>
Menentukan usia objek atau bahan purba <i>Determine the age of fossils and artifacts</i>

[2 markah/ 2 mark]

Mengingat/Remember

b) Isi tempat kosong dengan pilihan jawapan yang betul.

Fill in the blanks with the correct answers.

Tangan robotik <i>Robotic hands</i>	Plumbum <i>Lead</i>	Perlindungan <i>Protective</i>
--	------------------------	-----------------------------------

(i) Kepingan _____ yang tebal digunakan untuk menghadang bahan radioaktif.

Thick _____ sheet is used to shield radioactive substances.

(ii) Pakaian _____ yang sesuai dipakai semasa mengendalikan bahan radioaktif.

Wear suitable _____ clothes when handling radioactive substances.

[2 markah/ 2 markss]

Mengingat/Remember

3. Berikut adalah keadaan buah strawberi selepas satu bulan.

The following are the conditions of strawberries fruit after a month.

Strawberi N <i>Strawberry N</i>	Strawberi M <i>Strawberry M</i>
 Tidak dipancar dengan sinaran R <i>Not emitted with radiation R</i>	 Dipancar dengan sinaran R <i>Emitted with Radiation R</i>

a) Nyatakan jenis sinaran R.

State the radiation R.

[1 markah/ 1 mark]
Memahami/*Understand*

b) Nyatakan dua langkah keselamatan yang betul semasa mengendalikan sinaran R.

State two correct safety precaution when handling radiation R.

[2 markah/ 2 marks]
Memahami/*Understand*

c) Wajarkan penggunaan sinaran R dalam pengawetan makanan.

Justify the use of radiation R in food preservation.

[3 markah/ 3 marks]
Menilai/*Evaluate*

L4: Penilaian**A4: Assessment**

1. Tuliskan bidang yang mengaplikasikan sinaran radioaktif tersebut.

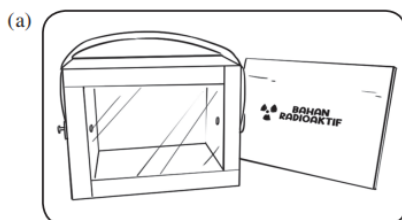
Write the field that applying the following radioactive radiation.

Pernyataan <i>Statements</i>	Bidang <i>Field</i>
a) Menentukan usia bahan purba menggunakan karbon-14. <i>Determining the age of artifacts using carbon-14.</i>	
b) Menentukan kadar penyerapan baja fosfat menggunakan fosforus-32. <i>Determining the rate of absorption of phosphate fertiliser using phosphorus-32</i>	
c) Membunuh bakteria dalam makanan dan mengawet makanan. <i>Kill bacteria in food and preserves food.</i>	
d) Mengesan rekahan dan kebocoran paip bawah tanah. <i>Detect cracks and leakages in underground pipes.</i>	
e) Membunuh sel-sel kanser dalam rawatan radioterapi. <i>Kill cancerous cell in radiotherapies treatment.</i>	
f) Menggunakan sinaran rendah untuk mengesan objek yang mungkin disembunyikan oleh penumpang kapal terbang. <i>Use low level radiation to detect objects that might be hidden by airplane passengers.</i>	

[6 markah/ 6 marks]

2. Isi tempat kosong dengan jawapan yang betul.

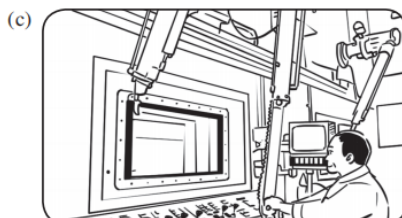
Fill in the blanks with the correct answer.



Menggunakan kotak _____
berdinding tebal
Using a box with thick _____ wall



Memakai _____
yang sesuai
Wearing appropriate _____



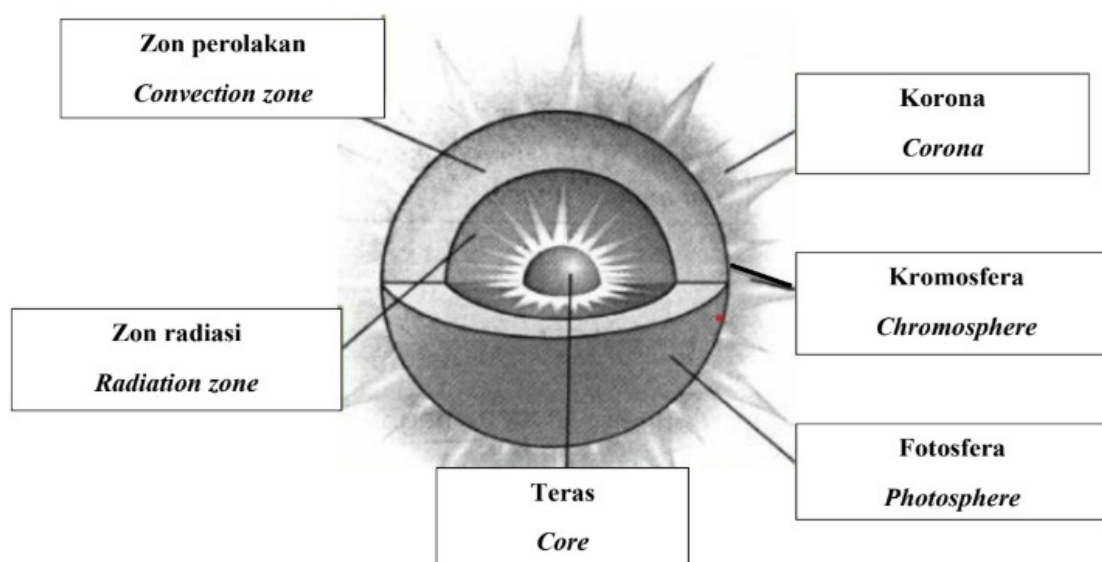
Menggunakan tangan _____
Using _____ hands



Memakai lencana _____
Wearing _____ badge

[4 markah/ 4 marks]

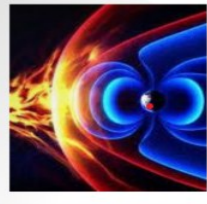
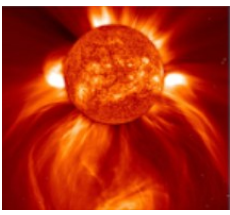
Sesi 21 / Session 21	
Bidang Pembelajaran <i>Learning Area</i>	9.0 Cuaca Angkasa Lepas <i>9.0 Space Weather</i>
Standard Kandungan <i>Content Standard</i>	9.1 Aktiviti matahari yang memberi kesan kepada Bumi <i>9.1 The Sun's activities that affect the Earth</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menjelaskan pelbagai aktiviti matahari seperti angin suria, letusan suria, dan lontaran jisim korona. <i>Students will be able to explain various solar activities such as solar wind, solar flares, and coronal mass ejections (CME).</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Jenis-jenis aktiviti matahari <i>Types of Solar activities</i> 2. Kesan aktiviti matahari terhadap bumi <i>Effects of Solar activities on earth</i>

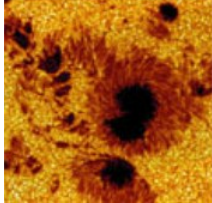
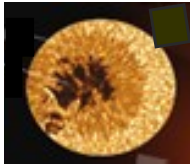
L1: Nota Revisi Cepat**A1: Speedy Revision Notes****9.1 Aktiviti matahari yang memberi kesan kepada Bumi***The Sun's activities that affect the Earth***Struktur Matahari / Structure of the Sun**Sumber: <https://www.liveworksheets.com/w/ms/sains/517151>

9.1 Aktiviti matahari yang memberi kesan kepada Bumi

The Sun's activities that affect the Earth

Fenomena pada permukaan Matahari / *Phenomena on the Sun's surface*

Fenomena / <i>Phenomena</i>	Penerangan / <i>Explanation</i>
Angin Suria / <i>Solar winds</i>  Sumber: Nota Sains Tingkatan 3 KSSM, SMK Ulu Tiram, Cikgu Norazila Khalid	- Terdiri daripada zarah dalam plasma seperti elektron, proton dan zarah alfa yang meletus dari Matahari ke angkasa lepas pada kelajuan yang tinggi. <i>Consists of plasma particles such as electrons, protons and alpha particles that erupts from the Sun into outer space at the high speed.</i> - Membawa medan magnet antara planet. <i>Carries interplanetary magnetic field.</i>
Semarak suria/Prominen <i>Prominences</i>  Sumber: https://www.spaceweather.com/glossary/filaments.html	- Berbentuk gelungan besar atau lajur melengkung. <i>Large loop or curved column shaped.</i> - Terdiri daripada gas menyala di sebelah atas. <i>Consist of burning gas on the top of sunspots.</i>
Lentingan Jisim Korona <i>Coronal mass ejections</i>  Sumber: https://www.space.com/coronal-mass-ejections-cme	- Berbentuk awan besar. <i>In the form of large cloud.</i> - Letusan zarah gas yang bermagnet. <i>An explosion of magnetic gas particles.</i>
Nyalaan suria <i>Solar flares</i>  Sumber: https://www.boulder.noaa.gov/authoring-institution/noaa-satellites/	- Berbentuk lajur yang terdiri daripada gas bercas. <i>Column shaped consisting of charged gas.</i> - Kerap berlaku berdekatan dengan tompok matahari. <i>Frequently occurs near sunspots.</i> - Letusan zarah gas yang bercas ke angkasa lepas. <i>An explosion of charged gas particles into space.</i>

Tompok Matahari <i>Sunspots</i>  Sumber: https://anyflip.com/xntzc/KNVh, Noor Aniza Baharom	• Mempunyai suhu yang lebih rendah berbanding granul. <i>Have lower temperature than granules.</i> • Lokasi letusan di fotosfera. <i>The location of the eruption at photosphere.</i>
Granul <i>Granule</i>  Sumber: Nota Sains Tingkatan 3 KSSM, SMK Ulu Tiram, Cikgu Norazila Khalid	• Kelihatan berbutir. <i>Looks granular.</i> • Bahagian atas zon perolakan bagi plasma yang sangat panas. <i>The top of convection zone of the extremely hot plasma.</i>

9.1 Aktiviti matahari yang memberi kesan kepada Bumi

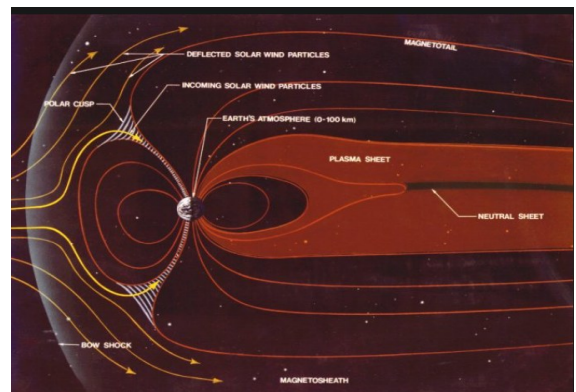
The Sun's activities that affect the Earth

Magnetosfera Bumi / *Earth's magnetosphere*

Bentuk Magnetosfera Bumi / *Shape of Earth's magnetosphere*



Medan magnet bumi / *Earth's magnetic field*



Magnetosfera Bumi / *Earth's magnetosphere*

Sumber: <https://sharifahfatini.blogspot.com/2019/08/sains-kssm-t3-cuaca-angkasa-lepas.html>

- Ruang dalam angkasa lepas yang meliputi Bumi. Ia terbentuk daripada interaksi antara medan magnet yang dibawa oleh angin suria dengan medan magnet Bumi.

