PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA SEKOLAH MENENGAH NEGERI KEDAH DARUL AMAN

PEPERIKSAAN PERCUBAAN SPM 2010 4531/1

PHYSICS

Kertas 1

$1\frac{1}{4}$ jam Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
3. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Kertas soalan ini mengandungi **33** halaman bercetak

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, $P = \frac{tenaga}{masa}$

18. $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

19. $\lambda = \frac{ax}{D}$

20. $n = \frac{\sin i}{\sin r}$

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

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

22. $Q = It$

23. $V = IR$

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

25. $\frac{N_S}{N_P} = \frac{V_S}{V_P}$

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

27. $g = 10\ \text{m s}^{-2}$

28. $c = 3{\cdot}0 \times 10^8\ \text{m s}^{-1}$

1 The speed of light in vacuum is 300 Mm s^{-1}.
What is this speed in m s^{-1}?
Laju cahaya dalam vakum ialah 300 Mm s^{-1}.
Berapakah laju ini dalam m s^{-1}?

A 3.00×10^{6} m s^{-1}
B 3.00×10^{8} m s^{-1}
C 3.00×10^{9} m s^{-1}
D 3.00×10^{11} m s^{-1}

2 A student finds that the readings he obtained from a stopwatch are not consistent.
Which step will help him to reduce the error caused by this problem?
Seorang pelajar mendapati bacaan-bacaan yang diperoleh daripada sebuah jam randik tidak konsisten. Langkah manakah akan membantunya mengurangkan ralat yang disebabkan oleh masalah ini?

A Use a better quality stopwatch
Guna jam randik lebih berkualiti
B Check the stopwatch for zero error
Semak jam randik untuk ralat sifar
C Repeat the measurement and choose the best value
Ulang pengukuran dan pilih nilai terbaik
D Repeat the measurement and calculate the average value
Ulang pengukuran dan hitung nilai purata

3 Table 1 shows the results of an experiment to investigate the relationship between the length of a wire and its resistance.
Jadual 1 *menunjukkan keputusan suatu eksperimen untuk menyiasat hubungan antara panjang seutas dawai dan rintangannya.*

Length / cm *Panjang* / cm	10.0	20.0	30.0	40.0	50.0
Current / A *Arus* / A	0.4	0.4	0.4	0.4	0.4
Potential difference / V *Beza keupayaan* / V	0.8	1.6	2.4	3.2	4.0
Resistance / Ω *Rintangan* / Ω	2.0	4.0	6.0	8.0	10.0

Table 1 / *Jadual* 1

Which is the manipulated variable?
Yang manakah pembolehubah dimanipulasikan?

A Length / *Panjang*
B Current / *Arus*
C Potential difference / *Beza keupayaan*
D Resistance / *Rintangan*

4 Diagram 1 shows the velocity-time graph of an object.
Rajah 1 menunjukkan graf halaju-masa bagi suatu objek.

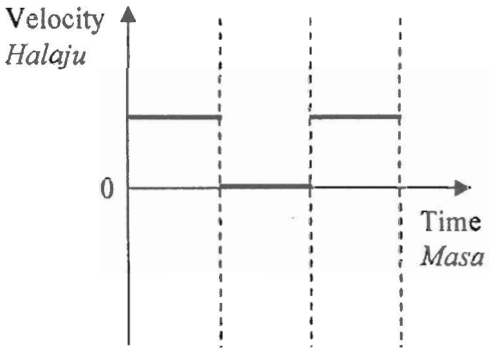
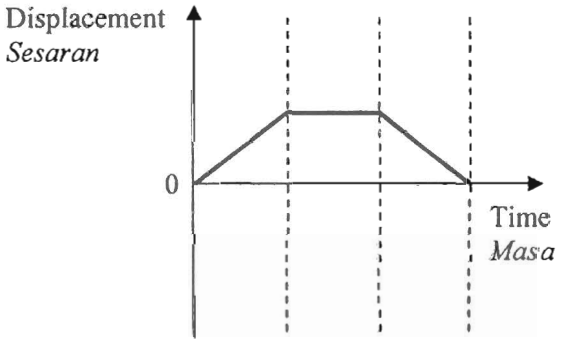


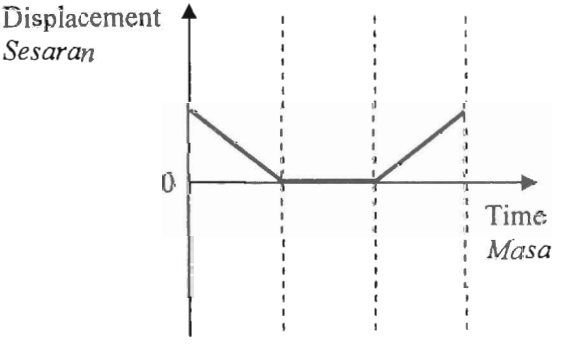
Diagram 1 / *Rajah 1*

Which displacement-time graph represents the same motion as the object?
Graf sesaran-masa manakah yang mewakili pergerakan yang sama seperti objek itu?

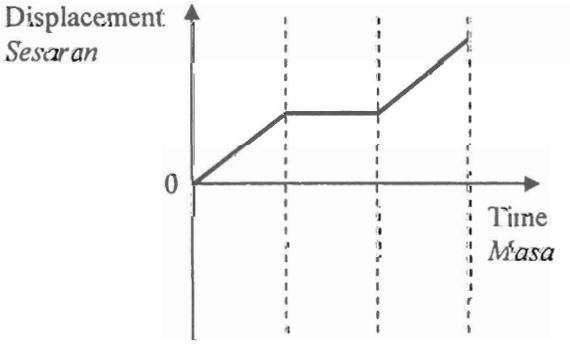
A



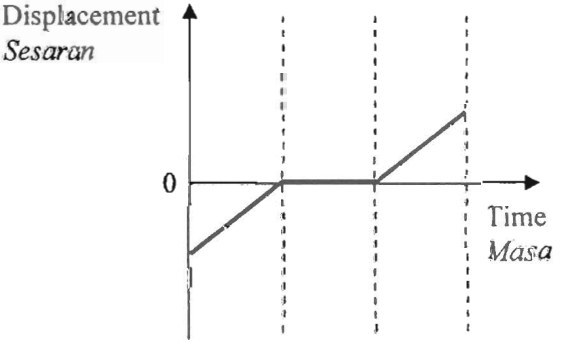
B



C



D



5 Diagram 2 shows two brass weights being held by a student. The two weights are then dropped at the same time and fall to the floor.
Rajah 2 menunjukkan dua pemberat loyang dipegang oleh seorang pelajar. Dua pemberat itu kemudian dilepaskan pada masa yang sama dan jatuh ke lantai.

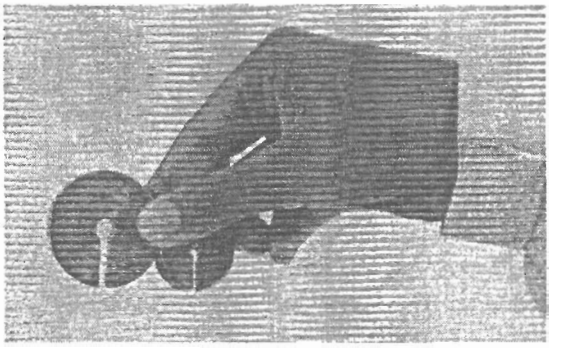


Diagram 2 / *Rajah 2*

Which physical quantity is the same for both weights?
Kuantiti fizik manakah adalah sama untuk kedua-dua pemberat?

A Force pulling it down / *Daya yang menariknya ke bawah*
B Momentum / *Momentum*
C Kinetic energy / *Tenaga kinetik*
D Acceleration / *Pecutan*

6 Which object has the largest kinetic energy?
Objek yang manakah mempunyai tenaga kinetik yang paling besar?

A

Mass / *Jisim* = 90 kg
Speed / *Laju* = 20 m s^{-1}

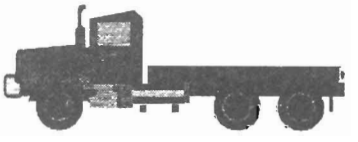
B

Mass / *Jisim* = 360 kg
Speed / *Laju* = 40 m s^{-1}

C

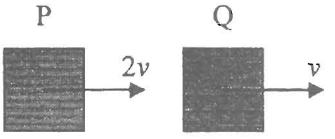
Mass / *Jisim* = 1000 kg
Speed / *Laju* = 38 m s^{-1}

D



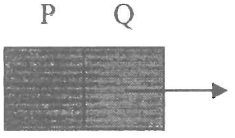
Mass / *Jisim* = 12000 kg
Speed / *Laju* = 3 m s^{-1}

7 Diagram 3.1 shows two identical blocks, P and Q, moving in the same direction with a velocity of $2v$ and v respectively.
Diagram 3.2 shows the blocks after collision.
Rajah 3.1 *menunjukkan dua bongkah yang serupa,* P *dan* Q, *bergerak dalam arah yang sama dengan halaju* $2v$ *dan* v *masing-masing.*
Rajah 3.2 *menunjukkan dua bongkah itu selepas perlanggaran.*



Before collision / *Sebelum perlanggaran*

Diagram 3.1 / *Rajah* 3.1



After collision / *Selepas perlanggaran*

Diagram 3.2 / Rajah 3.2

Which statement is correct about the collision?
Pernyataan manakah yang betul tentang perlanggaran itu?

A The momentum of block P before the collision is equal to the momentum of block Q before the collision
Momentum bongkah P *sebelum perlanggaran adalah sama dengan momentum bongkah* Q *sebelum perlanggaran*

B The total momentum before the collision is greater than the total momentum after the collision
Jumlah momentum sebelum perlanggaran adalah lebih besar daripada jumlah momentum selepas perlanggaran

C The kinetic energy of block P before the collision is equal to the kinetic energy of block Q before the collision
Tenaga kinetik bongkah P *sebelum perlanggaran adalah sama dengan tenaga kinetik bongkah* Q *sebelum perlanggaran*

D The total kinetic energy before the collision is greater than the total kinetic energy after the collision
Jumlah tenaga kinetik sebelum perlanggaran lebih besar daripada jumlah tenaga kinetik selepas perlanggaran

8 Diagram 4 shows three arrangements, X, Y and Z made up of identical springs.
Rajah 4 *menunjukkan tiga susunan*, X, Y *dan* Z *yang terdiri daripada spring yang serupa.*

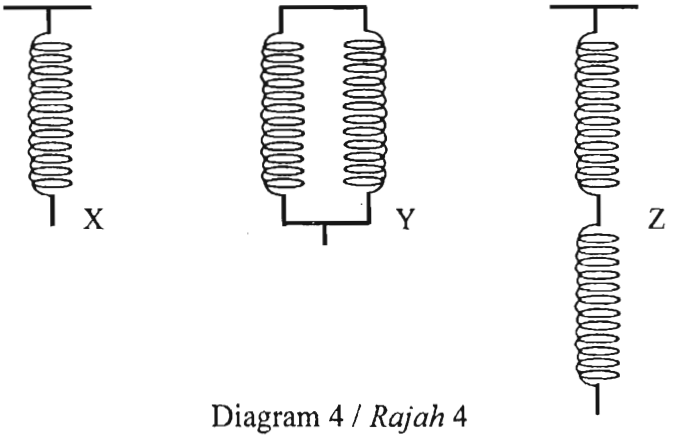
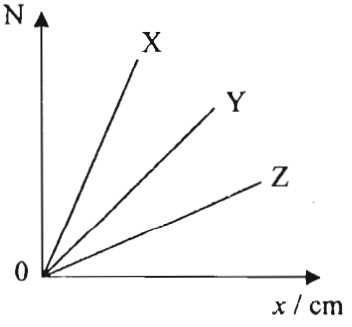


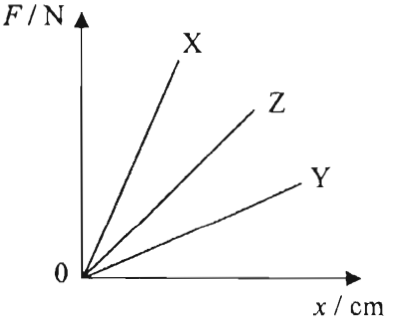
Diagram 4 / *Rajah* 4

Which graph shows the force-extension relationship of arrangement X, Y and Z?
Graf yang manakah menunjukkan hubungan daya-pemanjangan bagi susunan X, Y *dan* Z?

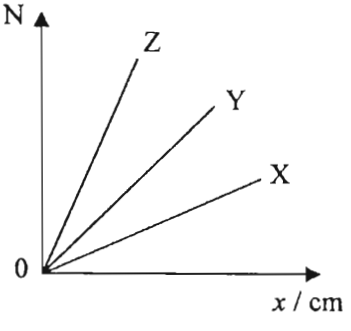
A



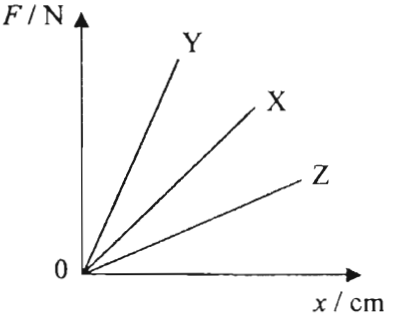
B



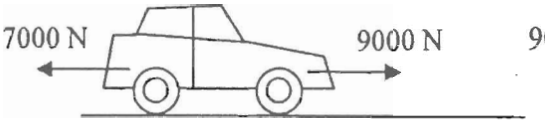
C



D

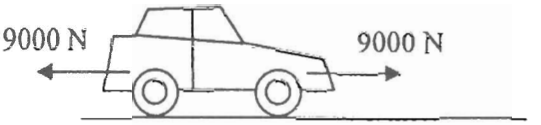


9 Diagram 5.1 shows the forces acting on a car at time, t_1.
Diagram 5.2 shows the forces acting on the car at a later time, t_2.
Rajah 5.1 *menunjukkan daya-daya yang bertindak pada sebuah kereta pada masa,* t_1.
Rajah 5.2 *menunjukkan daya-daya yang bertindak pada kereta itu pada suatu masa kemudian,* t_2.



At time t_1 / *Pada masa* t_1

Diagram 5.1 / *Rajah* 5.1



At time t_2 / *Pada masa* t_2

Diagram 5.2 / *Rajah* 5.2

What is the type of motion of the car at time t_1 and time t_2?
Apakah jenis gerakan kereta itu pada masa t_1 *dan masa* t_2?

	At time t_1 / *Pada masa* t_1	At time t_2 / *Pada masa* t_2
A	Acceleration *Pecutan*	Constant velocity *Halaju malar*
B	Acceleration *Pecutan*	Stationary *Pegun*
C	Deceleration *Nyahpecutan*	Stationary *Pegun*
D	Deceleration *Nyahpecutan*	Constant velocity *Halaju malar*

10 Diagram 6 shows an oil tanker with three tanks.
Rajah 6 menunjukkan sebuah lori minyak dengan tiga buah tangki.

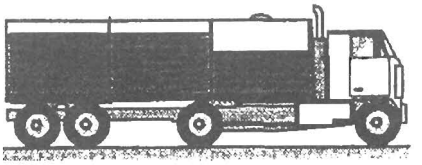


Diagram 6 / *Rajah 6*

The use of three tanks in the oil tanker is to
Penggunaan tiga tangki di dalam lori minyak adalah untuk

A reduce the negative effect of inertia
mengurangkan kesan negatif inersia
B reduce the kinetic energy of the oil tanker
mengurangkan tenaga kinetik lori tangki minyak
C increase the stability of the oil tanker
menambah kestabilan lori tangki minyak
D increase the mass of oil that can be carried
menambah jisim minyak yang boleh diangkut

11 Diagram 7 shows an empty bottle in the hand of a student.
Rajah 7 menunjukkan sebuah botol kosong yang dipegang oleh seorang pelajar.

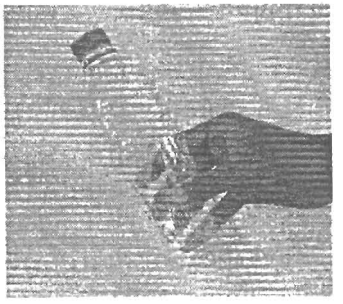


Diagram 7 / *Rajah 7*

The air molecules in the bottle will move slower when the student
Molekul-molekul udara di dalam botol itu akan bergerak lebih perlahan apabila pelajar itu

A puts the bottle in a refrigerator
meletakkan botol itu di dalam peti sejuk
B shakes the bottle
menggoncang botol itu
C squeezes the bottle
memicit botol itu
D leaves the bottle under the sun
membiarkan botol itu di bawah sinaran matahari

12 Diagram 8.1 shows two steel rods, P and Q of equal mass being held above two blocks of plasticine.
Diagram 8.2 shows the two steel rods after they have been dropped on the blocks of plasticine.
Rajah 8.1 *menunjukkan dua batang rod keluli*, P *dan* Q *dipegang di atas dua bongkah plastisin.*
Rajah 8.2 *menunjukkan dua batang rod keluli itu selepas dijatuhkan ke atas dua bongkah plastisin itu.*

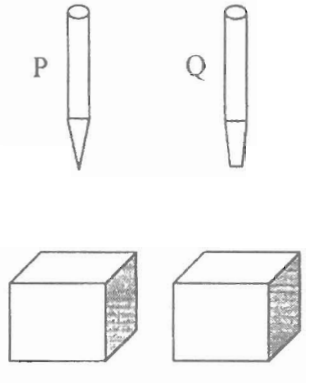


Diagram 8.1 / *Rajah* 8.1

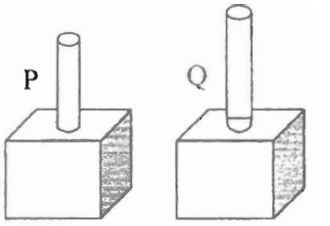


Diagram 8.2 / *Rajah* 8.2

Which is the correct comparison between rod P and rod Q?
Perbandingan yang manakah betul antara rod P *dan rod* Q?

A P hits the plasticine block with a greater momentum than Q
P *menghentam bongkah plastisin dengan momentum yang lebih besar daripada* Q

B P exerts a greater force on the plasticine block than Q
P *mengenakan daya yang lebih besar pada bongkah plastisin daripada* Q

C P exerts a higher pressure on the plasticine block than Q
P *mengenakan tekanan yang lebih tinggi pada bongkah plastisin daripada* Q

D P arrives at the plasticine block with a greater kinetic energy than Q
P *tiba di bongkah plastisin dengan tenaga kinetik yang lebih besar daripada* Q

13 Diagram 9 shows two barometers filled with liquid X and liquid Y respectively.
Rajah 9 menunjukkan dua barometer yang masing-masing diisi dengan cecair X *dan cecair* Y.

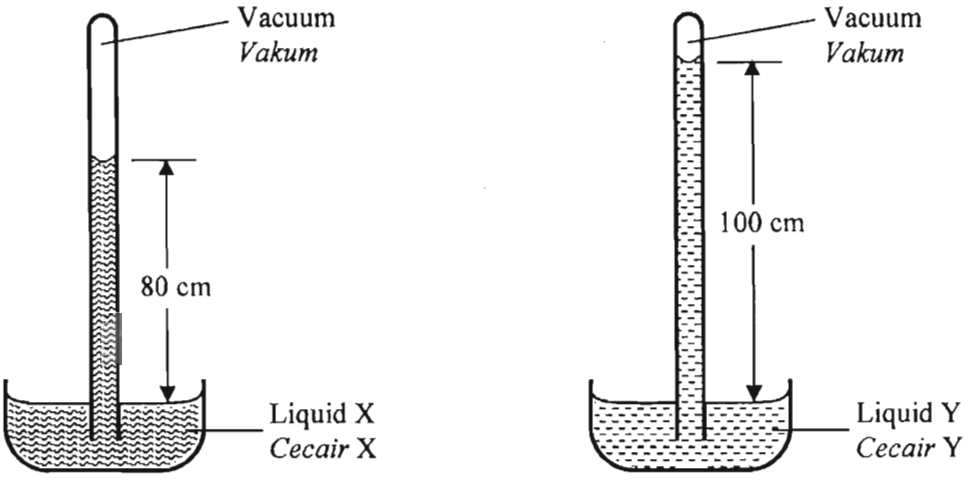


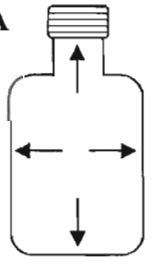
Diagram 9 / Rajah 9

The density of liquid X is 12 000 kg m^{-3}.
What is the density of liquid Y?
Ketumpatan cecair X *ialah* 12 000 kg m^{-3}.
Berapakah ketumpatan cecair Y?

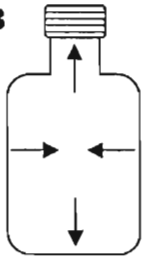
A 2 400 kg m^{-3}
B 9 600 kg m^{-3}
C 12 180 kg m^{-3}
D 15 000 kg m^{-3}

14 Which diagram shows correctly the air pressure inside an empty bottle?
Rajah yang manakah menunjukkan dengan betul tekanan udara di dalam sebuah botol kosong?

A



B



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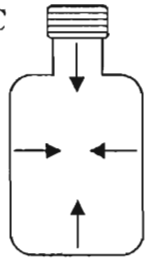
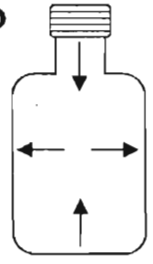


D



15 Diagram 10 shows a hydraulic brake system.
Rajah 19 *menunjukkan suatu sistem brek hidraulik.*

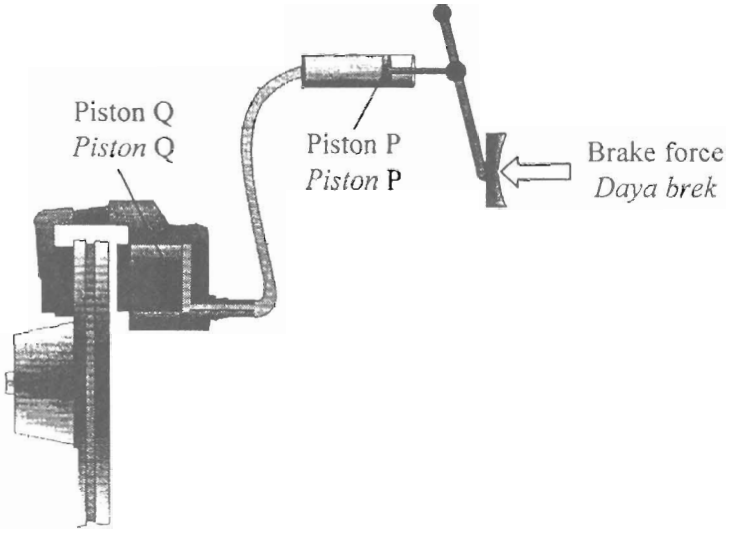


Diagram 10 / *Rajah* 10

Which relationship is correct?
Hubungan yang manakah betul?

