4531/1
Physics
Paper 1
August/September
2014
1 ¼ hours

MAKTAB RENDAH SAINS MARA

PEPERIKSAAN SIJIL PENDIDIKAN MRSM 2014

PHYSICS

Paper 1

One hour and fifteen minutes

4 5 3 1 - 1

DO NOT OPEN THIS QUESTION BOOKLET UNTIL TOLD TO DO SO

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

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

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

This question booklet consists of 47 printed pages and 1 blank page

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

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

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

    Kuasa, $P = \frac{tenaga}{masa}$
18. $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

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

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

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

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

22. $Q = It$

23. $V = \dfrac{E}{Q}$

24. $V = IR$

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

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

27. Efficiency / *Kecekapan* $= \dfrac{I_s V_s}{I_p V_p} \times 100\%$

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

29. $c = 3.0 \times 10^8 \text{ m s}^{-1}$

1 A vector quantity has

Kuantiti vektor mempunyai

A Direction only
Arah sahaja

B Magnitude only
Magnitud sahaja

C Magnitude or direction
Magnitud atau arah

D Magnitude and direction
Magnitud dan arah

2 Potential difference, V between two points is given by

Beza keupayaan, V di antara dua titik ialah

$$V = \frac{W}{Q}$$

What is the S.I. unit of V ?

Apakah unit S.I. bagi V ?

A $V\ C^{-1}$

B V C

C $J\ C^{-1}$

D J C

3 Which of the following shows the correct pair of derived quantity and base quantities?

Antara berikut yang manakah menunjukkan pasangan kuantiti terbitan dan kuantiti asas yang betul?

	Derived quantity ***Kuantiti terbitan***	**Base quantities** ***Kuantiti asas***
A	Density *Ketumpatan*	Mass, time *Masa, jisim*
B	Force *Daya*	Mass, length *Jisim, panjang*
C	Pressure *Tekanan*	Mass, time, length *Jisim, masa, panjang*
D	Specific heat capacity *Muatan haba tentu*	Mass, time, temperature *Jisim, masa, suhu*

4 Diagram 1 shows the distribution of gunshots fired on a target board.

Rajah 1 menunjukkan taburan kesan tembakan pada sebuah papan sasar.

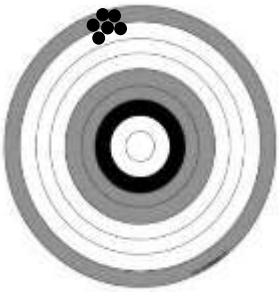


Diagram 1
Rajah 1

Which of the following explains the gunshots distribution on the target board correctly?

Manakah di antara berikut menerangkan taburan kesan tembakan pada papan sasar yang betul?

	Accuracy ***Kejituan***	**Consistency** ***Kepersisan***
A	High *Tinggi*	High *Tinggi*
B	High *Tinggi*	Low *Rendah*
C	Low *Rendah*	High *Tinggi*
D	Low *Rendah*	Low *Rendah*

5 Diagram 2 shows a graph of T^2 againts l.

Rajah 2 *menunjukkan graf* T^2 melawan l.

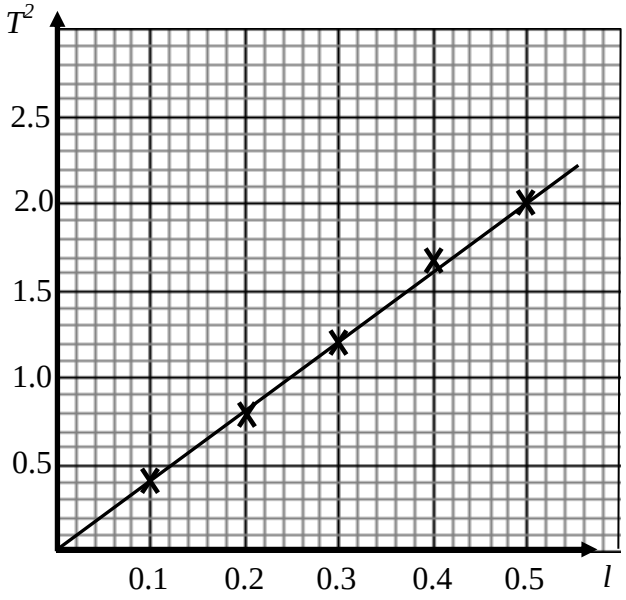


Diagram 2
Rajah 2

Which of the following is the correct equation for the graph?

Manakah di antara berikut adalah persamaan yang betul bagi graf ini?

A $l = 4T^2$

B $T^2 = 4l$

C $l = 0.2T^2$

D $T^2 = 0.2l$

6 Diagram 3.1 shows the speedometer of a car at 11.00 am.
Diagram 3.2 shows the speedometer of the car at 11.05 am.

Rajah 3.1 *menunjukkan meter kelajuan sebuah kereta pada jam 11.00 pagi.*
Rajah 3.2 *menunjukkan meter kelajuan kereta tersebut pada jam 11.05 pagi.*

Diagram 3.1
Rajah 3.1

Diagram 3.2
Rajah 3.2

Which of the following is correct about the acceleration of the car?

Antara berikut yang manakah betul mengenai pecutan kereta tersebut?

A Zero
Sifar

B Constant
Malar

C Increasing
Bertambah

D Decreasing
Berkurang

7 Diagram 4 shows the velocity-time graph of a car.

Rajah 4 *menunjukkan graf halaju-masa sebuah kereta.*

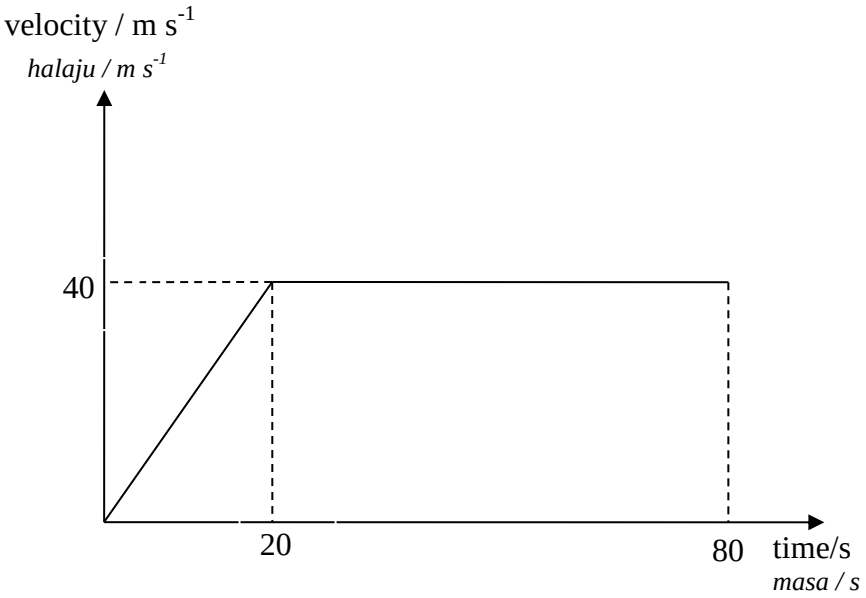


Diagram 4
Rajah 4

How far does the car travel before it reaches a constant velocity?

Berapa jauhkan kereta itu bergerak sebelum ia mencapai halaju seragam?

A 240 m

B 400 m

C 640 m

D 3200 m

8 Diagram 5.1 shows toy car A moving at velocity, *u* while toy car B is at rest. After collision both toy cars move together at velocity, *v* as shown in Diagram 5.2. Both cars have the same mass.

Rajah 5.1 *menunjukkan sebuah kereta mainan A bergerak pada suatu halaju, u manakala kereta mainan B adalah pada keadaan pegun.*
Selepas perlanggaran kedua-dua kereta mainan bergerak bersama-sama pada halaju,v seperti pada Rajah 5.2.
Jisim kedua-dua kereta adalah sama.

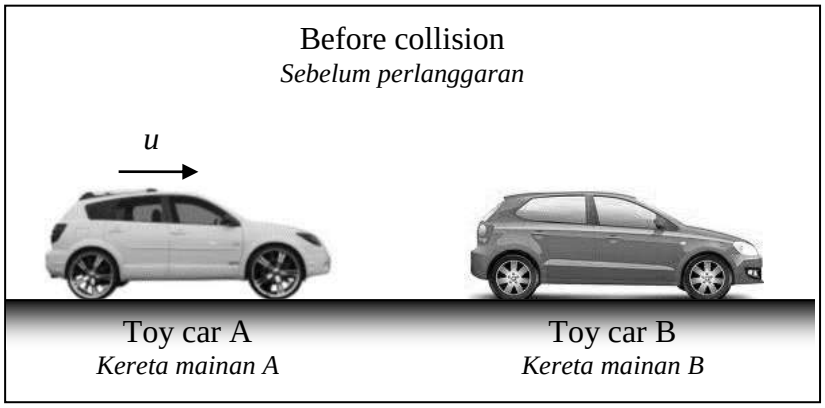


Diagram 5.1
Rajah 5.1

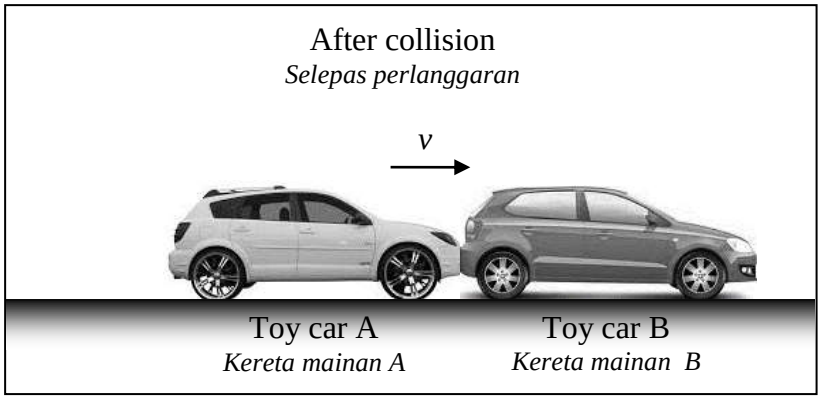


Diagram 5.2
Rajah 5.2

Which statement is correct?