Region of space surrounding Earth. It is formed from the interaction between magnetic field that carried by solar wind with Earth's magnetic field.

Kepentingan / Importances

- Menghalang zarah bercas dalam angin suria daripada sampai ke Bumi.
Prevents charged particles in the solar wind from reaching the Earth.
- Melindungi hidupan di Bumi daripada kesan buruk yang disebabkan oleh angin suria.
Protects the life in the Earth from adverse effects caused by solar wind.
- Mengurangkan tekanan yang dikenakan oleh fenomena angin suria terhadap atmosfera Bumi.
Reduces the pressure exerted by solar wind phenomena towards Earth's atmosphere.

L2: Teknik menjawab soalan

A2: Answering Technique

1. Fahami kehendak soalan - selalunya arahan soalan atau kehendak soalan ada pada awal soalan.
Understand the question needed - instruction always in the beginning of question
2. Kenal pasti kata kunci/kata tugas dan gariskan
Identify the key word
3. Markah mempengaruhi bentuk jawapan :
The mark given can be used how the answer written. :
 - a) 1 markah: jawapannya pendek, tidak perlu huraian
1 mark: the answer is short not need any explanation
 - b) 2 markah dan lebih: 2 isi penting – 1 m menjawab persoalan utama, 1 m menghuraikan isi yang pertama, juga perlu menyatakan contoh sekiranya ada tambahan markah.
2 marks or more : 2 important concept - 1 mark for the main issue, another 1 mark for the explanation, also need to give an example if there is any extra mark.
4. Soalan padanan perlu merujuk kepada jumlah markah yang diberi bagi mengelakkan 'WCR' (Wrong cancel right).
Matching question needs to refer to the amount of mark given to avoid 'WCR' (Wrong cancel right).

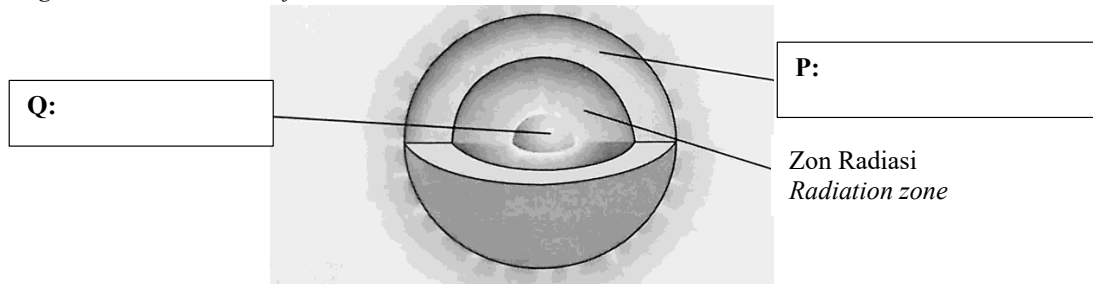
L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 1/Level 1)**

1. Apakah nama kawasan gelap yang kelihatan pada permukaan matahari?
What is the name of the dark regions on the surface of Sun?

- A Granul
Granules
 B Kitaran suria
Solar cycle
 C Nyalaan suria
Solar flares
 D Tompok matahari
Sunspots

[1 markah/ 1 mark]
 Mengingat/Remember

2. Rajah menunjukkan struktur Matahari
Diagram shows structure of the Sun.



- a) Label P dan Q dengan perkataan yang diberi.
Label the parts P and Q using the words given.

Teras <i>Core</i>	Korona <i>Corona</i>	Zon Perolakan <i>Convection zone</i>
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[2 markah/ 2 marks]
 Mengingat / Remember

- b) Tuliskan **BENAR** bagi pernyataan yang betul dan **PALSI** bagi pernyataan yang salah.
*Write **TRUE** for the correct statement and **FALSE** for the wrong statement.*

Pernyataan <i>Statements</i>	BENAR/PALSI <i>TRUE/FALSE</i>
Matahari merupakan bebola gas yang membara. <i>The Sun is a ball of glowing gases.</i>	
Matahari terdiri daripada tiga jenis gas iaitu gas hidrogen, gas helium dan gas karbon dioksida. <i>The Sun is comprised of three types of gas namely hydrogen gas, helium gas and carbon dioxide gas.</i>	
Terdapat tiga lapisan dalam struktur Matahari iaitu teras, korona dan kromosfera. <i>There are three layers in the structure of the Sun namely core, corona and chromosphere.</i>	

[2 markah/ 2 marks]
 Memahami / Understand

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 2/Level 2)**

1. Apakah yang dimaksudkan dengan tompok Matahari?

What is meant by Sunspot?

- A Kawasan terang di permukaan Matahari
Bright areas on the Sun's surface
- B Kawasan angin suria yang kuat
Regions of intense solar wind
- C Aliran zarah bercas yang berterusan dari Matahari
A steady stream of charged particles from the Sun
- D Kawasan yang lebih gelap dan lebih sejuk di permukaan Matahari
Darker and cooler areas on the Sun's surface

[1 markah/ 1 mark]

Mengingat / Remember

2. a) Isikan tempat kosong dengan perkataan yang diberi.

Fill in the blank with the given words.

Zarah bercas
Charged particles

tenaga
energy

plasma
plasma

- i. Lentingan jisim korona adalah fenomena yang berbentuk awan yang besar yang terdiri daripada _____.

Coronal mass ejection was the phenomena in the form of huge cloud which consists of

- ii. Nyalaan Suria adalah pelepasan _____ secara tiba-tiba dari Matahari yang boleh mengganggu komunikasi di Bumi.

Solar Flare is a sudden release of _____ from the Sun that can disrupt communication on Earth.

[2 markah / 2 marks]

Mengingat / Remember

- b) Padankan fenomena di permukaan Matahari dengan penerangannya yang betul.

Match the phenomena on the surface of the Sun with their correct description.

Phenomena <i>Phenomena</i>
Tompok Matahari <i>Sunspots</i>

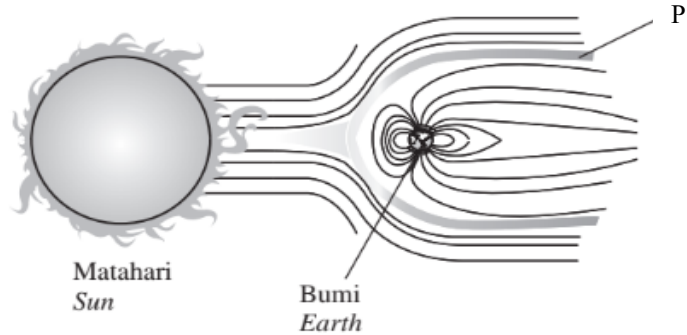
Nyalaan Suria <i>Solar flares</i>

Penerangan <i>Descriptions</i>
Berbentuk lajur terdiri daripada gas bercas dan kerap berlaku berdekatan tompok matahari. <i>Is a column of large amounts of charged gases erupting from the Sun and often occurs near sunspot.</i>
Kawasan gelap dan lebih sejuk di permukaan Matahari akibat gangguan medan magnet. <i>A dark, cooler region on the Sun's surface due to magnetic activity.</i>
Kelihatan sebagai kawasan yang lebih cerah dan berbutir <i>Looks like a brighter and granular area</i>

[2 markah / 2 marks]

Mengingat / Remember

3. Rajah menunjukkan suatu fenomena yang terjadi di sekeliling Bumi.
Diagram shows a phenomenon which occurs around the Earth.



- a) Nyatakan lapisan P.
State the layer P.

[1 markah/ 1 mark]
 Mengingat / Remember

- b) Terangkan pembentukan lapisan P.
Explain the formation of layer P.

[2 markah/ 2 marks]
 Memahami / Understand

- c) Nyatakan **dua** kepentingan lapisan P kepada Bumi.
*State **two** importances of layer P to the Earth.*

[2 markah/ 2 marks]
 Memahami / Understand

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 3/Level 3)**

1. P ialah kawasan gelap pada permukaan matahari. Suhunya lebih kurang 4000°C dan lebih rendah daripada suhu kawasan sekelilingnya. Apakah P?

P is a dark part on the surface of the sun. The temperature is about 4000°C and it is lower than the temperature of the surrounding area. What is P?

- A Granul
Granules
- B Semarak suria
Solar prominence
- C Nyalaan suria
Solar flares
- D Tompok matahari
Sunspots

[1 markah/ 1 mark]
Mengingat/Remember

2. Apakah kepentingan magnetosfera Bumi?

What is the importance of Earth's magnetosphere?

- A Melindungi bumi dari gempa bumi.
Protect the Earth from earthquake.
- B Melindungi Bumi dari sinar ultraungu.
Protect the Earth from ultraviolet ray.
- C Melindungi Bumi dari haba melampau.
Protect the Earth from extreme heat.
- D Melindungi Bumi dari zarah-zarah bercas bertenaga tinggi.
Protect the Earth from high powered particles.

[1 markah/ 1 mark]
Mengingat / Remember

3. a) Padankan fenomena berikut kepada penerangan yang sepadan.

