Set A

MODUL PENINGKATAN PRESTASI AKADEMIK SPM

TAHUN 2013

FIZIK

Kertas 1

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.

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. Power, $P = \frac{\text{energy}}{\text{time}}$

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

10. Density / *Ketumpatan*, $\rho = \frac{m}{V}$

11. Pressure / *Tekanan*, $p = h\rho g$

12. Pressure / *Tekanan*, $p = \frac{F}{A}$

13. Heat / *Haba*, $Q = mc\theta$

14. Heat / *Haba*, $Q = ml$

15. $\frac{pV}{T}$ = constant / *pemalar*

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

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

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

18. Magnifying power /

    Kuasa pembesaran = $\frac{f_O}{f_E}$

19. $v = f\lambda$

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

21. $Q = It$

22. $E = VQ$

23. $V = IR$

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

    Power / *Kuasa*, $P = I^2R$

    Power / *Kuasa*, $P = \frac{V^2}{R}$

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

26. Efficiency /

    Kecekapan = $\frac{I_S V_S}{I_P V_P} \times 100\ \%$

27. $E = mc^2$

28. g = 10 m s^{-2}

29. c = 3.0 × 10^8 m s^{-1}

1 Which quantity is **not** derived from mass?

*Kuantiti yang manakah **tidak** diterbitkan daripada jisim*?

A momentum / *momentum*
B acceleration / *pecutan*
C force / *daya*
D work done / *kerja yang dilakukan*

2 Diagram 1 shows an object being measured with a micrometer screw gauge.

Rajah 1 *menunjukkan satu objek sedang diukur dengan tolok skru mikrometer.*

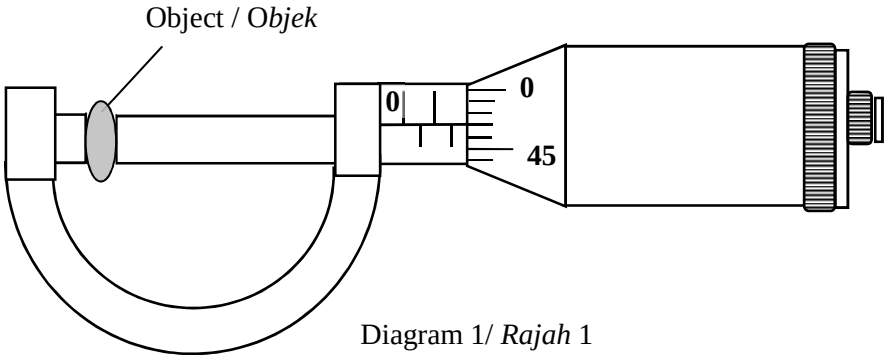


Diagram 1/ *Rajah* 1

What is the thickness of the object?

Berapakah ketebalan objek itu?

A 1.03 mm
B 1.47 mm
C 1.97 mm
D 1.547 mm

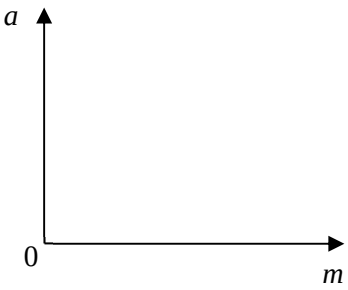
3 A student carries out an experiment to determine how *m* affects *a* where the constant variable is *F*.

Seorang pelajar menjalankan suatu eksperimen untuk mengkaji bagaimana m mempengaruhi a dengan pembolehubah dimalarkan F.

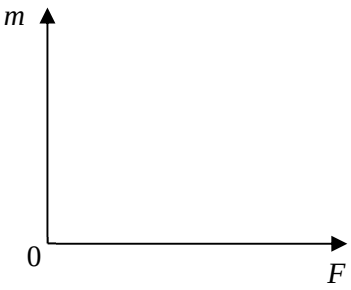
Which is the graph that should be drawn?

Graf yang manakah patut dilukis?

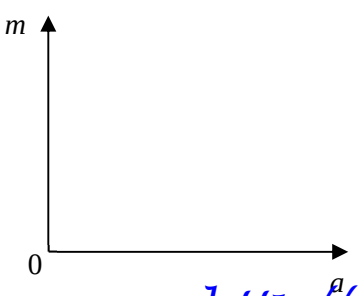
A



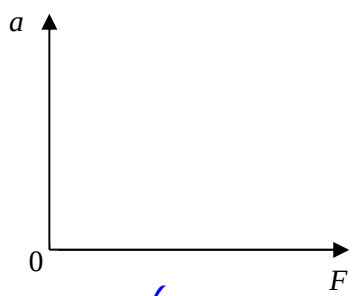
B



C



D



4 Diagram 2 shows a tape chart for the motion of an object. Each strip consists of 10 ticks.

Rajah 2 *menunjukkan satu carta pita bagi gerakan suatu objek. Setiap jalur mengandungi* 10 *detik.*

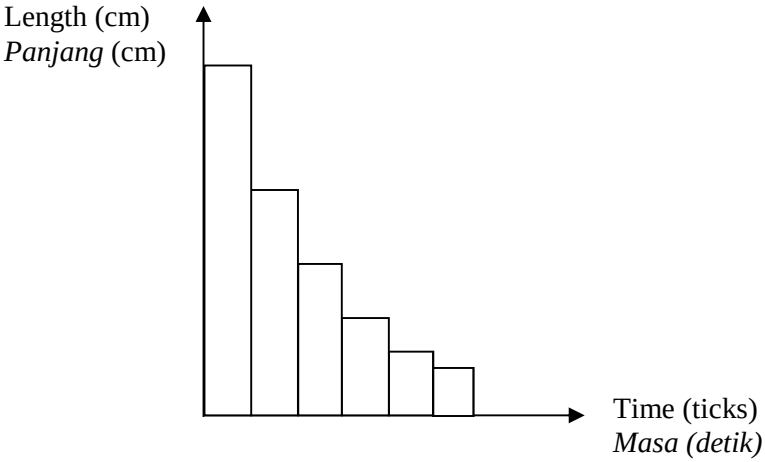


Diagram 2 / *Rajah* 2

What is the motion of the object?

Apakah gerakan objek itu?

A Decreasing acceleration / *Pecutan yang berkurang*
B Increasing acceleration / *Pecutan yang bertambah*
C Decreasing deceleration / *Nyahpecutan yang berkurang*
D Increasing deceleration / *Nyahpecutan yang bertambah*

5 Diagram 3 shows a graph of velocity against time for a moving object.

Rajah 3 *menunjukkan graf halaju melawan masa bagi suatu objek bergerak.*

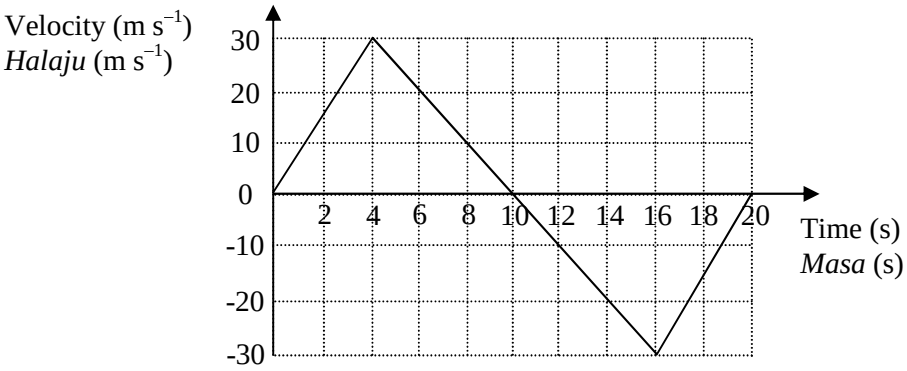


Diagram 3 / *Rajah* 3

What is the distance travelled and displacement of the object after 20 s?

Berapakah jarak yang dilalui dan sesaran objek itu selepas 20 s?

	Distance ***Jarak***	**Displacement** ***Sesaran***
A	150 m	300 m
B	150 m	0
C	300 m	0
D	300 m	300 m

6 Diagram 4 shows two trolleys P and Q in contact with each other. The plunger in trolley P is released by knocking its release knob.

Rajah 4 *menunjukkan dua buah troli* P *dan* Q *bersentuhan dengan satu sama lain. Pelocok dalam* P *dilepaskan dengan memukul tombol pelepasnya.*

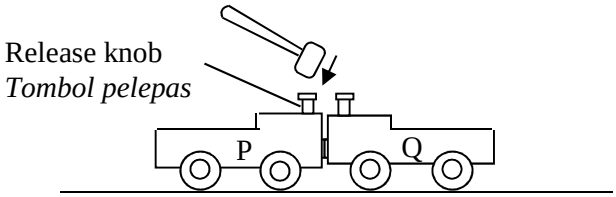


Diagram 4 / *Rajah* 4

What is the direction of motion of trolley P and trolley Q after the plunger in P is released?

Apakah arah gerakan troli P *dan troli* Q *selepas pelocok dalam* P *dilepaskan*?

	Trolley P / *Troli* P	**Trolley Q / *Troli* Q**
A	←	→
B	←	←
C	→	→
D	→	←

7 Diagram 5 shows the forces acting on four different objects P, Q, R and S.

Rajah 5 *menunjukkan daya-daya yang bertindak ke atas empat objek yang berlainan* P, Q, R *dan* S.

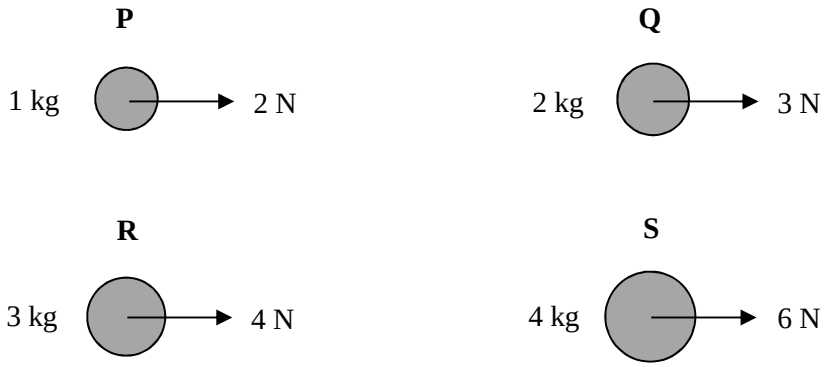


Diagram 5 / *Rajah* 5

Which objects move with the same acceleration?

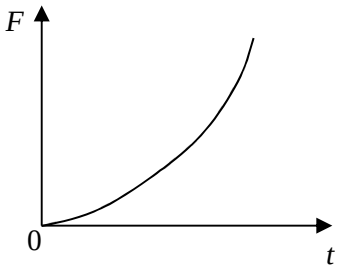
Objek-objek yang manakah bergerak dengan pecutan yang sama?

A P and Q / P *dan* Q
B P and R / P *dan* R
C Q and S / Q *dan* S
D R and S / R *dan* S

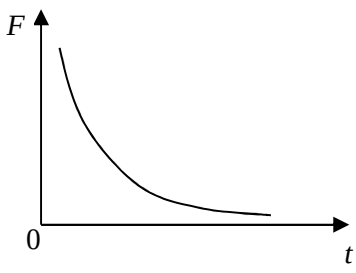
8 Which graph shows the relationship between the force, *F*, and time of impact, *t*, when a moving object is stopped by a collision?

Graf yang manakah menunjukkan hubungan antara daya, F, dan masa hentaman, t, apabila suatu objek dihentikan oleh suatu perlanggaran?

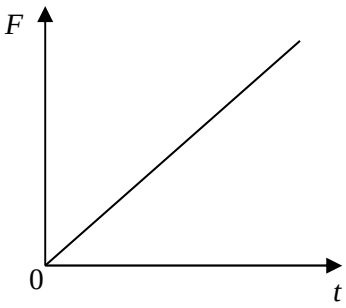
A



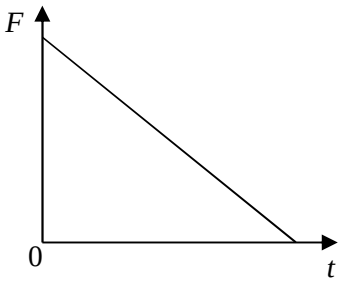
B



C



D



9 Diagram 6 shows two metal balls of different mass being dropped simultaneously from a tower to the ground. One ball is released from a height of 20 m and the other ball from a height of 10 m from the ground.

Rajah 6 *menunjukkan dua biji bebola logam dengan jisim yang berlainan dilepaskan serentak dari sebuah menara. Sebiji bebola dilepaskan dari ketinggian* 20 m *manakala sebiji bebola lagi dari ketinggian* 10 m *dari tanah.*

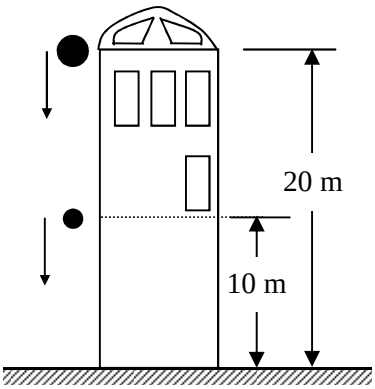


Diagram 6 / *Rajah* 6

Which physical quantity is the same for both metal balls?

Kuantiti fizik yang manakah sama bagi kedua-dua biji bebola logam?

A Weight / *Berat*
B Falling time / *Masa jatuh*
C Acceleration / *Pecutan*
D Final velocity / *Halaju akhir*

10 Diagram 7 shows the forces acting on a ladder leaning against the smooth wall of a building.

Rajah 7 menunjukkan daya-daya yang bertindak pada sebuah tangga yang bersandar pada dinding yang licin di sebuah bangunan.

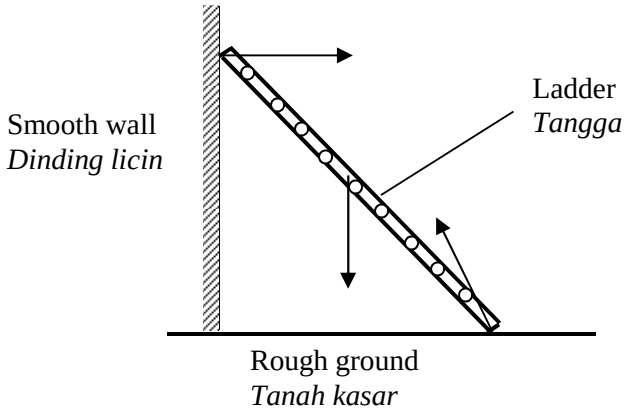
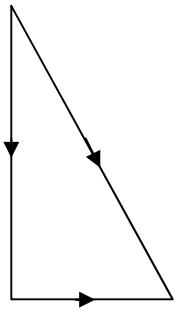


Diagram 7 / *Rajah* 7

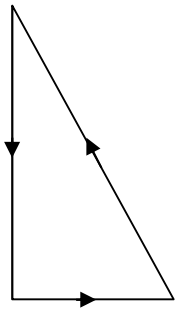
Which of the following vector diagrams represents the forces acting on the ladder?

Antara rajah vektor yang berikut, yang manakah mewakili daya-daya yang bertindak pada tangga itu?

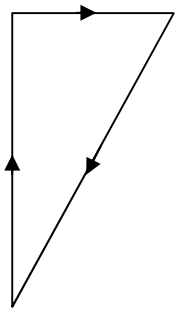
A



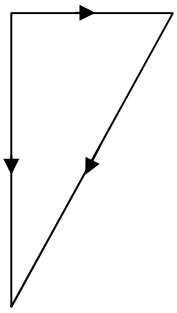
B



C



D



11 Diagram 8.1 and Diagram 8.2 show the positions of a pin when a spring is loaded with two different masses.

Rajah 8.1 *dan Rajah* 8.2 *menunjukkan kedudukan sebatang pin apabila seutas spring dibebankan dengan jisim yang berlainan.*

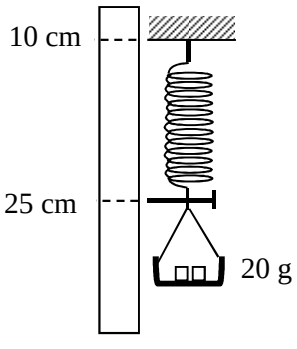


Diagram 8.1 / *Rajah* 8.1

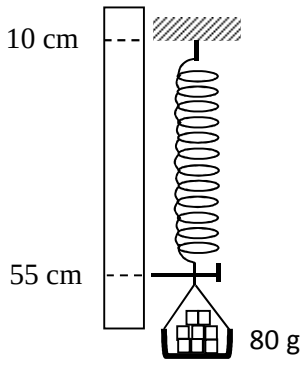


Diagram 8.2 / *Rajah* 8.2

What is the scale reading shown by the pin when a mass of 20 g is unloaded in Diagram 8.2?

Apakah bacaan skala yang ditunjukkan oleh pin itu apabila jisim 20 g *dikeluarkan dalam Rajah* 8.2?

A 30 cm **B** 35 cm **C** 40 cm **D** 45 cm

12 Pressure is

Tekanan ialah

A the force acting on any surface area.

daya yang bertindak pada sebarang luas permukaan.

B the force acting on 1 m^2 of an area.

daya yang bertindak pada 1 m^2 *suatu permukaan.*

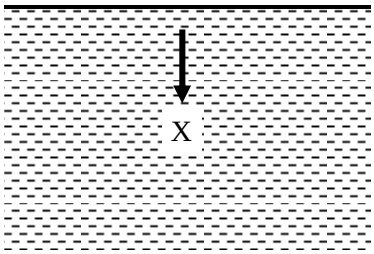
C the product of the force and the area it acts on.

hasil darab daya dengan luas permukaan yang daya itu bertindak.

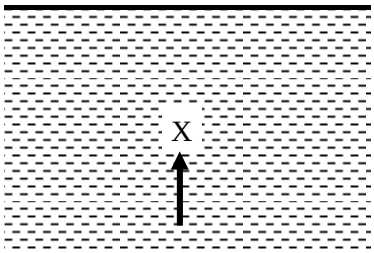
13 Which diagram shows the correct direction of the pressure that acts on the point X in a liquid?

Rajah manakah menunjukkan dengan betul arah tekanan yang bertindak pada satu titik X *dalam suatu cecair*?

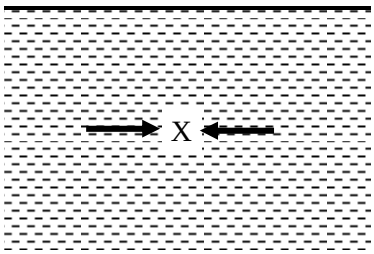
A



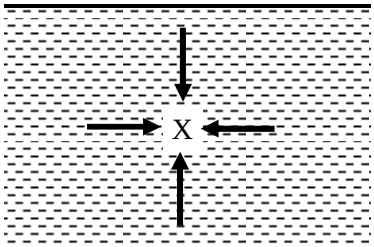
B



C



D



14 Diagram 9 shows identical blocks of wood floating in three different liquids X, Y and Z.

Rajah 9 *menunjukkan bongkah-bongkah kayu yang serupa terapung dalam tiga cecair yang berlainan* X, Y *dan* Z.

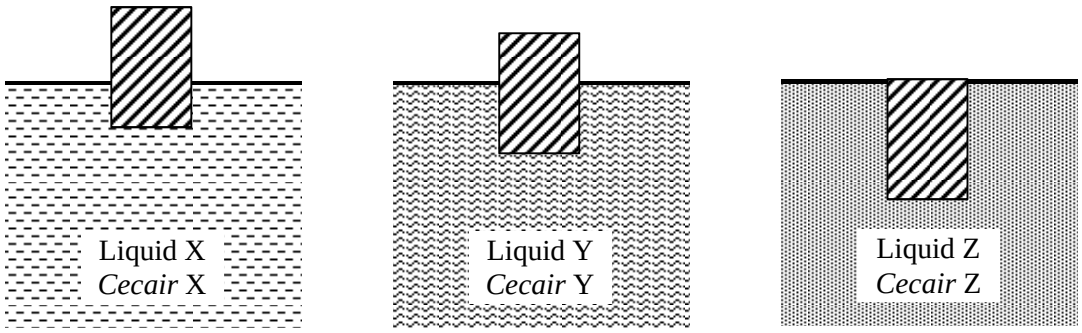


Diagram 9 / *Rajah* 9

Which statement about the upthrust is true?

Pernyataan manakah berkenaan dengan daya julangan adalah benar?

A Upthrust in Z = 0

Daya julangan dalam Z = *0*

B Upthrust in X > Upthrust in Y > Upthrust in Z

Daya julangan dalam X > *Daya julangan dalam* Y > *Daya julangan dalam* Z

C Upthrust in Z > Upthrust in Y > Upthrust in X

Daya julangan dalam Z > *Daya julangan dalam* Y > *Daya julangan dalam* X

D Upthrust in X = Upthrust in Y = Upthrust in Z

Daya julangan dalam X = *Daya julangan dalam* Y = *Daya julangan dalam* Z

15 A mercury barometer shows a reading of 74 cm Hg. What is the atmospheric pressure?

Suatu barometer merkuri menunjukkan bacaan 74 cm Hg. *Berapakah tekanan atmosfera*?
[Density of mercury / *Ketumpatan merkuri* = 13 600 kg m^{-3}]

A 7.4 Pa
B 1.01×10^4 Pa
C 1.01×10^5 Pa
D 1.01×10^7 Pa

16 Diagram 10 shows a simple hydraulic jack.

Rajah 10 *menunjukkan satu jek hidraulik ringkas.*

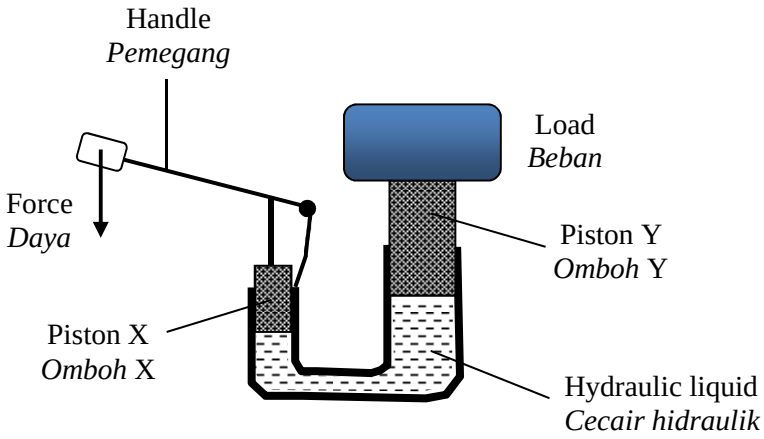


Diagram 10 / *Rajah* 10

The jack can lift a heavier load using the same force by

Jek tersebut dapat mengangkat beban yang lebih berat dengan menggunakan daya yang sama dengan

A shortening the length of the handle.

memendekkan panjang pemegang.

B increasing the vertical length of piston X.

menambahkan panjang menegak omboh X.