A Force on P < force on Q / *Daya pada* P < *daya pada* Q
B Force on P = force on Q / *Daya pada* P = *daya pada* Q
C Force on P > force on Q / *Daya pada* P > *daya pada* Q

16 Diagram 11 shows two blocks, K and L of equal mass immersed in liquid M and in liquid N respectively.
Rajah 11 *menunjukkan dua bongkah,* K *dan* L *yang mempunyai jisim yang sama direndam ke dalam cecair* M *dan cecair* N *masing-masing.*

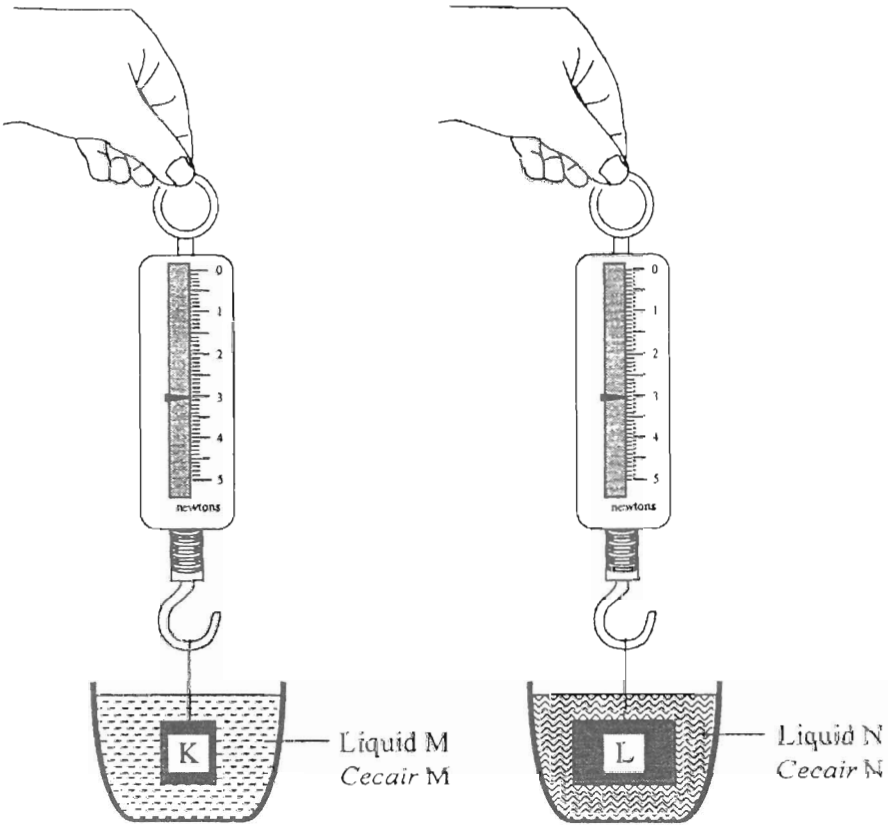


Diagram 11 / *Rajah* 11

Which statement is correct?
Pernyataan yang manakah betul?

A The weight of L is greater than the weight of K
Berat L *lebih besar daripada berat* K

B The buoyant force on K is greater than the buoyant force on L
Daya julangan pada K *lebih besar daripada daya julangan pada* L

C The density of liquid M is greater than the density of liquid N
Ketumpatan cecair M *lebih besar daripada ketumpatan cecair* N

17 Diagram 12 shows a hydrometer floating on a liquid. *p*, *q* and *r* are three readings marked on the stem of the hydrometer.
Rajah 12 *menunjukkan sebuah hidrometer terapung di suatu cecair. p, q dan r adalah tiga bacaan yang ditanda pada batang hidrometer itu.*

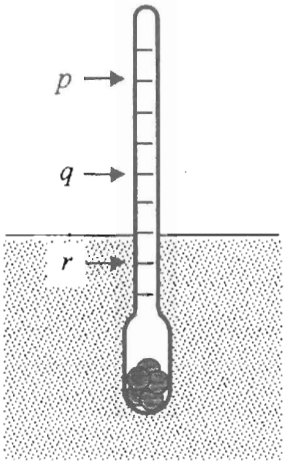


Diagram 12 / *Rajah* 12

Which relationship is correct?
Hubungan yang manakah betul?

A $p > q > r$
B $q > p > r$
C $q > r > p$
D $r > q > p$

18 Diagram 13 shows a bunsen burner.
Rajah 13 *menunjukkan sebuah penunu bunsen.*

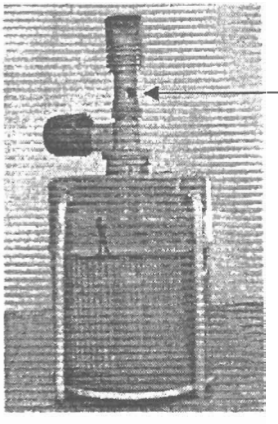


Diagram 13 / *Rajah* 13

Air is sucked into the bunsen burner using
Udara disedut ke dalam penunu bunsen itu menggunakan

A Newton's First Law / *Hukum Pertama Newton*
B Pascal's Principle / *Prinsip Pascal*
C Archimedes' Principle / *Prinsip Archimedes*
D Bernoulli's Principle / *Prinsip Bernoulli*

19 Diagram 14 shows cold milk being poured into hot coffee.
Rajah 14 *menunjukkan susu sejuk dituang ke dalam kopi panas.*

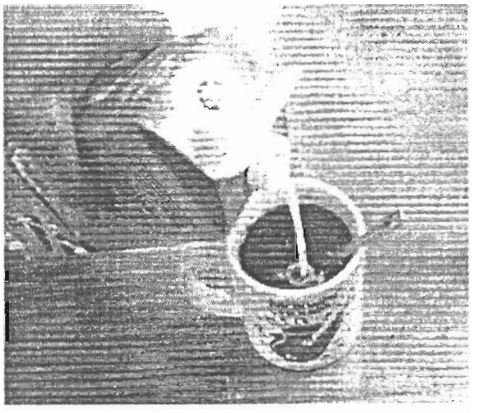


Diagram 14 / *Rajah* 14

Which statement is correct about the final temperature of the mixture?
Pernyataan manakah yang betul tentang suhu akhir campuran itu?

A It is lower than the temperature of the cold milk
Lebih rendah daripada suhu susu sejuk
B It is lower than the temperature of the hot coffee
Lebih rendah daripada suhu kopi panas
C It is higher than the temperature of the hot coffee
Lebih tinggi daripada suhu kopi panas
D It is the same as the temperature of the cold milk
Sama dengan suhu susu sejuk

20 A liquid to be used as a cooling agent in the cooling system of a machine should have a
Cecair yang digunakan sebagai agen penyejuk di dalam sistem penyejukan sebuah mesin harus mempunyai nilai

A high specific heat capacity / *muatan haba tentu yang tinggi*
B low boiling point / *takat didih yang rendah*
C high density / *ketumpatan yang tinggi*

21 Diagram 15 shows the cooling curve of a substance.
Rajah 15 menunjukkan lengkung penyejukan bagi suatu bahan.

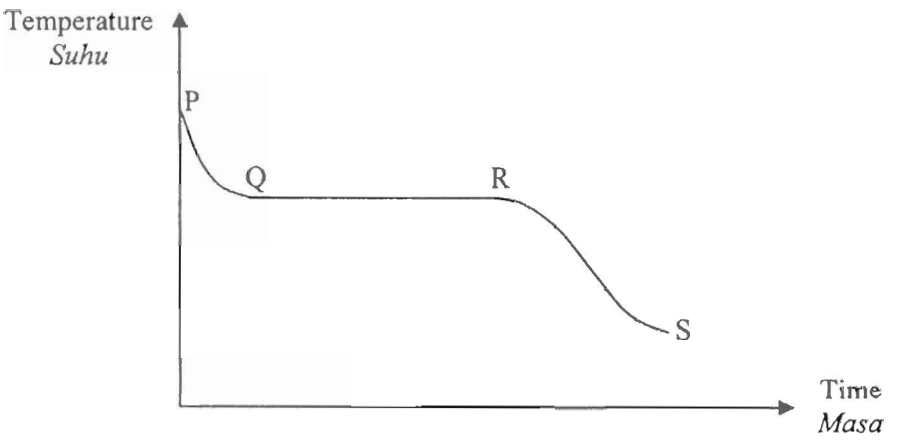


Diagram 15 / *Rajah 15*

At which stage(s) are heat being released by the substance?
Pada peringkat manakah haba dibebaskan oleh bahan itu?

A QR / QR
B PQ and RS / PQ *dan* RS
C QR and RS / QR *dan* RS
D PQ, QR and RS / PQ, QR *dan* RS

22 A fixed mass of gas in a cylinder is compressed slowly.
Which statement is correct?
Suatu gas berjisim tetap di dalam sebuah silinder dimampat dengan perlahan-lahan.
Pernyataan yang manakah benar?

A The pressure of the gas is constant
Tekanan gas adalah malar
B The molecules of the gas move further apart
Molekul gas bergerak lebih jauh antara satu sama lain
C The average kinetic energy of the gas molecules increases
Tenaga kinetik purata molekul gas bertambah
D The molecules of the gas collide more frequently with the walls of the cylinder
Molekul gas berlanggar lebih kerap dengan dinding silinder

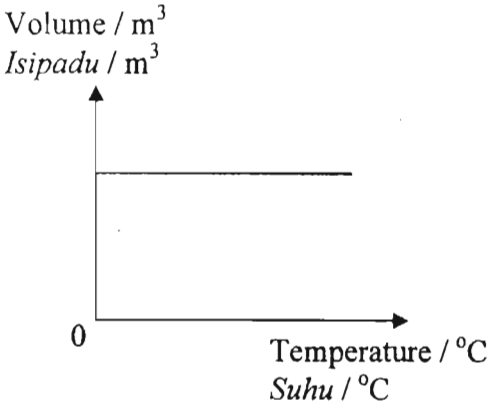
23 An experiment is carried out to investigate the change of volume with temperature for a fixed mass of gas.

Which of the following graphs shows the correct relationship between volume and temperature?

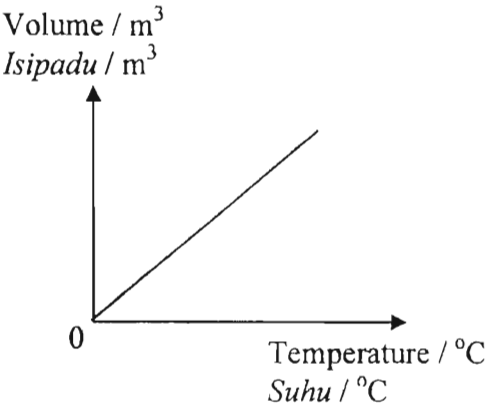
Satu eksperimen dijalankan untuk menyiasat perubahan isipadu dengan suhu bagi suatu gas berjisim tetap.

Graf yang manakah menunjukkan dengan betul perubahan isipadu dengan suhu?

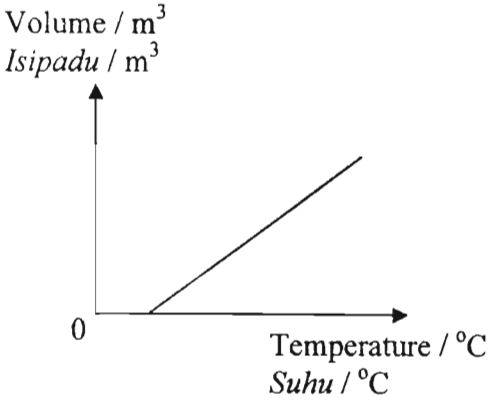
A



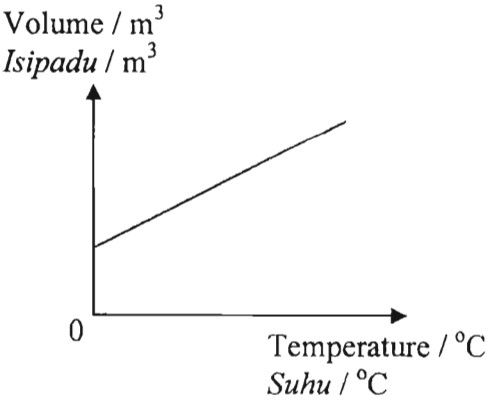
B



C



D



24 Diagram 16 shows light rays entering and coming out of a black box.
Rajah 16 menunjukkan sinar-sinar cahaya masuk dan keluar daripada sebuah kotak hitam.

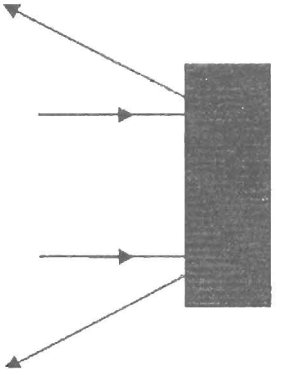


Diagram 16 / *Rajah* 16

What is inside the black box?
Apakah yang terdapat di dalam kotak hitam itu?

A Plane mirror / *Cermin satah*
B Concave mirror / *Cermin cekung*
C Convex mirror / *Cermin cembung*
D Rectangular glass block / *Bongkah kaca segiempat tepat*

25 Diagram 17 shows a layer of oil floating on water. Which light ray in Diagram 17 is correct?
Rajah 17 menunjukkan satu lapisan minyak terapung di atas air. Sinar manakah dalam Rajah 17 yang betul?

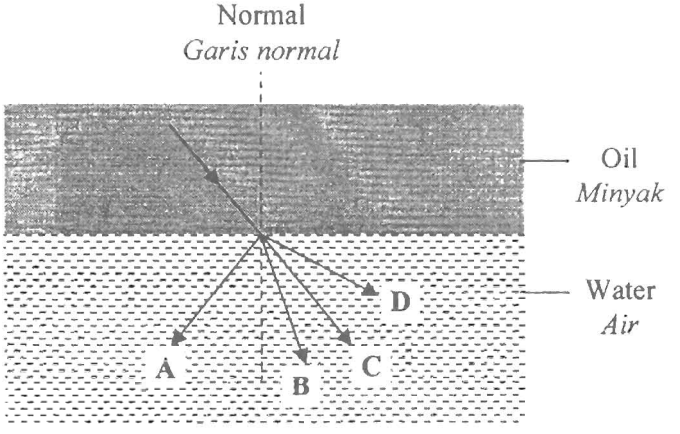
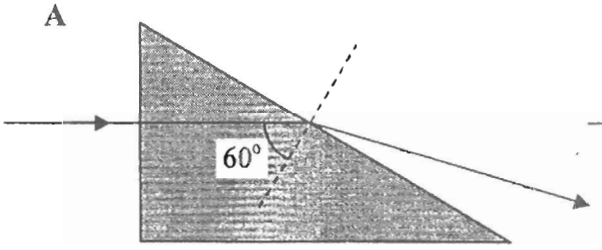


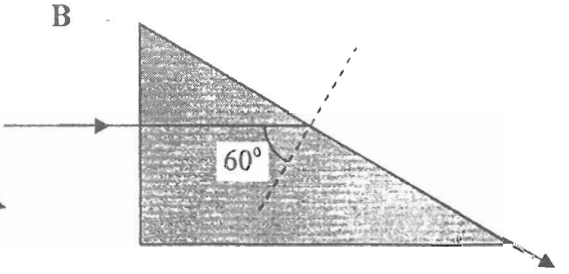
Diagram 17 / *Rajah* 17

26 Which diagram shows the correct light ray through a prism made of a substance which has a critical angle of 60° ?
Rajah yang manakah menunjukkan sinar cahaya yang betul melalui prisma yang diperbuat daripada bahan yang mempunyai sudut genting 60° ?

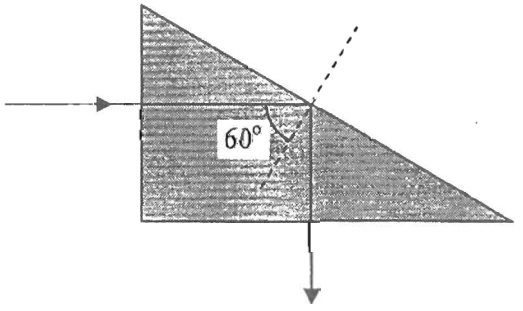
A



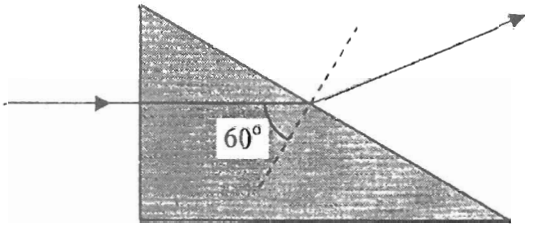
B



C



D



27 Diagram 18 shows the graph of image distance, *v*, against object distance, *u*, for a convex lens.
Rajah 18 menunjukkan graf bagi jarak imej, v, melawan jarak objek, u, bagi sebuah kanta cembung.

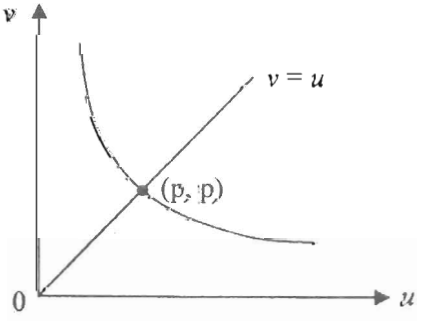


Diagram 18 / *Rajah* 18

The focal length of the lens is *f*. What is the value of p?
Panjang fokus kanta itu ialah f. Berapakah nilai p?

A $\frac{f}{2}$

B f

C $2f$

D $\frac{1}{f}$

28 The focal length of the objective lens of a compound microscope is f. A specimen is placed at a distance, u, from the objective lens.
Which statement is correct?
Panjang fokus bagi kanta objek sebuah mikroskop majmuk ialah f. Suatu spesimen diletakkan pada jarak, u, dari kanta objek itu.
Pernyataan yang manakah betul?

A $u > 2f$
B $u = 2f$
C $f < u < 2f$
D $u < f$

29 Diagram 19 shows the displacement-time graph of a wave.
Rajah 19 menunjukkan graf sesaran-masa bagi suatu gelombang.

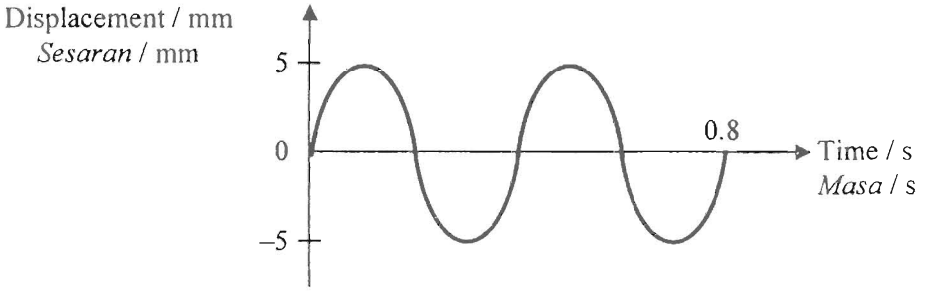


Diagram 19 / *Rajah* 19

What is the frequency of the wave?
Berapakah frekuensi gelombang itu?

A 0.20 Hz
B 1.25 Hz
C 2.50 Hz
D 5.00 Hz

30 What happens to the frequency and the speed of water waves when it moves from a region of deep to shallow water?
Apakah yang berlaku kepada frekuensi dan laju gelombang air apabila ia bergerak dari kawasan air dalam ke kawasan air cetek?

	Frequency *Frekuensi*	Speed *Laju*
A	Decreases *Berkurang*	Decreases *Berkurang*
B	Unchanged *Tidak berubah*	Decreases *Berkurang*
C	Unchanged *Tidak berubah*	Increases *Bertambah*
D	Increases *Bertambah*	Increases *Bertambah*

31 Diagram 20 shows the wavefronts of water waves moving towards a barrier.
Rajah 20 *menunjukkan muka-muka gelombang bagi gelombang air bergerak mendekati suatu halangan.*

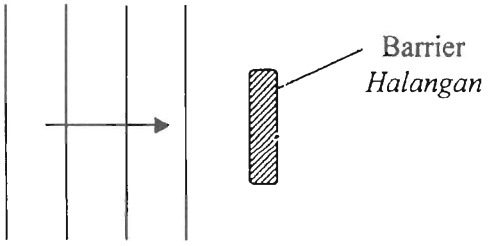


Diagram 20 / *Rajah* 20

What are the phenomena that will occur when the waves arrive at the barrier?
Apakah fenomena yang akan berlaku apabila gelombang tiba di halangan itu?

A Reflection and refraction / *Pantulan dan pembiasan*
B Reflection and diffraction / *Pantulan dan pembelauan*
C Refraction and diffraction / *Pembiasan dan pembelauan*
D Reflection, refraction and diffraction / *Pantulan, pembiasan dan pembelauan*

32 A ship transmits an ultrasonic wave pulse to the seabed and receives an echo 0.12 s later. The speed of the ultrasonic waves in sea water is 1500 m s^{-1}.
What is the depth of the sea?
Sebuah kapal memancar satu denyutan gelombang ultrasonik ke dasar laut dan menerima gema 0.12 s *kemudian. Laju gelombang ultrasonik dalam air laut ialah* 1500 m s^{-1}.
Berapakah kedalaman laut itu?

A 90 m
B 180 m
C 333 m
D 360 m

33 Which is the correct comparison between sound waves of frequency 20 kHz and radio waves of frequency 20 kHz?
Yang manakah perbandingan yang betul antara gelombang bunyi berfrekuensi 20 kHz *dan gelombang radio berfrekuensi* 20 kHz?

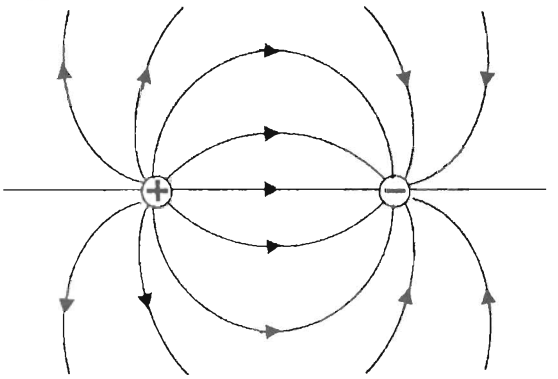
A Sound waves move at a lower speed and have a shorter wavelength
Gelombang bunyi bergerak dengan laju yang lebih rendah dan mempunyai panjang gelombang yang lebih pendek
B Sound waves move at a lower speed and have a longer wavelength
Gelombang bunyi bergerak dengan laju yang lebih rendah dan mempunyai panjang gelombang yang lebih panjang
C Sound waves move at a higher speed and have a shorter wavelength
Gelombang bunyi bergerak dengan laju yang lebih tinggi dan mempunyai panjang gelombang yang lebih pendek
D Sound waves move at a higher speed and have a longer wavelength
Gelombang bunyi bergerak dengan laju yang lebih tinggi dan mempunyai panjang gelombang yang lebih panjang

34 Which is the common property for microwaves, ultra-violet rays and red light?
Ciri yang manakah sepunya bagi gelombang mikro, sinar ultra-ungu dan cahaya merah?