Pernyataan yang manakah betul?

A The collision is an elastic collision
Perlanggaran itu adalah perlanggaran kenyal

B The total momentum before and after collision are the same
Jumlah momentum sebelum dan selepas perlanggaran adalah sama

C The total kinetic energy before and after the collision are the same
Jumlah tenaga kinetik sebelum dan selepas perlanggaran itu adalah sama

D The momentum of each toy car before and after collision are the same
Momentum setiap kereta mainan sebelum dan selepas perlanggaran adalah sama

[Turn over

9 Diagram 6 shows X and Y connected by a string over a smooth pulley. When the system is released, X and Y accelerate at 4 m s^{-2}.

Rajah 6 *menunjukkan X dan Y yang dihubungkan oleh seutas tali melalui satu takal licin. Apabila sistem dilepaskan, X dan Y memecut pada* 4 m s^{-2}.

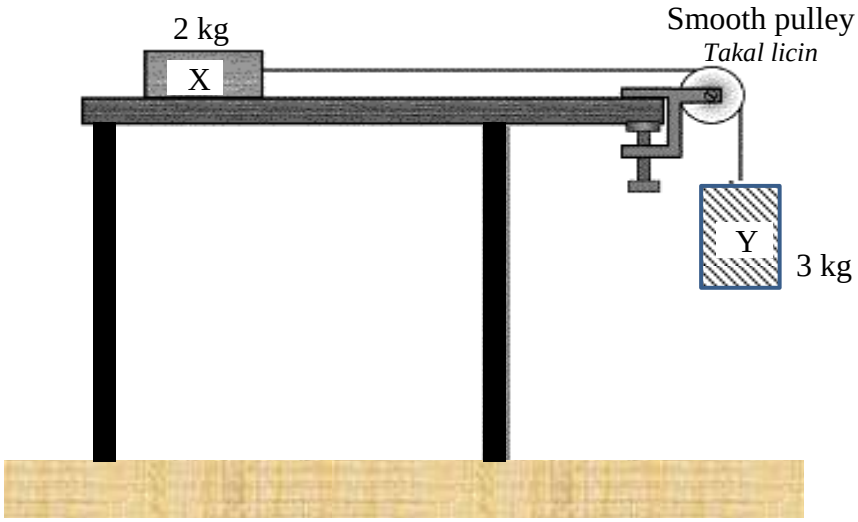


Diagram 6
Rajah 6

What is the frictional force between X and the table surface?
Berapakah daya geseran di antara X dan permukaan meja?

A 1.0 N

B 5.0 N

C 6.5 N

D 10.0 N

10 Diagram 7 shows a high jump athlete landing onto a mattress.

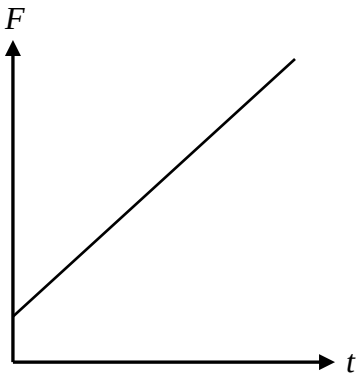
Rajah 7 menunjukkan seorang atlet lompat tinggi jatuh di atas sebuah tilam.

Diagram 7
Rajah 7

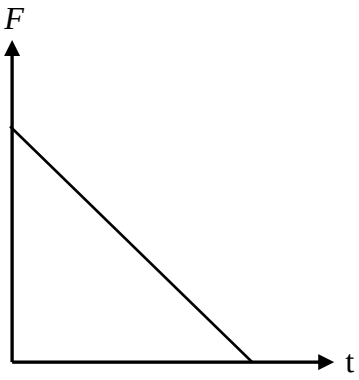
Which graph shows the correct relationship between the impulsive force, *F* and the time of impact, *t* acting on the athlete upon landing?

Graf manakah yang menunjukkan hubungan yang betul antara daya impuls, F dan masa perlanggaran, t ke atas atlet semasa mendarat?

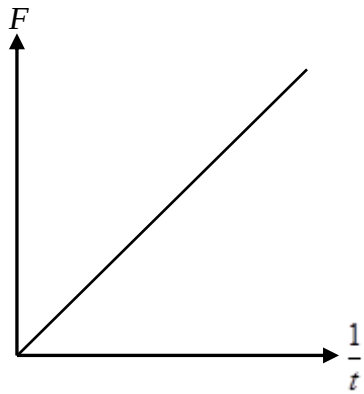
A



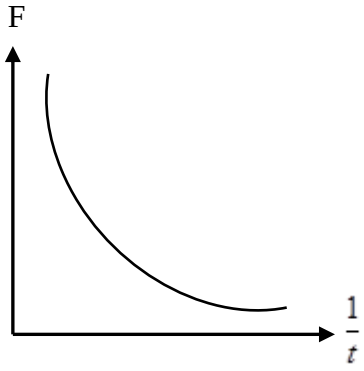
B



C



D



11 Diagram 8 shows a cyclist cycling down a slope from a height of 3 m. Mass of the cyclist is 60 kg and mass of the mountain bike is 5 kg.

Rajah 8 *menunjukkan seorang penunggang basikal yang berada pada ketinggian* 3m *menuruni suatu curam. Jisim penunggang basikal ialah* 60 kg *dan jisim basikal gunung ialah* 5 kg.

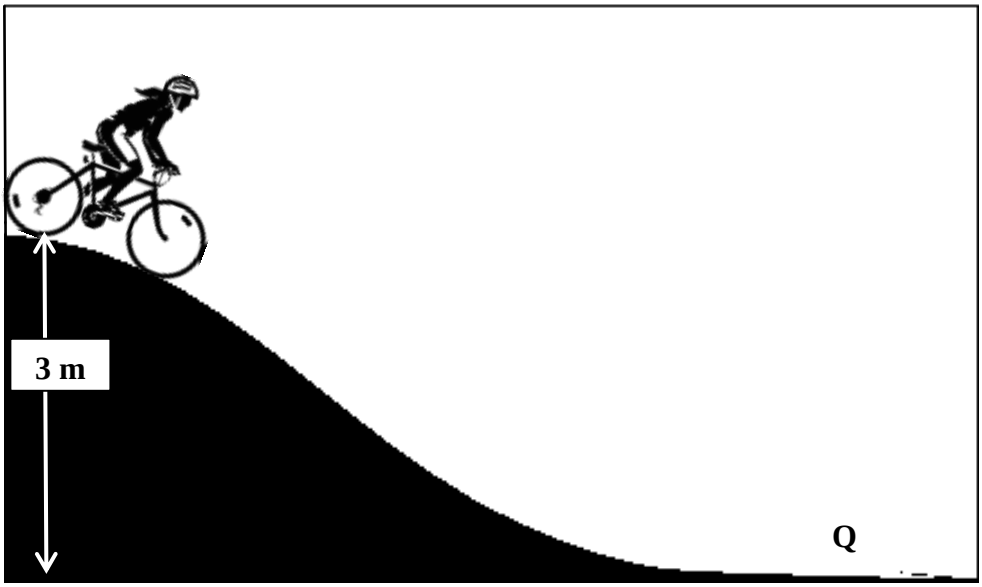


Diagram 8
Rajah 8

What is the velocity of the mountain bike at point Q?

Apakah kelajuan basikal gunung tersebut pada kedudukan Q?

A 7.7 m s^{-1}

B 26.8 m s^{-1}

C 60.0 m s^{-1}

D 720.0 m s^{-1}

12 Diagram 9 shows four spring arrangements. All the springs are identical.

Rajah 9 *menunjukkan empat susunan spring. Semua spring adalah serupa.*

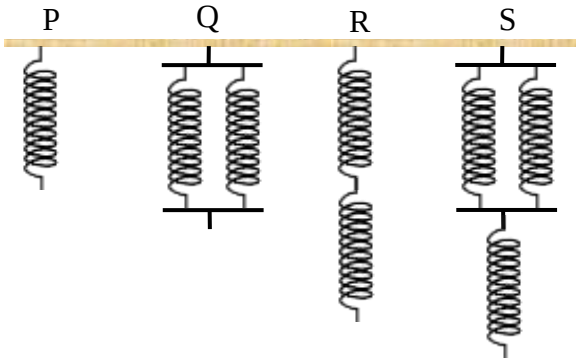
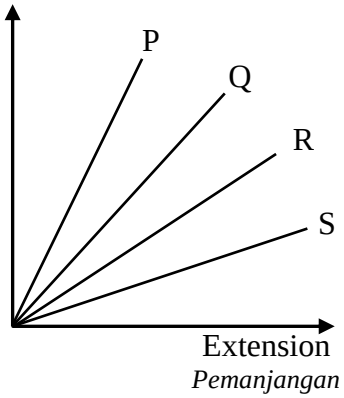


Diagram 9
Rajah 9

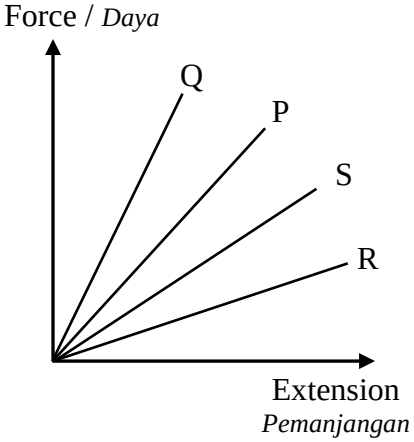
Which group of force-extension graph is correct for P, Q, R and S if 1 kg loads are attached to each spring?

