The following information may be useful. The symbols have their usual meaning.

Maklumat berikut mungkin berfaedah. Simbol-simbol mempunyai makna yang biasa.

1. $a = \frac{v - u}{t}$
2. $v^2 = u^2 + 2as$
3. $s = ut + \frac{1}{2}at^2$
4. Momentum = mv
5. $F = ma$
6. Kinetic energy / *Tenaga kinetik* = $\frac{1}{2}mv^2$
7. Gravitational potential energy / *Tenaga keupayaan graviti* = mgh
8. Elastic potential energy / *Tenaga keupayaan kenyal* = $\frac{1}{2}Fx$
9. $\rho = \frac{m}{V}$
10. Pressure / *Tekanan,* $P = h\rho g$
11. Pressure / *Tekanan*, $P = \frac{F}{A}$
12. Heat / *Haba*, $Q = mc\theta$
13. Heat / *Haba*, $Q = ml$
14. $\frac{PV}{T}$ = constant / *pemalar*
15. $E = mc^2$
16. $v = f\lambda$
17. Power, $P = \frac{\text{energy}}{\text{time}}$

    Kuasa, P = $\frac{\text{tenaga}}{\text{masa}}$
18. $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
19. $\lambda = \frac{ax}{D}$
20. $n = \frac{\sin i}{\sin r}$

21. $n = \frac{\text{real depth}}{\text{apparent depth}}$

$n = \frac{\text{dalam nyata}}{\text{dalam ketara}}$

22. $Q = It$

23. $V = IR$

24. $E = VQ$

25. Power / *Kuasa*, $P = IV$

26. $\frac{N_s}{N_p} = \frac{V_s}{V_p}$

27. Efficiency / *Kecekapan* = $\frac{I_S V_S}{I_P V_P} \times 100\%$

28. $g = 10\ ms^{-2}$

29. $c = 3.0 \times 10^8\ ms^{-1}$

1. Diagram 1 shows a student holding a glass rod.

Rajah 1 menunjukkan seorang pelajar memegang sebatang rod kaca.

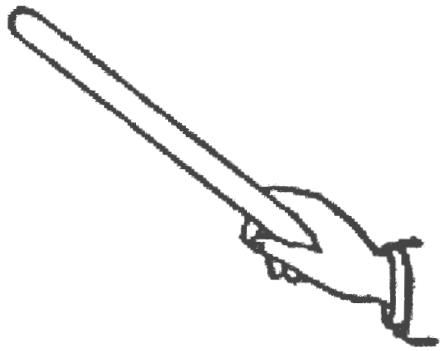


Diagram 1

Rajah 1

The most suitable measuring instrument to measure the length and diameter of the glass rod is

Alat pengukur yang paling sesuai untuk mengukur panjang dan diameter rod kaca itu ialah

	Length *Panjang*	Diameter *Diameter*
A.	Vernier calipers *Angkup vernier*	Metre rule *Pembaris metre*
B.	Vernier calipers *Angkup vernier*	Micrometer screw gauge *Tolok skru mikrometer*
C.	Vernier calipers *Angkup vernier*	Vernier calipers *Angkup vernier*
D.	Metre rule *Pembaris meter*	Micrometer screw gauge *Tolok skru mikrometer*

2. Which of the following physical quantities consists of derived quantities?

Manakah antara kuantiti fizik berikut terdiri daripada kuantiti terbitan?

A. Temperature, time, force
Suhu, masa, daya

B. Electric current, length, time
Arus elektrik, panjang, masa

C. Force, velocity, electric charge
Daya, halaju, cas elektrik

D. Velocity, force, length
Halaju, daya, panjang

3. Which measurement is the shortest?
Ukuran manakah yang paling pendek?

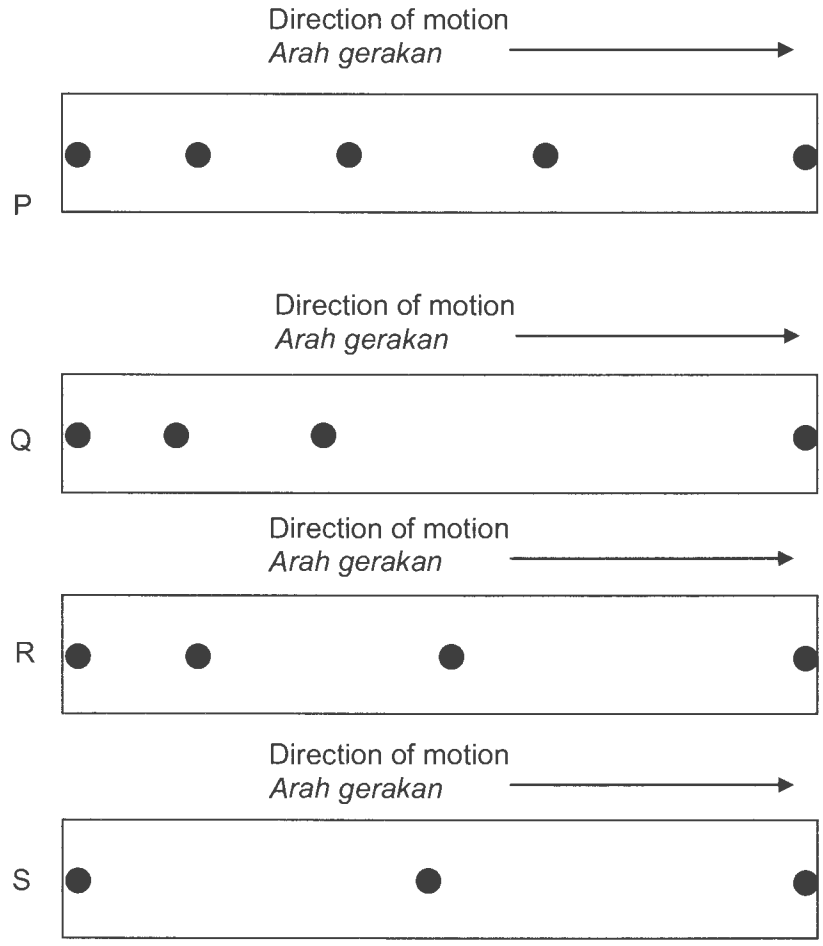
A. 4.56×10^{3} μm

B. 4.56×10^{-2} mm

C. 4.56×10^{3} cm

D. 4.56×10^{-4} m

4. The diagram below shows four ticker tapes P,Q,R and S obtained from an experiment.
Rajah di bawah menunjukkan empat pita detik P,Q,R dan S yang diperoleh daripada satu ujikaji.



Which ticker tape shows the object that has moved at the highest speed?
Pita detik manakah menunjukkan objek yang bergerak dengan kelajuan yang paling tinggi?

A. P

B. Q

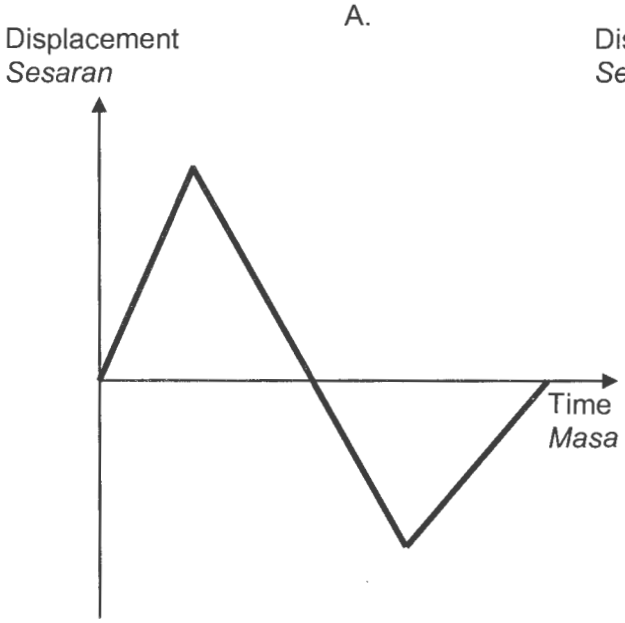
C. R

D. S

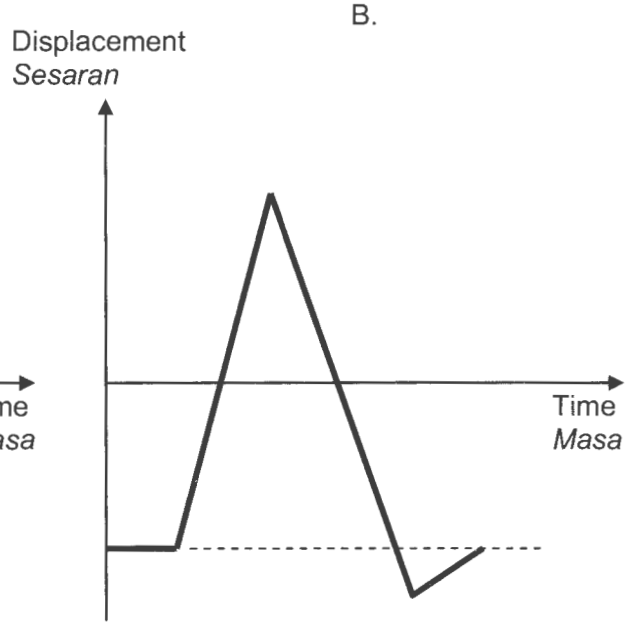
5. Which of the following displacement against time graphs shows that the object does not end its motion at its starting point?

Manakah antara graf sesaran melawan masa berikut menunjukkan bahawa objek tidak berakhir gerakannya pada titik permulaannya?

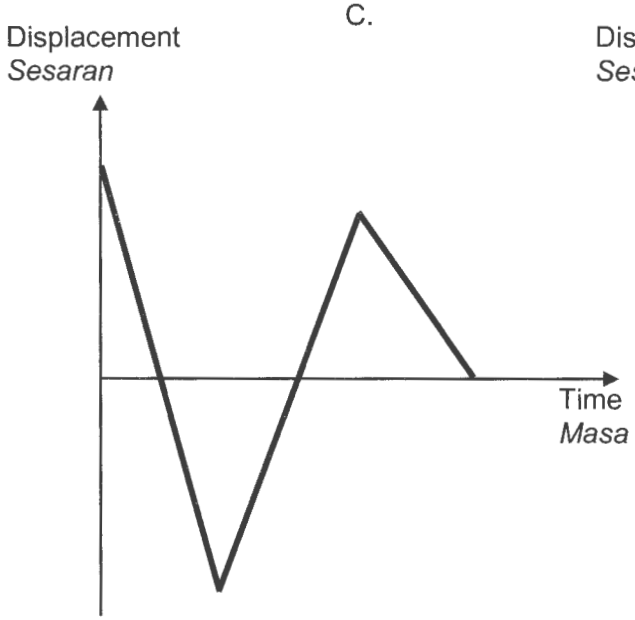
A.



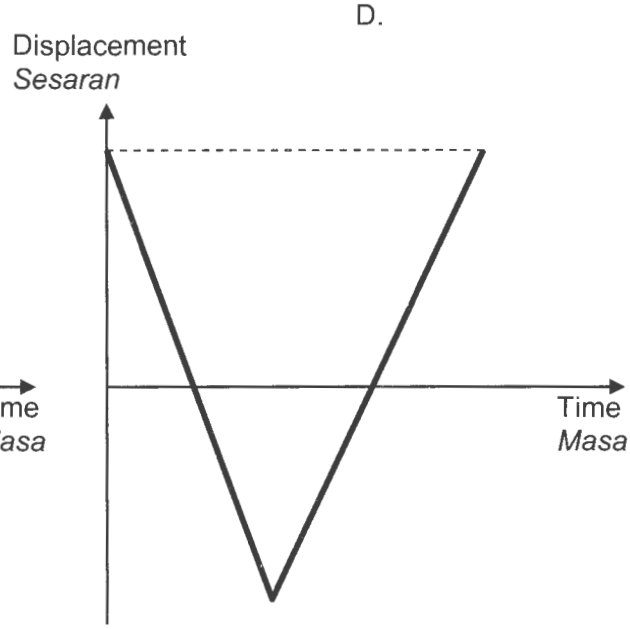
B.



C.



D.



6. Diagram 2 shows water which moves together with the bucket when the bucket is spinning. The water keeps spinning in the bucket when the bucket is stopped quickly.
Rajah 2 menunjukkan air bergerak bersama-sama timba yang berpusing. Air masih berpusing di dalam timba apabila timba diberhenti dengan tiba-tiba.

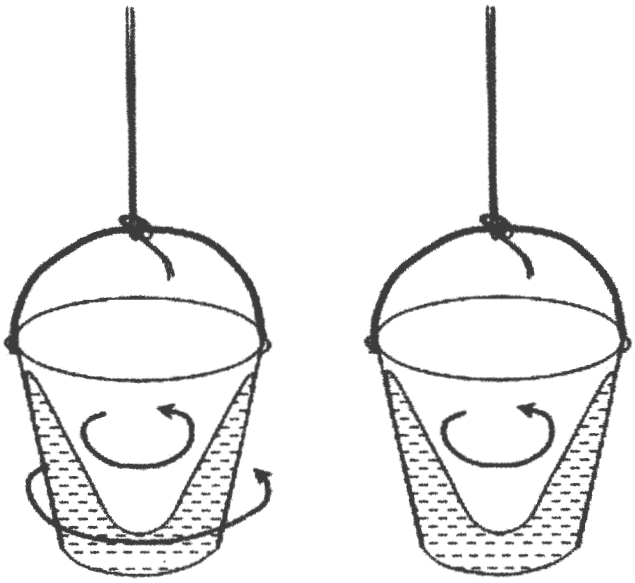


Diagram 2
Rajah 2

Which of the following can explain the situation?
Manakah antara berikut boleh menerangkan situasi ini?

A. Concept of inertia.
Konsep inersia.
B. Equilibrium of forces.
Keseimbangan daya.
C. Principle of conservation of energy.
Prinsip keabadian tenaga.
D. Principle of conservation of momentum.
Prinsip keabadian momentum.

7. Diagram 3 shows a man falling from a height.

Rajah 3 menunjukkan seorang lelaki terjatuh dari suatu ketinggian.

Diagram 3

Rajah 3

Which of the following statements is **true**?

*Manakah antara pernyataan berikut adalah **benar**?*

A. His velocity decreases.

Halajunya berkurang.

B. His acceleration decreases.

Pecutannya berkurang.

C. His kinetic energy decreases.

Tenaga kinetiknya berkurang.

D. His potential energy decreases.

Tenaga keupayaannya berkurang.

8. Diagram 4 shows a block of weight, W which is tied to two strings.The tensions of the strings are T_1 and T_2 respectively.

Rajah 4 menunjukkan satu bongkah dengan berat,W diikat kepada dua tali. Tegangan tali masing-masing ialah T_1 dan T_2.

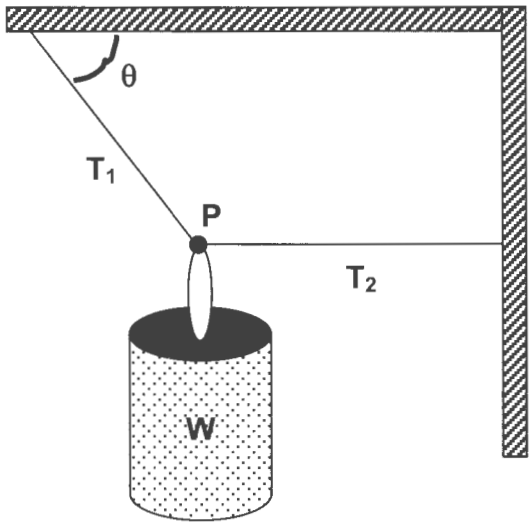


Diagram 4

Rajah 4

Which of the following represents the total vertical component forces which acts at point P?

Manakah antara berikut mewakili jumlah komponen daya menegak yang bertindak pada titik P?

A. $T_2 - T_1 \cos \theta$

B. $T_1 \sin \theta - W$

C. $T_1 + T_2 - W$

D. $T_1 \cos \theta - W$

9. Diagram 5 shows a ball of mass 500 g heading towards a concrete wall at a velocity of 30 ms^{-1}.The ball bounces with a velocity of 20 ms^{-1} after hitting the concrete wall. Calculate the change of momentum of the ball.

Rajah 5 menunjukkan sebiji bola berjisim 500 g menghala ke arah sebuah dinding konkrit pada halaju 30 ms^{-1}.Bola itu melantun pada halaju 20 ms^{-1} selepas menghentam dinding konkrit. Hitungkan perubahan momentum bola.

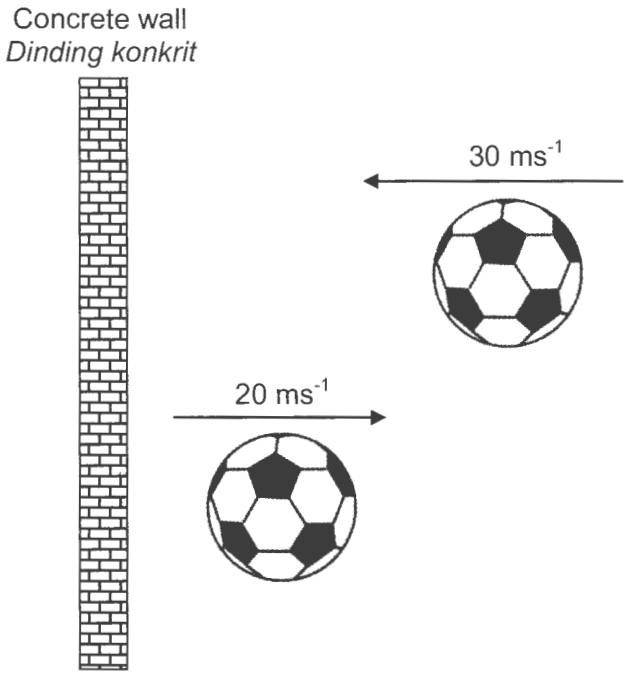


Diagram 5

Rajah 5

A. 5 Ns

B. 25 Ns

C. 5000 Ns

D. 25 000 Ns

10. A 6 cm spring extends 2 cm when a 1 kg load is hung on it as shown in Diagram 6.1. What is the mass of load, M which will produce the observation in Diagram 6.1 when two identical springs as in Diagram 6.2 are used?

Satu spring 6 cm memanjang sebanyak 2 cm apabila disangkutkan dengan beban 1 kg seperti yang ditunjukkan dalam Rajah 6.1. Berapakah jisim beban, M yang akan menghasilkan pemerhatian dalam Rajah 6.2 apabila dua spring yang serupa dalam Rajah 6 digunakan?

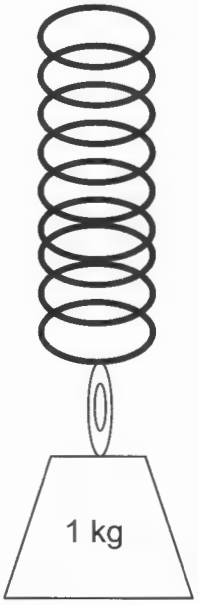


Diagram 6.1

Rajah 6.1

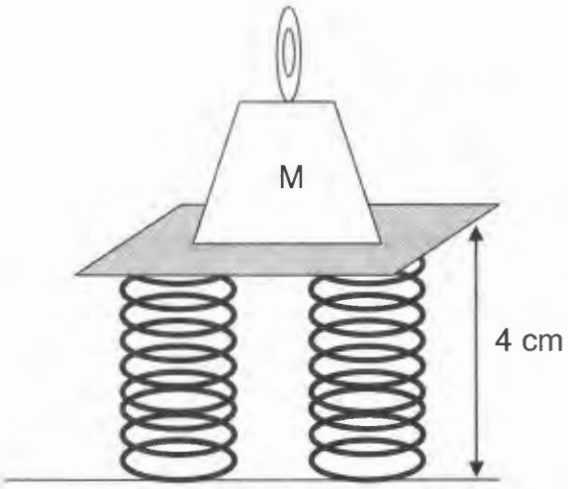


Diagram 6.2

Rajah 6.2

A. 1 kg.

B. 2 kg.

C. 3 kg.

D. 4 kg.

11. Which shoe would exert the **least** pressure on the ground when worn by the same lady?
*Kasut manakah menghasilkan tekanan yang **paling kecil** pada permukaan tanah apabila dipakai oleh seorang perempuan yang sama?*

A.

B.

C.

D.

12. Diagram 7 shows a container with a hole squirting out water.
Rajah 7 menunjukkan satu bekas berlubang sedang memancutkan air.

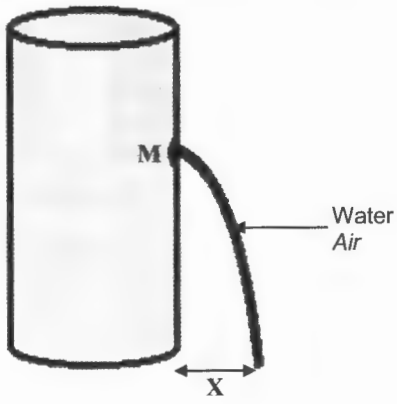


Diagram 7
Rajah 7

Distance X can be increased by
Jarak X boleh ditambahkan dengan

A. lowering the hole M.
merendahkan lubang M.

B. replacing water with oil.
menggantikan air dengan minyak.

C. using a wider container.
menggunakan bekas yang lebih lebar.

D. lowering the water level in the container.
merendahkan paras air dalam bekas.

13. Diagram 8 shows two ping pong balls which move towards each other when air is blown between them.

Rajah 8 menunjukkan dua bola ping pong yang bergerak ke arah satu sama lain apabila udara ditiup di antaranya.

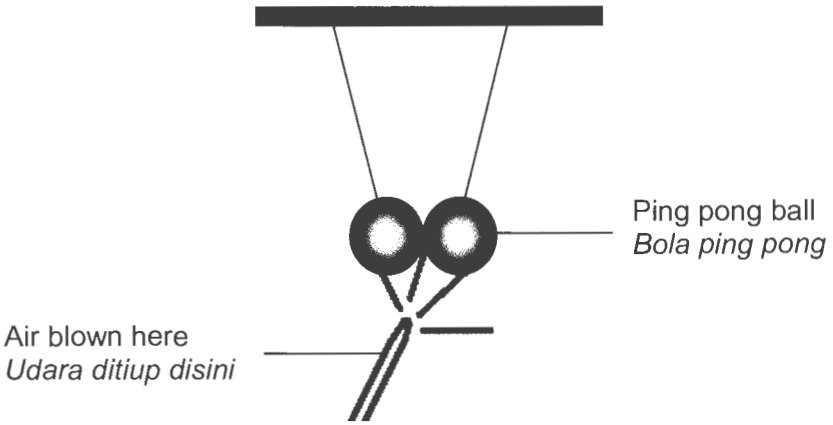


Diagram 8

Rajah 8

Which of the following principles can explain the observation?

Manakah antara prinsip berikut boleh menerangkan pemerhatian tersebut?

A. Pascal's Principle.
Prinsip Pascal.

B. Bernoulli's Principle.
Prinsip Bernoulli.

C. Archimedes' Principle.
Prinsip Archimedes.

D. Principle of fluid mechanics.
Prinsip mekanik bendalir.

14. Diagram 9 shows a hydraulic brake system of a car.

Rajah 9 menunjukkan satu sistem brek hidraulik sebuah kereta.

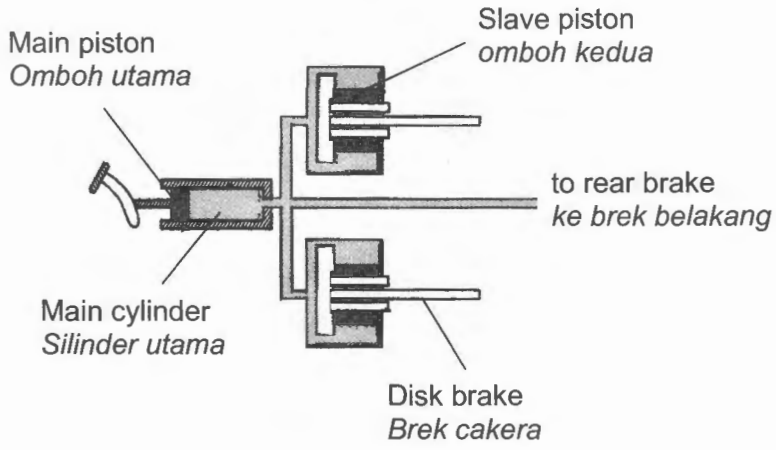


Diagram 9

Rajah 9

The main piston cylinder of the brake is smaller than the slave piston cylinder.This is because of

Silinder piston utama lebih kecil daripada silinder piston kedua.Ini disebabkan oleh

A. the small pressure applied at the main piston producing a high pressure at the slave piston.
tekanan yang kecil dikenakan ke atas omboh utama menghasilkan tekanan besar ke atas omboh kedua.

B. the high pressure applied at the main piston producing a small pressure at the slave piston.
tekanan yang besar dikenakan ke atas omboh utama menghasilkan tekanan kecil ke atas omboh kedua.

C. a large force applied at the main piston producing a small force at the slave piston.
daya yang besar dikenakan ke atas omboh utama menghasilkan daya yang kecil ke atas omboh kedua.

D. a small force applied at the main piston producing a large force at the slave piston.
daya yang kecil dikenakan ke atas omboh utama menghasilkan daya yang besar ke atas omboh kedua.

15. Diagram 10 shows a glass before and after ice cubes are put in the water.

Rajah 10 menunujukkan sebiji gelas sebelum dan selepas ketulan ais dimasukkan ke dalam air.