C increasing the cross-sectional area of piston Y.

menambahkan luas keratan rentas omboh Y.

D using a hydraulic liquid of higher density.

menggunakan cecair hidraulik yang berketumpatan lebih tinggi.

17 Diagram 11 shows a balloon tied to the ground using a piece of string. The weight of the balloon is 0.9 N.
Rajah 11 *menunjukkan sebuah belon diikat pada tanah menggunakan seutas benang. Berat belon itu ialah* 0.9 N.

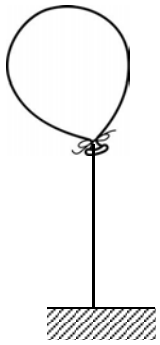


Diagram 11 / *Rajah* 11

If the tension in the string is 0.3 N, what is the upthrust that acts on the balloon?
Jika tegangan dalam benang itu ialah 0.3 N, *berapakah daya julangan ke atas belon itu*?

A 0.3 N
B 0.6 N
C 0.9 N
D 1.2 N

18 Which of the following **does not** use Bernoulli's principle?
Antara yang berikut, yang manakah ***tidak*** *menggunakan prinsip Bernoulli*?

A

B

C

D

19 Diagram 12 below shows two metal cylinders X and Y in thermal equilibrium.

Rajah 12 *menunjukkan dua silinder logam* X *dan* Y *berada dalam keseimbangan terma.*

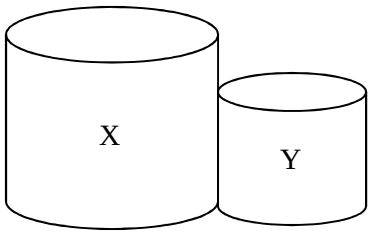


Diagram 12 / *Rajah* 12

Which statement is correct about the temperature of X and Y?

Pernyataan manakah yang betul tentang suhu X *dan* Y?

A Temperature of X = temperature of Y / *Suhu* X = *suhu* Y
B Temperature of X > temperature of Y / *Suhu* X > *suhu* Y
C Temperature of X < temperature of Y / *Suhu* X < *suhu* Y

20 Diagram 13 shows the heating curve for a 0.5 kg liquid heated by a 100 W immersion heater.

Rajah 13 *menunjukkan lengkung pemanasan bagi* 0.5 kg *cecair yang dipanaskan oleh pemanas rendam* 100 W.

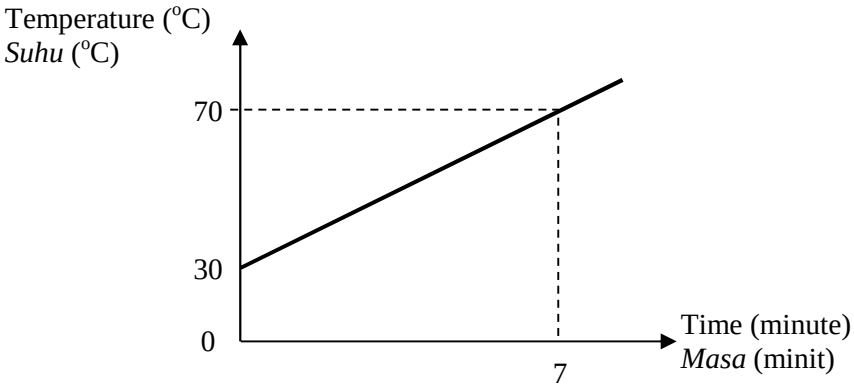


Diagram 13 / *Rajah* 13

What is the specific heat capacity of the liquid?

Berapakah muatan haba tentu cecair itu?

A 280 J kg^{-1} $°C^{-1}$
B 1400 J kg^{-1} $°C^{-1}$
C 2100 J kg^{-1} $°C^{-1}$
D 4200 J kg^{-1} $°C^{-1}$

21 Which process changes the state of matter from gas to liquid?

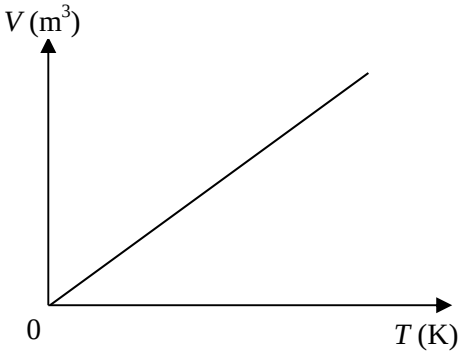
Proses yang manakah mengubah keadaan jirim daripada gas kepada cecair?

A Cooling / *Penyejukan*
B Boiling / *Pendidihan*
C Freezing / *Pembekuan*
D Condensation / *Kondensasi*

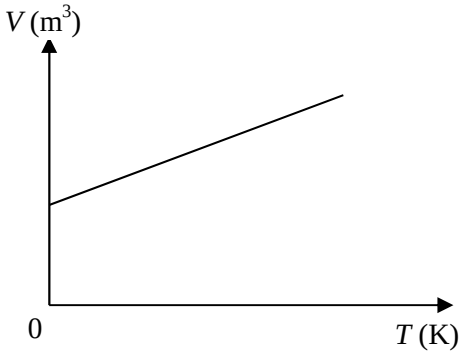
22 Which graph shows the correct relationship between volume, *V*, and temperature, *T*, of a gas if the mass and the pressure are constant?

Graf yang manakah menunjukkan hubungan yang betul antara isipadu, V, dan suhu, T, bagi suatu gas yang jisim dan tekanannya malar?

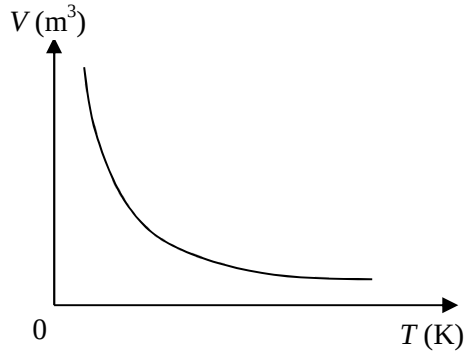
A



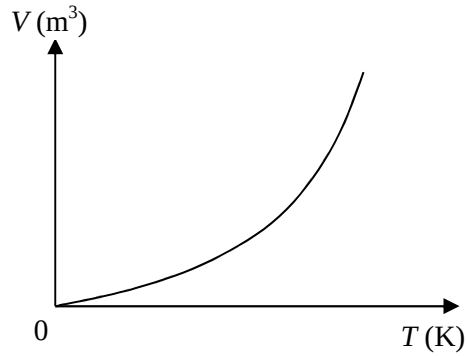
B



C



D



23 A fixed mass of a gas at constant volume has a pressure P at 25 °C. The pressure of the gas will increase to 2P if the temperature becomes

Suatu gas berjisim tetap pada isipadu malar mempunyai tekanan P *pada* 25 °C. *Tekanan gas itu akan meningkat ke* 2P *jika suhunya adalah*

A 12.5 °C
B 50.0 °C
C 116.5 °C
D 323.0 °C

24 Diagram 14 shows a man standing at a distance of 4 m in front of a plane mirror.

Rajah 14 *menunjukkan seorang lelaki berdiri pada jarak* 4 m *di hadapan sebuah cermin satah.*

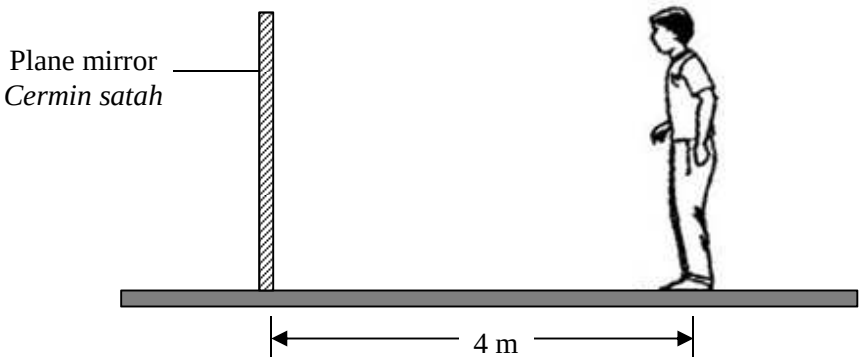


Diagram 14 / *Rajah* 14

If the man steps backward 2 m from his initial position, what are the characteristics of the image formed by the mirror?

Jika lelaki itu berundur 2 m *ke belakang dari kedudukan asalnya, apakah ciri-ciri imej yang terbentuk oleh cermin itu*?

A Real and diminished / *Nyata dan dikecilkan*
B Real and same size / *Nyata dan sama saiz*
C Virtual and diminished / *Maya dan dikecilkan*
D Virtual and same size / *Maya dan sama saiz*

25 Diagram 15 shows a light ray passing through three different media, K, L and M.

Rajah 15 *menunjukkan satu sinar cahaya merambat melalui tiga medium yang berlainan,* K, L *dan* M.

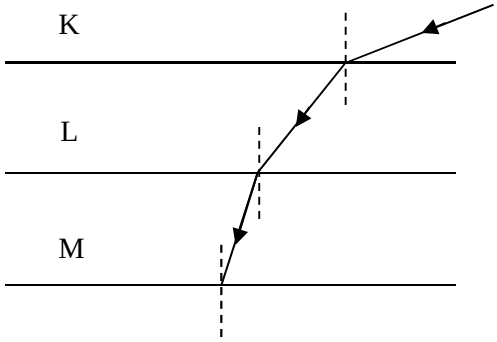


Diagram 15 / *Rajah* 15

Which of the following shows the correct comparison of the refractive indices n_K, n_L, and n_M of the three media?

Antara yang berikut, yang manakah menunjukkan perbandingan yang betul bagi indeks biasan, n_K, n_L, *dan* n_M *bagi tiga medium itu*?

A $n_L > n_K > n_M$

B $n_M > n_L > n_K$

C $n_L > n_M > n_K$

D $n_M < n_K < n_L$

26 Diagram 16 shows a light ray travelling from glass to air. The critical angle of glass is 44^o.

Rajah 16 *menunjukkan satu sinar cahaya bergerak dari kaca menuju ke udara. Sudut genting kaca ialah* 44^o.

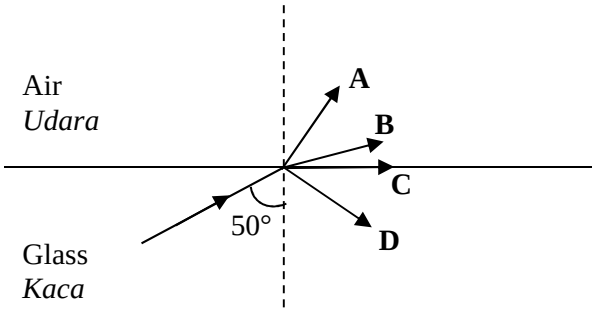


Diagram 16 / *Rajah* 16

Which of the following paths, **A**, **B**, **C** or **D**, shows the correct path of the light ray?

Antara lintasan **A**, **B**, **C**, *dan* **D**, *yang manakah menunjukkan lintasan sinar cahaya yang betul*?

27 Diagram 17 shows an object in front of a concave lens.

Rajah 17 *menunjukkan satu objek di hadapan sebuah kanta cekung.*

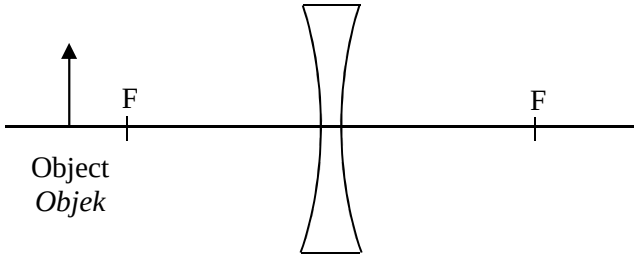


Diagram 17 / *Rajah* 17

What are the characteristics of the image formed by the concave lens?

Apakah ciri-ciri imej yang dibentuk oleh kanta cekung itu?

P : Real / *Nyata* Q : Diminished / *Dikecilkan* R : Upright / *Tegak*

A P and Q / P *dan* Q
B P and R / P *dan* R
C Q and R / Q *dan* R
D P, Q and R / P, Q *dan* R

28 The power of a convex lens can be increased by

Kuasa kanta cembung boleh ditambah dengan

A increasing the thickness of the lens. / *menambah ketebalan kanta itu.*
B decreasing the thickness of the lens. / *mengurangkan ketebalan kanta itu.*
C increasing the diameter of the lens. / *menambah diameter kanta itu.*
D decreasing the diameter of the lens. / *mengurangkan diameter kanta itu.*

29 Diagram 18 shows a tuning fork being struck to produce sound waves.

Rajah 18 *menunjukkan sebuah tala bunyi diketuk untuk menghasilkan gelombang bunyi.*

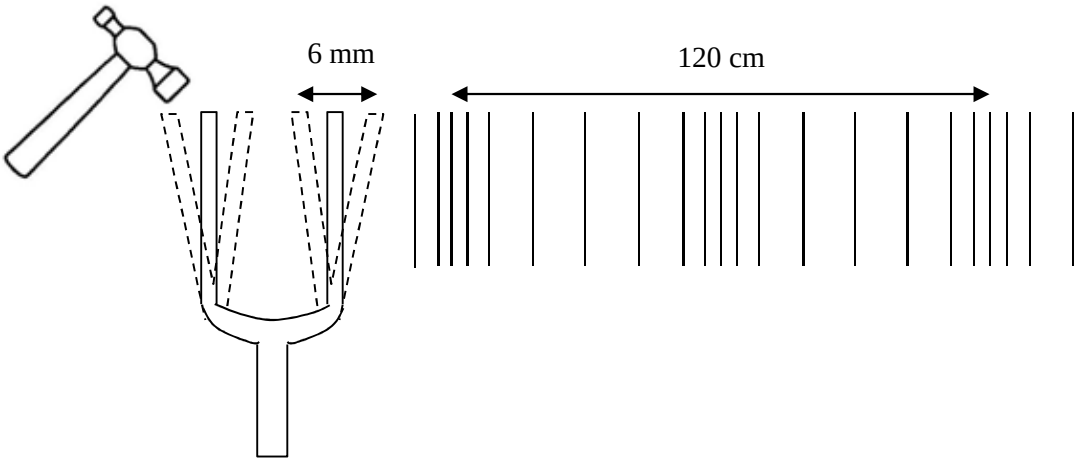


Diagram 18 / *Rajah* 18

What is the amplitude and wavelength of the sound wave?

Berapakah amplitud dan panjang gelombang bunyi itu?

	Amplitude (mm) *Amplitud* (mm)	Wavelength (cm) *Panjang gelombang* (cm)
A	3	60
B	3	120
C	6	60
D	6	120

30 When an external force causes a system to oscillate at its natural frequency, the system oscillates at the maximum amplitude. This occurrence is known as

Apabila satu daya luar menyebabkan satu sistem berayun pada frekuensi aslinya, sistem itu berayun pada amplitud maksimum. Kejadian ini dikenali sebagai

A damping / *pelembapan*
B resonance / *resonans*
C modulation / *modulasi*
D rectification / *rektifikasi*

31 Diagram 19 shows an incident wave and the refracted wave over a piece of Perspex.

Rajah 19 *menunjukkan gelombang tuju dan gelombang biasan melalui sekeping Perspeks.*

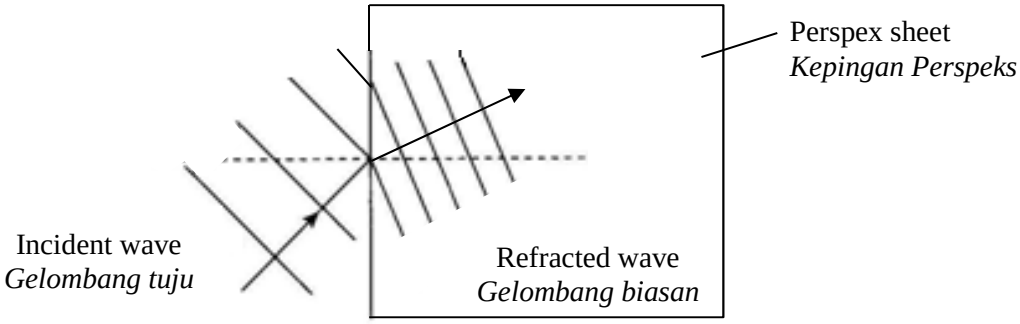


Diagram 19 / *Rajah* 19

What happens to the frequency of the wave when it moves over the Perspex sheet?

Apakah yang berlaku pada frekuensi gelombang itu apabila ia bergerak melalui kepingan Perspeks?

A Increases / *Bertambah*
B Unchanged / *Tidak berubah*
C Decreases / *Berkurang*

32 Diagram 20 shows water waves passing through a gap.

Rajah 20 *menunjukkan gelombang air yang melalui satu celah.*

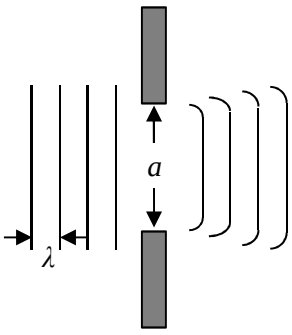


Diagram 20 / *Rajah* 20

What change should be made to produce circular diffracted waves?

Apakah perubahan yang harus dibuat untuk menghasilkan gelombang belauan membulat?

A The distance, *a*, should be decreased
Jarak, a, harus dikecilkan

B The wavelength, λ, should be decreased
Panjang gelombang, λ*, harus dikecilkan*

C The amplitude of the wave should be increased
Amplitud gelombang harus dibesarkan

D The frequency of the wave should be increased
Frekuensi gelombang harus dibesarkan

33 Diagram 21 shows the interference patterns for three monochromatic light sources X, Y and Z.

Rajah 21 *menunjukkan corak interferens bagi tiga sumber cahaya monokromatik* X, Y *dan* Z.

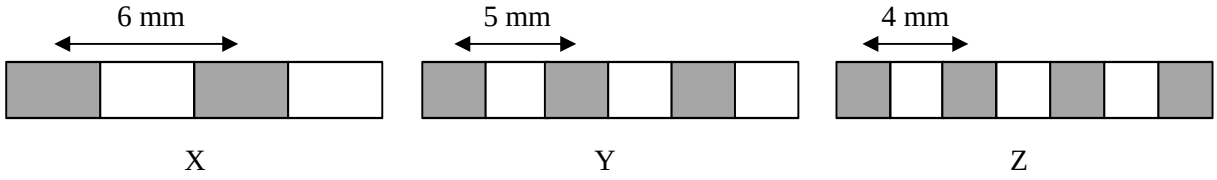


Diagram 21 / *Rajah* 21

What are the colours of the monochromatic light sources X, Y and Z?

Apakah warna bagi sumber cahaya monokromatik X, Y *dan* Z?

	X	**Y**	**Z**
A	Blue *Biru*	Yellow *Kuning*	Red *Merah*
B	Yellow *Kuning*	Blue *Biru*	Red *Merah*
C	Red *Merah*	Yellow *Kuning*	Blue *Biru*
D	Blue *Biru*	Red *Merah*	Yellow *Kuning*

34 Which electromagnetic wave is usually used to detect counterfeit notes?

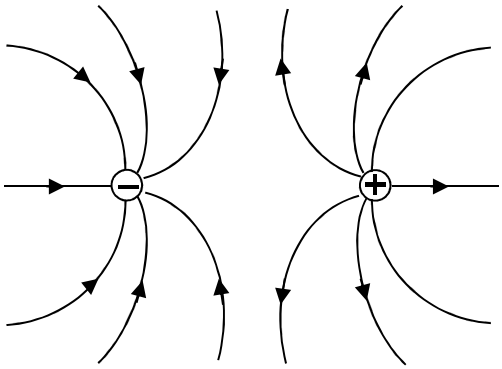
Gelombang elektromagnet yang manakah biasanya digunakan untuk mengesan wang palsu?

A Radio waves / *Gelombang radio*
B Microwaves / *Gelombang mikro*
C Gamma rays / *Sinar gamma*
D Ultraviolet rays / *Sinar ultra ungu*

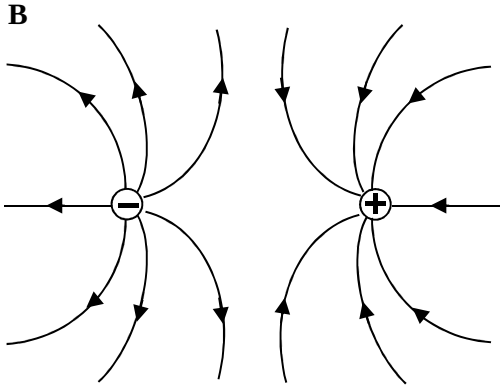
35 Which diagram shows the correct electric field?

Rajah manakah yang menunjukkan medan elekrik yang betul?

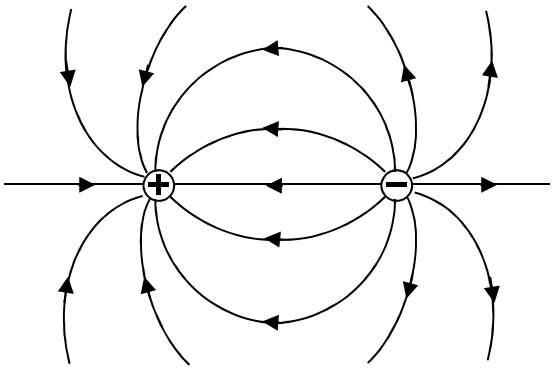
A



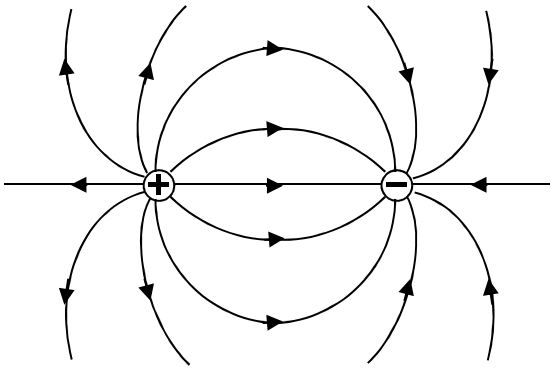
B



C



D



36 Diagram 22 shows two electrical circuits.

Rajah 22 *menunjukkan dua litar elektrik.*

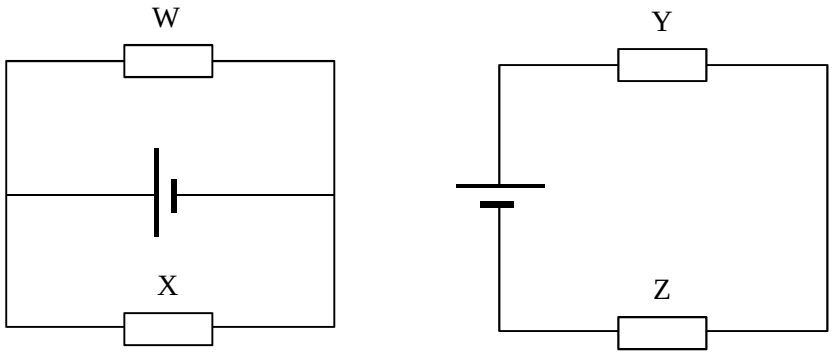


Diagram 22 / *Rajah* 22

What is the type of connection for resistors W and X, and resistors Y and Z?

