

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



MAKTAB RENDAH SAINS MARA

PEPERIKSAAN AKHIR SIJIL PENDIDIKAN MRSMA 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 $F = ma$

HABA
HEAT

- 1 $Q = mc\theta$
- 2 $Q = ml$
- 3 $Q = Pt$
- 4 $P_1 V_1 = P_2 V_2$
- 5 $\frac{V_1}{T_1} = \frac{V_2}{T_2}$
- 6 $\frac{P_1}{T_1} = \frac{P_2}{T_2}$

KEGRAVITIAN
GRAVITATION

- 1 $F = \frac{Gm_1 m_2}{r^2}$
- 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 $g = 9.81 \text{ m s}^{-2} @ 9.81 \text{ N kg}^{-1}$
- 11 $G = 6.67 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$
- 12 Jisim Bumi, $M = 5.97 \times 10^{24} \text{ kg}$
Mass of Earth
- 13 Jejari Bumi, $R = 6.37 \times 10^6 \text{ m}$
Radius of Earth

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

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

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

TEKANAN
PRESSURE

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

$$2 \quad P = h\rho g$$

$$3 \quad \rho = \frac{m}{V}$$

ELEKTRIK
ELECTRICITY

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

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

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

$$4 \quad V = IR$$

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

$$6 \quad \varepsilon = V + Ir$$

$$7 \quad P = VI$$

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

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

KEELEKTROMAGNETAN
ELECTROMAGNETISM

$$1 \quad \frac{V_s}{V_p} = \frac{N_s}{N_p}$$

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

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

ELEKTRONIK
ELECTRONICS

$$1 \quad \text{Tenaga keupayaan elektrik, } E = eV$$

Electrical potential energy, } E = eV

$$2 \quad \text{Tenaga kinetik maksimum, } E = \frac{1}{2} mv^2$$

Maximum kinetic energy, } E = \frac{1}{2} mv^2

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

$$4 \quad V_{\text{out}} = \frac{R_2}{R_1 + R_2} V_{\text{in}}$$

FIZIK NUKLEAR
NUCLEAR PHYSICS

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

$$2 \quad E = mc^2$$

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

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

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

FIZIK KUANTUM
QUANTUM PHYSICS

$$1 \quad E = hf$$

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

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

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

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

$$6 \quad p = nhf$$

$$7 \quad hf = W + \frac{1}{2} mv_{\text{maks}}^2$$

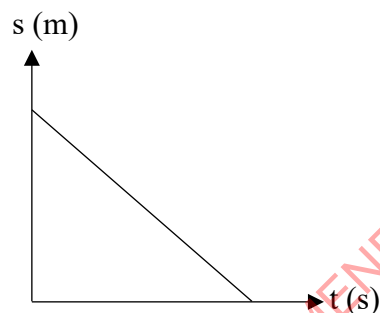
$$8 \quad W = hf_0$$

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

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

- | | |
|---|---------------------------------------|
| A Halaju
<i>Velocity</i> | B Momentum
<i>Momentum</i> |
| C Sesaran
<i>Displacement</i> | D Ketumpatan
<i>Density</i> |

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

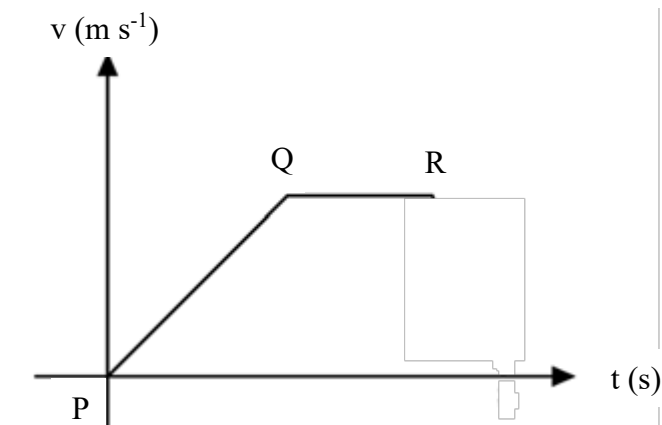


Rajah 1
Diagram 1

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

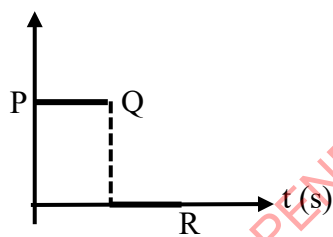
- 3 Rajah 2 menunjukkan graf halaju-masa bagi gerakan suatu objek.
Diagram 2 shows the velocity-time graph of the motion of an object.



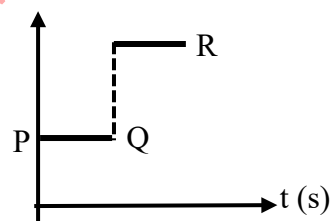
Rajah 2
 Diagram 2

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

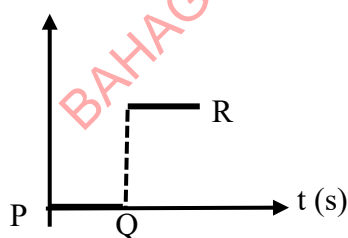
A $a \text{ (m s}^{-2}\text{)}$



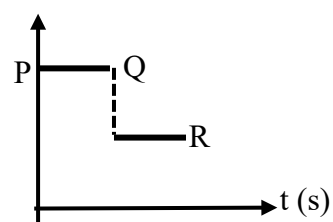
B $a \text{ (m s}^{-2}\text{)}$



C $a \text{ (m s}^{-2}\text{)}$

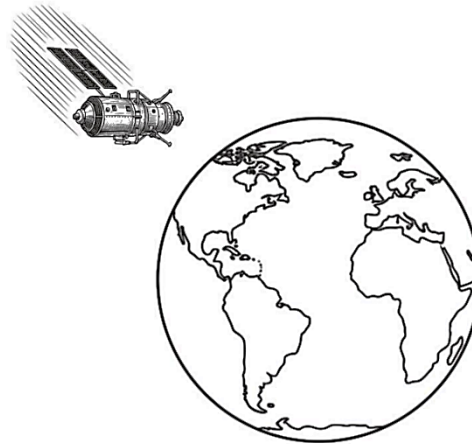


D $a \text{ (m s}^{-2}\text{)}$



- 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?