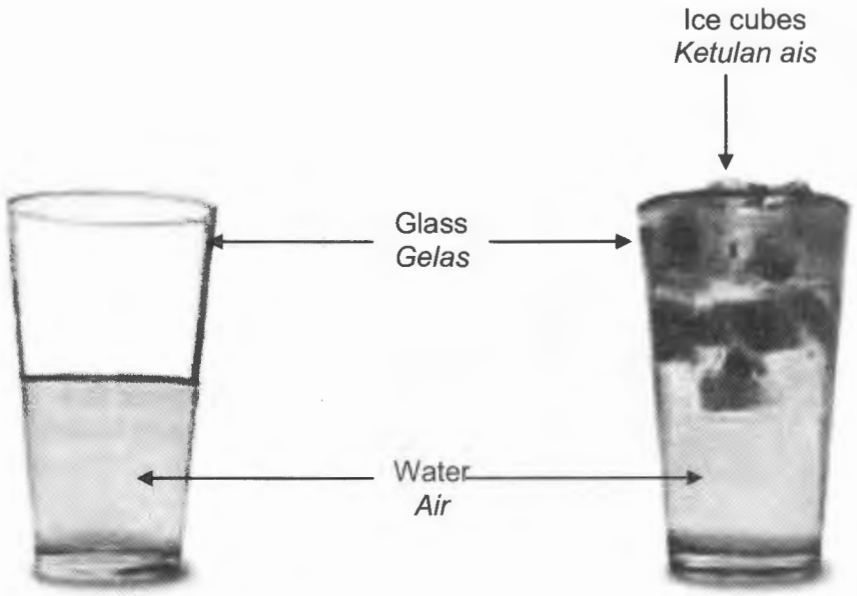


Diagram 10

Rajah 10

Which of the following statements about the ice cubes is **correct**?

*Antara pernyataan berikut,yang manakah **betul** tentang ketulan ais?*

A. The weight of ice cubes is equal to the volume of water displaced.
Berat ketulan ais adalah sama dengan isipadu air yang disesarkan.

B. The weight of ice cubes is more than the weight of water displaced.
Berat ketulan ais adalah melebihi berat air yang disesarkan.

C. The weight of the ice cubes is equal to the weight of water displaced.
Berat ketulan ais adalah sama dengan berat air yang disesarkan.

D. The weight of the ice cubes is less than the weight of water displaced.
Berat ketulan ais adalah kurang daripada berat air yang disesarkan

16. Diagram 11 shows a submarine.

Rajah 11 menunjukkan sebuah kapal selam.

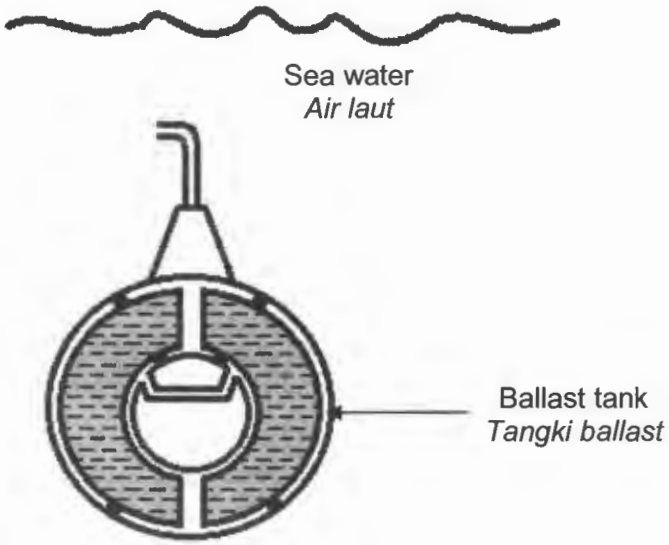


Diagram 11

Rajah 11

When water is pumped into the ballast tank, the submarine will sink because

Apabila air dipam masuk ke dalam tangki ballast, kapal selam tersebut akan tenggelam kerana

A. weight of submarine < upthrust

berat kapal selam < daya tujah ke atas.

B. weight of submarine = upthrust

berat kapal selam = daya tujah ke atas.

C. weight of submarine > upthrust

berat kapal selam > daya tujah ke atas

17. Diagram 12 shows a bag commonly used by students.

Rajah 12 menunjukkan sebuah beg yang biasa digunakan oleh pelajar.

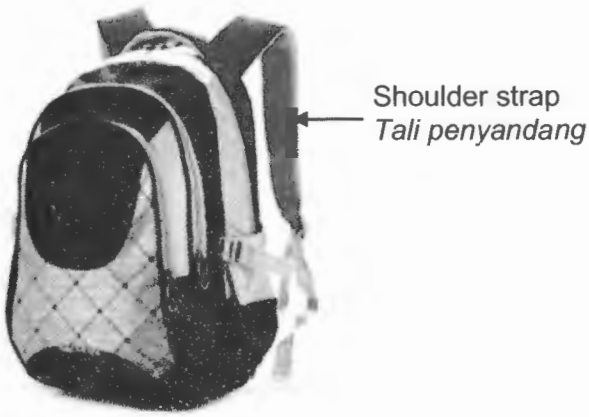


Diagram 12

Rajah 12

Why is the shoulder strap widé?

Mengapakah tali penyandang adalah lebar?

A. To increase weight and pressure.
Untuk menambahkan berat dan tekanan.

B. To decrease weight and pressure.
Untuk mengurangkan berat dan tekanan.

C. To increase surface area and to decrease pressure.
Untuk menambahkan luas permukaan dan mengurangkan tekanan.

D. To decrease surface area and to increase weight.
Untuk mengurangkan luas permukaan dan menambahkan berat

18. Diagram 13 shows a hydraulic system.

Rajah 13 menunjukkan satu sistem hidraulik.

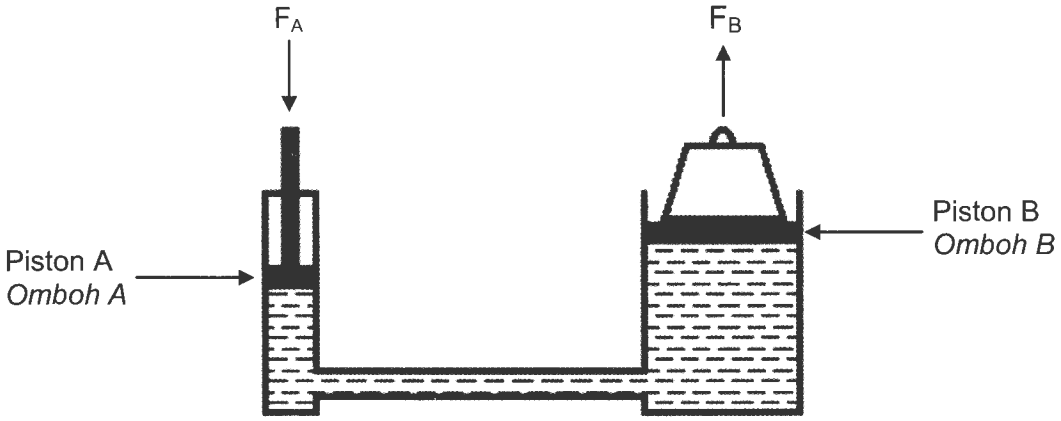


Diagram 13

Rajah 13

Given area A is 0.01 m^2 and area B is 0.02 m^2.

Diberi luas A ialah 0.01 m^2 *dan luas B ialah* 0.02 m^2.

What is the maximum force, F_B that can be supported by 20 N of the force, F_A applied on piston A?

Apakah daya maksimum, F_B yang boleh disokong oleh 20 N daya, F_A yang dikenakan pada omboh A?

A. 2 N.

B. 4 N.

C. 20 N.

D. 40 N.

19. Diagram 14 shows hot coffee being poured into a cup.

Rajah 14 menunjukkan kopi panas dituang ke dalam cawan.

Diagram 14

Rajah 14

What happens when the coffee and the cup reach thermal equilibrium?

Apakah yang berlaku apabila kopi dan cawan itu mencapai keseimbangan terma?

A. The temperature of the cup is increasing.
Suhu cawan semakin meningkat.

B. The temperature of the coffee is decreasing.
Suhu kopi semakin berkurang.

C. There is a net heat flow from the coffee to the cup.
Terdapat pengaliran haba bersih daripada kopi ke cawan.

D. The net heat flow from the coffee to the cup is equal to zero.
Pengaliran haba bersih dari kopi ke cawan adalah sifar.

20. Diagram 15 below shows the heating curve of water.

Rajah 15 di bawah menunjukkan lengkung pemanasan bagi air.

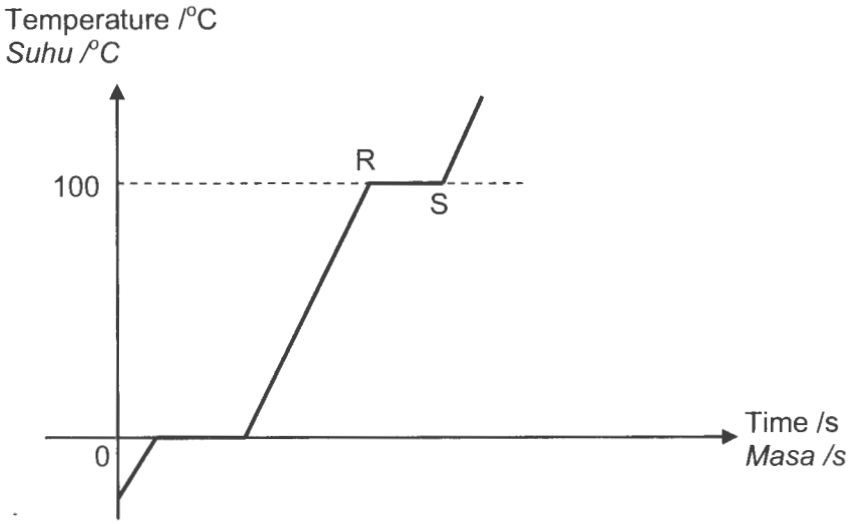


Diagram 15

Rajah 15

At point R to S, there is no rise in temperature when heat is supplied to change the water to steam. Which of the following explains this observation?

Pada titik R hingga S, suhu tidak meningkat apabila haba dibekalkan untuk menukarkan air kepada wap air. Antara berikut yang manakah menerangkan pemerhatian tersebut?

A. The heat is used to exert pressure on the molecules.
Haba digunakan untuk mengenakan tekanan pada molekul-molekul.

B. The heat is used to increase the vibrations of the molecules.
Haba digunakan untuk meningkatkan getaran molekul-molekul.

C. The heat is used to increase the kinetic energy of the molecules.
Haba digunakan untuk meningkatkan tenaga kinetik molekul-molekul.

D. The heat is used to overcome the attractive forces between the molecules.
Haba digunakan untuk mengatasi daya tarikan antara molekul-molekul.

21. The air pressure in a car tyre is 210 kPa at a temperature of 27 °C as shown in Diagram 16. What is the air pressure in the tyre when the temperature is 37 °C?
[Assume the volume of the air in the tyre is constant]
Tekanan udara dalam tayar kereta ialah 210 kPa pada suhu 27°C seperti yang ditunjukkan dalam Rajah 16. Berapakah tekanan dalam tayar tersebut pada suhu 37°C?
[*Anggap isipadu udara dalam tayar adalah tetap*]

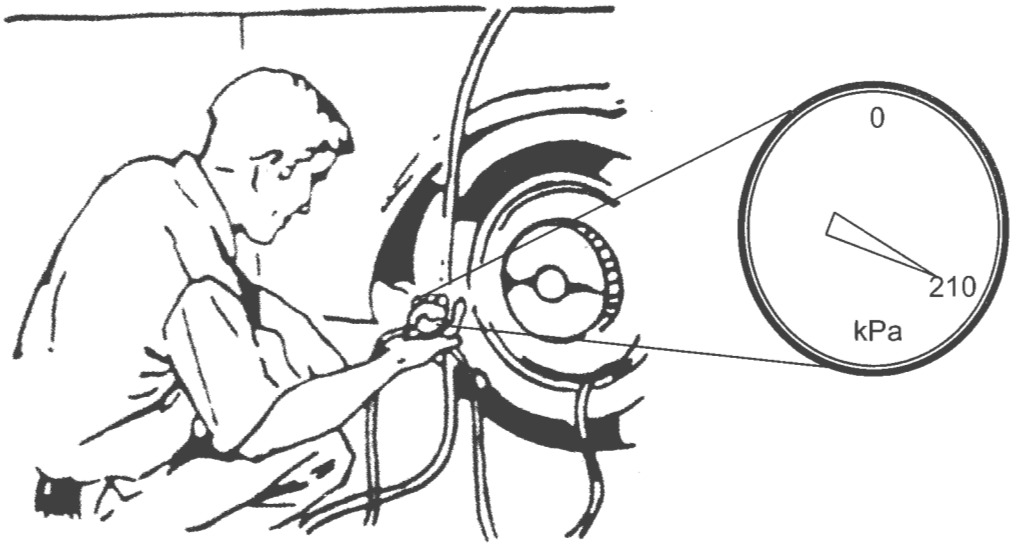


Diagram 16
Rajah 16

A. 153 kPa.
B. 203 kPa.
C. 217 kPa.
D. 288 kPa.

22. Diagram 17 below shows an arrangement of apparatus to investigate the relationship between the volume of air column, V and the temperature, T for a fixed mass of air.
Rajah 17 di bawah menunjukkan suatu susunan radas untuk mengkaji hubungan antara isipadu turus udara, V dan suhu, T bagi suatu jisim udara yang malar.

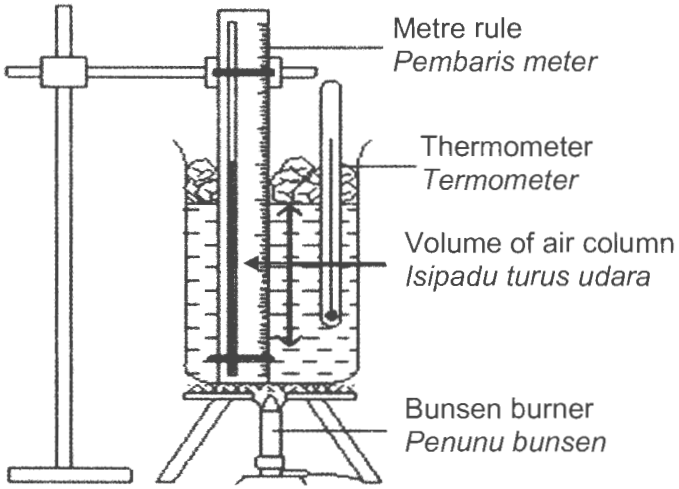
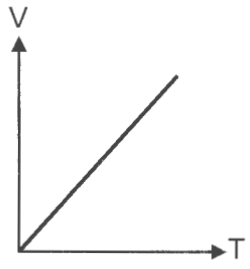


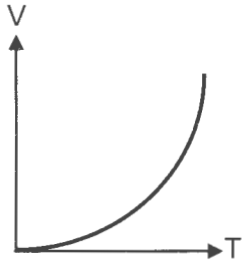
Diagram 17
Rajah 17

Which of the following graphs shows the relationship between V and T, where T is the temperature measured in Kelvin?
Graf yang manakah menunjukkan hubungan V dengan T, di mana T ialah suhu dalam unit Kelvin?

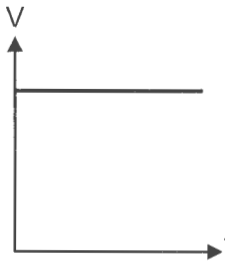
A.



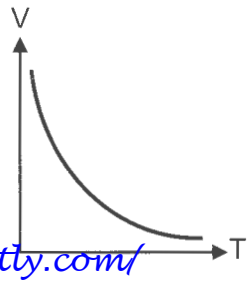
B.



C.



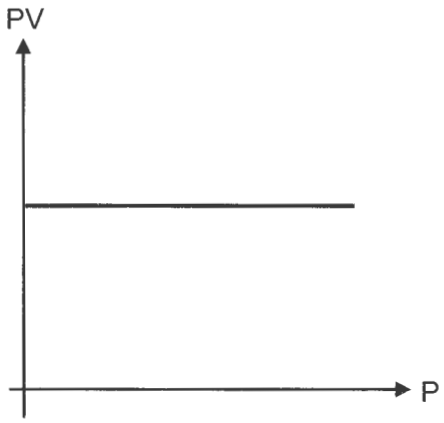
D.



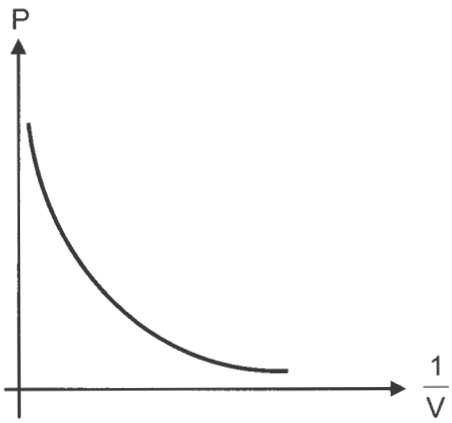
23. Which graph shows the relationship between the pressure,P and volume of a gas,V that obeys Boyle's Law?

Graf manakah menunjukkan hubungan antara tekanan,P dan isipadu bagi suatu gas,V yang mematuhi Hukum Boyle?

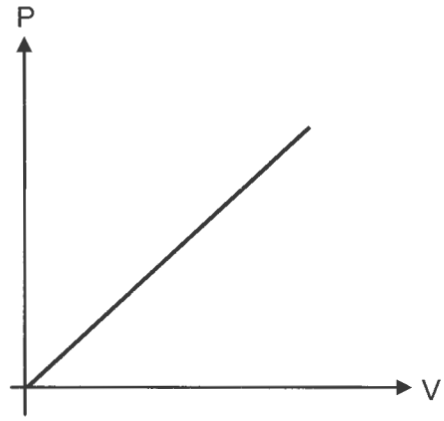
A.



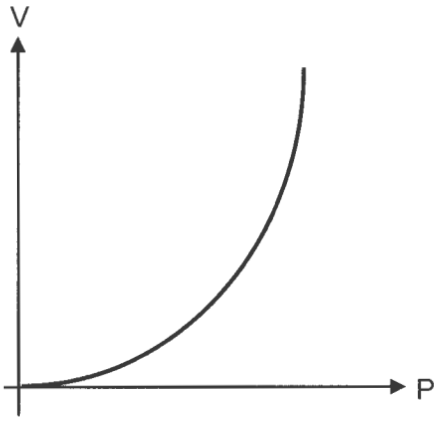
B.



C.



D.



24. Diagram 18 shows an image of a ship which appears in sea water.

Rajah 18 menunjukkan satu imej kapal laut yang kelihatan dalam air laut.

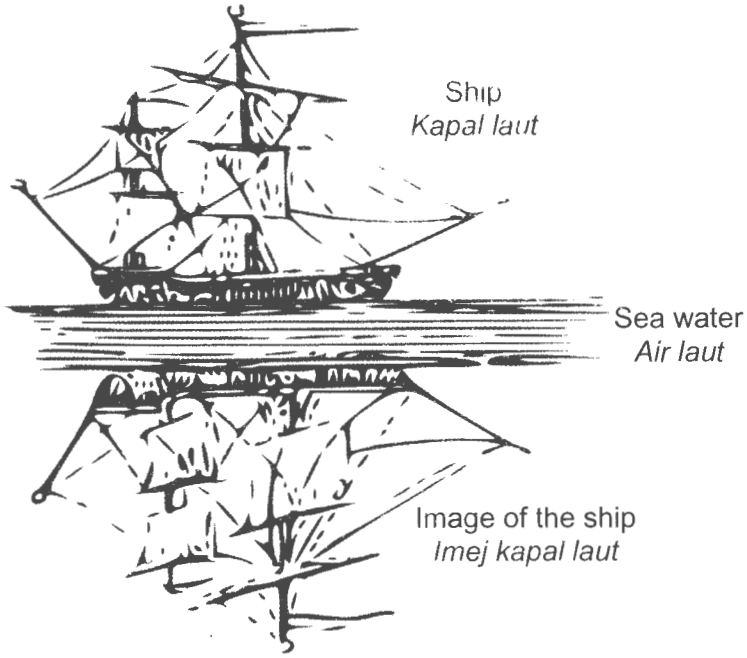


Diagram 18

Rajah 18

The formation of image of the ship is due to

Pembentukkan imej kapal laut disebabkan oleh

A. the reflection of light.
pantulan cahaya.

B. the refraction of light.
pembiasan cahaya.

C. real depth and apparent depth.
dalam nyata dan dalam ketara.

D. total internal reflection of light
pantulan dalam penuh cahaya

25. Diagram 19 shows a side mirror mounted on a bus

Rajah 19 menunjukkan satu cermin sisi yang dipasang pada sebuah bas

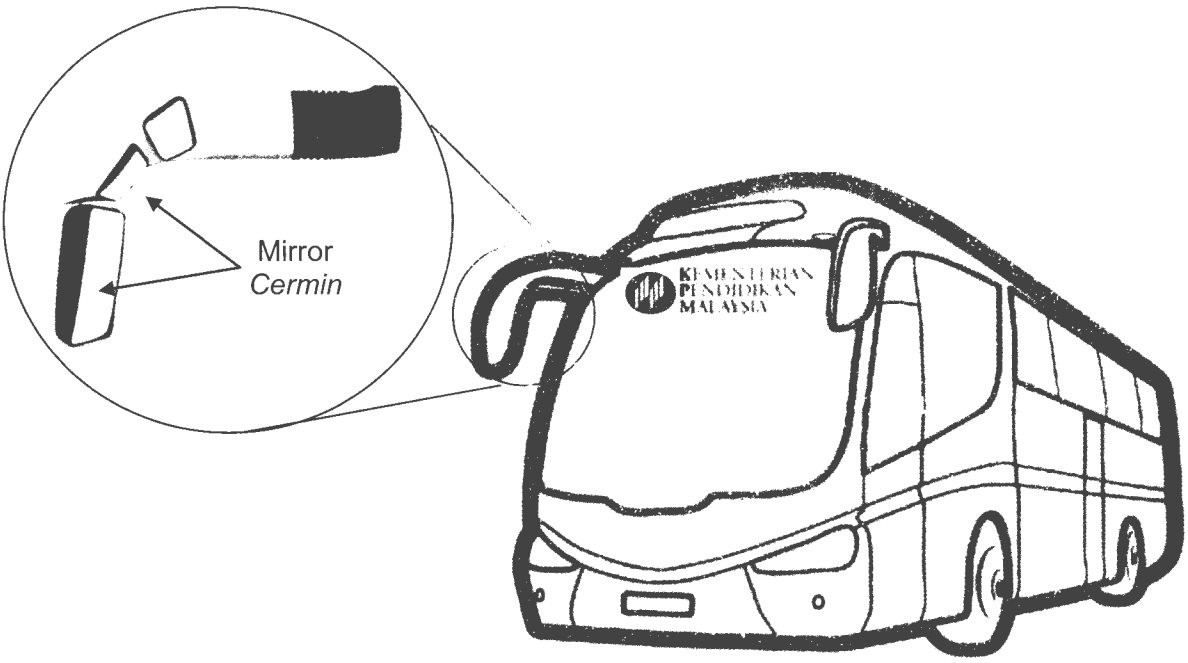


Diagram 19

Rajah 19

Which of the following statements is **not** true about the mirror?

*Manakah antara pernyataan berikut **tidak** benar mengenai cermin tersebut?*

A. A type of convex mirror.
Sejenis cermin cembung.

B. Increases the field of view.
Meningkatkan medan penglihatan

C. Always produces an upright image
Sentiasa menghasilkan imej tegak

D. Sometimes produces a virtual image
Kadang-kadang menghasilkan imej maya

26. Diagram 20 shows an observer looking at an image of an object in a cylinder. The observer keeps watching as water from the tap flows into the cylinder.

Rajah 20 menunjukkan seorang pemerhati melihat imej bagi satu objek yang berada di dalam silinder. Pemerhati terus memerhati semasa air dari pili mengalir ke dalam silinder.

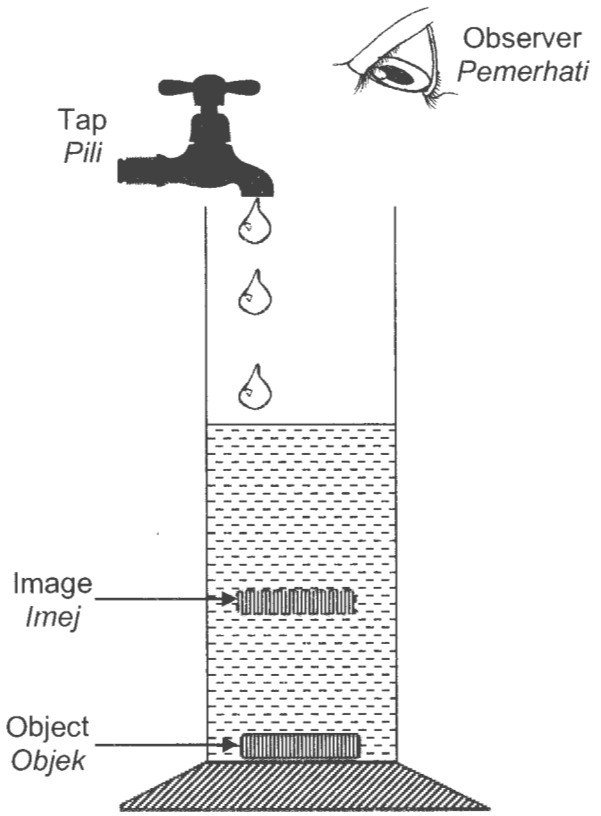


Diagram 20

Rajah 20

What happens to the image of the object after some time?

Apakah yang berlaku kepada imej bagi objek selepas beberapa ketika?

A. Stays at its position.
Kekal pada kedudukannya.

B. Gets closer to the observer.
Semakin dekat dengan pemerhati.

C. Gets further from the observer.
Semakin menjauhi permerhati.

D. Gradually disappears from the sight of the observer.
Semakin hilang dari pandangan pemerhati.

27. Diagram 21 shows a light signal being propagated in an optical fibre.

Rajah 21 menunjukkan satu isyarat cahaya merambat dalam satu serabut optik.

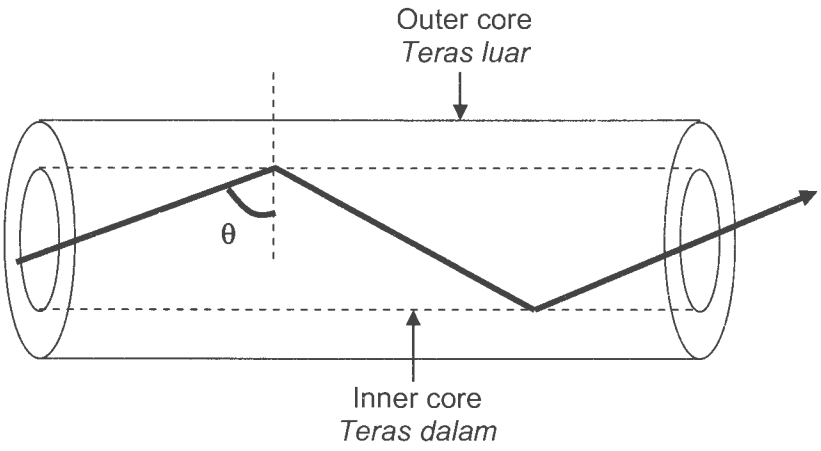


Diagram 21

Rajah 21

Which of the following combinations of θ and density of the core is able to ensure that the light signal goes out of the optical fibre?