Apakah jenis sambungan bagi perintang W *dan* X, *dan perintang* Y *dan* Z?

	W and X / W *dan* X			**Y and Z / Y *dan* Z**		
A	Series	/	*Siri*	Series	/	*Siri*
B	Series	/	*Siri*	Parallel	/	*Selari*
C	Parallel	/	*Selari*	Series	/	*Siri*
D	Parallel	/	*Selari*	Parallel	/	*Selari*

37 Diagram 23 shows a circuit containing a dry cell and resistor R. The dry cell has internal resistance, *r*, and electromotive force (e.m.f.) 1.5 V.

Rajah 23 *menunjukkan satu litar yang mengandungi sel kering dan perintang* R. *Sel kering itu mempunyai rintangan dalam, r, dan daya gerak elektrik (d.g.e.)* 1.5 V.

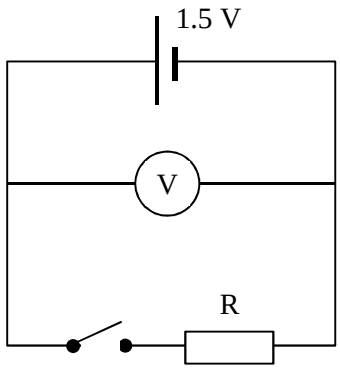


Diagram 23 / *Rajah* 23

What is the voltmeter reading before and after the switch is on?

Berapakah bacaan voltmeter sebelum dan selepas suis dihidupkan?

	Before switch is on ***Sebelum suis dihidupkan***	**After switch is on** ***Selepas suis dihidupkan***
A	1.5 V	1.5 V
B	1.5 V	Less than 1.5 V / *Lebih kecil daripada* 1.5 V
C	0	1.5 V
D	0	Less than 1.5 V / *Lebih kecil daripada* 1.5 V

38 A current of 0.3 A flows through a light bulb connected to a 2.5 V supply for 60 s.
What is the electrical energy used up by the light bulb?

Arus 0.3 A *mengalir melalui mentol yang disambung ke bekalan* 2.5 V *selama* 60 s.
Berapakah tenaga elektrik yang digunakan oleh mentol itu?

A 13.5 J **B** 45.0 J **C** 112.5 J **D** 500.0 J

39 Diagram 24 shows an electrical circuit to investigate the magnetic field produced by a current.

Rajah 24 *menunjukkan suatu litar elektrik untuk menyiasat medan magnet yang dihasilkan oleh arus elektrik.*

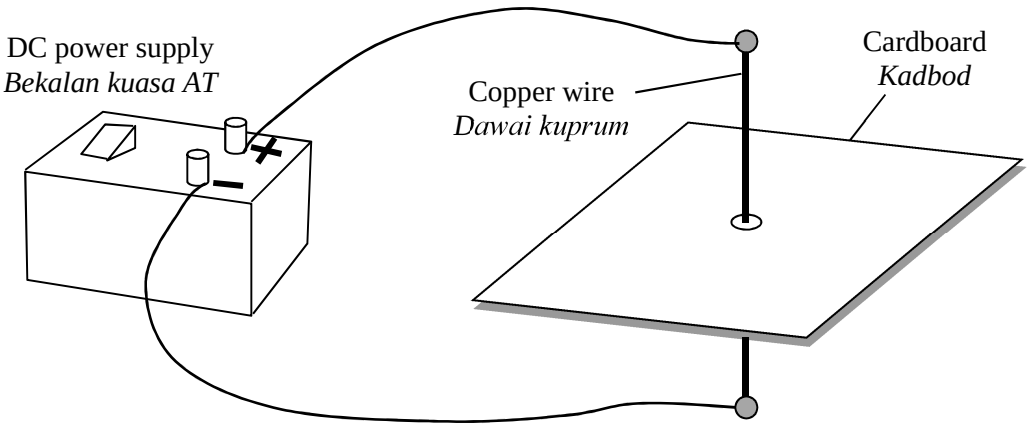
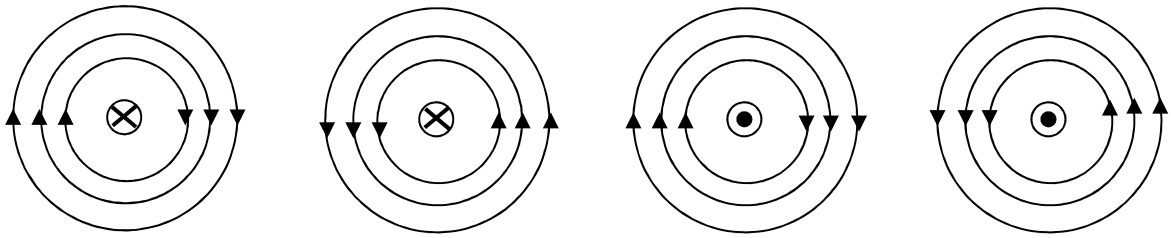


Diagram 24 / *Rajah* 24

What is the pattern of the magnetic field when iron filings are sprinkled on the cardboard?

Apakah corak medan magnet apabila serbuk besi ditaburkan di atas kadbod?

A **B** **C** **D**



40 Diagram 25 shows a current carrying conductor placed between two permanent magnets. In which direction, **A, B, C** or **D** will the conductor move when the current flows into the paper?

Rajah 25 *menunjukkan suatu konduktor yang mengalirkan arus elektrik diletakkan di antara dua magnet kekal. Pada arah manakah,* **A, B, C,** *atau* **D** *konduktor itu akan bergerak apabila arus mengalir masuk ke dalam kertas*?

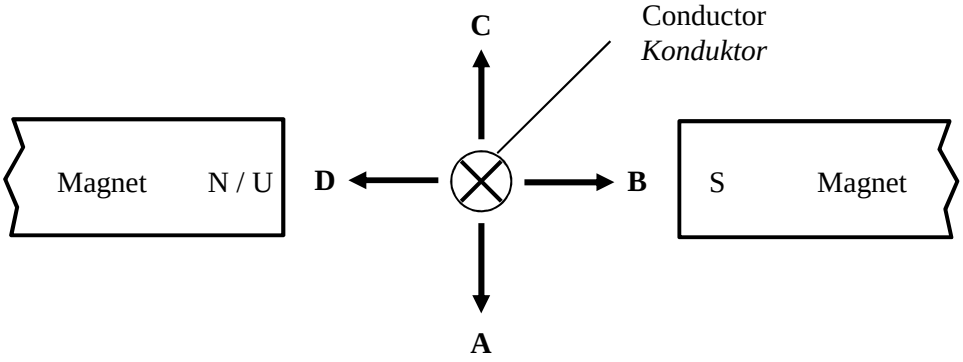


Diagram 25 / *Rajah* 25

41 Diagram 26 shows a solenoid connected to a galvanometer and a bar magnet placed inside the solenoid.

Rajah 26 *menunjukkan solenoid disambung kepada sebuah galvanometer dan satu magnet bar berada di dalam solenoid itu.*

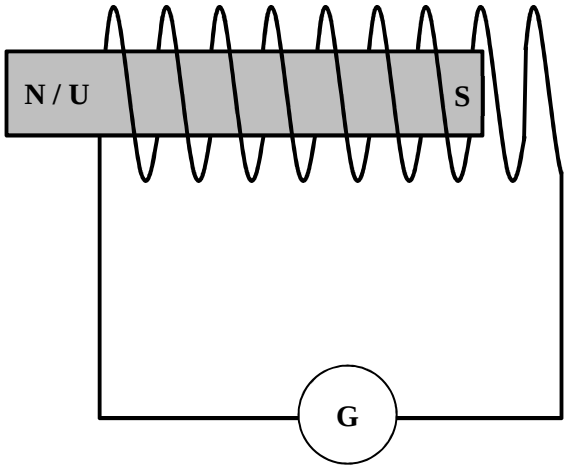


Diagram 26 / *Rajah* 26

Which action will cause **no deflection** of the galvanometer pointer?

Tindakan yang manakah akan menyebabkan ***tiada pesongan*** *pada penunjuk galvanometer*?

A Push the magnet slowly into the solenoid

Menolak magnet dengan perlahan ke dalam solenoid

B Pull the magnet away from the solenoid

Tarik magnet menjauhi solenoid

C Move the magnet and the solenoid in the opposite direction

Menggerakkan magnet dan solenoid dalam arah yang berlawanan

D Move the magnet and the solenoid in the same direction at the same speed

Menggerakkan magnet dan solenoid dalam arah yang sama pada laju yang sama

42 Diagram 27 shows an ideal transformer.

Rajah 27 *menunjukkan sebuah transformer yang unggul.*

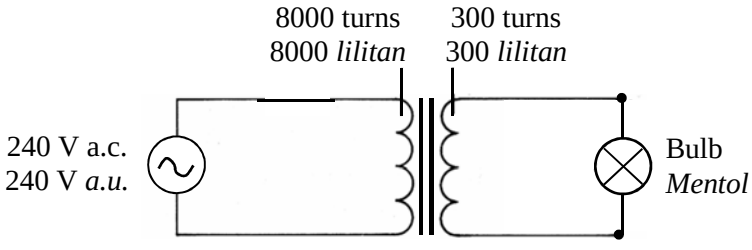


Diagram 27 / *Rajah* 27

What is the potential difference across the bulb?

Berapakah beza keupayaan merentasi mentol itu?

A 9 V **B** 27 V **C** 96 V **D** 200 V

43 The function of a transformer in an electrical energy transmission system is to

Fungsi transformer dalam sistem penghantaran tenaga elektrik adalah untuk

A	increase the power.	/	*meninggikan kuasa.*
B	reduce the resistance.	/	*merendahkan rintangan.*
C	change the potential difference.	/	*mengubah beza keupayaan.*
D	speed up the time of transmission.	/	*mempercepat masa penghantaran.*

44 Diagram 28 shows the structure of a cathode ray oscilloscope.

Rajah 28 *menunjukkan struktur sebuah osiloskop sinar katod.*

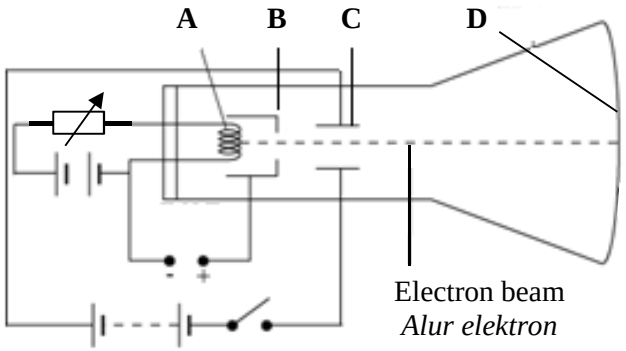


Diagram 28 / *Rajah* 28

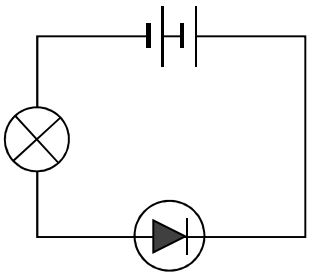
Which of the part, **A**, **B**, **C** or **D** changes the kinetic energy of electron beam into light energy?

Antara bahagian **A, B, C** *dan* **D**, *yang manakah menukarkan tenaga kinetik alur elektron kepada tenaga cahaya*?

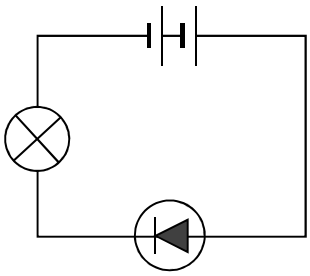
45 Which of the following circuits shows the forward-biased arrangement of a diode?

Antara litar yang berikut, yang manakah menunjukkan susunan diod pincang ke depan?

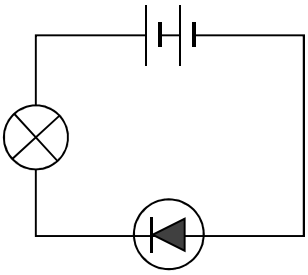
A



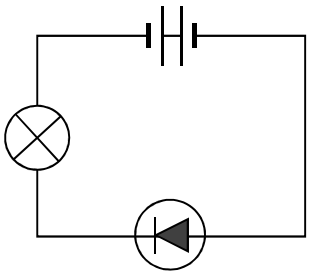
B



C



D



46 Diagram 29 shows a n-p-n transistor connected to a direct current supply.

Rajah 29 *menunjukkan sebuah transistor n-p-n disambung ke bekalan arus terus.*

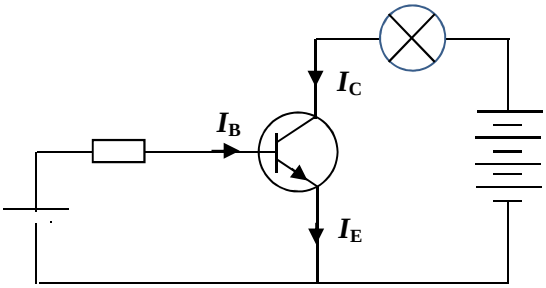


Diagram 29 / *Rajah* 29

Which of the following is correct?
Antara yang berikut, yang manakah benar?

A $I_E > I_C > I_B$

B $I_E > I_B > I_C$

C $I_C > I_E > I_B$

D $I_C > I_B > I_E$

47 Diagram 30 shows a NAND logic gate combined with an OR logic gate.

Rajah 30 *menunjukkan get logik TAKDAN digabungkan dengan get logik ATAU.*

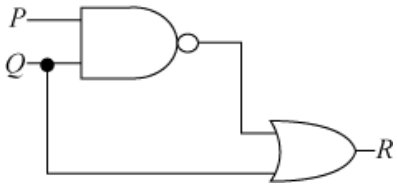


Diagram 30 / *Rajah* 30

Which is the correct truth table for the circuit?

Jadual kebenaran yang manakah betul bagi litar tersebut?

A

Input		Output
P	*Q*	*R*
0	1	0
0	0	0
1	1	0
1	0	0

B

Input		Output
P	*Q*	*R*
1	1	0
1	0	1
0	1	0
0	0	1

C

Input		Output
P	*Q*	*R*
0	1	1
0	0	0
1	1	1
1	0	1

D

Input		Output
P	*Q*	*R*
1	1	1
1	0	1
0	1	1
0	0	1

48 Which of the following has a similar characteristic to X-rays?

Antara yang berikut, yang manakah mempunyai ciri yang sama seperti sinar-X?

A Alpha particles / *Zaraj alfa*
B Beta particles / *Zarah beta*
C Gamma rays / *Sinar gama*
D Cathode rays / *Sinar katod*

49 The following equation represents an alpha decay.

Persamaan berikut mewakili suatu pereputan alfa.

$$ {}^{b}_{a}X \rightarrow {}^{d}_{c}Y + \alpha $$

Which relationship is correct?

Hubungan yang manakah betul?

A $b + 4 = d$
B $a = c + 2$
C $a + b = c + d$
D $a - b = c - d$

50 Which radioisotope is most suitable to be injected into the body for the radioactive imaging of an organ?

Radioisotop yang manakah paling sesuai disuntik ke dalam badan untuk pengimejan radioaktif suatu organ?

Radioisotope ***Radioisotop***	**Half-life** ***Setengah hayat***	**Radiation emitted** ***Sinaran yang dipancar***
A	6 hours 6 *jam*	Low energy gamma rays *Sinar gama tenaga rendah*
B	15 hours 15 jam	Low energy beta particles *Zarah beta tenaga rendah*
C	24 days 24 *hari*	High energy alpha particles *Zarah alfa tenaga tinggi*
D	138 days 138 *hari*	High energy gamma rays *Sinar gama tenaga tinggi*

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES

MAKLUMAT UNTUK CALON

1. This question paper consists of 50 questions.

   Kertas soalan ini mengandungi 50 *soalan*.

2. Answer **all** questions.

   *Jawab **semua** soalan.*

3. Each question is followed by either three or four options. Choose the best option for each question and blacken the correct space on the objective answer sheet.

   Tiap-tiap soalan diikuti oleh sama ada tiga atau empat pilihan jawapan. Pilih satu jawapan yang terbaik bagi setiap soalan dan hitamkan ruangan yang betul pada kertas jawapan objektif.

4. Blacken only **one** space for each question.

   *Hitamkan **satu** ruangan sahaja bagi setiap soalan*.

5. If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer.

   Sekiranya anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.

6. The diagrams in the questions provided are not drawn to scale unless stated.

   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

7. You may use a scientific calculator.

   Anda dibenarkan menggunakan kalkulator saintifik.

8. A list of formulae is provided on page 2.

   Satu senarai formula disediakan di halaman 2.

Nama : …… Tingkatan : ……..

Set A

MODUL PENINGKATAN PRESTASI AKADEMIK SPM

TAHUN 2013

FIZIK
Kertas 2

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	4	
	2	5	
	3	6	
	4	7	
	5	8	
	6	8	
	7	10	
	8	12	
B	9	20	
	10	20	
C	11	20	
	12	20	
Jumlah			

Kertas soalan ini mengandungi **26** 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. Power, $P = \frac{\text{energy}}{\text{time}}$

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

10. Density / *Ketumpatan*, $\rho = \frac{m}{V}$

11. Pressure / *Tekanan*, $p = h\rho g$

12. Pressure / *Tekanan*, $p = \frac{F}{A}$

13. Heat / *Haba*, $Q = mc\theta$

14. Heat / *Haba*, $Q = ml$

15. $\frac{pV}{T}$ = constant / *pemalar*

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

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

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

18. Magnifying power /

    Kuasa pembesaran = $\frac{f_O}{f_E}$

19. $v = f\lambda$

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

21. $Q = It$

22. $E = VQ$

23. $V = IR$

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

    Power / *Kuasa*, $P = I^2R$

    Power / *Kuasa*, $P = \frac{V^2}{R}$

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

26. Efficiency /

    Kecekapan = $\frac{I_S V_S}{I_P V_P} \times 100\ \%$

27. $E = mc^2$

28. g = 10 m s^{-2}

29. c = 3.0 × 10^8 m s^{-1}

Section A
Bahagian A

[60 *marks*]

Answer **all** questions in this section.

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

1 Diagram 1.1 shows the vernier calipers which is used to measure the internal diameter, *d*, and the thickness, *l*, of the mug in Diagram 1.2.

Rajah 1.1 *menunjukkan angkup vernier yang digunakan untuk mengukur diameter dalam, d, dan ketebalan, l, sebuah kole dalam Rajah* 1.2.

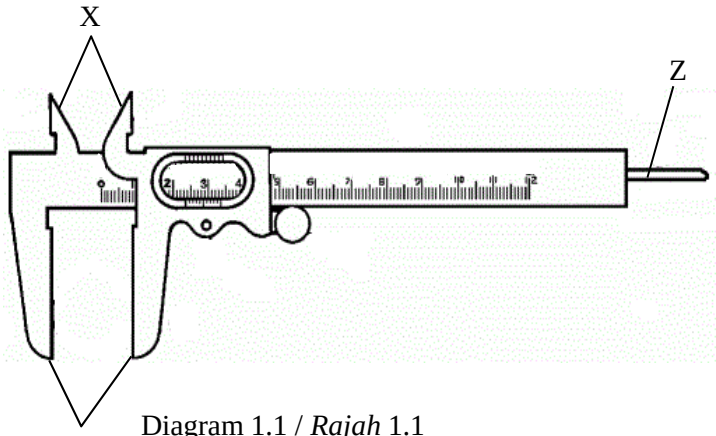
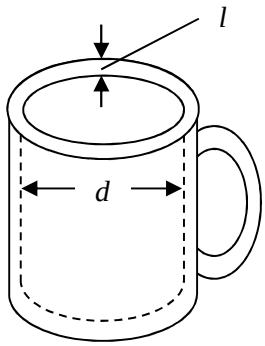


Diagram 1.1 / *Rajah* 1.1



Mug / *Kole*

Diagram 1.2 / *Rajah* 1.2

Table 1 shows the measurements obtained. / *Jadual* 1 *menunjukkan ukuran yang diperoleh.*

Quantity measured / *Kuantiti diukur*	**Measurement / *Ukuran***
Internal diameter, *d* / *Diameter dalam, d*	7.25 cm
Thickness, *l* / *Ketebalan, l*	0.75 cm

Table 1 / *Jadual* 1

(a) What is the sensitivity of the vernier calipers? / *Berapakah kepekaan bagi angkup vernier itu*?

..... [1 mark] / [1 *markah*]

(b) Match the quantities measured with the parts of the vernier calipers that are used to measure the mug.

Padankan kuantiti yang diukur dengan bahagian pada angkup vernier yang digunakan untuk mengukur kole tersebut.

Internal diameter, *d* / *Diameter dalam, d*	X
Thickness, *l* / *Ketebalan, l*	Y
	Z

[2 marks] / [2 *markah*]

(c) Name one measuring instrument that is more sensitive than the vernier calipers.

Namakan satu alat pengukur yang lebih peka daripada angkup vernier.

..... [1 mark] / [1 *markah*]

2 Diagram 2.1 shows a person's hand being used in Fleming's Left Hand Rule.

Rajah 2.1 *menunjukkan tangan seseorang digunakan dalam Petua Tangan Kiri Fleming.*

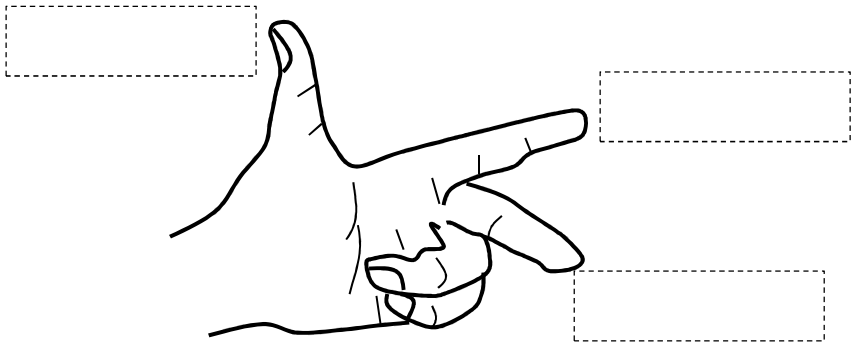


Diagram 2.1 / *Rajah* 2.1

(a) Write the physical quantities represented by the thumb, forefinger and middle finger in the boxes provided in Diagram 2.1.

Tuliskan kuantiti fizik yang diwakili oleh ibu jari, jari telunjuk dan jari tengah dalam petak-petak yang disediakan dalam Rajah 2.1.

[1 mark] / [1 *markah*]

(b) Diagram 2.2 shows a copper rod XY resting on copper tracks between the poles of a permanent magnet.