Graf daya-sesaran manakah yang betul bagi P, Q, R dan S jika beban 1 kg *dikenakan pada setiap susunan spring tersebut?*

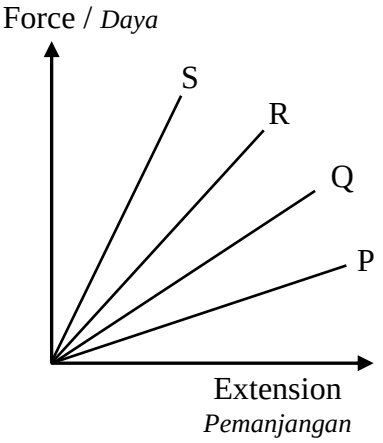
A



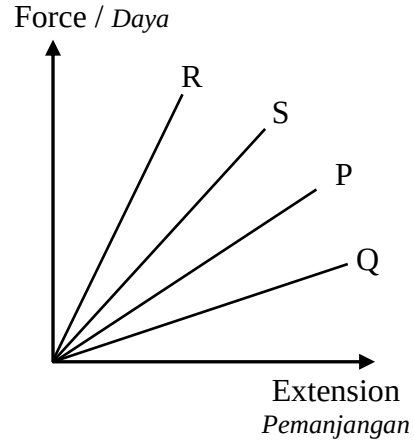
B



C



D



13 What is the meaning of pressure?

Apakah maksud tekanan?

A The normal force acting on a unit area
Daya normal yang bertindak pada seunit luas

B The normal force acting on an object
Daya normal yang bertindak ke atas suatu objek

C The product of normal force and the area it acts on
Hasil darab daya normal dan luas permukaan di mana daya itu bertindak

D The sum of normal forces acting on an area
Jumlah daya normal yang bertindak secara seragam ke atas satu luas permukaan

14 Diagram 10 shows a manometer connected to a gas supply. The liquid X has a density of 1000 kg m^{-3}.

Rajah 10 *menunjukkan sebuah manometer yang disambungkan kepada suatu bekalan gas. Ketumpatan cecair X adalah* 1000 kg m^{-3}.

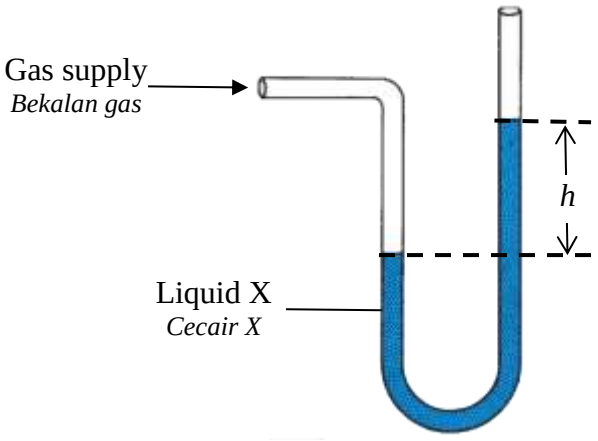


Diagram 10
Rajah 10

What happens to *h* if liquid X is replaced with another liquid which has a density of 789 kg m^{-3} ?

Apakah yang berlaku kepada h jika cecair X digantikan dengan suatu cecair yang mempunyai ketumpatan 789 kg m^{-3}*?*

A Increases
Bertambah

B Decreases
Berkurang

C No change
Tiada perubahan

15 Diagram 11 shows the water supply system to a house on a hill. The storage tank cannot get adequate water supply from the main tank.

Rajah 11 *menunjukkan sistem bekalan air ke sebuah rumah di atas bukit. Tangki simpanan tidak menerima bekalan air yang mencukupi daripada tangki utama.*

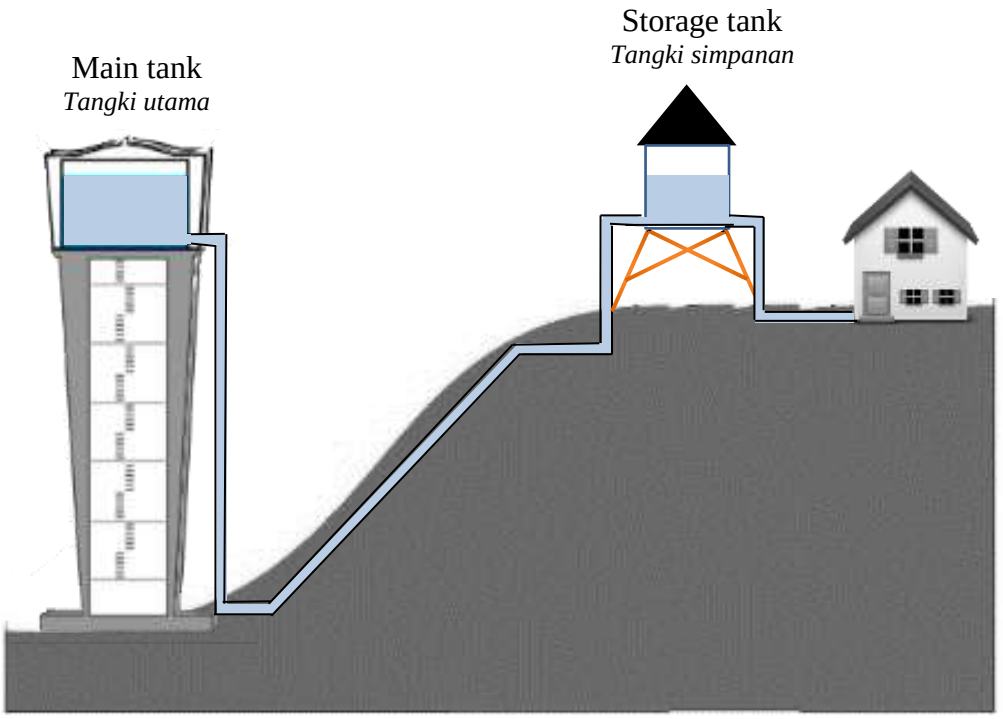


Diagram 11
Rajah 11

Which statement explains the situation?

Pernyataan manakah yang menerangkan situasi tersebut ?

A Pressure of water in the storage tank is higher than in the main tank
Tekanan air di dalam tangki simpanan lebih tinggi daripada di dalam tangki utama

B Pressure of water in the storage tank is lower than in the main tank
Tekanan air di dalam tangki simpanan lebih rendah daripada di dalam tangki utama

C Water level in the storage tank is equal to water level in main tank
Paras air di dalam tangki simpanan sama dengan paras air di dalam tangki utama

D Water level in the storage tank is lower than the water level in main tank
Paras air di dalam tangki simpanan lebih rendah daripada paras air di dalam tangki utama

16 Diagram 12 shows several mountaineers climbing mount Everest.

Rajah 12 *menunjukkan beberapa orang pendaki gunung mendaki gunung Everest.*

Diagram 12
Rajah 12

Why do the climbers have difficulty breathing at the top of the mountain?

Mengapakah pendaki-pendaki tersebut mengalami kesukaran untuk bernafas apabila berada di puncak gunung?

A The air layer is thicker
Lapisan udara menebal

B The air density is lower
Ketumpatan udara adalah lebih rendah

C The air temperature is lower
Suhu udara adalah lebih rendah

D The atmospheric pressure is higher
Tekanan atmosfera adalah lebih tinggi

17 Diagram 13 shows a car's hydraulic braking system.

Rajah 13 *menunjukkan sistem brek hidraulik sebuah kereta.*

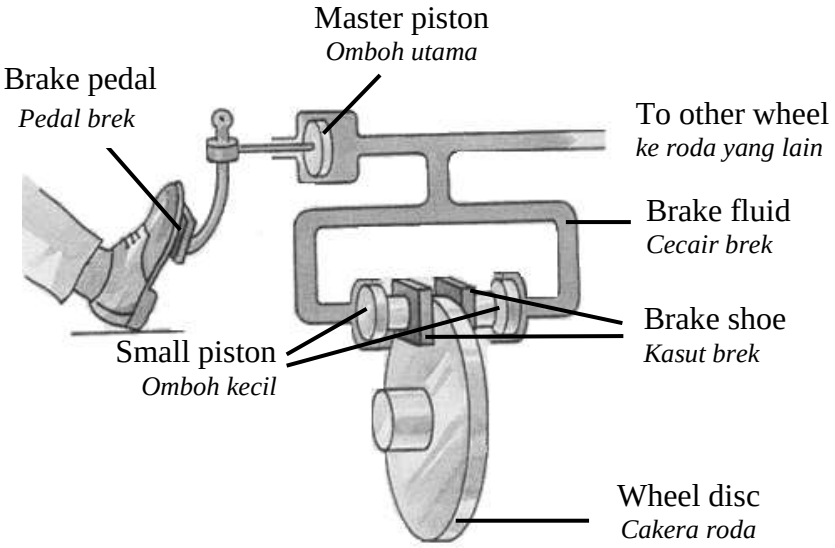


Diagram 13
Rajah 13

Why does the brake shoe grip the wheel disc when the brake pedal is pressed?

Mengapakah kasut brek mencengkam cakera roda apabila brek ditekan?

A The force on the brake pedal is transmitted uniformly in the brake fluid
Daya ke atas pedal brek dipindahkan secara seragam di dalam cecair brek

B The pressure on each small piston is bigger than the pressure on the master piston
Tekanan ke atas setiap omboh kecil adalah lebih besar berbanding tekanan ke atas omboh utama

C The pressure on the brake pedal is transmitted uniformly in the brake fluid
Tekanan ke atas pedal brek dipindahkan secara seragam di dalam cecair brek

D The force on the brake pedal compresses the brake fluid
Daya ke atas pedal brek memampat cecair brek

18 Diagram 14 shows a hot air balloon floating at a constant altitude. The mass of the hot air balloon is 750 kg. The volume of the balloon is 1000 m^3 and the density of the surrounding air is 1.25 kg m^{-3}.

Rajah 14 *menunjukkan sebuah belon udara panas terapung pada satu altitud tetap. Jisim belon udara panas ialah* 750 kg. *Isipadu belon ialah* 1000 m^3 *dan ketumpatan udara sekeliling ialah* 1.25 kg m^{-3}.