Manakah antara kombinasi θ dan ketumpatan teras berikut mampu memastikan isyarat cahaya keluar dari serabut optik?

	θ *θ*	Density of core *Ketumpatan teras*
A.	Bigger than the critical angle of outer core. *Lebih besar daripada sudut genting teras luar.*	Outer core is bigger than inner core. *Teras luar lebih besar daripada teras dalam.*
B.	Smaller than the critical angle of outer core. *Lebih kecil daripada sudut genting teras luar.*	Outer core smaller than inner core. *Teras luar lebih kecil daripada teras dalam.*
C.	Bigger than the critical angle of inner core. *Lebih besar daripada sudut genting teras dalam.*	Inner core is bigger than outer core. *Teras dalam lebih besar daripada teras luar.*
D.	Smaller than the critical angle of inner core. *Lebih kecil daripada sudut genting teras dalam.*	Inner core is smaller than outer core. *Teras dalam lebih kecil daripada teras luar.*

28. Diagram 22 shows an object and its image for a concave lens.

Rajah 22 menunjukkan satu objek dan imejnya bagi sebuah kanta cekung.

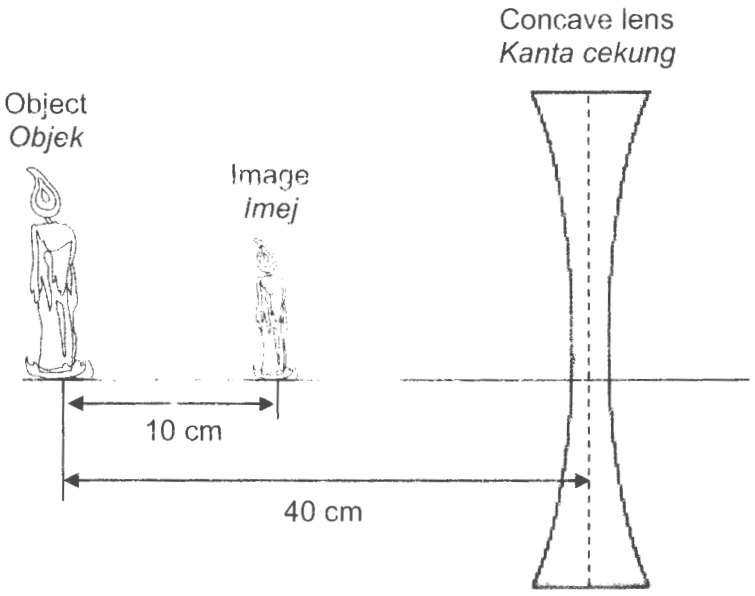


Diagram 22

Rajah 22

Calculate the power of the concave lens.

Hitungkan kuasa kanta cekung tersebut.

A. – 0.83 D

B. – 5.83 D

C. – 7.50 D

D. – 12.50 D

29. Diagram 23 shows a displacement – time graph of an oscillating spring.

Rajah 23 menunjukkan satu graf sesaran – masa bagi suatu ayunan spring.

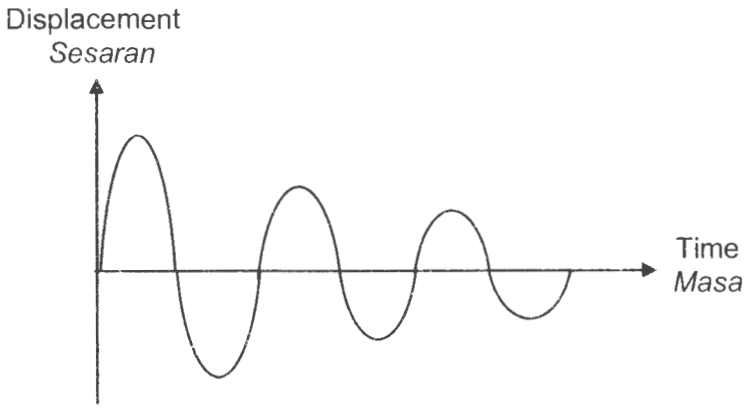


Diagram 23

Rajah 23

The spring is undergoing

Spring itu sedang mengalami

A. resonance
resonans

B. damping
pelembapan

C. modulation
modulasi

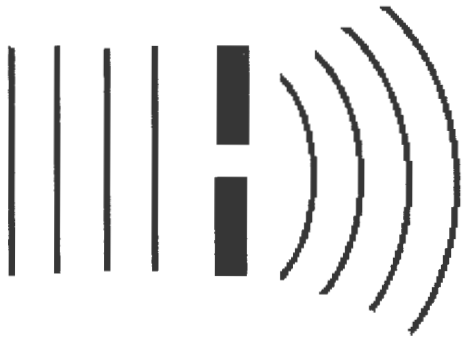
D. rectification
rektifikasi

30. Which diagram shows the **correct** pattern of waves when the waves passes through a gap?

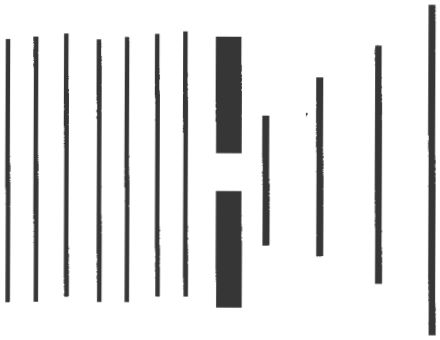
*Rajah manakah menunjukkan corak gelombang yang **betul** apabila gelombang melalui suatu celah?*

A.

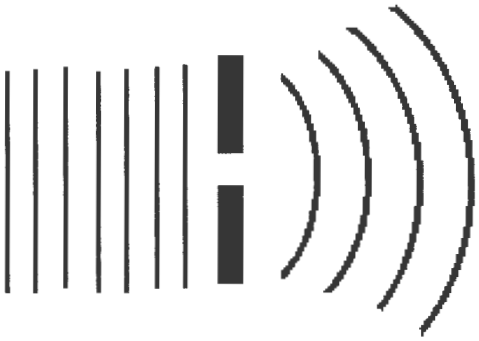
B.



C.



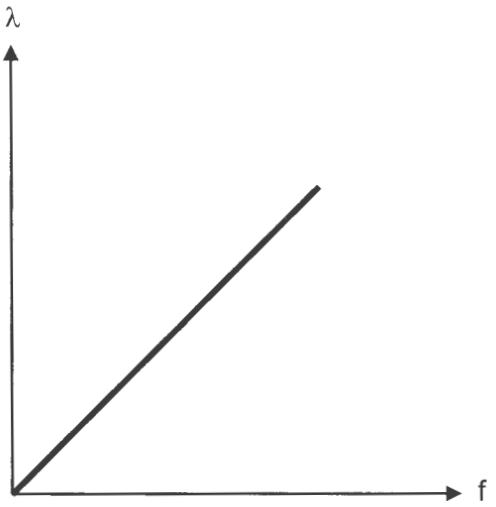
D.



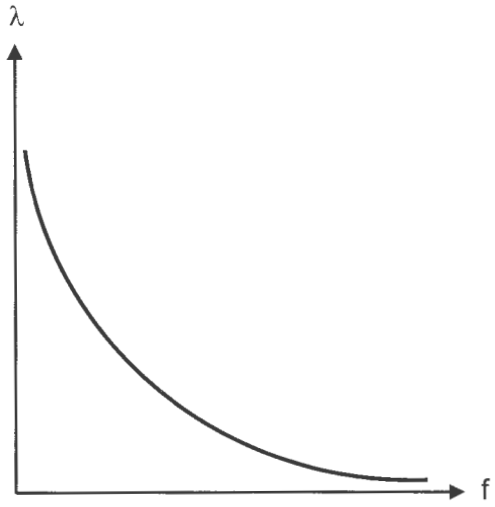
31. Which of the following graphs represents the relationship between λ and *f* for water waves in a ripple tank at a constant depth?

Graf yang manakah menunjukkan hubungan di antara λ dan f untuk gelombang air di dalam tangki riak pada kedalaman yang tetap?

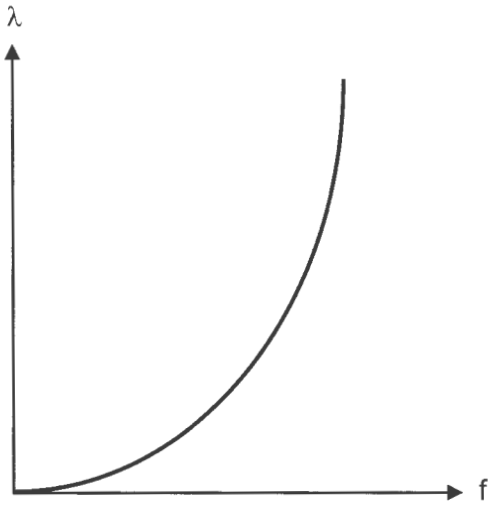
A.



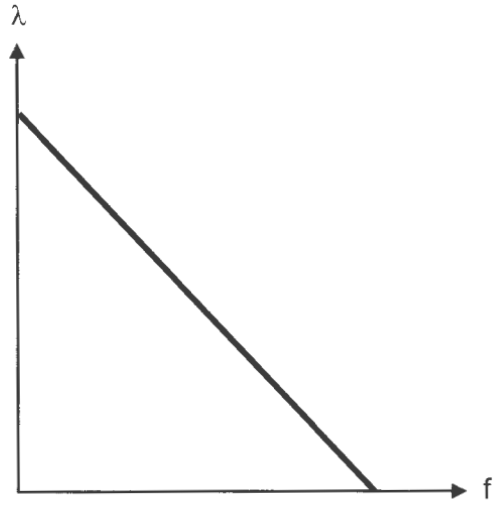
B.



C.



D.



32. Diagram 24 shows a displacement-distance graph of a wave.

Rajah 24 menunjukkan graf sesaran-jarak bagi suatu gelombang.

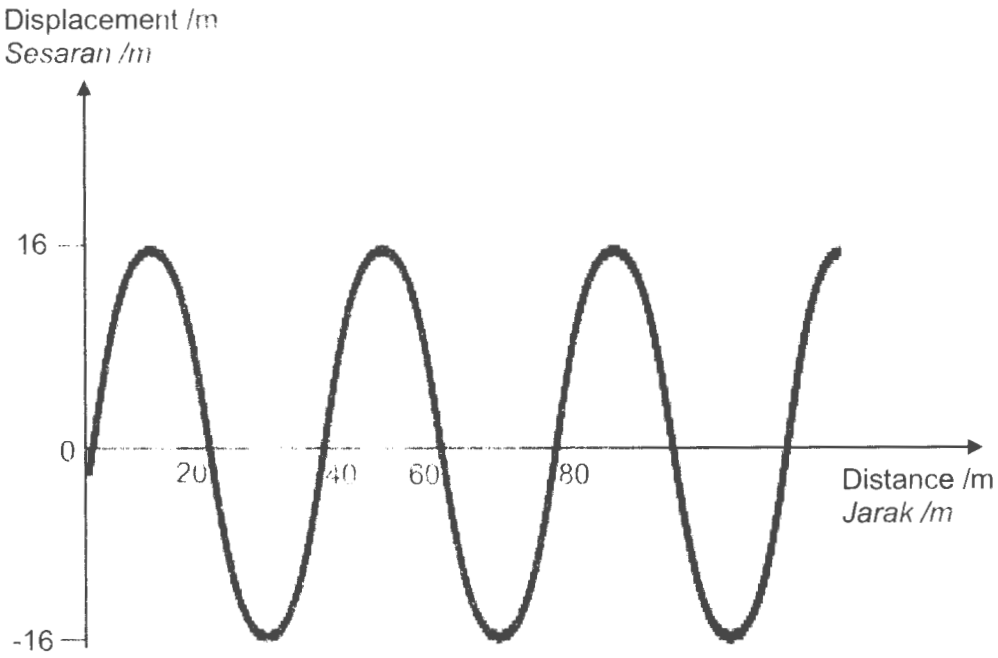


Diagram 24

Rajah 24

What is the amplitude of the wave?

Berapakah nilai amplitud gelombang tersebut?

A. 16 m

B. 20 m

C. 32 m

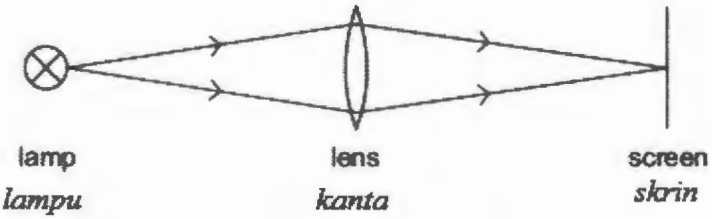
D. 40 m

33. Which of the following diagrams shows an example of a longitudinal wave?

Manakah antara rajah-rajah berikut menunjukkan contoh gelombang membujur?

A. Light wave moving from a lamp to a screen.

Gelombang cahaya merambat dari sebuah lampu ke skrin.



B. A water ripple caused by a dipper moving up and down.

Riak gelombang air dihasilkan oleh pencelup bergetar ke atas dan ke bawah.

C. A spring which is pushed backwards and forwards.

Spring digerakkan ke depan dan ke belakang.

D. A spring being pushed up and down.

Spring digerakkan ke atas dan ke bawah.

34. Which of the following wave property changes when interference occurs?

Manakah antara sifat-sifat gelombang berikut berubah apabila berlakunya interferens?

A. Speed.
Kelajuan.

B. Wavelength.
Panjang gelombang.

C. Amplitude.
Amplitud.

D. Direction of propagation.
Arah perambatan.

35. Diagram 25 shows waves propagating through three regions P , Q and R .

Rajah 25 menunjukkan suatu gelombang merambat melalui tiga kawasan P , Q dan R.

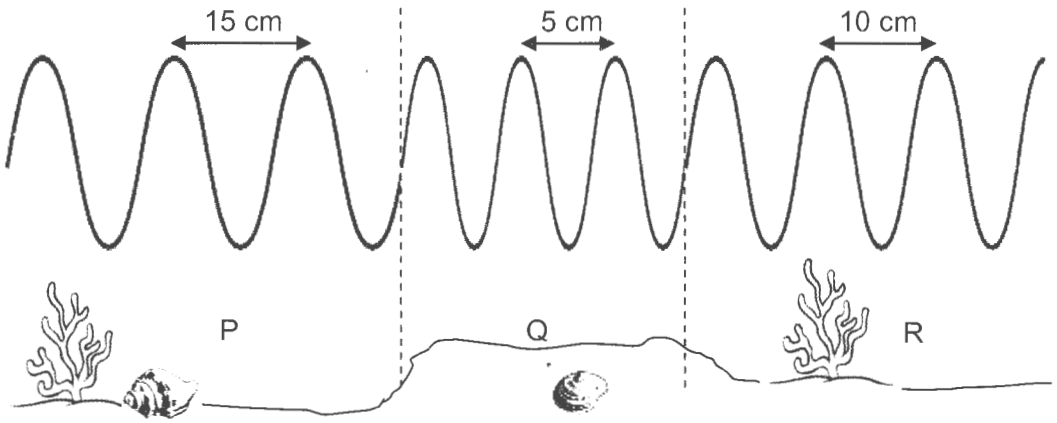


Diagram 25

Rajah 25

What is the wave speed in region R if the wave speed in region P is 6 m s^{-1}?

Berapakah laju gelombang dalam kawasan R jika laju gelombang dalam kawasan P ialah 6 m s^{-1}?

A. 2 ms^{-1}

B. 4 ms^{-1}

C. 6 ms^{-1}

D. 9 ms^{-1}

36. Diagram 26 shows an electric circuit .

Rajah 26 menunjukkan satu litar elektrik.

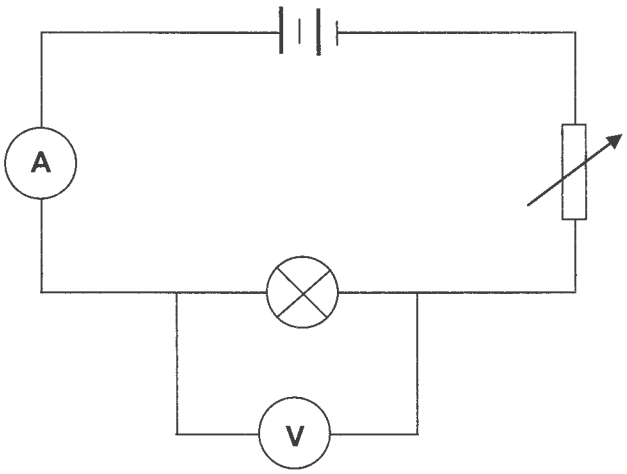


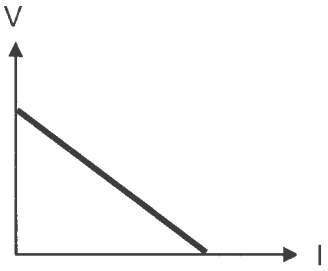
Diagram 26

Rajah 26

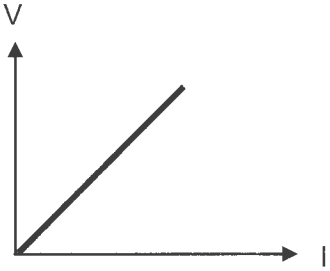
Which of the following graphs of V against I is **correct**?

*Manakah antara graf V lawan I berikut adalah **betul**?*

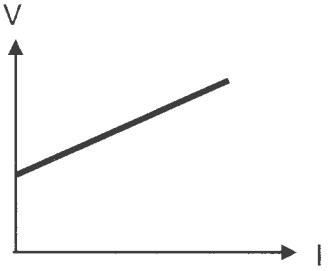
A.



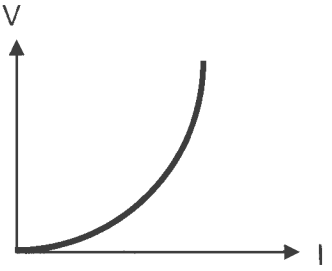
B.



C.



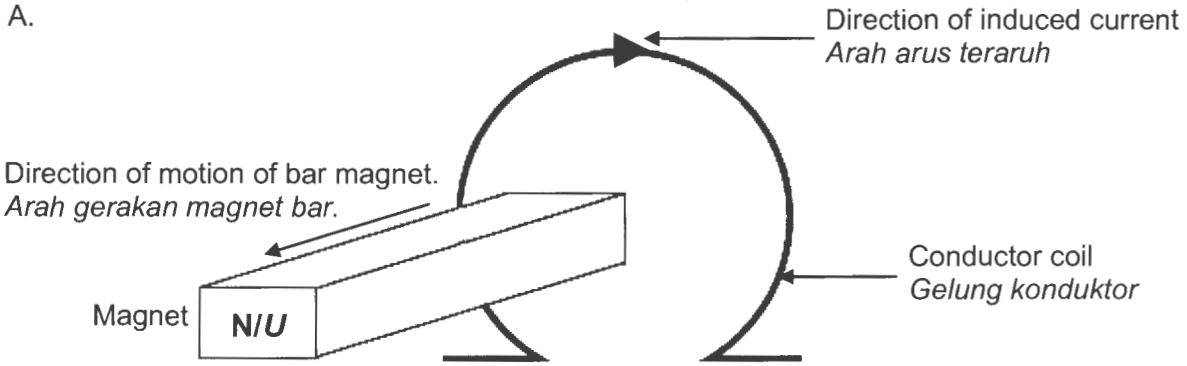
D.



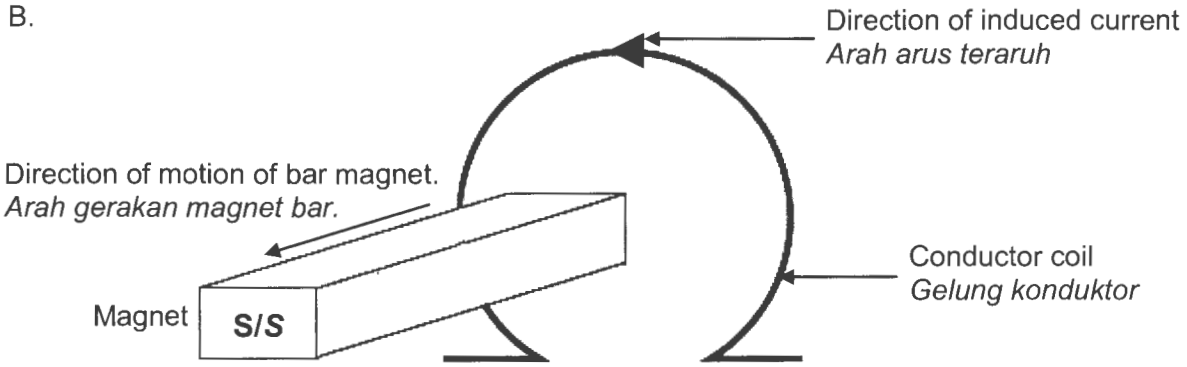
37. Which of the following diagrams shows the **correct** direction of induced current?

*Manakah antara rajah berikut menunjukkan arah arus aruhan yang **betul**?*

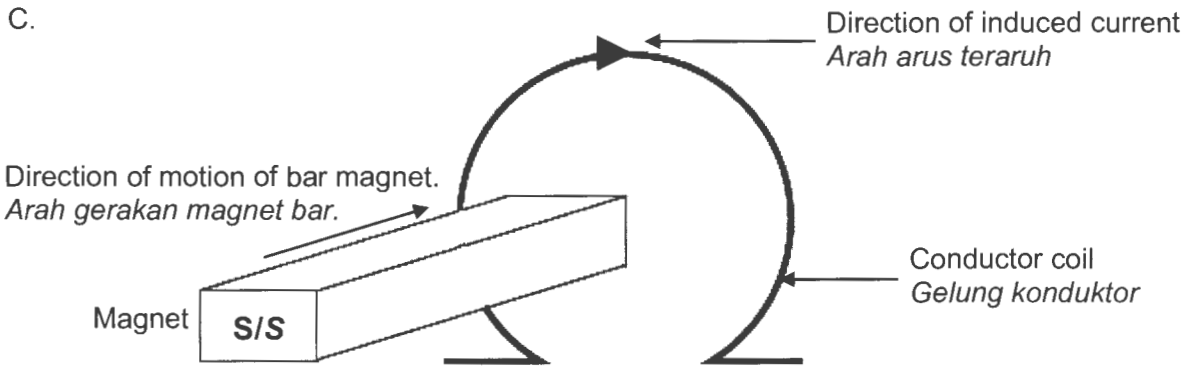
A.



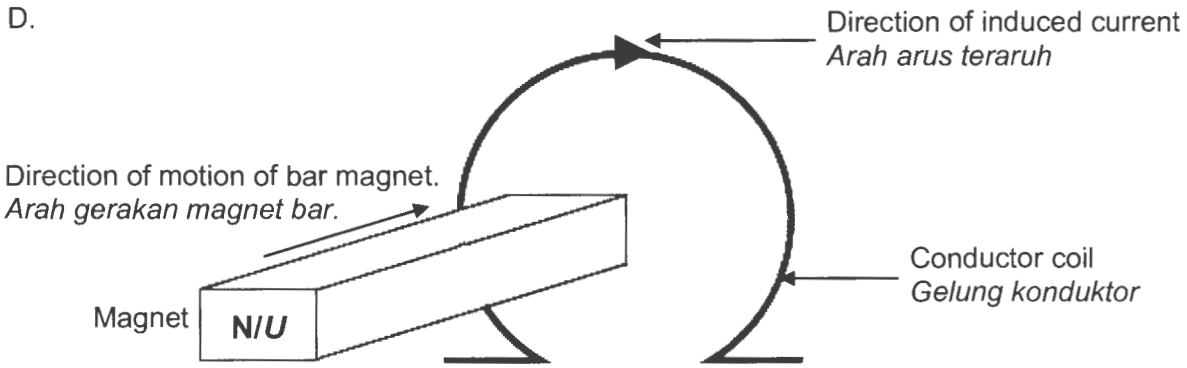
B.



C.



D.



38. Diagram 27 shows four diodes connected to a direct current power supply.

Rajah 27 menunjukkan empat diod yang disambung kepada bekalan kuasa arus terus.

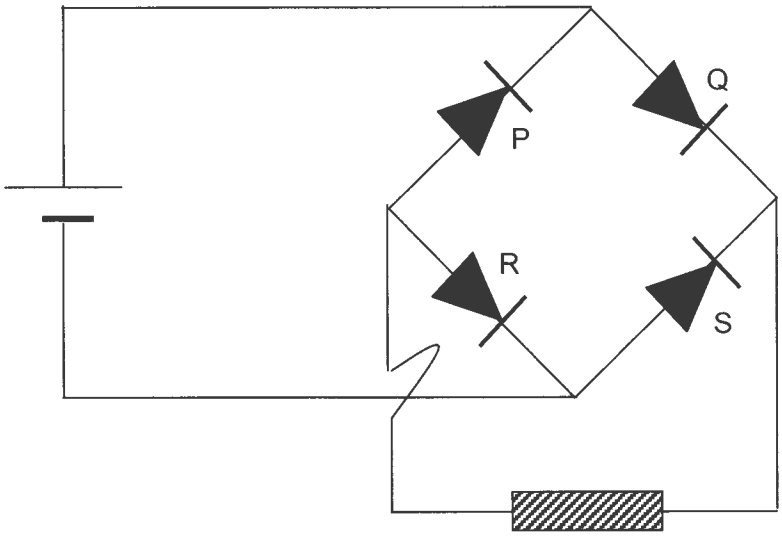


Diagram 27

Rajah 27

Which diodes are in forward bias?

Diod-diod manakah dalam keadaan pincang hadapan?

A. P and R

P dan R

B. P and S

P dan S

C. Q and R

Q dan R

D. Q and S

Q dan S

39. Diagram 28 shows two different electrical circuits. When 1 C of charge flows through each circuit, the energy released in R_1 is E_1 and the energy released in R_2 is E_2.
Rajah 28 menunjukkan dua litar elektrik yang berbeza. Apabila 1 C *cas mengalir melalui setiap litar, tenaga yang dibebaskan dalam* R_1 *ialah* E_1 *dan tenaga yang dibebaskan dalam* R_2 *ialah* E_2.

