SULIT
4531/1
Fizik
Kertas 1
September
2025

$1\frac{1}{4}$ jam

# MAKTAB RENDAH SAINS MARA

## PEPERIKSAAN AKHIR SIJIL PENDIDIKAN MRSM 2025

## FIZIK

**Kertas 1**

Satu jam lima belas minit

**JANGAN BUKA KERTAS PEPERIKSAAN INI SEHINGGA DIBERITAHU**

1. Kertas peperiksaan ini adalah dalam dwibahasa.
   *This paper is written in bahasa Melayu and English.*

2. Soalan di atas adalah dalam bahasa Melayu dan soalan dalam bahasa Inggeris terdapat di bawahnya.
   *The question in bahasa Melayu is written on top while the English version is below.*

3. Calon dikehendaki membaca maklumat di halaman belakang kertas peperiksaan ini.
   *Candidates are required to read the information at the back of the booklet.*



Kertas peperiksaan ini mengandungi 38 halaman bercetak.



 

Rumus – rumus berikut boleh membantu anda menjawab soalan. Simbol – simbol yang diberi adalah yang biasa digunakan.

## DAYA DAN GERAKAN I
## *FORCE AND MOTION* I

1 $v = u + at$

2 $s = \frac{1}{2}(u + v)t$

3 $s = ut + \frac{1}{2}at^2$

4 $v^2 = u^2 + 2as$

5 Momentum = mv

6 F = ma

## KEGRAVITIAN
## *GRAVITATION*

1 $F = \frac{Gm_1m_2}{r^2}$

2 $g = \frac{Gm}{r^2}$

3 $F = \frac{mv^2}{r}$

4 $a = \frac{v^2}{r}$

5 $v = \frac{2\pi r}{T}$

6 $\frac{T_1^2}{r_1^3} = \frac{T_2^2}{r_2^3}$

7 $v = \sqrt{\frac{GM}{r}}$

8 $u = -\frac{GMm}{r}$

9 $v = \sqrt{\frac{2GM}{r}}$

10 $g = 9.81\ m\ s^{-2}$ @ $9.81\ N\ kg^{-1}$

11 $G = 6.67 \times 10^{-11}\ N\ m^2\ kg^{-2}$

12 Jisim Bumi, M $= 5.97 \times 10^{24}$ kg
*Mass of Earth*

13 Jejari Bumi, R $= 6.37 \times 10^{6}$ m
*Radius of Earth*

## HABA
## *HEAT*

1 $Q = mc\theta$

2 Q = ml

3 Q = Pt

4 $P_1V_1 = P_2V_2$

5 $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

6 $\frac{P_1}{T_1} = \frac{P_2}{T_2}$

## GELOMBANG
## *WAVES*

1 $v = f\lambda$

2 $\lambda = \frac{ax}{D}$

## CAHAYA DAN OPTIK
## LIGHT AND OPTICS

1 $n = \frac{c}{v}$

2 $n = \frac{\sin i}{\sin r}$

3 $n = \frac{1}{\sin c}$

4 $n = \frac{H}{h}$

5 $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

6 $n_1 \sin\theta_1 = n_2 \sin\theta_2$

7 Pembesaran linear, $m = \frac{v}{u}$
Linear magnification

## DAYA DAN GERAKAN II
## *FORCE AND MOTION* II

1 $F = kx$

2 $E = \frac{1}{2} Fx$

3 $E = \frac{1}{2} kx^2$

## TEKANAN
## *PRESSURE*

1 $P = \frac{F}{A}$

2 $P = h\rho g$

3 $\rho = \frac{m}{v}$

## ELEKTRIK
## *ELECTRICITY*

1 $E = \frac{F}{Q}$

2 $I = \frac{Q}{t}$

3 $V = \frac{E}{Q}$

4 $V = IR$

5 $R = \frac{\rho \ell}{A}$

6 $\varepsilon = V + Ir$

7 $P = VI$

8 $P = \frac{E}{t}$

9 $E = \frac{V}{d}$

## KEELEKTROMAGNETAN
## *ELECTROMAGNETISM*

1 $\frac{V_S}{V_P} = \frac{N_S}{N_P}$

2 $\eta = \frac{\text{Kuasa output}}{\text{Kuasa input}} \times 100\%$

$\eta = \frac{Output\ power}{Input\ power} \times 100\%$

## ELEKTRONIK
## *ELECTRONICS*

1 Tenaga keupayaan elektrik, $E = eV$
*Electrical potential energy,* $E = eV$

2 Tenaga kinetik maksimum, $E = \frac{1}{2}mv^2$
*Maximum kinetic energy*, $E = \frac{1}{2}mv^2$

3 $\beta = \frac{I_C}{I_B}$

4 $V_{out} = \frac{R_2}{R_{1+}R_2} V_{in}$

## FIZIK NUKLEAR
## *NUCLEAR PHYSICS*

1 $N = \left(\frac{1}{2}\right)^n N_0$

2 $E = mc^2$

3 $c = 3.00 \times 10^8 \text{ m s}^{-1}$

4 $1 \text{ u.j.a} = 1.66 \times 10^{-27} \text{ kg}$
$1 \text{ a.m.u} = 1.66 \times 10^{-27} \text{ kg}$

## FIZIK KUANTUM
## *QUANTUM PHYSICS*

1 $E = hf$

2 $f = \frac{c}{\lambda}$

3 $\lambda = \frac{h}{p}$

4 $\lambda = \frac{h}{mv}$

5 $E = \frac{hc}{\lambda}$

6 $p = nhf$

7 $hf = W + \frac{1}{2} mv^2_{maks}$

8 $W = hf_o$

9 $h = 6.63 \times 10^{-34} \text{ J s}$



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**1** Kuantiti fizik manakah merupakan kuantiti skalar?
*Which physical quantity is a scalar quantity?*

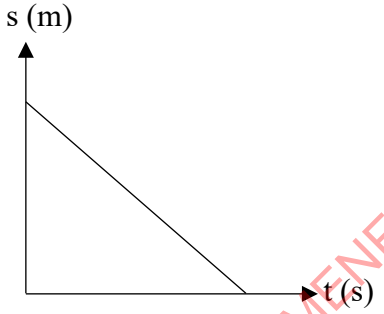
**A** Halaju
*Velocity*

**B** Momentum
*Momentum*

**C** Sesaran
*Displacement*

**D** Ketumpatan
*Density*

**2** Rajah 1 menunjukkan graf s melawan t.
*Diagram* 1 *shows the graph of* s *against* t.




Rajah 1
*Diagram* 1

Antara berikut, hubungan manakah yang betul?
*Which of the following relationship is correct?*

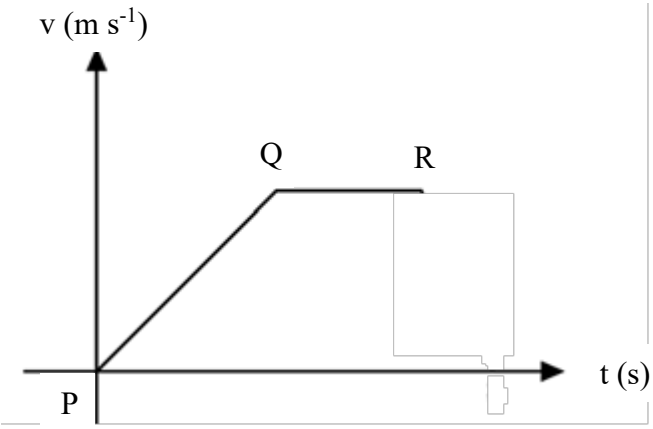
**A** s berkadar terus dengan t
s *is directly proportional to* t

**B** s berkadar songsang dengan t
s *is inversely proportional to* t

**C** s bertambah secara linear dengan t
s *increases linearly with* t

**D** s berkurang secara linear dengan t
s *decrease linearly with* t

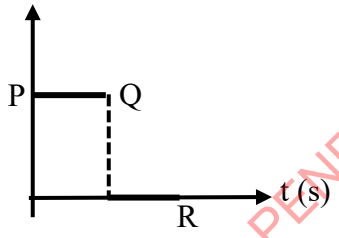
**3** Rajah 2 menunjukkan graf halaju-masa bagi gerakan suatu objek.
*Diagram* 2 shows *the velocity-time graph of the motion of an object*.



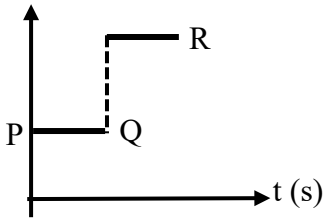

Rajah 2
*Diagram* 2

Graf pecutan-masa manakah yang setara dengan graf pada Rajah 2?
*Which of the acceleration-time graph equivalent to the graph in Diagram* 2?