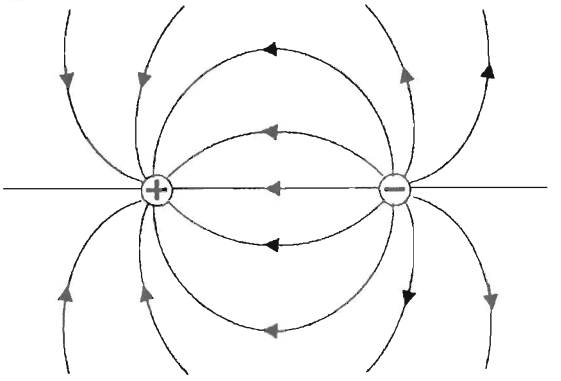
A Cannot be seen by the human eye
Tidak boleh dilihat oleh mata manusia
B Are transverse waves
Adalah gelombang melintang
C Moves at the same speed in water
Bergerak dengan laju yang sama dalam air
D Have the same frequency
Mempunyai frekuensi yang sama

35 Which diagram shows the correct electric field pattern?
Rajah manakah yang menunjukkan corak medan elektrik yang betul?

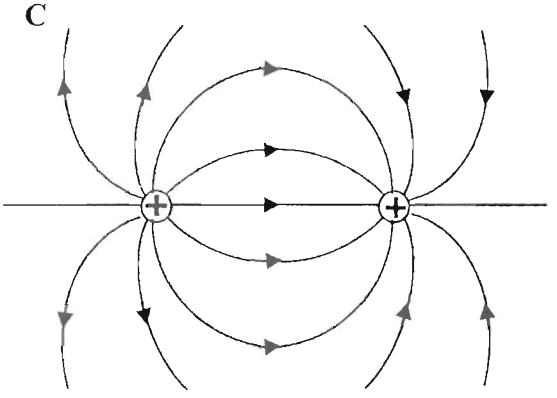
A



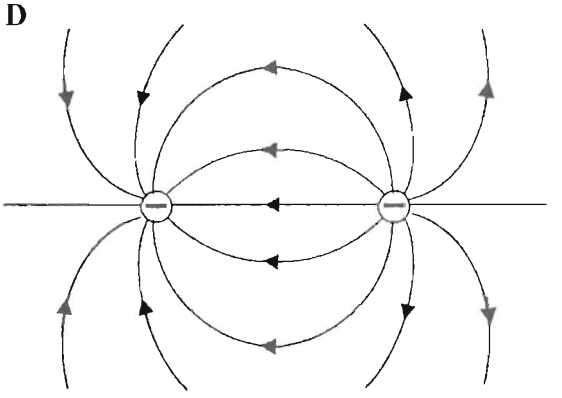
B



C



D



36 Diagram 21 shows an electric circuit.
Rajah 21 menunjukkan sebuah litar elektrik.

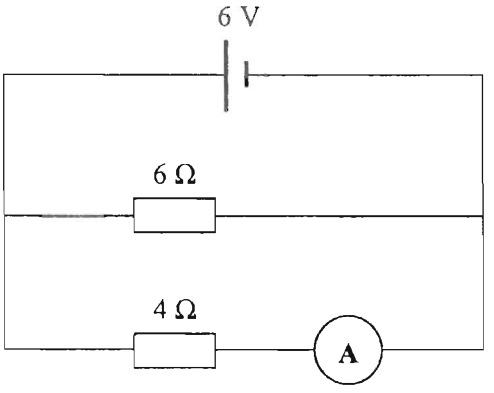


Diagram 21 / *Rajah 21*

What is the reading on the ammeter?
Berapakah bacaan ammeter itu?

A 0.6 A
B 1.0 A
C 1.5 A
D 2.5 A

37 Diagram 22 shows an electric circuit with three identical bulbs.
Rajah 22 *menunjukkan litar elektrik dengan tiga buah mentol yang serupa.*

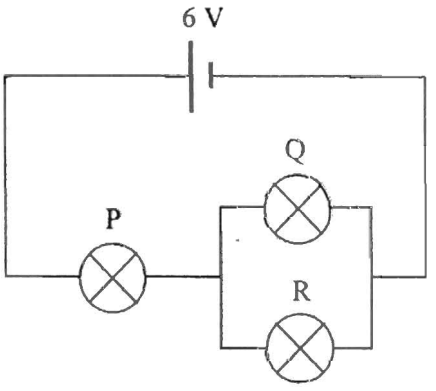


Diagram 22 / *Rajah* 22

Which statement is correct about the circuit?
Pernyataan yang manakah betul mengenai litar itu?

A The three bulbs light up with equal brightness
Ketiga-tiga mentol itu menyala dengan kecerahan yang sama

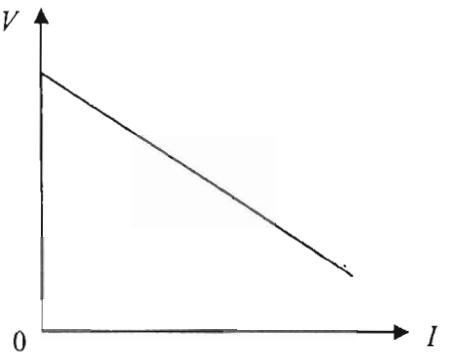
B Bulb P is brighter than bulb Q
Mentol P *lebih cerah daripada mentol* Q

C The potential difference across P is smaller than across R
Beza keupayaan merentasi P *lebih kecil daripada merentasi* R

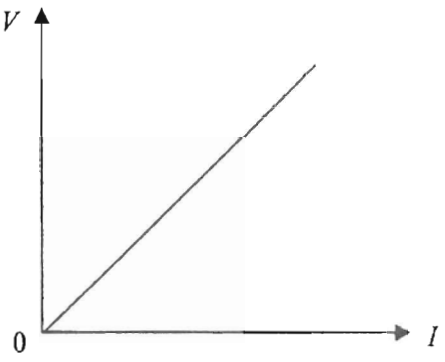
D The current in P is equal to the current in Q
Arus dalam P sama dengan arus dalam Q

38 Which graph shows the relationship between potential difference, V, and current, I, for an ohmic conductor?
Graf yang manakah menunjukkan hubungan antara beza keupayaan, V, dan arus, I, bagi suatu konduktor ohm?

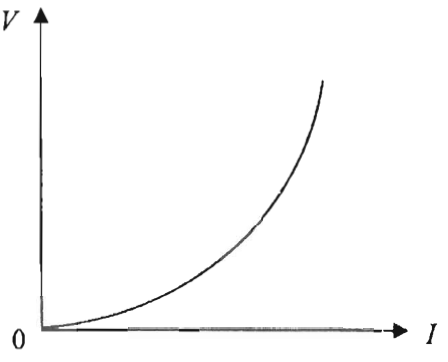
A



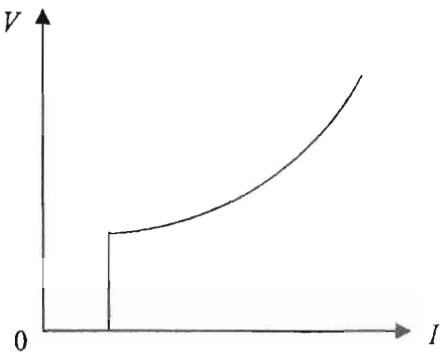
B



C



D



39 Diagram 23 shows an electromagnet.
Rajah 23 menunjukkan sebuah elektromagnet.

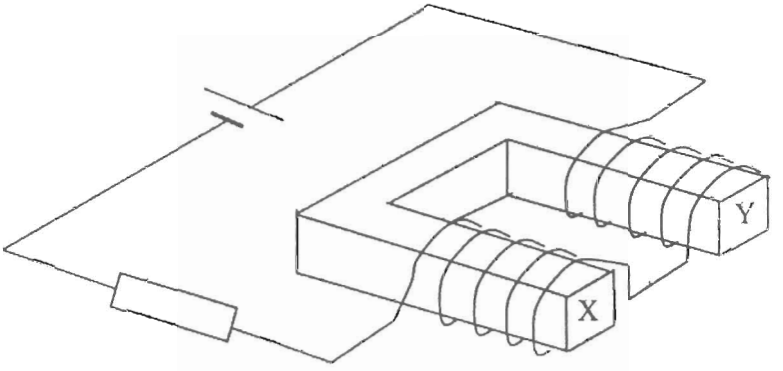
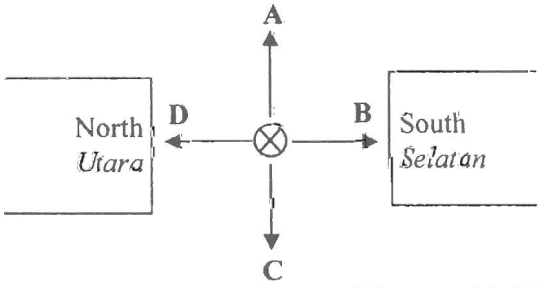


Diagram 23 / *Rajah 23*

What is the polarity at X and Y?
Apakah kekutuban di X dan Y?

	Polarity at X *Kekutuban di X*	Polarity at Y *Kekutuban di Y*
A	North *Utara*	North *Utara*
B	North *Utara*	South *Selatan*
C	South *Selatan*	North *Utara*
D	South *Selatan*	South *Selatan*

40 Diagram 24 shows a current-carrying conductor in a magnetic field.
What is the direction of the magnetic force that acts on the conductor?
Rajah 24 menunjukkan konduktor pembawa arus di dalam medan magnet.
Apakah arah daya magnet yang bertindak pada konduktor itu?



⊗ Direction of current into the paper
Arah arus ke dalam kertas

Diagram 24 / *Rajah 24*

41 Diagram 25 shows a copper rod that can be moved in four different directions between the poles of a permanent magnet.
Rajah 25 menunjukkan sebatang rod kuprum yang boleh digerakkan dalam empat arah berlainan di antara kutub-kutub sebuah magnet kekal.

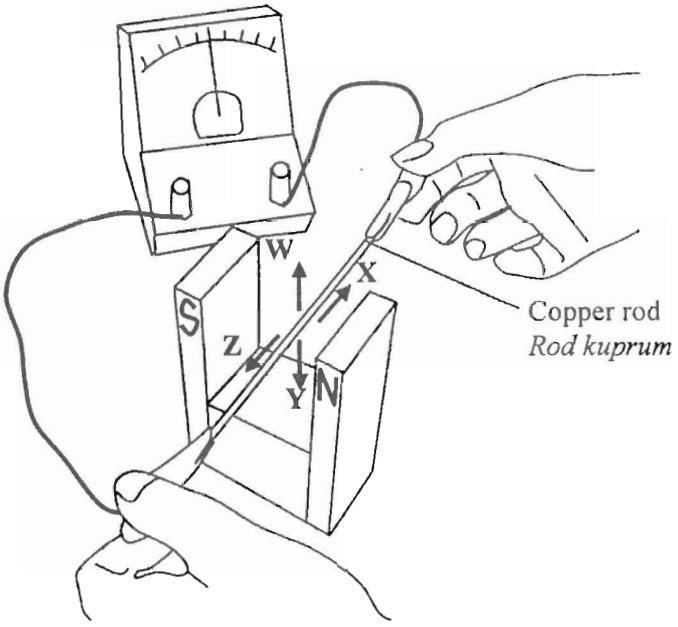


Diagram 25 / *Rajah* 25

Which directions will produce a deflection on the galvanometer?
Arah yang manakah akan menghasilkan pesongan pada galvanometer?

A W and X / W *dan* X
B W and Y / W *dan* Y
C X and Z / X *dan* Z
D Y and Z / Y *dan* Z

42 Diagram 26 shows a simple transformer. The bulb does not light up.
Rajah 26 menunjukkan sebuah transformer ringkas. Mentol itu tidak menyala.

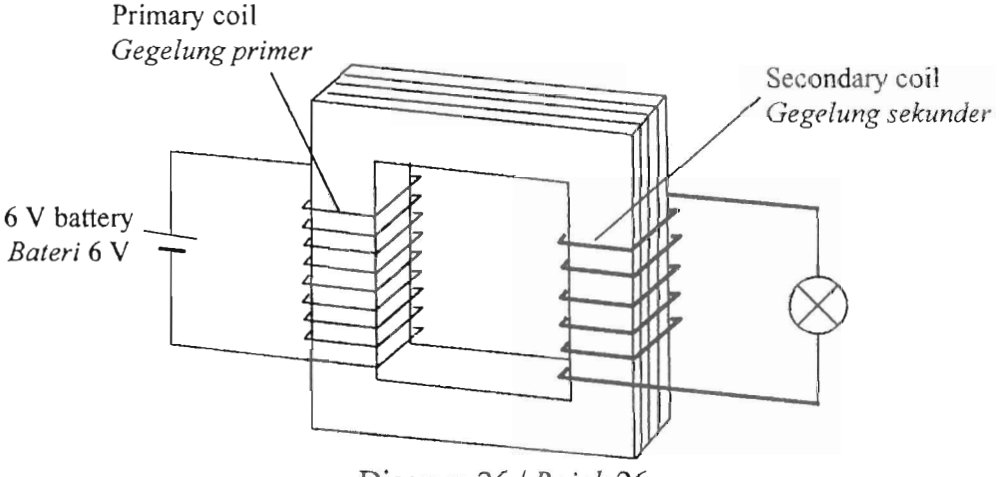


Diagram 26 / *Rajah* 26

Which step will cause the bulb to light up?
Langkah yang manakah akan menyalakan mentol itu?

A Increase the number of turns of the secondary coil
Menambah bilangan lilitan bagi gegelung sekunder
B Decrease the number of turns of the primary coil
Mengurangkan bilangan lilitan bagi gegelung primer
C Replace the 6 V battery with a 9 V battery
Menggantikan bateri 6 V *dengan bateri* 9 V
D Replace the 6 V battery with a 6 V alternating current supply
Menggantikan bateri 6 V *dengan bekalan arus ulangalik* 6 V

43 Diagram 27 shows part of the National Grid Network.
Rajah 27 *menunjukkan sebahagian daripada Rangkaian Grid Nasional.*

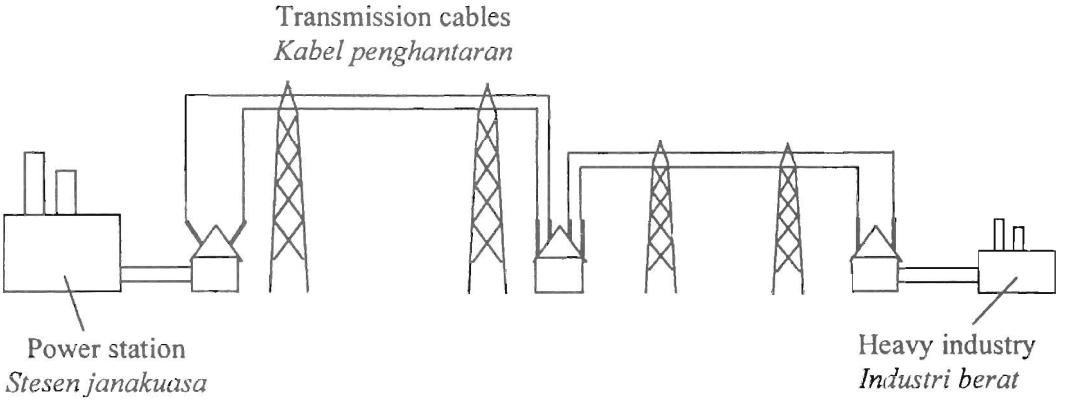


Diagram 27 / *Rajah* 27

What is the magnitude of the voltage and the type of current in the transmission cables?
Apakah magnitud voltan dan jenis arus dalam kabel penghantaran?

	Magnitude of the voltage *Magnitud voltan*	Type of current *Jenis arus*
A	Low *Rendah*	Direct current *Arus terus*
B	Low *Rendah*	Alternating current *Arus ulangalik*
C	High *Tinggi*	Direct current *Arus terus*
D	High *Tinggi*	Alternating current *Arus ulangalik*

44 Diagram 28 shows a cathode ray tube.
Rajah 28 menunjukkan sebuah tiub sinar katod.

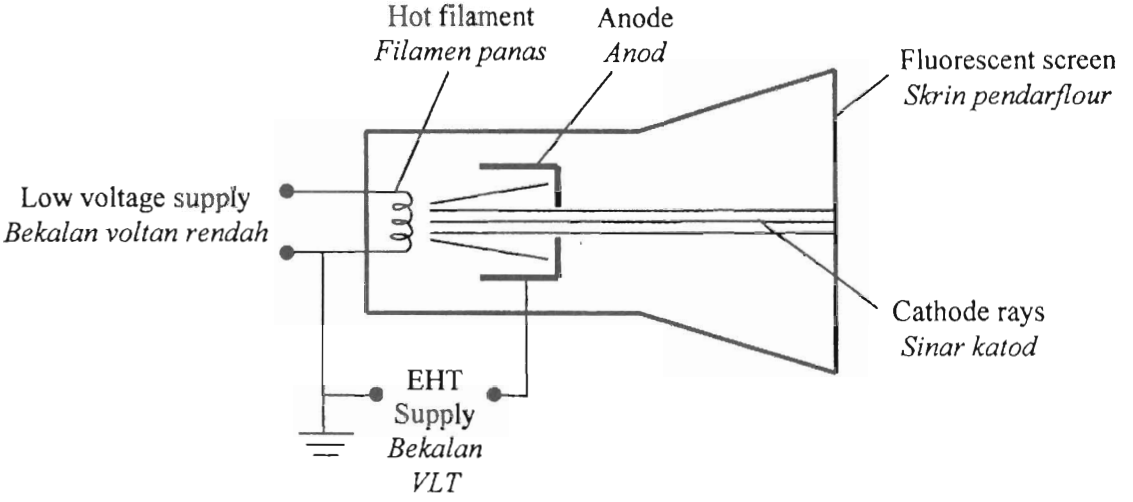


Diagram 28 / *Rajah 28*

What particle is found in the cathode rays?
Apakah zarah yang terdapat dalam sinar katod?

A Proton / *Proton*
B Neutron / *Neutron*
C Electron / *Elektron*
D Alpha / *Alfa*

45 Diagram 29 shows a circuit with identical bulbs, K, L, M and N.
Rajah 29 menunjukkan suatu litar dengan empat mentol, K, L, M *dan* N *yang serupa.*

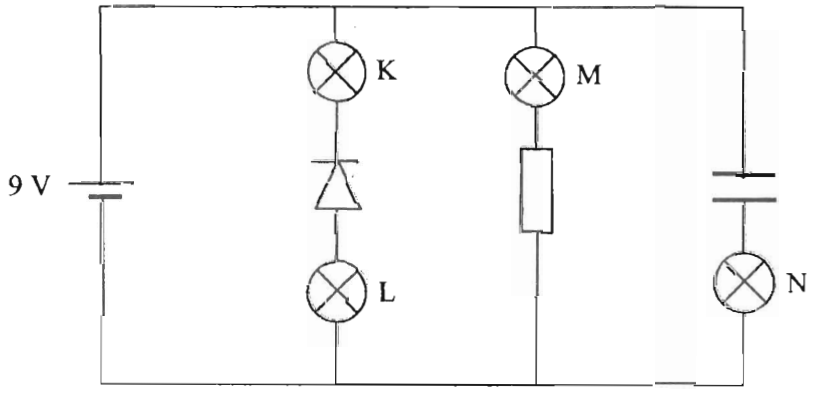


Diagram 29 / *Rajah 29*

Which bulb will light up?
Mentol yang manakah menyala?

A M
B K and M / K *dan* M
C L and N / L *dan* N
D K, L, and N / K, L *dan* N

46 What are the two components that are necessary to construct an electronic heat sensitive switch?
Apakah dua komponen yang diperlukan untuk membina suatu suis elektronik peka haba?

A Diode and resistor / *Diod dan perintang*
B Diode and thermistor / *Diod dan termistor*
C Transistor and resistor / *Transistor dan perintang*
D Transistor and thermistor / *Transistor dan termistor*

47 Diagram 30 shows a combination of two logic gates.
Rajah 30 *menunjukkan satu kombinasi dua get logik.*

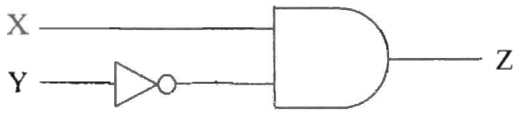


Diagram 30 / *Rajah* 30

Which truth table is correct?
Jadual kebenaran manakah yang betul?

A

X	Y	Z
0	0	0
0	1	0
1	0	1
1	1	1

B

X	Y	Z
0	0	1
0	1	1
1	0	0
1	1	0

C

X	Y	Z
0	0	0
0	1	0
1	0	1
1	1	0

D

X	Y	Z
0	0	0
0	1	1
1	0	0
1	1	0

48 A radioactive sample has an initial activity of 1400 counts per minute. After 54 days, the activity is 175 counts per minute.
What is the half life of the radioactive sample?
Suatu sampel radioaktif mempunyai aktiviti awal 1400 *pembilangan per minit. Selepas* 54 *hari, aktivitinya ialah* 175 *pembilangan per minit.*
Berapakah setengah hayat sampel radioaktif itu?