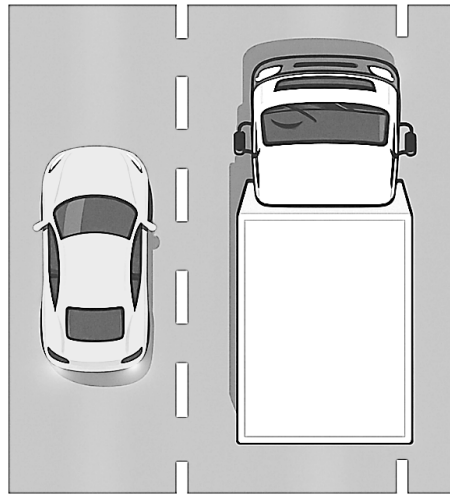
- | | |
|---|---|
| A Laju
<i>Speed</i> | B Halaju
<i>Velocity</i> |
| C Sesaran
<i>Displacement</i> | D Pecutan
<i>Acceleration</i> |
- 5 Seorang pelajar mendapati lebih mudah untuk menggerakkan sebiji bola sepak berbanding bola boling di atas lantai.
A student found that it is easier to move a football 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.

[Lihat halaman sebelah

- 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



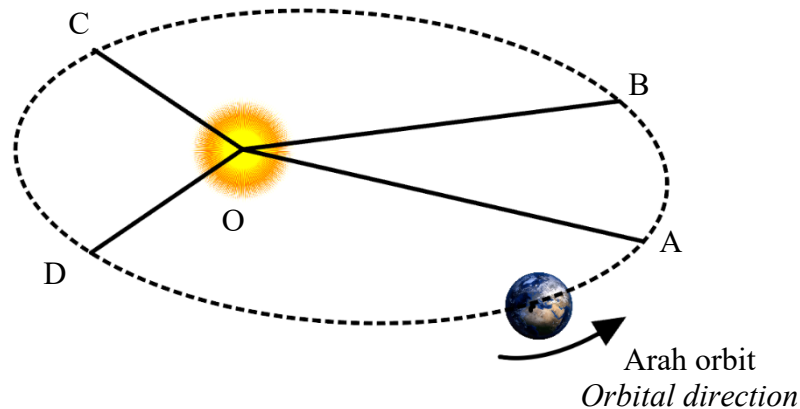
Menangkap bola lisut
Catching a softball

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 <i>Shape of orbit</i>	Ketinggian orbit / m <i>Height of orbit / m</i>	Tempoh orbit / jam <i>Period of orbit / hour</i>
E	Elips <i>Ellipse</i>	3.59×10^3	24.00
F	Elips <i>Ellipse</i>	6.70×10^3	1.41
G	Bulat <i>Circle</i>	3.59×10^7	24.00
H	Bulat <i>Circle</i>	5.43×10^7	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
C F

B G
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

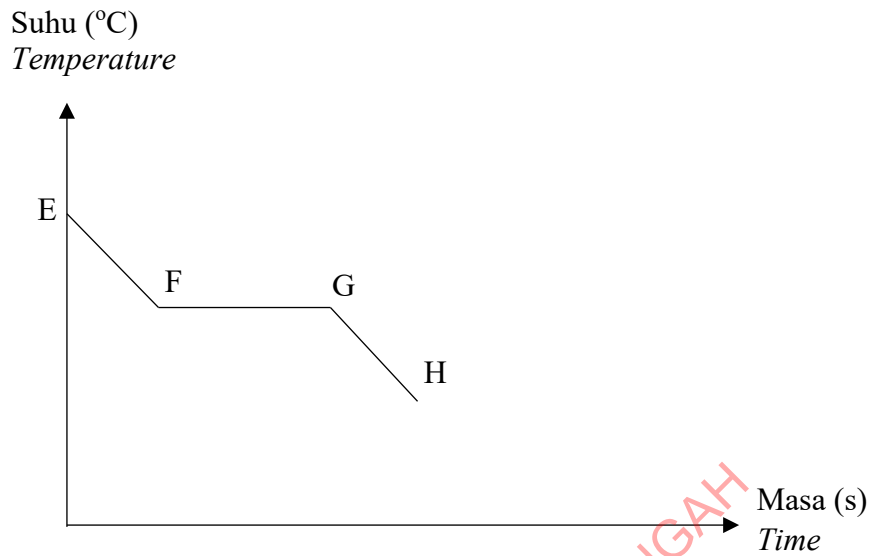
Berapakah tenaga haba yang diperlukan untuk meningkatkan suhu air kepada 100 °C?
What is the heat energy needed to raise the temperature of water to 100 °C?

[Muatan haba tentu air, $c = 4200 \text{ J kg}^{-1} \text{ }^{\circ}\text{C}^{-1}$]

[*Specific heat capacity of water, $c = 4200 \text{ J kg}^{-1} \text{ }^{\circ}\text{C}^{-1}$*]

- A $1.008 \times 10^5 \text{ J}$
B $2.352 \times 10^5 \text{ J}$
C $3.360 \times 10^5 \text{ J}$
D $4.368 \times 10^5 \text{ J}$