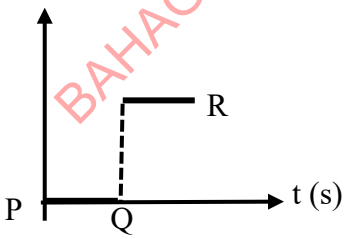
**A**



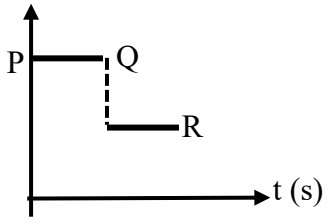

**B**




**C**




**D**



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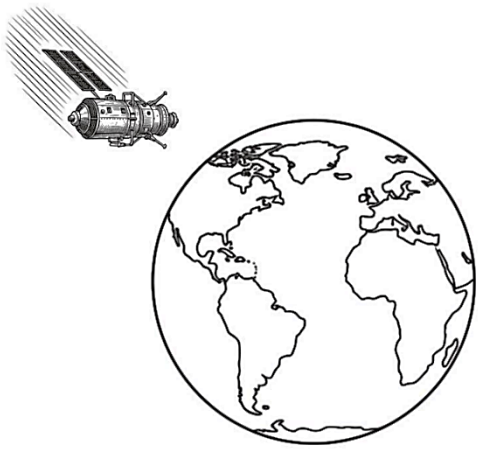
**4** Rajah 3 menunjukkan sebuah satelit yang jatuh ke bumi sebelum memasuki lapisan atmosfera.
*Diagram 3 shows a satellite falling to earth before entering the atmosphere.*



Rajah 3
*Diagram 3*

Kuantiti fizik manakah yang tidak berubah ketika satelit tersebut sedang jatuh?
*Which physical quantity that is unchanged during the fall?*

**A** Laju
*Speed*

**B** Halaju
*Velocity*

**C** Sesaran
*Displacement*

**D** Pecutan
*Acceleration*

**5** Seorang pelajar mendapati lebih mudah untuk menggerakkan sebiji bola sepak berbanding bola boling di atas lantai.
*A student found that it is easier to move a football compared to a bowling ball on the floor.*

Antara berikut, manakah pernyataan yang sesuai menerangkan situasi di atas?
*Which of the following best describe the situation above?*

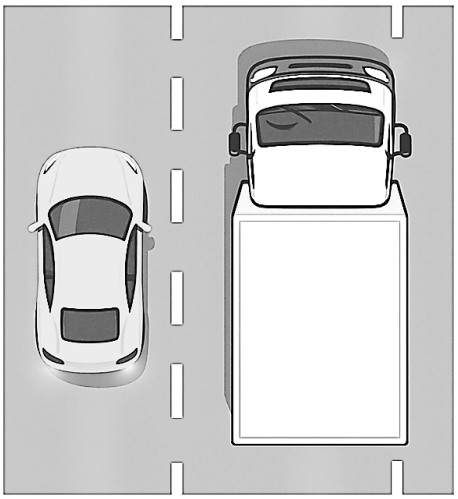
**A** Jisim bola sepak lebih rendah berbanding bola boling.
*Mass of football is lower than bowling ball.*

**B** Isipadu bola sepak lebih rendah berbanding bola boling.
*Volume of football is lower than bowling ball.*

**C** Ketumpatan bola sepak lebih rendah berbanding bola boling.
*Density of football is lower than bowling ball.*

**D** Daya geseran bola sepak lebih tinggi daripada bola boling.
*Frictional force of the football is greater than bowling ball.*

6 Rajah 4 menunjukkan sebuah kereta bergerak dengan momentum yang lebih kecil daripada lori.
*Diagram 4 shows a car moving with smaller momentum than a lorry.*



Rajah 4
*Diagram 4*

Momentum kereta akan sama dengan lori apabila
*The momentum of the car will be the same as the lorry when*

**A** halaju kereta sama dengan halaju lori.
*velocity of the car same as velocity of the lorry.*

**B** halaju kereta lebih rendah dengan halaju lori.
*velocity of the car is lower than velocity of the lorry.*

**C** halaju kereta lebih tinggi daripada halaju lori.
*velocity of the car is higher than velocity of the lorry.*

**D** jisim kereta lebih rendah berbanding jisim lori.
*mass of the car is lower than the mass of the lorry.*

7 Antara berikut yang manakah menerangkan Hukum Gerakan Newton Kedua?
*Which of the following explains Newton's Second Law of Motion?*

**A** Perubahan momentum berkadar terus dengan daya.
*Change of momentum is directly proportional to force.*

**B** Kadar perubahan momentum berkadar terus dengan daya.
*Rate of change of momentum is directly proportional to force.*

**C** Daya berkadar songsang dengan jisim apabila pecutan malar.
*Force is directly proportional to mass when the acceleration is constant.*

**D** Daya berkadar songsang dengan pecutan apabila jisim malar.
*Force is inversely proportional to acceleration when mass is constant.*



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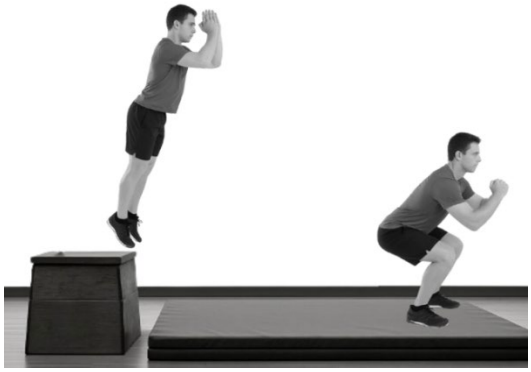
**8** Situasi manakah yang menghasilkan daya impuls yang tinggi?
*Which situation produces high impulsive force?*

**A**

Telur di dalam karton
*Eggs inside carton*

**B**



Melompat dari satu ketinggian
*Jump from a certain height*

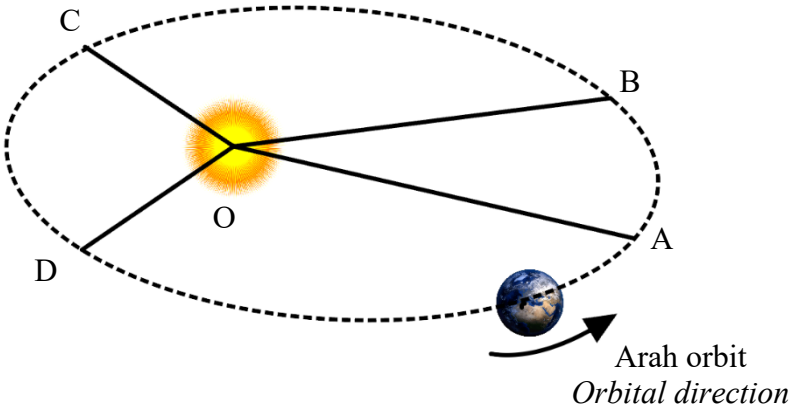
**C**

Menangkap bola lisut
*Catching a softball*

**D**

Menanam cerucuk
*Driving the pile*

**9** Rajah 5 menunjukkan sebuah planet mengorbit Matahari.
*Diagram 5 shows a planet orbiting the Sun.*




Rajah 5
*Diagram 5*

Masa yang diambil oleh planet berkenaan untuk bergerak dari titik A ke B adalah sama dengan masa yang diambil oleh planet berkenaan untuk bergerak dari titik C ke D.
*The time taken for the planet to move from point* A *to point* B *is equal to the time taken for the planet to move from point* C *to point* D.

Pernyataan tersebut merupakan
*The statement is*

**A** Hukum Kepler Pertama
*Kepler's First Law*

**B** Hukum Kepler Kedua
*Kepler's Second Law*

**C** Hukum Kepler Ketiga
*Kepler's Third Law*

**10** Jadual 1 menunjukkan maklumat empat jenis orbit E, F, G dan H bagi satelit yang mengorbit bumi.
*Table* 1 *shows information about four types of orbits* E, F, G *and* H *for satellites orbiting the earth.*

| **Orbit** | **Bentuk orbit** ***Shape of orbit*** | **Ketinggian orbit / m** ***Height of orbit* / m** | **Tempoh orbit / jam** ***Period of orbit* / *hour*** |
|---|---|---|---|
| E | Elips *Ellipse* | $3.59 \times 10^3$ | 24.00 |
| F | Elips *Ellipse* | $6.70 \times 10^3$ | 1.41 |
| G | Bulat *Circle* | $3.59 \times 10^7$ | 24.00 |
| H | Bulat *Circle* | $5.43 \times 10^7$ | 41.33 |

Jadual 1
*Table* 1

Berdasarkan maklumat dalam Jadual 1, tentukan orbit manakah yang sesuai untuk mengkaji cuaca.
*Based on the information in the Table* 1*, determine which orbit is suitable for weather casting.*

**A** H **B** G
**C** F **D** E

**11** Sebiji kek pisang diletakkan di dalam sebuah ketuhar panas. Selepas 20 minit, suhu kek berkenaan adalah sama dengan suhu udara di dalam ketuhar tersebut.
*A banana cake is placed in a hot oven. After* 20 *minutes, the temperature of the cake is the same as the air temperature inside the oven.*

Konsep manakah yang menerangkan situasi itu?
*Which concept explains the situation?*

**A** Muatan haba tentu.
*Specific heat capacity.*

**B** Keseimbangan terma.
*Thermal equilibrium.*

**C** Haba pendam tentu pelakuran.
*Specific latent heat of fusion.*

**D** Haba pendam tentu pengewapan.
*Specific latent heat of vaporization.*

**12** Rajah 6 menunjukkan sebuah cerek elektrik yang digunakan untuk mendidihkan 0.8 kg air. Suhu awal air ialah 30 °C.
*Diagram* 6 *shows an electric kettle used to boil* 0.8 kg *of water. The initial temperature of the water is* 30 °C.