A 9 days / 9 *hari*
B 18 days / 18 *hari*
C 27 days / 27 *hari*
D 36 days / 36 *hari*

49 Diagram 31 shows four possible radioactive decays, P, Q, R and S on a graph of nucleon number, *A*, against proton number, *Z*.
Rajah 31 *menunjukkan empat reputan radioaktif yang mungkin*, P, Q, R *dan* S *pada graf nombor nukleon, A, melawan nombor proton, Z.*

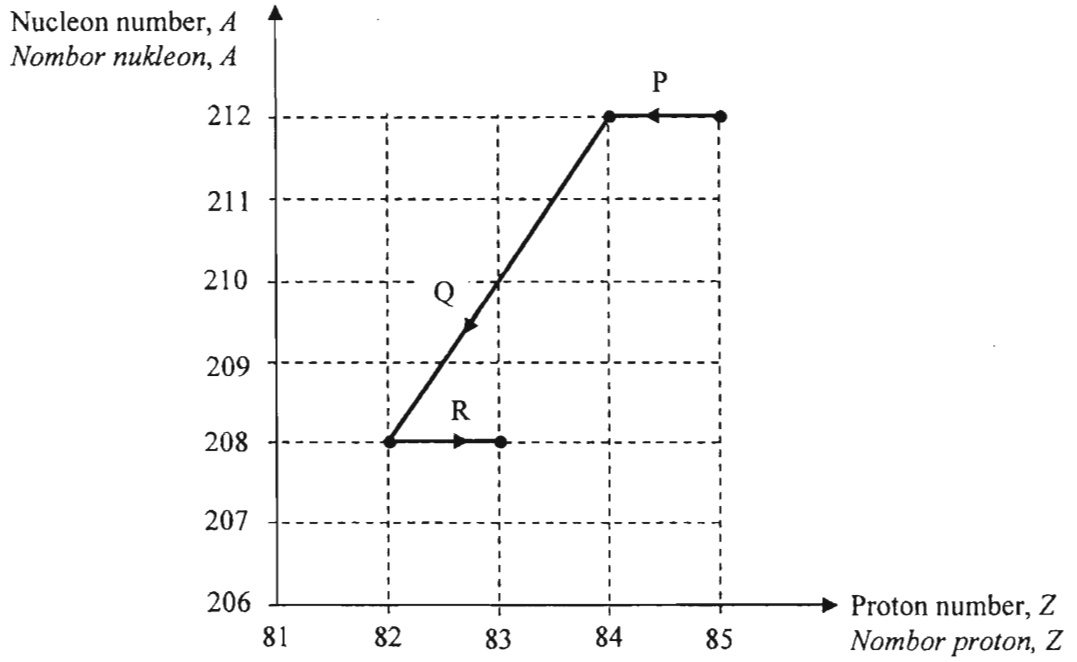


Diagram 31 / *Rajah* 31

Which decay emits a beta particle?
Reputan yang manakah mengeluarkan satu zarah beta?

A P
B Q
C R

50 The following equation is for a nuclear fusion.
Persamaan berikut adalah untuk suatu pelakuran nuklear.

$$ {}^{2}_{1}\mathrm{H} + {}^{3}_{1}\mathrm{H} \rightarrow {}^{4}_{2}\mathrm{He} + X $$

What is *X*?
Apakah X?

A Proton / *Proton*
B Neutron / *Neutron*
C Beta particle / *Zarah beta*
D Alpha particle / *Zarah alfa*

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

NO. KAD PENGENALAN | | | | | | | – | | | – | | | | |

ANGKA GILIRAN | | | | | | | | | |

NAMA: ..... TINGKATAN: .....

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA SEKOLAH MENENGAH NEGERI KEDAH DARUL AMAN

PEPERIKSAAN PERCUBAAN SPM 2010 4531/2

PHYSICS

Kertas 2

$2\frac{1}{2}$ jam Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
3. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
4. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Untuk Kegunaan Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
B	9		
	10		
C	11		
	12		
Jumlah			

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, $P = \frac{tenaga}{masa}$

18. $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

19. $\lambda = \dfrac{ax}{D}$

20. $n = \dfrac{\sin i}{\sin r}$

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

$n = \dfrac{\textit{dalam nyata}}{\textit{dalam ketara}}$

22. $Q = It$

23. $V = IR$

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

25. $\dfrac{N_S}{N_P} = \dfrac{V_S}{V_P}$

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

27. $g = 10 \text{ m s}^{-2}$

28. $c = 3{\cdot}0 \times 10^8 \text{ m s}^{-1}$

Section A
Bahagian A

[60 *marks*]

Answer **all** questions in this section.

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

1 Diagram 1 shows a cross section of water waves in a ripple tank.
Rajah 1 *menunjukkan keratan rentas gelombang air di dalam sebuah tangki riak.*

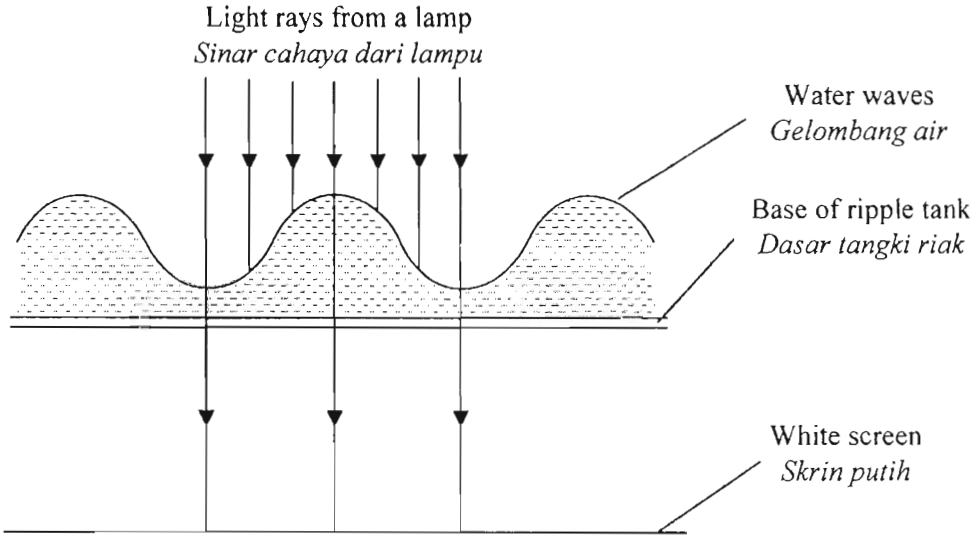


Diagram 1 / *Rajah 1*

(a) Underline the correct word in the bracket to complete the sentence below.
Gariskan perkataan yang betul di dalam kurungan untuk melengkapkan ayat di bawah.

Water wave is a (longitudinal, transverse) wave.

Gelombang air ialah gelombang (membujur, melintang). [1 *mark*]

(b) (i) Complete the rays in Diagram 1 to show how the light rays pass through the water waves to form a bright line on the white screen.
Lengkapkan sinar-sinar di dalam Rajah 1 *untuk menunjukkan bagaimana sinar cahaya itu merentasi gelombang air bagi membentuk garis cerah di atas skrin putih.*

[1 *mark*]

(ii) Mark on the white screen in Diagram 1 to show the wavelength of the water wave. Label the wavelength using the symbol λ.
Tandakan di atas skrin putih dalam Rajah 1 *untuk menunjukkan panjang gelombang bagi gelombang air itu. Label panjang gelombang itu menggunakan simbol* λ.

[1 *mark*]

(c) Name the instrument used to freeze the motion of the water waves.
Namakan alat yang digunakan untuk membekukan pergerakan gelombang air itu.

..... [1 *mark*]

2 Diagram 2 shows an object in front of a mirror. C is the centre of curvature of the mirror.
Rajah 2 menunjukkan satu objek di hadapan sebuah cermin. C ialah pusat kelengkungan cermin itu.

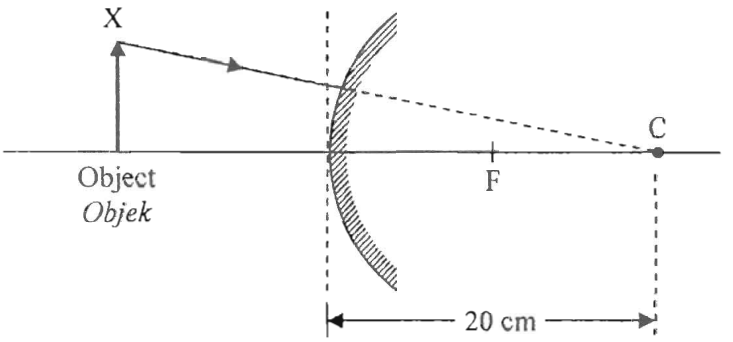


Diagram 2 / *Rajah* 2

(a) Name the type of mirror used.
Namakan jenis cermin yang digunakan.

.....

[1 *mark*]

(b) Calculate the focal length of the mirror.
Hitungkan panjang fokus cermin itu.

[1 *mark*]

(c) Complete Diagram 2 by drawing one more ray from point X on the object to show the formation of the image by the mirror. Draw the image formed.
Lengkapkan Rajah 2 dengan melukis satu lagi sinar dari titik X di atas objek untuk menunjukkan pembentukan imej oleh cermin itu. Lukiskan imej yang terbentuk.

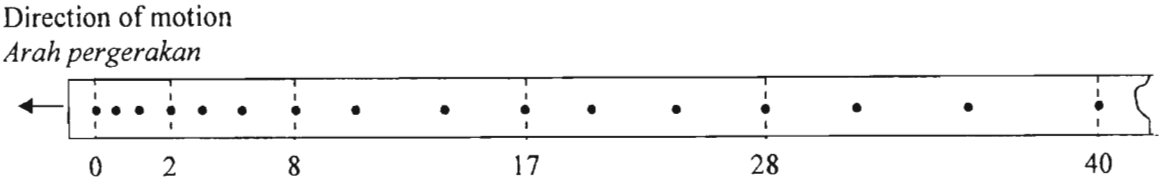
[2 *marks*]

(d) State one characteristic of the image.
Nyatakan satu ciri bagi imej itu.

.....

[1 *mark*]

3 Diagram 3.1 shows a ticker tape obtained by a student for a moving trolley in an experiment using a ticker timer. The ticker timer records 50 ticks per second.
Rajah 3.1 *menunjukkan satu pita detik yang diperoleh oleh seorang pelajar bagi pergerakan sebuah troli dalam suatu eksperimen menggunakan jangkamasa detik. Jangkamasa detik tersebut merakamkan* 50 *detik setiap saat.*



Scale in cm / *Skala dalam* cm

Diagram 3.1 / *Rajah* 3.1

The scale given shows the length of the ticker tape measured in centimetres from the first dot marked on the tape.
Skala yang diberi menunjukkan panjang pita detik diukur dalam sentimeter bermula dari titik pertama yang ditandakan di atas pita.

(a) State the type of electric current which is used to operate the ticker timer.
Nyatakan jenis arus elektrik yang digunakan untuk mengendalikan jangkamasa detik itu.

.....

[1 *mark*]

(b) What is the meaning of '1 tick'?
Apakah maksud '1 *detik* '?

.....

[1 *mark*]

(c) The ticker tape obtained is then cut into five strips consisting of 3 ticks each. All the five strips of ticker tape are then pasted side by side to form a tape chart. Draw the tape chart on the graph in Diagram 3.2.

Pita detik yang diperolehi kemudian dipotong kepada lima keratan yang mengandungi 3 *detik setiap satu. Kesemua lima keratan itu dilekatkan sebelah menyebelah untuk membentuk satu carta pita.*
Lukiskan carta pita itu pada graf di dalam Rajah 3.2.

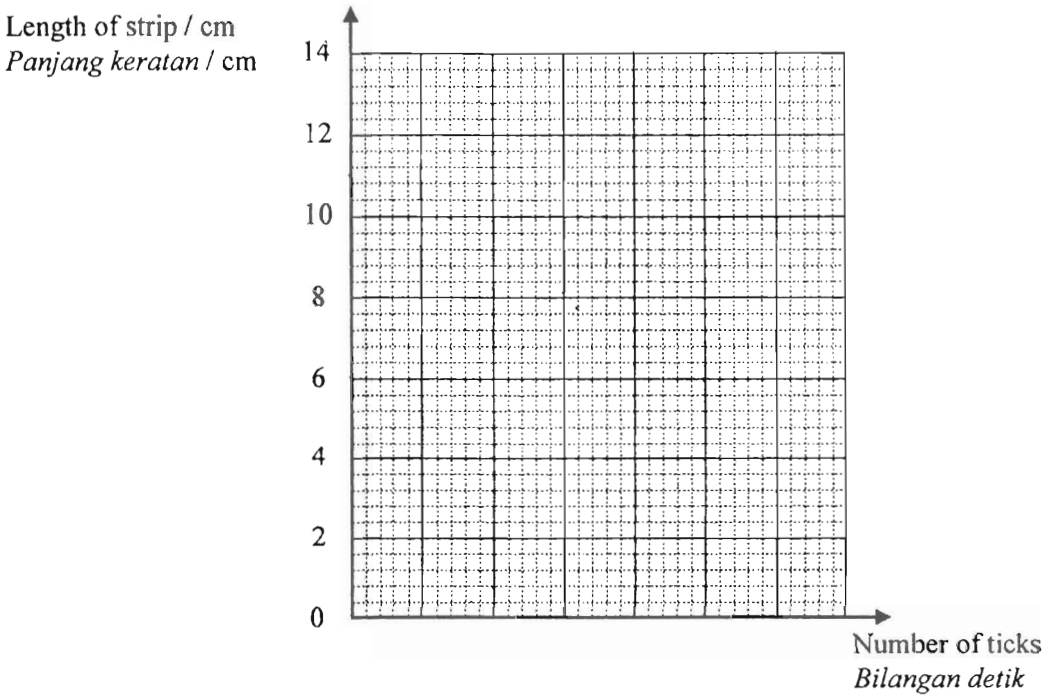


Diagram 3.2 / *Rajah* 3.2

[2 *marks*]

(d) Based on the tape chart, describe the motion of the trolley.
Berdasarkan carta pita, huraikan pergerakan troli itu.

.....

[2 *marks*]

4 Diagram 4 shows a transistor circuit. The transistor will switch on when the base voltage V_b is 1.0 V or more.
Rajah 4 *menunjukkan satu litar transistor. Transistor itu akan dihidupkan apabila voltan tapak* V_b *adalah* 1.0 V *atau lebih.*

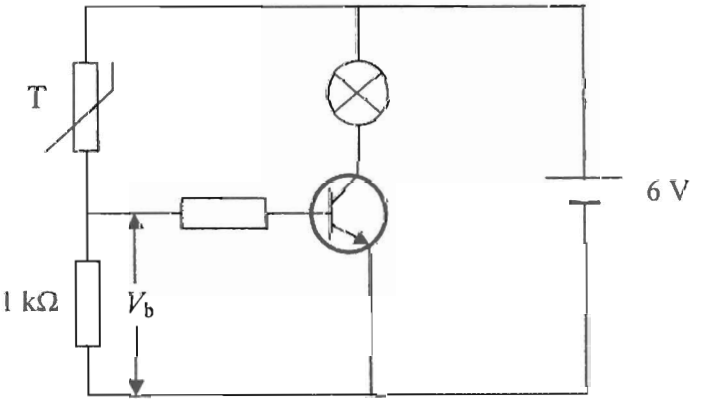


Diagram 4 / *Rajah* 4

(a) Name the type of transistor used in the circuit.
Namakan jenis transistor yang digunakan dalam litar itu.

.....

[1 *mark*]

(b) Underline the correct word in the brackets to complete the sentence below.
Gariskan perkataan yang betul dalam kurungan untuk melengkapkan ayat berikut.

The device T is a thermistor and is sensitive to (light / heat / moisture).

Alat T *ialah sebuah termistor dan ia peka kepada (cahaya / haba / kelembapan).*

[1 *mark*]

(c) Calculate the resistance of T when V_b is 1.0 V.
Hitungkan rintangan T *apabila* V_b *adalah* 1.0 V.

[2 *marks*]

(d) Explain what happens to the value of V_b when the temperature of the surrounding increases.
Terangkan apa terjadi pada nilai V_b *apabila suhu sekeliling bertambah.*

.....

.....

[2 marks]

(e) Besides being used a switch, state **one** other use of a transistor.
Selain daripada digunakan sebagai suatu suis, nyatakan ***satu*** *kegunaan lain sebuah transistor.*

.....

[1 *mark*]

5 Diagram 5.1 shows the arrangement of apparatus used in an experiment to investigate the maximum distance travelled by rays from a radioactive source.
Rajah 5.1 *menunjukkan susunan radas suatu eksperimen untuk mengkaji jarak maksimum yang dilalui oleh sinaran dari suatu sumber radioaktif.*

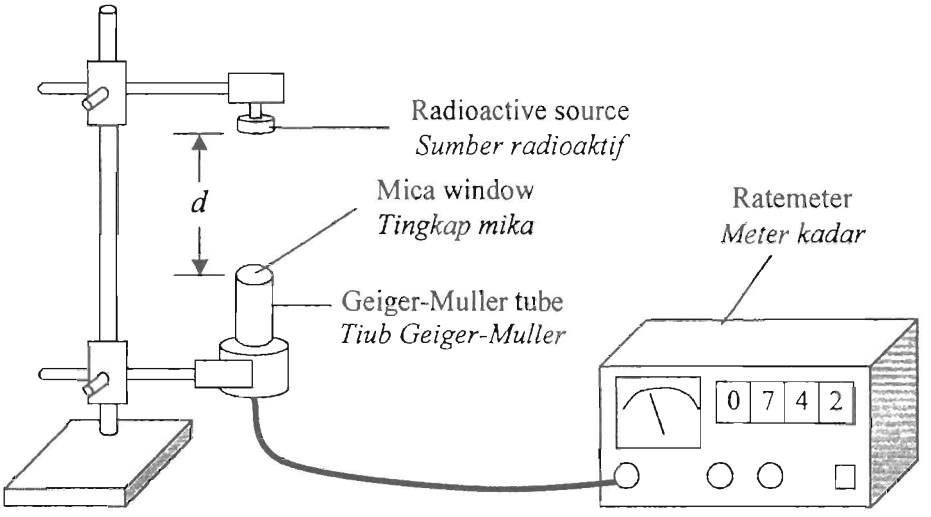


Diagram 5.1 / *Rajah* 5.1

Diagram 5.2 shows the graph of the rate meter reading against distance for radioactive source A.
Rajah 5.2 *menunjukkan graf bacaan meter kadar melawan jarak bagi sumber radioaktif* A.

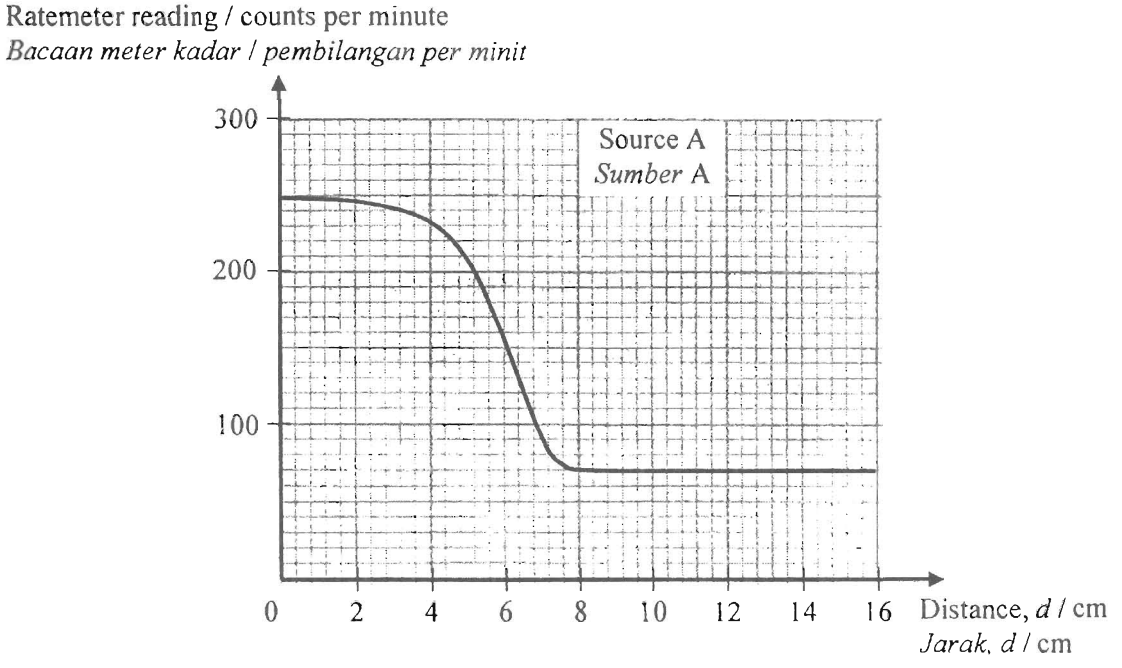


Diagram 5.2 / *Rajah* 5.2

Diagram 5.3 shows the graph of the rate meter reading against distance for radioactive source B.
Rajah 5.3 *menunjukkan graf bacaan meter kadar melawan jarak bagi sumber radioaktif* B.

Ratemeter reading / counts per minute
Bacaan meter kadar / pembilangan per minit

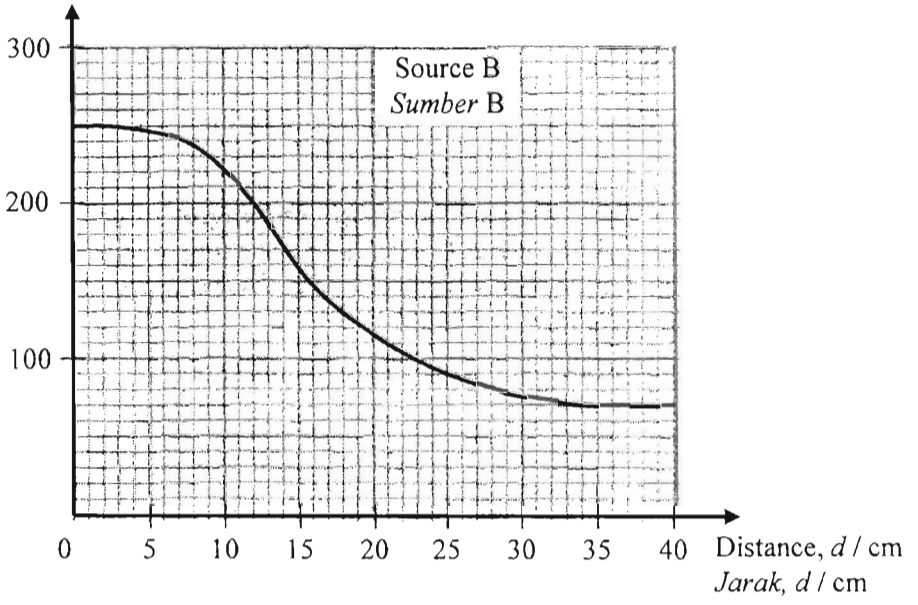


Diagram 5.3 / *Rajah* 5.3

(a) Why is the mica window of the Geiger-Muller tube very thin?
Mengapakah tingkap mika tiub Geiger-Muller itu sangat nipis?

.....

[1 *mark*]

(b) Observe Diagram 5.2 and Diagram 5.3.
Perhatikan Rajah 5.2 *dan Rajah* 5.3.