Rajah 2.2 *menunjukkan sebatang rod kuprum* XY *sedang berehat di atas landasan kuprum di antara kutub-kutub sebuah magnet kekal.*

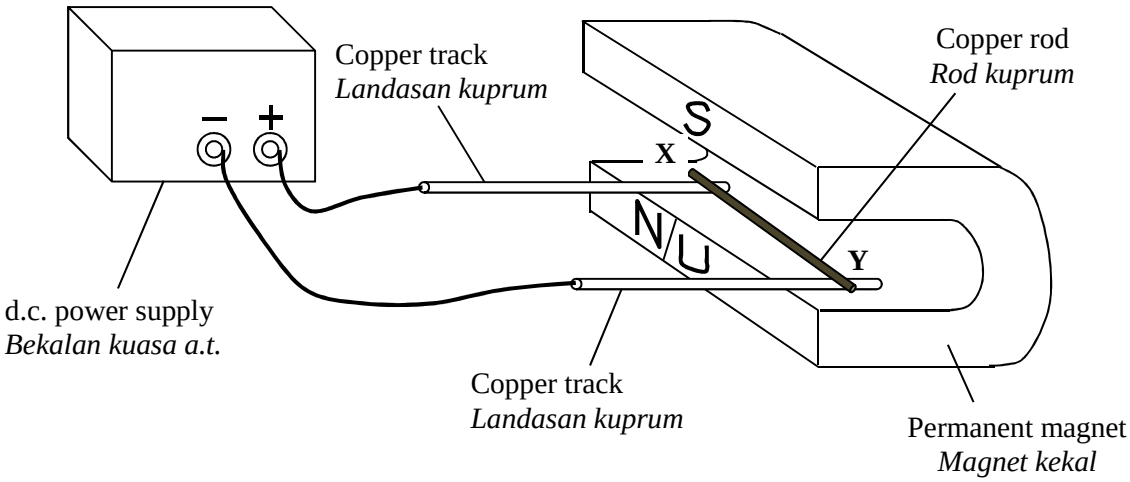


Diagram 2.2 / *Rajah* 2.2

(i) Underline the correct answer in the brackets to complete the sentence below.

Garis jawapan yang betul dalam kurungan untuk melengkapkan ayat di bawah.

When the d.c. power supply is switched on, the current in the copper rod flows from (X to Y, Y to X)

Apabila bekalan kuasa a.t. dihidupkan, arus dalam rod kuprum mengalir dari (X *ke* Y, Y *ke* X)

[1 mark] / [1 *markah*]

(ii) Mark with an arrow on Diagram 2.2, the direction of the magnetic force on the copper rod.

Tanda dengan satu anak panah pada Rajah 2.2, *arah daya magnet ke atas rod kuprum itu.*

[1 mark] / [1 *markah*]

(iii) What happens to the magnitude of the magnetic force when the voltage of the d.c. power supply is increased?

Apakah yang berlaku pada magnitud daya magnet itu apabila voltan bekalan kuasa a.t. ditambah?

…….

[1 mark] / [1 *markah*]

(iv) State one method to reverse the direction of the magnetic force.

Nyatakan satu kaedah untuk menyongsangkan arah daya magnet itu.

…….

[1 mark] / [1 *markah*]

3 Diagram 3.1 shows a catapult with two elastic cords which is used to shoot out a stone.
When the elastic cords are pulled with a force of 12 N, the extension of each elastic cord is 0.2 m.

Rajah 3.1 *menunjukkan sebuah lastik dengan dua utas tali kenyal yang digunakan untuk melancar sebiji batu.*
Apabila tali-tali kenyal itu ditarik dengan daya 12 N, *pemanjangan bagi setiap tali kenyal ialah* 0.2 m.

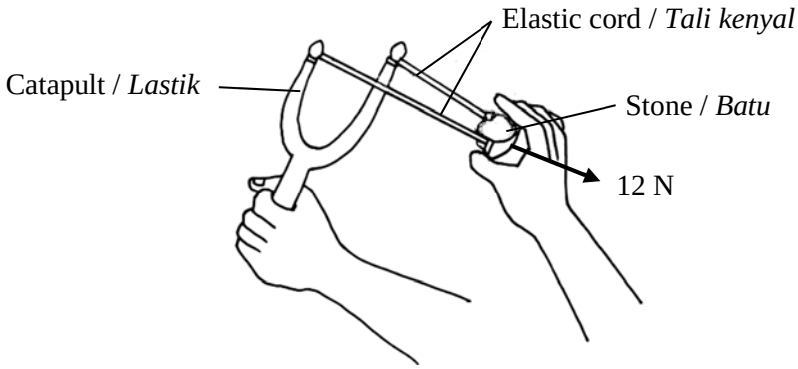


Diagram 3.1 / *Rajah* 3.1

(a) Name the form of energy stored in the extended elastic cords.

Namakan bentuk tenaga yang tersimpan dalam tali-tali kenyal yang dipanjangkan.

..... [1 mark] / [1 *markah*]

(b) Calculate the work done to stretch the two elastic cords.

Hitung kerja yang dilakukan untuk memanjangkan dua utas tali kenyal itu.

[2 marks] / [2 *markah*]

(c) The elastic cords are then released from the catapult.

Tali-tali kenyal kemudian dilepaskan.

(i) State the conversion of energy that occurs.

Nyatakan pemindahan tenaga yang berlaku.

..... [1 mark] / [1 *markah*]

(ii) The mass of the stone is 0.012 kg.
Calculate the velocity of the stone as it leaves the catapult.

Jisim batu ialah 0.012 kg.
Hitung halaju batu semasa ia meninggalkan lastik itu.

[2 marks] / [2 *markah*]

4 Diagram 4.1 shows an electrical circuit where a resistor, *R*, and box A containing a diode are connected to an a.c. power supply. The voltage across the a.c. power supply and the voltage across the resistor, *R*, are each displayed on a cathode ray oscilloscope (CRO).

Rajah 4.1 *menunjukkan litar elektrik yang mana satu perintang, R, dan kotak* A *yang mengandungi sebuah diod disambung pada bekalan kuasa a.u.. Voltan merentasi bekalan kuasa a.u. dan voltan merentasi perintang, R, masing-masing dipaparkan pada osiloskop sinar katod (OSK).*

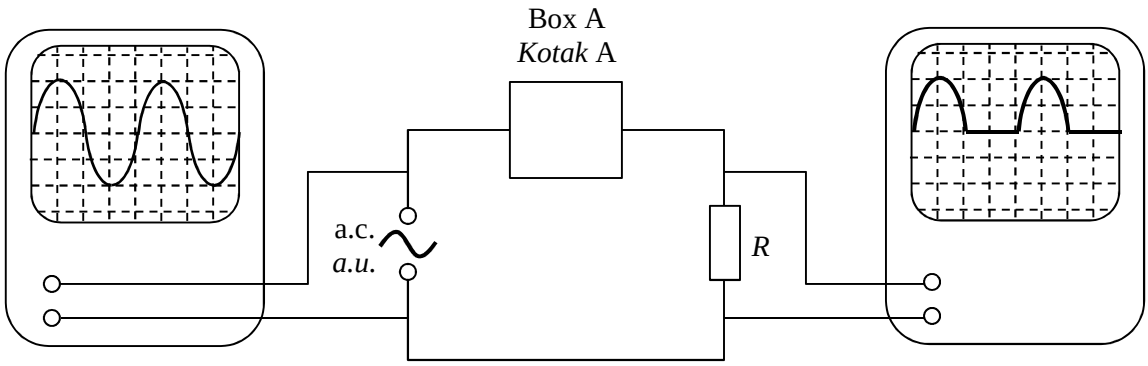


Diagram 4.1/ *Rajah* 4.1

(a) The y-gain of the CRO across the a.c. power supply is set at 1 V / division.
Calculate the peak voltage of the a.c. power supply.

Gandaan-y bagi OSK merentasi bekalan kuasa a.u. ditetapkan pada 1 V / *bahagian.*
Hitung voltan puncak bagi bekalan kuasa a.u. itu.

[2 marks] / [2 *markah*]

(b) The CRO across *R* displays a d.c. signal.

OSK merentasi R memaparkan satu isyarat arus terus.

(i) Draw the symbol of diode in box A.

Lukiskan simbol diod dalam kotak A. [1 mark] / [1 *markah*]

(ii) State the function of the diode in box A.

Nyatakan fungsi diod dalam kotak A.

……

[1 mark] / [1 *markah*]

(c) A capacitor is connected across the resistor, *R* to produce a better output signal.

Satu kapasitor disambungkan menerusi perintang, R untuk menghasilkan isyarat output yang lebih baik.

(i) State the function of the capacitor.

Nyatakan fungsi kapasitor itu.

……

[1 mark] / [1 *markah*]

(ii) In Diagram 4.2, draw the signal displayed on the CRO across resistor *R*.

Pada Rajah 4.2, *lukiskan isyarat yang dipapar pada OSK merentasi perintang R.*

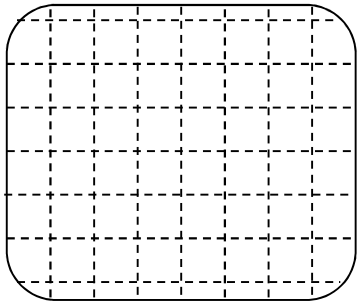


Diagram 4.2 / *Rajah* 4.2

[2 marks] / [2 *markah*]

5 Diagram 5.1 shows two identical metal balls heated for a few minutes in boiling water. The two metal balls are then transferred into two beakers containing liquid X and liquid Y.
Diagram 5.2 and Diagram 5.3 show the initial and final readings of thermometers in liquid X and liquid Y.

Rajah 5.1 *menunjukkan dua bebola logam yang seiras dipanaskan selama beberapa minit dalam air mendidih. Dua bebola logam itu kemudian dipindahkan ke dalam dua buah bikar yang mengandungi cecair* X *dan cecair* Y.
Rajah 5.2 *dan Rajah* 5.3 *menunjukkan bacaan awal dan bacaan akhir termometer dalam cecair* X *dan cecair* Y.

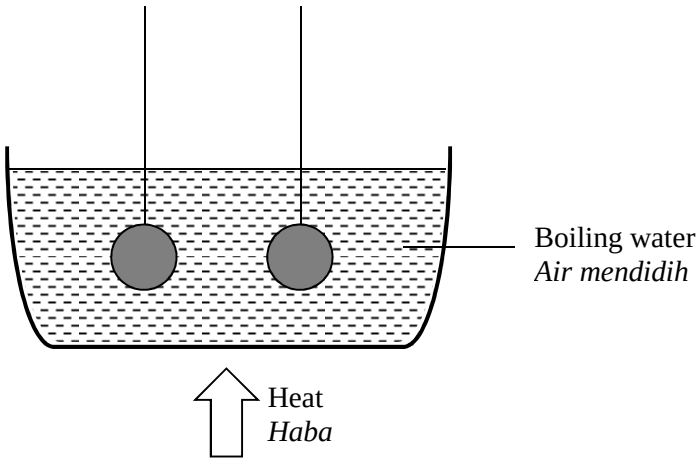
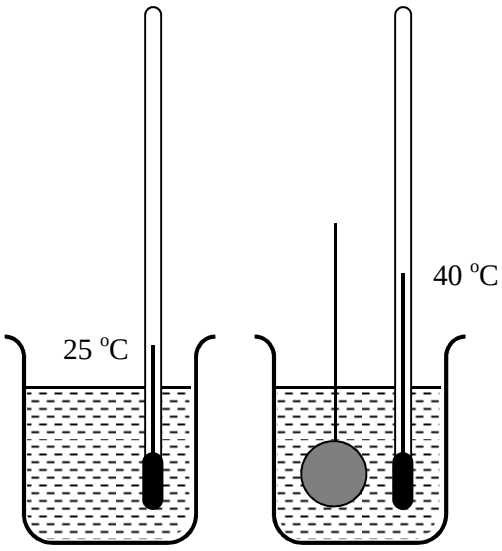
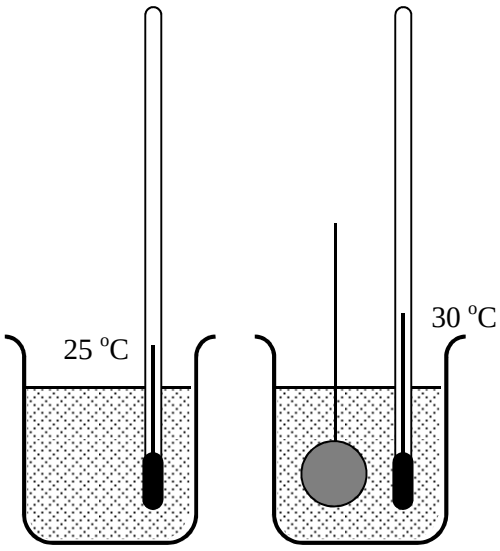


Diagram 5.1 / *Rajah* 5.1



Liquid X
Mass = 300 g
Specific heat capacity = 2 100 J kg^{-1} $°C^{-1}$

Diagram 5.2 / *Rajah* 5.2



Liquid Y
Mass = 300 g
Specific heat capacity = 4 200 J kg^{-1} $°C^{-1}$

Diagram 5.3 / *Rajah* 5.3

(a) What is the meaning of specific heat capacity?

Apakah maksud muatan haba tentu?

……

……

[1 mark] / [1 *markah*]

(b) (i) State the physical quantity measured by a thermometer.

Nyatakan kuantiti fizik yang diukur oleh sebuah termometer.

……

[1 mark] / [1 *markah*]

(ii) Explain why the reading of the thermometer is taken after a few minutes?

Jelaskan mengapa bacaan termometer diambil selepas beberapa minit?

……

……

[1 mark] / [1 *markah*]

(c) Based on Diagram 5.1 and Diagram 5.2:

Berdasarkan Rajah 5.1 *dan Rajah* 5.2:

(i) Compare the specific heat capacity of liquid X and liquid Y.

Bandingkan muatan haba tentu cecair X *dan cecair* Y.

……

[1 mark] / [1 *markah*]

(ii) Compare the final readings of the thermometers in liquid X and liquid Y.

Bandingkan bacaan akhir termometer dalam cecair X *dan cecair* Y.

……

[1 mark] / [1 *markah*]

(iii) Compare the change in temperature of liquid X and liquid Y.

Bandingkan perubahan suhu bagi cecair X *dan cecair* Y.

……

[1 mark] / [1 *markah*]

(iv) State the relationship between specific heat capacity and change in temperature of the liquid.

Nytakan hubungan antara muatan haba tentu dan perubahan suhu cecair.

……

[1 mark] / [1 *markah*]

(d) Which liquid is more suitable to be used as a coolant in the cooling system of a car?

Cecair yang manakah lebih sesuai digunakan sebagai bahan penyejuk dalam sistem penyejukan sebuah kereta?

……

[1 mark] / [1 *markah*]

6 Diagram 6.1 shows a ripple tank used to produce plane waves.

Rajah 6.1 *menunjukkan sebuah tangki riak yang digunakan untuk menghasilkan gelombang satah.*

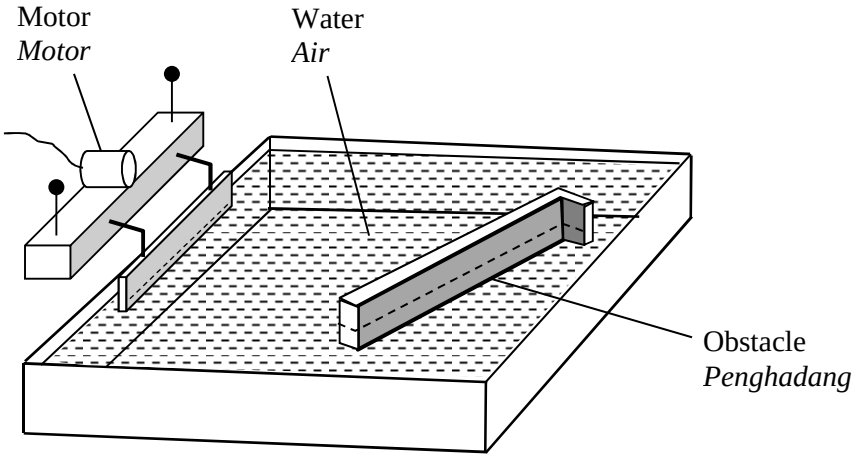


Diagram 6.1 / *Rajah* 6.1

Diagram 6.2 dan Diagram 6.3 show the water waves propagate and strike an obstacle.

Rajah 6.2 *dan Rajah* 6.3 *menunjukkan gelombang air yang merambat dan terkena penghadang.*

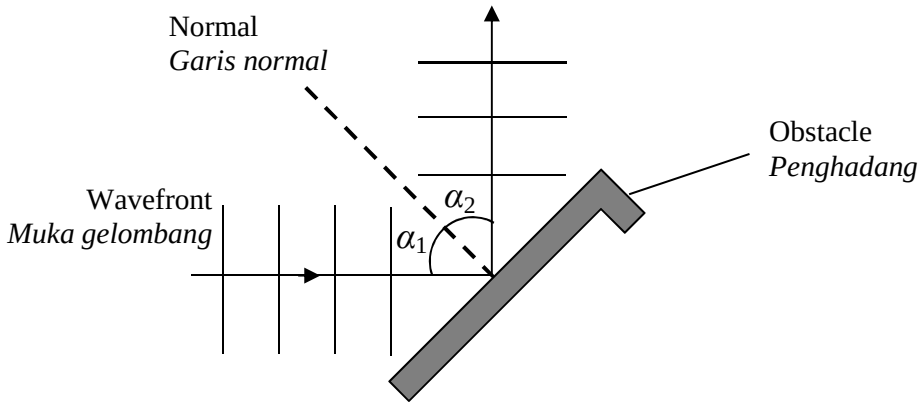


Diagram 6.2 / *Rajah* 6.2

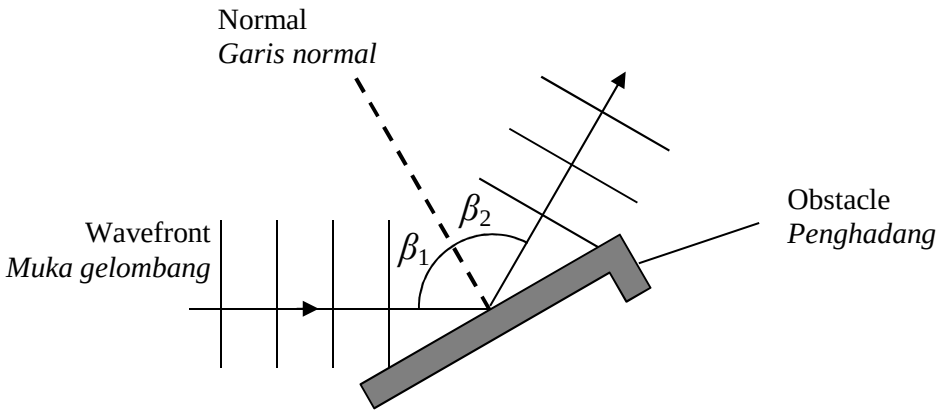


Diagram 6.3 / *Rajah* 6.3

(a) What is the meaning of angle of incidence?
Apakah maksud sudut tuju?

……

[1 mark] / [1 *markah*]

(b) Based on the Diagram 6.2 and Diagram 6.3:

Berdasarkan Rajah 6.2 *dan Rajah* 6.3:

(i) Compare the angle α_1 and α_2.

Bandingkan sudut α_1 *dan* α_2.

……

[1 *mark*] / [1 *markah*]

(ii) Compare the angle β_1 and β_2.

Bandingkan sudut β_1 *dan* β_2.

……

[1 *mark*] / [1 *markah*]

(iii) Based on the answer in 6(b) (i) and 6(b) (ii), state the relationship between angle of incidence and angle of reflection.

Berdasarkan jawapan di 6(b) (i) *dan* 6(b) (ii), *nyatakan hubungan antara sudut tuju dan sudut pantulan.*

……

[1 mark] / [1 *markah*]

(iv) Name the law involved.

Namakan hukum yang terlibat.

……

[1 mark] / [1 *markah*]

(c) The frequency of the motor is increased. What will happen to:

Frekuensi motor itu ditambah. Apakah akan berlaku kepada:

(i) the distance between the wavefronts?

jarak antara muka gelombang?

……

[1 mark] / [1 *markah*]

(ii) the speed of the wave?

laju gelombang itu?

……

[1 mark] / [1 *markah*]

(d) Name **one** application of the reflection of waves.

Namakan ***satu*** *kegunaan pantulan gelombang.*

……

[1 mark] / [1 *markah*]

7 Diagram 7.1 shows an apparatus that is used to investigate a physics principle. When air flows from P to Q, the water level in one arm of the tube rises as shown.

Rajah 7.1 *menunjukkan satu alat untuk mengkaji satu prinsip fizik. Apabila udara mengalir dari* P *ke* Q, *paras air dalam satu lengan tiub itu naik seperti yang ditunjukkan.*

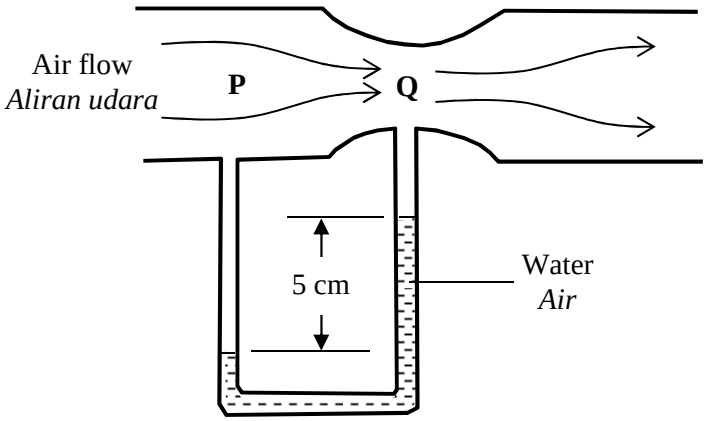


Diagram 7 / *Rajah* 7

(a) Name the physics principle involved.

Namakan prinsip fizik itu.

……

[1 mark] / [1 *markah*]

(b) (i) Compare the pressure at point P and point Q.

Bandingkan tekanan di titik P *dan titik* Q.

……

[1 mark] / [1 *markah*]

(ii) Explain why there is a difference in pressure between point P and point Q.

Jelaskan mengapa terdapat perbezaan tekanan antara titik P *dan titik* Q.

……

……

[2 marks] / [2 *markah*]

(c) Calculate the pressure difference between point P and point Q.

Hitungkan perbezaan tekanan antara titik P *dan titik* Q.

[Density of water / *Ketumpatan air* = 1 000 kg m^{-3}]

[2 marks] / [2 *markah*]

(d) Suggest **two** ways by which the difference in water level in the tube can be increased and give reasons for your answers.