Rajah 6
*Diagram* 6

Berapakah tenaga haba yang diperlukan untuk meningkatkan suhu air kepada 100 °C?
*What is the heat energy needed to raise the temperature of water to* 100 °C?

[Muatan haba tentu air, c = 4200 J $kg^{-1}$ $°C^{-1}$]
[*Specific heat capacity of water,* c = 4200 J $kg^{-1}$ $°C^{-1}$]

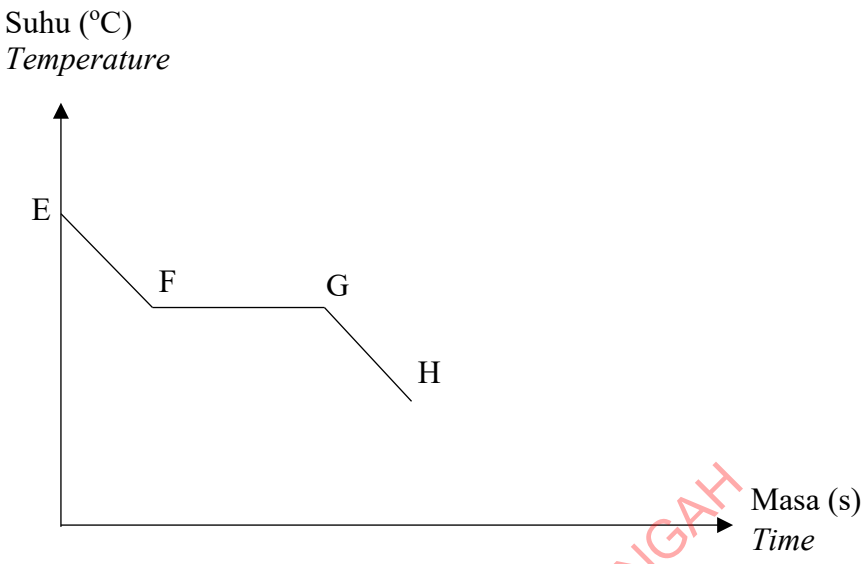
**A** $1.008 \times 10^5$ J

**B** $2.352 \times 10^5$ J

**C** $3.360 \times 10^5$ J

**D** $4.368 \times 10^5$ J

**13** Rajah 7 menunjukkan satu lengkung penyejukan bagi naftalena.
*Diagram 7 shows a cooling curve for naphthalene.*




Rajah 7
*Diagram 7*

Mengapakah suhu bahan tidak berubah walaupun haba terus dibebaskan pada fasa FG?
*Why does the temperature of the material does not change even if heat continues to release at* FG *phase*?

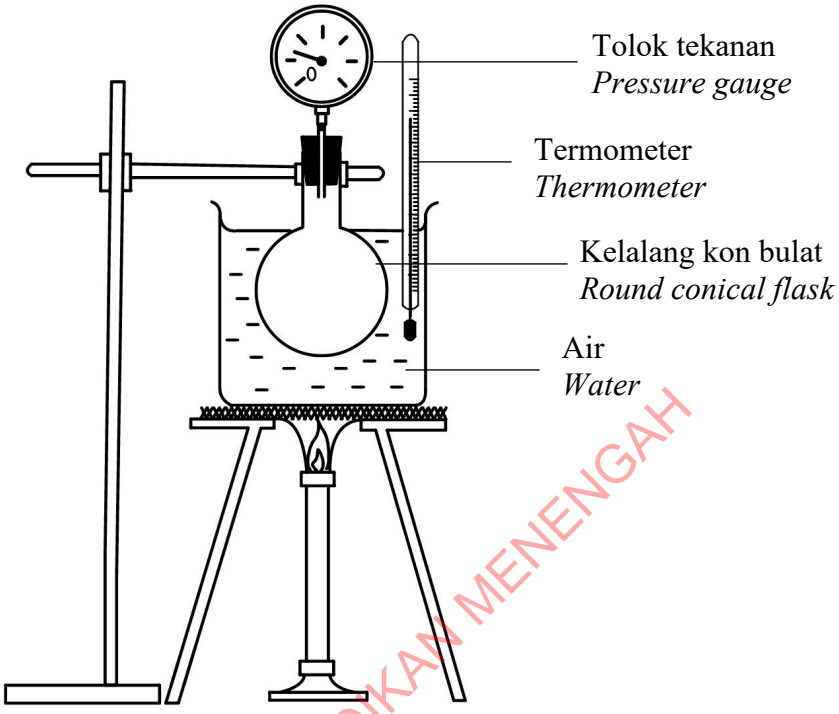
**A** Semua haba digunakan untuk memutuskan ikatan antara molekul.
*All heat is used to break the bonds between the molecules.*

**B** Haba dibebaskan untuk membentuk ikatan antara molekul.
*Heat released to form bonds between molecules.*

**C** Tenaga haba disimpan dalam bentuk tenaga kinetik.
*Thermal energy is stored in the form of kinetic energy.*

**D** Haba dibebaskan ke persekitaran.
*Heat release to the environment.*

**14** Rajah 8 menunjukkan susunan radas yang digunakan untuk mengkaji hubungan antara tekanan dan suhu bagi suatu jisim gas yang tetap pada isipadu yang malar.
*Diagram 8 shows the arrangement of apparatus used to investigate the relationship between the pressure and the temperature for a fixed mass of gas at constant volume.*




Rajah 8
*Diagram 8*



Namakan hukum gas yang terlibat dalam eksperimen ini.
*Name the gas law involved in this experiment.*

**A** Hukum Boyle
*Boyle's law*

**B** Hukum Charles
*Charles' law*

**C** Hukum Gay-Lussac
*Gay-Lussac's law*

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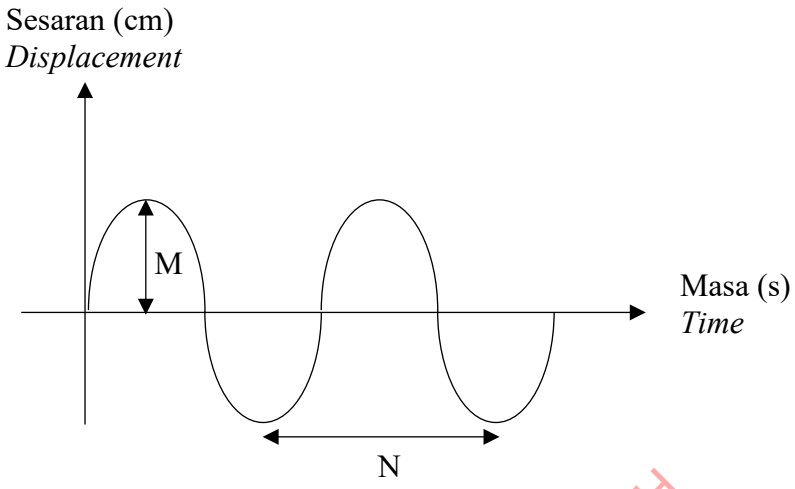
**15** Rajah 9 menunjukkan graf sesaran-masa bagi satu gelombang.
*Diagram 9 shows a displacement-time graph of a wave.*