(i) State one similarity in the change of the ratemeter reading for source A and source B.
Nyatakan satu kesamaan bagi perubahan bacaan meter kadar bagi sumber A *dan sumber* B.

.....

.....

[1 *mark*]

(ii) Compare the maximum distance travelled by the radiation from source A and source B.
Bandingkan jarak maksimum yang dilalui oleh sinaran dari sumber A dan sumber B.

.....

.....

[1 *mark*]

(iii) Compare the final ratemeter reading for source A and source B.
Bandingkan bacaan akhir meter kadar bagi sumber A *dan sumber* B.

.....

.....

[1 *mark*]

(c) Name the radiation that causes the final reading of the ratemeter.
Namakan sinaran yang menyebabkan bacaan akhir meter kadar itu.

.....

[1 *mark*]

(d) State the type of radiation emitted by source A.
Explain your answer.
Nyatakan jenis sinaran yang dipancarkan oleh sumber A.
Jelaskan jawapan anda.

.....

.....

[2 *marks*]

(e) State one precaution that should be taken when conducting the experiment.
Nyatakan satu langkah berjaga-jaga yang perlu diambil apabila mengendalikan eksperimen tersebut.

.....

[1 *mark*]

6 Diagram 6.1 shows water flowing out of a hole at the side of a container.
Rajah 6.1 *menunjukkan air memancut keluar dari lubang di tepi sebuah bekas.*

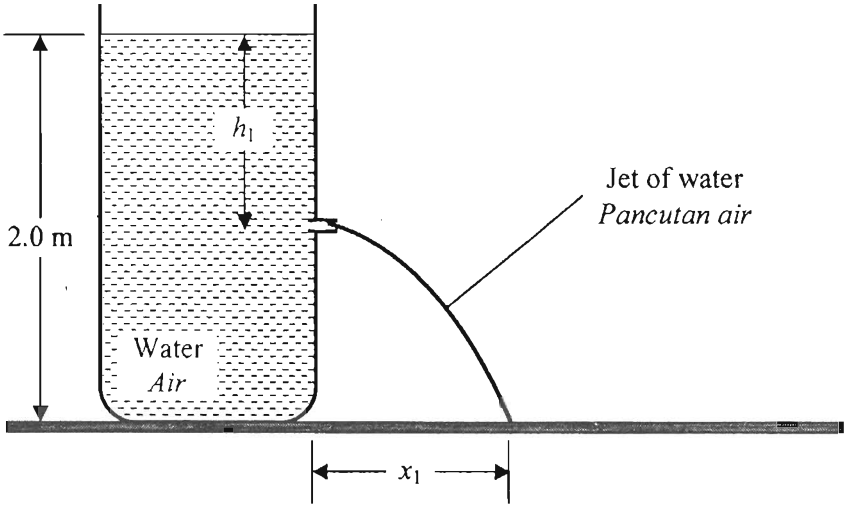


Diagram 6.1 / *Rajah* 6.1

Diagram 6.2 shows water flowing out of a hole at the side of another container.
Rajah 6.2 *menunjukkan air memancut keluar dari lubang di tepi sebuah bekas yang lain.*

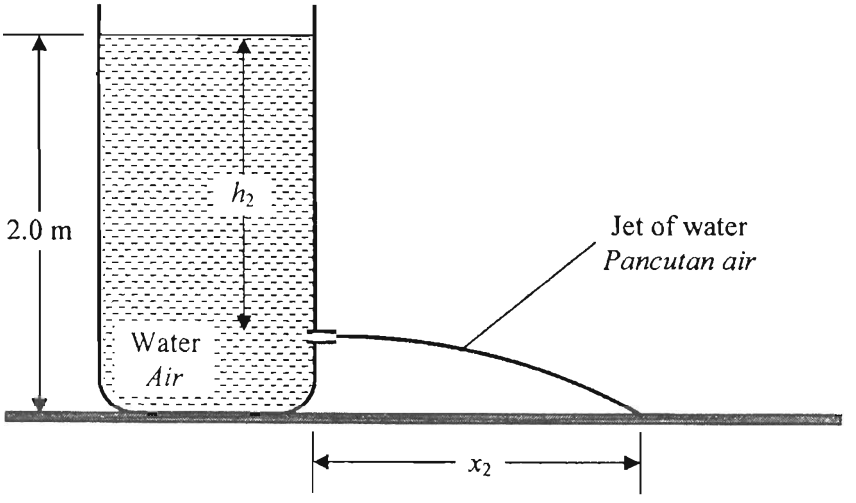


Diagram 6.2 / *Rajah* 6.2

(a) What is the meaning of pressure?
Apakah maksud tekanan?

.....

[1 *mark*]

(b) Observe Diagram 6.1 and Diagram 6.2.
Perhatikan Rajah 6.1 *dan Rajah* 6.2.

(i) Compare the depth of the holes from the surface of the water.
Bandingkan kedalaman lubang itu dari permukaan air.

.....
[1 *mark*]

(ii) Compare the horizontal distance travelled by the jet of water.
Bandingkan jarak ufuk yang dilalui oleh pancutan air itu.

.....
[1 *mark*]

(iii) Relate the horizontal distance in (b)(ii) to the pressure of water at the hole.
Hubungkaitkan jarak ufuk dalam (b)(ii) *dengan tekanan air pada lubang itu.*

.....
[1 *mark*]

(iv) Relate the pressure in the water to the depth of the water.
Hubungkaitkan tekanan air dengan kedalaman air.

.....
[1 *mark*]

(c) State two other factors that affect the pressure in a liquid.
Nyatakan dua lagi faktor yang mempengaruhi tekanan cecair.

.....
[2 *marks*]

(d) Explain why a diver finds it difficult to breathe normally when he is in the deep sea.
Terangkan mengapa seorang penyelam tidak dapat bernafas dengan normal apabila ia berada di laut yang dalam.

.....

.....
[1 *mark*]

7 Diagram 7 shows the initial situation and the situation after 5 minutes when water is being boiled by an electric heater of power 1000 W.
Rajah 7 menunjukkan keadaan awal dan keadaan selepas 5 minit bagi air yang sedang mendidih oleh suatu pemanas elektrik berkuasa 1000 W.

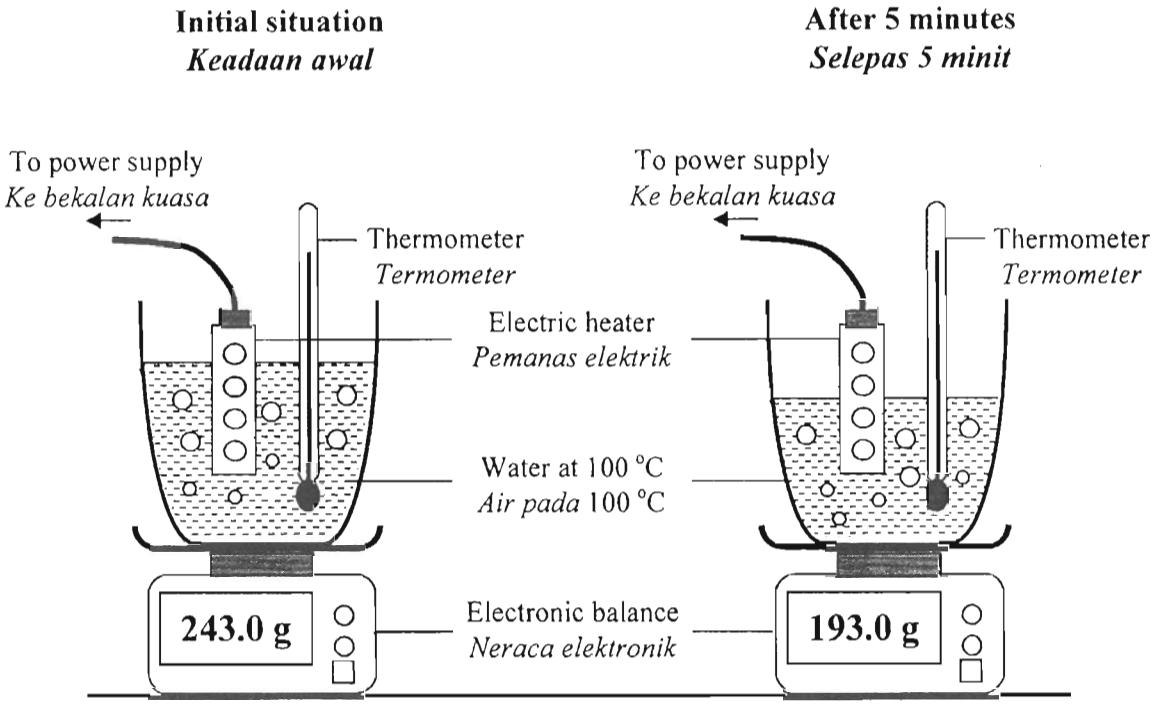


Diagram 7 / *Rajah 7*

(a) What is the meaning of temperature?
Apakah maksud suhu?

.....

[1 *mark*]

(b) Based on Diagram 7;
Berdasarkan Rajah 7;

(i) State **one** reason why the temperature does not increase even though heat is supplied.
*Nyatakan **satu** sebab mengapa suhu tidak meningkat walaupun haba dibekalkan.*

.....

.....

[1 *mark*]

(ii) Calculate the heat energy released by the immersion heater in 5 minutes.
Hitung tenaga haba yang dibebaskan oleh pemanas rendam dalam 5 masa minit.

[2 *marks*]

(iii) Calculate the specific latent heat of vaporization of water in the above process.
Hitung haba pendam tentu pengewapan air dalam proses di atas.

[3 *marks*]

(c) The actual value of specific latent heat of vaporization of water is 2.26×10^6 J kg^{-1}.
Nilai sebenar haba pendam tentu pengewapan air ialah 2.26×10^6 J kg^{-1}.

(i) Explain why the value obtained in (b)(iii) is different from the actual value.
Jelaskan mengapa nilai yang diperoleh dalam (b)(iii) *berbeza daripada nilai sebenar.*

.....

.....

[1 *mark*]

(ii) Suggest two modifications to the arrangement of apparatus in Diagram 7 that will give a more accurate value of specific latent heat of vaporization of water.
Cadangkan dua pengubahsuaian kepada susunan alat radas dalam Rajah 7 yang akan memberi nilai haba pendam tentu pengewapan air yang lebih tepat.

.....

.....

[2 *marks*]

8 Diagram 8 shows a transformer with four output terminals, W, X, Y and Z.
Rajah 8 *menunjukkan sebuah transformer dengan empat terminal output*, W, X, Y *dan* Z.

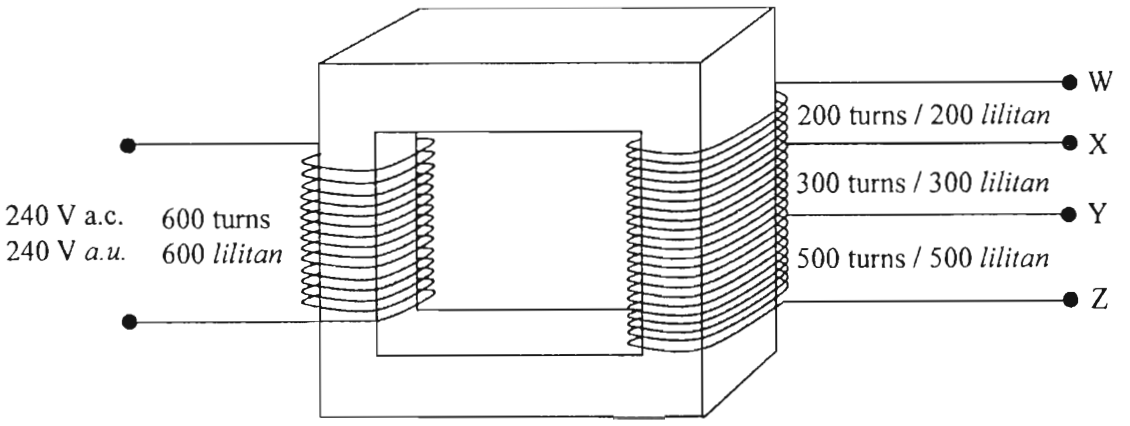


Diagram 8 / *Rajah* 8

(a) State the physics concept used to produce a voltage across the secondary coil of the transformer?
Nyatakan konsep fizik yang digunakan untuk menghasilkan suatu voltan merentasi gegelung sekunder transformer itu.

.....

[1 *mark*]

(b) State the two pairs of output terminals that can be used when the transformer is used to step up voltage.
Nyatakan dua pasangan terminal output yang boleh digunakan apabila transformer itu digunakan untuk menaikkan voltan.

1. Terminal ..... and ..... / *Terminal ..... dan .....*

2. Terminal ..... and ..... / *Terminal ..... dan .....*

[2 *marks*]

(c) (i) Which pair of output terminals will give the largest output voltage?
Pasangan terminal output yang manakah memberikan voltan output yang paling besar?

Terminal ..... and ..... / *Terminal ..... dan .....*

[1 *mark*]

(ii) Explain your answer to (c)(i).
Terangkan jawapan anda dalam (c)(i).

.....

[1 *mark*]

(d) A student would like to use a transformer with the minimum input power and minimum wastage of power.
He can choose the transformers from Table 8.
Seorang pelajar ingin menggunakan sebuah transformer dengan kuasa input yang minimum dan kehilangan kuasa yang minimum.
Dia boleh memilih transformer-transformer dari Jadual 8.

Transformer *Transformer*	Primary voltage *Voltan primer* V_P / V	Primary current *Arus primer* I_P / A	Input power *Kuasa input* $P_{in} = (V_P\ I_P)$ / W	Output power *Kuasa output*, P_{out} / W	Efficiency *Kecekapan* $e = \frac{P_{out}}{P_{in}}$
A	240	0.25		48.0	
B	240	0.25		54.0	
C	240	0.30		57.6	
D	240	0.30		64.8	

Table 8 / *Jadual 8*

(i) Complete Table 8 by writing down the values of the input power, P_{in}, and efficiency, e, for every transformer.
Lengkapkan Jadual 8 dengan menulis nilai-nilai kuasa input, P_{in}, dan kecekapan, e, bagi setiap transformer.

[3 *marks*]

(ii) Choose the two transformers that have the lowest input power.
Pilih dua transformer yang mempunyai kuasa input yang paling rendah.

.....

[1 *mark*]

(iii) Choose the two transformers that have the lowest loss of power.
Pilih dua transformer yang mempunyai kehilangan kuasa yang paling kecil.

.....

[1 *mark*]

(iv) Give one reason for the answer in 8(d)(iii).
Beri satu sebab bagi jawapan anda di 8(d)(iii).

.....

[1 *mark*]

(v) Based on the answers in 8(d)(ii) and 8(d)(iii), choose the most suitable transformer to be used by the student.
Berdasarkan jawapan di 8(d)(ii) *dan* 8(d)(iii), *pilih transformer yang paling sesuai digunakan oleh pelajar itu.*

.....

[1 *mark*]

Section B
Bahagian B
[20 marks]

Answer any **one** question from this section.
Jawab mana-mana **satu** *soalan daripada bahagian ini.*

9 Diagram 9.1 shows the initial and final position of a student sliding down a slide. Diagram 9.2 shows the initial and final position of the same student sliding down the slide from a different initial position.
Rajah 9.1 *menunjukkan kedudukan awal dan akhir bagi seorang pelajar yang menggelongsor menuruni sebuah papan gelongsor.*
Rajah 9.1 *menunjukkan kedudukan awal dan akhir bagi pelajar yang sama menggelongsor menuruni papan gelongsor itu dari kedudukan awal yang lain.*

Diagram 9.1 / *Rajah* 9.1

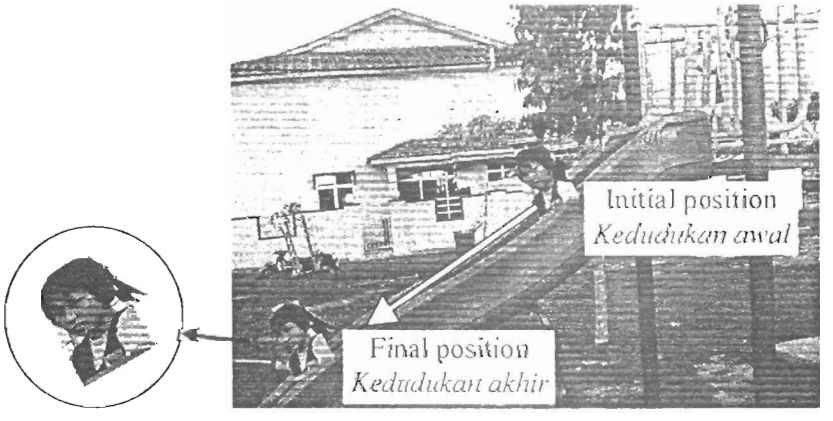


Diagram 9.2 / *Rajah* 9.2

(a) (i) What is the meaning of gravitational potential energy of the student?
Apakah maksud tenaga keupayaan graviti pelajar itu?

[1 *mark*]

(ii) Observe Diagram 9.1 and Diagram 9.2. Compare the initial position of the student and the speed of the student on reaching the final position.
Relate the speed of the student on reaching the final position with the energy gained by the student to make a deduction on the relationship between the initial position and the energy gained.

Perhatikan Rajah 9.1 dan Rajah 9.2. Bandingkan kedudukan awal pelajar itu dan laju pelajar itu semasa tiba di kedudukan akhir.
Hubungkait laju pelajar semasa tiba di kedudukan akhir dengan tenaga yang diperoleh oleh pelajar itu untuk membuat kesimpulan tentang hubungan antara kedudukan awal dan tenaga yang diperoleh.

[4 *marks*]

(iii) Name the physics principle that explains the situation in (a)(ii).

Namakan prinsip fizik yang menerangkan situasi di (a)(ii).

[1 *mark*]

(b) Diagram 9.3 shows a baby sleeping in a cradle. The cradle is made to oscillate between position P and Q through the equilibrium position O.
Rajah 9.3 menunjukkan seorang bayi tidur di dalam buaian. Buaian itu diayunkan di antara kedudukan P dan Q melalui kedudukan keseimbangan O.

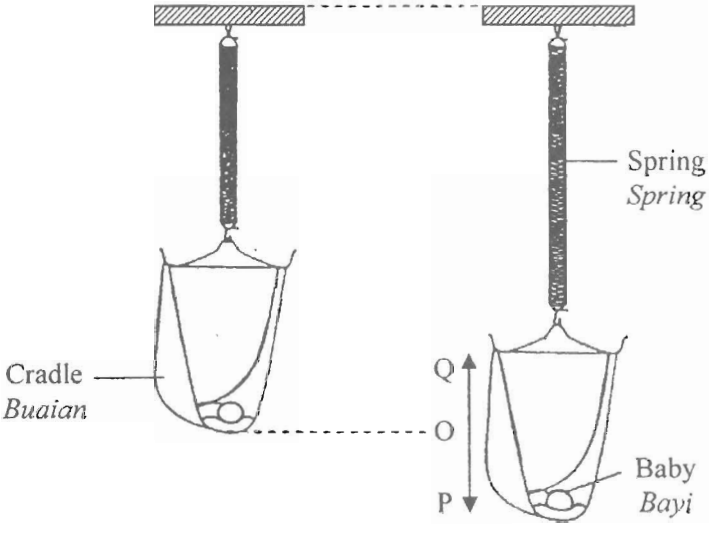


Diagram 9.3 / *Rajah 9.3*

(i) State the changes in energy that occur when the cradle swings from P to O, and then from O to Q.
Nyatakan perubahan tenaga yang berlaku apabila buaian itu berayun dari P ke O dan kemudian dari O ke Q.

(ii) After some time, the cradle stops oscillating. Explain why.
Selepas suatu masa, buaian itu berhenti. Terangkan mengapa.

[4 *marks*]

(c) Diagram 9.4 shows an archer getting ready to shoot an arrow towards a target board from a far distance. When he releases the arrow, he observes that the arrow falls short of the target.
Rajah 9.4 menunjukkan seorang pemanah bersedia untuk melepaskan anak panah ke arah papan sasaran dari jarak yang jauh. Apabila pemanah itu melepaskan anak panah, dia memerhatikan bahawa anak panah itu tidak sampai ke sasarannya.