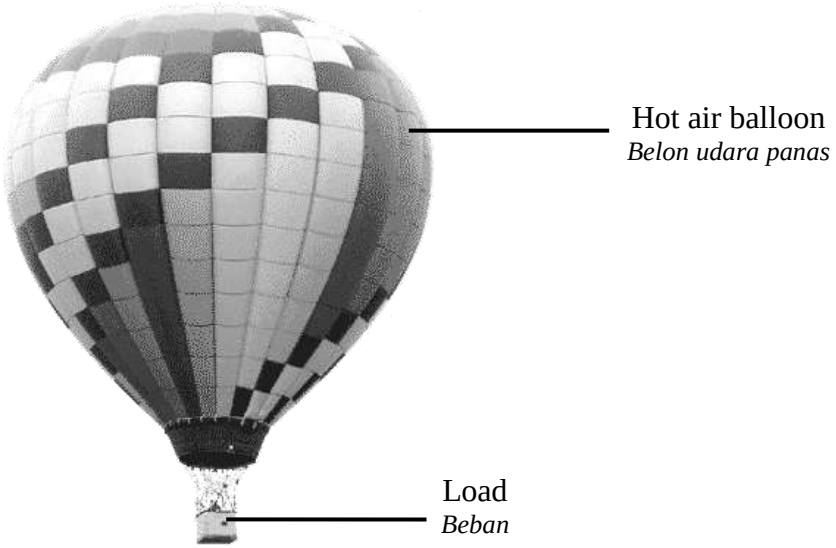


Diagram14
Rajah 14

What is the weight of the load?

Berapakah berat beban?

A 1.25×10^4 N

B 1.18×10^4 N

C 7.50×10^3 N

D 5.00×10^3 N

19 Diagram 15 shows water flowing into a venturi tube.

Rajah 15 *menunjukkan air mengalir melalui tiub venturi.*

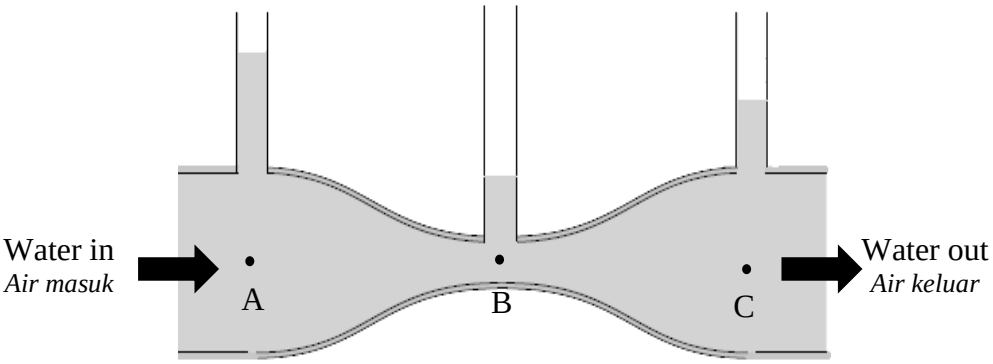


Diagram 15
Rajah 15

At which point is the velocity of water the highest?

Pada titik manakah halaju air paling tinggi?

20 Diagram 16 shows a cup of hot tea.

Rajah 16 *menunjukkan secawan air teh panas.*

Diagram 16
Rajah 16

Compare the temperature of the hot tea and the cup when they are in thermal equilibrium?

Bandingkan suhu air teh panas dan cawan apabila keduanya berada dalam keseimbangan terma.

A Temperature of hot tea = Temperature of cup
Suhu air teh panas = Suhu cawan

B Temperature of hot tea < Temperature of cup
Suhu air teh panas < Suhu cawan

C Temperature of hot tea > Temperature of cup
Suhu air teh panas > Suhu cawan

21 Diagram 17 shows a 240 V, 1960 W steam iron being used to iron a shirt.

Rajah 17 *menunjukkan sebuah seterika wap* 240 V, 1960 W *yang digunakan untuk menggosok kemeja.*

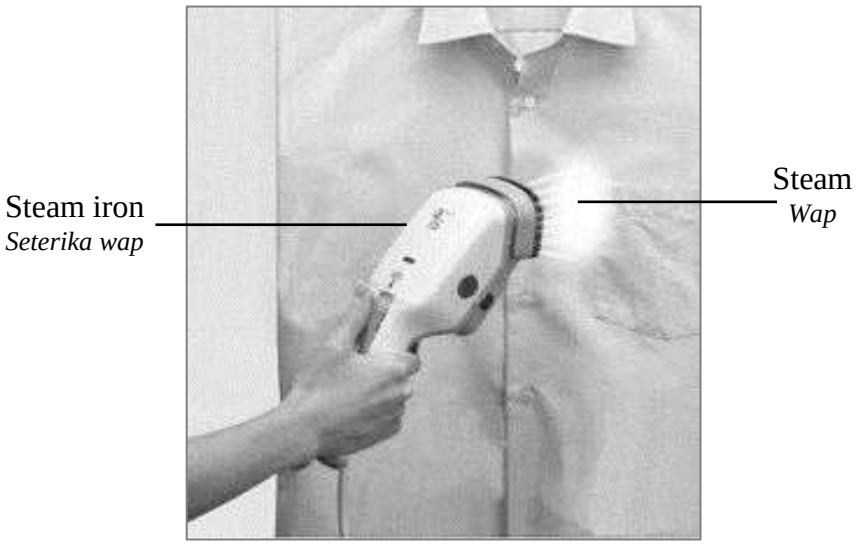


Diagram 17
Rajah 17

What is the time taken to change 500 g of water at 100° C to steam at 100° C?
[Specific latent heat of vaporization of water = 2.26 x10^6 J kg^{-1}]

Berapakah masa yang diambil untuk menukarkan 500 g *air* 100° C *kepada stim pada suhu* 100° C*?*
[Haba pendam tentu pengewapan air = 2.26 x10^6 J kg^{-1} *]*

A 5.77 x 10^5 s

B 4.52 x 10^3 s

C 1.15 x 10^3 s

D 5.77 x 10^2 s

22 Diagram 18 shows four gas jars which contain the same amount of gas particles and at room temperature.

Rajah 18 *menunjukkan empat kelalang gas yang mempunyai jumlah zarah gas yang sama dan berada pada suhu bilik.*

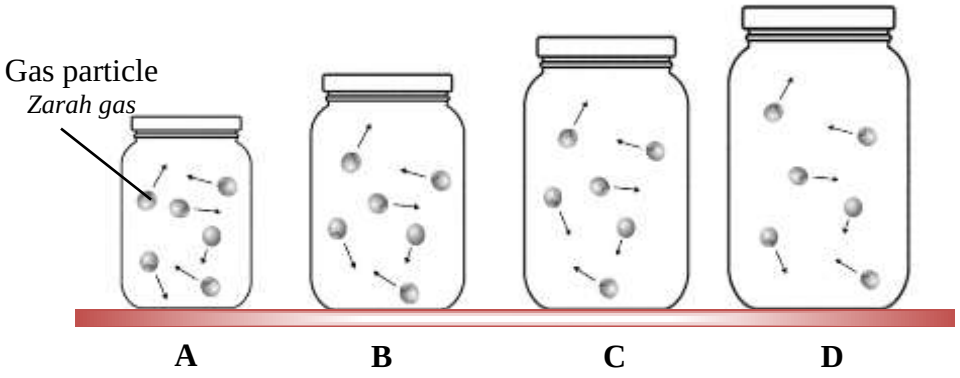


Diagram 18
Rajah 18

Which jar has the highest gas pressure?

Kelalang manakah mempunyai tekanan gas paling tinggi?

23 A car tyre contains air at a pressure of 1.25 x 10^5 Pa when the temperature is 27°C. Once the car has been running for a while, the temperature of the air in the tyre rises to 42°C.

Tayar sebuah kereta berisi udara pada tekanan 1.25 x 10^5 Pa *apabila suhu adalah* 27°C. *Setelah bergerak untuk suatu tempoh, suhu udara dalam tayar meningkat ke* 42°C.

What is the tyre's air pressure?

Berapakah tekanan udara dalam tayar?

A 8.04 x 10^4 Pa

B 1.19 x 10^5 Pa

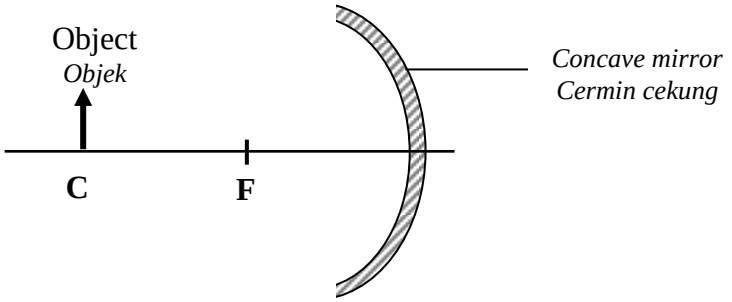
C 1.31x 10^5 Pa

D 1.94 x 10^5 Pa

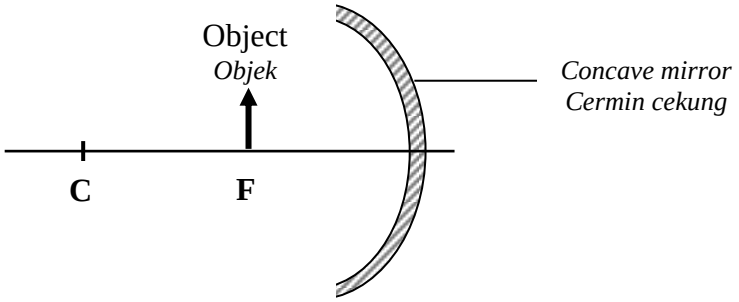
24 Which object position will produce a real, inverted and bigger image for a concave mirror?
F is the focal point of the mirror while C is its center of curvature.

Manakah antara kedudukan objek berikut akan menghasilkan imej yang nyata, songsang dan lebih besar bagi cermin cekung?
F ialah titik fokus bagi cermin itu manakala C adalah pusat kelengkungannya.