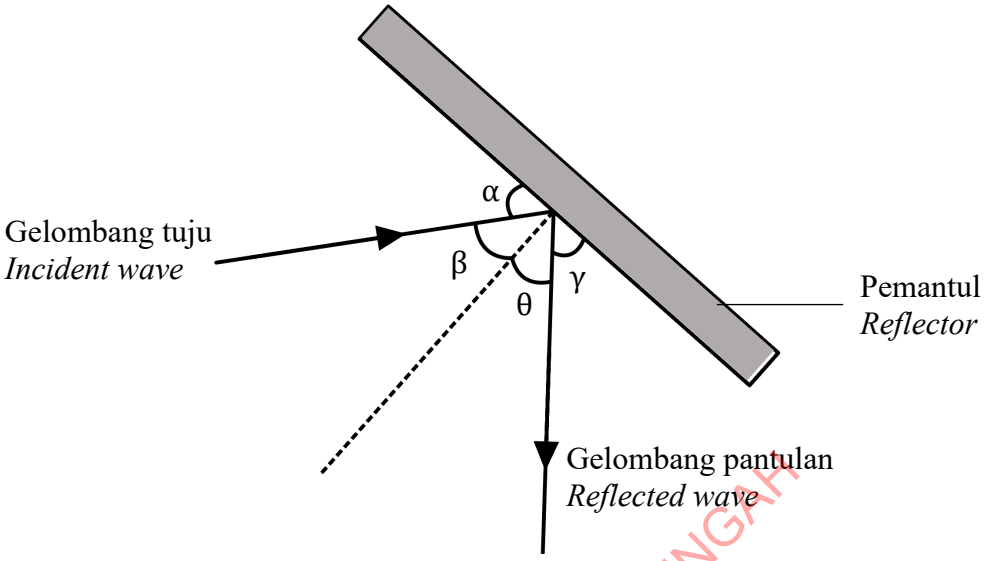



Rajah 9
*Diagram 9*

Apakah kuantiti fizik yang diwakili oleh M dan N?
*What are the physical quantities represented by* M *and* N?

| | M | N |
|---|---|---|
| **A** | Amplitud<br>*Amplitude* | Tempoh<br>*Period* |
| **B** | Amplitud<br>*Amplitude* | Panjang gelombang<br>*Wavelength* |
| **C** | Panjang gelombang<br>*Wavelength* | Amplitud<br>*Amplitude* |
| **D** | Tempoh<br>*Period* | Amplitud<br>*Amplitude* |

**16** Rajah 10 menunjukkan fenomena pantulan gelombang.
*Diagram* 10 *shows the phenomenon reflection of a wave.*




Rajah 10
*Diagram* 10

Antara berikut, yang manakah sudut pantulan?
*Which of the following is the angle of reflection?*

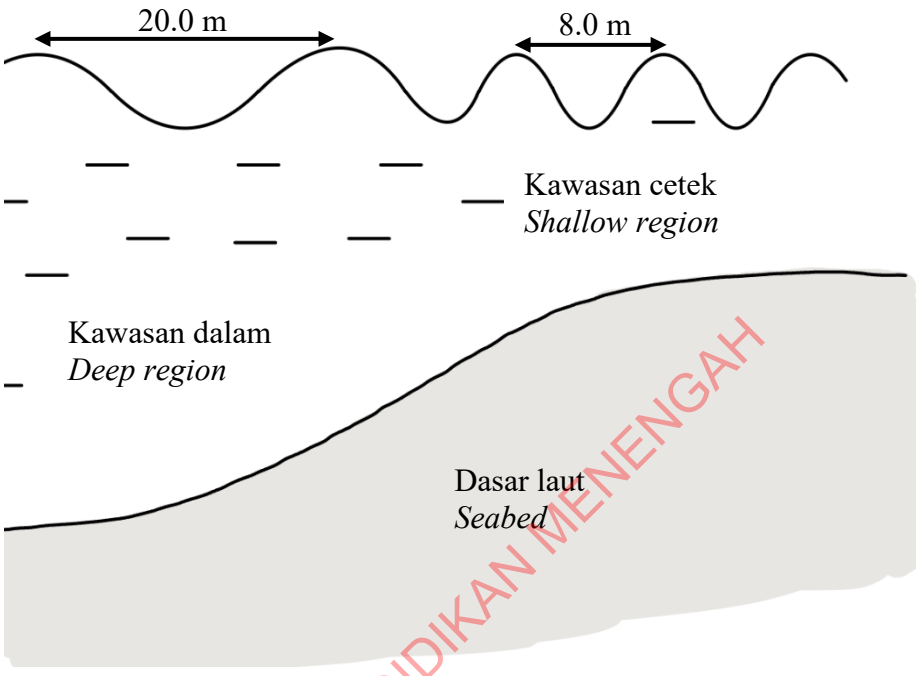
**A** α

**B** β

**C** γ

**D** θ

**17** Rajah 11 menunjukkan perubahan panjang gelombang air yang merambat dari kawasan dalam ke kawasan cetek.
*Diagram* 11 *shows the change in wavelength of water wave travelling from deep region to shallow region.*




Rajah 11
*Diagram* 11

Berapakah laju gelombang di kawasan dalam sekiranya laju gelombang di kawasan cetek adalah 2.5 m $s^{-1}$?
*What is the wave speed in deep region if the wave speed in shallow region is* 2.5 m $s^{-1}$?

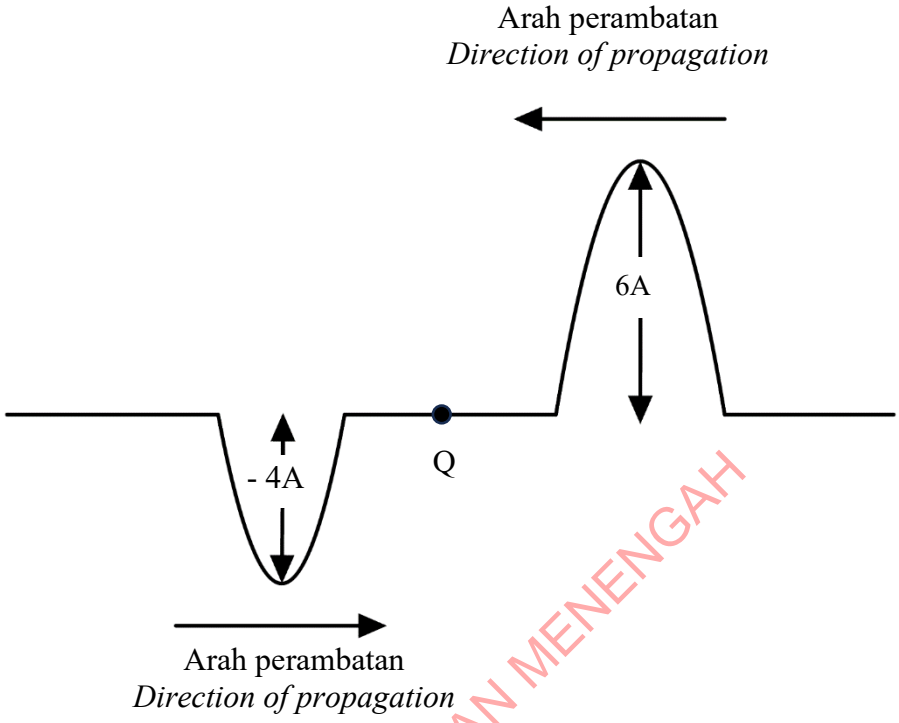
**A** 0.13 m $s^{-1}$

**B** 1.00 m $s^{-1}$

**C** 6.25 m $s^{-1}$

**D** 64.00 m $s^{-1}$

**18** Rajah 12 menunjukkan perambatan dua gelombang pada arah yang bertentangan dan bertemu di titik Q.
*Diagram* 12 *shows two waves propagate in the opposite direction and meet at point* Q.




Rajah 12
*Diagram* 12

Berapakah sesaran paduan pada titik Q?
*What is the resultant displacement at point* Q*?*

**A** 2A **B** 4A

**C** 6A **D** 10A

**19** Mengapakah sinar gama digunakan untuk membunuh sel kanser dalam radioterapi?
*Why gamma ray is used to kill cancer cells in radiotherapy?*

**A** Ia bersifat neutral.
*It is neutral.*

**B** Ia mempunyai frekuensi yang tinggi.
*It has a high frequency.*

**C** Ia memerlukan medium untuk merambat.
*It needs a medium to propagate.*

**D** Ia mempunyai panjang gelombang yang panjang.
*It has a long wavelength.*



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**20** Rajah 13 menunjukkan seberkas gentian optik.
*Diagram* 13 *shows a bundle of optical fibers.*

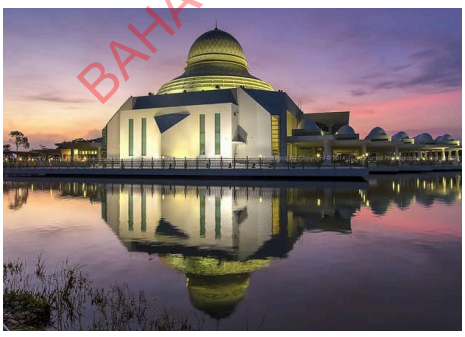
Rajah 13
*Diagram* 13

Fenomena manakah yang menunjukkan konsep fizik yang sama seperti Rajah 13?
*Which phenomenon shows the same physics concept as Diagram* 13?