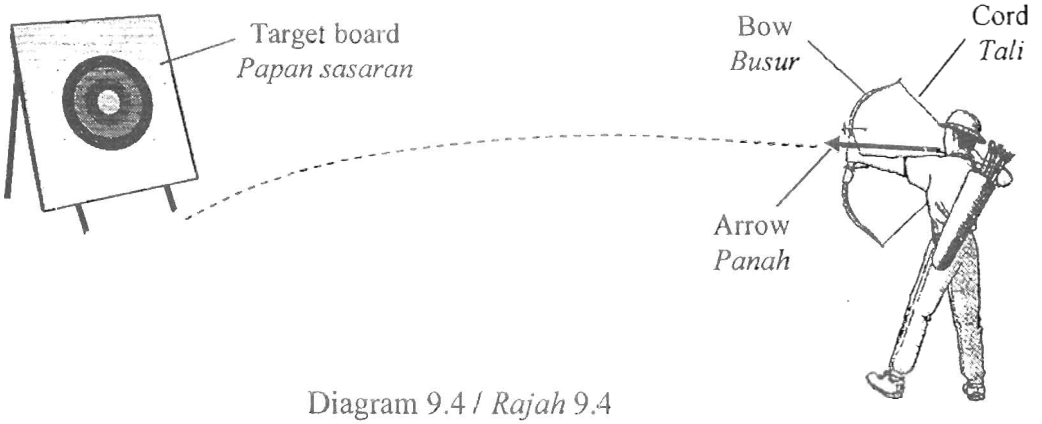


Diagram 9.4 / *Rajah 9.4*

Suggest and explain how he would be able to shoot the arrow to hit the centre of the target board, based on the following aspects:

Cadang and terangkan bagaimana ia boleh melepaskan anak panah itu supaya kena pada pusat papan sasaran, berdasarkan aspek-aspek berikut:

(i) The strength of the cord
Kekuatan tali

(ii) The force constant of the bow
Pemalar daya busur

(iii) The material used for the bow
Bahan yang digunakan untuk busur

(iv) The design of the arrow
Rekabentuk anak panah

(iv) The way the arrow is aimed at the target
Cara anak panah ditujukan ke arah sasaran

[10 *marks*]

10 A student carries out an experiment to investigate a water wave phenomenon using a ripple tank.
Diagram 10.1 and Diagram 10.2 show the pattern obtained on the screen of the ripple tank when two vibrators, S and T, are vibrating simultaneously.
Seorang pelajar menjalankan eksperimen untuk mengkaji satu fenomena gelombang air dengan menggunakan sebuah tangki riak.
Rajah 10.1 *dan Rajah* 10.2 *menunjukkan corak yang diperoleh pada skrin tangki riak itu apabila dua penggetar,* S *dan* T, *sedang bergetar serentak.*

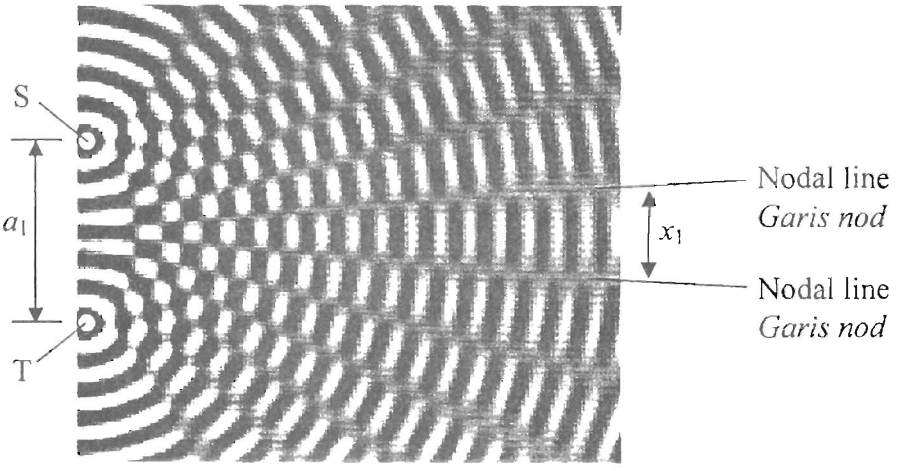


Diagram 10.1 / *Rajah* 10.1

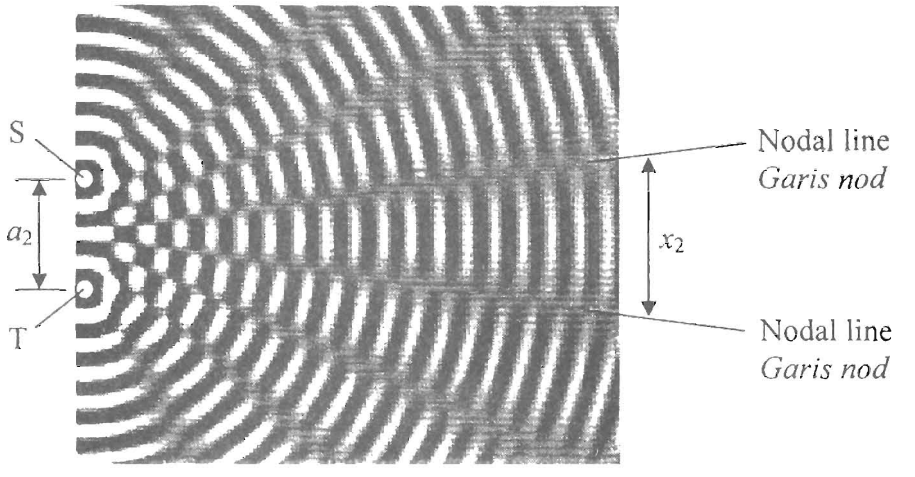


Diagram 10.2 / *Rajah* 10.2

(a) (i) State the reason why the depth of water in the ripple tank must be uniform.
Nyatakan sebab mengapa kedalaman air dalam tangki riak itu mestilah seragam.

[1 *mark*]

(ii) Name the water wave phenomenon that is being investigated.
Namakan fenomena gelombang air yang dikaji.

[1 *mark*]

(iii) State the amplitude of the wave along the nodal lines.
Nyatakan amplitud gelombang sepanjang garis-garis nod.

[1 *mark*]

(iv) Using a suitable diagram, explain how a nodal line is formed.
Dengan menggunakan satu rajah yang sesuai, terangkah bagaimana satu garis nod dihasilkan.

[2 *marks*]

(b) Observe Diagram 10.1 and Diagram 10.2.
Perhatikan Rajah 10.2 *dan Rajah* 10.2.

(i) Compare the distance between vibrators S and T.
Banding jarak antara penggetar S *dan* T.

[1 *mark*]

(ii) Compare the distance between adjacent nodal lines.
Banding jarak antara garis nod yang bersebelahan.

[1 *mark*]

(iii) Compare the wavelength of the water waves.
Banding panjang gelombang bagi gelombang air itu.

[1 *mark*]

(iv) State the relationship between a and x.
[a = distance between the vibrators, x = distance between adjacent lines]
Nyatakan hubungan antara a dan x.
[a = *jarak antara penggetar*, x = *jarak antara garis nod yang bersebelahan*]

[2 *marks*]

(c) Diagram 10.3 shows the plan of a football stadium. When an announcement was made using only one loudspeaker, spectators at positions such as P, Q and R could not hear the announcement clearly.
Rajah 10.3 *menunjukkan pelan sebuah stadium bola sepak. Apabila pengumuman dibuat dengan menggunakan hanya sebuah pembesar suara, penonton di kedudukan seperti* P, Q *dan* R *tidak dapat mendengar pengumuman itu dengan jelas.*

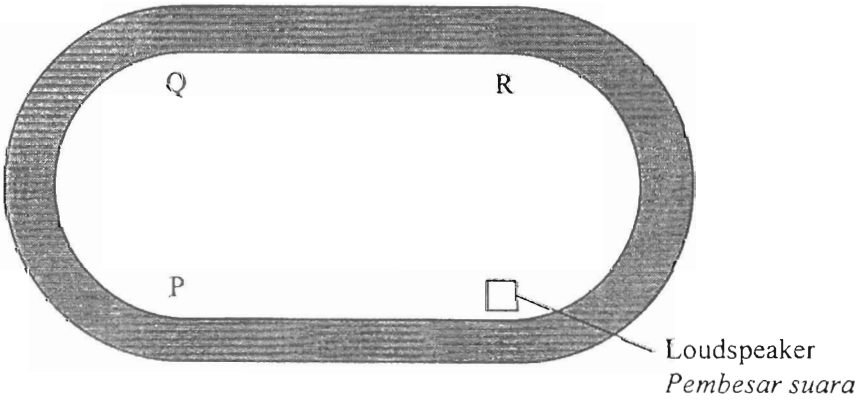


Diagram 10.3 / *Rajah* 10.3

Suggest and explain improvements to the sound system and transmission of the sound so that spectators all around the stadium can hear the announcement clearly. Your answer should cover the following aspects:
Cadang dan terangkan penambahbaikan kepada sistem bunyi dan penghantaran bunyi supaya penonton di sekeliling stadium boleh mendengar pengumuman dengan jelas. Jawapan anda harus meliputi aspek-aspek berikut:

(i) The number of loudspeakers
Bilangan pembesar suara

(ii) The position of the loudspeakers
Kedudukan pembesar suara

(iii) The amplification of the sound
Amplifikasi bunyi

[6 *marks*]

(d) The loudspeaker used in (c) is as shown in Diagram 10.4
Pembesar suara yang digunakan dalam (c) *adalah seperi ditunjukkan dalam Rajah* 10.4.

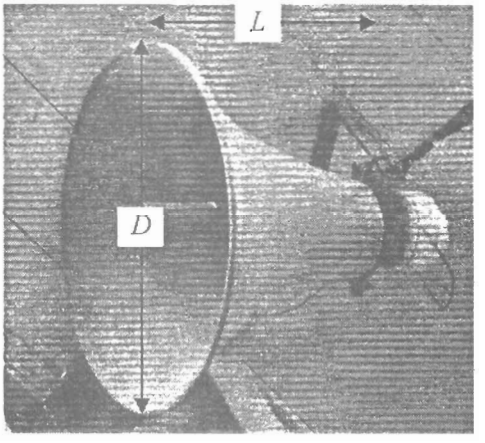


Diagram 10.4 / *Rajah* 10.4

Explain whether *D* and *L* should be big or small so that sound from the loudspeaker can be transmitted over a longer distance.
Terangkan sama ada D dan L harus mempunyai yang besar atau kecil supaya bunyi dari pembesar suara itu boleh dihantar melalui jarak yang lebih jauh.

[4 *marks*]

Section C
Bahagian C
[20 marks]
Answer any **one** question from this section.
Jawab mana-mana **satu** *soalan daripada bahagian ini.*

11 Total internal reflection occurs when light travels from a denser medium to less dense medium and the angle of incidence is greater than the critical angle.
Pantulan dalam penuh berlaku apabila cahaya merambat dari medium lebih tumpat ke medium kurang tumpat dan sudut tuju melebihi sudut genting.

(a) What is the meaning of critical angle?
Apakah maksud sudut genting?

[1 *mark*]

(b) (i) Write an equation to show the relationship between the critical angle, *c*, and the refractive index, *n*, of a medium.
Tuliskan satu persamaan untuk menunjukkan hubungan antara sudut genting, c, dan indeks biasan, n, suatu medium.

(ii) Use the equation in (b)(i) to explain why total internal reflection is easier to occur in diamond than in glass.
Menggunakan hubungan di (b)(i), *terangkan mengapa pantulan dalam penuh lebih mudah berlaku dalam intan daripada* kaca.

[Refractive index of glass = 1.5, refractive index of diamond = 2.4]
[*Indeks biasan kaca* = 1.5, *indeks biasan intan* = 2.4]

[4 *marks*]

(c) Diagram 11.1 shows a ray of light from an object at point P at the bottom of a swimming pool travelling from water into the air.
Rajah 11.1 *menunjukkan satu sinar cahaya dari satu objek di titik P pada dasar sebuah kolam renang merambat dari air ke udara.*

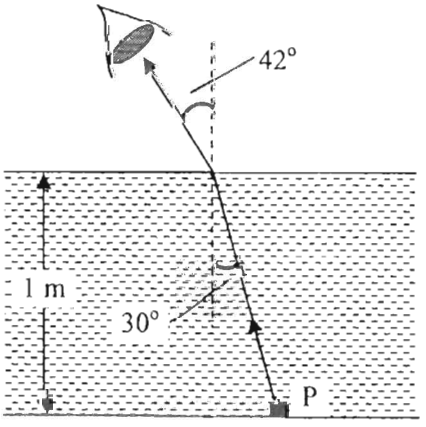


Diagram 11.1 / *Rajah* 11.1

Calculate,
Hitung,

(i) the refractive index of the water in the pool.
indeks biasan bagi air dalam kolam itu.

(ii) the apparent depth of the image.
dalam ketara bagi imej..

[5 *marks*]

(d) Diagram 11.2 shows a glass window which opens outwards at an angle θ.
Rajah 11.2 *menunjukkan sebuah tingkap kaca dibuka ke luar pada sudut* θ.

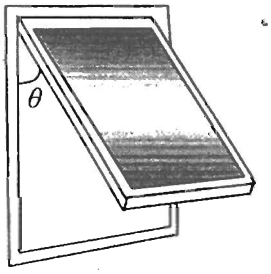


Diagram 11.2 / *Rajah* 11.2

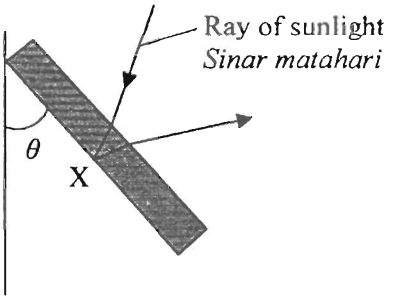


Diagram 11.3 / *Rajah* 11.3

Diagram 11.3 shows the side view of the window. If rays of sunlight incident on the window undergo total internal reflection at points like X, direct sunlight would not be able to enter the room and it would be cooler. Four designs P, Q, R and S of the window are available and are designed such that it can be opened at a maximum angle of θ.

Rajah 11.3 *menunjukkan pandangan sisi tingkap tersebut. Jika sinar matahari yang tuju ke tingkap itu mengalami pantulan dalam penuh di titik seperti* X, *sinar matahari langsung tidak dapat memasuki bilik dan bilik akan menjadi lebih sejuk. Terdapat empat rekabentuk tingkap* P, Q, R *dan* S *yang direka supaya tingkap itu boleh dibuka sehingga sudut maksimum* θ.

Table 11 shows the characteristics of the glass used and the angle θ of each design.
Jadual 11 *menujukkan ciri-ciri kaca yang digunakan dan sudut* θ *bagi setiap rekabentuk.*

Design *Rekabentuk*	Glass *Kaca*			θ / °
	Refractive index *Indeks Biasan*	Thickness *Ketebalan* / mm	Thermal conductivity *Kekonduksian terma*	
P	1.5	3.0	low *rendah*	15
Q	1.8	5.0	low *rendah*	10
R	1.8	3.0	medium *sederhana*	15
S	1.5	5.0	medium *sederhana*	10

Table 11 / *Jadual* 11

Explain the suitability of each characteristic of the glass and the size of the angle θ and determine the most suitable design to be used so that the room would be kept cool during the day.
Terangkan kesesuaian setiap ciri kaca tersebut dan saiz sudut θ dan tentukan rekabentuk yang paling sesuai digunakan supaya bilik itu sejuk pada siang hari.

Give reasons for your choice.
Beri sebab bagi pilihan anda.

[10 *marks*]

12 Diagram 12.1 shows a hair dryer labelled 240 V, 500 W connected to a three pin plug. Diagram 12.2 shows the fuse in the three pin plug.
Rajah 12.1 *menunjukkan sebuah pengering rambut berlabel* 240 V, 500 W *yang disambung kepada sebuah palam tiga pin.*
Rajah 12.2 *menunjukkan fius yang terdapat di dalam palam tiga pin itu.*

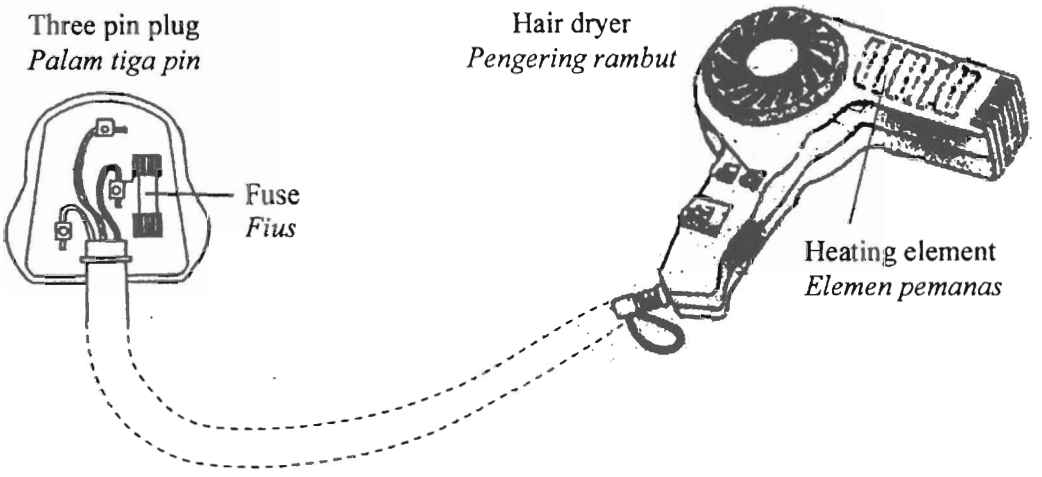


Diagram 12.1 / *Rajah* 12.1

Diagram 12.2 / *Rajah* 12.2

(a) State **two** properties of the material of the heating element in the hair dryer. Explain your answers.
Nyatakan ***dua*** *ciri bagi bahan elemen pemanas di dalam pengering rambut itu. Terangkan jawapan anda.*

[4 *marks*]

(b) (i) What is the meaning of the label 0.5 A on the fuse?
Apakah maksud label 0.5 A *pada fius itu?*

[1 *mark*]

(ii) Table 12 shows the specification of a few metals to be used as a fuse wire.
Jadual 12 *menunjukkan spesifikasi bagi beberapa jenis logam untuk digunakan sebagai dawai fius.*

Metal *Logam*	Melting point *Takat lebur* / °C	Specific heat capacity *Muatan haba tentu* / $J\ kg^{-1}\ °C^{-1}$	Diameter *Diameter*	Resistivity *Kerintangan*
W	1100	900	Big	Low
X	600	900	Small	High
Y	1100	240	Big	Low
Z	700	240	Small	High

Table 12 / *Jadual* 12

Explain the suitability of each characteristic of the four metals and determine the most suitable metal to be used as the fuse wire.
Give reasons for your choice.

Terangkan kesesuaian setiap ciri bagi empat jenis logam itu dan tentukan logam yang paling sesuai untuk digunakan sebagai dawai fius.
Beri sebab-sebab bagi pilihan anda.

[10 *marks*]

(c) The hair dryer is Diagram 12.1 is switched on.
Pengering rambut dalam Rajah 12.1 *dihidupkan.*

(i) Calculate the current flowing through the hair dryer.
Hitung arus yang mengalir melalui pengering rambut itu.

(ii) State whether the 0.5 A fuse is suitable to be used in the plug.
Nyatakan sama ada fius 0.5 A *sesuai digunakan dalam palam itu.*

(iii) Calculate the energy used by the hair dryer when it is switched on for 10 minutes.
Hitung tenaga yang digunakan oleh pengering rambut itu apabila ia dihidupkan selama 10 *minit.*

[5 *marks*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

NO. KAD PENGENALAN | | | | | | | – | | | – | | | | |

ANGKA GILIRAN | | | | | | | | | |

NAMA: ..... TINGKATAN: .....

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA SEKOLAH MENENGAH NEGERI KEDAH DARUL AMAN

PEPERIKSAAN PERCUBAAN SPM 2010 4531/3

PHYSICS

Kertas 3

$1\frac{1}{2}$ jam Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
3. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
4. *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 **15** halaman bercetak

1 A student carries out an experiment to investigate the relationship between the current, I, in a resistance wire and the length, L, of the wire.
Diagram 1.1 shows the circuit used in the experiment.

Seorang pelajar menjalankan satu eksperimen untuk mengkaji hubungan antara arus, I, dalam seutas dawai rintangan dengan panjang, L, bagi dawai itu.
Rajah 1.1 *menunjukkan litar yang digunakan dalam eksperimen itu.*

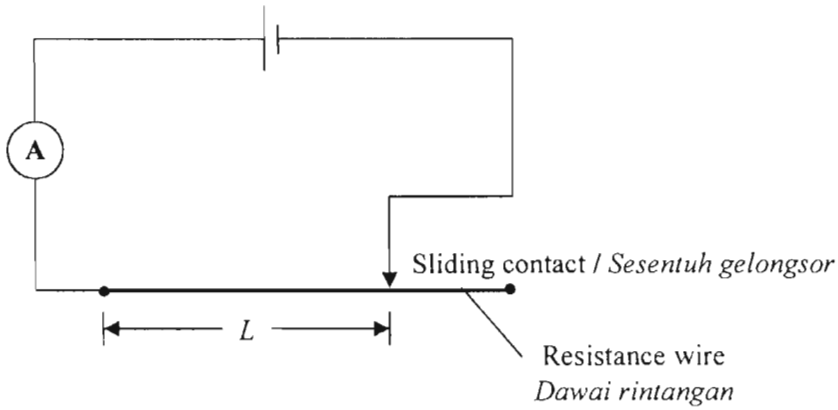


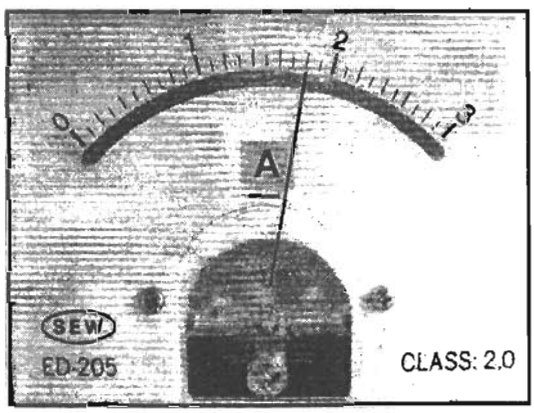
Diagram 1.1 / *Rajah* 1.1

The position of the sliding contact is adjusted until the length of the wire, L = 0.20 m. The current, I, is measured by an ammeter. Diagram 1.2 shows the reading of the ammeter.

The procedure is repeated for lengths of the wire, L = 0.30 m, 0.40 m, 0.50 m and 0.60 m. The corresponding readings of the ammeter are shown in Diagrams 1.3, 1.4, 1.5 and 1.6.

Kedudukan bagi sesentuh gelongsor dilaraskan sehingga panjang dawai, L = 0.20 m. *Arus, I, diukur oleh sebuah ammeter. Rajah* 1.2 *menunjukkan bacaan ammeter itu..*

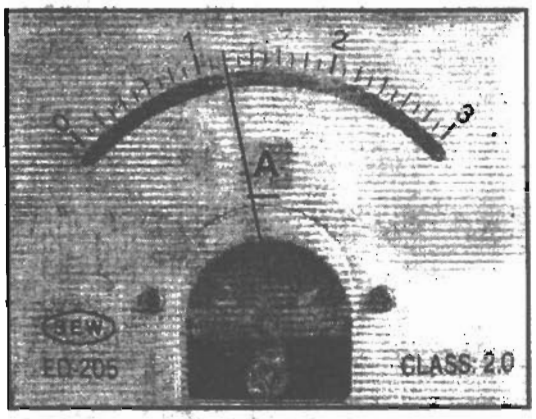
Prosedur itu diulang bagi panjang dawai, L = 0.30 m, 0.40 m, 0.50 m *dan* 0.60 m. *Bacaan-bacaan sepadan bagi ammeter ditunjukkan dalam Rajah* 1.3, 1.4, 1.5 *dan* 1.6.