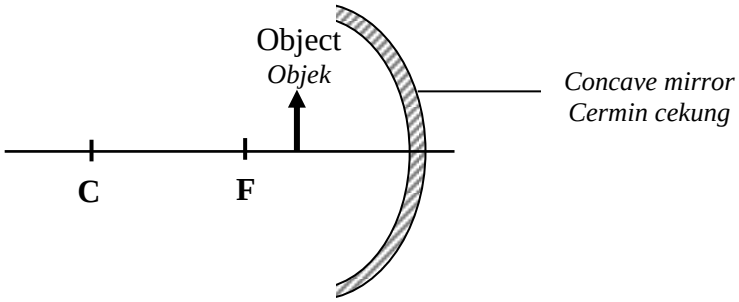
A



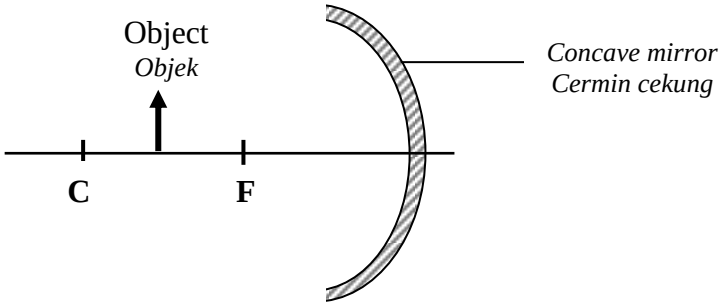
B



C



D



25 Diagram 19 shows the image of numbers through the spectacle.

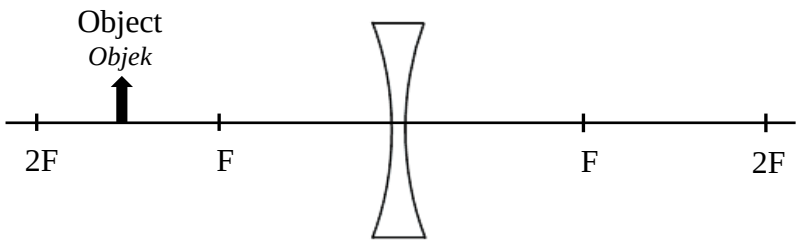
Rajah 19 *menunjukkan imej nombor menerusi sebuah kacamata.*

Diagram 19
Rajah 19

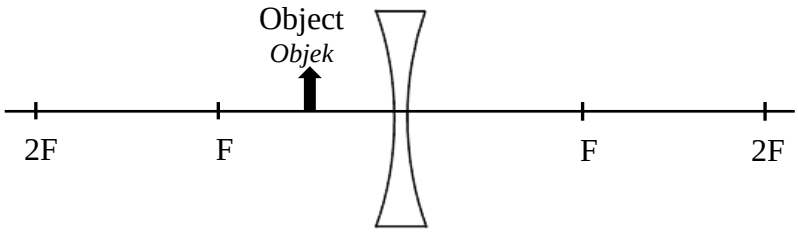
Which lens and object position is correct for Diagram 19?

Kanta dan kedudukan objek yang manakah adalah betul bagi Rajah 19?

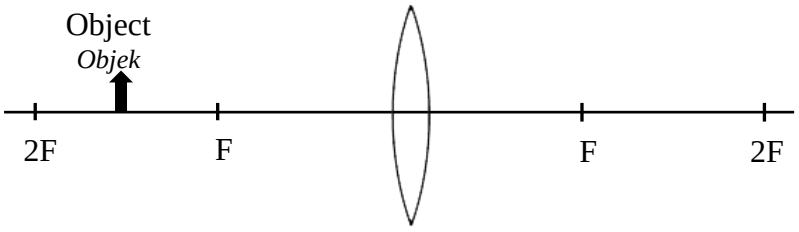
A



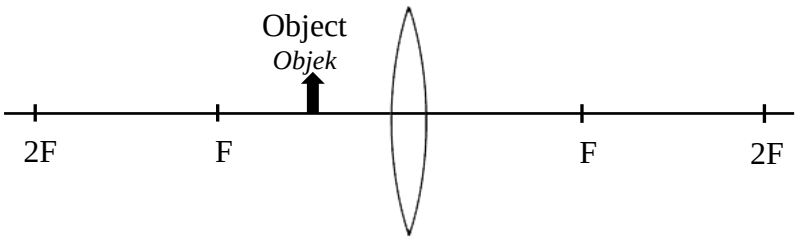
B



C



D



26 Diagram 20 shows four optical devices.

Rajah 20 *menunjukkan empat alat optik.*

P  Periscope *Periskop*	**Q**  Telescope *Teleskop*
R  Endoscope *Endoskop*	**S**  Microscope *Mikroskop*

Diagram 20
Rajah 20

Which device uses total internal reflection?

Alat manakah yang menggunakan pantulan dalam penuh?

A P and Q
P dan Q

B P and R
P dan R

C Q and S
Q and S

D Q and R
Q and R

27 Diagram 21 shows a load hanging from a spring. The spring is stretched to point **P** and released. It vibrates between points **P** and **Q**.

Rajah 21 *menunjukkan satu beban yang digantung pada satu spring. Spring diregangkan ke titik P dan dilepaskan. Ia bergetar di antara titik P dan Q.*

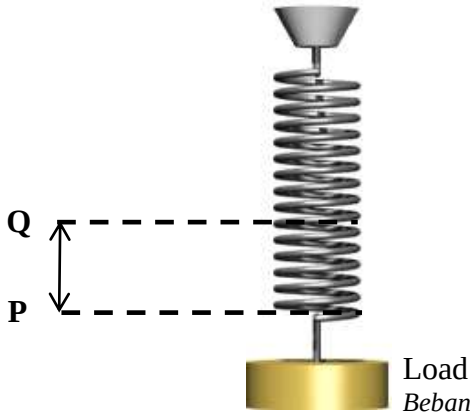
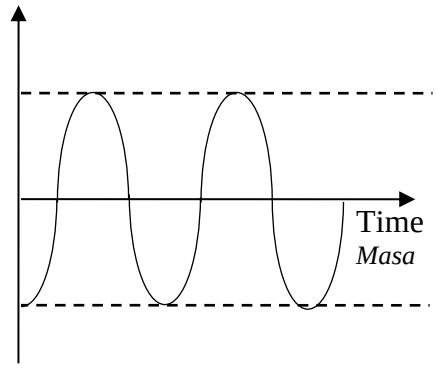


Diagram 21
Rajah 21

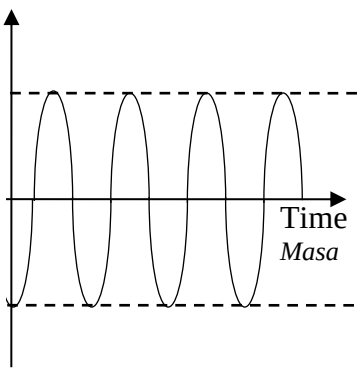
Which displacement-time graph describes the vibration of the spring?

Graf sesaran-masa yang manakah menunjukkan getaran spring tersebut?

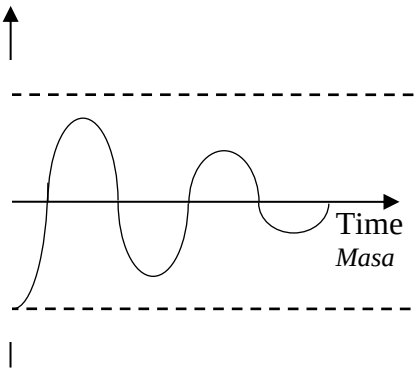
A



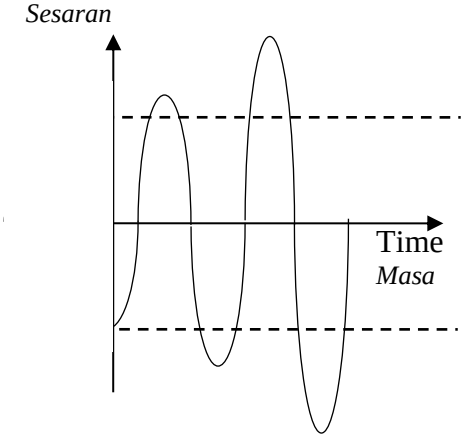
B



C



D



28 Diagram 22 shows water waves propagating towards a reflector in a ripple tank.

Rajah 22 *menunjukkan gelombang air yang merambat ke arah satu pemantul dalam tangki riak.*

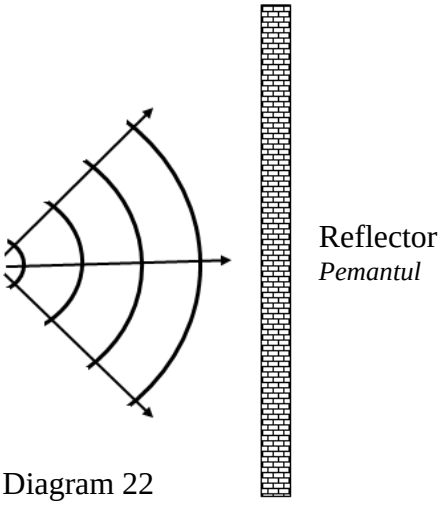
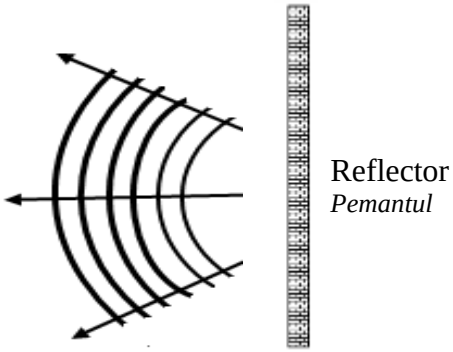


Diagram 22
Rajah 22

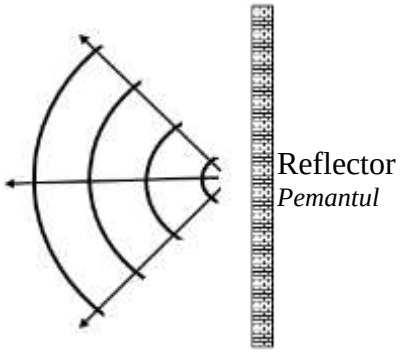
Which wave pattern is observed after it hits the reflector?

Corak gelombang manakah yang dilihat selepas ia menghentam pemantul tersebut?