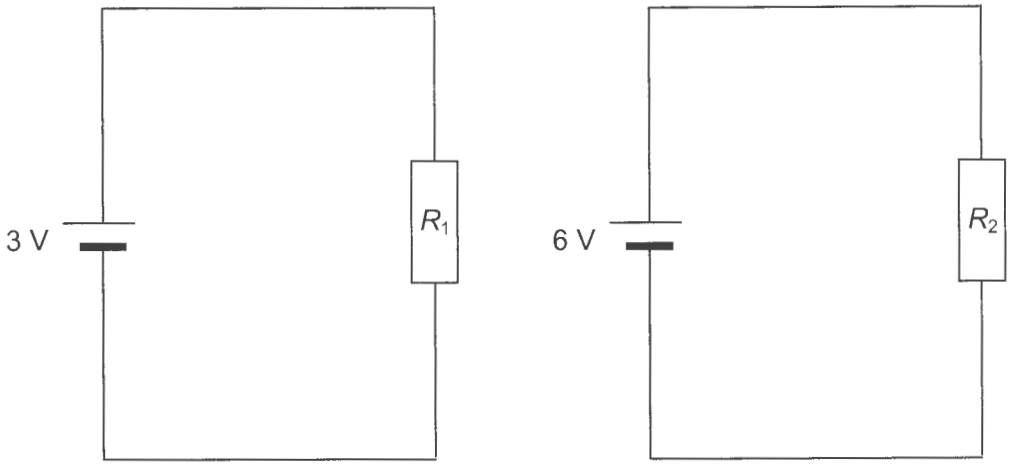


Diagram 28
Rajah 28

Which of the following relationships is **correct**?
Manakah antara hubungan berikut ***betul****?*

A. $E_1 = E_2$
B. $E_1 = 2E_2$
C. $E_2 = 2E_1$
D. $E_2 = 4E_1$

40. Diagram 29 shows a transistor circuit.

Rajah 29 menunjukkan satu litar transistor.

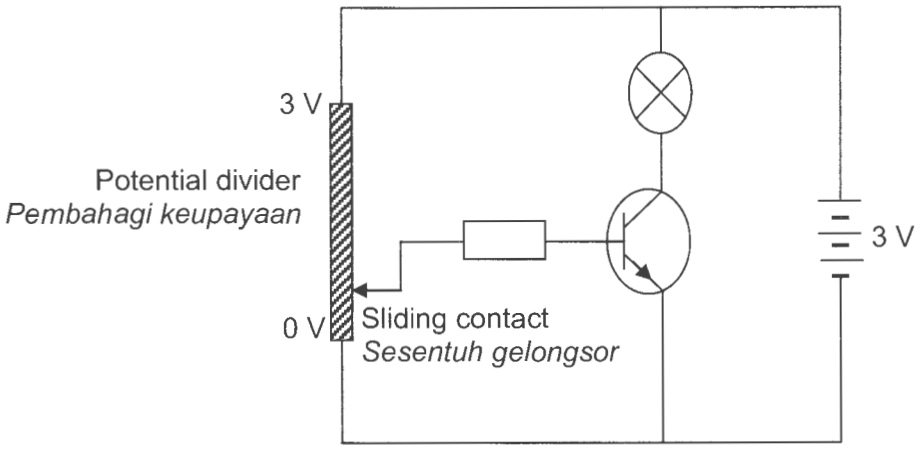


Diagram 29

Rajah 29

What would be observed if the sliding contact is moved from the 0 V end to the 3 V end of the potential divider?

Apakah yang akan diperhatikan jika sesentuh gelongsor itu digerakkan dari hujung 0 V ke hujung 3 V bagi pembahagi keupayaan itu?

A. The brightness of the lamp increases.
Kecerahan lampu itu bertambah.

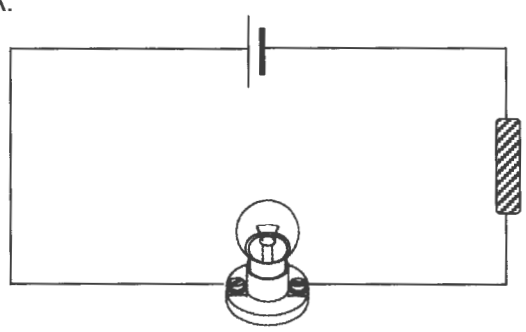
B. The brightness of the lamp decreases.
Kecerahan lampu itu berkurang.

C. The lamp lights up with the same brightness.
Lampu itu menyala dengan kecerahan yang sama.

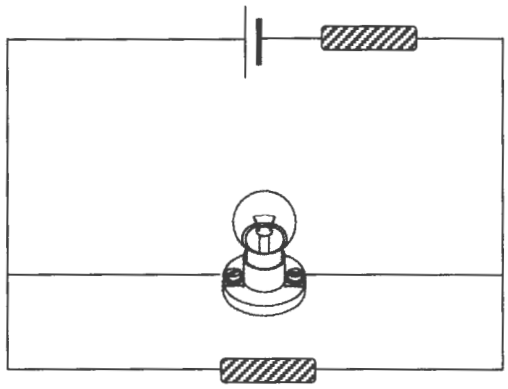
41. In the following circuits, all the resistors and light bulbs are similar. In which circuit is the light bulb the brightest?

Setiap perintang dan lampu dalam litar-litar berikut adalah serupa. Lampu dalam litar yang manakah menyala paling cerah?

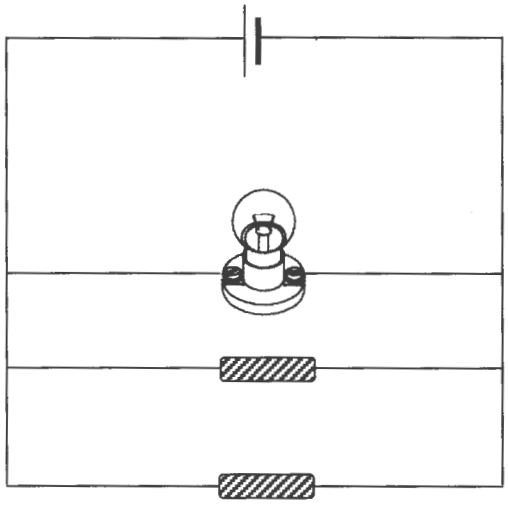
A.



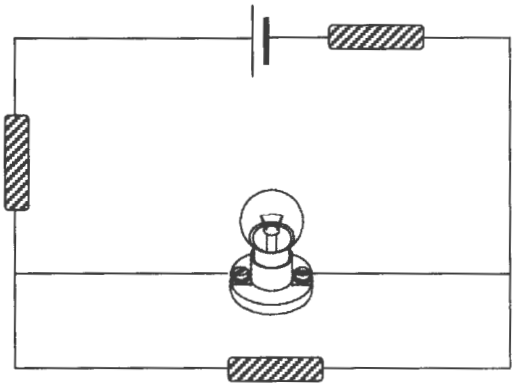
B.



C.



D.



42. Diagram 30 shows a transformer.

Rajah 30 menunjukkan sebuah transformer.

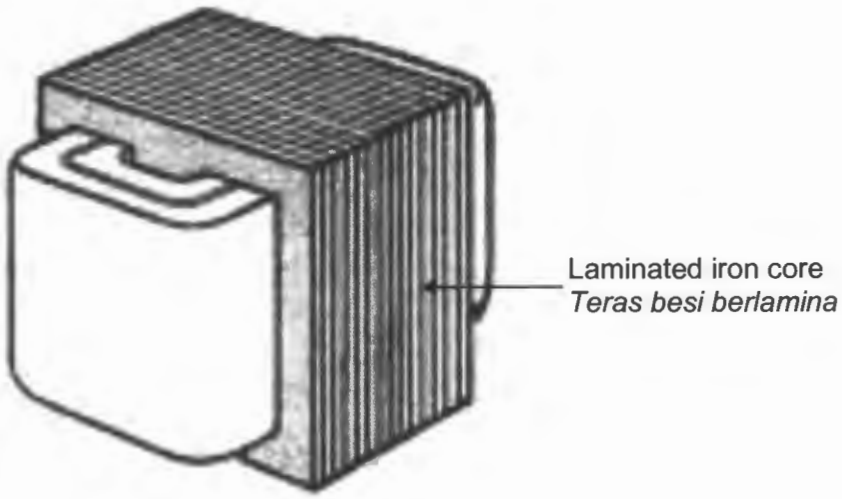


Diagram 30

Rajah 30

The purpose of using laminated iron core in a transformer is to

Tujuan penggunaan teras besi berlamina dalam transformer ialah untuk

A. reduce resistance.
mengurangkan rintangan.

B. reduce eddy current.
mengurangkan arus pusar.

C. prevent flux leakage.
menghalang kebocoran fluks.

D. magnetize and demagnetize the iron core easily.
menyenangkan pemagnetan dan menyahmagnetkan teras besi.

43. Diagram 31 shows a graph of the potential difference, *V*, across the terminals of a dry cell which changes with the current, *I*, through the cell.
Rajah 31 menunjukkan graf beza keupayaan,V, merentasi terminal sebuah sel kering yang berubah dengan arus,I, melalui sel itu.

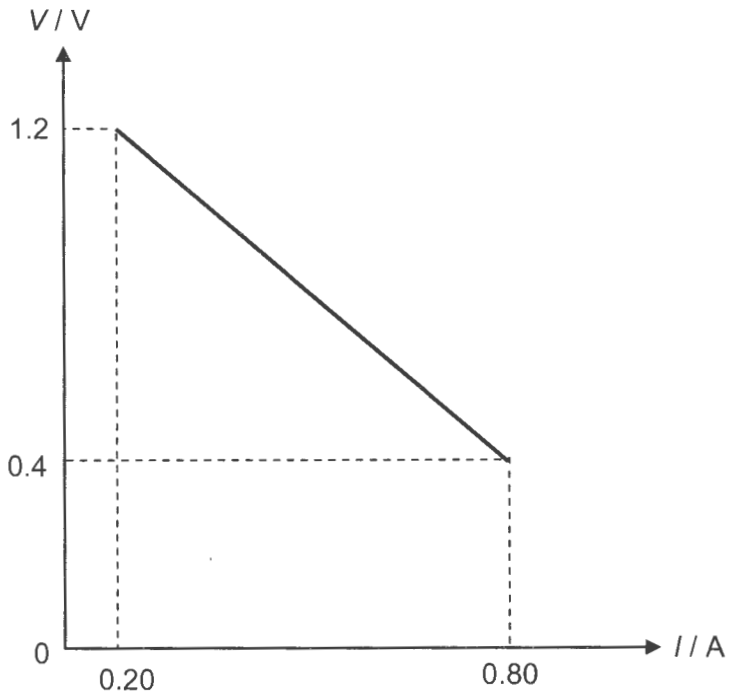


Diagram 31
Rajah 31

What is the internal resistance of the dry cell?
Berapakah rintangan dalam sel kering itu?

A. 0.75 Ω
B. 1.33 Ω
C. 1.50 Ω
D. 2.00 Ω

44. Diagram 32 shows an electrical energy transmission system.

Rajah 32 menunjukkan satu sistem penghantaran tenaga elektrik.

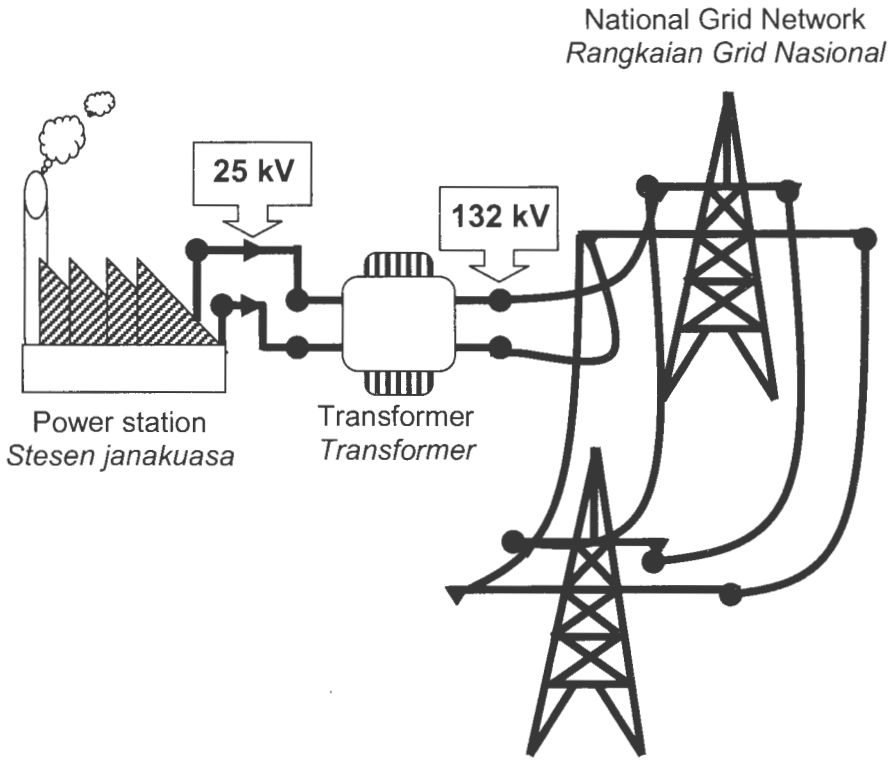


Diagram 32

Rajah 32

Why is the electrical energy generated at a voltage of 25 kV in the power station raised to 132 kV before transmission?

Mengapakah tenaga elektrik yang dijana pada voltan 25 kV di stesen janakuasa dinaikkan ke 132 kV sebelum penghantaran?

A. To increase the current in the transmission cables.
Untuk meningkatkan arus dalam kabel penghantaran.

B. So that step-down transformers can be used in the substations.
Supaya transformer injak turun boleh digunakan di substesen.

C. To distribute the power equally to all consumers.
Untuk pengagihan kuasa sama rata kepada semua pengguna.

D. To reduce the power loss in the transmission cables.
Untuk mengurangkan kehilangan kuasa dalam kabel penghantaran.

45. Diagram 33 shows the trace of an alternating voltage signal displayed on the screen of a cathode ray oscilloscope (CRO).The control knob for the time base is 2 ms/division and the Y- gain is set at 0.5 V/division.

Rajah 33 menunjukkan surihan suatu isyarat voltan ulang alik ditayangkan di atas skrin osiloskop sinar katod(OSK).Tombol kawalan dasar - masa adalah 2 ms/bahagian dan gandaan-Y dilaraskan pada 0.5 V/bahagian.

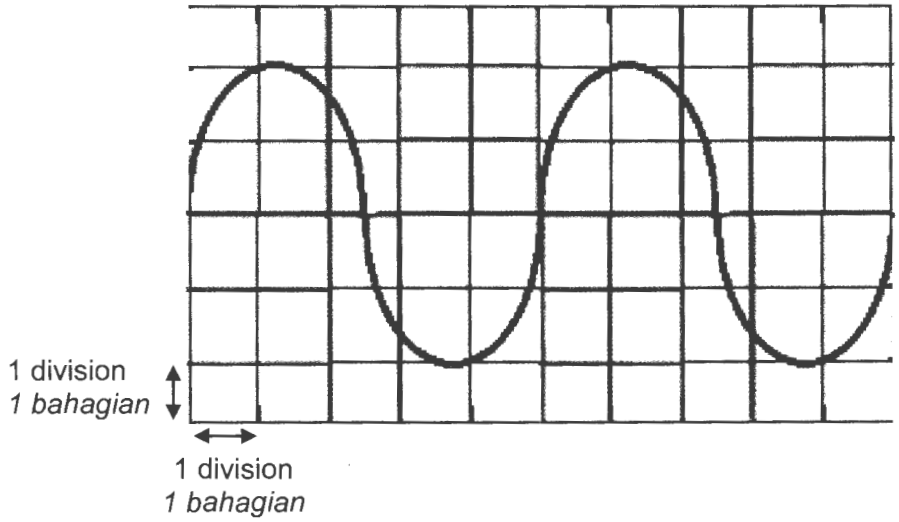


Diagram 33

Rajah 33

What is the frequency and peak voltage of the wave form shown?

Berapakah frekuensi dan voltan puncak bagi gelombang yang ditunjukkan?

	Frequency/Hz *Frekuensi/Hz*	Peak Voltage /V *Voltan puncak /V*
A.	100	2.0
B.	100	1.0
C.	50	2.0
D.	50	1.0

46. Diagram 34 shows five identical bulbs P,Q,R,S and T in a circuit.

Rajah 34 menunjukkan lima buah mentol P,Q,R,S dan T di dalam suatu litar.

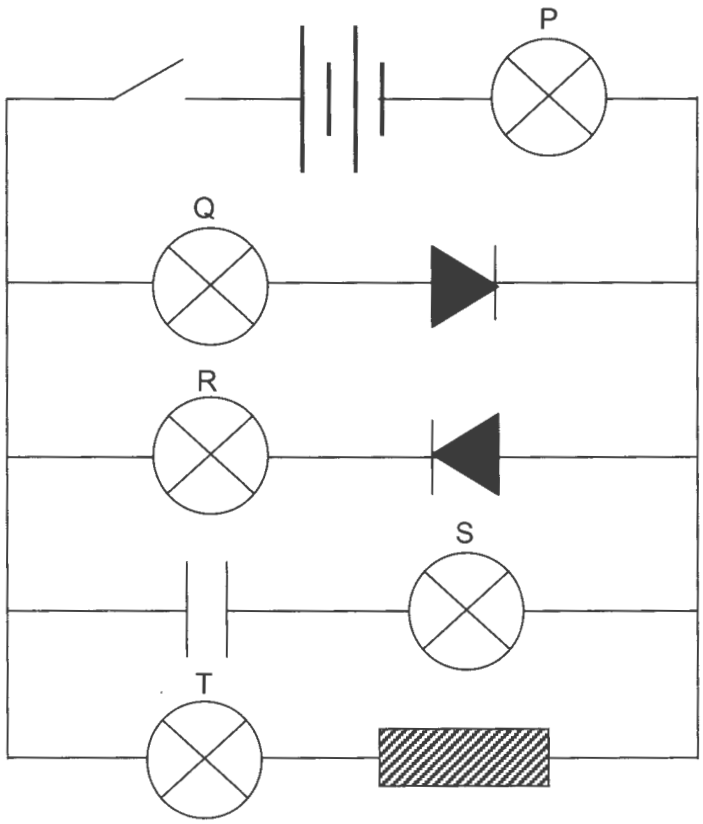


Diagram 34

Rajah 34

Which bulbs light up continuously when the switch is on?

Mentol-mentol manakah menyala berterusan apabila suis dihidupkan?

A. P,Q and T only.

P,Q dan T sahaja.

B. Q and S only.

Q dan S sahaja.

C. R and S only.

R dan S sahaja.

D. P and R only.

P dan R sahaja.

47. Diagram 35 shows a combination of logic gates which has two inputs, *X* and *Y*.

Rajah 35 menunjukkan satu gabungan get logik yang mempunyai dua input, X dan Y.

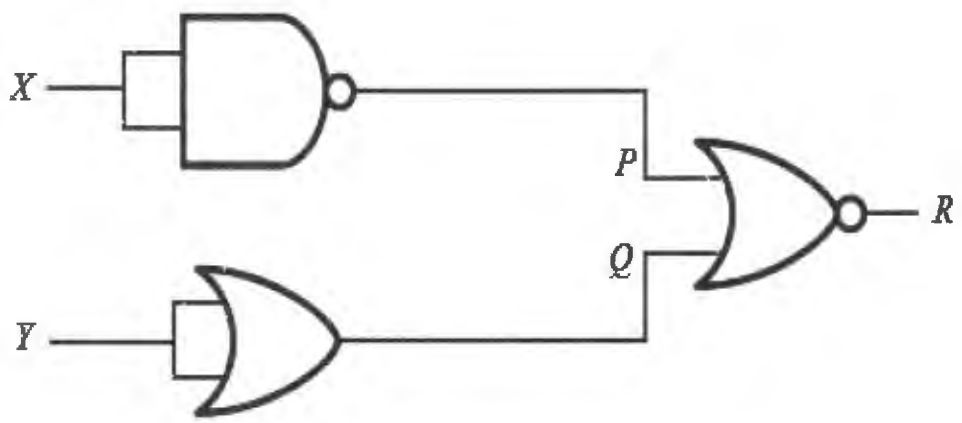


Diagram 35

Rajah 35

If the logic state of *X* is 0 and the logic state of *Y* is 1, what are the logic states at *P*, *Q* and *R*?

Jika keadaan logik X ialah 0 dan keadaan logik Y ialah 1, apakah keadaan logik bagi P, Q dan R?

	P	Q	R
A.	0	0	1
B.	0	1	1
C.	1	1	0
D.	1	0	1

48. Diagram 36 shows the penetrating power of different types of energetic particles.

Rajah 36 menunjukkan kuasa penembusan beberapa zarah bertenaga.

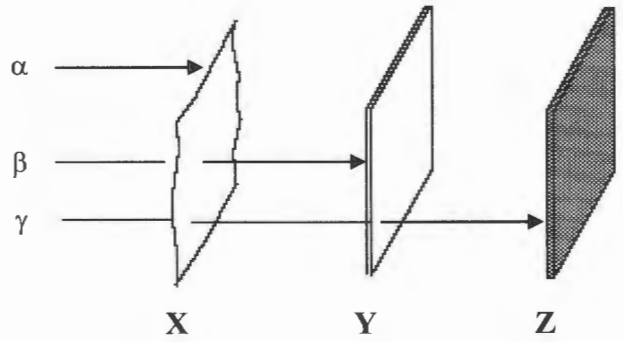


Diagram 36

Rajah 36

Which of the following is **correct**?

*Manakah antara yang berikut adalah **benar**?*

	X	Y	Z
A.	Thick lead *Plumbum tebal*	Aluminium *Aluminium*	Helaian kertas *Helaian kertas*
B.	Concrete *Konkrit*	Thick lead *Plumbum tebal*	Aluminium *Aluminium*
C.	Helaian kertas *Helaian kertas*	Aluminium Aluminium	Thick lead *Plumbum tebal*
D.	Aluminium *Aluminium*	Concrete *Konkrit*	Thick lead *Plumbum tebal*

49. A rate meter of a G-M tube recorded a background reading of 40 counts per minute. When a radioactive element is put in front of the G-M tube, the rate meter reads 160 counts per minute. After 6 hours, the rate meter become 55 counts per minute.
Meter kadar pada satu tiub G-M mencatatkan sinaran latar belakang 40 bilangan per minit. Apabila satu bahan radioaktif diletakkan di hadapan tiub G-M, meter kadar mencatatkan 160 bilangan per minit. Selepas 6 jam, bacaan meter kadar menjadi 55 bilangan per minit.
Determine the half life of the radioactive element.
Tentukan separuh hayat bagi bahan radioaktif itu

A. 2 hours.
2 jam.
B. 4 hours.
4 jam.
C. 6 hours.
6 jam.
D. 12 hours.
12 jam.

50. A chain reaction occurs in a reactor nuclear due to
Tindak balas berantai berlaku di dalam sebuah reaktor nuklear disebabkan oleh

A. new neutrons are produced.
neutron baru dihasilkan.
B. two fission fragments are produced.
dua serpihan belahan dihasilkan.
C. a large amount of energy is released.
tenaga yang banyak dibebaskan.
D. the temperature is very high.
suhu adalah sangat tinggi.

END OF EVALUATION MODULE
MODUL PENILAIAN TAMAT

MAJLIS PENGETUA SEKOLAH MALAYSIA
CAWANGAN PULAU PINANG

MODUL PENILAIAN SPM 2014 4531/1
JAWAPAN KERTAS 1

1	D	11	C	21	C	31	B	41	C
2	C	12	A	22	A	32	A	42	B
3	B	13	B	23	A	33	C	43	B
4	D	14	D	24	A	34	C	44	D
5	C	15	C	25	D	35	B	45	B
6	A	16	C	26	B	36	D	46	A
7	D	17	C	27	C	37	D	47	C
8	B	18	D	28	A	38	C	48	C
9	B	19	D	29	B	39	C	49	A
10	B	20	D	30	B	40	A	50	A

Nama : _____ Tingkatan : _____

PHYSICS
Paper 2
September
2 ½ hours

4531/2

MAJLIS PENGETUA SEKOLAH MENENGAH
(CAWANGAN PULAU PINANG)
MODUL LATIHAN BERFOKUS SPM 2014

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan tingkatan anda pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan adalah dalam bahasa Melayu dan bahasa Inggeris.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Melayu atau bahasa Inggeris.*

Kod Pemeriksa			
Bahagian	*Soalan*	*Markah Penuh*	*Markah Diperoleh*
A	1	4	
	2	5	
	3	6	
	4	7	
	5	8	
	6	8	
	7	10	
	8	12	
B	9	20	
	10	20	
C	11	20	
	12	20	
JUMLAH			

Kertas soalan ini mengandungi 32 halaman bercetak.

The following information may be useful. The symbols have their usual meaning.

1. $a = \frac{v-u}{t}$
2. $v^2 = u^2 + 2as$
3. $s = ut + \frac{1}{2}at^2$
4. Momentum = mv
5. $F = ma$
6. Kinetic energy = $\frac{1}{2}mv^2$
7. Gravitational potential energy = mgh
8. Elastic potential energy = ½ Fx
9. Power = $\frac{Energy}{time}$
10. $\rho = \frac{m}{V}$
11. Pressure, p = F/A
12. Pressure, p = hρg
13. Heat, $Q = mc\theta$
14. Heat, $Q = ml$
15. $P_1V_1 = P_2V_2$
16. $n = \frac{\sin i}{\sin r}$
17. $\frac{PV}{T}$ = constant
18. $E = mc^2$
19. $v = f\lambda$
20. $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
21. $\lambda = \frac{ax}{D}$
22. $Q = It$
23. V = IR
24. $\frac{Ns}{Np} = \frac{Vs}{Vp}$
25. Power, P = VI
26. $g = 10\ ms^{-2}$
27. Speed of light, $c = 3 \times 10^8\ ms^{-1}$

Maklumat berikut mungkin berfaedah.Simbol-simbol mempunyai makna yang biasa.