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

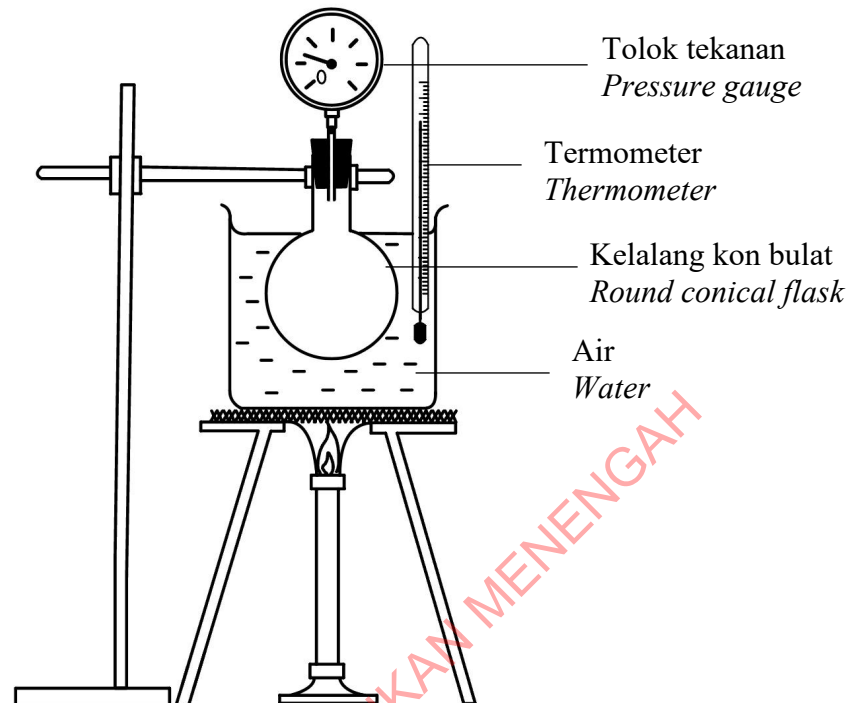


Rajah 7
Diagram 7

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.

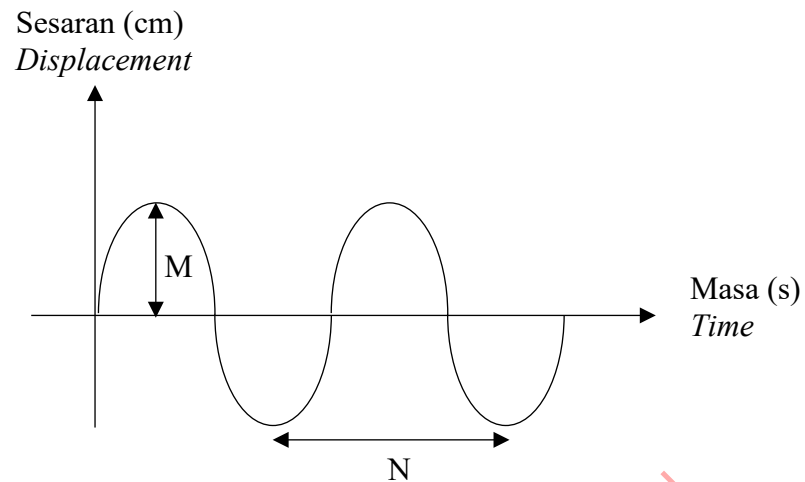


Rajah 8
Diagram 8

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

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

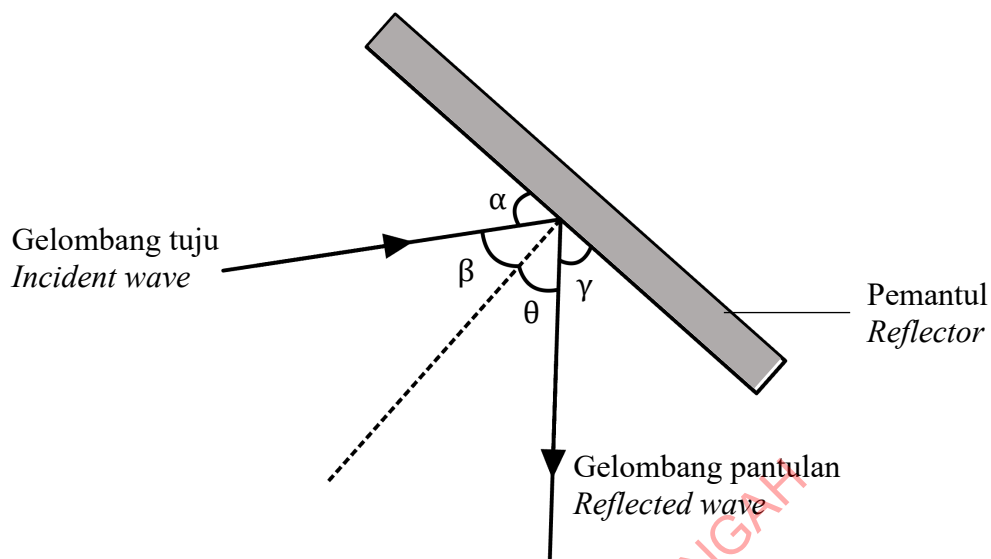


Rajah 9
Diagram 9

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

	M	N
A	Amplitud <i>Amplitude</i>	Tempoh <i>Period</i>
B	Amplitud <i>Amplitude</i>	Panjang gelombang <i>Wavelength</i>
C	Panjang gelombang <i>Wavelength</i>	Amplitud <i>Amplitude</i>
D	Tempoh <i>Period</i>	Amplitud <i>Amplitude</i>