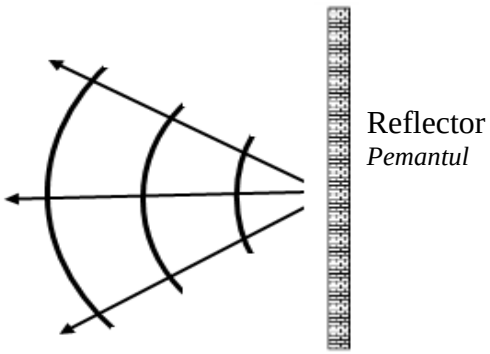
A



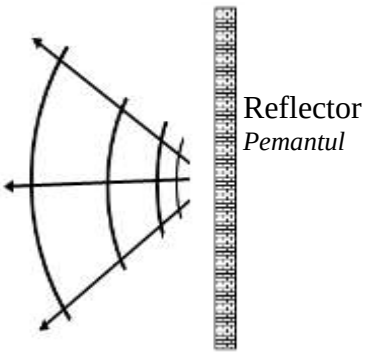
B



C



D



29 Diagram 23 shows plane waves propagating at different depths in a ripple tank.

Rajah 23 *menunjukkan gelombang satah merambat melalui kawasan dengan kedalaman yang berbeza di dalam sebuah tangki riak.*

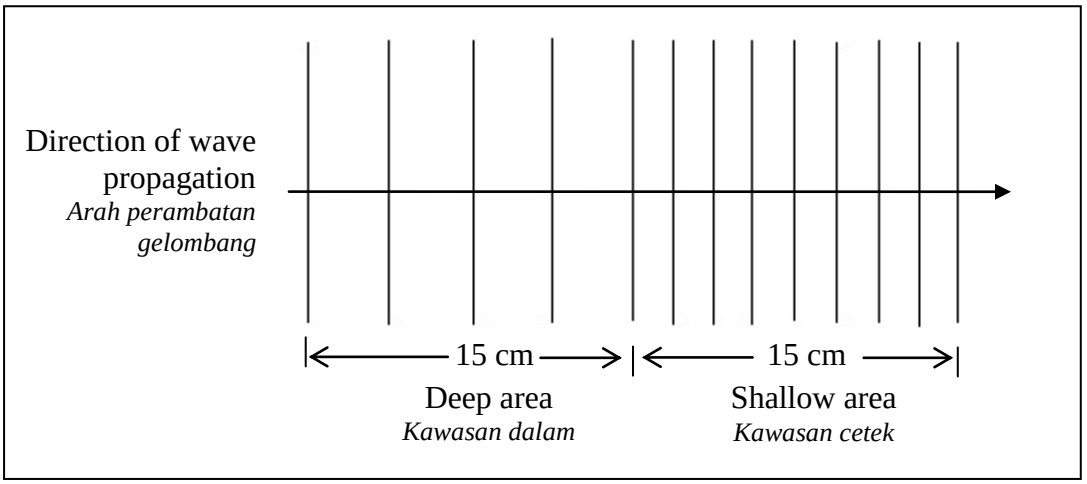


Diagram 23
Rajah 23

If the speed of water waves in the deep area is 15 cm s^{-1}, what is its speed in the shallow area?

Jika kelajuan gelombang air di kawasan dalam ialah 15 cm s^{-1}, *berapakah kelajuan di kawasan cetek?*

A 7.5 cm s^{-1}

B 8.3 cm s^{-1}

C 15.0 cm s^{-1}

D 30.0 cm s^{-1}

30 Diagram 24.1 shows an experimental set-up for light diffraction.
Diagram 24.2 shows the diffraction pattern produced on the screen by three different monochromatic light sources X, Y and Z.

Rajah 24.1 *menunjukkan susunan radas untuk eksperimen belaun cahaya*
Rajah 24.2 *menunjukkan corak belauan yang dihasilkan di skrin oleh tiga sumber chaya monokromatik berbeza X, Y dan Z*

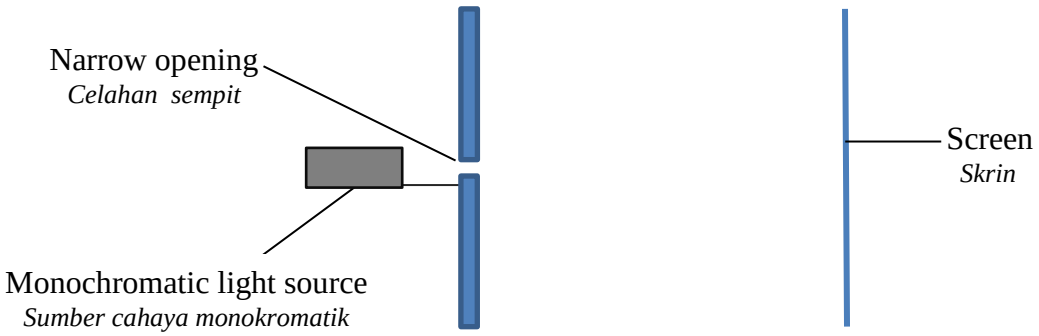


Diagram 24.1
Rajah 24.1

Monochromatic Light ***Cahaya Monokromatik***	**Diffraction pattern** ***Corak belauan***
X	
Y	
Z	

What are the colours of X, Y and Z
Apakah warna X, Y dan Z?

	X	**Y**	**Z**
A	Blue *Biru*	Green *Hijau*	Red *Merah*
B	Blue *Biru*	Red *Merah*	Green *Hijau*
C	Red *Merah*	Green *Hijau*	Blue *Biru*
D	Red *Merah*	Blue *Biru*	Green *Hijau*

31 Diagram 25 shows the fringes pattern displayed on the screen when blue light propagates through double slits.

Rajah 25 *menunjukkan corak pinggir yang dipaparkan pada skrin apabila cahaya biru merambat melalui dwicelah.*

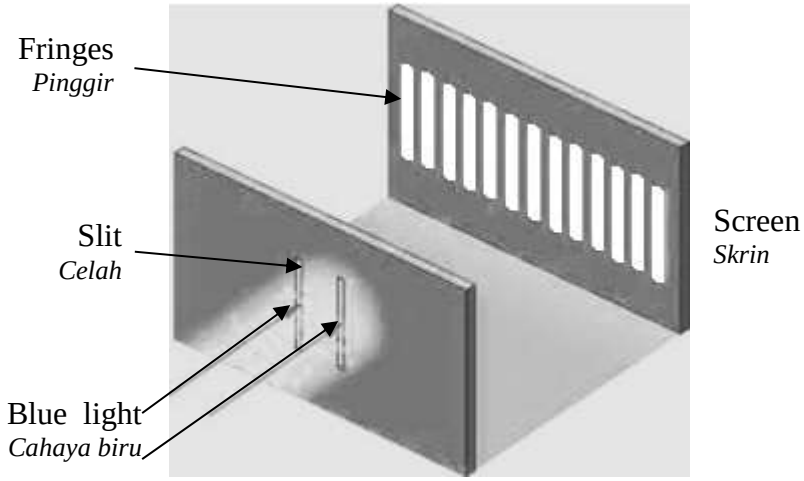


Diagram 25
Rajah 25

What will happen to the distance between consecutive fringes when the same experiment is carried out in the International Space Station (ISS)?

Apakah yang akan berlaku kepada jarak antara pinggir berturutan sekiranya eksperimen yang sama dijalankan di Stesen Angkasa Antarabangsa (ISS)?

A Increases
Bertambah

B Decreases
Berkurang

C No change
Tidak berubah

32 Diagram 26 shows the Y-input of a cathode ray oscilloscope (CRO) connected to a microphone.

Rajah 26 *menumjukkan input-Y sebuah osiloskop sinar katod (OSK) yang disambungkan pada satu mikrofon.*

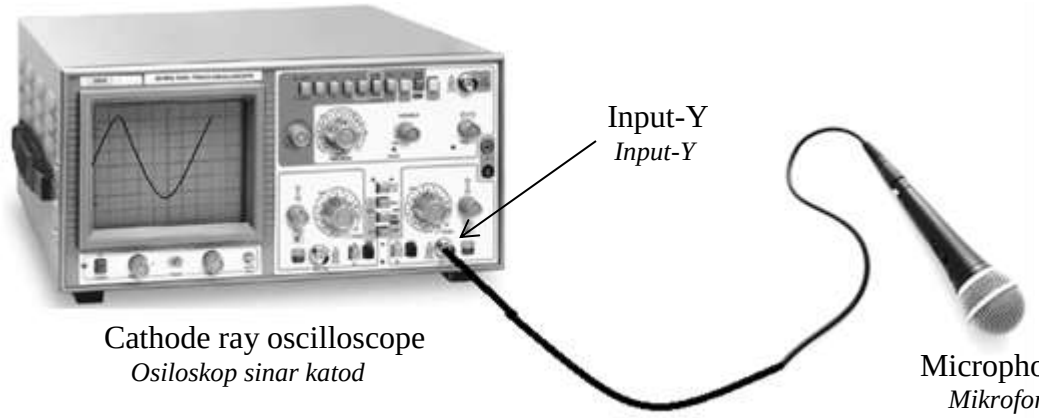


Diagram 26.1
Rajah 26.1

Diagrams 26.2 (a) and (b) show the waveform on the screen of the same CRO from the microphone when two different sound waves of M and N are produced respectively.

Rajah 26.2 (a) *dan* (b) *menunjukkan bentuk gelombang yang dipaparkan pada skrin OSK yang sama dari mikrofon apabila dua gelombang bunyi M dan N yang berbeza dihasilkan.*

Sound wave M
Gelombang bunyi M

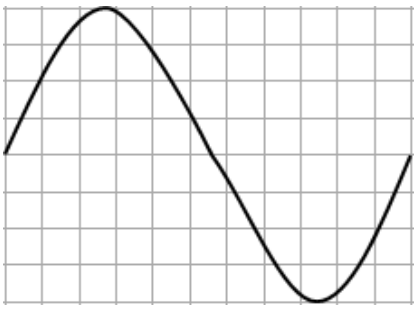


Diagram 26.2 (a)
Rajah 26.2(a)

Sound wave N
Gelombang bunyi N

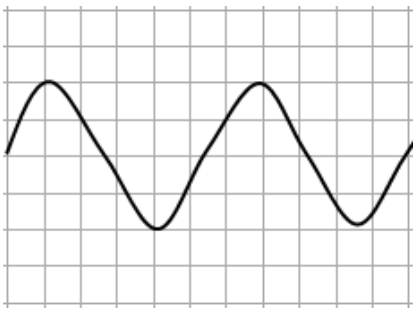


Diagram 26.2 (b)
Rajah 26.2(b)

Which statement is correct?

Pernyataan manakah yang betul?