1. $a = \frac{v-u}{t}$
2. $v^2 = u^2 + 2as$
3. $s = ut + \frac{1}{2}at^2$
4. Momentum = mv
5. $F = ma$
6. Tenaga kinetik = $\frac{1}{2}mv^2$
7. Tenaga keupayaan graviti = mgh
8. Tenaga keupayaan kenyal = ½ Fx
9. Kuasa = $\frac{Tenaga}{masa}$
10. $\rho = \frac{m}{V}$
11. Tekanan, p = F/A
12. Tekanan, p = h□g
13. Haba , $Q = mc\theta$
14. Haba , $Q = ml$
15. $P_1V_1 = P_2V_2$
16. $n = \frac{\sin i}{\sin r}$
17. $\frac{PV}{T}$ = pemalar
18. $E = mc^2$
19. $v = f\lambda$
20. $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
21. $\lambda = \frac{ax}{D}$
22. $Q = It$
23. V = IR
24. $\frac{Ns}{Np} = \frac{Vs}{Vp}$
25. Kuasa, P = VI
26. $g = 10\ ms^{-2}$
27. Halaju cahaya, $c = 3 \times 10^8\ ms^{-1}$

Section A

Bahagian A

[60 marks]

[60 markah]

For examiner's Use

Answer **all** questions in this section.

*Jawab **semua** soalan dalam bahagian ini.*

1. Diagram 1 shows a student riding a motorcycle at a speed of 30 km h^{-1}.

Rajah 1 menunjukkan seorang pelajar sedang menunggang motosikal pada kelajuan 30 km j^{-1}.

Diagram 1 / *Rajah 1*

(a) What is the principle involved in this phenomenon?

Apakah prinsip yang terlibat dalam fenomena ini?

1(a)

1

_____

[1 mark / 1 *markah*]

(b) In Diagram 1, at which position, X or Y is the air pressure higher?

Dalam Rajah 1, tekanan udara lebih tinggi pada kedudukan X atau Y?

1(b)

1

_____

[1 mark / 1 *markah*]

For examiner's Use

(c) The resultant force acting on the cloth is in the (upward / downward) direction.
Daya paduan bertindak ke arah (atas / bawah) pada kain itu.

1(c) 1

[1 mark / 1 *markah*]

(d) If the student rides the motorcycle at 40 km h^{-1}, his cloth will fly...
Tick (√) the correct answer in the box provided.
Jika pelajar itu menunggang motosikal itu pada kelajuan 40 km j^{-1}, kainnya akan terangkat...
Tandakan (√) jawapan yang betul dalam petak yang disediakan.

1(d) 1

☐ higher / *lebih tinggi*

☐ *lower / lebih rendah*

[1 mark / *1 markah*]

Total 4

2. Diagram 2 shows a box in a lift. The weighing scale records a weight of 50 N.
Rajah 2 menunjukkan sebuah kotak dalam lif. Penimbang merekodkan bacaan berat sebanyak 50 N.

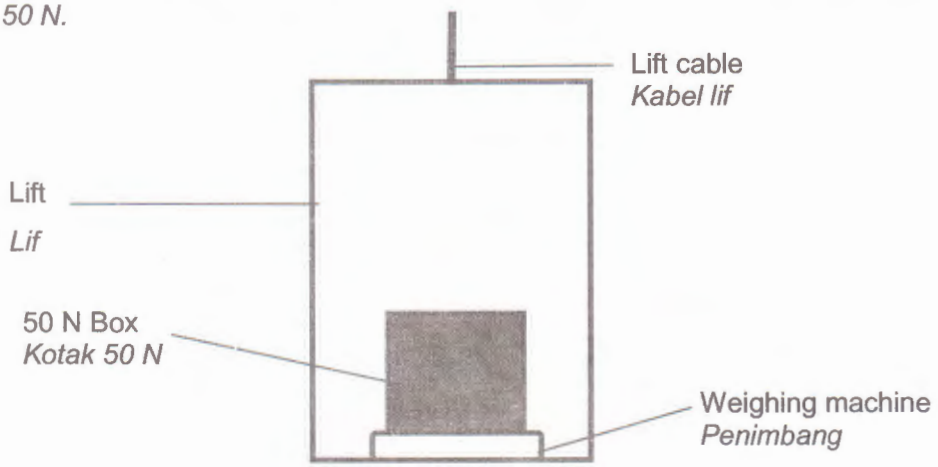


Diagram 2 / *Rajah 2*

(a) What is the meaning of 'free fall'?
Apakah maksud 'jatuh bebas'?

2(a) 1

_____

[1 mark / *1 markah*]

For examiner's Use

(b)(i) If the lift moves upwards with a constant velocity, what is the reading of the weighing scale?
Jika lif bergerak ke atas dengan halaju seragam, apakah bacaan penimbang?

2(b)(i) 1

_____

[1 mark / 1 markah]

(ii) If the lift moves upwards with an acceleration, what will happen to the reading of the weighing scale?
Jika lif memecut ke atas, apa yang akan berlaku kepada bacaan penimbang?

2(b)(ii) 1

_____

[1 mark /*1 markah*]

(c) If the cable of the lift is cut,
Jika kabel lif terputus,

(i) What is the reading of the weighing scale?
Apakah bacaan penimbang?

2(c)(i) 1

_____

[1 mark /*1 markah*]

(ii) What is the value of the acceleration of the box?
Apakah nilai pecutan kotak itu?

2(c)(ii) 1

_____

[1 mark /*1 markah*]

Total 5

3. Diagram 3 shows a football hitting the face of a player. The initial velocity of the ball is 4 m s^{-1} before it comes to a stop in 1 s. The mass of the ball is 200 g.
Rajah 3 menunjukkan sebiji bola sepak menghentam muka seorang pemain. Halaju awal bola itu ialah 4 m s^{-1} sebelum ia berhenti dalam masa 1 s. Jisim bola ialah 200 g.

Diagram 3 / Rajah 3

For examiner's Use

3(a) 1

(a) What is the meaning of impulsive force?
Apakah maksud daya impuls?

[1 mark /*1 markah*]

(b) Calculate the impulsive force on the player's face.
Kirakan daya impuls pada muka pemain itu.

3(b) 2

[2 marks / *2 markah*]

3(c)(i) 1

(c)(i) What will happen to the impulsive force if a softer ball is used?
Apakah yang berlaku kepada daya impuls sekiranya bola yang lebih lembut digunakan?

[1 mark /*1 markah*]

3(c)(ii) 1

(ii) Give a reason for your answer in 3(c)(i).
Berikan sebab bagi jawapan anda di 3(c)(i).

[1 mark /*1 markah*]

3(d) 1

(d) Give an example where a big impulsive force is necessary and beneficial.
Berikan satu contoh di mana suatu daya impuls yang besar adalah diperlukan dan berguna.

[1 mark /*1 markah*]

Total 6

4. Diagram 4.1 shows an open electric circuit.
Diagram 4.2 shows a graph of potential difference against current for the closed circuit.
Rajah 4.1 menunjukkan suatu litar elektrik yang terbuka.
Rajah 4.2 menunjukkan graf beza keupayaan lawan arus bagi litar yang tertutup.

For examiner's Use

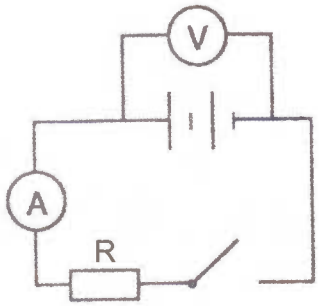


Diagram 4.1 / Rajah 4.1

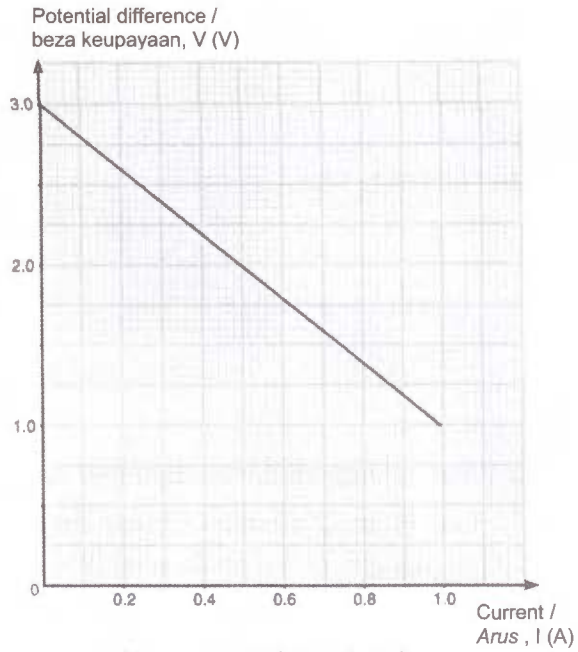


Diagram 4.2 / Rajah 4.2

(a) What is being measured by the voltmeter in Diagram 4.1?
Apakah yang diukur oleh voltmeter dalam Rajah 4.1?

4(a) 1

[1 mark /*1 markah*]

(b)(i) From the graph in Diagram 4.2, what is the voltmeter reading when I = 0 A?
Daripada graf dalam Rajah 4.2, apakah bacaan voltmeter bila I = 0 A?

4(b)(i) 1

[1 mark /*1 markah*]

(ii) Calculate the gradient of the graph.
Kirakan kecerunan graf.

4(b)(ii) 2

[2 marks / *2 markah*]

For examiner's Use

4(c)(i) 1

(c)(i) What is the current when the voltmeter reading is 2.0 V?
Apakah nilai arus bila bacaan voltmeter ialah 2.0 V?

[1 mark /*1 markah*]

(ii) Calculate the external resistance, R in the circuit.
Kirakan nilai rintangan luar, R dalam litar tersebut.

4(c)(ii) 2

[2 marks / *2 markah*]

Total 7

5. Diagram 5.1 shows a light ray being propagated through glass A with a refractive index of 1.50. Diagram 5.2 shows another light ray being propagated through glass B of refractive index 1.40.
Rajah 5.1 menunjukkan satu sinar cahaya yang dirambat melalui kaca A dengan indeks biasan 1.50. Rajah 5.2 menunjukkan satu lagi sinar cahaya yang merambat melalui kaca B dengan indeks biasan 1.40.

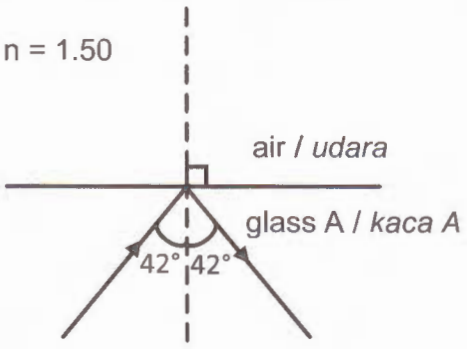


Diagram 5.1 / *Rajah 5.1*

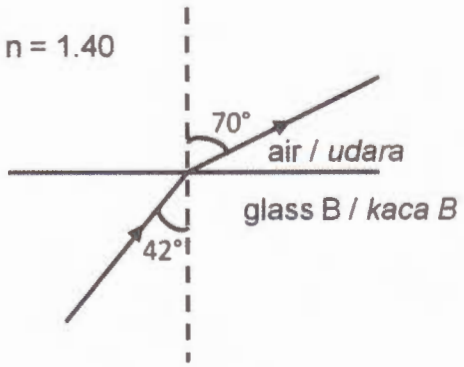


Diagram 5.2 / *Rajah 5.2*

5(a) 1

(a) What is the light phenomenon happening in Diagram 5.1?
Apakah fenomena cahaya yang berlaku dalam Rajah 5.1?

[1 mark /*1 markah*]

For examiner's Use

(b) Based on Diagram 5.1 and Diagram 5.2,
Berdasarkan Rajah 5.1 dan Rajah 5.2,

(i) Compare the refractive indices in both diagrams.
Bandingkan indeks biasan pada kedua-dua rajah.

5(b)(i) 1

_____

[1 mark /*1 markah*]

(ii) Compare the angle of incidence of the light ray in both diagrams.
Bandingkan sudut tuju sinar cahaya pada kedua-dua rajah.

5(b)(ii) 1

_____

[1 mark /*1 markah*]

(iii) State two conditions for the phenomenon in Diagram 5.1 above.
Nyatakan dua syarat untuk fenomena pada Rajah 5.1 di atas.

5(b)(iii) 1

_____

_____

[2 marks /*2 markah*]

(c) Calculate the critical angle for glass B in Diagram 5.2.
Kira sudut genting bagi kaca B dalam Rajah 5.2.

5(c) 2

[2 marks /*2 markah*]

(d) State the relationship between the critical angle and the refractive index.
Nyatakan hubungkait di antara sudut genting dan indeks biasan.

5(d) 2

_____

[1 mark /*1 markah*]

Total 8

6. Diagram 6.1 shows a sensor board which consist a transmitter device and a sensor device that controls an automatic sliding door of an office. When a worker walks into the office, the sliding door opens automatically.
Rajah 6.1 menunjukkan papan pengesan yang mengandungi alat pemancar dan pengesan yang mengawal pintu gelangsar automatik di sebuah pejabat. Apabila seorang pekerja berjalan masuk ke dalam pejabat itu, pintu gelangsar terbuka secara automatik.

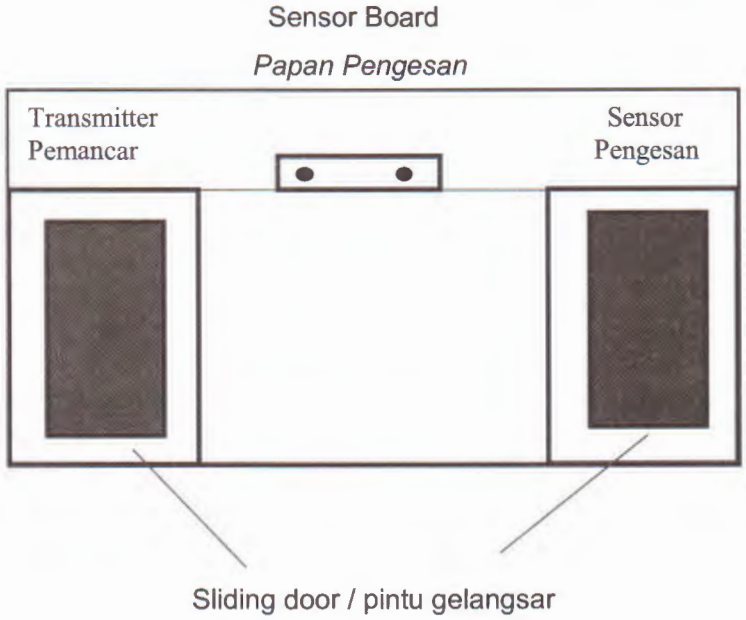


Diagram 6.1 / *Rajah 6.1*

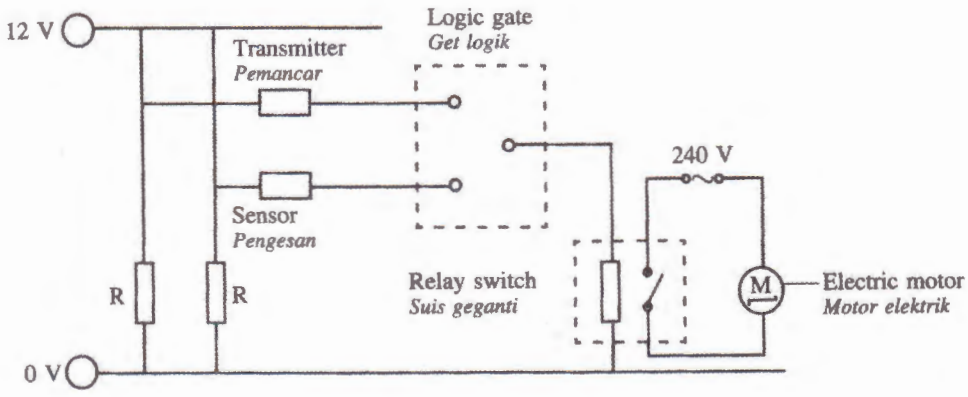


Diagram 6.2 / *Rajah 6.2*

Diagram 6.2 shows the circuit which contain the logic gate circuit that is connected to an electric motor to control the sliding door.
Rajah 6.2 menunjukkan litar yang mengandungi litar get logik yang disambungkan ke sebuah motor elektrik untuk mengawal pintu gelangsar itu.

For examiner's Use

Table 6.1 shows the keys for all situations.
Jadual 6.1 menunjukkan kekunci bagi semua situasi.

Transmitter *Pemancar*		Sensor *Pengesan*		Output X	
Situation *Situasi*	Logic *Logik*	Situation *Situasi*	Logic *Logik*	Situation *Situasi*	Logic *Logik*
ON	1	Customer present *Ada pelanggan*	1	Electric motor is activated *Motor elektrik dihidupkan*	1
OFF	1	Customer absent *Tiada pelanggan*	0	Electric motor is not activated *Motor elektrik tidak dihidupkan*	0

Table 6.1 / *Jadual 6.1*

(a) Table 6.2 is a truth table which shows the operations of the logic gate in the sliding door motor control system.
Jadual 6.2 adalah jadual kebenaran yang menunjukkan operasi get logik dalam sistem kawalan motor pintu gelangsar itu.

Transmitter *Pemancar*	Sensor *Pengesan*	Output X *Output X*
0	0	
0	1	
1	0	
1	1	

Table 6.2 / *Jadual 6.2*

(i) Using the keys given in Table 6.1, complete Table 6.2.
Menggunakan kekunci yang diberikan dalam Jadual 6.2, lengkapkan Jadual 6.2.

[2 marks / *2 markah*]

6(a)(i) 2

For examiner's Use

6(a)(ii) 1

(ii) Name the logic gate in the circuit in Diagram 6.2.
Namakan get logik dalam litar pada Rajah 6.2.

[1 mark /*1 markah*]

6(a)(iii) 1

(iii) In the space below, draw the symbol of the logic gate named in 6(b) (ii).
Dalam ruang di bawah, lukis simbol get logik yang dinamakan di 6(b)(ii).

[1 mark /*1 markah*]

(b) The sliding door in Diagram 6.1 takes a long time to open automatically.
Some modifications need to be done to the sliding door and the electric motor to enable the sliding door to open in a shorter time.
State the suitable modification and give one reason for the modification.
Pintu gelangsar dalam Rajah 6.1 mengambil masa yang lama untuk terbuka secara automatic. Beberapa modifikasi perlu dilakukan kepada pintu gelangsar dan motor elektrik bagi membolehkan pintu gelangsar terbuka dalam masa yang lebih singkat.
Nyatakan modifikasi yang sesuai dan berikan satu sebab untuk modifikasi itu.

6(b)(i) 2

(i) Mass of sliding door
Jisim pintu gelangsar

Reason / *Sebab*

[2 marks / *2 markah*]

6(b)(ii) 2

(ii) Power of the electric motor
Kuasa motor elektrik

Reason / *Sebab*

[2 marks / *2 markah*]

Total 8

For examiner's Use

7. Diagram 7.1 shows the change of phase when 1 kg of ice turns into boiling water.
Rajah 7.1 menunjukkan perubahan fasa apabila 1 kg ais berubah menjadi air yang mendidih.

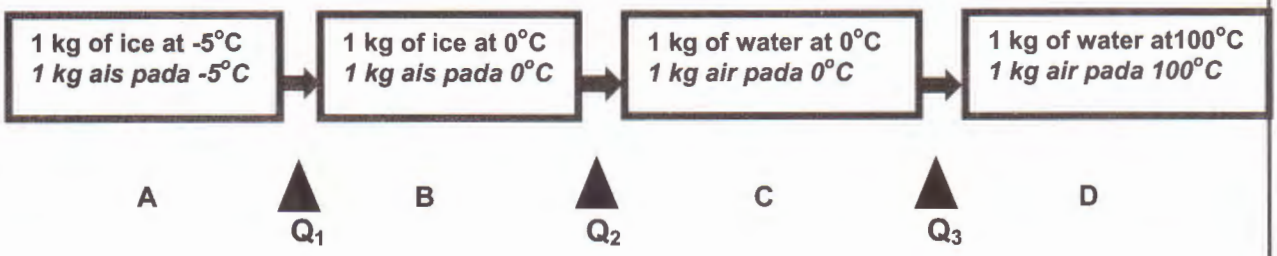


Diagram 7.1 / *Rajah 7.1*

Q_1, Q_2 and Q_3 are the heat energies absorbed during the heating process.
Q_1, Q_2 dan Q_3 ialah tenaga haba yang diserap ketika proses pemanasan itu.

(a)(i) Name the heat energy, Q_2 which is absorbed from **B** to **C**.
*Namakan tenaga haba, Q_2 yang di serap dari **B** ke **C**.*

7(a)(i) 1

_____

[1 mark /*1 markah*]

(ii) State **one** reason why the temperature at **B** and **C** is the same even though heat is supplied.
*Nyatakan satu sebab mengapa suhu di **B** dan **C** adalah sama walau pun haba dibekalkan.*

7(a)(ii) 1

_____

[1 mark /*1 markah*]

(b) Calculate the heat energy, Q_2 which is absorbed from **B** to **C**.
[The specific latent heat of fusion of ice = 3.36×10^5 Jkg^{-1}]
*Kirakan tenaga haba, Q_2 yangdiserap dari**B** ke **C**.*
[Haba pendam tentu pelakuran ais = 3.36×10^5 Jkg^{-1}]

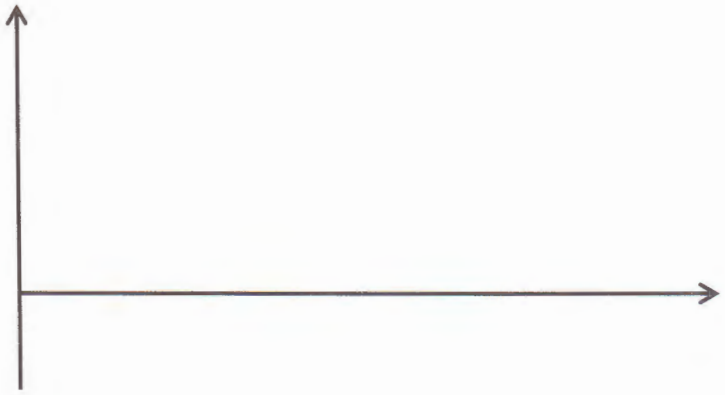
7(b) 2

[2 marks/ 2 *markah*]

For examiner's Use

(c) Sketch the graph of temperature against time in the space below for the change of phase from **A** to **D**as shownin Diagram 7.

*Lakarkan graf suhu lawan masa pada ruang di bawah untuk menunjukkan perubahan keadaan fasa dari **A** ke **D** seperti di tunjukkan dalam Rajah 7.*



7(c) 2

[2 marks/ 2 *markah*]

(d)

Diagram 7.2 / *Rajah 7.2*

Diagram 7.2 shows a boy blowing on the surface of a bowl of a very hot soup to cool it down.

Rajah 7.2 menunjukkan seorang budak yang sedang meniup permukaan sup yang sangat panas dalam mangkuk bagi menyejukkannya.

(i) What will happen to the rate of evaporation of water from the soup when air is blown over it?
Apa akan terjadi kepada kadar pengewapan air daripada sup jika udara ditiup di atasnya?

[1 mark /*1 markah*]

For examiner's Use

7(d)(i)

1

(ii) Why does evaporation cool down the soup?
Mengapakah penyejatan menyejukkan sup?

[1 mark /*1 markah*]

7(d)(ii)

1

(iii) Name **one** other method by which the rate of evaporation water from the soup can be increased.
*Namakan **satu** lagi kaedah yang boleh meningkatkan kadar penyejatan air daripada sup tersebut.*

[1 mark /*1 markah*]

7(d)(iii)

1

(iv) Explain your answer in 7(d)(iii) in terms of the Kinetic Theory of Matter.
Terangkan jawapan anda di 7(d) (iii) dengan Teori Kinetik Jirim.

[1 mark /*1 markah*]

7 (d)(iv)

1

Total

10

[Lihat halaman sebelah

8. An a.c voltage of 240 V is converted to d.c 15 V when charging a car battery.
Voltan 240 V arus ulang alik ditukarkan kepada 15 V arus terus semasa mengecas sebuah bateri kereta.

Table 8.1 shows the specification of four transformers J, K, L and M that is used to step down the a.c voltage of 240 V to 15 V in the car battery charger.
Jadual 8.1 menunjukkan spesifikasi bagi empat transformer J, K, L dan M yang digunakan untuk menurunkan voltan 240 V arus ulang alik kepada 15 V di dalam sebuah pengecas bateri kereta.

Transformer *Transformer*	**Type of core** *Jenis teras*	**Ratio of the number of turns of primary coil to secondary coil** *Nisbah bilangan lilitan pada gegelung primer kepada gegelung sekunder*
J	Laminated steel core *Teras keluli berlamina*	15:1
K	Laminated soft iron core *Teras besi lembut berlamina*	16:1
L	Solid steel core Teras besi keluli padat	18:1
M	Solid soft iron core Teras besi lembut padat	20:1

Table 8.1 / *Jadual 8.1*

Table 8.2 shows four circuit P, Q, R and S that is used to change alternating current into a steady direct current in the car battery charger.
Jadual 8.2 menunjukkan empat litar P, Q, R dan S yang digunakan untuk menukar arus ulang alik kepada arus terus yang mantap di dalam sebuah pengecas bateri kereta.