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



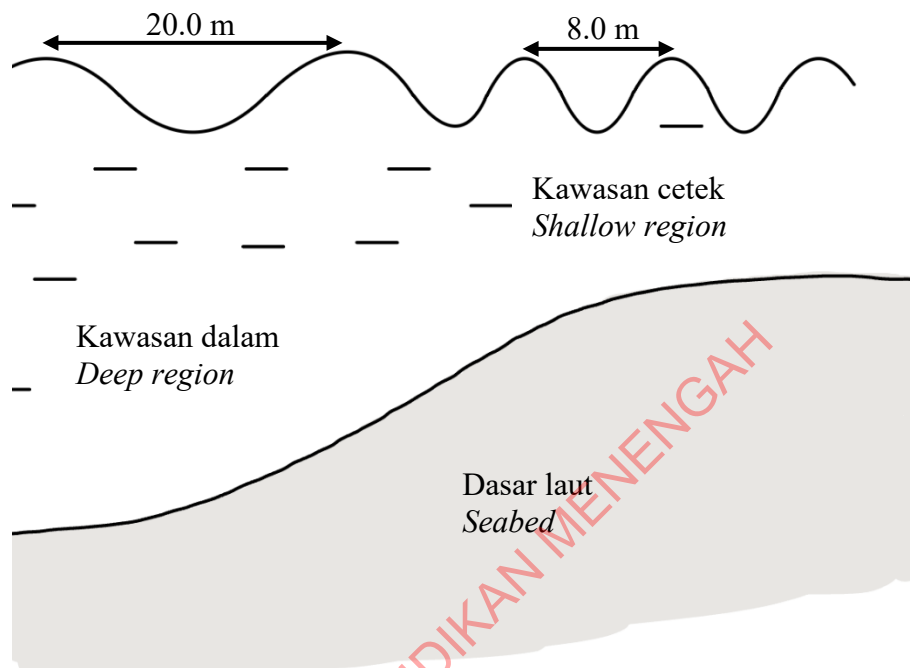
Rajah 10
Diagram 10

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

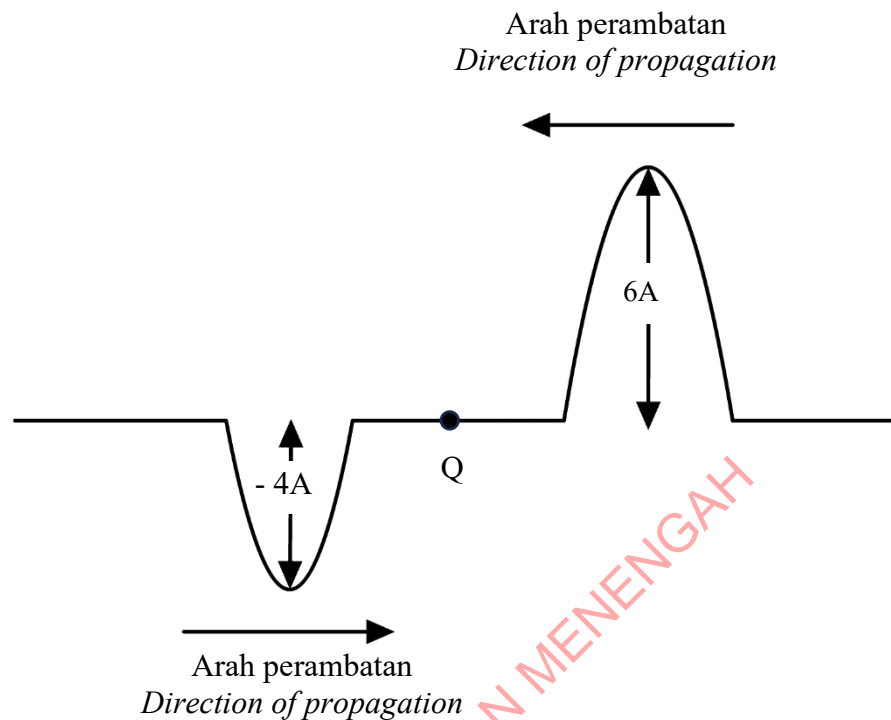
Berapakah laju gelombang di kawasan dalam sekiranya laju gelombang di kawasan cetek adalah 2.5 m s^{-1} ?

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.

- 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?

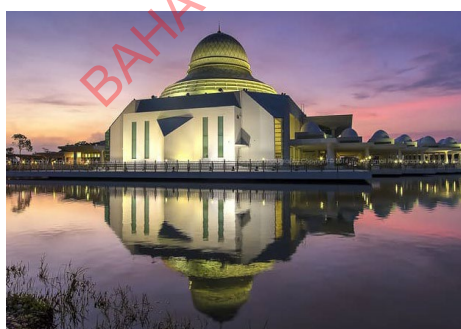
A



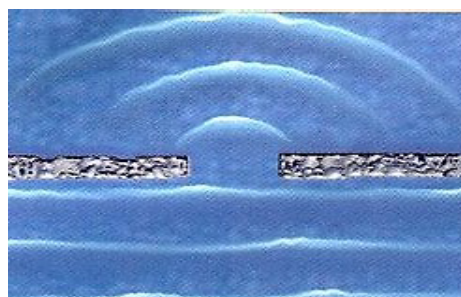
B



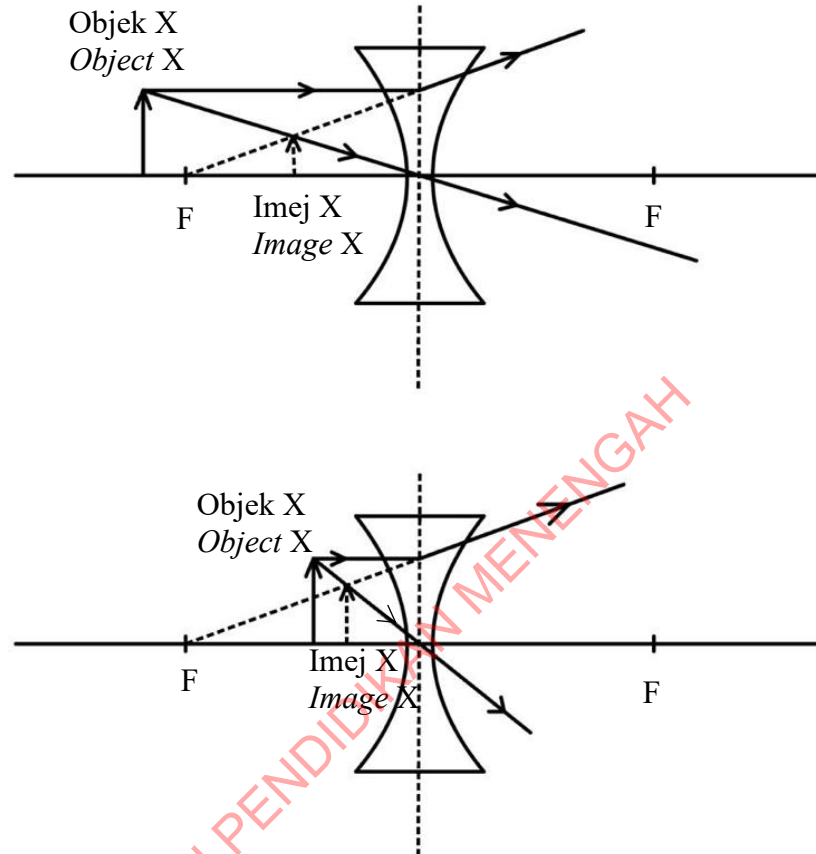
C



D



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

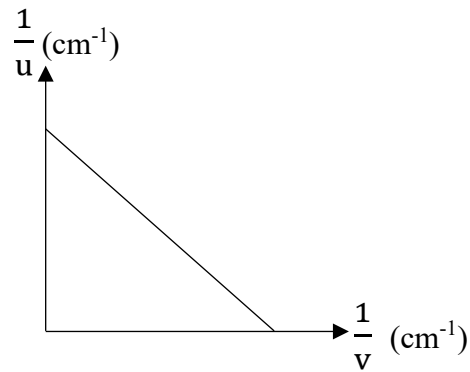


Rajah 14
Diagram 14

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.