*Cadangkan **dua** cara bagaimana perbezaan paras air dalam tiub itu boleh ditambah dan beri sebab bagi jawapan anda*.

Suggestion 1 / *Cadangan* 1

……

……

Reason / *Sebab*

……

……

[2 marks] / [2 *markah*]

Suggestion 2 / *Cadangan* 2

……

……

Reason / *Sebab*

……

……

[2 marks] / [2 *markah*]

8 Diagram 8.1 shows the structure of a hair dryer.

Rajah 8.1 *menunjukkan struktur sebuah pengering rambut.*

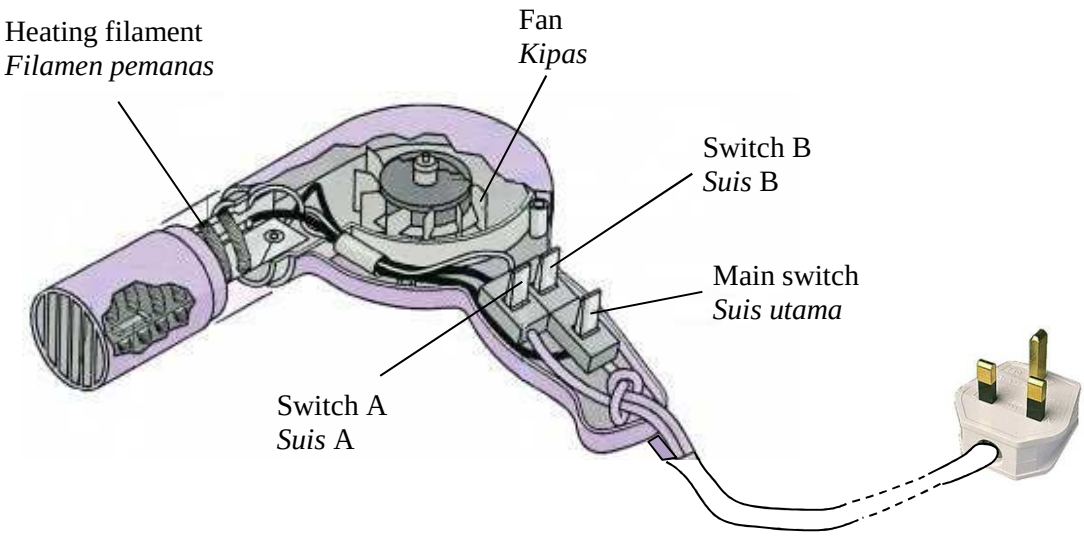


Diagram 8.1 / *Rajah* 8.1

(a) Name **one** suitable material to be used as the heating element in the hair dryer.

Namakan ***satu*** *bahan yang sesuai digunakan sebagai elemen pemanas dalam pengering rambut.*

…… [1 mark] / [1 *markah*]

(b) The hair dryer has the specification of 240 V, 1 000 W and is connected to the 240 V power supply.

Pengering rambut itu mempunyai spesifikasi 240 V, 1 000 W *dan disambungkan kepada bekalan kuasa* 240 V.

(i) What is the meaning of '240 V, 1 000 W'?

Apakah yang dimaksudkan dengan '240 V, 1 000 W'?

……

……

[1 mark] / [1 *markah*]

(ii) Calculate the current flowing in the main circuit of the hair dryer.

Hitungkan arus yang mengalir dalam litar utama pengering rambut itu.

[2 marks] / [2 *markah*]

(iii) If two fuses of 5 A and 8 A are available, which one is more suitable to be used in the hair dryer?

Jika dua fius 5 A *dan* 8 A *boleh diperoleh, yang manakah lebih sesuai digunakan untuk pengering rambut itu*?

……

[1 mark] / [1 *markah*]

(c) Diagram 8.2 and Diagram 8.3 show two different electric circuits for the fan and the heating element in the hair dryer.

Rajah 8.2 *dan Rajah* 8.3 *menunjukkan dua litar elektrik untuk kipas dan elemen pemanas dalam pengering rambut itu.*

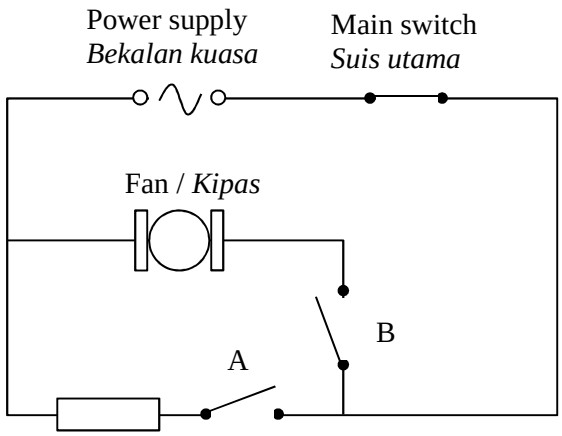


Diagram 8.2 / *Rajah* 8.2

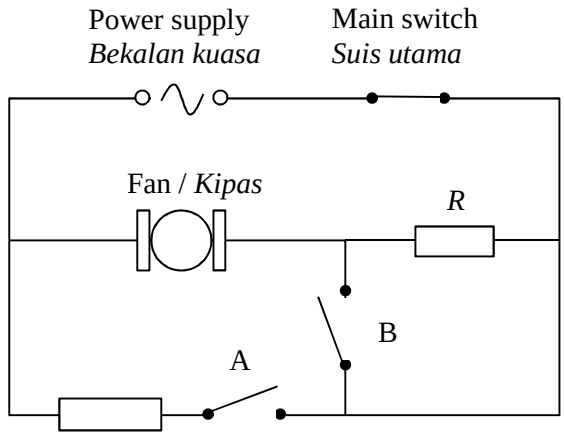


Diagram 8.3 / *Rajah* 8.3

Explain why wet hair dries faster if both the switches A and B are switched on simultaneously compared to when only switch B is closed.

Terangkan mengapa rambut basah menjadi kering dengan lebih cepat jika kedua-dua suis A *dan suis* B *dihidupkan serentak berbanding dengan hanya suis* B *dihidupkan.*

……

……

……

[3 marks] / [3 *markah*]

(d) (i) What happens to the fan in Diagram 8.2 and Diagram 8.3 when switch B is off?

Apakah yang berlaku pada kipas dalam Rajah 8.2 *dan Rajah* 8.3 *apabila suis* B *dimatikan?*

Diagram 8.2 / *Rajah* 8.2: …….

Diagram 8.3 / *Rajah* 8.3: …….

[2 marks] / [2 *markah*]

(ii) Based your answer in 8(d)(i), suggest the circuit that is more suitable for the hair dryer. Give **one** reason for your answer.

Berdasarkan jawapan anda di 8(d)(i), *cadangkan litar yang lebih sesuai untuk pengering rambut. Berikan* ***satu*** *sebab bagi jawapan anda.*

Circuit in Diagram : …….

Litar dalam Rajah : …….. [1 mark] / [1 *markah*]

Reason / *Sebab*

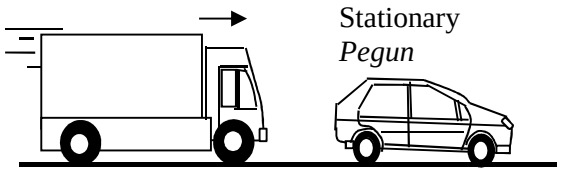
……

[1 mark] / [1 *markah*]

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

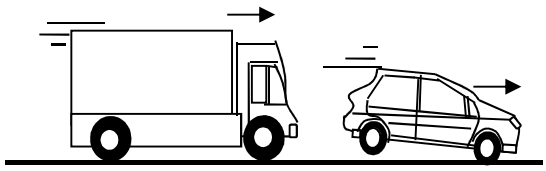
9 Diagram 9.1 shows a van of mass 1 500 kg travelling at 25 m s^{-1} before it collides with a stationary car of mass 1 000 kg.
Diagram 9.2 shows the van and the car after the collision.

Rajah 9.1 *menunjukkan sebuah van berjisim* 1 500 kg *yang bergerak pada* 25 m s^{-1} *sebelum berlanggar dengan sebuah kereta pegun berjisim* 1 000 kg.
Rajah 9.2 *menunjukkan van dan kereta itu selepas perlanggaran.*



Before collision
Sebelum perlanggaran

Diagram 9.1 / *Rajah* 9.1



After collision
Selepas perlanggaran

Diagram 9.2 / *Rajah* 9.2

Table 9 shows the momentum and kinetic energy of the van and the car before and after the collision.

Jadual 9 *menunjukkan momentum dan tenaga kinetik van dan kereta itu sebelum dan selepas perlanggaran.*

	Before collision		After collision	
	Van	Car	Van	Car
Momentum / kg m s^{-1}	37 500	0	18 000	19 500
Kinetic energy / J	468 750	0	108 000	190 125

Table 9 / *Jadual* 9

(a) What is the meaning of momentum?
Apakah maksud momentum? [1 mark] / [1 *markah*]

(b) Based on Diagram 9.1 and Diagram 9.2:
Berdasarkan Rajah 9.1 *dan Rajah* 9.2:

(i) What happens to the speed of the van after the collision?
Apakah yang berlaku pada laju van itu selepas perlanggaran?

(ii) Compare the total momentum before and after the collision.
Bandingkan jumlah momentum sebelum dan selepas perlanggaran itu.

(iii) Name the physics principle involved.
Namakan prinsip fizik yang terlibat.

(iv) Compare the total kinetic energy before and after the collision.
Bandingkan jumlah tenaga kinetik sebelum dan selepas perlanggaran itu.

(v) Name the type of collision between the van and the car.
Namakan jenis perlanggaran antara van dan kereta itu. [5 marks] / [5 *markah*]

(c) (i) Explain how a car seat belt saves the driver from serious injury during a collision.

Jelaskan bagaimana tali keledar kereta menyelamatkan pemandunya daripada kecederaan yang serius semasa perlanggaran.

(ii) Suggest another feature of a car which can improve the safety of its passengers during a collision.
Explain your suggestion.

Cadangkan satu lagi ciri kereta yang boleh meningkatkan keselamatan penumpangnya semasa perlanggaran.
Jelaskan cadangan anda. [4 marks] / [4 *markah*]

(d) Diagram 9.3 shows an ordinary bicycle.

Rajah 9.3 *menunjukkan sebuah basikal biasa.*

Diagram 9.3 / *Rajah* 9.3

You are required to give some suggestions to enable a cyclist to ride the bicycle safely at a higher speed.

Anda dikehendaki memberi beberapa cadangan untuk membolehkan seorang menunggang basikal itu pada laju yang lebih tinggi dengan selamatnya.

Using your knowledge on forces and motion and properties of materials, explain your suggestions based on the following aspects:

Menggunakan pengetahuan tentang daya dan gerakan dan sifat-sifat bahan, terangkan cadangan anda berdasarkan aspek-aspek berikut:

(i) the mass of the bicycle
jisim basikal

(ii) the type of material for the body of the bicycle
jenis bahan bagi badan basikal itu

(iii) the width of the tyre in contact with the road surface
lebar tayar yang bersentuhan dengan permukaan jalan

(iv) the type of the braking system
jenis sistem brek

(v) the attire or accessories of the cyclist
pakaian atau kelengkapan penunggang basikal itu [10 marks] / [10 *markah*]

10 (a) Diagram 10.1 shows a magnet being dropped from a certain height into a solenoid which is connected to a galvanometer.
Diagram 10.2 shows the same magnet being dropped from the same height into a solenoid of a different diameter.

Rajah 10.1 *menunjukkan sebatang magnet dilepaskan dari satu ketinggian yang tertentu ke dalam sebuah solenoid yang disambung ke sebuah galvanometer.*
Rajah 10.2 *menunjukkan magnet yang sama dilepaskan dari ketinggian yang sama ke dalam sebuah solenoid yang mempunyai diameter yang berbeza.*

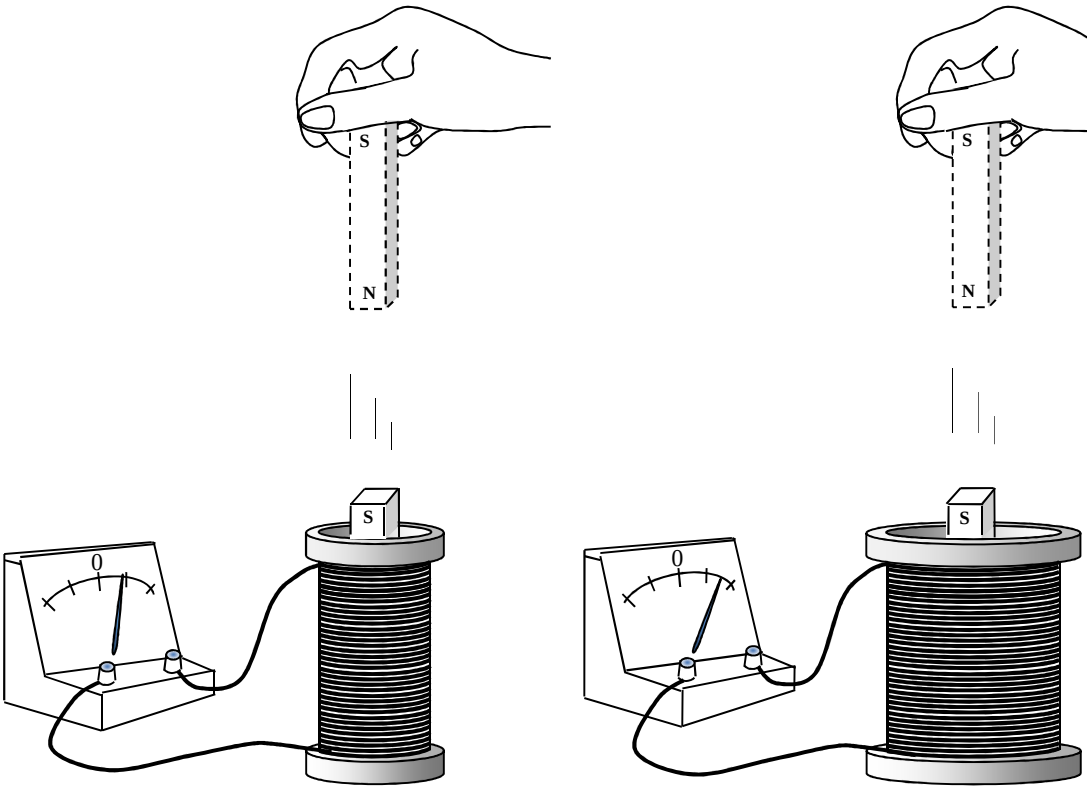


Diagram 10.1 / *Rajah* 10.1

Diagram 10.2 / *Rajah* 10.2

Based on Diagram 10.1 and Diagram 10.2, compare:
Berdasarkan Rajah 10.1 *dan Rajah* 10.2, *bandingkan*:

(i) The diameters of the solenoid
Diameter solenoid

(ii) The deflection of the galvanometer pointer
Pesongan penunjuk galvanometer

(iii) The rate of cutting of the magnetic field
Kadar pemotongan medan magnet

(iv) Relate the induced current to the rate of cutting of the magnetic field
Hubungkaitkan arus aruhan dengan kadar pemotongan medan magnet

(v) State the law involved in 10(a)(iv).
Nyatakan hukum yang terlibat di 10(a)(iv).

[5 marks] / [5 *markah*]

(b) Diagram 10.3 shows a bicycle dynamo.
When the wheel grip is rotated, an e.m.f. is induced in the coil. An induced current flows out from the output terminals.

Rajah 10.3 *menunjukkan sebuah dinamo basikal.*
Apabila pencengkam roda itu diputarkan, satu d.g.e. diaruh di dalam gegelung. Satu arus aruhan mengalir keluar melalui terminal-terminal output.

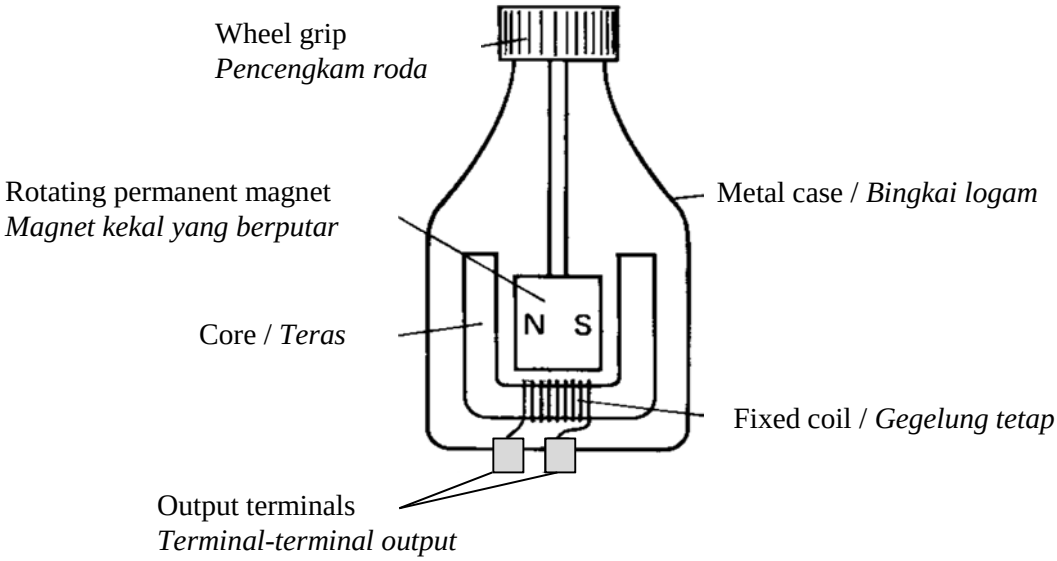


Diagram 10.3 / *Rajah* 10.3

(i) What is the meaning of induced current?
Apakah maksud arus aruhan?

(ii) Explain why carbon brushes are not required in this type of dynamo.
Jelaskan mengapa berus karbon tidak diperlukan dalam dinamo jenis ini.

(iii) Name the type of current produced.
Namakan jenis arus yang dihasilkan.

(iv) Explain your answer in 10(b)(iii).
Jelaskan jawapan anda dalam 10(b)(iii). [5 marks] / [5 *markah*]

(c) You are required to give some suggestions to design a dynamo that can produce a bigger induced current.
Based on Diagram 10.3, and using appropriate concepts of physics, explain your suggestions based on the following aspects:

Anda dikehendaki memberi beberapa cadangan untuk mereka bentuk sebuah dinamo yang boleh menghasilkan arus aruhan yang lebih besar.
Berdasarkan Rajah 10.3*, dan menggunakan konsep fizik yang sesuai, terangkan cadangan anda berdasarkan aspek-aspek berikut*:

(i) Type of core / *Jenis teras*

(ii) Thickness of the coil wire / *Ketebalan dawai gegelung*

(iii) Strength of the magnet / *Kekuatan magnet*

(iv) Diameter of the wheel grip / *Diameter pencengkam roda*

(v) Number of turns of the coil / *Bilangan lilitan gegelung* [10 marks] / [10 *markah*]

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

11 Diagram 11.1 shows two light rays, A and B, from an object incident on a prism. The light rays are parallel to the surface X. An inverted image is seen by the observer.

Rajah 11.1 *menunjukkan dua sinar cahaya,* A *dan* B*, dari suatu objek ditujukan pada sebuah prisma. Sinar-sinar itu selari dengan permukaan* X*. Satu imej songsang dilihat oleh pemerhati.*

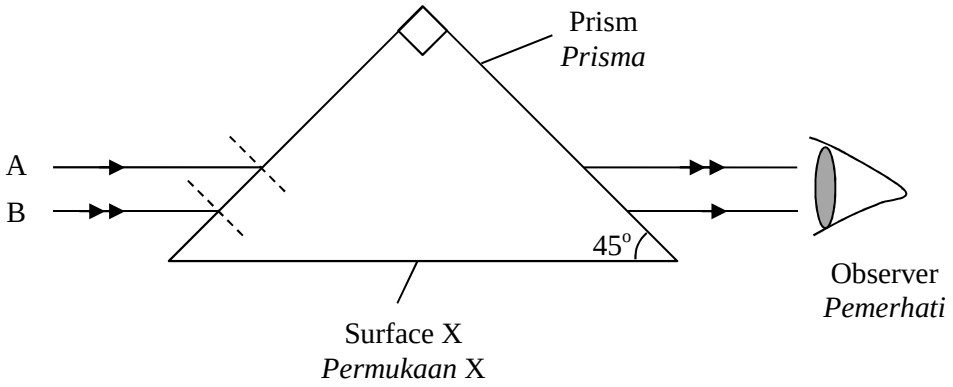


Diagram 11.1 / *Rajah 11.1*

(a) (i) What is the incident angle of light ray A?

Berapakah sudut tuju sinar cahaya A? [1 mark] / [1 *markah*]

(ii) The critical angle of the prism is 42°. Calculate the refractive index of the prism.

Sudut genting bagi prisma itu ialah 42°. *Hitung indeks biasan prisma itu.*

[2 marks] / [2 *markah*]

(iii) Copy Diagram 11.1 and complete the paths of the light rays inside the prism.
Use the sign → and →→ to indicate light rays A and B respectively.

Salin Rajah 11.1 *dan lengkapkan lintasan sinar-sinar cahaya dalam prisma itu.*
Gunakan tanda → *dan* →→ *untuk menunjukkan sinar* A *dan* B *masing-masing.*

[2 marks] / [2 *markah*]

(iv) Name the light phenomenon that occurs at surface X when the light rays move through the prism.

Namakan fenomena cahaya yang berlaku pada permukaan X apabila sinar cahaya bergerak menerusi prisma itu.

[1 mark] / [1 *markah*]

(b) While travelling on a bus on a hot day, you see a pool of water on the road in front of you. However, as you reach that particular location, you find that the pool does not exist.
Using your knowledge of the propagation of light in media of different densities, explain this occurrence.

Semasa perjalanan dalam sebuah bas pada suatu hari yang panas terik, anda terlihat sebuah lopak air di atas jalan raya di hadapan anda. Namun apabila mendekati lokasi tersebut anda mendapati ia tidak wujud. Menggunakan pengetahuan anda tentang perambatan cahaya dalam medium yang berlainan ketumpatan, terangkan kejadian ini.

[4 marks] / [4 *markah*]

(c) Diagram 11.2 shows an astronomical telescope.