[Lihat halaman sebelah

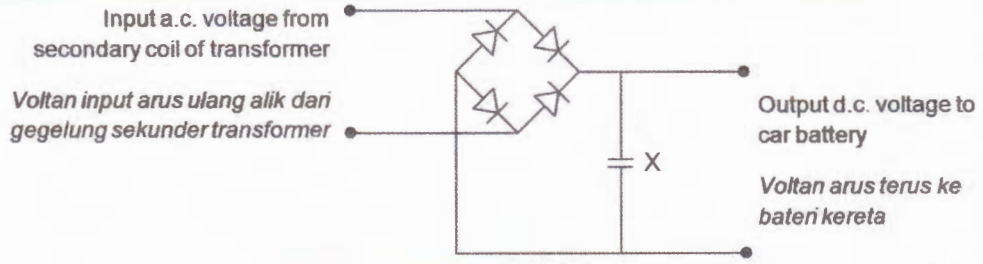
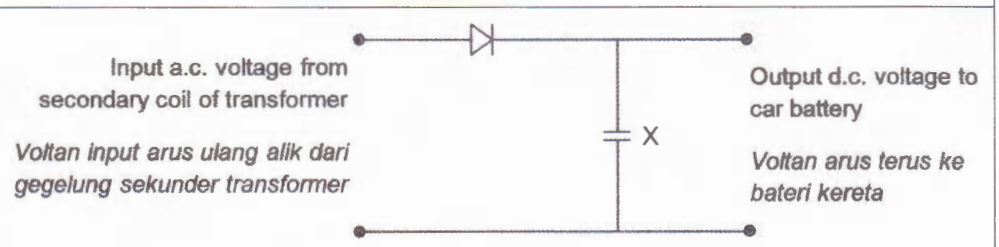
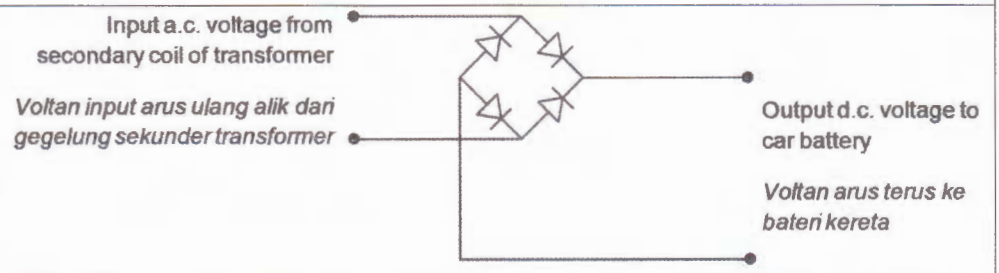
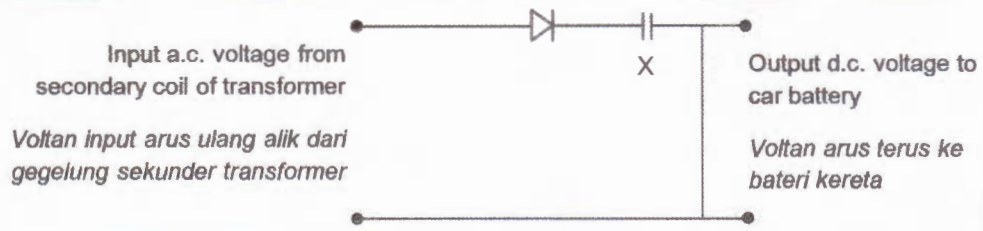
Circuit *Litar*	Specification of circuit Spesifikasi litar
P	
Q	
R	
S	

Table 8.2 / *Jadual 8.2*

(a) Based on the information in Table 8.1 and 8.2, state the suitable type of car battery charger used to convert the a.c voltage of 240 V to d.c. 15 V.
Berdasarkan maklumat dalam Jadual 8.1 dan 8.2, nyatakan jenis pengecas bateri kereta yang sesuai digunakan untuk menukarkan voltan 240 V arus ulang alik kepada 15 V arus terus.

For examiner's Use

Give a reason for your respective choices.

Beri sebab untuk pilihan anda.

(i) Type of core

Jenis teras

_____

8(a)(i) 2

Reason

Sebab

_____

[2 marks /*2 markah*]

(ii) Ratio of the number of turns of primary coil to secondary coil

Nisbah bilangan lilitan pada gegelung primer kepada gegelung sekunder

_____

8(a)(ii) 2

Reason

Sebab

_____

[2 marks /*2 markah*]

(iii) Number of diode

Bilangan diod

_____

8(a)(iii) 2

Reason

Sebab

_____

[2 marks / *2 markah*]

(iv) Usage of component X

Kegunaan komponen X

_____

8(a)(iv) 2

Reason

Sebab

_____

[2 marks / *2 markah*]

(v) Determine the most suitable transformer and circuit of the car battery charger.
Tentukan jenis transformer dan litar pengecas bateri kereta yang paling sesuai.

[2 marks / *2 markah*]

(b) Why does a transformer only function using a.c.?
Mengapa transformer hanya boleh berfungsi menggunakan arus ulang alik?

[2 mark /*2 markah*]

For examiner's Use

8(a)(v) 2

8(b) 2

Total 12

[Lihat halaman sebelah

Section B

Bahagian B

[20 marks]

[20 markah]

9. Diagram 9.1 and Diagram 9.2 show the light rays from two identical objects passing through the convex lenses, C and D. Both the lenses produce real images. F is the focal point for each lens.

Rajah 9.1 dan Rajah 9.2 menunjukkan sinar cahaya dari dua objek yang serupa melalui kanta cembung, C dan D. Kedua-dua kanta tersebut menghasilkan imej nyata. F ialah titik focus untuk setiap kanta.

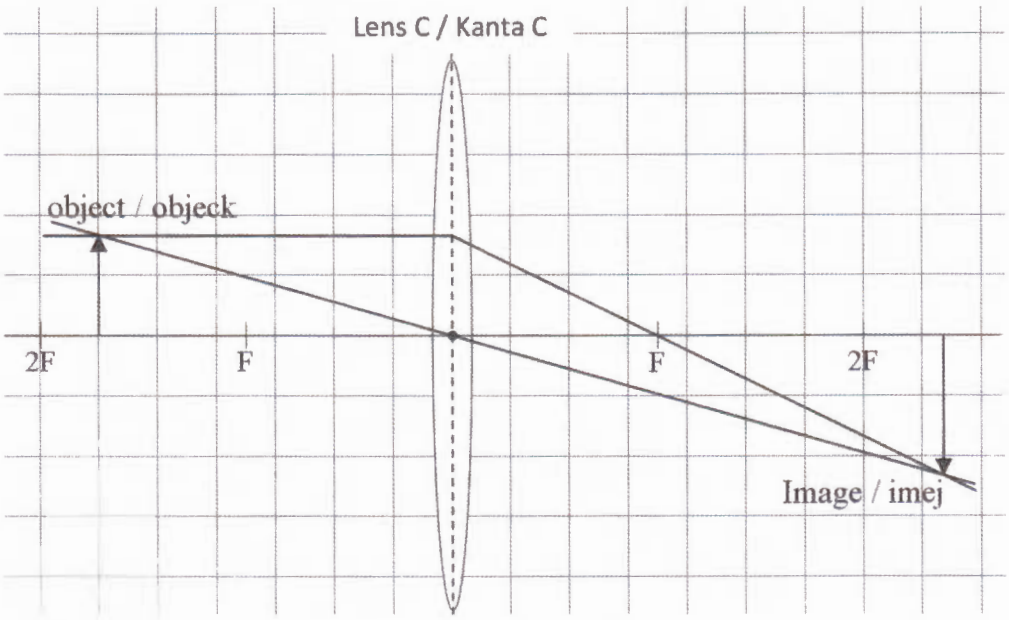


Diagram 9.1 / *Rajah 9.1*

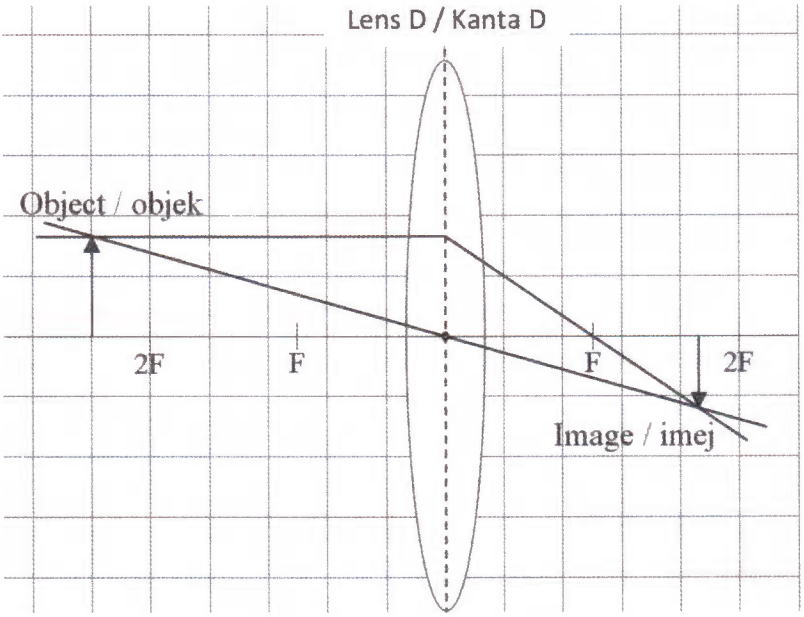


Diagram 9.2 / *Rajah 9.2*

(a) What is meant by real image?
Apakah maksud imej nyata?

[1 mark / *1 markah*]

(b) With reference to Diagram 9.1 and Diagram 9.2, compare the thickness of the lenses, focal length, object distance and image distance. State the relationship between the focal length and the thickness of lens. Relate the forcal length with the power of lens.
Merujuk kepada Rajah 9.1 dan Rajah 9.2, bandingkan ketebalan kanta, panjang fokus, jarak objek dan jarak imej. Nyatakan perhubungan di antara panjang fokus dan ketebalan kanta. Hubungkaitkan antara panjang fokus dengan kuasa kanta.

[5marks / *5 markah*]

(c) Describe how you estimate the focal length of a convex lens.
Huraikan bagaimana anda boleh menganggarkan jarak fokus bagi sebuah kanta cembung.

[4 marks / *4 markah*]

(d) An astronomical telescope is used to view very far objects such as the moon.
Teleskop astronomi digunakan untuk melihat objek yang jauh seperti bulan.

Construction of a simple astronomical telescope can be done in the school laboratory as shown in Diagram 9.3.
Pembinaan sebuah teleskop astronomi ringkas boleh dilakukan dalam makmal sekolah seperti dalam rajah 9.3.

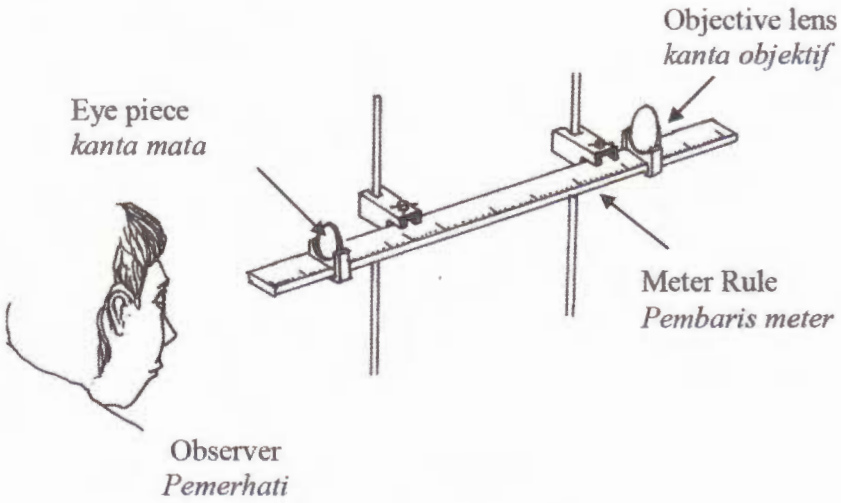


Diagram 9.3 / *Rajah 9.3*

You are asked to investigate the arrangement and characteristics of the lenses used to construct the simple astronomical telescope.
Anda ditugaskan untuk menyiasat susunan kanta dan sifat-sifat kanta yang akan digunakan untuk membina sebuah teleskop astronomi ringkas.

Study the arrangement and characteristics of the lenses used based on the following aspects:
Kaji susunan kanta dan sifat-sifat kanta yang digunakan dari aspek berikut:

(i) Diameters of lenses
Diameter kedua-dua kanta

(ii) Focal length of lenses
Panjang fokus kedua-dua kanta

(iii) Distance between two lenses
Jarak antara dua kanta

 [10 marks / *10 markah*]

[Lihat halaman sebelah

10. Diagram 10.1 and diagram 10.2 show the decay graphs of two difference radioactive sources.

Rajah 10.1 dan Rajah 10.2 menunjukkan graf reputan bagi dua sumber radioaktif yang berlainan.

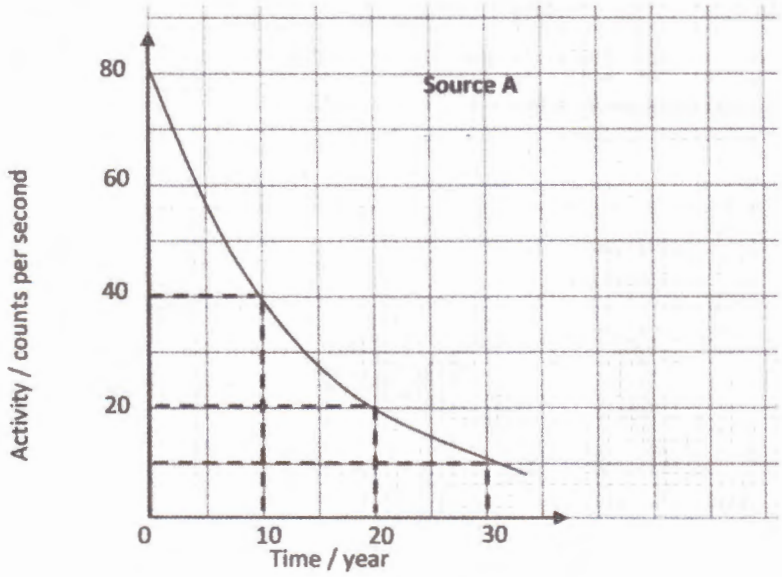


Diagram 10.1

Rajah 10.1

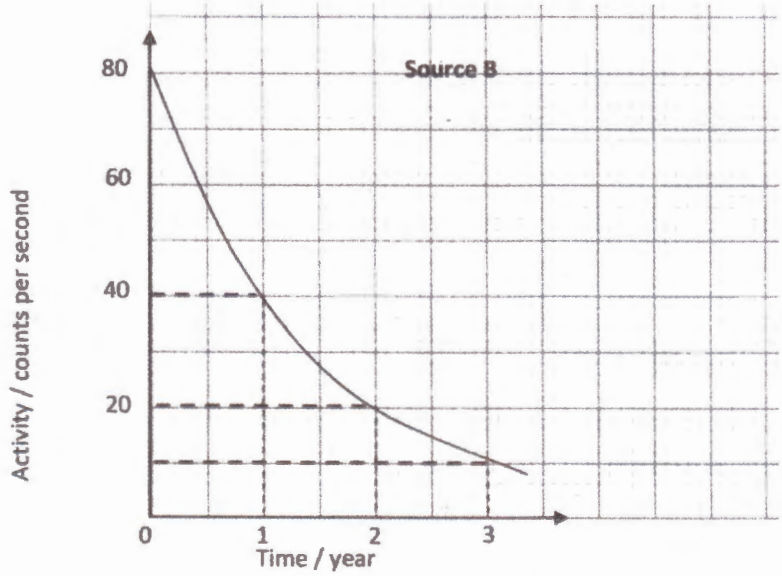


Diagram 10.2

Rajah 10.2

(a) What is the meaning of half-life?
Apakah yang dimaksudkan dengan separuh hayat?

[1 mark / *1 markah*]

(b) Using Diagram 10.1 and Diagram 10.2, compare the initial activity of the sources, the time interval for the activity to be halved and the rate of decay of the radioactive.
Menggunakan Rajah 10.1 dan Rajah 10.2, bandingkan aktiviti awal sumber-sumber itu, sela masa untuk aktiviti menjadi separuh dan kadar penyusutan radioaktif-radioaktif itu.

[3 marks / *3 markah*]

(c) State the relationship between:
Nyatakan hubungan antara:

(i) The rate of decay of the radioactives and the time of interval for the radioactive to be halved.
Kadar penyusutan radioaktif dan sela masa untuk radioaktif menjadi separuh.

(ii) Half life and the rate of decay of the radioactives.
Separuh hayat dan kadar penyusutan radioaktif.

[2 marks / *2 markah*]

(d) Thorium-230 decays to Radium (Ra) by emitting an alpha particle.
Thorium-230 mereput kepada Radium (Ra) dengan memancarkan satu zarah alfa.

(i) Write the nuclear equation expressing the alpha decay of $^{230}_{90}Th$
Tuliskan persamaan nuklear bagi pereputan alfa bagi $^{230}_{90}Th$

[2 marks / *2 markah*]

(ii) What happens to the proton number and neutron number of Th-230 after the decay process?
Apakah yang berlaku kepada nombor proton dan nombor neutron selepas proses penyusutan.

[2 mark / *2 markah*]

Diagram 10.3 / *Rajah 10.3*

(e) Diagram 10.3 shows a man handling a radioactive source
Suggest and explain;
Rajah 10.3 menunjukkan bahan radioaktif dikendalikan oleh seorang lelaki.
Cadang dan terangkan;

(i) The equipment to be used in handling a radioactive source.
Peralatan yang perlu digunakan dalam mengendalikan bahan radioaktif.

(ii) Modifications to the storing method to ensure safe keeping of the radioactive source.
Pengubahsuaian cara penyimpanan untuk memastikan penyimpanan sumber radioaktif adalah selamat.

(iii) Other precautions that need to be taken when handling a radioactive source.
Langkah berjag-jaga lain yang perlu diambil semasa mengendalikan sumber radioaktif.

[10 marks / *10 markah*]

Section C

Bahagian C

[20 marks]

[20 markah]

11. Diagram 11.1 shows a thermometer being used by a doctor to check the temperature of patient's body during medical treatment.
Rajah 11.1 menunjukkan satu termometer yang digunakan oleh seorang doctor untuk memeriksa suhu seorang pesakit semasa membuat rawatan.

Diagram 11.1 / *Rajah 11.1*

(a) What is meant by temperature?
Apakah yang dimaksudkan dengan suhu?

[1 *mark / 1 markah*]

(b) According to the principle of thermal equilibrium and the working principle of a thermometer, explain how a doctor can check his patient's temperature during medical treatment.
Merujuk kepada prinsip keseimbangan terma dan prinsip kerja termometer, terangkan bagaimana seorang doktor dapat memeriksa suhu badan pesakit semasa membuat rawatan kesihatan.

[4 *marks / 4 markah*]

(c) Diagram 11.2 shows a portable ice cream container which can keep the ice cream in the solid state.
Rajah 1.2 menunjukkan bekas menyimpan ais krim yang mudah dibawa dan dapat mengekalkan keadaan ais krim dalam bentuk pepejal.

Diagram 11.2 / *Rajah 11.2*

Table 11.3 shows the specification of four types of ice cream containers P, Q, R and S, that can be used.

Jadual 11.3 menunjukkan spesifikasi empat jenis bekas ais krim P, Q, R and S, yang boleh digunakan.

Box *Kotak*	P	Q	R	S
Specific heat capacity of ice cream box *Muatan haba tentu kotak aiskrim*	High *Tinggi*	High *Tinggi*	Low *Rendah*	Low *Rendah*
Size of ice cream box *Saiz kotak aiskrim*	Large *Besar*	Small *Kecil*	Small *Kecil*	Large *Besar*
Material of outer box *Bahan kotak luar*	Copper *Tembaga*	PVC plastic *Plastik PVC*	PVC plastic *Plastik PVC*	Aluminium *Aluminium*
Colour of outer box *Warna kotak luar*	Dark *Gelap*	Bright *Cerah*	Bright *Cerah*	Dark *Gelap*

Table 11.3 / *Jadual 11.3*

You are required to determine the most suitable ice cream container.
Study the specification of the four types of ice cream container based on the following aspects:
Anda dikehendaki untuk mengenalpasti bekas ais krim yang sesuai.
Kaji spesifikasi bagi empat jenis bekas ais krim berdasarkan aspek-aspek berikut:

- Specific heat capacity of ice cream box
  Muatan haba tentu kotak ais krim
- Size of ice cream box
  Saiz kotak ais krim kotak ais krim
- Material of outer box
  Bahan kotak luar
- Colour of outer box
  Warna kotak luar

Explain the suitability of the aspects
Terangkan kesesuaian aspek aspek tersebut

[10 marks / 10 markah]

(d) A solid substance, of mass 0.05 kg, is heated using an immersion heater of 240 V, 0.1 kW. Diagram 11.4 shows the heating curve of the solid.
Suatu bahan dalam keadaan pepejal berjisim 0.05 kg dipanaskan menggunakan pemanas rendam 240 V, 0.1 kW. Rajah 11.4 menunjukkan keluk pemanasan bagi pepejal tersebut.

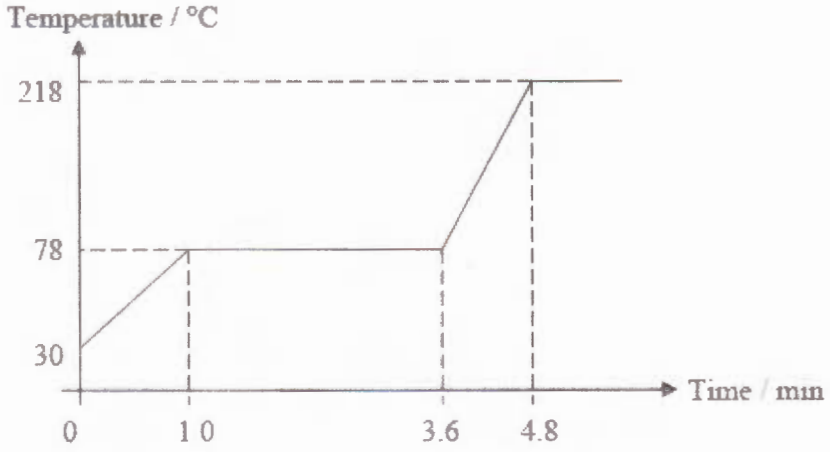


Diagram 11.4 / *Rajah 11.4*

Calculate

Hitung

(i) The specific latent heat of fusion of the substance

Haba pendam tentu pelakuran bahan itu

(ii) The specific heat capacity of the substance in liquid state

Muatan haba tentu bahan itu dalam keadaan cecair

[*5marks / 5 markah*]

12. Diagram 12.1 shows water waves approaching a jetty. A protective wall is built around the jetty. A gap in the wall allows boats and waves to pass through.

Rajah 12.1 menunjukkan gelombang air mendekati sebuah jeti. Suatu tembok pelindung dibina mengeliling jeti itu. Suatu bukaan pada tembok membenarkan bot-bot dan gelombang air melaluinya.

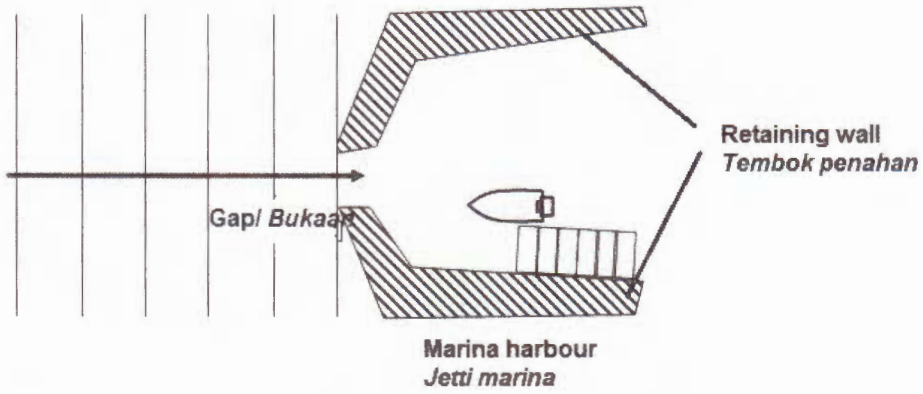


Diagram 12.1 / *Rajah 12.1*

(a) Name the wave phenomena shown in Diagram 12.1.

Namakan fenomena gelombang yang di tunjukkan dalam Rajah 12.1.

[1 mark / *1 markah*]

(b) Based on Diagram 12.2 (a) and 12.2(b), copy and draw the pattern of the wave after passing through the opening between the walls (gap).

Berdasarkan Rajah 12.2(a) dan 12.2(b), salin dan lukis corak gelombang selepas melalui bukaan pada tembok.

[3 marks / *3 markah*]

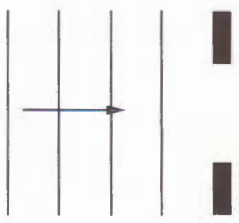


Diagram 12.2(a) / *Rajah12.2 (a)*

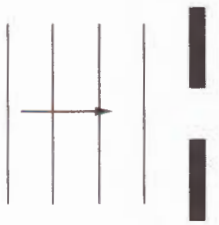


Diagram12.2 (b) / *Rajah12.2 (b)*

(c) Which of the diagrams shows a bigger effect of wave phenomenon stated in 12(b)? Explain your answer.
Rajah manakah yang menunjukkan kesan fenomena gelombang yang dinyatakandi 12(b) yang lebih besar? Terangkan jawapan anda.

[2 marks / *2 markah*]

(d)

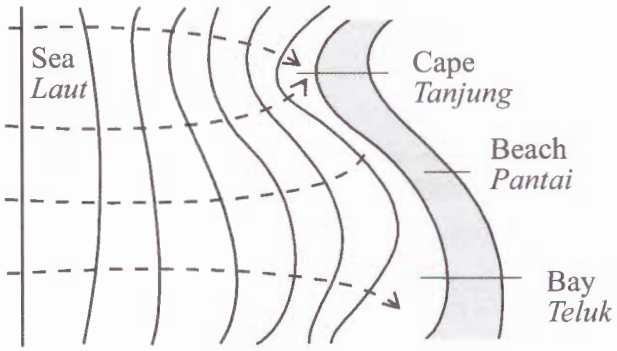


Diagram 12.3 / *Rajah 12.3*

Explain in terms of the wave phenomenon in Diagram12.3,why the water waves follow the shape of beach as it approaches the shore.
Terangkan dalam konteks fenomena gelombang dalam Rajah 12.3, mengapa gelombang air mengikut bentuk pantai apabila menghampiri pinggir pantai.