- 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

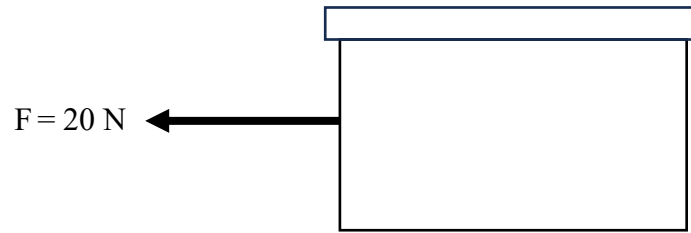
B Tegak
Upright

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.

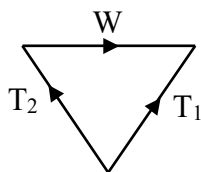
- 25 Rajah 18 menunjukkan satu papan tanda digantung dengan tali.
Diagram 18 shows a signboard hanging on a rope.



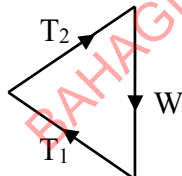
Rajah 18
Diagram 18

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

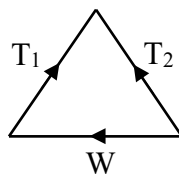
A



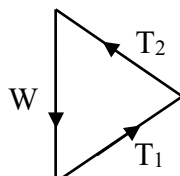
B



C



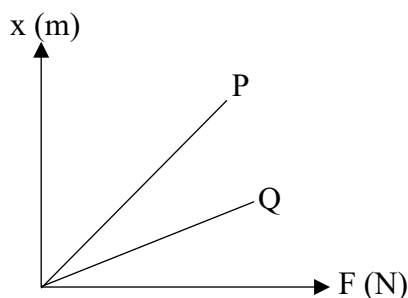
D



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- 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.

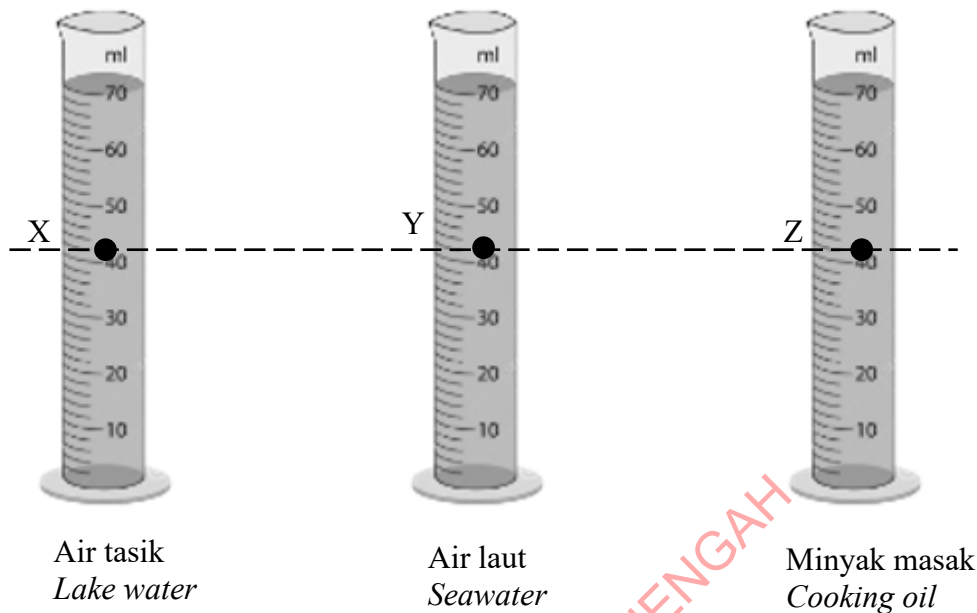


Rajah 19
 Diagram 19

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 <i>Smaller diameter of wire</i>	Diameter dawai besar <i>Larger diameter of wire</i>
B	Diameter spring kecil <i>Small spring diameter</i>	Diameter spring besar <i>Large spring diameter</i>
C	Keluli <i>Steel</i>	Aluminium <i>Aluminium</i>
D	Pendek <i>Short</i>	Panjang <i>Long</i>

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



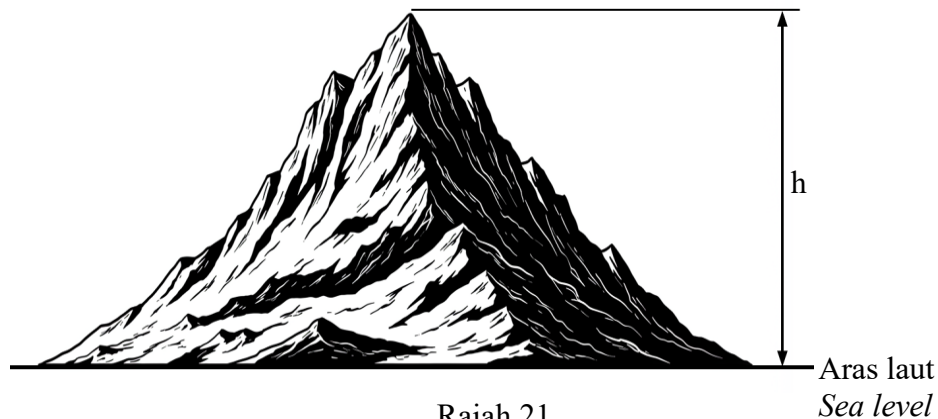
Rajah 20
Diagram 20

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 $P_Y > P_X > P_Z$

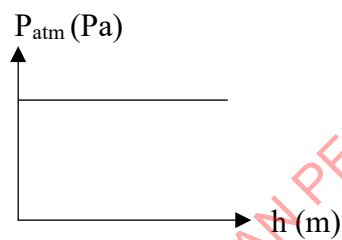
- 28 Rajah 21 menunjukkan sebuah gunung.
Diagram 21 shows a mountain.