Rajah 11.2 *menunjukkan sebuah teleskop astronomi.*

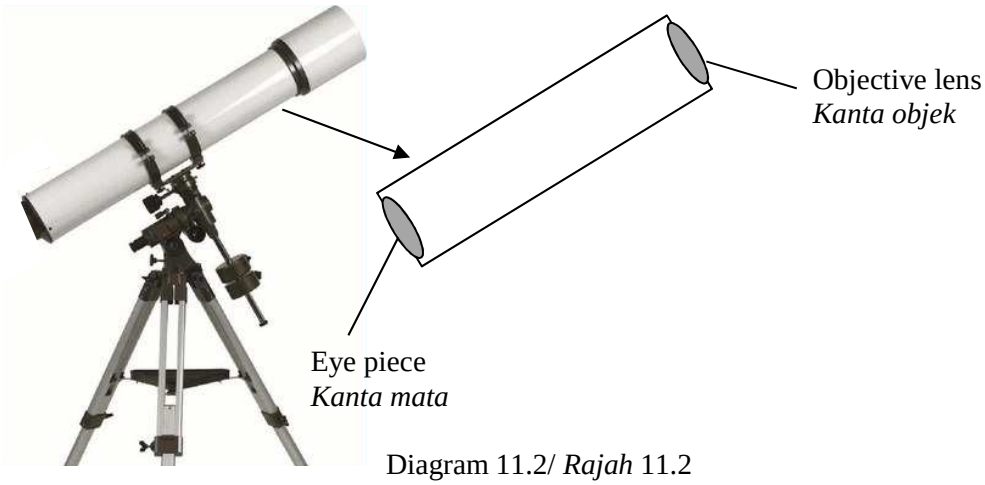


Diagram 11.2/ *Rajah* 11.2

Table 11 shows four sets of convex lenses R, S, T and U with different specifications.

Jadual 11 *menunjukkan empat set kanta cembung* R, S, T *dan* U *dengan spesifikasi yang berbeza.*

Set of lenses *Set kanta*	Objective lens *Kanta objek*		Eyepiece *Kanta mata*	
	Focal length / cm *Panjang fokus* / cm	Diameter / cm *Diameter* / cm	Type of lens *Jenis kanta*	Power / D *Kuasa* / D
R	50.0	6.0	Convex *Cembung*	30
S	30.0	3.0	Convex *Cembung*	25
U	50.0	3.0	Concave *Cekung*	25
T	30.0	6.0	Concave *Cekung*	30

Table 11 / *Jadual 11*

You are required to determine the most suitable set of convex lenses to construct an astronomical telescope that can produce a sharp, bright and big image.

Study the specifications of all four sets of convex lenses from the following aspects:

Anda dikehendaki menentukan set kanta cembung yang paling sesuai untuk membina sebuah teleskop astronomi yang boleh menghasilkan imej yang tajam, cerah dan besar.

Kaji spesifikasi keempat-empat set kanta cembung itu daripada aspek-aspek berikut:

- Focal length of the objective lens / *Panjang fokus bagi kanta objek*
- Diameter of the objective lens / *Diameter kanta objek*
- Type of lens of the eyepiece / *Jenis kanta bagi kanta mata*
- Power of the eyepiece / *Kuasa kanta mata*

Explain the suitability of the aspects and determine the most suitable set of lenses. Give reasons for your choice.

Terangkan kesesuaian aspek-aspek itu dan tentukan set kanta yang paling sesuai.
Beri sebab bagi pilihan anda.

[10 marks] / [10 *markah*]

12 (a) Neptunium-239 $\left({}^{239}_{93}\mathrm{Np}\right)$ has a proton number of 93 and decays to a nuclide, X, with proton number 94.

Neptunium-239 $\left({}^{239}_{93}\mathrm{Np}\right)$ *mempunyai nombor proton* 93 *dan mereput untuk menjadi nuklid* X, *yang mempunyai nombor proton* 94.

(i) What is the meaning of proton number?

Apakah maksud nombor proton?

[1 mark] / [1 *markah*]

(ii) Name the radiation given out in the decay of neptunium-239.

Namakan sinaran yang dipancar oleh reputan neptunium-239.

[1 *mark*] / [1 *markah*]

(iii) Write the equation for the decay of neptunium-239.

Tuliskan persamaan bagi reputan neptunium-239.

[1 mark] / [1 *markah*]

(iv) Explain how energy is released in the decay of neptunium-239.

Terangkan bagaimana tenaga dibebaskan oleh reputan neptunium-239.

[2 marks] / [2 *markah*]

(b) Diagram 12.1 shows the schematic diagram of a nuclear reactor at a nuclear power station.

Rajah 12.1 *menunjukkan gambar rajah skematik sebuah reaktor di sebuah stesen kuasa nuklear.*

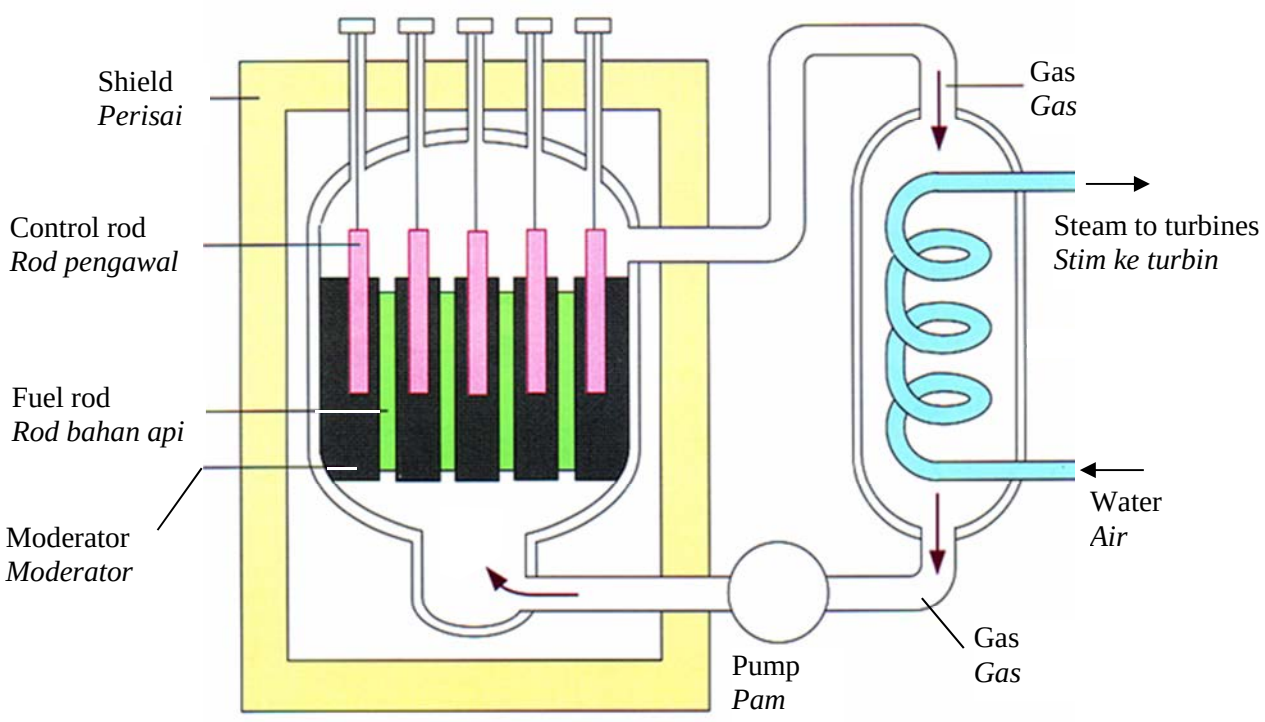


Diagram 12.1 / *Rajah* 12.1

Table 12 shows four designs P, Q, R and S of nuclear reactors with different specifications.

Jadual 12 *menunjukkan empat reka bentuk* P, Q, R *dan* S *bagi reaktor nuklear dengan spesifikasi yang berlainan.*

Design *Reka bentuk*	Type of reaction *Jenis tindak balas*	Half life of nuclear fuel *Setengah hayat bahan api nuklear*	Specific heat capacity of the gas *Muatan haba tentu gas*	Material of the shield *Bahan perisai*
P	Fusion *Pelakuran*	Long *Panjang*	Low *Rendah*	Brick *Bata*
Q	Fission *Pembelahan*	Short *Pendek*	High *Tinggi*	Concrete *Konkrit*
R	Fission *Pembelahan*	Long *Panjang*	Low *Rendah*	Concrete *Konkrit*
S	Fusion *Pelakuran*	Short *Pendek*	High *Tinggi*	Brick *Bata*

Table 12 / *Jadual* 12

You are required to determine the most suitable design of nuclear reactor so that nuclear energy can be used efficiently and safely in the generation of electricity.
Study the specifications of all four designs from the following aspects:

Anda dikehendaki menentukan reka bentuk reaktor nuklear yang paling sesuai supaya tenaga nuklear boleh digunakan dengan cekap dan selamat dalam penjanaan elektrik.
Kaji spesifikasi keempat-empat reka bentuk itu daripada aspek-aspek berikut:

- Type of reaction / *Jenis tindak balas*
- Half life of nuclear fuel / *Setengah hayat bahan api nuklear*
- Specific heat capacity of the gas / *Muatan haba tentu gas*
- Material of the shield / *Bahan perisai*

Explain the suitability of the aspects and determine the most design of nuclear reactor.
Give reasons for your choice.

Terangkan kesesuaian aspek-aspek itu dan tentukan reka bentuk reaktor nuklear yang paling sesuai. Beri sebab bagi pilihan anda.

[10 marks] / [10 *markah*]

(c) (i) The radioisotope radium-226 ($^{226}_{90}\text{Ra}$) undergoes a series of decays to become the stable isotope lead-206 ($^{206}_{82}\text{Pb}$).
Determine the number of α-particles and β-particles emitted when radium-226 decays to lead-206.

Radioisotop radium-226 ($^{226}_{90}\text{Ra}$) *menjalani satu siri reputan untuk menjadi isotop yang stabil plumbum*-206 ($^{206}_{82}\text{Pb}$).
Tentukan bilangan zarah- α *dan zarah-*β *yang dipancar apabila radium*-226 *mereput menjadi plumbum*-206.

[3 marks] / [3 *markah*]

(ii) Polonium-210 is another radioisotope that decays to lead-206. The half-life of polonium-210 is 138 days.
Diagram 12.2 shows the decay of polonium-210 to lead-206.

Polonium-210 *adalah satu radioisotop lain yang mereput menjadi plumbum*-206. *Setengah hayat polonium*-210 *ialah* 138 *hari.*
Rajah 12.2 *menunjukkan reputan polonium*-210 *menjadi plumbum*-206.

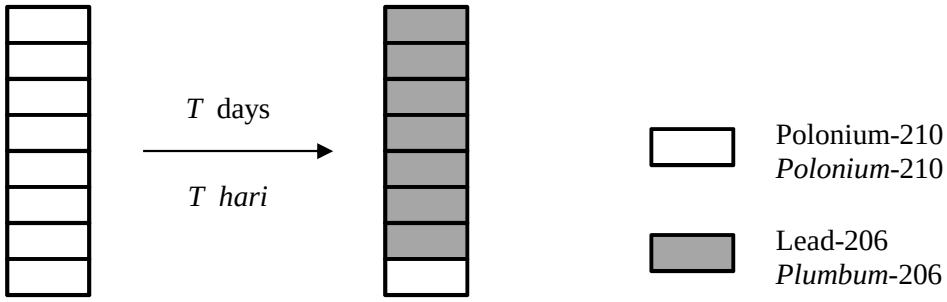


Diagram 12.2 / *Rajah* 12.2

Determine the value of *T*.
Tentukan nilai T.

[2 marks] / [2 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES

MAKLUMAT UNTUK CALON

1. This question paper consists of **three** sections: **Section A**, **Section B** and **Section C**.

   *Kertas soalan ini mengandungi **tiga** bahagian: **Bahagian** **A**, **Bahagian** **B** dan **Bahagian** **C**.*

2. Answer all questions in **Section A**. Write your answers for **Section A** in the spaces provided in the question paper.

   *Jawab semua soalan dalam **Bahagian** **A**. Tulis jawapan anda bagi **Bahagian** **A** pada ruang yang disediakan dalam kertas soalan ini.*

3. Answer **one** question from **Section B** and **one** question from **Section C**. Write your answers for **Section B** and **Section C** on the paper provided.

   *Jawab **satu** soalan daripada **Bahagian** **B** dan **satu** soalan daripada **Bahagian** **C**. Tulis jawapan anda bagi **Bahagian** **B** dan **Bahagian** **C** dalam kertas yang disediakan.*

4. Show your working, it may help you to get marks.

   Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.

5. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.

   Jika anda hendak menukar sesuatu jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.

6. The diagrams in the questions provided are not drawn to scale unless stated.

   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

7. A list of formulae is provided on page 2.

   Satu senarai formula disediakan di halaman 2.

8. The marks allocated for each question or part of a question are shown in brackets.

   Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

9. You are advised to spend 90 minutes to answer questions in **Section A**, 30 minutes for **Section B** and 30 minutes for **Section C**.

   Anda dinasihati supaya mengambil masa 90 *minit untuk menjawab soalan dalam **Bahagian** **A**,* 30 *minit untuk **Bahagian** **B** dan* 30 *minit untuk **Bahagian** **C**.*

10. You may use a scientific calculator.

    Anda dibenarkan menggunakan kalkulator saintifik.

Nama : …… Tingkatan : ……..

Set A

MODUL PENINGKATAN PRESTASI AKADEMIK SPM

TAHUN 2013

FIZIK
Kertas 3

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 **13** halaman bercetak

Section A
Bahagian A
[28 marks]
Answer **all** questions in this section.
*Jawab **semua** soalan dalam bahagian ini.*

1 A student carried out an experiment to investigate the relationship between mass, *m*, and the period of oscillation, *T*, of an inertial balance. A hacksaw blade is clamped at one end and a plasticine ball with mass 50 g is fixed at the other end. The arrangement of the apparatus for the experiment is shown in Diagram 1.1.

Seorang pelajar menjalankan suatu eksperimen untuk menyiasat hubungan antara jisim, m, dan tempoh ayunan, T, bagi sebuah neraca inersia. Sebilah gergaji diapit pada satu hujungnya dan sebiji bola plastisin berjisim 50 g *dipasang pada hujung yang satu lagi. Susunan radas adalah seperti ditunjukkan dalam Rajah* 1.1.

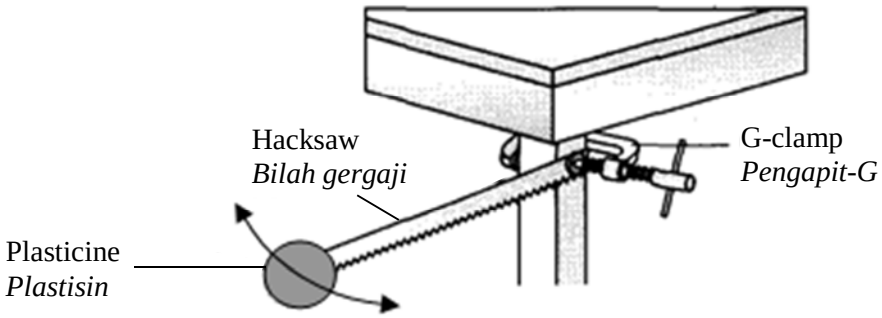
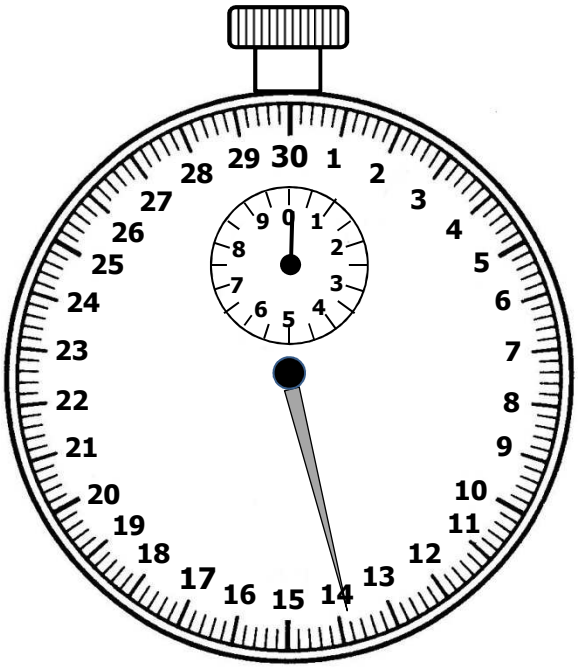


Diagram 1.1 / *Rajah* 1.1

The hacksaw blade is displaced horizontally and then released so that it oscillates. The time for 20 oscillations, *t*, is recorded using a stopwatch. The reading of the stopwatch is shown in Diagram 1.2. The experiment is repeated by using plasticine balls with masses 100 g, 150 g, 200 g and 250 g. The readings of the stopwatch are shown in Diagrams 1.3, 1.4, 1.5 and 1.6.

Bilah gergaji itu disesar secara mengufuk dan dilepaskan supaya ia berayun. Masa untuk 20 *ayunan, t, dicatat oleh sebuah jam randik. Bacaan jam randik ditunjukkan dalam Rajah* 1.2.
Eksperimen itu diulang dengan menggunakan bola plastisin berjisim 100 g, 150 g, 200 g *dan* 250 g. *Bacaan jam randik ditunjukkan dalam Rajah* 1.3, 1.4, 1.5 *dan* 1.6.

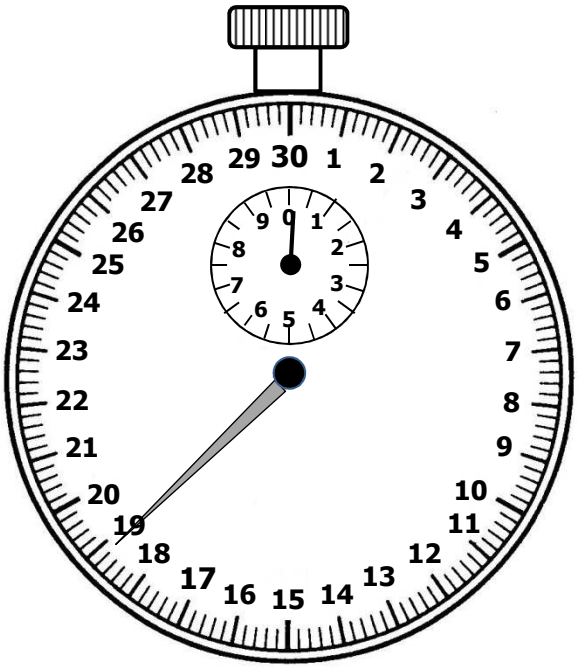


m = 50 g

t = ……..... s

T = ……. s; T^2 = ……..…. s^2

Diagram 1.2 / *Rajah* 1.2

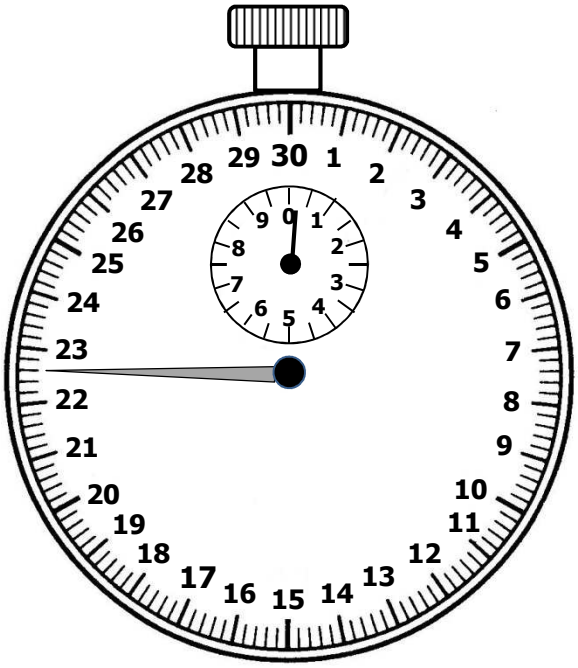


m = 100 g

t = ……..... s

T = ……. s; T^2 = ……..…. s^2

Diagram 1.3 / *Rajah* 1.3

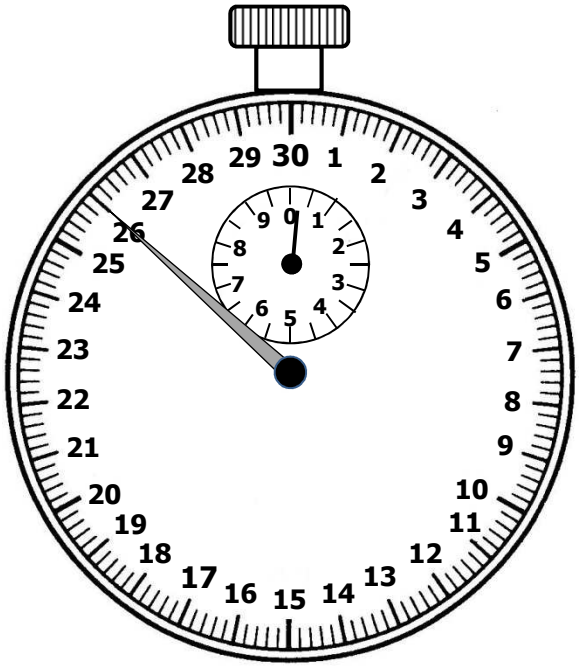


m = 150 g

t = ……..... s

T = ……. s; T^2 = ……..…. s^2

Diagram 1.4 / *Rajah* 1.4

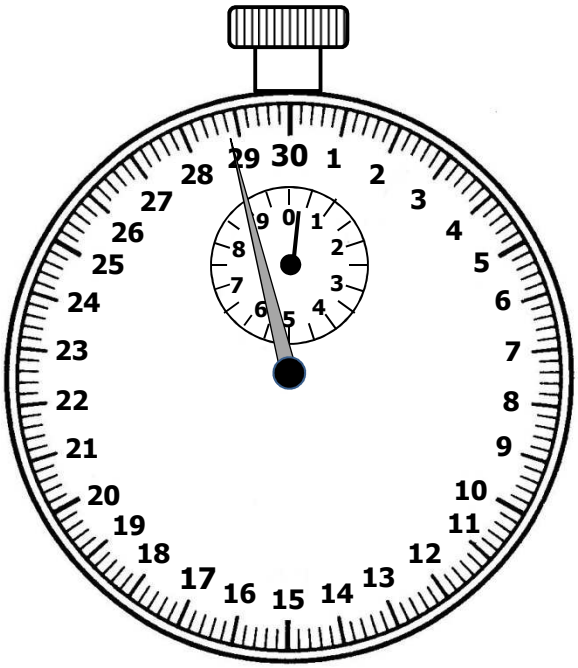


m = 200 g

t = ……..... s

T = ……. s; T^2 = ……..…. s^2

Diagram 1.5 / *Rajah* 1.5



m = 250 g

t = ……..... s

T = ……. s; T^2 = ……..…. s^2

Diagram 1.6 / *Rajah*1.6

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

(i) The manipulated variable
Pembolehubah dimanipulasikan

……. [1 mark] / [1 *markah*]

(ii) The responding variable
Pembolehubah bergerak balas

……. [1 mark] / [1 *markah*]

(iii) The constant variable
Pembolehubah dimalarkan

……. [1 mark] / [1 *markah*]

(b) For this part of the question, write your answers in the corresponding spaces provided in the diagrams.
Untuk bahagian soalan ini, tulis jawapan anda dalam ruang yang disediakan dalam rajah-rajah yang sepadan.