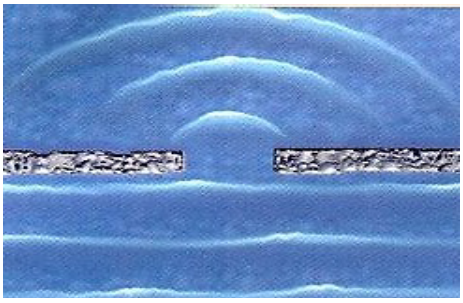
**A**

**B**

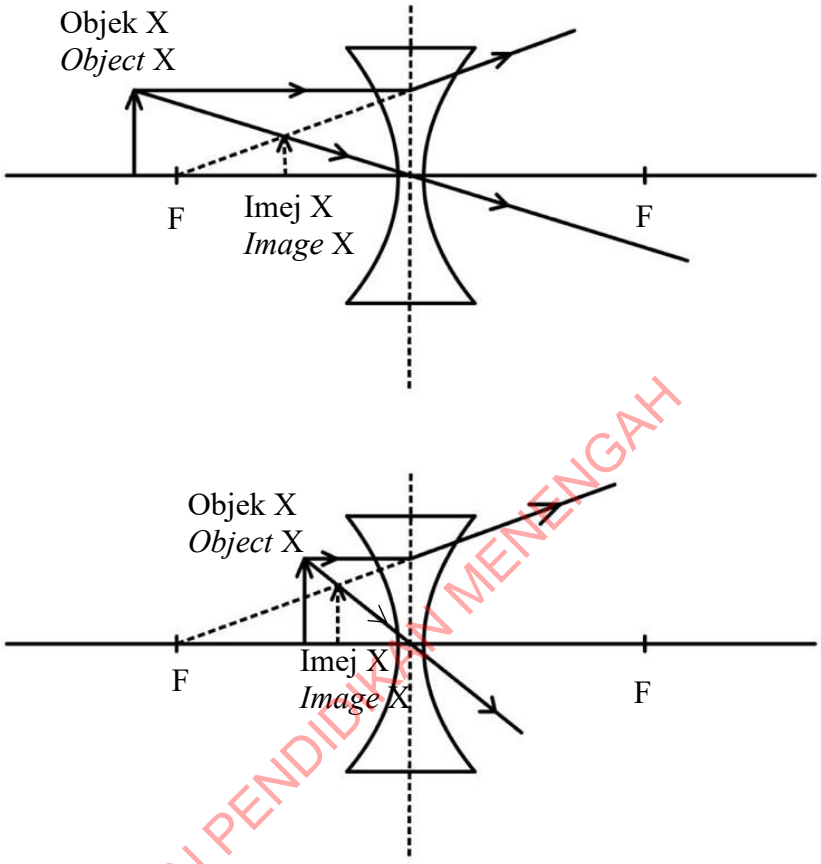
**C**



**D**



**21** Rajah 14 menunjukkan rajah sinar bagi satu kanta cekung.
*Diagram* 14 *shows a ray diagram of a concave lens.*




Rajah 14
*Diagram* 14



Pernyataan manakah yang betul bagi menerangkan situasi di atas?
*Which statement is correct to explain the above situation?*

**A** Semakin bertambah jarak objek, semakin bertambah saiz imej.
*The higher the object distance, the bigger the size of image.*

**B** Semakin bertambah jarak objek, semakin berkurang jarak imej.
*The higher the object distance, the lower the image distance.*

**C** Semakin bertambah jarak objek, semakin berkurang pembesaran linear.
*The higher the object distance, the smaller the linear magnification.*

**D** Semakin bertambah jarak objek, semakin bertambah pembesaran linear.
*The higher the object distance, the greater the linear magnification.*

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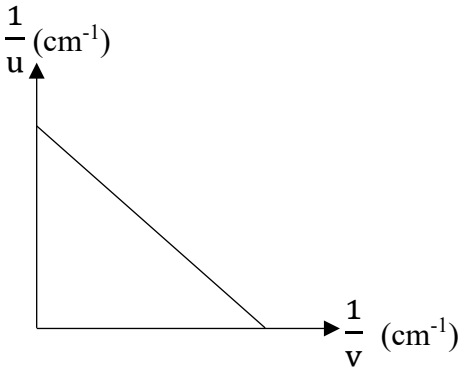
**22** Rajah 15 menunjukkan graf bagi satu kanta nipis.
*Diagram* 15 *shows the graph of a thin lens.*




Rajah 15
*Diagram* 15

Antara berikut, yang manakah mewakili pintasan-y graf tersebut?
*Which of the following represents the* y*-intercept of the graph?*

**A** u

**B** v

**C** $\frac{v}{u}$

**D** $\frac{1}{f}$

**23** Rajah 16 menunjukkan sebuah teleskop.
*Diagram* 16 *shows a telescope.*

Rajah 16
*Diagram* 16

Apakah ciri imej kanta objek?
*What is the characteristic of the image of the objective lens?*

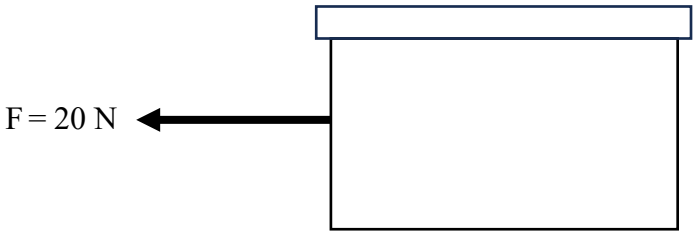
**A** Maya
*Virtual*

**B** Tegak
*Upright*

**C** Diperkecil
*Smaller*

**D** Diperbesar
*Bigger*

**24** Rajah 17 menunjukkan sebuah kotak yang ditarik oleh daya, F dan bergerak dengan halaju malar.
*Diagram* 17 *shows a box being pulled by a force,* F *and moves with constant velocity.*




Rajah 17
*Diagram* 17

Apakah yang akan berlaku kepada kotak itu sekiranya satu daya tambahan 25 N dikenakan pada arah yang sama?
*What will happen to the box if another force of* 25 N *is applied in the same direction?*

**A** Bergerak ke kiri dengan pecutan seragam.
*Moving to the left with constant acceleration.*

**B** Bergerak ke kiri dengan pecutan yang bertambah.
*Moving to the left with increasing acceleration.*

**C** Bergerak ke kiri dengan halaju malar yang lebih tinggi.
*Moves to the left with higher constant velocity.*

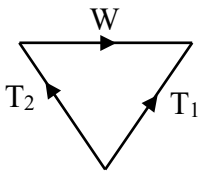
**D** Bergerak ke kiri dengan pecutan sifar.
*Moves to the left with zero acceleration.*

**25** Rajah 18 menunjukkan satu papan tanda digantung dengan tali.
*Diagram* 18 *shows a signboard hanging on a rope.*

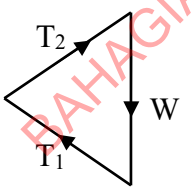

Rajah 18
*Diagram* 18

Segitiga daya manakah mewakili situasi tersebut?
*Which triangle of forces represents the situation?*

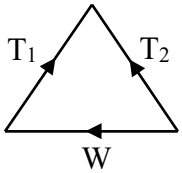
**A**



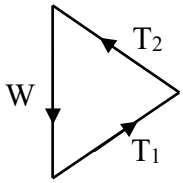

**B**



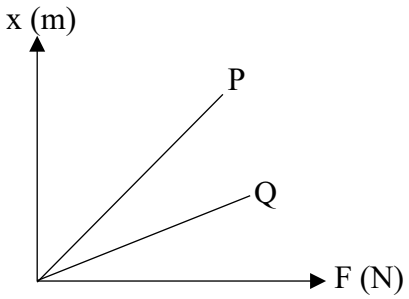

**C**




**D**



**26** Rajah 19 menunjukkan graf pemanjangan, x melawan daya, F bagi spring P dan Q.
*Diagram* 19 *shows a graph of extension,* x *against force,* F *for spring* P *and* Q.