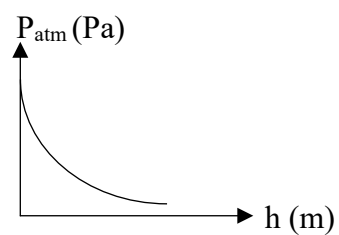
Rajah 21
Diagram 21

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?

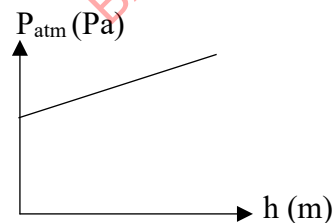
A



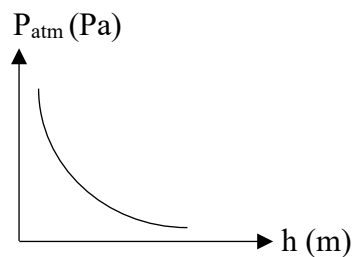
B



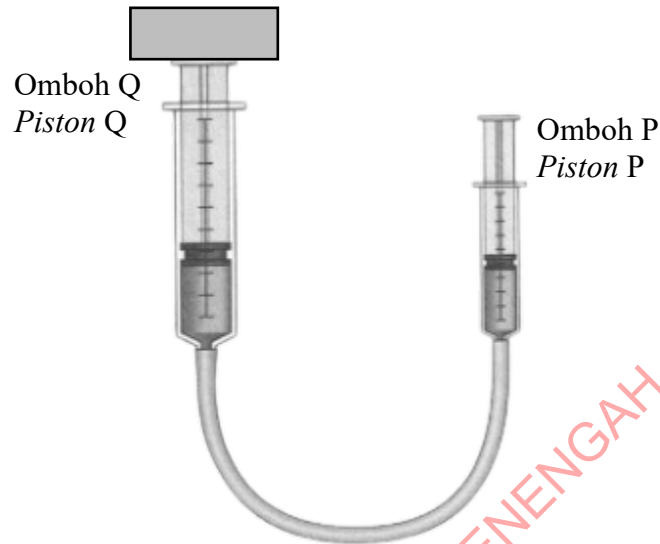
C



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 and 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 ?

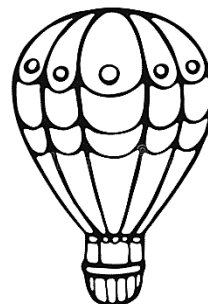
- A 6 N
- B 12 N
- C 24 N
- D 120 N

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

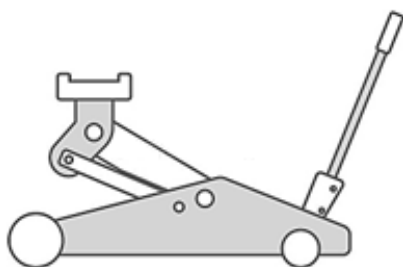
A



B



C



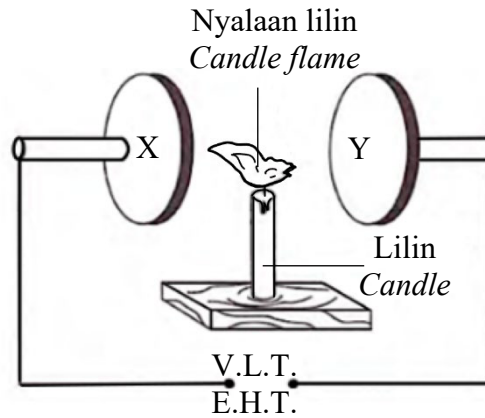
D



BAHAGIAN PENDIDIKAN MENENGAH

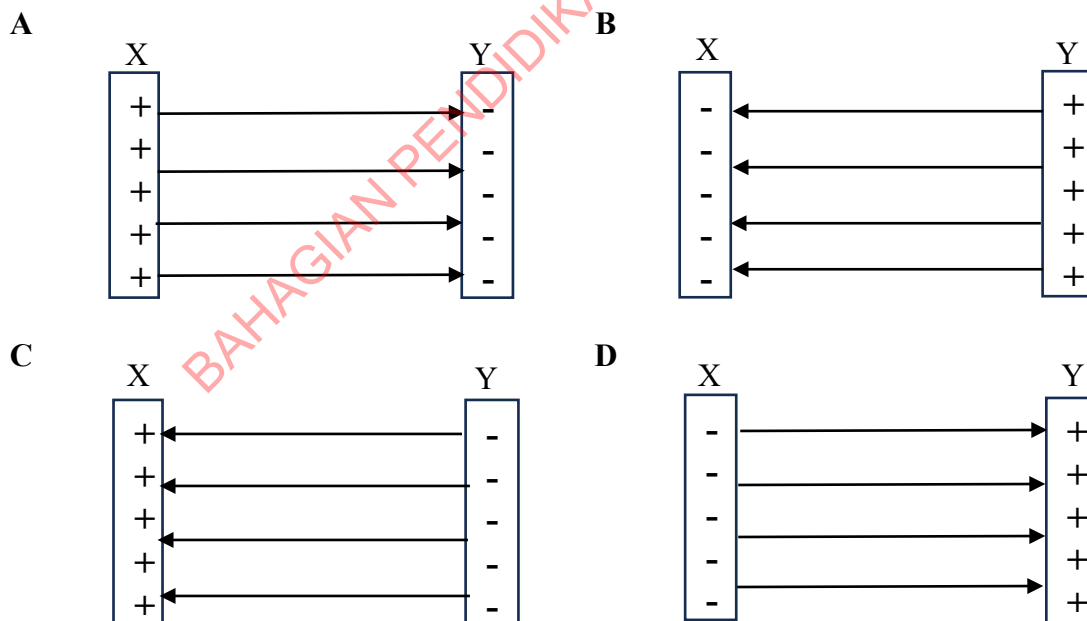
- 31 Rajah 23 menunjukkan bentuk nyalaan lilin apabila diletakkan di antara plat X dan Y yang disambung ke bekalan kuasa V.L.T.