Match the phenomena to the corresponding explanation.

Fenomena <i>Phenomena</i>	Penerangan <i>Explanations</i>
Kitaran suria <i>Solar cycle</i>	Satu perubahan bagi tempoh hampir 11 tahun pada aktiviti Matahari yang diukur dalam sebutan bilangan tompok Matahari. <i>A nearly periodic 11-years change in the Sun's activity measured in terms of number of sunspots.</i>
Lentingan jisim korona <i>Coronal mass ejection</i>	Satu pembebasan plasma dan medan magnet daripada korona. <i>A release of plasma and magnetic field from the corona.</i> Menghasilkan sinar-X dan sinar ultraungu. <i>Produce x-rays and ultraviolet rays.</i>

[2 markah/ 2 marks]
Mengingat / Remember

b) Tulis **BENAR** untuk pernyataan yang betul dan **PALSI** untuk pernyataan yang salah.

Write **TRUE** for the correct statement and **FALSE** for the wrong statement.

Pernyataan Statements	BENAR/ PALSI TRUE/ FALSE
Angin suria membawa medan magnet antara planet bersama-samanya.. <i>Solar winds carry the interplanetary magnetic field along with it.</i>	
Lentingan jisim korona adalah fenomena yang berlaku di angkasa lepas. <i>Corona mass ejection is a phenomenon occurs in space.</i>	
Matahari ialah bintang yang paling dekat dengan Bumi <i>The Sun is the nearest star to the Earth.</i>	

[2 markah/ 2 marks]

Memahami / Understand

4. Rajah menunjukkan dua fenomena yang berlaku pada permukaan matahari.

Diagram shows two phenomena which occur at the surface of the sun.



Fenomena P
Phenomena P



Fenomena Q
Phenomena Q

a) Nyatakan fenomena P dan Q.

State the phenomena P and Q.

P : _____

Q : _____

[2 markah/ 2 marks]

Mengingat / Remember

b) Nyatakan **tiga** perbezaan antara P dan Q.

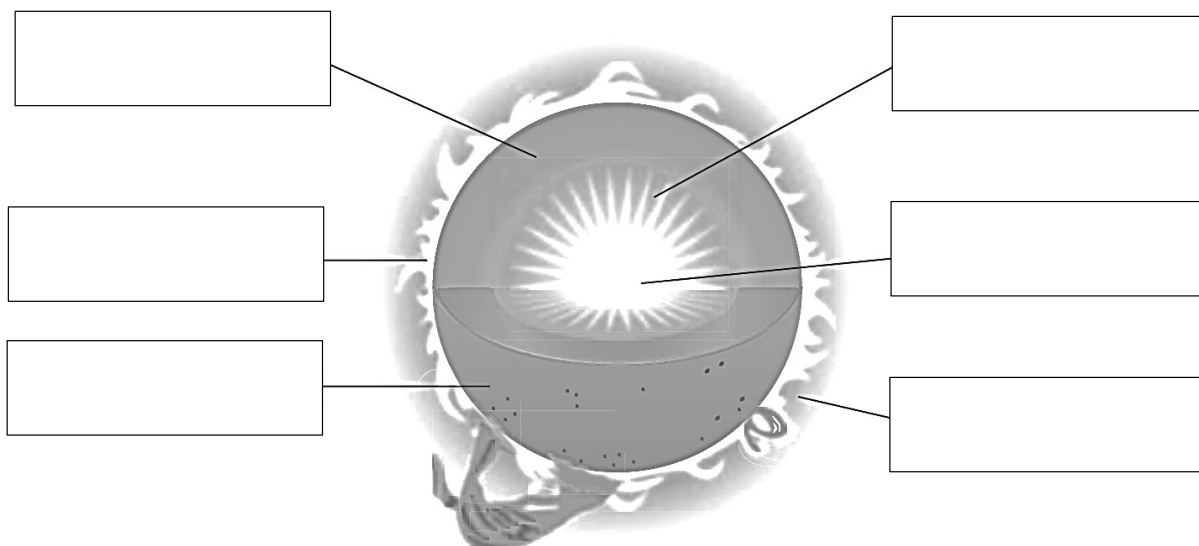
State **three** differences between P and Q.

[3 markah/ 3 marks]

Menganalisis/ Analyse

L4: Penilaian
A4: Assessment

1. Rajah menunjukkan struktur Matahari. Labelkan stuktur matahari tersebut.
Diagram shows the structure of the Sun. Label the structure of the Sun.

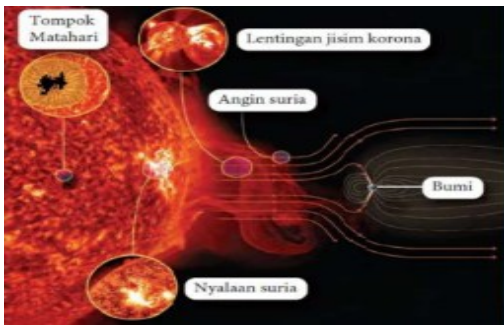


[6 markah/ 6 marks]

2. Nyatakan **empat** fenomena pada permukaan matahari.
*State **four** phenomena on the sun's surface.*

- a) _____
- b) _____
- c) _____
- d) _____

[4 markah/ 4 marks]

Sesi 22 / Session 22	
Bidang Pembelajaran <i>Learning Area</i>	9.0 Cuaca Angkasa Lepas <i>9.0 Space Weather</i>
Standard Kandungan <i>Content Standard</i>	9.2 Cuaca angkasa <i>9.2 Space weather</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menjelaskan tentang cuaca angkasa lepas dan kesannya terhadap Bumi. <i>Students can describe space weather and its effects on Earth.</i>
Fokus Pembelajaran <i>Learning Focus</i>	- Memahami cuaca angkasa <i>Understanding space weather</i> - Mengenal pasti punca cuaca angkasa <i>Identifying the causes of space weather</i> - Menganalisis kesan cuaca angkasa terhadap Bumi <i>Analysing the effects of space weather on Earth</i>
Fokus Pembelajaran <i>Learning Focus</i>	Cuaca angkasa lepas dan kesannya terhadap Bumi. <i>Space weather and its effects on Earth.</i>
L1: Nota Revisi Cepat A1: Speedy Revision Notes	
9.2 Cuaca Angkasa <i>Space weather</i> Definisi cuaca angkasa / Definition of space weather	
Definisi / Definition  Diagram Source: https://anyflip.com/xntzc/knyh, Noor Aniza Baharom - Fenomena yang berlaku di permukaan Matahari dan angkasa lepas. <i>Phenomenon that occurs on the Sun's surface and in outer space.</i> - Cuaca angkasa merujuk kepada keadaan persekitaran di magnetosfera, ionosfera dan termosfera hasil daripada aktiviti yang berlaku di permukaan Matahari (dipengaruhi oleh angin suria) <i>Space weather refers to the environmental conditions in the magnetosphere, ionosphere, and thermosphere as a result of activities occurring on the surface of the Sun (influenced by solar wind).</i>	

9.2 Cuaca Angkasa Space weather

Contoh fenomena / Example of a phenomenon

Contoh / Example

Di permukaan Matahari / On the Sun's surface	Di angkasa lepas / In the outer space
Lentingan jisim korona / <i>Coronal mass ejections</i> Nyalaan Suria / <i>Solar flares</i> Tompok Matahari / <i>Sunspots</i> Semarak suria / <i>Prominences</i>	Ribut pancaran suria / <i>Solar radiation storm</i> Ribut geomagnet / <i>Geomagnetic storm</i> Angin suria / <i>Solar wind</i>

Kesan cuaca angkasa terhadap aktiviti di Bumi / Effects of space weather on activities on Earth

Kesan / Effects	Penerangan / Descriptions
Aurora <i>Aurora</i>  Sumber: Buku Teks m/s 263, https://fliphtml5.com/dpdkh/ctfx/BA_B_9_Cuaca_Angkasa_Lepas/	- Aurora adalah cahaya berwarna warni pada waktu malam di kawasan kutub utara dan kutub selatan <i>Aurora is a colourful light display at night in the North and South Pole regions.</i> - Apabila Matahari aktif, banyak zarah-zarah bercas terbebas dan terperangkap di medan magnet Bumi <i>When the Sun is active, many charged particles are released and trapped in Earth's magnetic field.</i> - Zarah-zarah bercas dibawa oleh medan magnet Bumi ke kutub utara dan kutub selatan lalu pertembungan berlaku dan berinteraksi dengan nitrogen dan oksigen di atmosfera atas. <i>Charged particles are carried by Earth's magnetic field to the North and South Poles, where they collide and interact with nitrogen and oxygen in the upper atmosphere.</i> - Interaksi ini menghasilkan cahaya-cahaya berwarna hijau, biru, dan merah <i>This interaction produces green, blue, and red lights.</i>
Gangguan telekomunikasi <i>Telecommunication disruption</i>  Sumber: Buku Teks m/s 263, https://fliphtml5.com/dpdkh/ctfx/BA_B_9_Cuaca_Angkasa_Lepas/	- Ionosfera ialah lapisan atmosfera yang berfungsi untuk memantulkan gelombang radio dalam komunikasi. <i>The ionosphere is a layer of the atmosphere that functions to reflect radio waves in communication.</i> - Zarah-zarah bercas elektrik dari Matahari memasuki ionosfera berdekatan dengan kutub-kutub magnet Bumi dan mengionkan molekul-molekul untuk membentuk elektron dan ion-ion positif <i>Charged particles from the Sun enter the ionosphere near Earth's magnetic poles and ionize molecules to form electrons and positive ions.</i> - Penambahan jumlah elektron ini menyebabkan ionosfera menyerap gelombang radio di kawasan kutub-kutub Bumi dan menyebabkan gangguan radio <i>The increase in the number of electrons causes the ionosphere to absorb radio waves in Earth's polar regions, leading to radio interference.</i> - Zarah-zarah bercas elektrik ini juga mengganggu gelombang telefon bimbit, satelit komunikasi, dan gangguan komunikasi radio penerbangan <i>These charged particles also disrupt mobile phone signals, communication satellites, and aviation radio communications.</i>