A M is louder but it has a lower pitch compared to N
M lebih nyaring tetapi kurang langsing berbanding N

B M is softer but it has a higher pitch compared to N
M kurang nyaring tetapi lebih langsing berbanding N

C M is louder but it has a higher pitch compared to N
M lebih nyaring tetapi lebih langsing berbanding N

D M is softer but it has a lower pitch compared to N
M kurang nyaring tetapi kurang langsing berbanding N

33 Diagram 27 shows an electromagnetic spectrum.

Rajah 27 *menunjukkan suatu spektrum elektromagnet.*

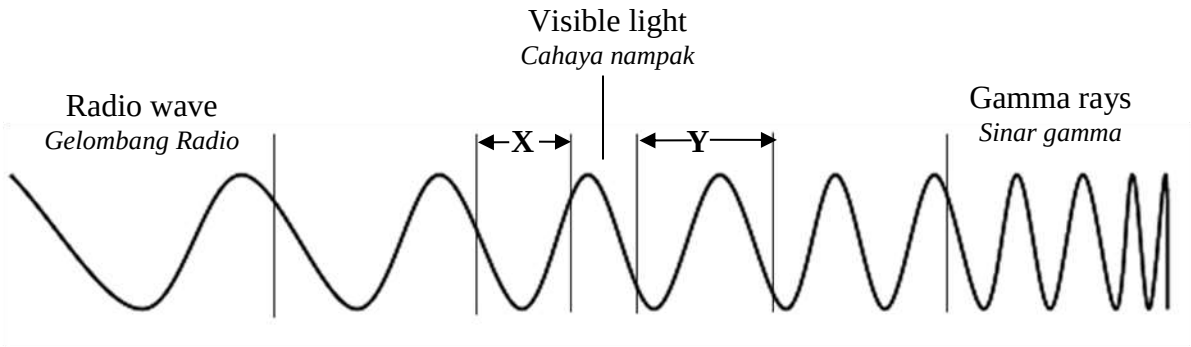


Diagram 27
Rajah 27

What spectrum components are at X and Y?

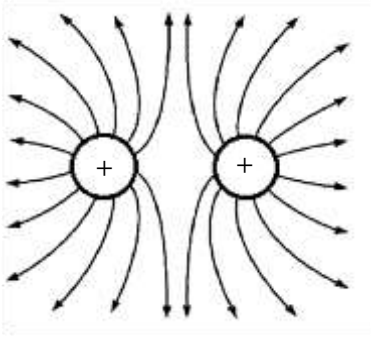
Apakah komponen-komponen spektrum pada X dan Y?

	X	Y
A	X-ray *Sinar-X*	Microwave *Gelombang mikro*
B	Infrared *Inframerah*	Ultraviolet *Ultraungu*
C	Ultraviolet *Ultraungu*	Infrared *Inframerah*
D	Microwave *Gelombang mikro*	X-ray *Sinar-X*

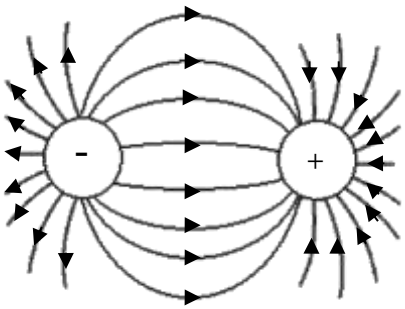
34 Which diagram shows the correct electric field?

Rajah manakah menunjukkan medan elektrik yang betul?

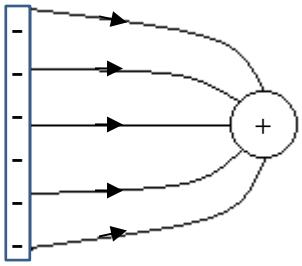
A



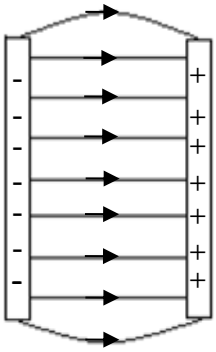
B



C



D



35 Wire X has a cross sectional area, A and resistance, R. Wire Y is made of the same material as wire X, has the same length as X but a cross sectional area of 2A.

Dawai X mempunyai luas keratan rentas, A dan rintangan, R. Dawai Y adalah dari bahan yang sama seperti dawai X, mempunyai panjang yang sama seperti X tetapi luas keratan rentas adalah 2A.

What is the resistance of the wire Y?

Apakah rintangan dawai Y?

A ¼ R

B ½ R

C R

D 2R

36 Diagram 28 shows three resistors connected in a circuit.

Rajah 28 *menunjukkan tiga perintang yang disambung dalam satu litar.*

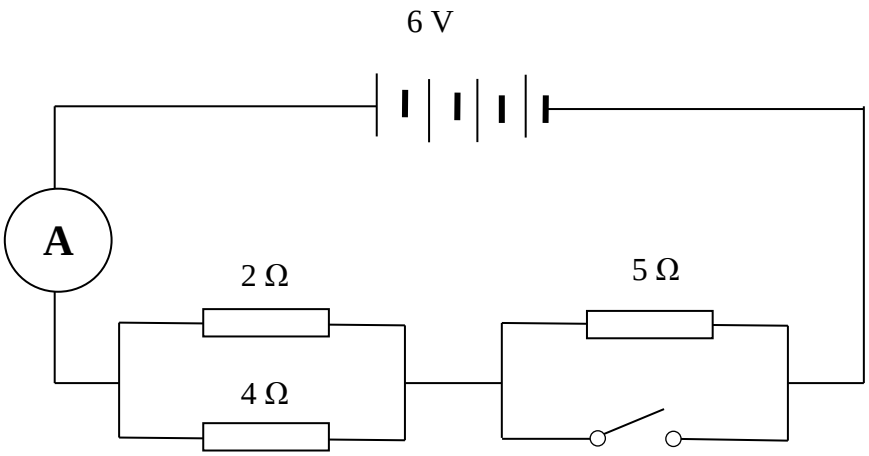


Diagram 28
Rajah 28

What is the reading of the ammeter when the switch is closed and then opened?

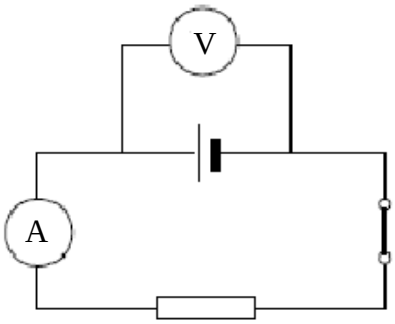
Apakah bacaan ammeter apabila suis ditutup dan kemudiannya dibuka?

	Switch closed *Suis ditutup*	Switch opened *Suis dibuka*
A	4.50 A	0.95 A
B	4.55 A	0.55 A
C	5.70 A	0.95 A
D	8.00 A	1.83 A

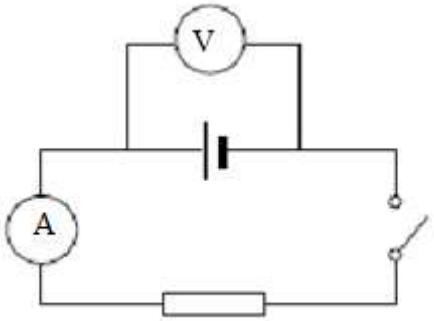
37 Which circuit can be used to determine the electromotive force of a battery?

Litar manakah yang boleh digunakan untuk mengukur daya gerak elektrik suatu bateri?

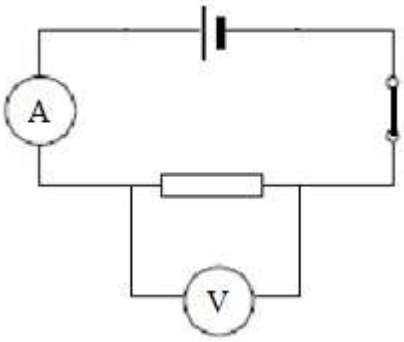
A



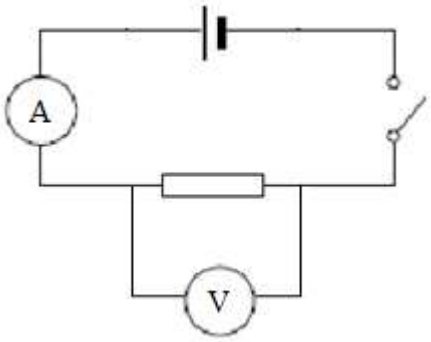
B



C



D



38 Diagram 29 shows an electric thermos pot and an enlarged view of its label.

Rajah 29 *menunjukkan sebuah pot termos elektrik dan label yang dibesarkan*.

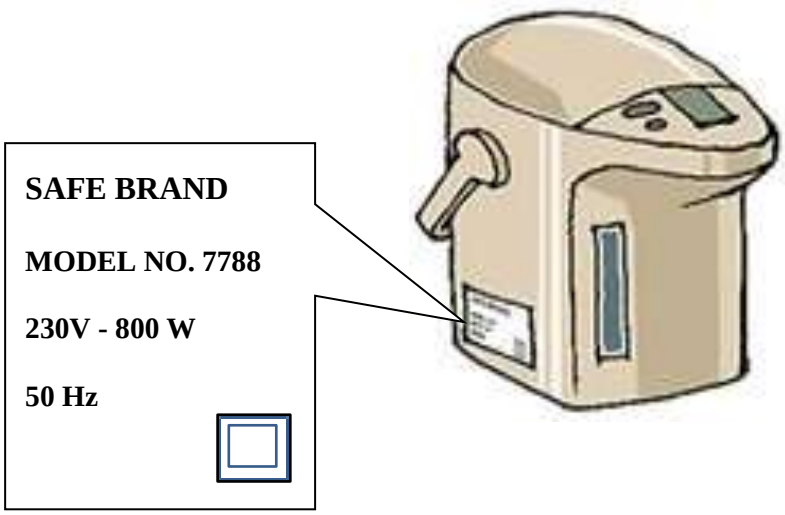


Diagram 29
Rajah 29

What is the meaning of 800 W?