Based on Diagrams 1.2, 1.3, 1.4, 1.5 and 1.6 on pages 2, 3 and 4:
Berdasarkan Rajah 1.2, 1.3, 1.4, 1.5 *dan* 1.6 *pada halaman* 2, 3 *dan* 4:

(i) Record readings, t, of the stop watch.
Catat bacaan-bacaan, t, bagi jam randik. [2 marks] / [2 *markah*]

(ii) For each value of t in 1(b)(i), calculate the period of oscillation, T, by using the following equation: $T = \frac{t}{20}$.

Bagi setiap nilai t di 1(b)(i), *hitung tempoh ayunan, T, dengan menggunakan persamaan berikut*: $T = \frac{t}{20}$.

Record the value of T to two decimal places.
Catat nilai T dalam dua tempat perpuluhan. [2 marks] / [2 *markah*]

(iii) For each value of T in 1(b)(ii), calculate the value of T^2.
Bagi setiap nilai T di 1(b)(ii), *hitung nilai*, T^2.

Record the value of T^2.
Catat nilai T^2. [1 mark] / [1 *markah*]

(c) Tabulate your results for all values of m, t, T and T^2 in the space below.
Jadualkan keputusan anda bagi semua nilai m, t, T dan T^2 *dalam ruang di bawah.*

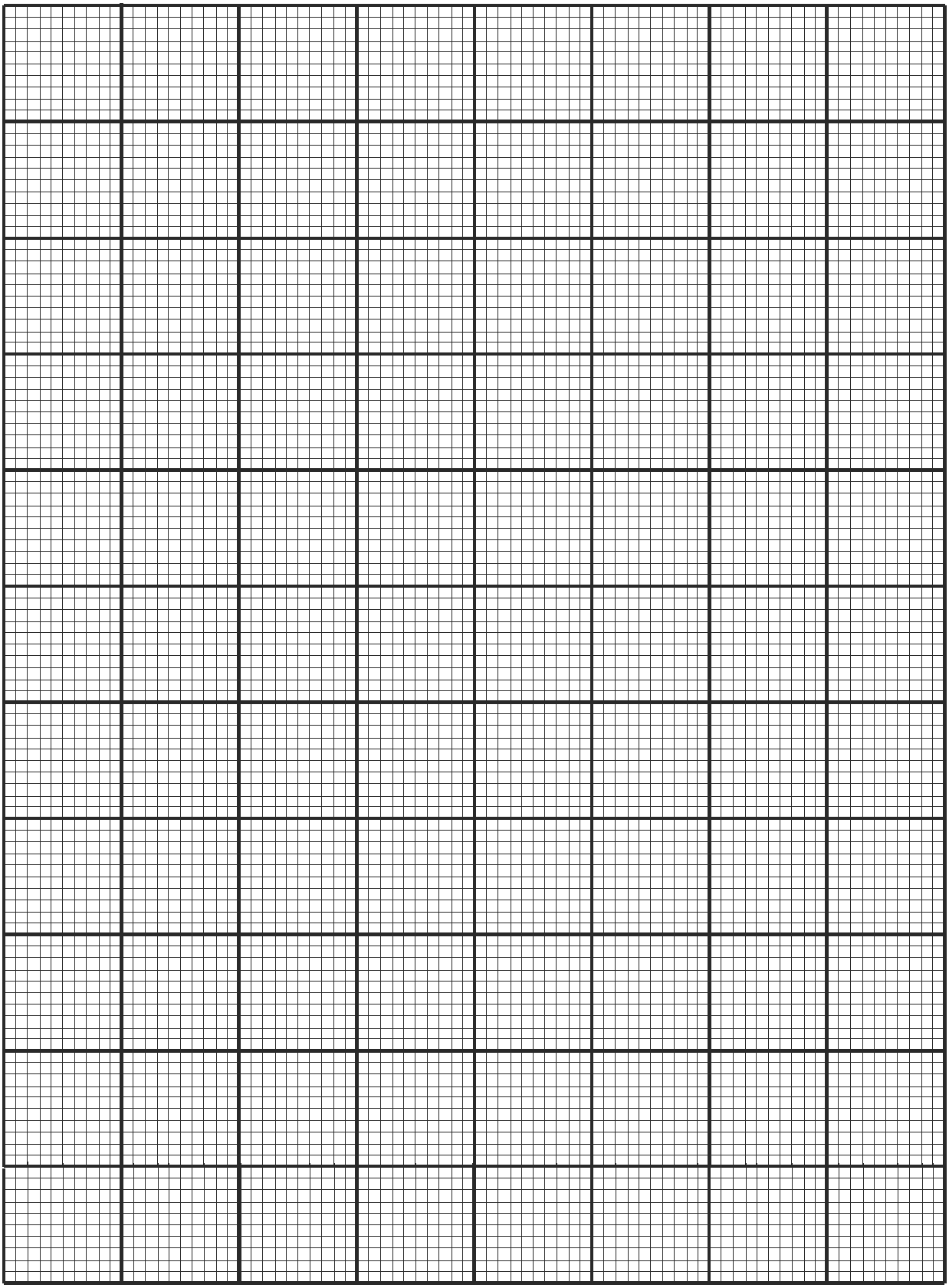
[2 marks] / [2 *markah*]

(d) On the graph paper on page 6, draw a graph of T^2 against m.
Pada kertas graf di halaman 6, *lukis graf* T^2 *melawan m.* [5 marks] / [5 *markah*]

(e) Based on the graph in 1(d), state the relationship between T^2 and m.
Berdasarkan graf di 1(d), *nyatakan hubungan antara* T^2 *dengan m.*

……
[1 mark] / [1 *markah*]

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



2 A student carried out an experiment to determine the electromotive force, *E*, and the internal resistance, *r*, of a dry cell. The student changed the resistance, *R*, of the circuit and measured the current, *I*.

The results of the experiment is shown in the graph of *R* against $\frac{1}{I}$ in Diagram 2.

Seorang pelajar menjalankan eksperimen untuk menentukan daya gerak elektrik, E, dan rintangan dalam. r, satu sel kering. Pelajar ini mengubah rintangan, R, litar itu dan mengukur arus, I.

Keputusan eksperimen ditunjukkan dalam graf R melawan $\frac{1}{I}$ *dalam Rajah* 2.

Graph of *R* against $\frac{1}{I}$ / *Graf R melawan* $\frac{1}{I}$

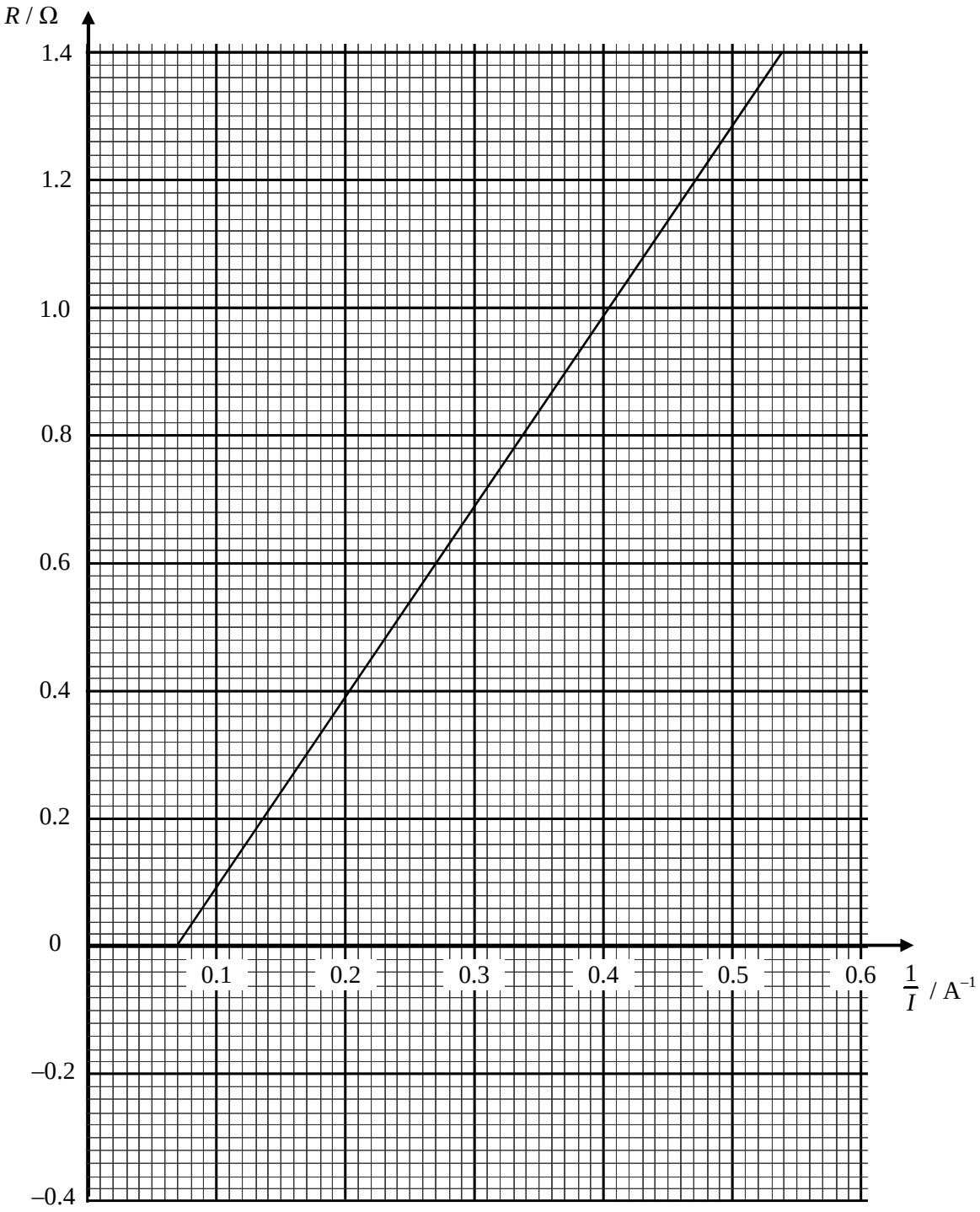


Diagram 2 / *Rajah* 2

(a) Based on the graph in Diagram 2:

State the relationship between R and $\frac{1}{I}$.

Berdasarkan graf dalam Rajah 2:

Nyatakan hubungan antara R dengan $\frac{1}{I}$.

……..…….

[1 mark] / [1 *markah*]

(b) (i) Determine the value of R when $\frac{1}{I} = 0$.

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

Tentukan nilai R apabila $\frac{1}{I} = 0$.

Tunjukkan pada graf bagaimana anda menentukan nilai R.

R = …… Ω [2 marks] / [2 *markah*]

(ii) What is the name given to the resistance when $\frac{1}{I} = 0$?

Apakah nama yang diberikan kepada rintangan itu apabila $\frac{1}{I} = 0$?

……..……. [1 mark] / [1 *markah*]

(c) Determine the current, I, in the dry cell when $R = 0.6\ \Omega$.
Show on the graph how you determine the value of I.

Tentukan arus, I, dalam sel kering apabila $R = 0.6\ \Omega$.
Tunjukkan pada graf bagaimana anda menentukan nilai I.

I = …… A [3 marks] / [3 *markah*]

(d) (i) Calculate the gradient, m, of the graph.
Show on the graph how you determine the value of m.

Hitung kecerunan graf, m.
Tunjukkan pada graf itu bagaimana anda menentukan nilai m.

m = …… [3 marks] / [3 *markah*]

(ii) The relationship between the resistance, *R*, and current, *I*, in this experiment is given by the equation $R = E\left(\frac{1}{I}\right) - r$, where E is the electromotive force of the dry cell.
State the value of *E*.

Hubungan antara rintangan, R dan arus, I, untuk eksperimen diberikan oleh persamaan $R = E\left(\frac{1}{I}\right) - r$, *yang mana E ialah daya gerak elektrik sel kering itu.*
Nyatakan nilai E.

E = …… V [1 mark] / [1 *markah*]

(e) State one precaution that can be taken to improve the accuracy of the results of the experiment.
Nyatakan satu langkah berjaga-jaga yang boleh diambil untuk memperbaiki kejituan keputusan eksperimen ini.

.....

.....
[1 *mark*] / [1 *markah*]

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

3 Diagram 3 shows part of a dam. The wall at the bottom is made thicker to withstand higher pressure.

Rajah 3 *menunjukkan sebahagian daripada sebuah empangan. Dinding di bahagian bawah dibuat lebih tebal untuk menahan tekanan yang lebih tinggi.*

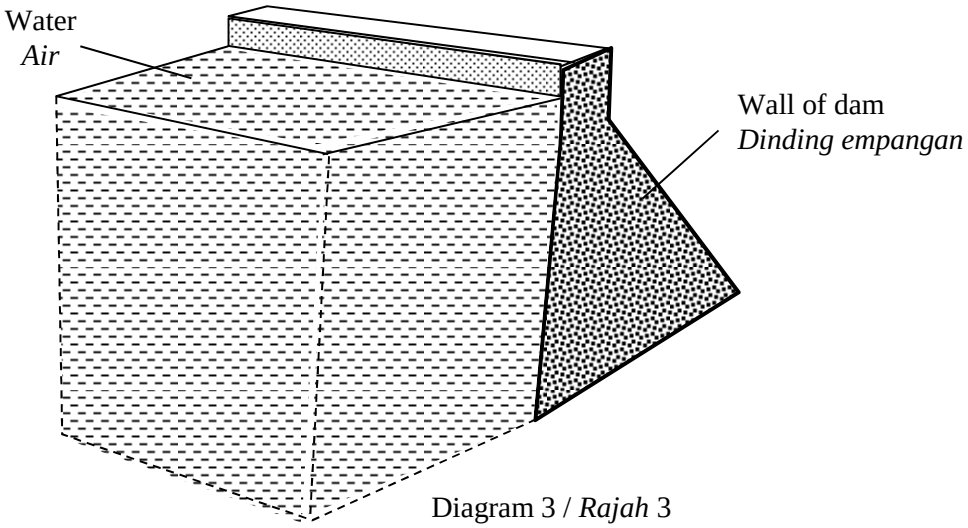


Diagram 3 / *Rajah* 3

Based on the information given and considering the pressure in the water:

Berdasarkan maklumat yang diberi dan mempertimbang tekanan dalam air:

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

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

(c) With the use of apparatus such as a thistle funnel, a tall glass jar, manometer and other apparatus, describe an experiment to investigate the hypothesis stated in 3(b).

Dengan menggunakan radas seperti corong tisel, balang kaca tinggi, manometer dan radas lain, terangkan satu eksperimen untuk menyiasat hipotesis yang dinyatakan di 3(b).

In your description, state clearly the following:

Dalam penerangan anda, nyatakan dengan jelas perkara berikut:

(i) The aim of 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 of the experiment which include **one** method of controlling the manipulated variable and **one** method of measuring the responding variable.

Prosedur eksperimen termasuk **satu** *kaedah mengawal pembolehubah dimanipulasi dan* **satu** *kaedah 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] / [10 *markah*]

4 Diagram 4.1 shows the transformer in the adaptor of a laptop computer.
Diagram 4.2 shows the transformer in the adaptor of a small LED television.
Both transformers have identical primary coils.

Rajah 4.1 *menunjukkan transformer di dalam penyesuai bagi sebuah komputer riba.*
Rajah 4.2 *menunjukkan transformer di dalam penyesuai bagi sebuah televisyen* LED *yang kecil*
Kedua-dua tranformer mempunyai gegelung primer yang serupa.

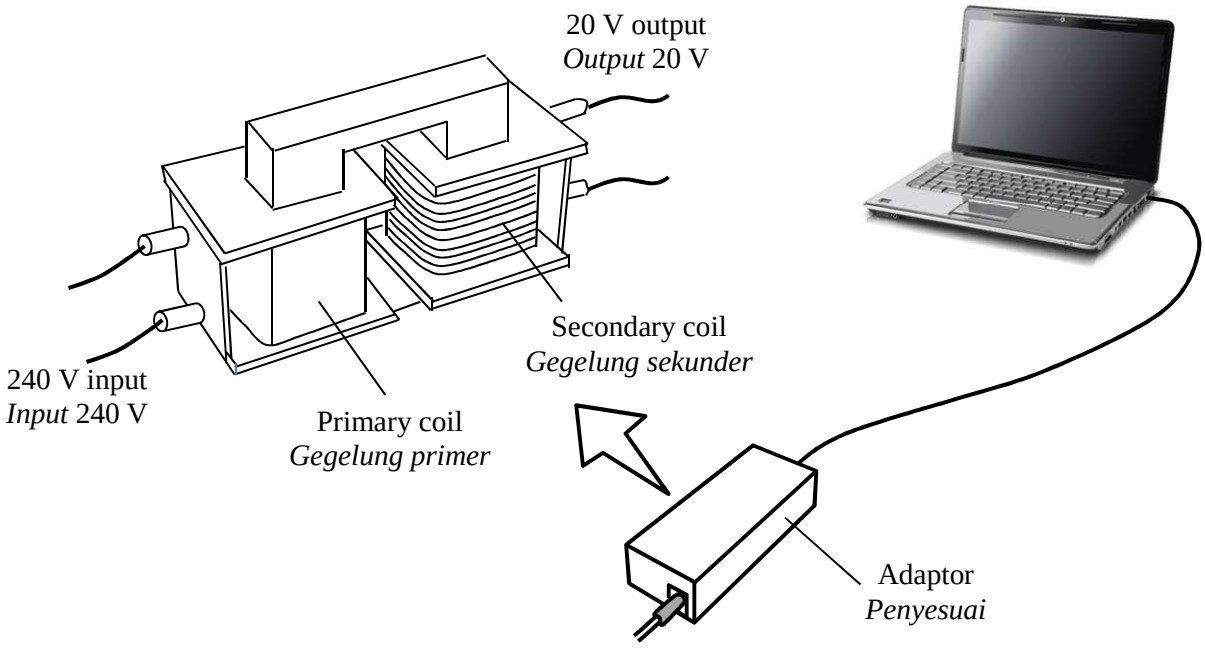


Diagram 4.1 / *Rajah* 4.1

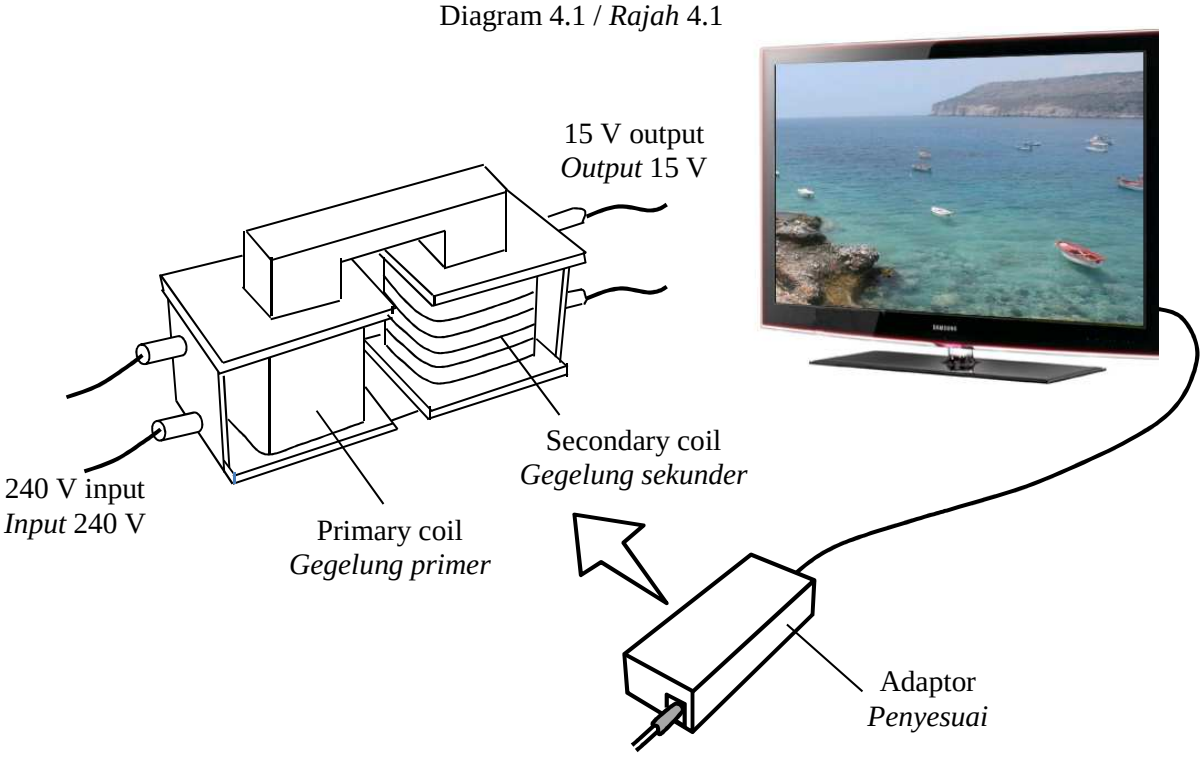


Diagram 4.2 / *Rajah* 4.2

Observe the secondary coils and output voltage in both transformers.

Perhatikan gegelung sekunder dan voltan output bagi kedua-dua transformer.

Based on your observation:

Berdasarkan pemerhatian anda:

(a) State one suitable inference.

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

(b) State one suitable hypothesis.

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

(c) With the use of copper coils, C-shaped soft iron core and other apparatus, describe one experiment to investigate the hypothesis stated in 4(b).

Dengan menggunakan gegelung-gegelung kuprum, teras besi lembut berbentuk-C *dan radas lain, terangkan satu eksperimen untuk menyiasat hipotesis yang dinyatakan di* 4(b).

In your description, state clearly the following:

Dalam penerangan anda, nyatakan dengan jelas perkara berikut:

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

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

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

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

(v) The procedure of the experiment which should include **one** method of controlling the manipulated variable and **one** method of measuring the responding variable.

*Prosedur eksperimen yang mesti termasuk **satu** kaedah mengawal pembolehubah dimanipulasikan dan **satu** kaedah 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] / [10 *markah*]

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES

MAKLUMAT UNTUK CALON

1. This question paper consists of **two** sections: **Section A** and **Section B**.
   *Kertas soalan ini mengandungi **dua** bahagian: **Bahagian** **A** dan **Bahagian** **B**.*

2. Answer all questions in **Section A**. Write your answers for **Section A** in the spaces provided in this question paper.
   *Jawab semua soalan dalam **Bahagian** **A**. Tulis jawapan anda bagi **Bahagian** **A** pada ruang yang disediakan dalam kertas soalan ini.*

3. Answer any **one** question from **Section B**. Write your answers for **Section B** on the paper provided. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.
   *Jawab mana-mana **satu** soalan daripada **Bahagian** **B**. Tulis jawapan anda bagi **Bahagian** **B** pada kertas yang disediakan.*
   Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.