Length / *Panjang*, L = 0.20 m $\quad \frac{1}{L}$ = ... m^{-1}

Current / *Arus*, I = ... A

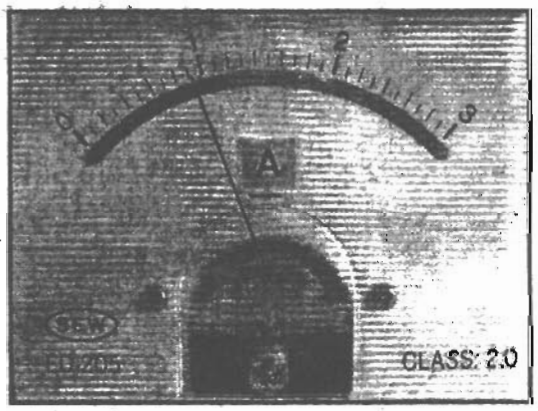
Diagram 1.2 / *Rajah* 1.2



Length / *Panjang*, L = 0.30 m $\frac{1}{L}$ = ... m^{-1}

Current / *Arus*, I = ... A

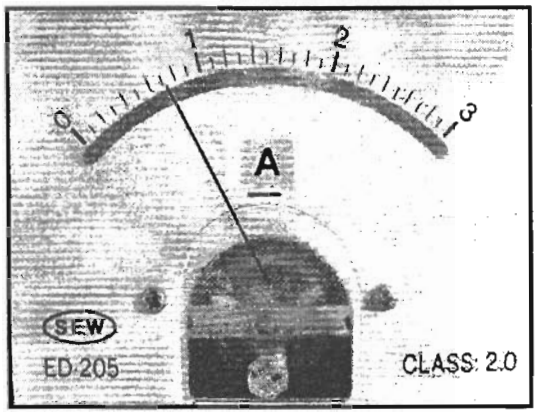
Diagram 1.3 / *Rajah* 1.3



Length / *Panjang*, L = 0.40 m $\frac{1}{L}$ = ... m^{-1}

Current / *Arus*, I = ... A

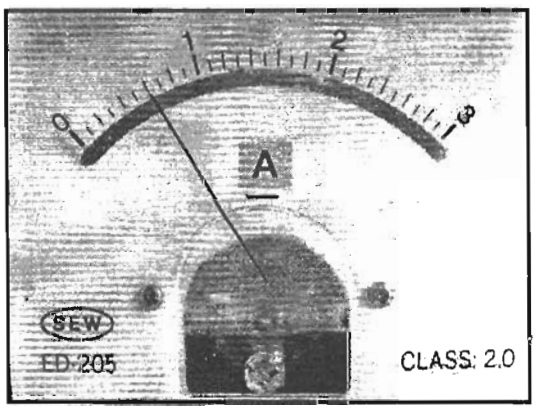
Diagram 1.4 / *Rajah* 1.4



Length / *Panjang*, L = 0.50 m $\frac{1}{L}$ = ... m^{-1}

Current / *Arus*, I = ... A

Diagram 1.5 / *Rajah* 1.5



Length / *Panjang*, L = 0.60 m $\frac{1}{L}$ = ... m^{-1}

Current / *Arus*, I = ... A

Diagram 1.6 / *Rajah* 1.6

(a) For the experiment described on page 2, identify:
Bagi eksperimen yang diterangkan di halaman 2, kenal pasti:

(i) the manipulated variable,
pembolehubah dimanipulasikan,

.....

[1 *mark*]

(ii) the responding variable,
pembolehubah bergerak balas,

.....

[1 *mark*]

(iii) a fixed variable.
satu pembolehubah dimalarkan.

.....

[1 *mark*]

(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 Diagrams 1.2, 1.3, 1.4, 1.5 and 1.6 on pages 2, 3 and 4, record the readings of the ammeter, I.
Berdasarkan Rajah 1.2, 1.3, 1.4, 1.5 *dan* 1.6 *di halaman* 2, 3 *dan* 4, *catat bacaan ammeter,* I.

[3 *marks*]

(ii) Calculate the value $\frac{1}{L}$, for each value of L in (b)(i).

Record the value of $\frac{1}{L}$.

Hitung nilai $\frac{1}{L}$, *bagi setiap nilai* L *di* (b)(i).

Rekod nilai $\frac{1}{L}$.

[2 *marks*]

(c) Tabulate your results for all values of L, $\frac{1}{L}$ and I in the space below.

Jadualkan keputusan anda bagi semua nilai L, $\frac{1}{L}$ dan I dalam ruang di bawah.

[2 *marks*]

(d) On the graph paper in page 7, plot a graph of I against $\frac{1}{L}$.

Pada kertas graf di halaman 7, lukiskan graf I melawan $\frac{1}{L}$.

[5 *marks*]

(e) Based on your graph, state the relationship between I and $\frac{1}{L}$.

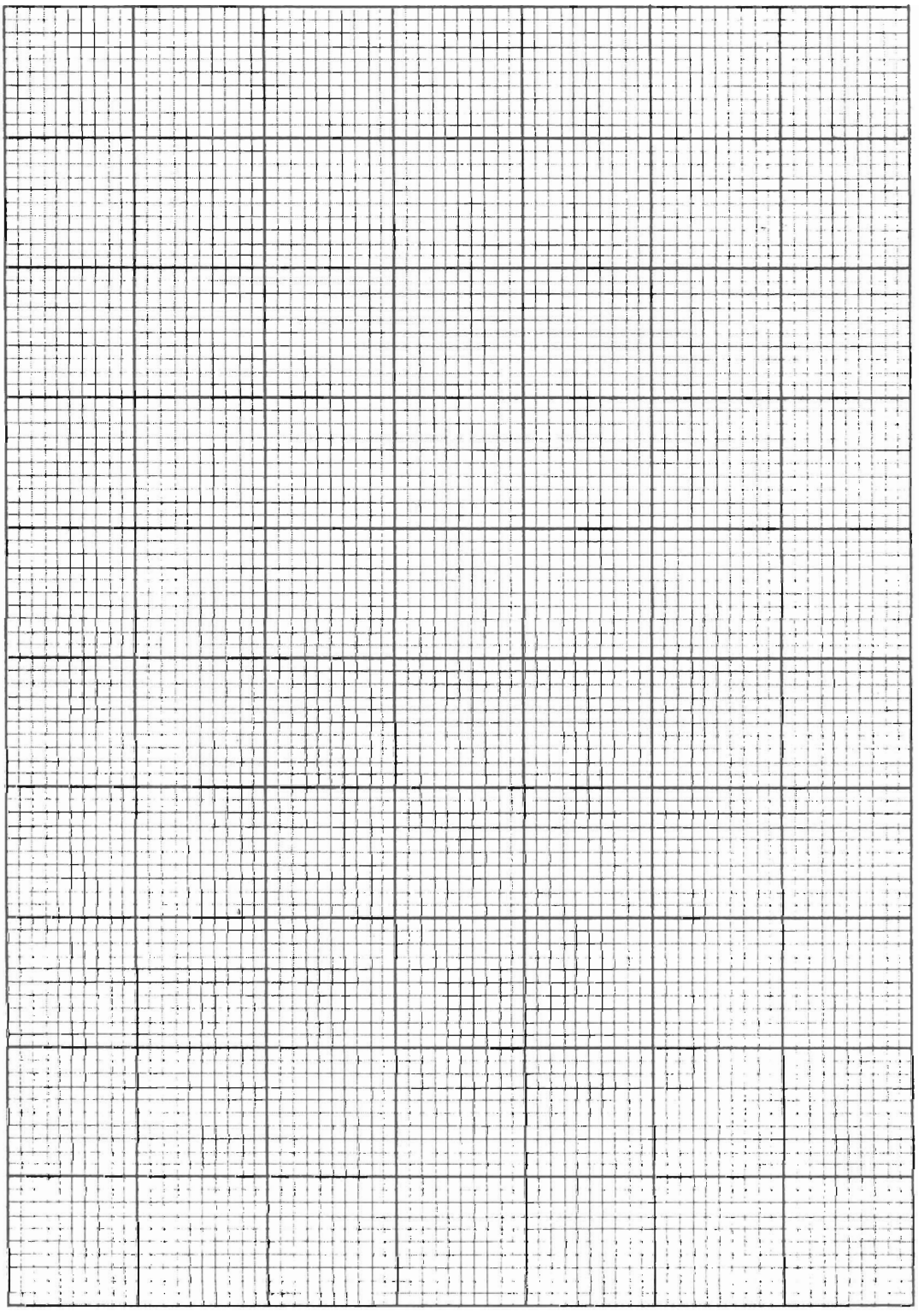
Berdasarkan graf anda, nyatakan hubungan antara I dan $\frac{1}{L}$.

.....

[1 *mark*]

Graph of I against $\frac{1}{L}$

Graf I against $\frac{1}{L}$



2 A student carries out an experiment to investigate the relationship between the period of oscillation, T, and the mass of the load, m, of a spring.
The results of the experiment are shown in the graph of T^2 against m in Diagram 2.

Seorang murid menjalankan eksperimen untuk menyiasat hubungan antara tempoh ayunan, T, dengan jisim beban, m, bagi sebuah spring.
Keputusan eksperimen ini ditunjukkan oleh graf T^2 melawan m dalam Rajah 2.

Graph of T^2 against m
Graf T^2 melawan m

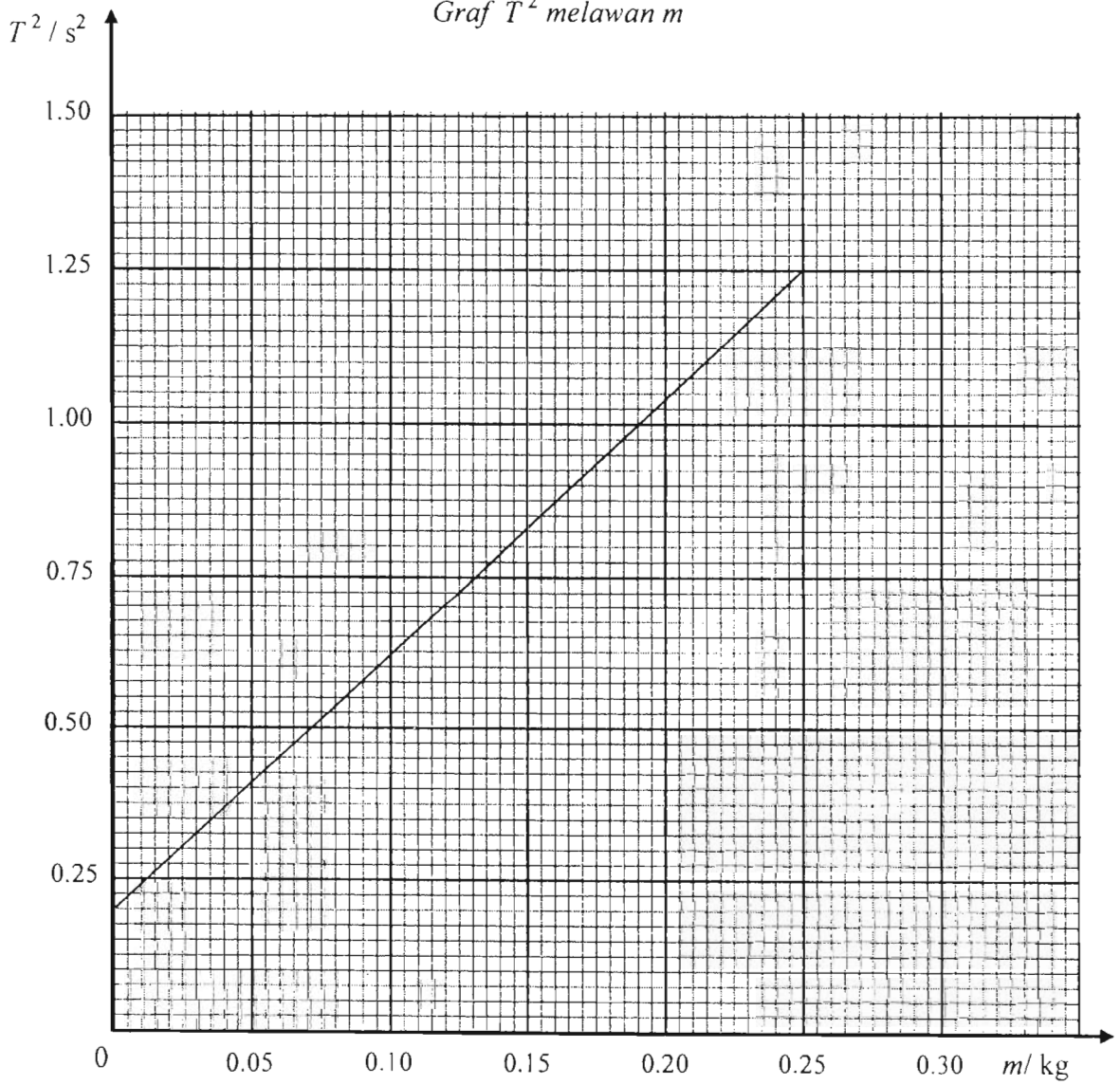


Diagram 2 / *Rajah* 2

(a) Based on the graph in Diagram 2:
Berdasarkan graf pada Rajah 2:

(i) State the relationship between T^2 and m.
Nyatakan hubungan antara T^2 dengan m.

.....

[1 *mark*]

(ii) Determine the value T when m = 0.30 kg.
Show on the graph, how you determine the value of T.
Tentukan nilai T apabila m = 0.30 kg.
Tunjukkan pada graf itu bagaimana anda menentukan nilai T.

T = ... s

[3 *marks*]

(iii) Calculate the gradient, h, of the graph.
Show on the graph how you calculate h.
Hitungkan kecerunan graf, h, bagi graf itu.
Tunjukkan pada graf itu bagaimana anda menghitung h.

h = ... $s^2\ kg^{-1}$

[3 *marks*]

(b) The spring constant, k, is given by the formula $k = \frac{4\pi}{h}$, where h is the gradient of the graph and π = 3.14.
Calculate the value of k.
Pemalar spring, k, diberi oleh formula $k = \frac{4\pi}{h}$, *dengan keadaan h ialah kecerunan graf dan* π = 3.14.
Hitung nilai k.

k = ...

[2 *marks*]

(c) The relationship between energy stored in the spring, E, and the spring constant, k, is $E = \frac{1}{2}kx^2$, where x is the extension of the spring.
Using the answer in 2(b), calculate the energy stored in the spring when $x = 0.10$ m.

Hubungan antara tenaga yang tersimpan di dalam spring, E, dengan pemalar spring, k, ialah $E = \frac{1}{2}kx^2$, *dengan keadaan x ialah pemanjangan spring.*
Menggunakan jawapan di 2(b), *hitung tenaga yang tersimpan di dalam spring itu apabila* $x = 0.10$ m.

E = ...

[2 *marks*]

(d) State **one** precaution that should be taken to improve the accuracy of the result of this experiment.
Nyatakan ***satu*** *langkah berjaga-jaga yang perlu diambil untuk meningkatkan kejituan bacaan dalam eksperimen ini.*

.....

.....

[1 *mark*]

Section B
Bahagian B

[12 *marks*]

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

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

3 Diagram 3.1 shows a student using a convex lens to form a sharp image of a lamp at the ceiling.
Diagram 3.2 shows the student using another convex lens to form a sharp image of the lamp.
Rajah 3.1 *menunjukkan seorang pelajar menggunakan sebuah kanta cembung untuk membentuk satu imej tajam bagi lampu di siling.*
Rajah 3.2 *menunjukkan pelajar itu menggunakan sebuah kanta cembung yang lain untuk membentuk satu imej tajam bagi lampu itu.*

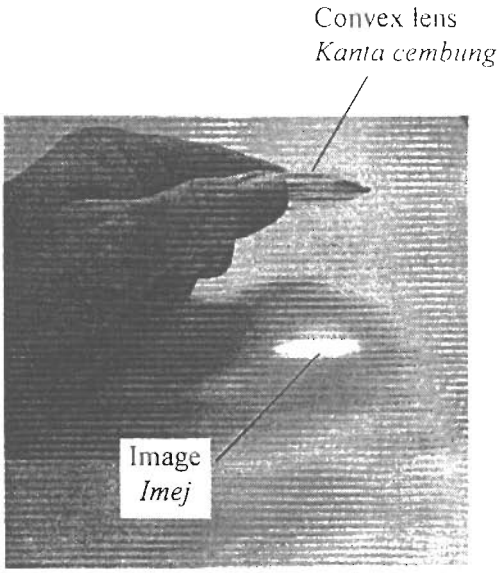


Diagram 3.1 / *Rajah* 3.1

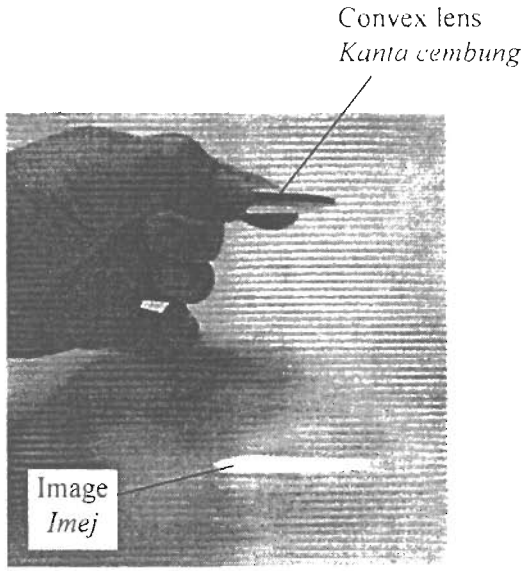


Diagram 3.2 / *Rajah* 3.2

Observe the thickness of the lens and the distance from the lens to the image in both situations.
Perhatikan ketebalan kanta-kanta itu dan jarak dari kanta ke imej bagi kedua-dua situasi.

Based on the observation:
Berdasarkan pemerhatian tersebut:

(a) State **one** suitable inference.
Nyatakan ***satu*** *inferens yang sesuai.*

[1 *mark*]

(b) State **one** hypothesis that could be investigated.
Nyatakan ***satu*** *hipotesis yang boleh disiasat.*

[1 *mark*]

(c) With the use of apparatus such as convex lenses, a screen and other apparatus, describe an experiment to investigate the hypothesis stated in 3(b).
Dengan menggunakan radas seperti kanta-kanta cembung, skrin dan radas-radas lain, terangkan satu eksperimen untuk menyiasat hipotesis yang dinyatakan di 3(b).

In your description, state clearly the following:
Dalam penerangan anda, jelaskan 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 in the experiment.
Describe how to control the manipulated variable and how to measure the responding variable.
Prosedur yang digunakan dalam eksperimen.
Terangkan bagaimana mengawal pembolehubah dimanipulasikan dan bagaimana mengukur 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*]

4 Diagram 4.1 shows a boy standing beside the road and a motorcycle moving towards the boy from a far distance.
Diagram 4.2 shows that the boy has to close his ears when the motorcycle has come nearer to him.

Rajah 4.1 *menunjukkan seorang budak berdiri di tepi jalan dan sebuah motorsikal sedang bergerak mendekati budak itu dari jarak yang jauh.*
Rajah 4.2 *menunjukkan budak itu terpaksa menutup telinganya apabila motorsikal itu berada lebih dekat dengannya.*

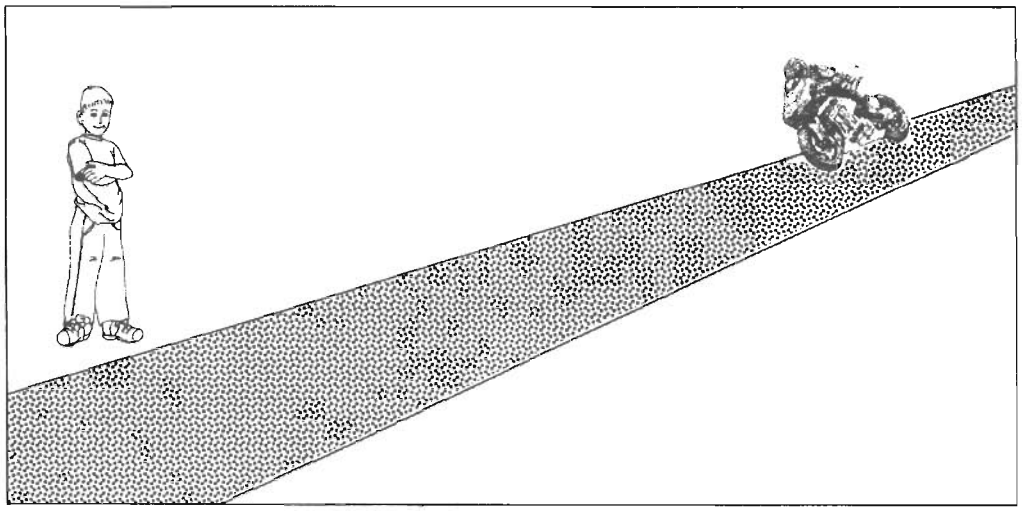


Diagram 4.1 / *Rajah* 4.1

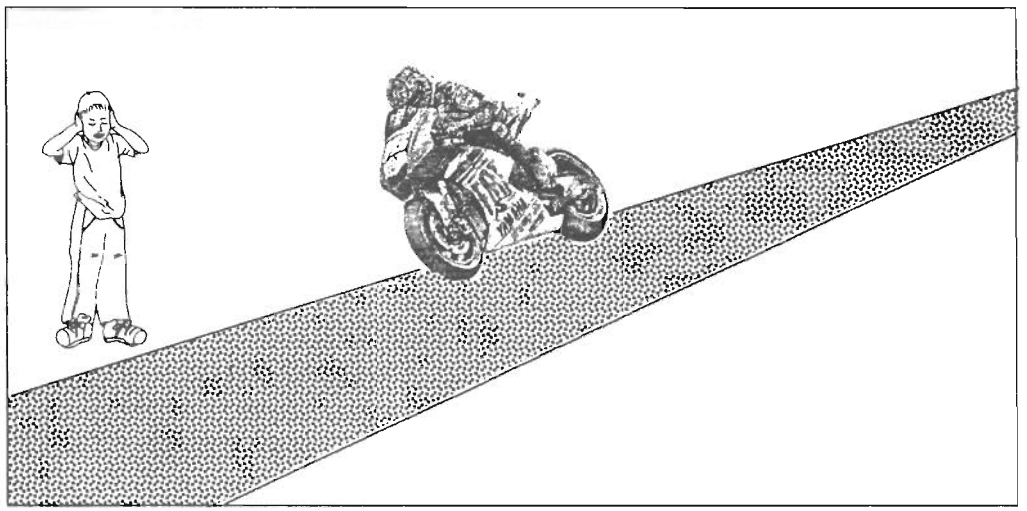


Diagram 4.2 / *Rajah* 4.2

Based on the information and observation:
Berdasarkan maklumat dan pemerhatian tersebut:

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

(b) State **one** hypothesis that could be investigated.
*Nyatakan **satu** hipotesis yang boleh disiasat.* [1 *mark*]

(c) With the use of apparatus shown in Diagram 4.3 and other apparatus, describe an experiment to investigate the hypothesis stated in 4(b).

Dengan menggunakan radas seperti yang ditunjukkan dalam Rajah 4.3 *dan radas-radas lain, terangkan satu eksperimen untuk menyiasat hipotesis yang dinyatakan di* 4(b).