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.

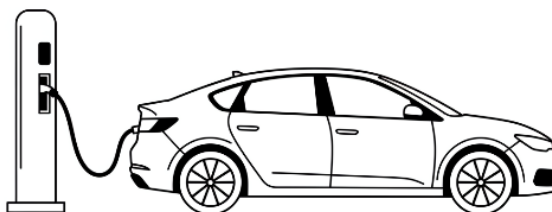


Rajah 23
Diagram 23

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?



- 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 <i>Car model</i>	Kapasiti bateri (kWj) <i>Battery capacity (kWh)</i>	Masa mengecas 0 - 100% (min) <i>Charging time 0 - 100%</i>
K	60	36
L	62	37
M	64	38
N	70	X

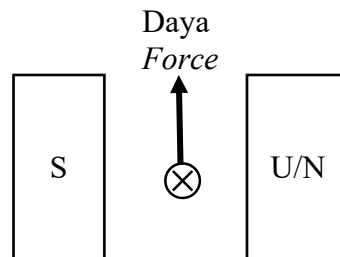
Jadual 2
Table 2

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

- 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.



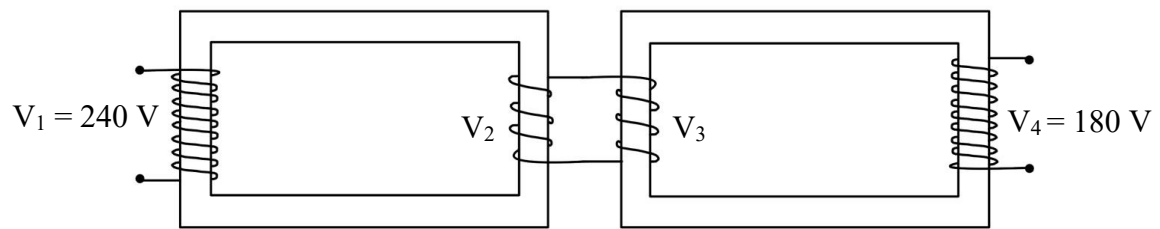
Rajah 25
Diagram 25

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

BAHAGIAN PENDIDIKAN MENENGAH

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

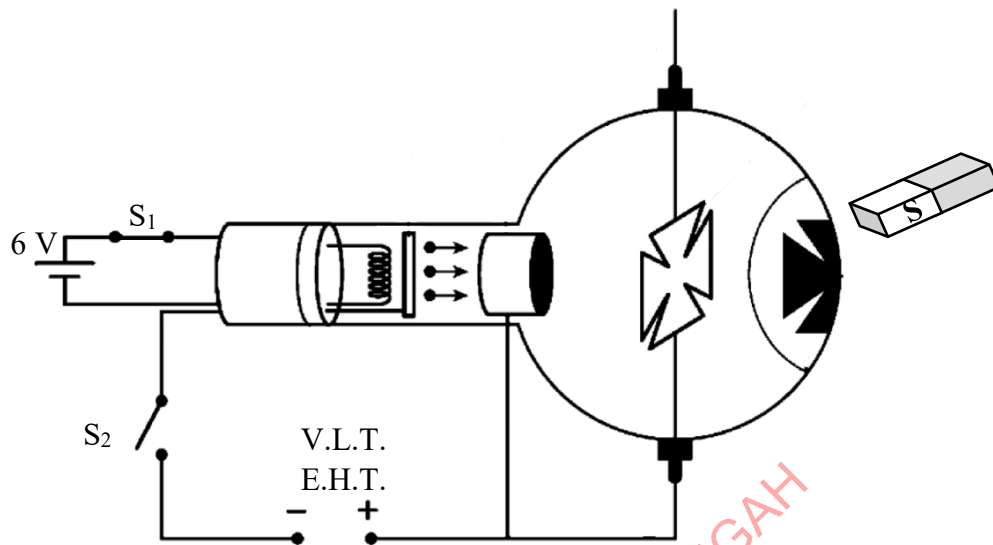


Rajah 26
 Diagram 26

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	$V_1 > V_2$	$V_2 > V_3$	$V_3 > V_4$

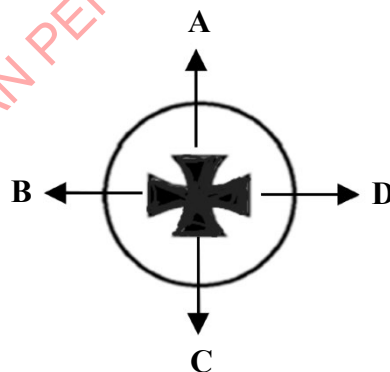
- 35 Rajah 27 menunjukkan satu magnet diletakkan di sisi tiub palang Maltese.
Diagram 27 shows a magnet is placed at the side of the Maltese cross tube.



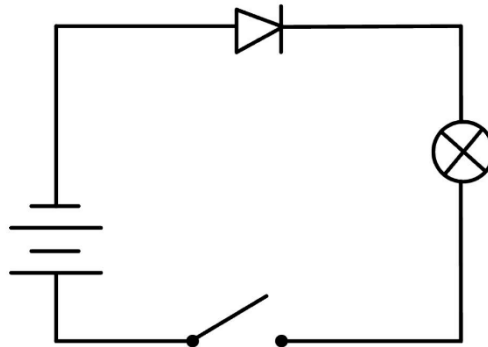
Rajah 27
 Diagram 27

Manakah arah pesongan bayang sinar katod yang diperhatikan di atas skrin apabila suis S₂ dihidupkan?