Gangguan talian kuasa grid <i>Power grid disruptions</i>  Sumber: Buku Teks m/s 263, https://fliphtml5.com/dpdkh/ctfx/BA_B_9_Cuaca_Angkasa_Lepas/	• Ribut geomagnetik boleh menyebabkan arus elektrik yang tinggi di dalam konduktor panjang seperti talian kuasa (kabel elektrik) <i>Geomagnetic storms can generate high electric currents in long conductors such as power lines (electric cables)</i> • Arus terlalu tinggi akan meleburkan transformer menyebabkan kerosakan sistem talian kuasa dan menyebabkan gangguan bekalan elektrik <i>Excessive current can melt transformers, causing damage to the power grid system and leading to power outages.</i> • Kejadian Carrington 1859 merosakkan sistem telegraf yang dipakai pada waktu itu <i>The Carrington Event of 1859 damaged the telegraph system used at that time.</i>
L2: Teknik menjawab soalan A2: Answering Technique	
1. Fahami kehendak soalan - selalunya arahan soalan atau kehendak soalan ada pada awal soalan. <i>Understand the question needed - instruction always in the beginning of question</i> 2. Kenal pasti kata kunci/kata tugas dan gariskan <i>Identify the key word</i> 3. Markah mempengaruhi bentuk jawapan: <i>The mark given can be used how the answer written:</i> a) 1 markah: jawapannya pendek, tidak perlu huraian. <i>1 mark: the answer is short not need any explanation.</i> b) 2 markah dan lebih: 2 isi penting – 1 m menjawab persoalan utama, 1 m menghuraikan isi yang pertama, juga perlu menyatakan contoh sekiranya ada tambahan markah. <i>2 marks or more: 2 important concept - 1 mark for the main issue, another 1 mark for the explanation, also need to give an example if there is any extra mark.</i> 4. Soalan padanan perlu merujuk kepada jumlah markah yang diberi bagi mengelakkan ‘WCR’ (<i>Wrong cancel right</i>). <i>Matching question needs to refer to the amount of mark given to avoid ‘WCR’(Wrong cancel right).</i>	

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA -format items****(Tahap 1/Level 1)**

1. Apakah kesan cuaca angkasa terhadap Bumi?
What are the effects of space weather on Earth?
- A Menyebabkan hujan meteor setiap tahun
Causing annual meteor showers
- B Menghasilkan gelombang tsunami di lautan
Generating tsunami waves in the ocean
- C Meningkatkan suhu atmosfera secara mendadak
Rapidly increasing atmospheric temperature
- D Mengganggu komunikasi satelit dan sistem kuasa
Disrupting satellite communications and power systems

[1 markah/ 1 mark]
Meningat/Remember

2. a) Tulis **BENAR** untuk pernyataan yang betul dan **PALSU** untuk pernyataan yang salah.

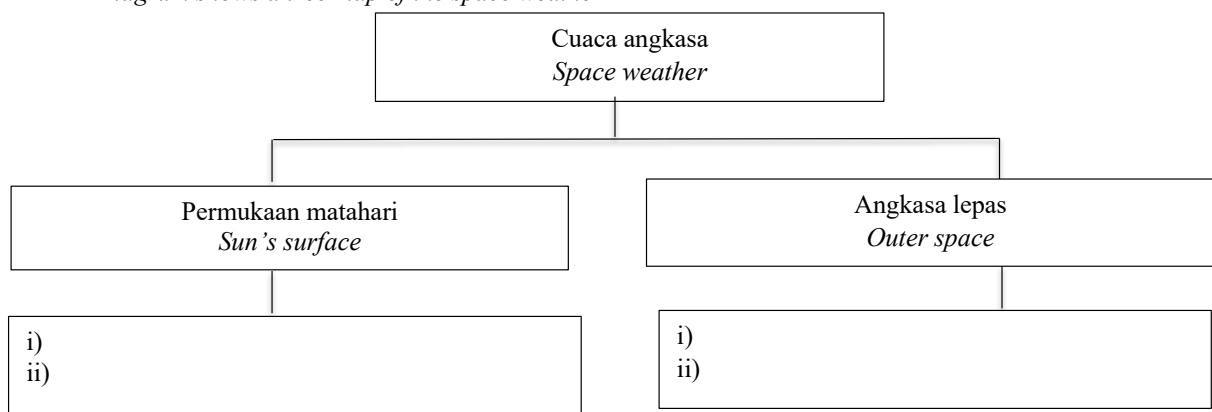
Write TRUE for the correct statement and FALSE for the wrong statement.

Pernyataan Statements		BENAR/ PALSU TRUE/ FALSE
i)	Angin suria dan nyalaan suria menyebabkan ribut geomagnet. <i>Solar winds and solar flares cause geomagnetic storm.</i>	
ii)	Letusan suria boleh menyebabkan gangguan kepada gelombang radio. <i>Solar flares can cause disruptions to radio waves.</i>	
iii)	Cuaca angkasa tidak memberi kesan kepada satelit di orbit. <i>Space weather has no effect on satellites in orbit.</i>	

[2 markah/ 2 marks]
Memahami/Understand

- b) Rajah menunjukkan peta pokok tentang cuaca angkasa.

Diagram shows a tree map of the space weather.



Kelaskan fenomena di bawah dengan betul.

Classify the phenomena below correctly.

Nyalaan suria <i>Solar flares</i>	Ribut geomagnet <i>Geomagnetic storm</i>	Ribut pancaran suria <i>Solar radiation storm</i>	Tompok matahari <i>Sunspot</i>
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[2 markah/ 2 marks]
Meningat/Remember

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA -format items****(Tahap 2/Level 2)**

1. Rajah menunjukkan satu fenomena.
Diagram shows a phenomenon



Apakah fenomena itu?
What is the phenomenon?

- A Komet
Comet
- B Aurora
Aurora
- C Semarak suria
Prominence
- D Tompok matahari
Sunspot

[1 markah/ 1 mark]
Mengingat /Remember

2. a) Padankan fenomena di bawah dengan pernyataan yang **betul**
Match the phenomena below with the **correct** statement.

Fenomena Phenomena
Angin suria Solar wind

Aurora Aurora

Pernyataan Statements
● Pelindung yang terbentuk daripada interaksi medan magnet. A shield formed from the interaction of the magnetic field. ● Jalur cahaya berwarna warni pada waktu malam di kawasan kutub utara dan kutub Selatan. Colourful light display at night in the North and South pole regions. ● Terdiri daripada zarah-zarah dalam plasma seperti elektron, proton, dan zarah alfa yang meletus dari Matahari ke angkasa lepas. Consists of plasma particles such as electrons, protons and alpha particles that erupt from the Sun into outer space.

[2 markah/ 2 marks]
Mengingat /Remember

b) Tulis **BENAR** untuk pernyataan yang betul dan **PALSI** untuk pernyataan yang salah.

Write **TRUE** for the correct statement and **FALSE** for the wrong statement.

Pernyataan Statements	BENAR/ PALSI TRUE/ FALSE
Gangguan telekomunikasi adalah disebabkan oleh bilangan zarah bercas yang berlebihan dalam atmosfera bumi. <i>Disruption of telecommunication is caused by the excessive numbers of charged particles in Earth's atmosphere.</i>	
Ribut suria menyebabkan gangguan telekomunikasi, sistem navigasi dan talian kuasa elektrik. <i>Solar storms cause disturbance to telecommunication, navigation system and electric power lines.</i>	
Magnetosfera berfungsi sebagai sekatan biologi yang melindungi hidupan di luar Sistem Suria. <i>The magnetospheres functions as a biological shield to protect life outside the Solar System</i>	

[2 markah/ 2 marks]

Memahami/Understand

3. Rajah menunjukkan kejadian Q yang berlaku di Bumi akibat fenomena di permukaan Matahari

Diagram shows occurrence Q that happens on the Earth due to phenomena on the surface of the Sun.



a) Nyatakan kejadian Q dan lokasi di mana Q kelihatan.

State an occurrence of Q and the location where Q can be seen.

[2 markah / 2 marks]

Memahami / Understand

b) Nyatakan satu fenomena yang berlaku di permukaan Matahari yang menyebabkan kejadian Q serta jelaskan bagaimana fenomena itu berlaku.

State one phenomena that occurs on the surface of the Sun that causes the occurrences of Q and explain how the phenomena occur.

[3 markah / 3 marks]

Memahami / Understand

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA -format items****(Tahap 3/Level 3)**

1. Maklumat berikut menunjukkan fenomena P yang berlaku di kutub bumi.

The following information described phenomenon P which occurs at the Earth's poles.

Fenomena ini terbentuk apabila zarah-zarah gas bercas berinteraksi dengan atom dan molekul dalam atmosfera bumi.

This phenomenon is formed when the charged gas particles interact with the atoms and molecules in Earth's atmosphere.

Apakah fenomena P?

What is phenomenon P?

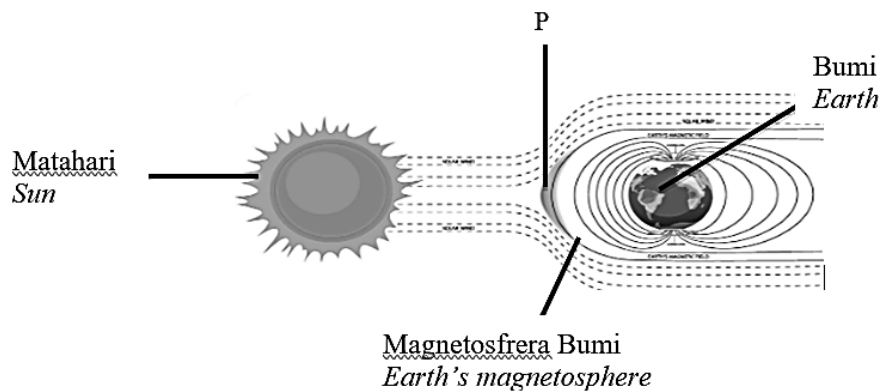
- A Aurora
Aurora
- B Angin suria
Solar wind
- C Semarak suria
Prominence
- D Tompok matahari
Sunspot

[1 markah/ 1 mark]

Memahami/Understand

2. Rajah menunjukkan fenomena cuaca angkasa lepas

Diagram shows phenomena of space weather.



- a) Nyatakan maksud cuaca angkasa lepas.

State the meaning of space weather.

[1 markah/ 1 mark]

Mengingat/Remember

- b) Berdasarkan rajah di atas, nyatakan fenomena P yang berlaku.