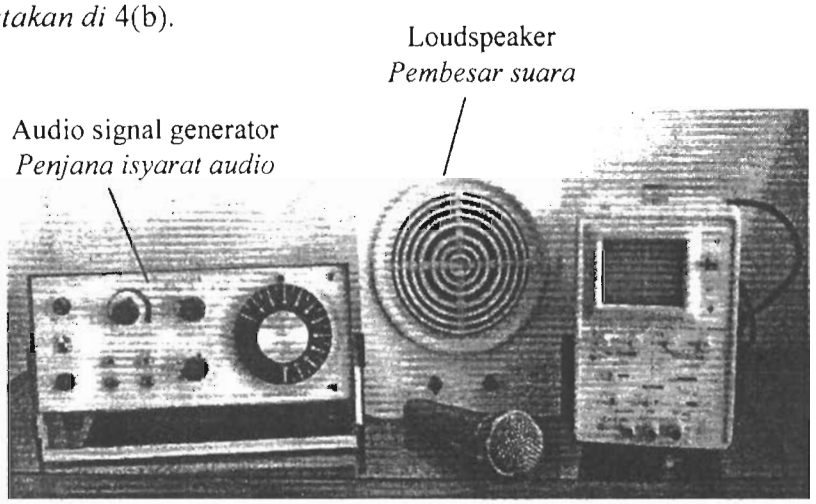


Diagram 4.3 / *Rajah* 4.3

In your description, state clearly the following:
Dalam penerangan anda, jelaskan 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 in the experiment.
Describe how to control the manipulated variable and how to measure the responding variable.
Prosedur yang digunakan dalam eksperimen.
Terangkan bagaimana mengawal pembolehubah dimanipulasikan dan bagaimana mengukur 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*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA
SEKOLAH MENENGAH
NEGERI KEDAH DARUL AMAN

PEPERIKSAAN PERCUBAAN SPM 2010

PHYSICS

PERATURAN PEMARKAHAN

PEPERIKSAAN PERCUBAAN SPM 2010
KEDAH DARUL AMAN

PERATURAN PEMARKAHAN

PHYSICS

PAPER		MARKS
Paper 1		50
Paper 2		100
Paper 3		40
	Total	**190**

Jumlah markah diskalakan kepada 100%

Paper 1

1	B
2	D
3	A
4	C
5	D
6	C
7	D
8	D
9	A
10	A
11	A
12	C
13	B
14	A
15	A
16	C
17	D
18	D
19	B
20	A
21	D
22	D
23	D
24	C
25	B

26	B
27	C
28	C
29	C
30	B
31	B
32	A
33	A
34	B
35	A
36	C
37	B
38	B
39	A
40	C
41	B
42	D
43	D
44	C
45	A
46	D
47	C
48	B
49	C
50	B

Paper 2

SECTION A

NO.	MARKING CRITERIA	MARK	
		SUB	TOTAL
1(a)	**Underline the word correctly** - transverse	1	
(b) (i)	**Complete the rays diagram correctly** - any two rays to show the convergence of light rays	1	
(ii)	**Marks the wavelength correctly** - distance between two dark lines	1	
(c)	**Name the instrument correctly** - stroboscope	1	**4**
2(a)	**Name the mirror correctly** - convex mirror	1	
(b)	**State the focal length correctly** - f = 10 cm	1	
(c)	**Ray diagram draw correctly** - ray parallel to the principal axis is reflected and pass through the principal focus	1	
	Marks the image correctly - intersection of the ray with the given ray	1	
(d)	**State one characteristic of the image correctly** - virtual / smaller (diminished) / upright	1	**5**
3(a)	**State the type of current correctly** - a.c. / alternating current	1	
(b)	**State the meaning correctly** - time taken between two consecutive dots	1	
(c)	**Draw the tape chart correctly** - 1st strip: 2 cm - 2nd strip: 6 cm - 3rd strip: 9 cm - 4th strip: 11 cm - 5th strip: 12 cm All five strips correctly drawn : 2 marks Any three or four strips correctly drawn: 1 mark	2	
(d)	**Describe the motion correctly** - Motion with decreasing acceleration : 2 marks Motion with acceleration : 1 mark	2	**6**

NO.	MARKING CRITERIA	MARK	
		SUB	TOTAL
4(a)	**Name the transistor correctly** - npn transistor	1	
(b)	**Underline the word correctly** - heat	1	
(c)	**Correct substitution** - $1 = \frac{1}{1 + R_T} \times 6$	1	
	Correct answer and correct unit - $R_T = 5\ \text{k}\Omega$	1	
(d)	**State the change in V_b correctly** - increases	1	
	State the explanation correctly - Resistance of the thermistor decreases / p.d. across thermistor decreases	1	
(e)	**State the use of transistor correctly** - as a current amplifier	1	**7**
5(a)	**State the explanation correctly** - α ray can penetrate through the mica window	1	
(b) (i)	**State the similarity correctly** - ratemeter reading decreases with distance	1	
(ii)	**Compare the distance traveled by the radiation correctly** - The distance travelled by the radiation from source B is further	1	
(iii)	**Compare the ratemeter reading correctly** - The final ratemeter reading for source A and B is the same	1	
(c)	**Name the radiation correctly** - background radiation	1	
(d)	**Name the type of radiation correctly** - α ray / α particle	1	
	State the explanation correctly - range of α ray in air is about 8 cm	1	
(e)	**State any one precaution correctly** - robotic arm / mechanical tongs operated by remote-control equipment / protective clothing / any acceptable answers	1	**8**

NO.	MARKING CRITERIA	MARK	
		SUB	TOTAL
6(a)	**State the meaning correctly** - force per unit area	1	
(b) (i)	**Compare the depth of the holes correctly** - $h_2 > h_1$ / h_2 is more	1	
(ii)	**Compare the horizontal distance correctly** - $x_2 > x_1$ / x_2 is more	1	
(iii)	**State the relationship correctly** - The bigger the pressure at the hole, the further the horizontal distance	1	
(iv)	**State the relationship correctly** - If the depth of water increases, then the pressure of water will increase // pressure is directly proportional to the depth	1	
(c)	**Give two other factors correctly** - density of liquid - gravitational field strengh, g	2	
(d)	**Give the explanation correctly** - pressure increases with depth / - pressure pressing on the body of the diver is high	1	**8**
7(a)	**State the meaning correctly** - degree of hotness	1	
(b) (i)	**State the reason correctly** - heat is used to break the bonds between molecule	1	
(ii)	**Correct formula or substitution** - $E = Pt$ // $E = 1000 \times 5 \times 60$	1	
	Correct answer and correct unit - 3×10^5 J // 3×10^5 W s	1	
(iii)	**State the mass of water changes to steam** - 50 g	1	
	State the substitution correctly - $0.05 \times l = 3 \times 10^5$	1	
	Correct answer with correct unit - $l = 6 \times 10^6$ J kg^{-1}	1	
(c) (i)	**State the explanation correctly** - heat loss to the surroundings	1	
(ii)	**Two suggestions correctly** - insulate the beaker - Electric heater must be completely immersed in water	2	**10**

NO.	MARKING CRITERIA	MARK	
		SUB	TOTAL
8(a)	**State the phenomenon correctly** - Electromagnetic induction	1	
(b)	**State the terminals correctly** - W and Z - X and Z	1	
(c) (i)	**State the terminals correctly** - W and Z	1	
(ii)	**Give the reason correctly** - Highest ratio of number of turns of secondary coil to number of turns of primary coil // highest $\frac{N_S}{N_P}$	2	
(d) (i)	**Complete the values of P_{in} correctly** - A : 60 W B : 60 W C : 72 W D : 72 W All values of P_{in} calculated correctly	1	
	Complete the values of *e* correctly - A : 0.80 B : 0.90 C : 0.80 D : 0.90 All values of *e* calculated correctly, 2 marks 2 or 3 calculated correctly, 1 mark	2	
(ii)	**Give the choice correctly** - A and B (accept e.c.f.)	1	
(iii)	**Give the choice correctly** - B and D (accept e.c.f.)	1	
(iv)	**Give the reason correctly** - Highest efficiency	1	
(v)	**Give the choose of the most suitable bulb correctly** - Transformer B	1	**12**

SECTION B

NO	MARKING CRITERIA	MARK SUB	MARK TOTAL
9(a) (i)	**State the meaning correctly** - Energy due to height	1	1
(ii)	**Compare the initial position correctly** - Initial position of the student in Diagram 9.1 is higher	1	
	Compare the speed correctly - The speed of the student on reaching the final position in Diagram 9.1 is higher	1	
	Relate the speed with energy correctly - The higher the speed of the student, the higher the energy	1	
	Relate the position with energy gained correctly - The higher the position , the higher the energy gained	1	4
(iii)	**Name the physics principle correctly** - Principle of Conservation of Energy	1	1
(b) (i)	**State the changes in energy from P to O correctly** - elastic potential energy to kinetic energy and gravitational potential energy	1	
	State the changes in energy from O to Q correctly - elastic potential energy and kinetic energy to gravitational potential energy	1	
(ii)	**Give the process correctly** - due to damping	1	
	Give the explanation correctly - work done against air resistance // - loss of energy due to the extension and compression of the molecules in the system	1	4
(c)	**State aspect of strength of the cord correctly** - strong // high strength	1	
	State reason for aspect of strength of the cord correctly - it won't break easily	1	
	State aspect of force constant of the bow correctly - high force constant	1	
	State reason for aspect of force constant of the bow correctly - store higher elastic potential energy	1	
	State aspect of material for the bow correctly - strong // high strength // any suitable material	1	
	State reason for material for the bow correctly - it won't break easily	1	
	State aspect of the design of the arrow correctly - thin // aerodynamic // streamline	1	
	State reason for aspect of the arrow correctly - less air resistance	1	
	State aspect of way the arrow is aimed correctly - slightly above the target	1	
	State reason for way the arrow is aimed correctly - the path is parabolic / curved/downward // due to free fall motion	1	10
			20

NO	MARKING CRITERIA	MARK	
		SUB	TOTAL
10(a) (i)	**State the reason correctly** - To ensure constant velocity of water wave / ripple.	1	1
(ii)	**Name the water wave phenomenon correctly** - Interference	1	1
(iii)	**State the amplitude of wave correctly** - Zero or minimum	1	1
(iv)	**Diagram showing superposition of a crest and a trough**	1	
	Diagram showing the resultant amplitude - zero // minimum // smaller than the original amplitude	1	2
(b) (i)	**Compare the distance between vibrators correctly** - The distance in Diagram 10.1 is higher	1	
(ii)	**Compare the distance between the adjacent nodal line correctly** - The distance in Diagram 10.1 is smaller	1	
(iii)	**Compare the wavelength correctly** - Same	1	
(iv)	**State the relationship between *a* and *x* correctly** - The higher the *a*, the smaller the *x* // *a* inversely proportional to *x* // $a \propto \frac{1}{x}$ **Reject Equation** $\lambda = \frac{ax}{D}$	1	5
(c) (i)	**Suggest the number of loudspeakers correctly** - Increase the number of loudspeakers // use more loudspeakers	1	
	Give the reason correctly - To produce louder sound // Sound transmitted covers a bigger area	1	
(ii)	**Suggest position of the loudspeaker correctly** - Placed at all corners // different locations	1	
	Give the reason correctly - Cover a bigger area // the spectators around the area can hear clearly	1	
(iii)	**Suggest the amplification correctly** - High amplification	1	
	Give the reason correctly - to produce louder sound // sound can travel further	1	6
(d)	**Give the choice of *D* correctly** - Large/big	1	
	Give the reason correctly - Less diffraction // spreading // sound travels straight	1	
	Give the choice of *L* correctly - Large/big	1	
	Give the reason correctly - Vibrates more air // produces louder sound	1	4
			20

SECTION C

NO	MARKING CRITERIA	MARK SUB	MARK TOTAL
11(a)	**State the meaning correctly** - angle of incidence when the angle of refraction is 90^o	1	1
(b) (i)	**Write the equation correctly** - $n = \frac{1}{\sin c}$	1	
(ii)	**Determine the critical angle for glass correctly // Compare the refractive index correctly** - 41.8^o // refractive index for glass is smaller	1	
	Determine the critical angle for diamond correctly // Compare the critical angle correctly - 24.6^o // critical angle for diamond is smaller	1	
	Relate the critical angle and occurrence of total internal reflection correctly - The smaller the critical angle, the easier total internal reflection can occur	1	4
(c) (i)	**Give the correct value of *i* and *r* in the substitution** $\boldsymbol{n} = \frac{\sin 42^o}{\sin 30^o}$	1+1	
	Correct answer without unit n = 1.34	1	
(ii)	**Correct substitution** $1.34 = \frac{1}{\text{apparent depth}}$, accept e.c.f. (c)(i)	1	
	State the answer with unit correctly 0.75 m	1	5
(d)	**State the choice and reason of refractive index correctly** 1 high refractive index 2 total internal reflection easier to occur // smaller critical angle	1+1	
	State the choice and reason of thickness correctly 3 thick 4 keep cool / cut off more light	1+1	
	State the choice and reason of thermal conductivity correctly 5 low 6 cut off more heat // reduce transmission of heat	1 + 1	
	State the choice and reason of angle θ correctly 7 small 8 critical angle can be easily exceeded // total internal reflection easier to occur	1 + 1	
	State most suitable design and justification correctly 9 Q 10 High refractive index, thick, low thermal conductivity and small angle θ	1+1	10
			20

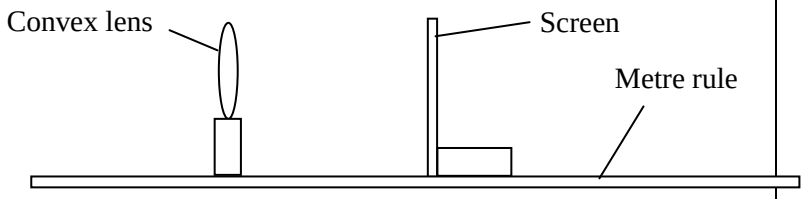
NO.	MARKING CRITERIA	MARK	
		SUB	TOTAL
12(a)	**State the two properties and explanations correctly**		
	- High melting point	1	
	- Can withstand high temperature / heat // does not melt easily	1	
	- Not easily oxidized	1	
	- Can last longer	1	4
(b) (i)	**State the meaning correctly**	1	
	- Maximum current flowing through the fuse is 0.5 A		
(ii)	**State the suitable melting point and reason correctly**	1+1	
	1 Low melting point		
	2 Can melt easily		
	State the suitable specific heat capacity and reason correctly	1+1	
	3 Low specific heat capacity		
	4 Can heat up easily		
	State the suitable diameter and reason correctly	1+1	
	5 Small		
	6 High resistance // more heat released // easy to break		
	State the suitable resistivity and reason correctly	1+1	
	7 High		
	8 High resistance // more heat released		
	State most suitable choice of generator and justification correctly	1+1	10
	9 Z		
	10 Low melting point, low specific heat capacity, small diameter and high resistivity		
(c) (i)	**Correct substitution**	1	
	- $\frac{500}{240}$		
	Correct answer and unit	1	
	- 2.08 A		
(ii)	**State correctly**	1	
	- Not suitable		
(iii)	**Correct substitution**	1	
	- 500 x (10x60)		
	Correct answer with unit	1	5
	- 300 000 J		
			20

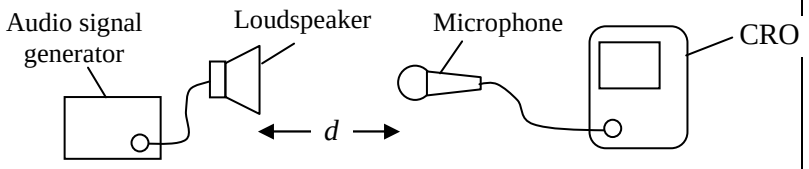
Paper 3
SECTION A

<table>
<tr><th colspan="2">NO</th><th>MARKING CRITERIA</th><th>MARK
SUB</th><th>MARK
TOTAL</th></tr>
<tr><td>1(a)</td><td>(i)</td><td>Able to state the manipulated variable
- Length / L</td><td>1</td><td>1</td></tr>
<tr><td></td><td>(ii)</td><td>Able to state the responding variable
- Current / I</td><td>1</td><td>1</td></tr>
<tr><td></td><td>(iii)</td><td>Able to state a constant variable
- Cross sectional area / A // material of wire// temperature</td><td>1</td><td>1</td></tr>
<tr><td>(b)</td><td>(i)</td><td>Able to state the value of I
All 5 readings of I correct: 1.8, 1.2, 0.9, 0.7, 0.6
3 or 4 correct
Consistency to 1 or 2 decimal places</td><td>2
1
1</td><td>3</td></tr>
<tr><td></td><td>(ii)</td><td>Able to calculate the value of 1/L
4 or 5 correct: 5.00, 3.33, 2.50, 2.00, 1.67
Consistency in 1, 2, 3 or 4 decimal places</td><td>1
1</td><td>2</td></tr>
<tr><td>(c)</td><td></td><td>Able to tabulate L, 1/L and I
Tick (✓) based on the following aspects:
A • Quantities L, 1/L and I shown in heading
B • Units m,m^{-1} and A shown in heading
<table><tr><th>L / m</th><th>1/L / m^{-1}</th><th>I / A</th></tr><tr><td>0.20</td><td>5.00</td><td>1.8</td></tr><tr><td>0.30</td><td>3.33</td><td>1.2</td></tr><tr><td>0.40</td><td>2.50</td><td>0.9</td></tr><tr><td>0.50</td><td>2.00</td><td>0.7</td></tr><tr><td>0.60</td><td>1.67</td><td>0.6</td></tr></table></td><td>✓
✓</td><td>2</td></tr>
<tr><td>(d)</td><td></td><td>Able to draw a complete graph of I against 1/L
Tick ✓ based on the following aspects:
A • Show I on Y-axis and 1/L on the X-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 : 3 to 4 points plotted correctly : ✓]
E • Best straight line is drawn
F • Show the minimum size of graph at least 5 x 4 (2 cm x 2 cm) square
(counted from the origin until furthest point)
<u>Score</u> :
<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>✓
✓
✓
✓✓
✓
✓
5</td><td>5</td></tr>
<tr><td>(e)</td><td></td><td>Able to state the correct relationship between I and 1/L
I is directly proportional to 1/L // I α 1/L</td><td>1</td><td>1</td></tr>
<tr><td colspan="4"></td><td>16</td></tr>
</table>

NO	MARKING CRITERIA	MARK	
		SUB	TOTAL
2(a) (i)	**Able to state the relationship between T^2 and m** T^2 increases linearly with m // T^2 increases, m increases	1	1
(ii)	**Able to show the method to read value of T** - Draw the extrapolation line and show the vertical line corresponding to m = 0.30 kg - State the value of T^2 (within range 1.45 – 1.50) - Determine the value of T (within range 1.20 – 1.22)	1 1 1	3
(iii)	**Able to calculate the gradient of the graph, T^2 against m** - Draw a sufficiently large triangle / 3 x 3 - Correct substitution (Follow candidate's triangle) Sample answer : $\frac{1.25-0.20}{0.25}$ // corresponding values Answer without unit 4.2 (within range 4.1 to 4.3)	1 1 1	3
(b)	**Able to calculate the value of k and state the value correctly** - Correct substitution $\frac{4\times3.14}{4.2}$ - Accept error carried forward (e.c.f.) (a)(iii) - Answer with correct unit 2.99 kg s^{-2} (within range 2.92 – 3.06)	1 1	2
(c)	**Able to calculate the value of energy, E and state the value correctly** - Correct substitution $E=\frac{1}{2}\times2.99\times0.1^2$ - Accept e.c.f. (b) - Answer with correct unit 0.015 J	1 1	2
(d)	**Able to state one correct precaution** Sample answers - Do not exceed the elastic limit of the spring - Position of the eyes must be aligned with the scale on the stopwatch - Repeat the experiment and take the average reading	1	1
			12

SECTION B

NO	MARKING CRITERIA	MARK SUB	MARK TOTAL
3 (a)	**Able to state a suitable inference** Sample answers The thickness of the lens affects the distance from the lens to the table / focal length	1	1
(b)	**Able to state a relevant hypothesis** Sample answer The greater the thickness of the lens, the smaller the distance from the lens to the screen / focal length	1	1
(c)	**Able to describe a complete and suitable experimental framework** Sample answer		
(i)	State the aim of experiment To investigate the relationship between the thickness of the lens and the distance from the lens to the screen / focal length	1	
(ii)	State the manipulated variable and the responding variable Manipulated variable : Thickness of the lens Responding variable : distance from the lens to the screen / focal length / *f* (Note: Constant variable can be ignored)	1 1	
(iii)	State the complete list of apparatus and materials Convex lenses, screen, metre rule, lens holder	1	
(iv)	State a functionable arrangement of the apparatus  	1	
(v)	State the method to control the manipulated variable A convex lens with thickness 0.4 cm is placed in front of a screen	1	
	State the method to measure the responding variable The screen is adjusted until a sharp image of a distant object is obtained and the distance between the lens and the screen is measured.	1	
	Repeat the experiment at least four times The previous steps are repeated using convex lenses of thickness 0.6 cm, 0.8 cm, 1.0 cm and 1.2 cm	1	
(vi)	State how the data is tabulated Thickness / cm | Focal length / cm 0.4 | 0.6 | 0.8 | 1.0 | 1.2 |	1	
(vii)	State how the data is analysed Plot a graph of focal length against thickness of the lens.	1	10
			12

NO	MARKING CRITERIA	MARK SUB	MARK TOTAL
4 (a)	**Able to state a suitable inference** Sample answer The loudness of the sound depends on the distance (between the source and the observer)	1	1
(b)	**Able to state a relevant hypothesis** Sample answer The smaller the distance (between the source and the observer), the louder the sound	1	1
(c)	**Able to describe a complete and suitable experimental framework** Sample answer		
(i)	State the aim of experiment To investigate the relationship between the loudness of a sound and the distance (between the source and the observer)	1	
(ii)	State the manipulated variable and the responding variable Manipulated variable : distance, *d* Responding variable : loudness of sound (amplitude, *a*) (Note: Constant variable can be ignored)	1 1	
(iii)	State the complete list of apparatus and materials Audio signal generator, loudspeaker, cathode ray oscilloscope (CRO), microphone, meter rule / measuring tape	1	
(iv)	State a functionable arrangement of the apparatus  	1	
(v)	State the method of controlling the manipulated variable The microphone is placed at a distance, *d* = 20.0 cm from the loudspeaker	1	
	State the method of measuring the responding variable The amplitude, *a*, of the trace on the screen of the is measured.	1	
	Repeat the experiment at least four times The procedure was repeated for the values of distance, *d* = 30.0 cm, 40.0 cm, 50.0 cm and 60.0 cm	1	
(vii)	Tabulate the data Distance, *d* / cm: 20.0, 30.0, 40.0, 50.0, 60.0 Amplitude, *a*:	1	
(vii)	State how data is analysed A graph of *a* against *d* is drawn	1	10
			12

END OF MARK SCHEME