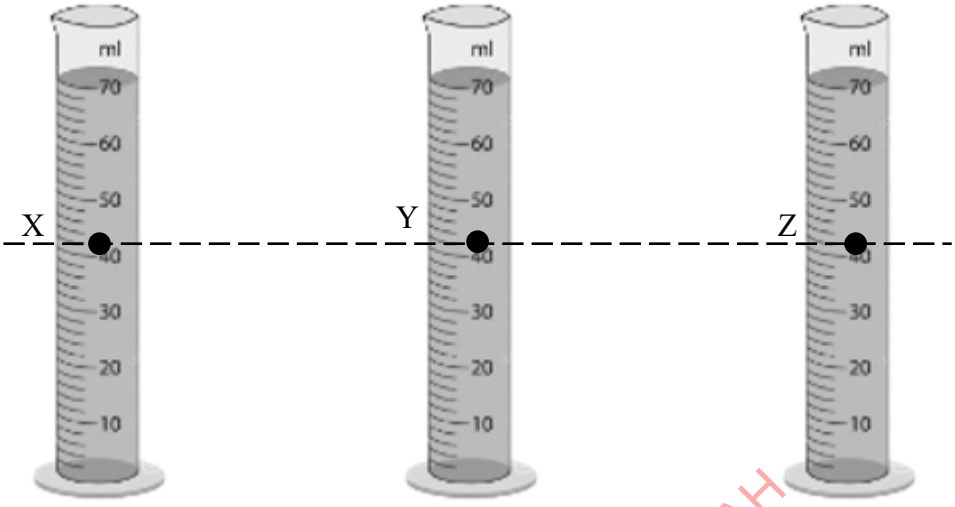



Rajah 19
*Diagram* 19

Pernyataan manakah yang benar mengenai spring P dan Q?
*Which statement is true about spring* P *and* Q*?*

| | **Spring P** | **Spring Q** |
|---|---|---|
| **A** | Diameter dawai kecil<br>*Smaller diameter of wire* | Diameter dawai besar<br>*Larger diameter of wire* |
| **B** | Diameter spring kecil<br>*Small spring diameter* | Diameter spring besar<br>*Large spring diameter* |
| **C** | Keluli<br>*Steel* | Aluminium<br>*Aluminium* |
| **D** | Pendek<br>*Short* | Panjang<br>*Long* |

**27** Rajah 20 menunjukkan tiga buah silinder penyukat yang sama.
*Diagram* 20 *shows three identical measuring cylinders.*




Air tasik
*Lake water*

Air laut
*Seawater*

Minyak masak
*Cooking oil*

Rajah 20
*Diagram* 20

Manakah antara berikut yang betul menerangkan perbandingan tekanan cecair di titik X, Y dan Z?
*Which of the following correctly describes the comparison of liquid pressure at point* X, Y *and* Z?

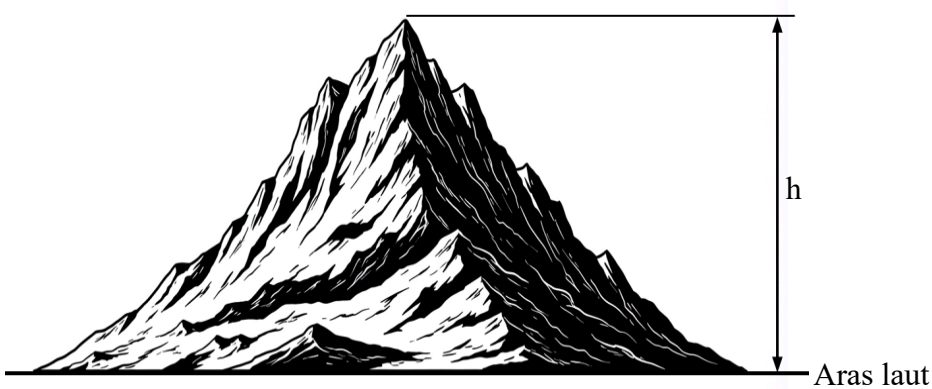
**A** $P_X = P_Y = P_Z$

**B** $P_X < P_Y < P_Z$

**C** $P_Y < P_X < P_Z$

**D** $P_Y > P_X > P_Z$

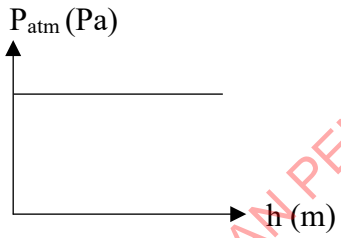
**28** Rajah 21 menunjukkan sebuah gunung.
*Diagram* 21 *shows a mountain.*



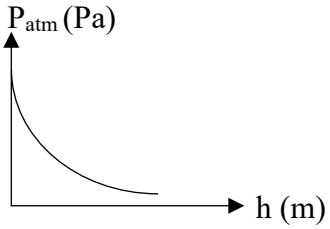

Rajah 21
*Diagram* 21

Graf manakah yang menunjukkan hubungan antara tekanan atmosfera, $P_{atm}$ dengan ketinggian gunung, h yang betul?
*Which graph shows the relationship between atmospheric pressure,* $P_{atm}$ *and the height of the mountain,* h *correctly?*

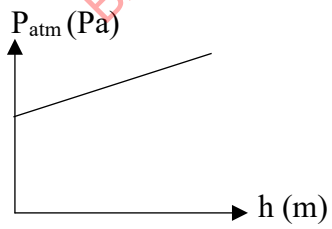
**A**



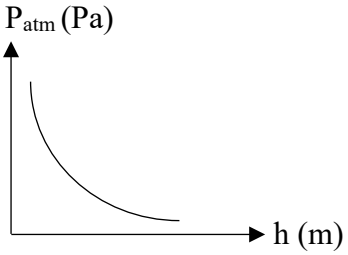

**B**



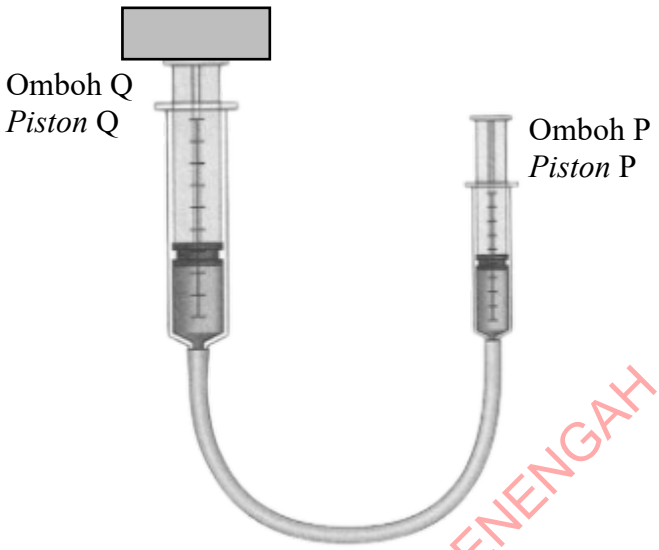

**C**




**D**



**29** Rajah 22 menunjukkan suatu sistem hidraulik. Luas keratan rentas omboh P dan Q masing-masing adalah 0.05 $m^2$ dan 0.1 $m^2$.
*Diagram* 22 *shows a hydraulic system. The cross-sectional area of pistons* P *and* Q *is* 0.05 $m^2$ *dan* 0.1 $m^2$, *respectively*.




Rajah 22
*Diagram* 22

Berapakah daya, F yang bertindak ke atas omboh Q jika omboh P ditekan dengan daya 12 N?
*What is the force,* F, *acting on piston* Q *if piston* P *is pressed with a force of* 12 N?

**A** 6 N

**B** 12 N

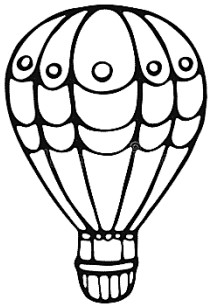
**C** 24 N

**D** 120 N

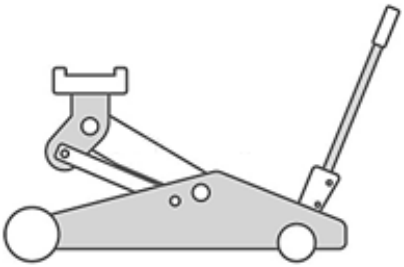
**30** Antara berikut, yang manakah menunjukkan aplikasi prinsip Archimedes?
*Which of the following shows the application of Archimedes' principle?*

**A**

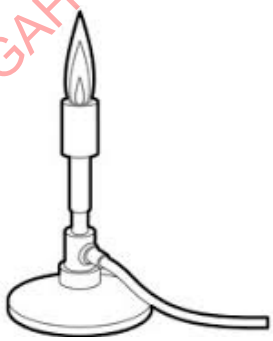
**B**



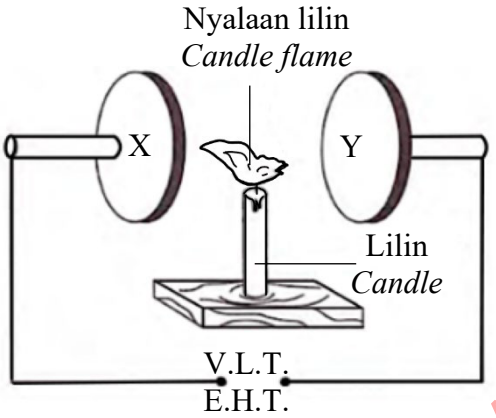
**C**



**D**



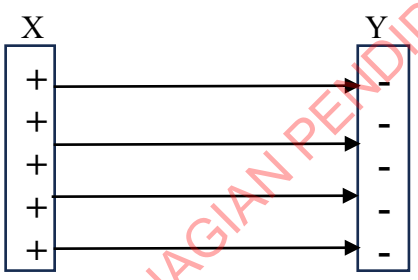
**31** Rajah 23 menunjukkan bentuk nyalaan lilin apabila diletakkan di antara plat X dan Y yang disambung ke bekalan kuasa V.L.T.
*Diagram 23 shows the shape of a candle flame when placed between plates* X *and* Y, *which are connected to an* E.H.T. *power supply*.