Based on the diagram above, state the phenomena P that occurred.

[1 markah/ 1 mark]
Mengingat/ Remember

- c) Nyatakan tiga kesan fenomena P ke atas sistem komunikasi.

State three effects of phenomena P toward communication system.

[3 markah/ 3 marks]
Memahami/Understand

- d) Terangkan peranan fenomena P dalam pembentukan aurora.

Explain the role of phenomenon P in the formation of aurora.

[2 markah/ 2 marks]
Memahami /Understand

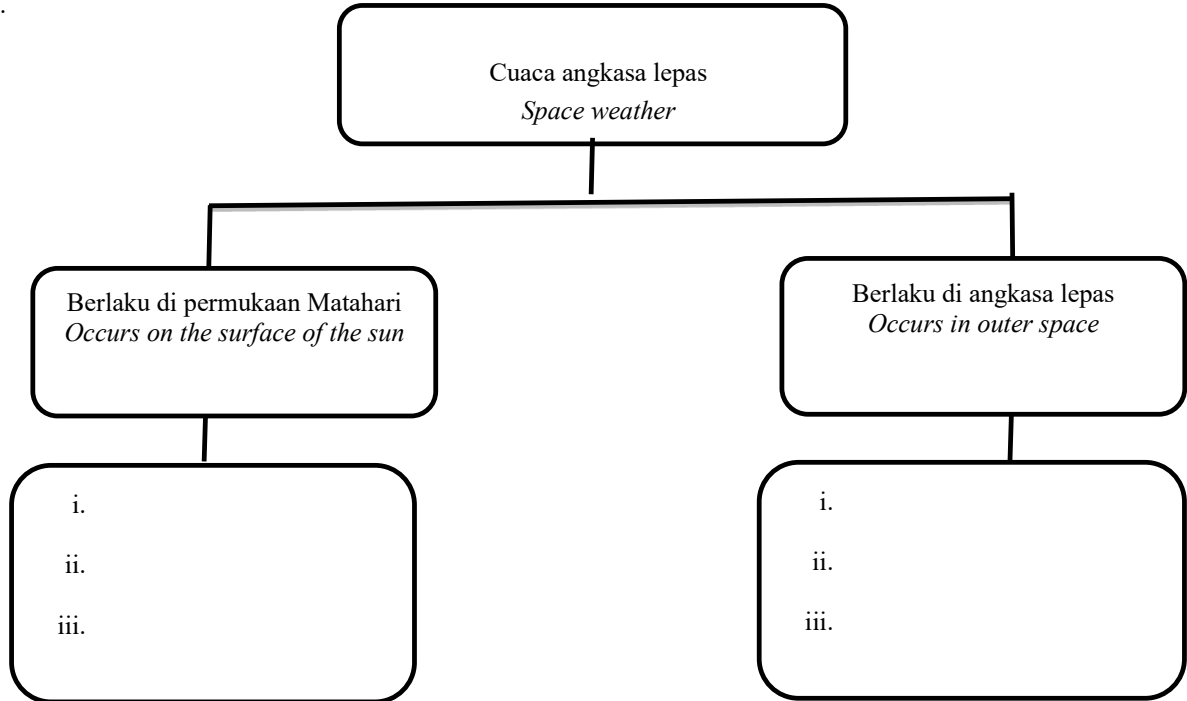
- e) Wajarkan mengapa aurora tidak terbentuk berdekatan dengan Khatulistiwa.

Justify why aurora is not formed near the equator.

[1 markah/ 1 mark]
Menilai/Evaluate

L4: Penilaian
A4: Assessment

1.



[6 markah/ 6 marks]

2. Nyatakan **empat** kesan cuaca angkasa terhadap aktiviti di Bumi.

*State **four** effects of space weather on activities on Earth*

- i. _____
- ii. _____
- iii. _____
- iv. _____

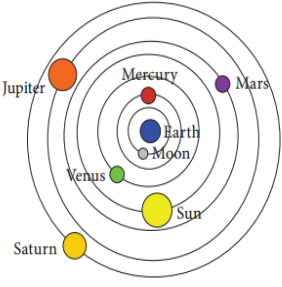
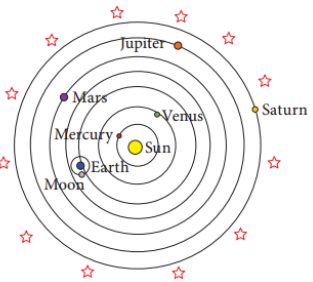
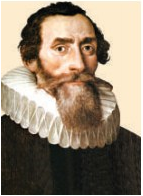
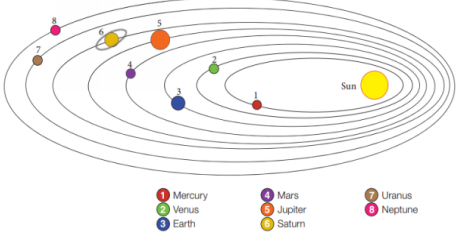
[4 markah/ 4 marks]

Sesi 23 / Session 23	
Bidang Pembelajaran <i>Learning Area</i>	10.0 Penerokaan Angkasa Lepas <i>10.0 Space Exploration</i>
Standard Kandungan <i>Content Standard</i>	10.1 Perkembangan dalam Astronomi <i>10.1 Development in Astronomy</i>
Objektif Pembelajaran <i>Learning Objective</i>	Murid dapat menyelesaikan tugas yang berkaitan dengan perkembangan sejarah model Sistem Suria <i>Students will be able to accomplish the tasks regarding the historical development of the Solar System model</i>
Fokus Pembelajaran <i>Learning Focus</i>	Perkembangan sejarah model Sistem Suria: Ptolemy, Copernicus, Kepler <i>Development of the History of Solar System Model: Ptolemy, Copernicus and Kepler</i>

L1: Nota Revisi Cepat

A1: Speedy Revision Notes



Claudius Ptolemy  Model Geosentrik <i>Geocentric model</i> 	Nicolaus Copernicus  Model Heliosentrik <i>Heliocentric model</i> 	Johannes Kepler  Model Heliosentrik <i>Heliocentric model</i>  Sumber : Bahan Powerpoint Ilmu bakti
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L2: Teknik menjawab soalan.

A2: Answering Technique.

Fahami kata kunci dalam soalan.

Understand the keywords in the question.

1. **Nyatakan** → Berikan jawapan betul tanpa huraian.
State → Give a correct answer without elaboration.

Nyatakan satu ciri model Heliosentrik.
State one characteristic of Heliocentric model.

- **Matahari merupakan pusat alam semesta**
- **The sun is the centre of the universe**

} Tanpa huraian
without elaboration

2. **Terangkan** → Berikan penerangan tentang konsep atau fenomena.
Explain → Give an explanation of a concept or phenomenon.

Terang satu ciri model Heliosentrik.
Explain one characteristic of Heliocentric model.

Fakta: Matahari merupakan pusat alam semesta

Penerangan: Bumi, bulan dan planet lain mengelilinginya

Fact: The sun is the centre of the universe

Explanation: The earth, the moon and other planet are orbiting the sun

} Perlu huraian
need elaboration

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 1/Level 1)**

1. Antara berikut, ahli astronomi yang manakah menyatakan Matahari ialah pusat bagi alam semesta?

Which of the following astronomer stated that the Sun is the centre of the universe?

- A Kepler
- B Ptolemy
- C Aristotle
- D Claudius

[1 markah/ 1 mark]
Mengingat/Remember

2. Apakah bentuk orbit dalam sistem suria model Kepler?

What is the shape of the orbits in the Kepler's model of the solar system?

- A Lurus
Straight
- B Bulatan
Circular
- C Bentuk elips
Elliptical
- D Berbentuk parabola
Parabolic

[1 markah/ 1 mark]
Mengingat/Remember

3. a) Padankan ahli astronomi kepada model sistem suria yang betul.

Match the astronomers to the correct solar system model.

Ahli Astronomi
Astronomers

Model Sistem Suria
Solar System Model

Ptolemy

Model Geosentrik
Geocentric model

Copernicus

Model Heliosentrik
Heliocentric model

Model Kepler
Kepler model

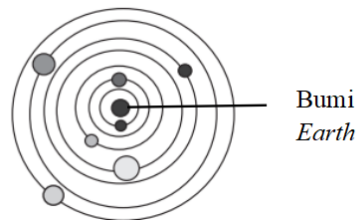
[2 markah/ 2 marks]
Mengingat/Remember

- b) Gariskan jawapan yang **betul** tentang model Sistem Suria yang dibina oleh Copernicus.
*Underline the **correct** answers about the Solar System model built by Copernicus.*

- (i) Bumi mengorbit mengikuti suatu laluan berbentuk (bulatan / elips).
The Earth orbits the Sun in (a circular / an elliptical) path.
- (ii) (Matahari / Bumi) sebagai pusat Sistem Suria.
The (Sun / Earth) as the centre of the Solar System

[2 markah/ 2 marks]
 Mengingat/Remember

4. Rajah menunjukkan model Geosentrik yang dibina oleh Ptolemy.
Diagram shows Geocentric model built by Ptolemy.



- a) Nyatakan maksud “Geo” dan “sentrik”?
State the meaning of “Geo” and “centric”?

Geo : _____
 Geo : _____
 sentrik : _____
 centric : _____

[2 markah/ 2 marks]
 Mengingat/Remember

- b) Nyatakan satu ciri bagi model Geosentrik.
State one characteristic of Geocentric model.

[1 markah/ 1 mark]
 Mengingat/Remember

- c) Terangkan satu ciri bagi model Geosentrik.
Explain one characteristic of Geocentric model.

[2 markah/ 2 marks]
 Mengingat/Remember

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 2/Level 2)**

1. Apakah sumbangan Kepler kepada bidang astronomi?

What is Kepler's contribution to the field of astronomy?