Which direction of the deflected shadow of cathode ray is observed on the screen when switch S₂ 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

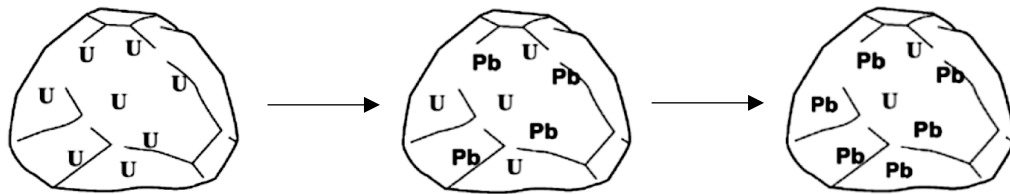
A I dan III
 I and III

B I dan IV
 I and IV

C II dan III
 II and III

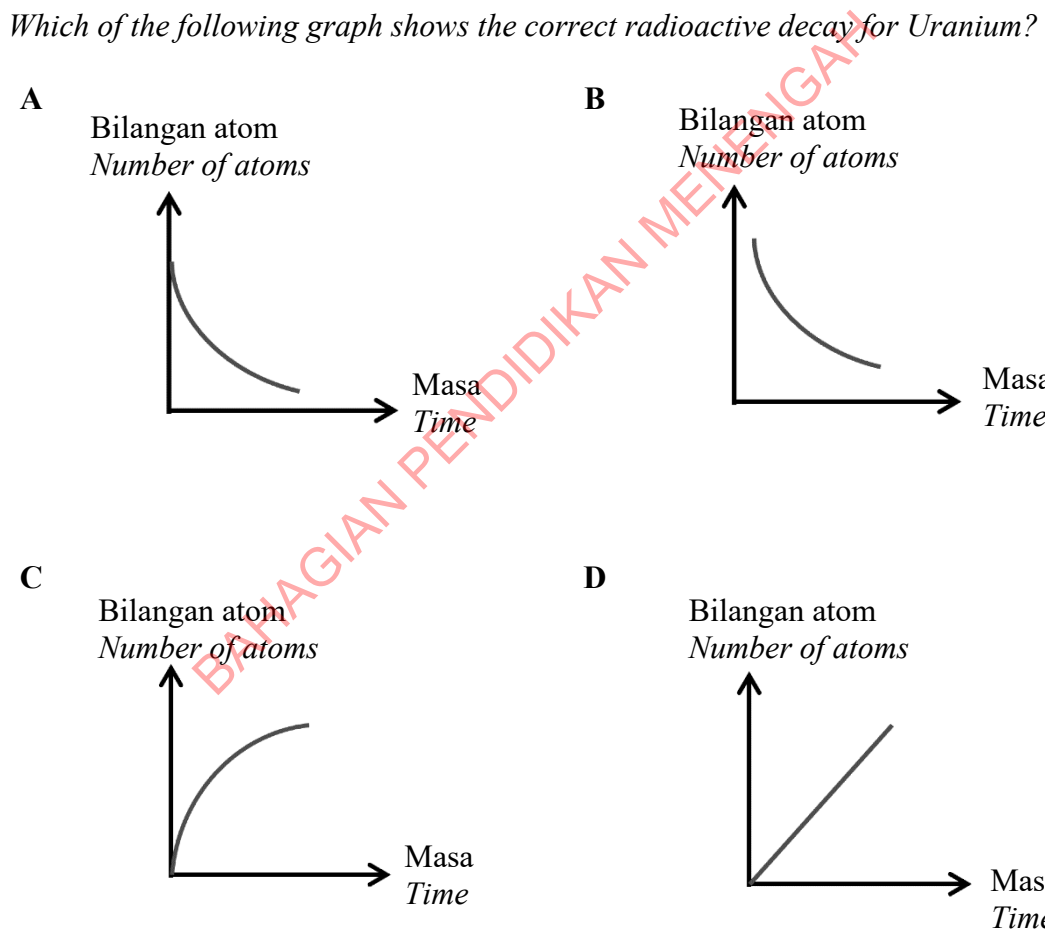
D II dan IV
 II and IV

- 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.

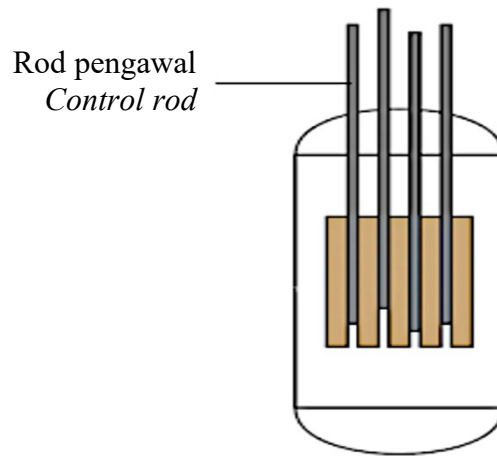


Rajah 29
Diagram 29

Antara berikut, manakah graf yang betul menunjukkan reputan radioaktif untuk Uranium?



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

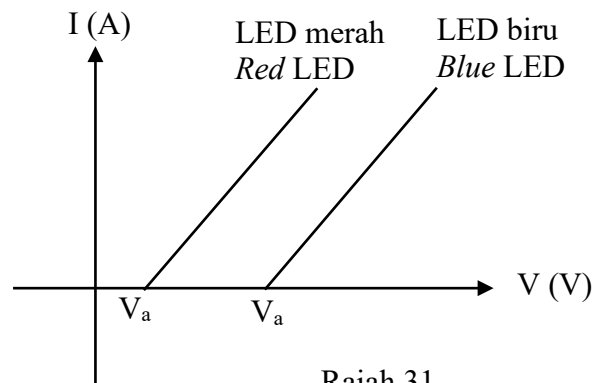


Rajah 30
Diagram 30

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 LEDs of different colours.



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.

BAHAGIAN PENDIDIKAN MENENGAH

KERTAS PEPERIKSAAN TAMAT
END OF QUESTION PAPER

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.