[4 marks / *4 markah*]

(e) Table 12.1 shows the characteristics of the retaining wall to build at a safe harbour. You are assigned to choose the safest retaining wall for the marina to keep the boats. The wall characteristics are based on the following aspects :
Jadual 12.1 menunjukkan ciri-ciri tembok penahan untuk dibina di sebuah jeti yangselamat. Anda ditugaskan untuk memilih tembok penahan yang selamat supaya dapat melabuhkan bot-bot. Ciri-ciri tembok adalah berdasarkan aspek-aspek berikut:

- The location to keep the boat
  Lokasi untuk melabuhkan bot
- Material used for the retaining wall
  Bahan yang digunakan untuk membina tembok penahan
- The height of the retaining wall
  Ketinggian tembok penahan
- Size of gap
  Saiz bukaan

Type of retaining wall/ *Jenis tembok penahan*	Location of retaining wall/ *Lokasi tembok penahan*	Material used to build the retaining wall / *Bahan yang digunakan untuk membina tembok*	Height of retaining wall / *Ketinggian tembok*	Size of gap / *Saiz bukaan*
P	Bay / *Teluk*	Concrete / *Konkrit*	Low / *Rendah*	Big / *Besar*
Q	Cape / *Tanjung*	Wood / *Kayu*	Low / *Rendah*	Small/ Kecil
R	Bay / *Teluk*	Concrete / *Konkrit*	High / *Tinggi*	Small/ *Kecil*

Table 12.1 / *Jadual 12.1*

Explain the best location and the suitability of each characteristic in Table 12.1.
Determine the most suitable retaining wall to be built.
Give reasons for your choice.
Terangkan kesesuaian lokasi dan ciri-ciri tembok penahan ombak seperti dalam Jadual 12.1. Tentukan tembok yang paling sesuai untuk dibina.
Berikan sebab-sebab untuk pilihan anda.

[10 marks / *10 markah*]

End of Question Paper
Kertas Soalan Tamat

NAMA

TINGKATAN

MAJLIS PENGETUA SEKOLAH MALAYSIA

CAWANGAN PULAU PINANG

MODUL LATIHAN BERFOKUS SPM 2014

FIZIK **4531/3**

Kertas 3

September

1 ½ jam **Satu jam tiga puluh minit**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis **nama** dan **tingkatan** anda pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Malaysia.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Inggeris atau Bahasa Malaysia.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Untuk Kegunaan Pemeriksa			
Bahagian	Soalan	Markah penuh	Markah diperoleh
A	1	16	
	2	12	
B	3	12	
	4	12	
Jumlah			

Kertas soalan ini mengandungi **16** halaman bercetak

1. A student carries out an experiment to investigate the relationship between the increase in temperature, $\Delta\theta$, of water and the heating time, t, of water. A mass, m = 0.30 kg of water is filled into a beaker. The initial temperature, θ_0, of water is measured by using a thermometer as shown in Diagram 1.1.

Seorang murid menjalankan eksperimen untuk mengkaji hubungan antara kenaikan suhu, $\Delta\theta$, bagi air dengan masa pemanasan, t, air itu. Air yang berjisim, m = 0.30 kg diisikan ke dalam sebuah bikar. Suhu awal, θ_0, bagi air diukur dengan menggunakan sebuah termometer seperti ditunjukkan dalam Rajah 1.1.

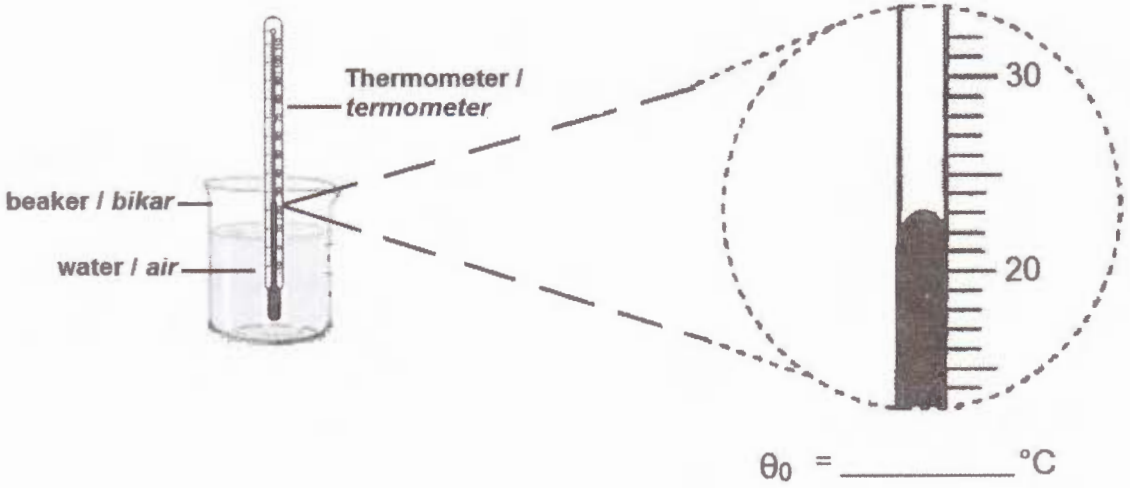


Diagram 1.1

Rajah 1.1

Diagram 1.2 shows the water in the beaker is heated for 2 minutes by using a Bunsen burner.

Rajah 1.2 menunjukkan air dalam bikar itu dipanaskan selama 2 minit dengan menggunakan penunu Bunsen.

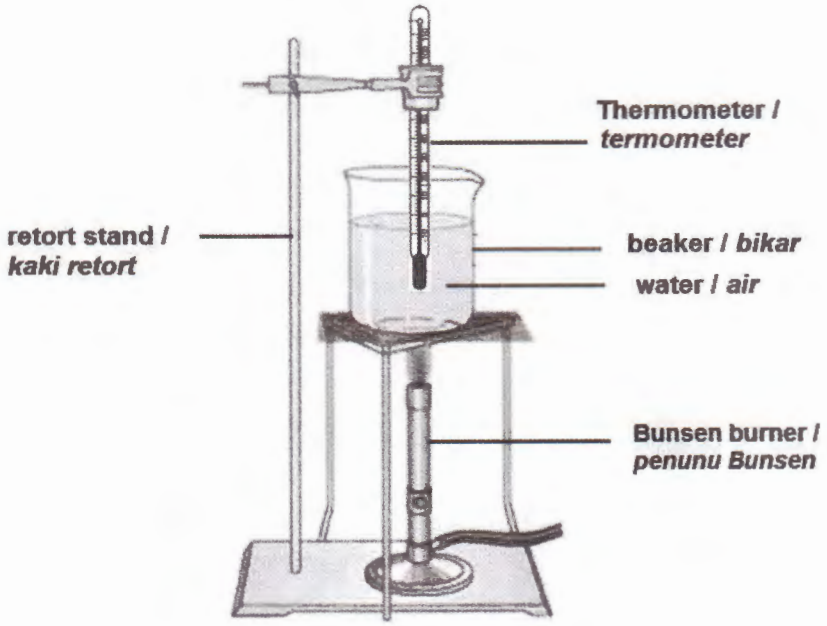


Diagram 1.2

Rajah 1.2

The final temperature, θ, of the water is read on the thermometer. Diagram 1.3 shows the meniscus of the mercury column in the thermometer after the beaker of water is being heated for 2 minutes. The increase in temperature, Δθ, of water can be determined by using the formula, $\Delta\theta = \theta - \theta_0$.

Suhu akhir, θ, bagi air itu diukur dengan termometer. Rajah 1.3 menunjukkan meniskus bagi turus merkuri dalam termometer selepas air dalam bikar dipanaskan selama 2 minit. Kenaikan suhu, Δθ, bagi air boleh dihitung dengan menggunakan formula, $\Delta\theta = \theta - \theta_0$.

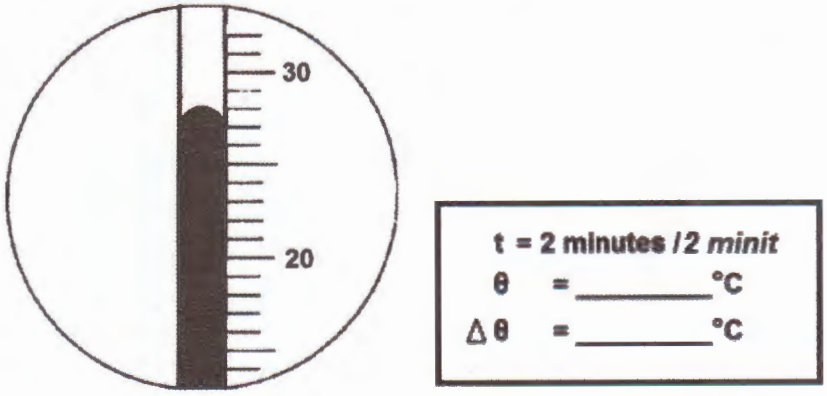


Diagram 1.3

Rajah 1.3

The procedure is repeated with heating time, t, of water = 4 minutes, 6 minutes, 8 minutes and 10 minutes. The corresponding final positions of meniscus of the mercury column in the thermometer are shown in Diagrams 1.4, 1.5, 1.6 and 1.7.

Prosedur ini diulang dengan masa pemanasan, t, bagi air = 4 minit, 6 minit, 8 minit dan 10 minit. Kedudukan-kedudukan akhir meniskus bagi turus merkuri dalam termometer yang sepadan ditunjukkan dalam Rajah 1.4, 1.5, 1.6 dan 1.7.

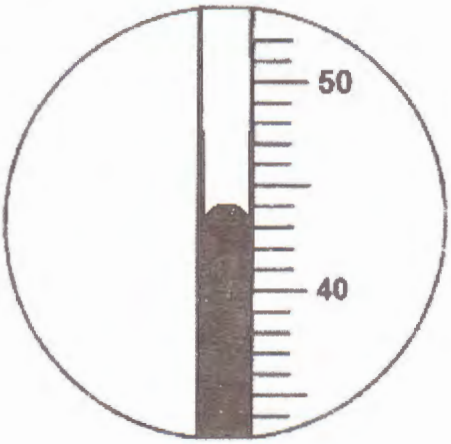
t = 4 minutes / *4 minit*

θ = _____ °C

Δθ = _____ °C

Diagram 1.4

Rajah 1.4



t = 6 minutes / *6 minit*

θ = _____ °C

Δθ = _____ °C

Diagram 1.5

Rajah 1.5

t = 8 minutes / *8 minit*

θ = _____ °C

Δθ = _____ °C

Diagram 1.6

Rajah 1.6

t = 10 minutes / *10 minit*

θ = _____ °C

Δθ = _____ °C

Diagram 1.7

Rajah 1.7

For Examiner's Use

(a) For the experiment described on pages 2, 3 and 4, identify:

Bagi eksperimen yang diterangkan di halaman 2, 3 dan 4, kenal pasti:

(i) The manipulated variable

Pemboleh ubah dimanipulasikan

1(a)(i) 1

_____

[1 mark]

[*1 markah*]

(ii) The responding variable

Pemboleh ubah bergerak balas

1(a)(ii) 1

_____

[1 mark]

[*1 markah*]

(iii) The constant variable

Pemboleh ubah dimalarkan

1(a)(iii) 1

_____

[1 mark]

[*1 markah*]

(b) For this part of the question, write your answers in the spaces provided in the corresponding diagrams.

Untuk bahagian soalan ini, tulis jawapan anda dalam ruang yang disediakan dalam rajah-rajah yang sepadan.

(i) Based on Diagram 1.1 on page 2, record the reading of θ_0.

Berdasarkan Rajah 1.1 di halaman 2, catat bacaan, θ_0.

1(b)(i) 1

[1 mark]

[*1 markah*]

(ii) Based on Diagram 1.3, 1.4, 1.5, 1.6 and 1.7 on page 3 and 4, record the readings of θ.

Berdasarkan Rajah 1.3, 1.4, 1.5, 1.6 dan 1.7 di halaman 3 dan 4, catat bacaan θ.

1(b)(ii) 2

[2 marks]

[*2 markah*]

For Examiner's Use

(iii) Calculate $\Delta\theta$ for each value of θ in 1(b)(ii), using the formula, $\Delta\theta = \theta - \theta_0$.
Record the value of $\Delta\theta$.
Hitung $\Delta\theta$ bagi setiap nilai θ di 1(b)(ii), menggunakan formula, $\Delta\theta = \theta - \theta_0$.
Catat nilai $\Delta\theta$.

[2 marks]
[*2 markah*]

1(b)(iii) 2

(c) Tabulate your results for all values of t, θ and $\Delta\theta$ in the spaces below.
Jadualkan keputusan anda bagi semua nilai t, θ *dan* $\Delta\theta$ *dalam ruang di bawah.*

[2 marks]
[*2 markah*]

1(c) 2

(d) On the graph paper on page 7, plot a graph of $\Delta\theta$ against t.
Pada kertas graf di halaman 7, lukis graf $\Delta\theta$ melawan t.

[5 marks]
[*5 markah*]

1(d) 5

(e) Based on the graph in 1(d), state the relationship between $\Delta\theta$ and t.
Berdasarkan graf di 1(d), nyatakan hubungan antara $\Delta\theta$ *dengan* t.

_____

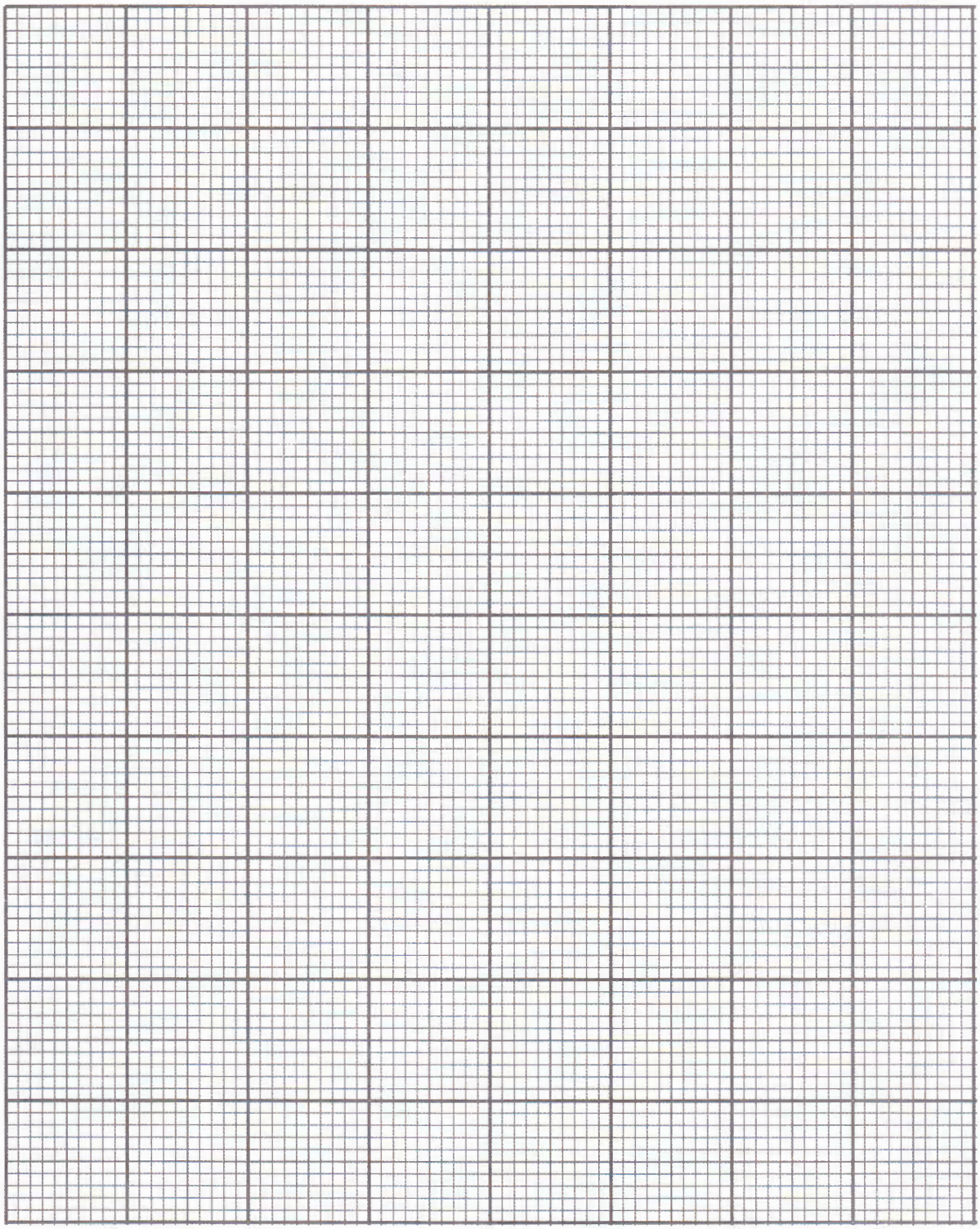
[1 mark]
[*1 markah*]

1(e) 1

Total A1 16

Graph of Δθ against t

Graf Δθ melawan t



For Examiner's Use

2. A student carries out an experiment to investigate the relationship between the base current, I_B, and the collector current, I_C for a transistor and to determine the current amplification factor of the transistor. This experiment is carried out using simple transistor circuit.

The results of this experiment is shown in the graph of I_C against I_B in Diagram 2.1 on page 9.

Seorang pelajar menjalankan satu eksperimen untuk mengkaji hubungan antara arus tapak, I_B dan arus pengumpul, I_C untuk satu transistor dan untuk menentukan faktor gandaan arus bagi transistor. Eksperimen ini dilakukan dengan menggunakan litar transistor ringkas.

Keputusan eksperimen ini ditunjukkan oleh graf I_C melawan I_B pada Rajah 2.1 di halaman 9.

(a) If the flow of current is from the collector to the emitter when the transistor is switched on, what is the type of transistor used?

Jika arus yang mengalir adalah dari pengumpul ke pemancar apabila transistor itu dihidupkan, apakah jenis transistor yang digunakan?

2(a) 1

_____

[1 mark]

[*1 markah*]

(b) Based on the graph in Diagram 2.1,

Berdasarkan graf pada Rajah 2.1,

(i) State the relationship between I_C and I_B.

Nyatakan hubungan antara I_C dengan I_B.

2(b)(i) 1

_____

[1 mark]

[*1 markah*]

(ii) Determine the value of I_C when I_B = 30 μA.

Show on the graph how you determine the value of I_C.

Tentukan nilai I_C apabila I_B = 30 μA.

Tunjukkan pada graf itu bagaimana anda menentukan nilai I_C.

2(b)(ii) 2

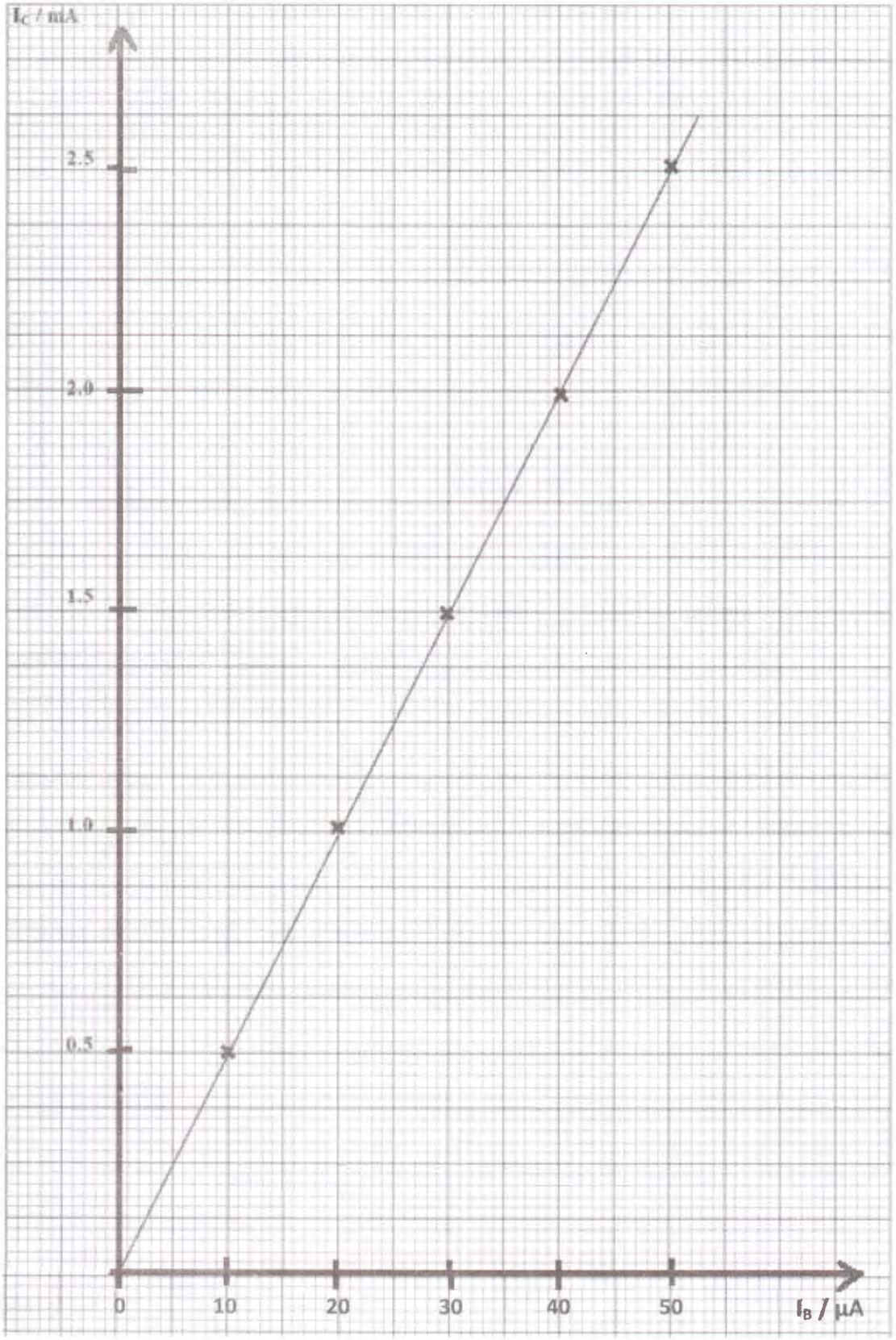
I_C = _____

[2 marks]

[*2 markah*]

Graph of I_C against I_B

Graf I_C melawan I_B



Rajah 2.1

For Examiner's Use

(iii) The gradient of the graph shows the current amplification factor of the transistor. Determine the current amplification factor of the transistor. Show on the graph how you determined the value.

Kecerunan graf menunjukkan faktor gandaan arus bagi transistor.

Tentukan faktor gandaan arus bagi transistor tersebut. Tunjukkan pada graf bagaimana anda menghitung nilai tersebut.

2(b)(iii)

3

[3 marks]

[*3 markah*]

(c) The current amplification factor in the circuit can be determined by using formulae, $I_{gain} = \frac{I_C}{I_B}$, where I_{gain} is the gradient of the graph from 2(b)(iii) and $I_B = 30\ \mu A$. Find the value of I_C in the circuit.

Faktor gandaan arus dalam litar diberi dalam formula $I_{gain} = \frac{I_C}{I_B}$, *di mana* I_{gain} *ialah kecerunan graf pada 2(b)(iii) dan diberi* $I_B = 30\ \mu A$. *Carikan nilai* I_C *dalam litar.*

2(c)

2

[2 marks]

[*2 markah*]

For Examiner's Use

(d) What is the function of the transistor in this experiment? Explain your answer.

Apakah fungsi transistor tersebut dalam eksperimen ini. Terangkan jawapan anda.

_____

_____

_____

_____

[2 marks]

[*2 markah*]

2(d) 2

(e) State **one** precaution that should be taken during this experiment.

*Nyatakan **satu** langkah berjaga-jaga yang boleh diambil semasa menjalankan eksperimen ini.*

_____

_____

[1 mark]

[1 *markah*]

2(e) 1

Total A2 12

Section B

Bahagian B

[12 *marks*]

[*12 markah*]

Answer any **one** question from this section.

*Jawab mana-mana **satu** soalan daripada bahagian ini.*

3. Diagram 3.1 shows a woman pushing a trolley filled with groceries in it. The trolley moves with a small acceleration.

Rajah 3.1 menunjukkan seorang wanita sedang menolak troli yang dipenuhi barangan runcit di dalamnya. Troli itu bergerak dengan pecutan yang kecil.

Diagram 3.1

Rajah 3.1

Diagram 3.2

Rajah 3.2

Diagram 3.2 shows two women pushing the same trolley where each of them exerting the same force as in Diagram 3.1. The trolley moves with bigger acceleration.

Rajah 3.2 menunjukkan dua orang wanita sedang menolak troli yang sama dengan masing-masing menggunakan daya yang sama seperti dalam Rajah 3.1. Troli itu bergerak dengan pecutan yang lebih besar.

Based on the information and observation:

Berdasarkan maklumat dan pemerhatian tersebut:

(a) State **one** suitable inference. [1 mark]

*Nyatakan **satu** inferens yang sesuai.* [*1 markah*]

(b) State **one** suitable hypothesis. [1 mark]

*Nyatakan **satu** hipotesis yang sesuai.* [*1 markah*]

(c) With the use of apparatus such as a trolley, elastic thread, ticker timer and other apparatus, describe an experiment to investigate the hypothesis stated in 3(b).
Dengan menggunakan radas seperti troli, tali kenyal, jangka masa detik, dan radas lain, terangkan satu eksperimen untuk menyiasat hipotesis yang dinyatakan di 3(b).

In your description, state clearly the following:
Dalam penerangan anda nyatakan dengan jelas perkara berikut:

(i) The aim of an experiment.
Tujuan eksperimen.

(ii) The variables in experiment.
Pembolehubah dalam eksperimen.

(iii) The list of apparatus and materials.
Senarai radas dan bahan.

(iv) The arrangement of the apparatus.
Susunan radas.

(v) The procedure of the experiment, which includes **one** method of controlling the manipulated variable and **one** method of measuring the responding variable.
*Prosedur eksperimen termasuk **satu** kaedah mengawal pemboleh ubah dimanipulasikan dan **satu** kaedah mengukur pemboleh ubah bergerak balas.*

(vi) The way to tabulate the data.
Cara menjadualkan data.

(vii) The way to analyse the data.
Cara menganalisis data.

[10 marks]
[*10 markah*]

4. Diagram 4.1 shows a bicycle cyclist cycles his bicycle with moderate velocity. Diagram 4.2 shows a bicycle cyclist cycles the same bicycle with high velocity. It is found that his bicycle's lamp lights up brighter.

Rajah 4.1 menunjukkan seorang pelumba basikal mengayuh basikal dengan kelajuan sederhana.
Rajah 4.2 pula menunjukkan seorang pelumba basikal mengayuh basikal yang sama dengan halaju yang tinggi. Didapati nyalaan lampunya lebih terang.

The lamp of the bicycle lights up when the magnet in the dynamo is rotated by turning the wheel.
Lampu sebuah basikal menyala apabila magnet di dalam dinamo itu berputar oleh putaran tayar.