4. Show your working, it may help you to get marks.
   Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.

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

6. The marks allocated for each question or part of a question are shown in brackets.
   Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

7. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
   Jika anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.

8. You may use a scientific calculator.
   Anda dibenarkan menggunakan kalkulator saintifik.

9. You are advised to spend 60 minutes to answer questions in **Section A** and 30 minutes for **Section B**.
   Anda dinasihati supaya mengambil masa 60 *minit untuk menjawab soalan dalam **Bahagian** **A** dan* 30 *minit untuk **Bahagian** **B**.*

Set A

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM

TAHUN 2013

FIZIK

Kertas 1

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

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

Set A

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM

TAHUN 2013

FIZIK

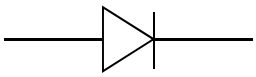
Kertas 2

PERATURAN PEMARKAHAN

Peraturan pemarkahan ini mengandungi **9** halaman bercetak

SECTION A

NO.	MARKING CRITERIA	MARK	
		SUB	TOTAL
1(a)	**State the sensitivity correctly** - 0.01 cm	1	**1**
(b)	**Match the quantities with the parts correctly** - Internal diameter - X - Thickness - Y	1 1	**2**
(c)	**State the instrument correctly** - Micrometer screw gauge	1	**1**
			4
2(a)	**State the quantity represented by each finger correctly** - Thumb - Force Forefinger - Magnetic field Middle finger - Current	1	**1**
(b) (i)	**Underline the answer** - X to Y	1	
(ii)	**Mark the direction of the magnetic force** - Refer diagram : ←	1	
(iii)	**State the change of the magnitude** - Increases	1	
(iv)	**State the method correctly** - Reverse the direction of the current // Reverse the poles of the magnet	1	**4**
			5
3(a)	**State the form of energy correctly** - Elastic potential energy	1	**1**
(b)	**Show the correct substitution** - Work done, W = 2 x ($\frac{1}{2}Fx$) = 2 x ($\frac{1}{2}$ x 6 x 0.2) **Correct answer and unit** - 1.2 J	1 1	**2**
(c) (i)	**State the conversion of energy correctly** - Elastic potential energy → Kinetic energy	1	
(ii)	**Show the correct substitution** $\frac{1}{2}mv^2 = 2 \times (\frac{1}{2}Fx)$ $\frac{1}{2} \times 0.012 \times v^2 = 1.2$ **Correct answer and unit** 14.14 m s^{-1}	1 1	**3**
			6

NO.	MARKING CRITERIA	MARK SUB	MARK TOTAL
4(a)	**Show the method correctly** - 2 division x 1 V/div	1	
	Correct answer and unit - 2 V	1	**2**
(b) (i)	**Draw the symbol in box A correctly** 	1	
(ii)	**State the function correctly** - To allow current flow in one direction only	1	**2**
(c) (i)	**State the function of the capacitor correctly** - To smoothen the voltage / current	1	
(ii)	**Draw the shape of the signal correctly** - Horizontal line // A line joining the peak of one pulse to another	1	
	Show correct amplitude - 2 divisions	1	**3**
			7
5(a)	**State the meaning correctly** - Heat required to change the temperature of one unit of mass of a substance by $1^{o}C$	1	**1**
(b) (i)	**State the physical quantity correctly** - Temperature	1	
(ii)	**Explain the reason correctly** - The thermometer needs some time to achieve thermal equilibrium with the liquid	1	**2**
(c) (i)	**Compare the specific heat capacity correctly** - Specific heat capacity of Y is higher than X	1	
(ii)	**Compare the final readings correctly** - Final reading of thermometer in liquid X is higher than in Y	1	
(iii)	**Compare the change in temperature correctly** - The change in temperature of liquid X is higher than Y	1	
(iv)	**State the relationship correctly** - The higher the specific heat capacity, the smaller the change in temperature	1	**4**
(d)	**State the choice correctly** - Liquid Y	1	**1**
			8

NO.	MARKING CRITERIA	MARK	
		SUB	TOTAL
6(a)	**State the meaning of angle of incidence correctly**		
	- Angle between the incident ray and the normal	1	**1**
(b) (i)	**Compare the angles correcly**		
	- $\alpha_1 = \alpha_2$	1	
(ii)	**Compare the angles correcly**		
	- $\beta_1 = \beta_2$	1	
(iii)	**State the relationship correctly**		
	- Angle of incidence equals to angle of reflection	1	
(iv)	**State the law correctly**		
	- Law of reflection	1	**4**
(c) (i)	**State the change to the distance between the wavefronts correctly**		
	- Decreases	1	
(ii)	**State the change to the speed correctly**		
	- The speed of the wave remains unchanged	1	**2**
(d)	**State one of the applications correctly**		
	- Example : Sonar system // Ultrasound scanner	1	**1**
			8
7(a)	**State the physic principle correctly**		
	- Bernoulli's principle	1	**1**
(b) (i)	**Compare the pressures correctly**		
	- Pressure at Q is lower than P	1	
(ii)	**Explain the difference in pressure correctly**		
	- The cross sectional area at Q is smaller than at P	1	
	- The speed of air flow at Q is higher than at P	1	**3**
(c)	**Show the correct substitution**		
	- Pressure difference, $\Delta P = h \rho g = (0.05)(1000)(10)$	1	
	Correct answer and unit		
	- 500 Pa	1	**2**
(d)	**State the suggestion 1 and the reason correctly**		
	- Increase the speed of the air flow		
	- Difference in pressure between P and Q is higher	2	
	State the suggestion 2 and the reason correctly		
	- Reduce the cross sectional area of Q		
	- Speed of air flow at Q is higher	2	**4**
			10

NO.	MARKING CRITERIA	MARK	
		SUB	TOTAL
8(a)	**State a suitable material of heating element**		
	- Nichrome	1	**1**
(b) (i)	**State the meaning of the specification correctly**		
	- The hair dryer consumes 1000 J of energy in every second when it is connected to a 240 V supply	1	
(ii)	**Show the correct substitution**		
	- $I = \frac{P}{V} = \frac{1000}{240}$	1	
	Correct answer and unit		
	- 4.17 A	1	
(iii)	**State the choice correctly**		
	- 5A fuse	1	**4**
(c)	**Explain the situation correctly**		
	- When only switch B is closed, cool air is blown towards the wet hair	1	
	- When both switches A and B are closed, hot air is blown towards the wet hair	1	
	- Rate of evaporation increases	1	**3**
(d) (i)	**State the observations when both switches A and B are off**		
	- Diagram 8.2 : The fan stops	1	
	- Diagram 8.3: The fan rotates	1	
(ii)	**State the choice correctly**		
	- Diagram 8.3	1	
	State the reason correctly		
	- The fan rotates as long as the main switch is on // To prevent over heating of the hair dryer	1	**4**
			12

SECTION B

NO	MARKING CRITERIA	MARK SUB	MARK TOTAL
9(a)	**State the meaning correctly** - Product of mass and velocity // mass × velocity	1	1
(b) (i)	**State the speed correctly** - decreases	1	
(ii)	**State the comparison of total momentum correctly** - Equal	1	
(iii)	**State the principle correctly** - Principle of Conservation of Momentum	1	
(iv)	**State the comparison of kinetic energy correctly** - Smaller after collision	1	
(v)	**State the type of collision correctly** Inelastic collision	1	5
(c) (i)	**State the explanation correctly** - Increase the stopping time of the driver - Reduce the impulsive force acting on the driver // - Applies a force over the body of the driver to stop the motion of the driver - Prevents the driver from being thrown forward	1 1	
(ii)	**Suggestion of another feature correctly with reason** - Any suitable feature - Correct reason	1 1	4
(d)	**State the mass of the bicycle and reason correctly** - Smaller mass - Higher acceleration // $a \propto \frac{1}{m}$	1+1	
	State the type of material of the body of the bicycle and reason correctly - Low density // name the material - Lighter mass	1+1	
	State the width of the tyre in contact with the road surface and reason correctly - Wider - Bicycle more stable	1+1	
	State the type of braking system and reason correctly - Hydraulic disc brake (Reject caliper rim brake) - Can stop the bicycle in a short distance more effectively	1+1	
	State the attire or accessories of the cyclist and reason correctly - Wear tight attire // glove // helmet - To reduce air resistance // Better grip on handles // Protect the head from injury during a fall	1+1	10
			20

NO	MARKING CRITERIA	MARK	
		SUB	TOTAL
10(a) (i)	**State the comparison correctly** - The diameter of the solenoid in Diagram 10.2 is bigger	1	1
(ii)	**State the comparison correctly** - The deflection of the galvanometer pointer in Diagram 10.2 is bigger	1	
(iii)	**State the comparison correctly** - The rate of cutting of the magnetic flux in Diagram 10.2 is higher	1	
(iv)	**State the relationship correctly** - The higher the rate of cutting of the magnetic field, the higher the induced current	1	
(v)	**State the law correctly** - Faraday's Law	1	5
(b) (i)	**State the meaning correctly** - Current produced when a conductor cuts a magnetic field	1	
(ii)	**State the explanation correctly** - The coil is stationary	1	
(iii)	**Name the type of current correctly** - a.c.	1	
(iv)	**State the explanation correctly** - The direction of the magnetic flux that cuts the coil changes constantly - The current produced constantly changes in direction	1 1	5
(c) (i)	**State the type of core and reason correctly** - Soft iron core - Easily magnetized and demagnetized	1+1	
	State the thickness of coil wire and reason correctly - Thick - Reduces the resistance of the coil	1+1	
	State the strength of magnet and reason correctly - Stronger - To increase the rate of cutting of the magnetic flux / field	1+1	
	State the diameter of wheel grip and reason correctly - Smaller - Magnet rotates faster // To increase the rate of cutting of the magnetic flux	1+1	
	State the number of turns of the coil and reason correctly - More turns - Cuts more magnetic flux / field	1+1	10
			20

SECTION C

NO	MARKING CRITERIA	MARK	
		SUB	TOTAL
11(a) (i)	**State the incident angle correctly** - 45^{o}	1	
(ii)	**Correct substitution for critical angle** $\frac{1}{\sin 42}$ // $n = \frac{1}{\sin 42}$	1	
	State the answer correctly 1.49	1	
(iii)	**Correct path for light ray A**	1	
	Correct path for light ray B	1	
(iv)	**State the phenomenon correctly** Total internal reflection	1	6
(b)	**State the temperature of the layer of air correctly** - The layer of air near the ground is hotter	1	
	State the density of the layer of air correctly - The layer of air near the ground is less dense	1	
	State the refraction of light ray correctly - Light ray from the sky passing the layers of air is refracted away from the normal // Diagram	1	
	State the phenomenon correctly - Light ray undergoes total internal reflection when the incident angle is greater than the critical angle // Diagram	1	4
(c)	**State the choice and reason of focal length of objective lens correctly** 1 Long 2 To produce a higher magnification	1+1	
	State the choice and reason of diameter of objective lens correctly 3 Big 4 To receive more light // to produce a brighter image	1+1	
	State the choice and reason of type of eyepiece correctly 5 Convex 6 As a magnifying glass // To magnify the image produced by the objective lens	1 + 1	
	State the choice and reason of power of eyepiece correctly 7 High 8 To produce bigger / magnified image	1 + 1	
	State most suitable set of lenses and justification correctly 9 R 10 Objective lens with long focal length and big diameter and convex lens for eyepiece with high power	1+1	10
			20

NO.	MARKING CRITERIA	MARK	
		SUB	TOTAL
12(a) (i)	**State the meaning correctly** - Number or proton in a nucleus	1	
(ii)	**State the radiation correctly** - Beta particle	1	
(iii)	**Write the equation correctly** - $^{239}_{93}\text{Ne} \longrightarrow {}^{239}_{94}\text{X} + {}^{0}_{-1}\text{e}$	1	
(iv)	**Explain how energy is released correctly** - loss in mass, m - converted into energy by the formula $E = mc^2$	1 1	5
(b)	**State the suitable type of reason and reason correctly** 1 Fission 2 Reaction can occur at lower temperature // chain reaction can occur easily	1+1	
	State the suitable half life and reason correctly 3 Long 4 No need to replace often	1+1	
	State the suitable specific heat capacity of gas and reason correctly 5 Low 6 Heat up faster // transfer heat faster to water	1+1	
	State the suitable material of the shield and reason correctly 7 Concrete 8 Less leakage of radiation // Good absorber of radiation	1+1	
	State most suitable choice of design and justification correctly 9 R 10 Fission, long half life, low SHC and made of concrete.	1+1	10
(c) (i)	**State any one of the equations correctly** $^{226}_{90}\text{Ra} \rightarrow {}^{206}_{82}\text{Pb} + \text{m}\,{}^{4}_{2}\text{He} + n\,{}^{o}_{-1}e$ // $226 = 206 + 4m$ $90 = 82 + 2m - n$ //	1	
	State the number of alpha particles correctly - 5	1	
	State the number of beta particles correctly - 2	1	
(ii)	**State the number of half lives correctly** 3	1	
	State the answer with unit correctly 414 days	1	5
			20

Set A

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM

TAHUN 2013

FIZIK

Kertas 3

PERATURAN PEMARKAHAN

SECTION A

NO	MARKING CRITERIA	MARK SUB	MARK TOTAL
1(a) (i)	**State the manipulated variable** - mass / m	1	
(ii)	**State the responding variable** - time for 20 oscillations / t // period / T // T^2	1	
(iii)	**State a constant variable** - length of hacksaw blade // Force constant // distance between plasticine and G-clamp	1	3
(b) (i)	**Record five values of t** Diagram 1.2 : 13.8 Diagram 1.3 : 18.8 Diagram 1.4 : 22.6 Diagram 1.5 : 26.0 Diagram 1.6 : 28.8 Note: Any three readings correct, award 1 mark	2	2
(ii)	**Record five T consistent in 2 decimal places** Diagram 1.2 : 0.69 Diagram 1.3 : 0.94 Diagram 1.4 : 1.13 Diagram 1.5 : 1.30 Diagram 1.6 : 1.44 Note: Not consistent readings award 1 mark Accept e.c.f. from (b)(i)	2	2
(iii)	**Record five values of T^2** Diagram 1.2 : 0.48 Diagram 1.3 : 0.88 Diagram 1.4 : 1.28 Diagram 1.5 : 1.69 Diagram 1.6 : 2.07	1	1
(c)	**Tabulate the results** - Heading for m, t , T and T^2 - State all the units of m, t , T and T^2 correctly	1 1	2

m / g	t / s	T / s	T^2 / s^2
50	13.8	0.69	0.48
100	18.8	0.94	0.88
150	22.6	1.13	1.28
200	26.0	1.30	1.69
250	28.8	1.44	2.07

<table>
<tr>
<td>(d)</td>
<td>
Draw a complete graph of T^2 against m

Tick (✓) based on the following aspects

A Show T^2 on vertical-axis and m on the horizontal-axis
B State the units of the variables correctly
C Both axes are marked with uniform scale
D All five points are plotted correctly
(Note: If only three points plotted correctly, award ✓)
E Best straight line is drawn
F Show the minimum size of graph at least 5 x 4
(2 cm x 2 cm) square
(counted from the origin until the 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>
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<tr>
<td>(e)</td>
<td>State the correct relationship between T^2 and m
T^2 increases linearly with m</td>
<td>1</td>
<td>1</td>
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<td>16</td>
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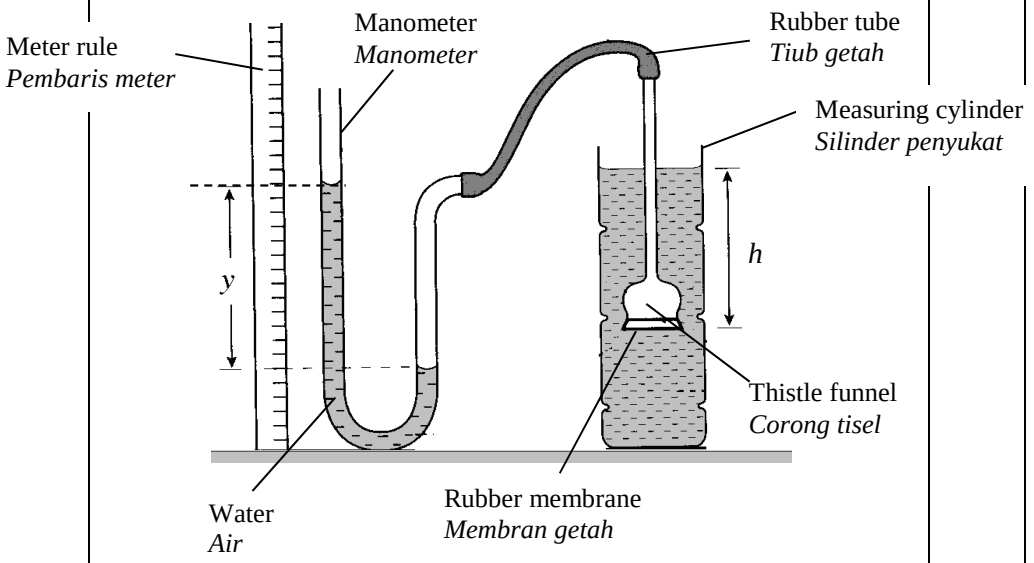
NO	MARKING CRITERIA	MARK	
		SUB	TOTAL
2(a) (i)	**State the relationship between *T* and x**		
	- R increases linearly with $\frac{1}{I}$	1	1
(b) (i)	**State the value of R when $\frac{1}{I} = 0$**		
	- Show graphical extrapolation correctly	1	
	- State the value of R = - 0.2 Ω // 0.2 Ω	1	
(ii)	**State the name correctly**		
	- Internal resistance / *r* / *-r*	1	3
(c)	**State the value of *I* when *R* = 0.6 Ω within the acceptable range**		
	- Show graphical intrapolation correctly	1	
	- State the value $\frac{1}{I}$ within acceptable range	1	
	$\frac{1}{I}$ = (0.26 – 0.28) A^{-1}		
	- State the value *I* within acceptable range *I* = (3.6 – 3.8) A	1	3
(d) (i)	**Calculate the gradient of the graph, *m* and state the value of *m* within the acceptable range**		
	- Draw a sufficiently large triangle at least 3 x 3 (2 cm x 2 cm) square	1	
	- Correct substitution (follow candidate's triangle) Sample answer: $m = \frac{1.28 - 0}{0.5 - 0.07}$	1	
	- State the correct value / answer with correct unit (2.95 – 3.05) ΩA / V	1	
(ii)	**State the value of *E* correctly using the given formula** *E* = gradient = (2.95 – 3.05) Accept e.c.f. for *m*	1	4
(e)	**State the correct precaution**		
	- Ensure all the connections in the circuits are tight - Place the eyes perpendicularly to the scale of voltmeter and the ammeter - Repeat the experiments and calculate the average value	1	1
			12

SECTION B

NO	MARKING CRITERIA	MARK SUB	MARK TOTAL
3 (a)	**State a suitable inference** - Depth affects the pressure in a liquid // Depth affects the thickness of the wall	1	1
(b)	**State a relevant hypothesis** - The bigger the depth, the higher the pressure in the liquid.	1	1
(c)	**Describe a complete suitable experimental framework**		
(i)	<u>State the aim of experiment</u> To investigate the relationship between the depth of water and its pressure	1	
(ii)	<u>State the manipulated variable and the responding variable</u> Manipulated variable : Depth Responding variable : Pressure (height between water levels in a manometer)	1	
	<u>State the constant variable</u> Constant variable : density of water	1	
(iii)	<u>List out the important apparatus and materials</u> Metre rule, manometer, measuring cylinder, water, thistle funnel, rubber membrane	1	
(iv)	<u>Draw a functional arrangement of apparatus</u>	1	
			
(v)	<u>State the method to control the manipulated variable</u> Push the thistle funnel into the water to a depth, h = 10 cm.	1	
	<u>State the method to measure the responding variable</u> Measure the height, y, between the water levels in the manometer with a metre rule.	1	
	<u>Repeat the experiment at least four times</u> Repeat steps 1 and 2 with h = 20 cm, 30 cm, 40 cm and 50 cm	1	

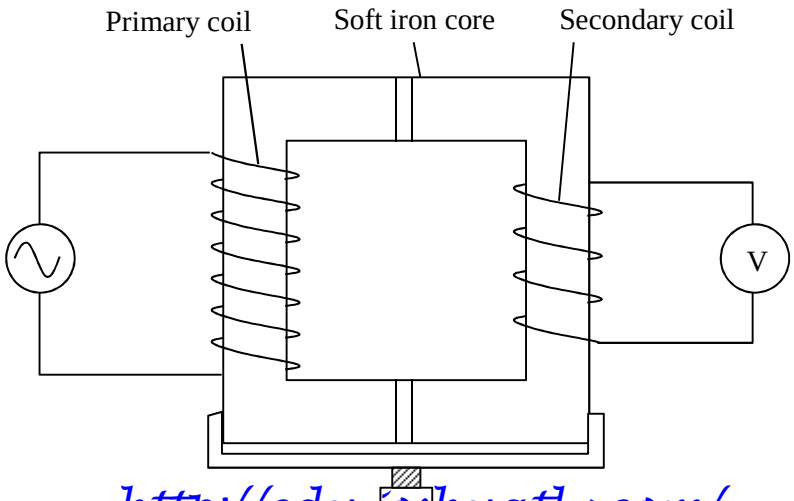
(vi) State how the data is tabulated

h	*y*
10	
20	
30	
40	
50	

1

(vii) State how the data is analysed
Plot a graph of *y* against *h*. 1 10

12

NO	MARKING CRITERIA	MARK SUB	MARK TOTAL
4 (a)	**Able to state a suitable inference** The number of turns of wire in the secondary coil affects the output voltage	1	1
(b)	**Able to state a suitable hypothesis** The greater the number of turns of wire in the secondary coil, the greater the output voltage	1	1
(c)	**Able to describe a complete experimental framework**		
(i)	State the aim of experiment To investigate the relationship between number of turns of wire in the secondary coil and the output voltage	1	
(ii)	State the manipulated variable and the responding variable		
	Manipulated : number of turns of wire in secondary coil, N **Responding :** output voltage, V	1	
	State the constant variable The number of turns of wire in the primary coil	1	
(iii)	State the complete list of apparatus and materials		
	(AC) voltmeter , ac power supply	1	
(iv)	Draw a functionable arrangement of the apparatus		
		1	

(v) State the method of controlling the manipulated variable

1. Use 900-turns copper coil as the primary coil and 100 turns of secondary coil of a transformer — 1

State the method of measuring the responding variable

2. The switch is on and the output voltage is measured by using a voltmeter. — 1

Repeat the experiment at least four times

3. The experiment is repeated by using copper coil with 200 turns, 300 turns, 400 turns and 500 turns as the secondary coil and same number of primary coil. — 1

(vi) Tabulate the data — 1

Number of turns of wire in secondary coil, N	Output voltage, V / V
100	
200	
300	
400	
500	

(vii) State how data is analysed

A graph of V against N is drawn — 1

10

12