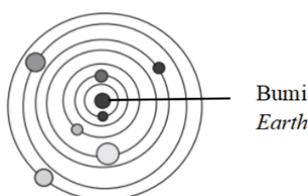
- A Mencadangkan hukum-hukum asas dalam daya, gerakan dan graviti.
To propose basic laws in force, motion and gravity.
- B Mengubahsuai teori Heliosentrik dengan Matahari pada titik fokus
Modifying the Heliocentric theory with the Sun as the focal point
- C Membina teori Heliosentrik dengan Matahari berada di tengah planet-planet
Build a Heliocentric theory with the Sun is at the center of the planets
- D Membina model Geosentrik dengan Bumi sebagai pusat pada planet-planet
Build a Geocentric model with Earth as the centre of the planets

[1 markah/ 1 mark]

Mengingat/Remember

2. Rajah menunjukkan model sistem suria.

Diagram shows a solar system model.



Antara berikut, yang manakah **BETUL** mengenai model tersebut?

*Which of the following is **CORRECT** about the model?*

- A Matahari adalah pusat sistem suria
The sun is the center of the solar system.
- B Bumi berputar pada paksinya sendiri
The Earth rotates on its own axis.
- C Bumi berputar mengelilingi bulan
The earth revolves around the moon
- D Matahari dan planet yang lain mengorbit mengelilingi bumi.
The sun and other planets orbit around the earth.

[1 markah/ 1 mark]

Memahami/Understand

3. (a) Tandakan (✓) pada pernyataan yang **betul** tentang model Heliosentrik.

*Tick (✓) the **correct** statements about the Heliocentric model.*

i. Bumi berada pada pusat Sistem Suria. <i>The Earth is at the centre of the Solar System.</i>	
ii. Matahari berada pada pusat Sistem Suria. <i>The sun is at the centre of the Solar system.</i>	
iii. Semua planet termasuk Bumi beredar mengelilingi Matahari. <i>All planets including the earth revolve around the Sun.</i>	

[2 markah/ 2 marks]

Mengingat/Remember

(b) Isikan tempat kosong dengan ahli astronomi yang memperkenalkan teori berikut.

Fill in the blanks with the correct astronomers that introduced the following theories.

Johannes Kepler

Nicolaus Copernicus

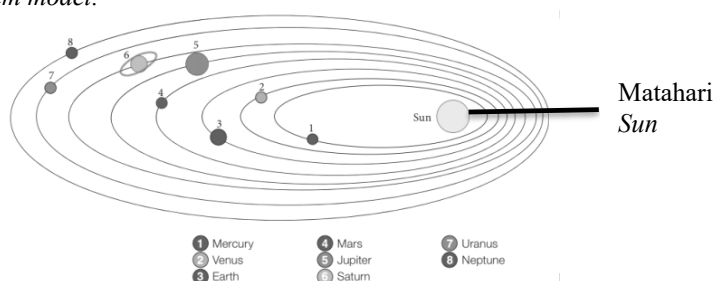
Claudius Ptolemy

i. Mengemukakan model yang menolak model Ptolemy <i>Proposed a model that rejects Ptolemy's model</i>	
ii. Menyatakan orbit planet adalah berbentuk elips <i>Stated the orbit of the planet is elliptical</i>	

[2 markah/ 2 marks]
Mengingat/Remember

4. Rajah menunjukkan satu model sistem solar.

Diagram shows a solar system model.



(a) Nyatakan ahli astronomi yang memperkenalkan model sistem solar tersebut.

State the astronomer that introduced the above solar system model.

[1 markah/ 1 mark]
Mengingat/Remember

(b) Jelaskan model sistem suria tersebut.

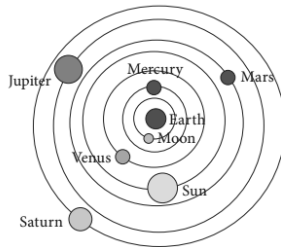
Explain the solar system model.

[2 markah/ 2 marks]
Memahami/Understand

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 3/Level 3)**

1. Antara berikut, ahli astronomi yang manakah membina model sistem suria di bawah?

Which of the following astronomer built the solar system model below?



- A Claudius Ptolemy
- B Nicolaus Copernicus
- C Johannes Kepler
- D Galileo Galilei

[1 markah/ 1 mark]
Memahami/Understand

2. Antara berikut, pernyataan yang manakah **BETUL** tentang sistem solar yang dibina oleh Copernicus and Kepler?

*Which of the following statements is **CORRECT** about the solar system built by Copernicus and Kepler?*

- A Kedua-dua model menekankan bahawa planet berputar mengelilingi bulan dan bukannya Bumi.
Both models emphasized that planets revolve around the moon rather than the Earth.
- B Kedua-dua model menekankan bahawa planet berputar mengelilingi bumi dan bukannya matahari.
Both models emphasized that planets revolve around the earth rather than the sun.
- C Kedua-dua Copernicus dan Kepler menyokong idea bahawa Matahari berada di tengah-tengah sistem suria.
Both Copernicus and Kepler supported the idea that the Sun is at the center of the solar system.
- D Kedua-dua Copernicus dan Kepler menyokong idea bahawa Bumi berada di tengah-tengah sistem suria.
Both Copernicus and Kepler supported the idea that the Earth is at the centre of the solar system.

[1 markah/ 1 mark]
Memahami/Understand

3. Isikan tempat kosong dengan jawapan betul.

Fill in the blanks with correct answers.

Bumi
Earth

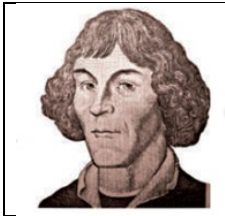
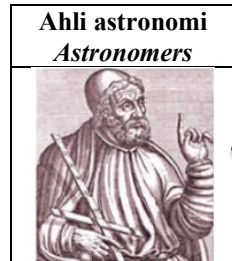
Matahari
Sun

Claudius Ptolemy
Claudius Ptolemy

- (a) _____ membina model Geosentrik. _____ berada di pusat bagi alam semesta.
_____ built the Geocentric model. The _____ is at the centre of the universe.

[2 markah/ 2 marks]
Mengingat/Remember

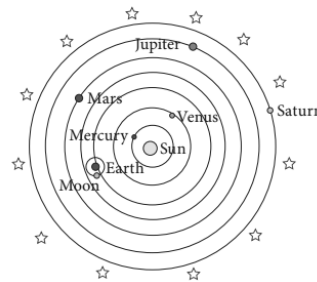
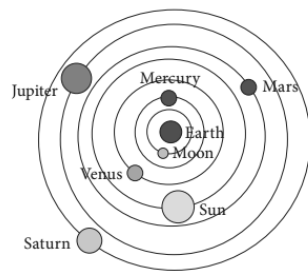
- (b) Padankan ahli astronomi berikut kepada sumbangan mereka dalam astronomi.
Match the following astronomers to their contributions in astronomy.



Sumbangan <i>Contributions</i>
Menyatakan semua planet bergerak mengelilingi Matahari dalam orbit berbentuk elips. <i>Stated that all planets move around the Sun in ellipse-shaped orbits</i>
Membina model Heliosentrik bagi sistem suria dengan orbit membulat matahari di pusat. <i>Built a Heliocentric solar system with circular orbits. The Sun is at the centre</i>
Mencadangkan model Geosentrik bagi sistem suria dengan keadaan Bumi di pusat. <i>Proposed the Geocentric model of solar system where the Earth is in the centre</i>

[2 markah/ 2 marks]
 Memahami/*Understand*

4. Rajah menunjukkan dua model sistem suria.
Diagram shows two solar system models.



Banding bezakan kedua-dua sistem suria tersebut.
Compare and contrast both of the solar systems.

Persamaan: _____

Similarity: _____

Perbezaan: _____

Difference: _____

[2 markah/ 2 marks]
 Menganalisis/*Analyse*

L4: Penilaian**A4: Assessment**

Lengkapkan pernyataan di bawah tentang sejarah model Sistem Suria.

Complete the statements below about the history of Solar System model.

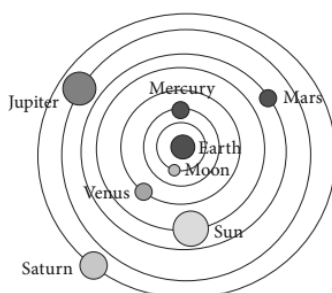
Model Geosentrik
Geocentric model

- (a) Diperkenalkan oleh _____ yang merupakan ahli astronomi, astrologi dan geografi Yunani.

Is introduced by _____ who is a Greek astronomer, astrologist and geographer.

- (b) _____ terletak pada pusat _____ dengan orbit yang membulat.

The _____ is at the centre of the _____ with circular orbits.



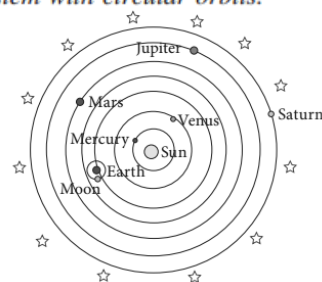
Model Heliosentrik
Heliocentric model

- (c) Diperkenalkan oleh _____ yang merupakan ahli astronomi, matematik, ekonomi dan doktor Poland.

Is introduced by _____ who is a Polish astronomer, mathematician, economist and doctor.

- (d) _____ berada pada pusat Sistem Suria dengan orbit yang membulat.

The _____ is at the centre of the Solar System with circular orbits.



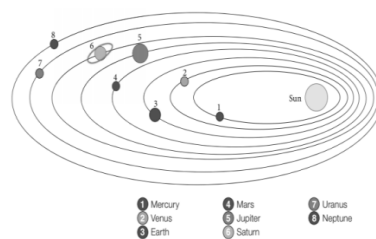
Model Heliosentrik yang dikemaskinikan dengan Hukum Kepler
Modified Heliocentric model according to Kepler's Law

- (e) Diperkenalkan oleh _____ yang merupakan ahli astronomi, matematik dan astrologi Jerman.

Is introduced by _____ who is a German astronomer, mathematician and astrologist.

- (f) Model ini diubah suai daripada model _____ di mana _____ terletak pada pusat Sistem Suria pada _____ dan orbit berbentuk _____.

This model is modified from the _____ model where the _____ is at _____ and the orbits are _____.