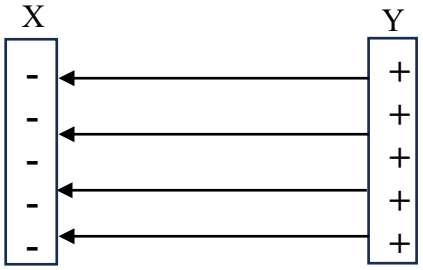

Rajah 23
*Diagram 23*

Antara berikut yang manakah merupakan corak medan elektrik di antara plat X dan Y?
*Which of the following diagram is the pattern for electric field between* X *and* Y *plates?*

**A**

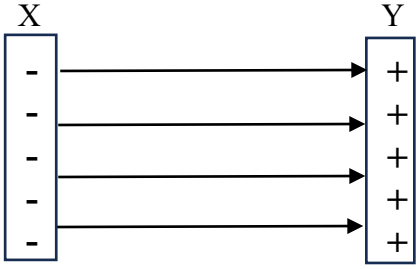



**B**




**C**


**D**



**32** Rajah 24 menunjukkan sebuah kereta elektrik sedang di cas.
*Diagram* 24 *shows an electric car is being charged.*

Rajah 24
*Diagram* 24

Jadual 2 menunjukkan perbandingan kapasiti bateri dan masa pengecasan bagi empat model kenderaan elektrik.
*Table* 2 *shows comparison of battery capacity and charging time for four electric vehicle models.*

| **Model kereta** ***Car model*** | **Kapasiti bateri (kWj)** ***Battery capacity* (kWh)** | **Masa mengecas 0 - 100% (min)** ***Charging time* 0 - 100%** |
|---|---|---|
| K | 60 | 36 |
| L | 62 | 37 |
| M | 64 | 38 |
| N | 70 | X |

Jadual 2
*Table* 2



Apakah masa yang sesuai bagi X?
*What is the suitable time for* X*?*

**A** 40 min

**B** 42 min

**C** 44 min

**D** 46 min

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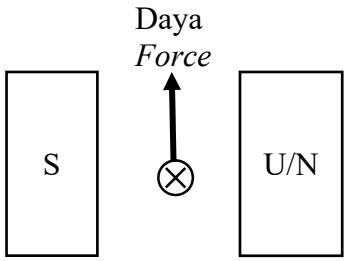
**33** Rajah 25 menunjukkan satu konduktor pembawa arus berada di antara sepasang magnet kekal.
*Diagram 25 shows a current-carrying conductor between a pair of permanent magnets.*




Rajah 25
*Diagram 25*

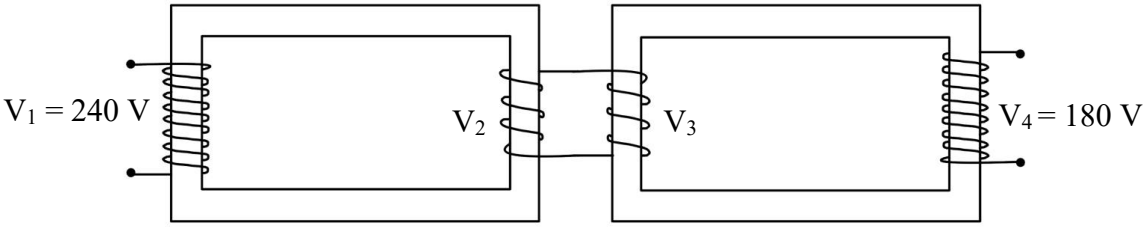
Arah daya tersebut ditentukan dengan menggunakan
*The direction of force is determined by using*

**A** Petua tangan kanan Fleming
*Fleming's right-hand rule*

**B** Petua tangan kiri Fleming
*Fleming's left-hand rule*

**C** Petua genggaman tangan kanan
*Right-hand grip rule*

**34** Rajah 26 menunjukkan dua transformer yang disambung di dalam satu litar elektrik.
*Diagram 26 shows two transformers connected in an electric circuit.*




Rajah 26
*Diagram 26*

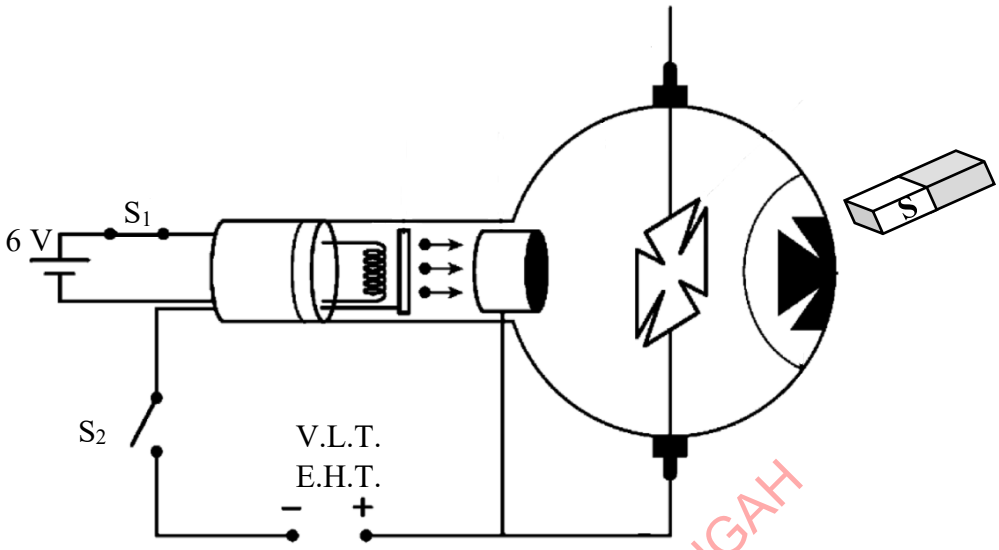
Antara berikut yang manakah benar berkenaan beza keupayaan, $V_1$, $V_2$, $V_3$ dan $V_4$?
*Which of the following is true about the potential differences,* $V_1$, $V_2$, $V_3$ *and* $V_4$*?*

| | | | |
|---|---|---|---|
| **A** | $V_1 > V_2$ | $V_2 = V_3$ | $V_3 < V_4$ |
| **B** | $V_1 > V_2$ | $V_2 < V_3$ | $V_3 < V_4$ |
| **C** | $V_1 < V_2$ | $V_2 = V_3$ | $V_3 > V_4$ |
| **D** | $V_1 > V_2$ | $V_2 > V_3$ | $V_3 > V_4$ |



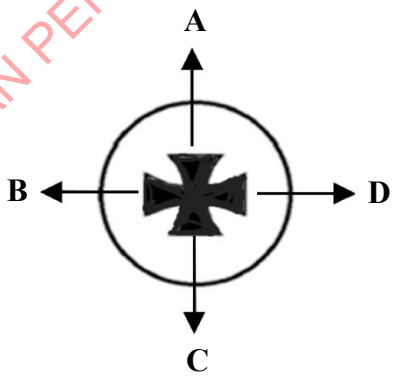
[Lihat halaman sebelah

**35** Rajah 27 menunjukkan satu magnet diletakkan di sisi tiub palang Maltese.
*Diagram 27 shows a magnet is placed at the side of the Maltese cross tube.*

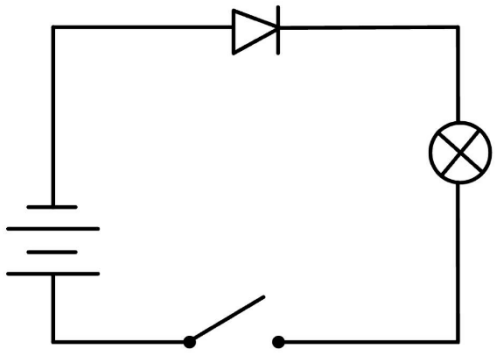



Rajah 27
*Diagram 27*

Manakah arah pesongan bayang sinar katod yang diperhatikan di atas skrin apabila suis $S_2$ dihidupkan?
*Which direction of the deflected shadow of cathode ray is observed on the screen when switch* $S_2$ *is turned on?*