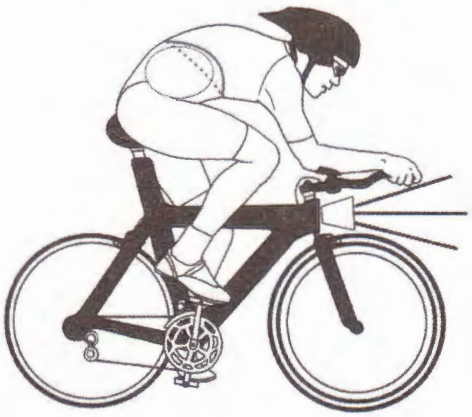


Diagram 4.1
Rajah 4.1

Diagram 4.2
Rajah 4.2

Based on the observation above and your knowledge of electromagnet:
Berdasarkan pemerhatian di atas dan pengetahuan berkaitan elektromagnet:

(a) State **one** suitable inference. [1 mark]
*Nyatakan **satu** inferens yang sesuai.* [*1 markah*]

(b) State **one** suitable hypothesis. [1 mark]
*Nyatakan **satu** hipotesis yang sesuai.* [*1 markah*]

(c) With the use of apparatus such as a bar magnet, a coil of a copper wire and other suitable apparatus, describe **one** experiment to investigate the hypothesis stated in **4**(b).

*Dengan menggunakan radas seperti magnet bar, gegelung dawai kuprum, dan radas-radas lain yang sesuai, terangkan **satu** eksperimen untuk menyiasat hipotesis yang dinyatakan di **4**(b).*

In your description, state clearly the following:

Dalam penerangan anda, nyatakan dengan jelas perkara berikut:

(i) The aim of the experiment.
Tujuan eksperimen.

(ii) The variables in the experiment.
Pembolehubah dalam eksperimen.

(iii) The list of apparatus and materials.
Senarai radas dan bahan

(iv) The arrangement of the apparatus.
Susunan radas.

(v) The procedure used of the experiment which include **one** method of controlling the manipulated variable and **one** method of measuring the responding variable.
*Prosedur eksperimen termasuk **satu** kaedah mengawal pembolehubah dimanipulasikan dan **satu** kaedah mengukur bagaimana pembolehubah bergerak balas.*

(vi) The way to tabulate the data.
Cara untuk menjadualkan data.

(vii) The way to analyse the data.
Cara untuk menganalisis data.

[10 marks]
[10 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

SECTION A

NO.	MARKING SCHEME	MARK SUB	MARK TOTAL
1(a)	Bernoulli's Principle	1	
(b)	Y	1	
(c)	upward	1	
(d)	higher	1	4
2(a)	Fall under gravity // fall with gravitational acceleration	1	
(b)(i)	50 N	1	
(ii)	Increases	1	
(c)(i)	zero	1	
(ii)	$10ms^{-2}$ / g	1	5
3(a)	Rate of change of momentum	1	
(b)	F= mv-mu / t = 0.200 (0-4)/1	1	
	= - 0.8N or 0.8N	1	
(c)(i)	Decrease	1	
(ii)	Time of impact / collision has increased	1	
(d)	Mortar and pestle // piling // hammer // karate chop wood	1	6
4(a)	Electromotive force / e.m.f	1	
(b)(i)	3.0 V	1	
(ii)	Gradient = (1 – 3) / 1	1	
	= - 2.0 ohm	1	
(c)(i)	I = 0.5 A	1	
(ii)	E = IR + Ir 3.0 = 0.5 (R) + (0.5)(2.0) or R = V/I = 2.0/0.5	1	
	R = 4.0 ohm = 4 ohm	1	7
5(a)	Total internal reflection	1	
(b)(i)	Glass A has a higher refractive index than glass B /5.1 >5.2	1	
(ii)	The same / 42°	1	
(iii)	Angle of incidence is greater than critical angle	1	
	Move from a denser to a less dense medium	1	
(c)	sin c = 1/1.4	1	
	c = 45.58° or 46°	1	
(d)	The higher the refractive index, the lower the critical angle	1	8

6.

a) (i)

Transmitter	Sensor	Output X
0	0	0
0	1	0
1	0	0
1	1	1

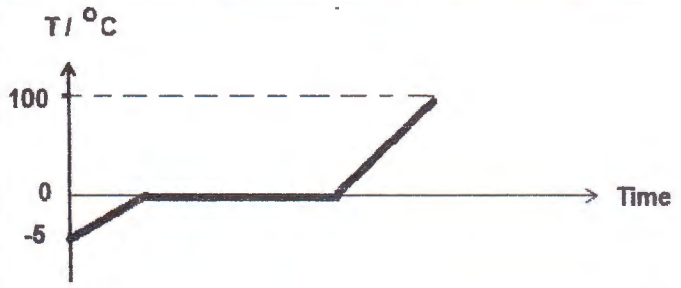
2

(ii) AND gate 1

(iii)  1

(b)(i)	Smaller mass	2	
	Reduce inertia		
(ii)	Higher power	2	
	Motor rotates faster		8

[Lihat halaman sebelah

NO.	MARKING SCHEME	MARK	
		SUB	TOTAL
7(a)(i)	Latent heat of fusion	1	
(a)(ii)	The heat absorbed is needed to weaken the bonds between the molecules.	1	
(b)	$Q_2 = ml$ $= 1kg \times 3.36 \times 10^5 Jkg^{-1}$ $= 3.36 \times 10^5 J$	1 1	
(c)		1 (Graph drawn correctly) 1 (Label scale correctly)	
(d)(i)	The rate of evaporation will increase	1	
(d)(ii)	Heat is absorbed from soup by the evaporating water as latent heat is needed for evaporation.	1	
(d)(iii)	By pouring the soup into a wider bowl to increase its surface area // Put under the fan (any relevant answer)	1	10

8(a)(i)	Laminated soft iron core Less eddy current / can be easily magnetized and demagnetized to reduce energy lost	2	
(a)(ii)	16:1 To produce 15 V output voltage / reduce 240 V to 15 V.	2	
(a)(iii)	4 diodes Full wave rectification	2	
(a)(iv)	Yes / capacitor Smoothen output current // produce output of steady direct current.	2	
(a)(v)	Transformer K and circuit P	2	
(b)	To produce a changing magnetic field To get an induced current / voltage // for electromagnectic induction	2	12

[Lihat halaman sebelah

SECTION B

NO.	ANSWER	MARK SUB	MARK TOTAL
9 (a)	Image that can be caught on a screen	1	
(b)	Thickness of lens in 9.2 > 9.1 Focal length in 9.1 > 9.2 Object distance 9.1 = 9.2 Image distance 9.1 > 9.2 Focal length of lens increase, thickness of lens decrease Focal length of lens increase, power of lens decrease	5	
(c)	1. The convex lens is aimed / focused to a distant object (infinity) 2. The screen is adjusted until a sharp image is formed on screen 3. The distance between the screen and the lens is measured 4. Focal length = distance between the screen and the lens	4	
(d)	Large diameter of objective lens — More light can enter objective lens // image brighter Small diameter of eye piece — The position of eye can be easily placed at the principle axis of eye piece // most of the light can enter the eyes. Short focal length of eye piece — bigger magnification Longer focal length of objective lens — Bigger magnification $m = \frac{f_o}{f_e}$ Distance equal to $f_o + f_e$ — Image formed at infinity / normal adjustment of lenses.	10	20

NO.	ANSWER	MARK SUB	MARK TOTAL
10 (a)	The time taken for half of the atoms in a given sample to decay	1	
(b)	1. Initial activity is the same 2. time interval in Diagram 10.1 is longer 3. rate of decay in Diagram 10.1 is lower	3	
(c)	(i) The higher the rate of decay the shorter the time interval	1	
	(ii) The higher the rate of decay the shorter the half life	1	
(d)	(i) $^{230}_{90}Th \longrightarrow {}^{226}_{88}Ra + {}^{4}_{2}He$	2	
	(ii)- The number of proton will decrease by 2 - The number of neutron will decrease by 2	2	

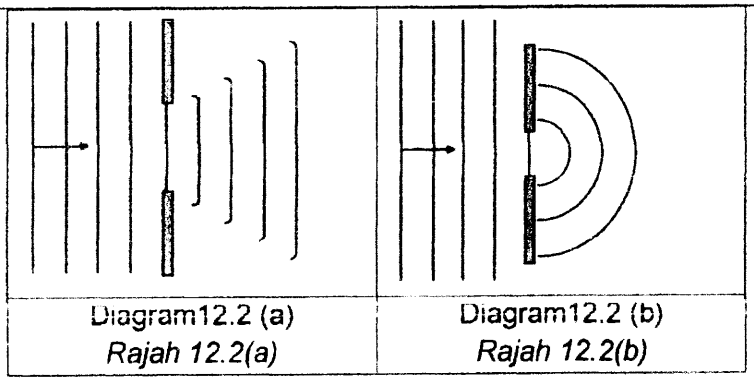
[Lihat halaman sebelah

(e)	**Suggestion**	**Explanation**	
	Use forceps/robot	The distance between the source and the body is far.	
	Use a lead box/container with thick concrete	To prevent radiation leakage to surroundings	
	Keep the exposure time as short as possible	The body is not exposed to the radiation for a long time.	10
	Wear a film badge	To detect the amount of radiation exposed	
	Put radiation symbol on the storage box	To inform users the dangerous contents of the box	
	TOTAL		20

SECTION C

NO.	MARKING SCHEME	MARK SUB	MARK TOTAL
11(a)	Temperature is the measure of the degree of hotness of an object.	1	
(b)	(i) Thermometer is placed in the mouth of patient	1	
	(ii) Heat is transferred from patient's body to the thermometer.	1	
	(iii) Thermal equilibrium between the thermometer and patient's body is reached when the net rate of heat transfer is zero.	1	
	(iv) The thermometer and the patient's body are at the same temperature //The thermometer reading shows the temperature of the patient's body.	1	
(c)	**Characteristics** / **Explanation**: Low specific heat capacity of ice cream box / Easy get cold // becomes cool quickly	2	
	Smaller size of ice cream box / Easier to carry // easy to become cool	2	
	Plastic PVC / Poor conductor of heat	2	
	Bright colour of outer box / Does not absorb heat from surroundings quickly	2	
	- R is chosen	1	
	- because Low specific heat capacity of ice cream box, Smaller size of ice cream box, Plastic PVC, Bright colour of outer box	1	
(d) (i)	$L = Pt/m$	1	
	$= 0.1 \times 10^{3} \times 156 / 0.05$	1	
(d) (ii)	$= 312000 \text{ J kg}^{-1}$		
	$t = 72$ s (from graph)	1 1	
	$c = Pt / m\theta$	1	
	$= 0.1 \times 10^{3} \times 72 / 0.05 \times 140$		
	$= 1028.57 \text{ J kg}^{-1} \text{ °C}^{-1}$		
	TOTAL		20

[Lihat halaman sebelah

NO.	MARKING SCHEME	MARK SUB	MARK TOTAL
12(a)(i)	Diffraction	1	1
12(a)(ii)	 Diagram12.2 (a) *Rajah 12.2(a)* Diagram12.2 (b) *Rajah 12.2(b)*	1 (λ same) 1 (12.2a correct) 1 (12.2b correct)	3
(a)(iii)	Diagram 12.2(b) shows a bigger effect of diffraction. The narrower the gap, the more obvious is the spreading of waves.	1 1	2
(a)(iv)	1 Wave propagate from deeper to shallow area. 2.The wavelength decreases. 3.The speed decreases. 4.The direction of the wave bends towards normal	1 1 1 1	4
(b)	Characteristics / Explanation Bay / Wave is calmer/amplitude lower Concrete retaining wall / Withstand high force//stronger// lasting High wall / Prevent high wave Smaller gap / Diffraction obvious//low wave energy **M9** - Type R is chosen **M10**–because it is at the bay, has high concrete wall and has a smaller gap.	2 2 2 2 1 1	10
	TOTAL	20	

MAJLIS PENGETUA SEKOLAH MALAYSIA

CAWANGAN PULAU PINANG

MODUL LATIHAN BERFOKUS SPM 2014

FIZIK 4531/3

Kertas 3

PERATURAN PEMARKAHAN

Kertas 3

SKEMA FIZIK KERTAS 3

SECTION A

NO	MARKING CRITERIA	MARK	
		SUB	TOTAL
1(a) (i)	**State the manipulated variable**		
	heating time, t	1	
(ii)	**State the responding variable**		
	increase in temperature, $\Delta\theta$	1	3
(iii)	**State a constant variable**		
	mass of water / initial temperature, θ_0	1	
(b) (i)	**State initial temperature, θ_0**		
	23 °C	1	
(ii)	**Record five values of θ**		
	Diagram 1.3, θ = 28 °C	2	
	Diagram 1.4, θ = 35 °C		
	Diagram 1.5, θ = 44 °C		
	Diagram 1.6, θ = 54 °C		
	Diagram 1.7, θ = 72 °C		5
	Note: Any three readings correct, award 1 mark		
(iii)	**Record five values of $\Delta\theta$**		
	Diagram 1.3, $\Delta\theta$ = 5 °C	2	
	Diagram 1.4, $\Delta\theta$ = 7 °C		
	Diagram 1.5, $\Delta\theta$ = 9 °C		

<table>
<tr>
<td></td>
<td>Diagram 1.6, Δθ = 10 °C

Diagram 1.7, Δθ = 12 °C

Note: Any three readings correct, award 1 mark

Accept e.c.f. from (b)(ii)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>Tabulate the results

- Heading for t, θ and Δθ

<table>
<tr><th>t (minutes)</th><th>θ (°C)</th><th>Δθ (°C)</th></tr>
<tr><td>2</td><td>28</td><td>5</td></tr>
<tr><td>4</td><td>35</td><td>7</td></tr>
<tr><td>6</td><td>44</td><td>9</td></tr>
<tr><td>8</td><td>54</td><td>10</td></tr>
<tr><td>10</td><td>72</td><td>12</td></tr>
</table>

- State all the units of t, θ and Δθ correctly</td>
<td>1

1</td>
<td>2</td>
</tr>
<tr>
<td>(d)</td>
<td>Draw a complete graph of Δθ against t

Tick (√) based on the following aspects

A Show Δθ on vertical-axis and t on the horizontal- axis

B State the units of the variables correctly

C Both axes are marked with uniform scale

D All five points are plotted correctly

(Note: If only three points plotted correctly, award √)

E Best straight line is drawn

F Show the minimum size of graph at least 5 x 4</td>
<td>

√

√

√

√√

√</td>
<td></td>
</tr>
</table>

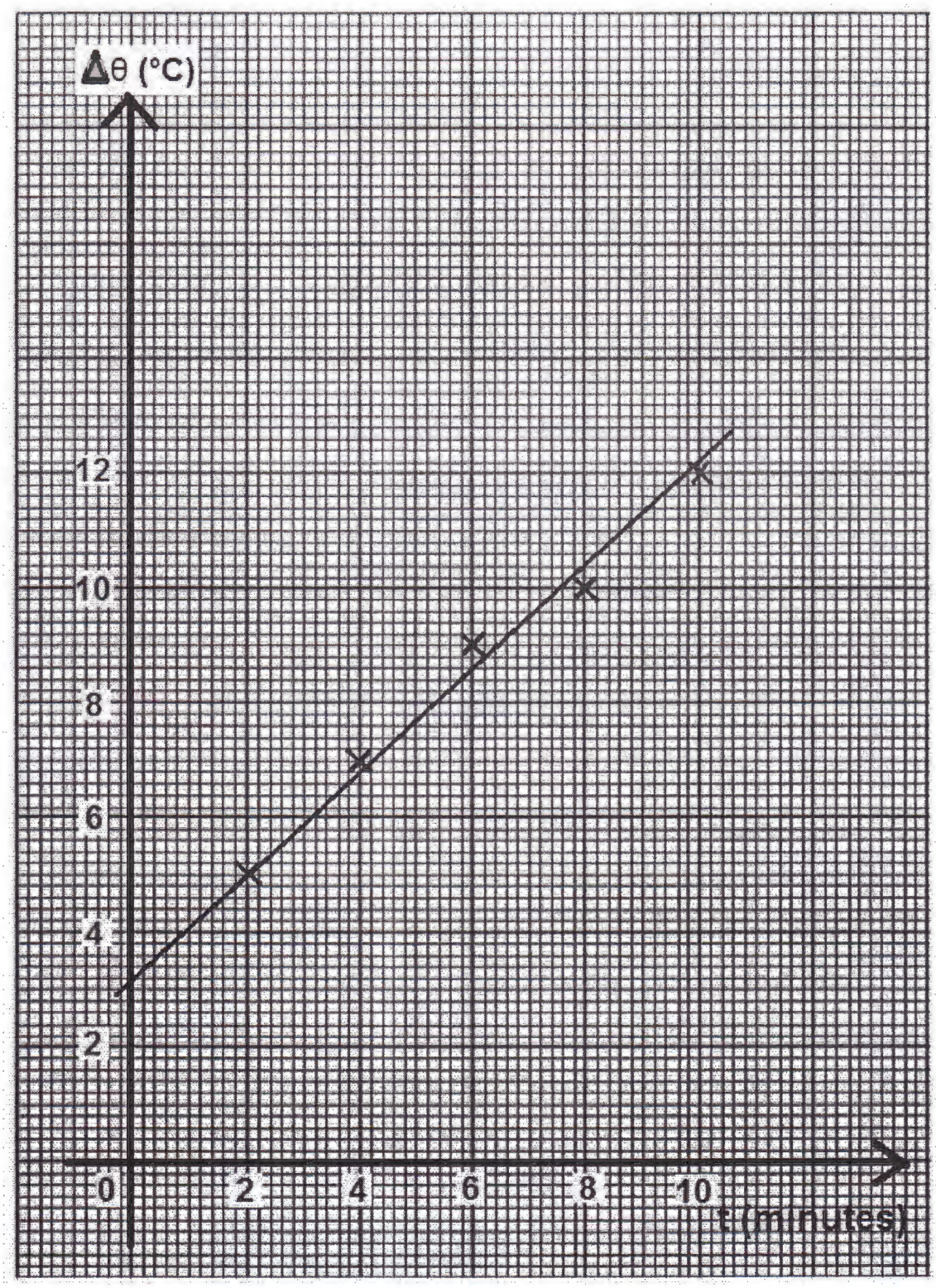
<table>
<tr>
<td></td>
<td>(2 cm x 2 cm) square

(counted from the origin until the furthest point)

Score :

<table>
<tr><th>Number of ✓</th><th>Score</th></tr>
<tr><td>7</td><td>5</td></tr>
<tr><td>5-6</td><td>4</td></tr>
<tr><td>3-4</td><td>3</td></tr>
<tr><td>2</td><td>2</td></tr>
<tr><td>1</td><td>1</td></tr>
</table>
</td>
<td>√</td>
<td>5</td>
</tr>
<tr>
<td>(e)</td>
<td>State the correct relationship between Δθ and t

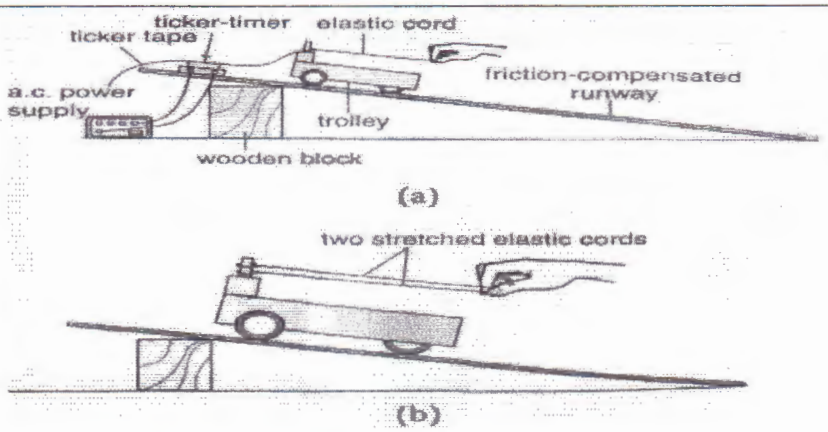
Δθ increases linearly with t</td>
<td>1</td>
<td>1</td>
</tr>
</table>

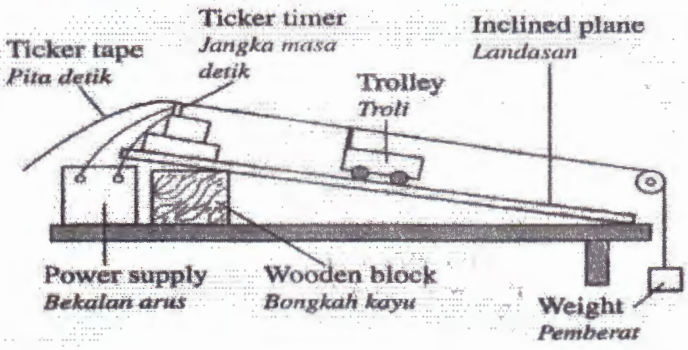


2.(a)	**Able to state the answer correctly** npn transistor	1	1
(b)(i)	**Able to state the relationship between I_C and I_B** I_C directly proportional to I_B // $I_C \propto I_B$	1 1	2
(ii)	**Able to show the method to read the value of I_C** - show the vertical line corresponding to I_B = 30 μA - identify the value of a I_C = 1.5 mA	1 1	2
(iii)	**Able to calculate the gradient , I_{gain}** draw a sufficiently large triangle correct substitution (follow candidate triangle) e.g $= \frac{(2.5-0)mA}{(50-0)\mu A}$ -Correct answer= **50** **(accept answer without unit)**	1 1 1	3
(c)	$50 = \frac{I_C}{30\mu A}$ =50 x 30 μA = 1.5 mA (with correct unit) Accept ecf from b(iii)	1 1	2
(d)	**Able to state correct answer** - Used as an amplifier - A small change in the base current results in a large change in the collector	1 1	2
(e)	**Able to state one correct precaution** - make sure that all the connections are fixed properly and tightly // the position of the eyes must be perpendicular to the reading scale of an ammeter (to avoid parallax error)	1	1
	Total		12

QUESTION 3

3(a)	**State the suitable inference** The acceleration depends on the force //The force effect the acceleration// (any suitable answer with cause and effect)	1
(b)	**State a relevant hypothesis** The higher the force, the higher the acceleration	1
(c)(i)	**State the aim of experiment** To study the relationship between the force and the acceleration.	1
(ii)	**State the suitable manipulated variables and responding variable (Quantity that can be measured)** Manipulated variables : Force Responding variables : Acceleration	1
	State the constant variable Mass	1
(iii)	**State the complete list of apparatus and materials** Trolley, ticker tape, ticker timer, inclined plane, **metre rule**, elastic cords, **power supply**, wooden bolck (accept – if label in diagram or stated in precedure)	1
(iv)	**Draw the functional arrangement of the apparatus**	1





(accept experiment if the students use slotted weight as a force instead of using elastic cord)

(v)

State the method to control the manipulated variable

The ticker timer is switched on and the trolley is pulled down with one piece of elastic cord that is stretched with constant length (i.e 5 cm) — 1

State the method to measure the responding variable

Based on the ticker tape obtained, the acceleration of the trolley is calculated by using the formulae $a = \frac{v-u}{t}$ — 1

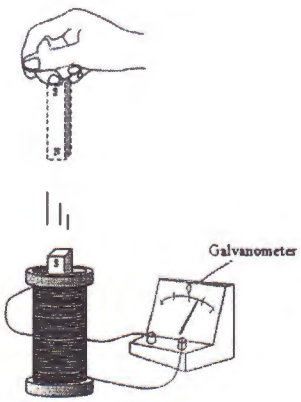
Repeat the experiment at least 4 times with the values

Repeat the eksperiment by using 2, 3, 4 and 5 elactic cords (stretched with the same length i.e 5 cm) — 1

(vi)	**State how the data tabulated with the title MV and RV** Force,F // Number of elastic cord // Number of slotted weight | Acceleration, a | | | | | | | | | |	1
(vii)	**State how the data is analysed, plot a graph RV against MV** **acceleration** **Force**	1
	TOTAL MARK	**12**

QUESTION 4

4(a)	**State the suitable inference** The brightness of the lamp increases when the **speed** of the magnet in the coils(solenoid) increases // Induced current depends on the speed of magnet //the brightness of the lamp depends on the velocity of the bicycle.	1

(b)	**State a relevant hypothesis** The higher the speed of the magnet, the higher the magnitude of the induced current.	1
(c)(i)	**State the aim of experiment** To study the relationship between the speed of a magnet in a coil and the magnitude of the induced current.	1
(ii)	**State the suitable manipulated variables and responding variable (Quantity that can be measured)** Manipulated variables : the height of the magnet fall, h Responding variables : Deflection/ reading of the galvanometer // induced current	1
	State the constant variable strength of the magnet / number of the turns in the coils.	1
(iii)	**State the complete list of apparatus and materials** **Bar magnet**, cardboard tube, **galvanometer, insulated copper wire**, retort stand and **metre rule**. (accept - if labeled in diagram or stated in precedure)	1
(iv)	**Draw the functional arrangement of the apparatus** 	1

State the method to control the manipulated variable

1. Make a solenoid of 50 turns by winding an insulated copper wire round a cardboard tube. Connect the ends of the wire to a galvanometer.
2. Hold a small bar magnet at a height of **h = 5 cm** above the top end of the solenoid.

1

State the method to measure the responding variable

3. **Drop** the magnet into the solenoid into the solenoid **and record the deflection of the galvanometer** as the induced current.

1

Repeat the experiment at least 4 times with the values

4. Repeat the eksperiment by changing the height h to 10 cm, 15 cm, 20 cm , 25 cm and 30 cm.

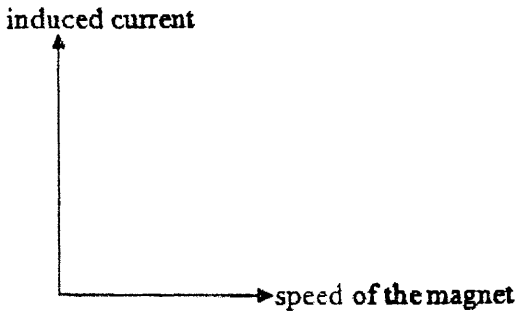
1

State how the data tabulated with the title MV and RV

Height of the magnet,h	Induced current I
5.0	
10.0	
15.0	
20.0	
25.0	

1

State how the data is analysed, plot a graph RV against MV



1