[10 markah/ 10 marks]

Sumber: Modul Aktiviti Sasbadi

Sesi 24 / Session 24	
Bidang Pembelajaran <i>Learning Area</i>	10.0 Penerokaan Angkasa Lepas <i>10.0 Space Exploration</i>
Standard Kandungan <i>Content Standard</i>	10.2 Perkembangan teknologi dan aplikasinya dalam penerokaan angkasa lepas <i>10.2 Development of technology and its application in space exploration</i>
Objektif Pembelajaran <i>Learning Objective</i>	1. Murid dapat menyelesaikan tugas yang berkaitan dengan kepentingan pembangunan teknologi dan aplikasinya dalam penerokaan angkasa lepas. <i>Students will be able to accomplish the tasks regarding the importance of the development of technology and its application in space exploration.</i> 2. Murid dapat memberi wajaran tentang keperluan meneruskan penerokaan angkasa lepas. <i>Students can give reasons for the need to continue space exploration.</i>
Fokus Pembelajaran <i>Learning Focus</i>	1. Pembangunan teknologi dan aplikasinya dalam penerokaan angkasa lepas. <i>Development of technology and its application in space exploration.</i> 2. Teknologi penderiaan jauh yang digunakan dalam pertanian, geologi, pengurusan bencana, pertahanan dan lain-lain. <i>Remote sensing technology used in agriculture, geology, disaster management, defence and etc.</i>

L1: Nota Revisi Cepat**A1: Speedy Revision Notes**

10.2 Perkembangan dan Teknologi dalam Penerokaan Angkasa Lepas *Development of Technology and their Application in Space Exploration*

Perkembangan Teknologi dalam Penerokaan Angkasa Lepas / *Development of Technology in Space Exploration*

Teleskop/Telescope

Alat yang merekodkan imej objek-objek di angkasa lepas.
A device that records images of objects in outer space.

Roket/Rocket

Untuk melancarkan satelit buatan dan kapal angkasa ke angkasa lepas.
To launch man-made satellites and spaceships to space.

Kapal angkasa lepas/Spaceship

Kapal angkasa yang membawa angkasawan ke angkasa lepas.
A spacecraft that carries astronauts to space.

Stesen angkasa lepas/Space station

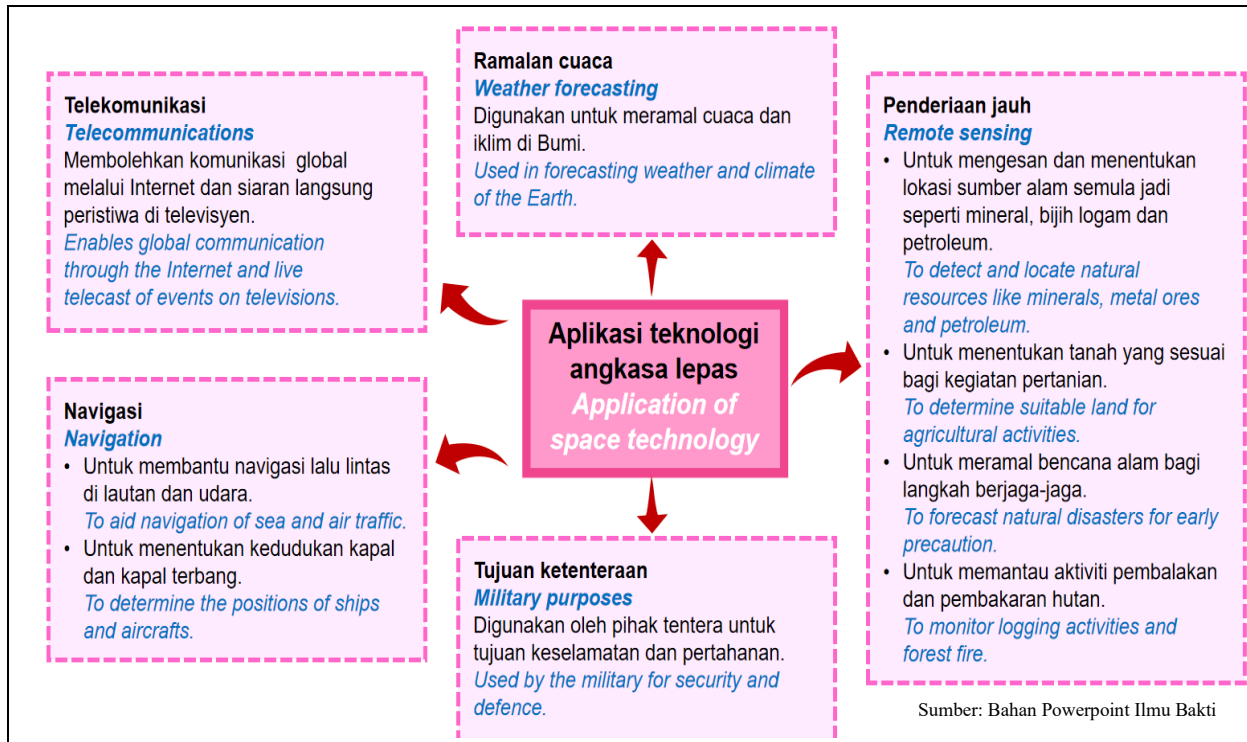
Tempat di mana angkasawan menjalankan penyelidikan saintifik di angkasa lepas.
A place where astronauts carry out scientific research in space.

Prob angkasa lepas/Space probe

Kapal angkasa tanpa manusia yang mengumpul maklumat tentang Bulan dan planet-planet lain.
A spacecraft without humans that collects information about the Moon and other planets.

Satelit/Satellite

Objek yang diletakkan di orbit untuk mengumpul maklumat tentang angkasa lepas atau untuk tujuan komunikasi dan ramalan cuaca.
An object that is placed in orbit to collect information about outer space or for communication and weather forecast purposes.



L2: Teknik Menjawab Soalan

A2: Answering Technique

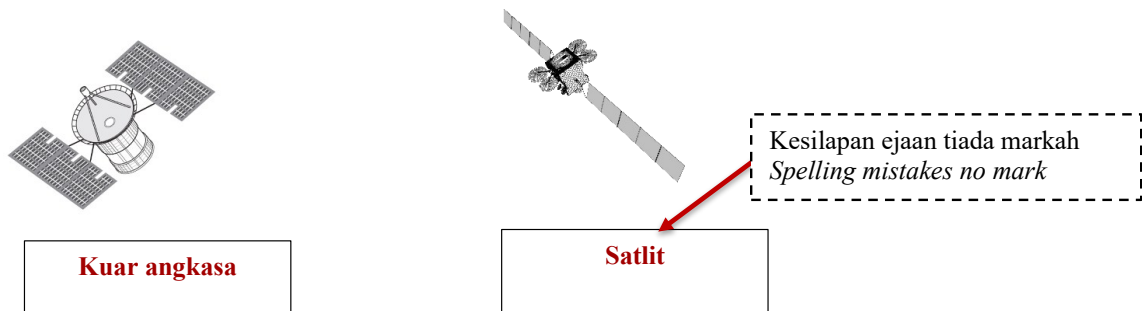
Elakkan membuat kesilapan ejaan semasa menjawab soalan yang pilihan jawapannya telah diberi.
Avoid making spelling mistakes when answering questions for which choices of answers have been given.

Contoh:

Example:

Rajah menunjukkan teknologi dalam penerokaan angkasa lepas.

Diagram shows the technology in space exploration.



Labelkan rajah dengan perkataan yang diberi.

Label the diagram with the words given.

Kuar angkasa <i>Space probe</i>	Satelit <i>Satellite</i>	Penderiaan jauh <i>Remote sensing</i>
------------------------------------	-----------------------------	--

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items: UASA-format items****(Tahap 1/Level 1)**

1. Antara berikut, yang manakah digunakan untuk mengumpul data dari planet lain?

Which of the following is used to collect data from another planet?

- A Prob
Probe
- B Roket
Rocket
- C Satelit
Satellite
- D Teleskop angkasa
Space telescope

[1 markah/ 1 mark]
Mengingat/Remember

2. Antara berikut, ahli astronomi yang manakah pertama sekali menggunakan teleskop?

Which of the following was the first astronomer using a telescope?

- A Yuri Gagarin
- B Galileo Galilei
- C Isaac Newton
- D Neil Armstrong

[1 markah/ 1 mark]
Mengingat/Remember

3. Antara berikut, yang manakah merupakan fungsi bagi teleskop radio?

Which of the following is a function of radio telescope?

- A Mengukur altitud bintang
Measuring the stars attitude
- B Melihat bintang dengan lebih jelas
Observe the star more clearly
- C Mengesan aktiviti angkasa lepas yang jauh
Detect remote space activities
- D Mengesan gelombang radio dari angkasa lepas
Detect radio waves from outer space

[1 markah/ 1 mark]
Mengingat/Remember

4. a) Penemuan dalam astronomi menyumbang kepada penerokaan angkasa lepas. Tandakan (✓) pada pernyataan yang betul.

Discovery in astronomy contributed to space exploration. Mark (✓) for the correct statements.

(i) Penerokaan angkasa lepas pada peringkat awal dijalankan di Bumi dengan menggunakan teleskop. <i>The initial space exploration was carried out from Earth by using telescope.</i>	
(ii) Galileo Galilei adalah orang pertama yang memerhatikan objek-objek di angkasa lepas menggunakan teleskop. <i>Galileo Galilei was the first man to observe objects in outer space using telescope.</i>	
(iii) Teleskop angkasa Spitzer digunakan untuk melancarkan roket ke angkasa. <i>The Spitzer space telescope is used to launch rockets into space.</i>	

[2 markah/ 2 marks]
Memahami/Understand

- (b) Padankan bidang dengan pernyataan yang betul.
Match the field with the correct statement.

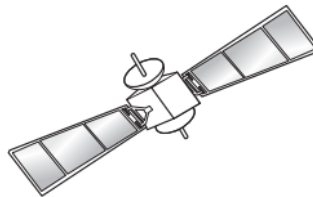
Bidang <i>Field</i>
Pertanian <i>Agriculture</i>

Geologi <i>Geology</i>

Pernyataan <i>Statements</i>
• Untuk mengesan lokasi sumber mineral, susutan jisim dan susutan darat. <i>To detect locations of mineral sources, mass depletion and land depletion.</i> • Untuk mengenalpasti pencemaran dan pembakaran hutan. <i>To identify the pollution and the forest fires</i> • Untuk mengesan kawasan pembangunan pertanian. <i>To detect suitable regions for agricultural development</i>

[2 markah/ 2 marks]
 Memahami/Understand

5. Rajah menunjukkan alat penderiaan jauh dalam penerokaan angkasa lepas.
Diagram shows a remote sensing device uses in spaces exploration.