**36** Rajah 28 menunjukkan satu litar elektrik.
*Diagram 28 shows an electrical circuit.*



Rajah 28
*Diagram 28*

Antara berikut pernyataan manakah yang betul apabila suis ditutup?
*Which of the following statements is correct when the switch is closed?*

I Mentol menyala
*The bulb lights up*
II Mentol tidak menyala
*The bulb not lights up*
III Diod dalam keadaan pincang depan
*Diod is in forward biased*
IV Diod dalam keadaan pincang songsang
*Diod is in reversed biased*

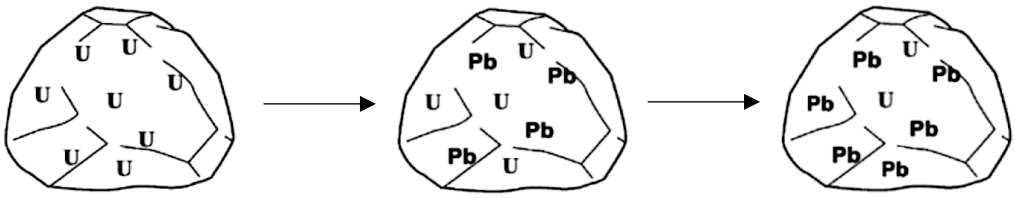
**A** I dan III
I *and* III

**B** I dan IV
I *and* IV

**C** II dan III
II *and* III

**D** II dan IV
II *and* IV

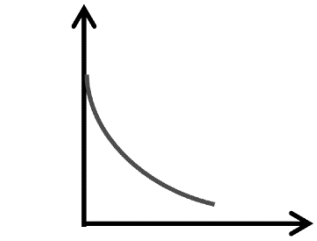
**37** Rajah 29 menunjukkan proses reputan uranium kepada plumbum dalam batu granit.
*Diagram 29 shows a decay process from uranium to lead in granite rock.*



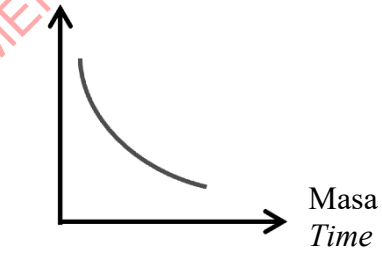

Rajah 29
*Diagram 29*

Antara berikut, manakah graf yang betul menunjukkan reputan radioaktif untuk Uranium?
*Which of the following graph shows the correct radioactive decay for Uranium?*

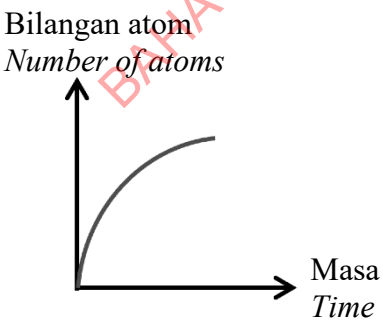
**A**



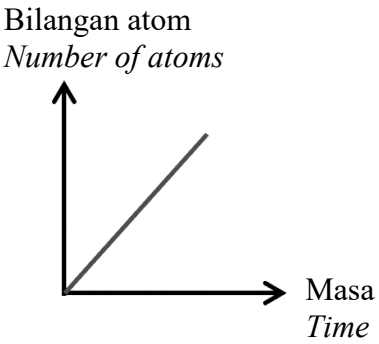

**B**



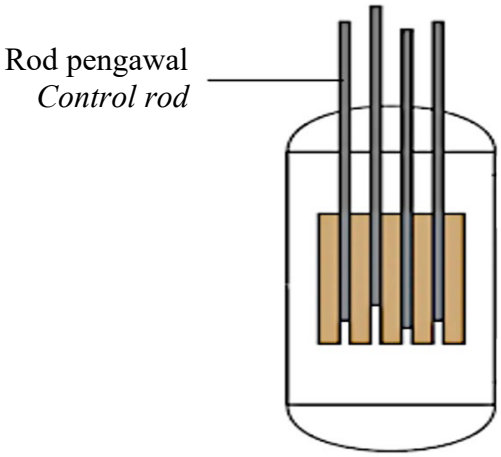

**C**




**D**



**38** Rajah 30 menunjukkan rod pengawal di dalam reaktor nuklear.
*Diagram* 30 *shows control rods in a nuclear reactor.*




Rajah 30
*Diagram* 30

Apakah yang akan berlaku sekiranya bilangan rod pengawal dikurangkan?
*What will happen if the number of control rods is reduced?*

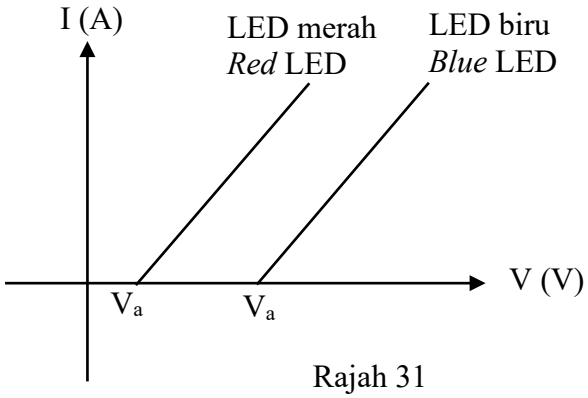
**A** Tenaga haba kurang diserap daripada tindak balas berantai.
*Less heat energy is absorbed from the chain reaction.*

**B** Neutron berkelajuan tinggi tidak dapat diperlahankan.
*The fast-moving neutron cannot be slowed down.*

**C** Tenaga nuklear yang dapat dijana berkurangan.
*Less nuclear energy can be produced.*

**D** Kadar tindak balas berantai bertambah.
*Rate of chain reaction increases.*

**39** Rajah 31 menunjukkan graf arus melawan voltan untuk dua LED yang berbeza warna.
*Diagram* 31 *shows the current versus voltage graph for two* LED*s of different colours.*




Rajah 31
*Diagram* 31

Antara berikut, pernyataan manakah menerangkan graf di atas?
*Which of the following describes the graph above?*

**A** LED merah akan lebih cepat menyala berbanding LED biru apabila dibekalkan dengan voltan yang bertambah secara berterusan.
*The red* LED *will light up more quickly compared to the blue* LED *when supplied with a continuously increasing voltage.*

**B** Voltan pengaktifan, $V_a$ LED biru lebih rendah daripada voltan pengaktifan, $V_a$ LED merah.
*Activation voltage,* $V_a$ *Blue* LED *is lower than activation voltage,* $V_a$ *red* LED.

**C** Panjang gelombang LED merah lebih tinggi daripada panjang gelombang LED biru.
*The wavelength of Red* LED *is higher than the wavelength of blue* LED.

**D** Tenaga LED biru lebih tinggi daripada tenaga LED merah.
*The energy of blue* LED *is higher than the energy of red* LED.

**40** Persamaan di bawah mewakili teori fotoelektrik Einstein.
*The equation below represents Einstein's photoelectric theory.*

$$E = W + K_{max}$$

Apakah yang diwakili oleh simbol W?
*What does the symbol* W *represents?*

**A** Frekuensi cahaya yang menyinari.
*The frequency of light that shines.*

**B** Tenaga kinetik maksimum fotoelektron.
*Maximum kinetic energy of photoelectron.*

**C** Fungsi kerja sesuatu logam.
*Work function of a metal.*

**D** Panjang gelombang cahaya.
*The wavelength of light.*



**KERTAS PEPERIKSAAN TAMAT**
***END OF QUESTION PAPER***

[Lihat halaman sebelah

## MAKLUMAT UNTUK CALON
## *INFORMATION FOR CANDIDATES*

1. Kertas soalan ini mengandungi **40** soalan.
   *This question paper consists of* **40** *questions.*

2. Jawab **semua** soalan.
   *Answer* ***all*** *questions*.

3. Tiap-tiap soalan diikuti oleh **tiga** atau **empat** pilihan jawapan. Pilih satu jawapan yang terbaik bagi setiap soalan dan hitamkan ruangan yang betul pada kertas jawapan anda.
   *Each question is followed by* ***three*** *or* ***four*** *options. Choose the best option for each question and blacken the correct space on the answer sheet.*

4. Hitamkan **satu** ruangan sahaja bagi setiap soalan.
   *Blacken only* ***one*** *space for each question.*

5. Sekiranya anda hendak menukarkan jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.
   *If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer.*

6. Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
   *The diagrams in the questions provided are not drawn to scale unless stated.*

7. Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.
   *You may use a non-programmable scientific calculator.*

8. Satu senarai formula disediakan di halaman 2 dan 3.
   *A list of formulae is provided on page* 2 *and* 3.