- (a) Nyatakan satu satelit yang pernah dilancarkan oleh Malaysia untuk penderiaan jauh.
State one satellite which are launched by Malaysia for remote sensing.

[1 markah/ 1 mark]
 Mengingat/Remember

- (b) Nyatakan fungsi alat penderiaan jauh.
State the function of a remote sensing device.

[1 markah/ 1 mark]
 Memahami/Understand

- (c) Nyatakan kepentingan alat penderiaan jauh tersebut dalam bidang pertahanan negara.
State the importance of remote sensing device in national defence.

[1 markah/ 1 mark]
 Memahami/Understand

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items : UASA-format items****(Tahap 2/Level 2)**

1. Antara berikut, yang manakah boleh bergerak jauh di dalam dan di luar Sistem Suria?

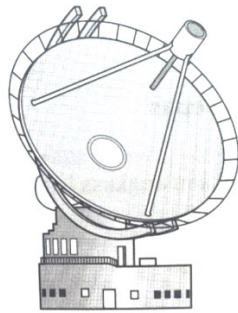
Which of the following can travel further into and out of the Solar System?

- A Roket
 Rocket
- B Satelit
 Satellite
- C Kuar angkasa
 Space probe
- D Kapal angkasa ulang- alik
 Space shuttle

[1 markah/ 1 mark]
Meningat/Remember

2. Rajah menunjukkan sejenis aplikasi teknologi dalam penerokaan angkasa.

Diagram shows a type of application technology in space exploration.



Apakah fungsi teleskop ini?

What is the function of this telescope?

- A Mengesakan gelombang radio dari angkasa lepas
 Detects radio waves from space
- B Mengesakan objek angkasa seperti asteroid yang bergerak ke arah bumi
 Detects space objects such as asteroids moving towards the Earth
- C Mengesakan isyarat berkaitan cuaca dari satelit kaji cuaca yang sedang mengorbit Bumi
 Detects signals related to weather from meteorological satellites that are orbiting the Earth
- D Mengesakan fenomena yang berlaku di angkasa lepas seperti gerhana bulan dan gerhana matahari
 Detects phenomena that occur in outer space such as lunar and solar eclipses

[1 markah/ 1 mark]
Memahami/Understand

- 3 (a) Padankan setiap fungsi dengan aplikasi teknologi dalam penerokaan angkasa lepas.
Match each function to its application of technology in space exploration.

Fungsi <i>Functions</i>	Aplikasi teknologi <i>Application of technology</i>
Membawa angkasawan mengkaji hal-hal berkaitan telekomunikasi, cuaca dan pemantauan Bumi. <i>Brings astronauts to study matters related to telecommunications, weather and Earth monitoring.</i>	Roket <i>Rocket</i>
Kenderaan berkuasa tinggi untuk melancarkan objek ke angkasa lepas. <i>High-powered vehicle to launch objects into outer space</i>	Kapal angkasa <i>Spacecraft</i>
	Satelit <i>Satellite</i>

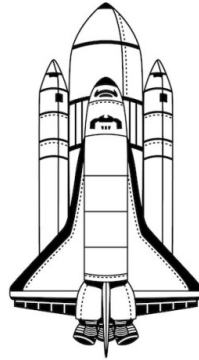
[2 markah/ 2 marks]
 Memahami/Understand

- (b) Berikut merupakan teknologi digunakan dalam astronomi. Isikan tempat kosong dengan jawapan betul.
The following are technology used in astronomy. Fill in the blanks with correct answers.

Jauh <i>distant</i>	gelombang <i>waves</i>	frekuensi <i>frequency</i>
	Fungsi: <i>Function:</i> Untuk memerhatikan objek-objek _____ di angkasa. <i>To observe _____ objects in space.</i>	
	Fungsi: <i>Function</i> Untuk mengesan _____ yang dipancarkan dari objek-objek di angkasa . <i>To detect _____ emitted from objects in space.</i>	

[2 markah/ 2 marks]
 Mengingat /Remember

4. Rajah menunjukkan sejenis kapal angkasa.
Diagram shows a type of spacecraft.



- (a) Nyatakan jenis kapal angkasa di atas.
State the type of spacecraft above.

[1 markah/ 1 mark]
 Mengingat/Remember

- (b) Nyatakan **dua** kepentingan kapal angkasa di 4(a).
*State **two** importance of spacecraft in 4 (a) .*

[2 markah/ 2 marks]
 Memahami/Understand

- (c) Banding bezakan kapal angkasa di 4(a) dengan roket.
Compare and contrast the spacecraft at 4(a) and rocket.

Persamaan: _____

Similarity: _____

Perbezaan: _____

Difference: _____

[2 markah/ 2 marks]
 Menganalisis/Analyse

L3: Soalan Perbincangan: Soalan berformat UASA**A3: Discussion items : UASA-format items****(Tahap 3/Level 3)**

1. Rajah menunjukkan alat pertama dicipta untuk mencerap objek di angkasa lepas.
Diagram shows the first device invented to observe objects in outer space.



Apakah nama alat itu dan siapakah yang menciptanya?
What is the name of the device and who created it?

	Alat Device	Pencipta Inventor
A	Teleskop <i>Telescope</i>	Edmund Halley
B	Satelit mikro <i>Micro satellite</i>	William Herschel
C	Jam angkasa <i>Space clock</i>	Hans Lippershey
D	Teropong bintang <i>Star binoculars</i>	Galileo Galilei

[1 markah/ 1 mark]
 Mengingat/Remember

2. Antara berikut, yang manakah ialah kegunaan satelit?
Which of the followings are the uses of satellite?

- I Untuk mengawal populasi dunia
To control the world population
- II Untuk meningkatkan sistem pertahanan negara
To improve the country's defence system
- III Untuk mengelakkan kejadian bencana alam
To avoid the occurrence of natural disaster
- IV Untuk mengawasi perubahan cuaca di Bumi
To monitor the weather changes on the Earth

- A I dan II
I and II
- B III dan IV
II and III
- C II dan III
II and III
- D I dan IV
I and IV

[1 markah/ 1 mark]
 Memahami/Understand

- 3.(a) Tandakan (✓) pada pernyataan yang benar tentang kuar angkasa.
Mark (✓) the correct statement about the space probe.

Meneroka dan mengkaji angkasa lepas <i>Explores and studies outer space</i>	
Mempunyai pemandu dan penumpang <i>Has a pilot and passengers</i>	
Bergerak dengan kawalan robot <i>Moves controlled by robot</i>	

[2 markah/ 2 marks]
 Memahami/Understand

- (b) Isikan tempat kosong dengan perkataan yang diberikan.
Fill in the blank with the words given.

Bumi	Zuhrah	Zuhal
<i>Earth</i>	<i>Venus</i>	<i>Saturn</i>

- (i) Kuar angkasa mengumpul maklumat dan menghantarnya kembali ke _____.
Space probe gathers information and sends it back to _____.
- (ii) Kuar angkasa Cassini masih aktif mengorbit mengelilingi _____ pada tahun 2017.
Space probe Cassini was still active orbiting _____ in the year 2017.

[2 markah/ 2 marks]
 Mengingat/Remember

4. Baca pernyataan di bawah.
Read the following statement.

Pada tahun 1969, Amerika Syarikat telah melancarkan kapal angkasa ke angkasa lepas dan berjaya mendarat di Bulan.
In 1969, the United States launched a spacecraft into outer space and successfully landed on the moon.

- (a) Namakan kapal angkasa tersebut.
Name the spacecraft.

[1 markah/ 1 mark]
 Mengingat/Remember

- (b) Berdasarkan maklumat di atas, nyatakan angkasawan pertama yang berjalan di permukaan bulan.
Based on the information above, state the first astronaut who walk on the surface of the moon.

[1 markah/ 1 mark]
 Mengingat/Remember

- (c) Angkasawan kelihatan seolah-olah terapung di permukaan bulan. Terangkan.
The astronaut appears to float on the surface of the moon. Explain.

[1 markah/ 1 mark]
Memahami/*Understand*

- (d) Bulan tidak sesuai dijadikan tempat tinggal hidupan. Terangkan.
Moon is not a suitable place for living things. Explain.

[2 markah/ 2 marks]
Mengaplikasi/*Apply*

L4: Penilaian
A4: Assessment

Lengkapkan jadual di bawah tentang peristiwa-peristiwa yang berlaku dalam penerokaan angkasa lepas.

Complete the table below about the events that occur in space exploration.

	Tahun Year	Negara terlibat Country involved	Penerangan Description
(a)	Abad ke-11 11 th century		- Penciptaan serbuk letupan <i>Invention of gunpowder</i> - Penggunaan roket primitif dalam pertempuran <i>Use of primitive rocket in battles</i>
(b)		Itali <i>Italy</i>	Teleskop pertama yang digunakan dalam bidang astronomi oleh Galileo Galilei. <i>First telescope used in the field of astronomy by Galileo Galilei.</i>
(c)	1957	Kesatuan Soviet <i>Soviet Union</i>	
(d)		Kesatuan Soviet <i>Soviet Union</i>	Yuri Gagarin adalah manusia pertama dihantar ke orbit dalam USSR Vostok 1. <i>Yuri Gagarin was the first human sent to orbit in the USSR Vostok 1.</i>
(e)		Amerika Syarikat <i>United States of America</i>	Neil Armstrong, manusia pertama menjejakkan kaki di Bulan. <i>Neil Armstrong, the first human to set foot on the Moon.</i>
(f)	1990		Teleskop Angkasa Hubble dilancarkan dari kapal angkasa ulang-alik Discovery. <i>Hubble Space Telescope was launched from Discovery space shuttle.</i>
(g)	1996		Satelit MEASAT-1 dan MEASAT-2 dilancarkan. <i>MEASAT-1 and MEASAT-2 satellites were launched.</i>
(h)	2000	Malaysia <i>Malaysia</i>	
(i)		Malaysia <i>Malaysia</i>	Agensi Angkasa Negara (ANGKASA) ditubuhkan. <i>National Space Agency (ANGKASA) was established.</i>
(j)		Pelbagai negara <i>Multiple countries</i>	Stesen Angkasa Antarabangsa (ISS) siap dibina. <i>The International Space Station (ISS) was completed.</i>

Sumber: Modul Aktiviti Sasbadi

[10 markah/ 10 marks]