Apakah yang dimaksudkan dengan 800 W*?*

A The rate of change of charge is 800 coulombs in 1 second
Kadar perubahan cas ialah 800 *coulomb dalam 1 saat*

B The rate of change of power is 800 watts in 1 second
Kadar perubahan kuasa ialah 800 *watt dalam 1 saat*

C The rate of change of current is 800 amperes.
Kadar perubahan arus ialah 800 *ampere.*

D The rate of change of energy is 800 joules.
Kadar perubahan tenaga ialah 800 *joule.*

39 Diagram 30 shows the magnetic field pattern produced by a current-carrying conductor.

Rajah 30 *menunjukkan corak medan magnet yang dihasilkan oleh satu konduktor yang mengalirkan arus.*

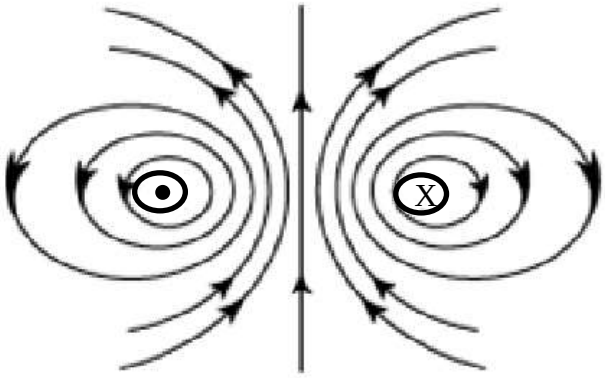


Diagram 30
Rajah 30

What is the shape of conductor that produces the magnetic field pattern?

Apakah bentuk konduktor yang menghasilkan corak medan magnet tersebut?

A Straight wire
Dawai lurus

B Bar magnet
Magnet bar

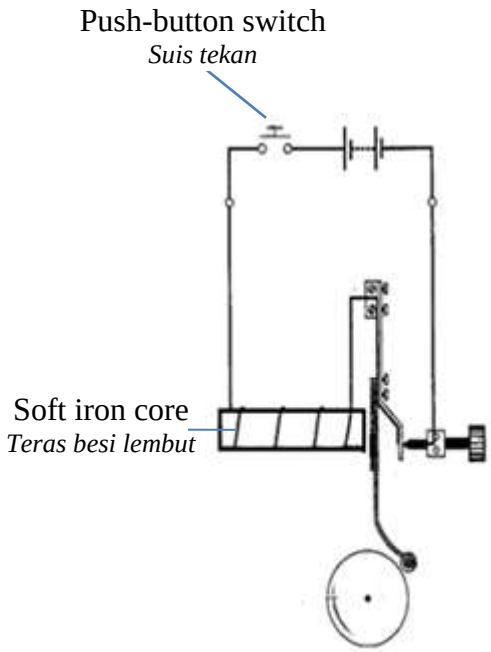
C Solenoid
Solenoid

D Coil
Gegelung

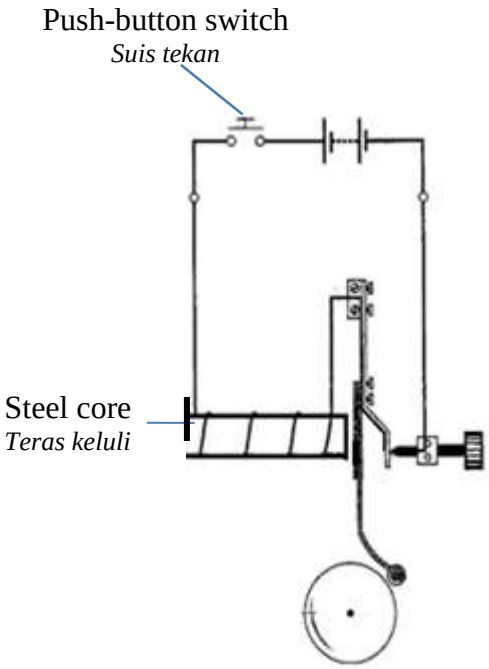
40 Which electric bell will produce the loudest sound when the push-button is closed?

Loceng elektrik manakah yang akan menghasilkan bunyi yang paling kuat apabila suis tekan ditutup?

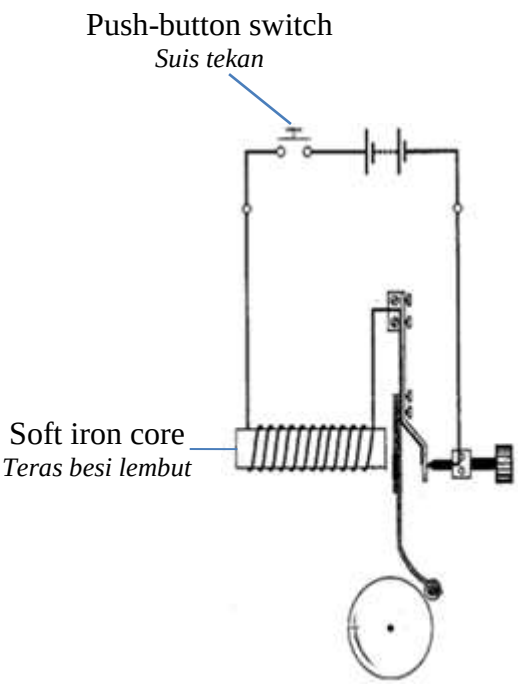
A



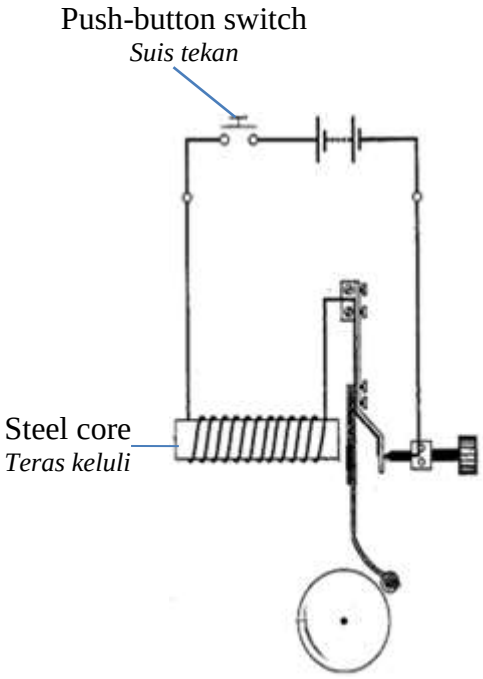
B



C



D



41 Diagram 31 shows a solenoid moving towards a bar magnet. The galvanometer pointer is deflected.

Rajah 31 *menunjukkan satu solenoid bergerak ke arah satu magnet bar. Didapati penunjuk galvanometer terpesong.*

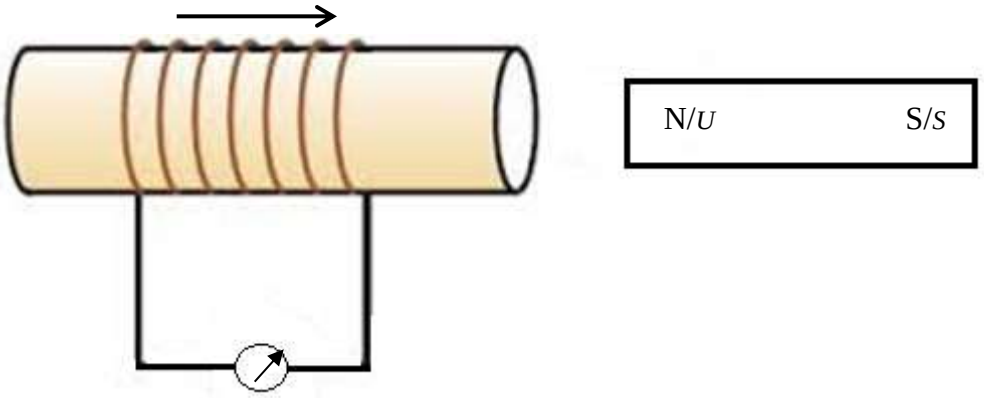


Diagram 31
Rajah 31

What is the law involved for this situation?

Hukum apakah yang terlibat bagi situasi ini?

A Lenz's Law
Hukum Lenz

B Snell's Law
Hukum Snell

C Ohm's Law
Hukum Ohm

D Faraday's Law
Hukum Faraday

42 Diagram 32 shows a simple transformer where a bulb is connected in the output circuit.

Rajah 32 *menunjukkan sebuah transformer ringkas di mana sebuah mentol disambungkan pada litar output.*

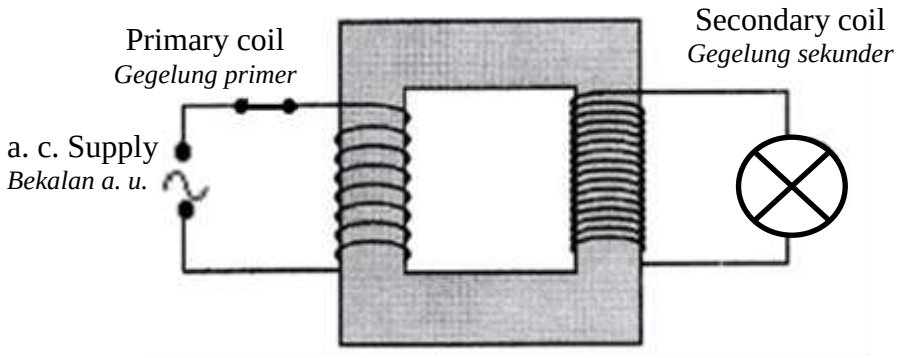


Diagram 32
Rajah 32

What happens to the brightness of the bulb, if the number of turns of the primary coil is increased?

Apakah yang berlaku kepada kecerahan mentol, jika bilangan lilitan gegelung primer ditambah?

A Increases
Bertambah

B Decreases
Berkurang

C Unchanged
Tidak berubah

43 Diagram 33 shows a trace on the cathode ray oscilloscope (CRO) screen when an alternating current is connected to the Y-input of the CRO and the time-base of the CRO is on.

Rajah 33 *menunjukkan surihan pada skrin sebuah osiloskop sinar katod (OSK) apabila bekalan arus ulang alik disambungkan pada input-Y OSK dan tapak-masa OSK dihidupkan.*

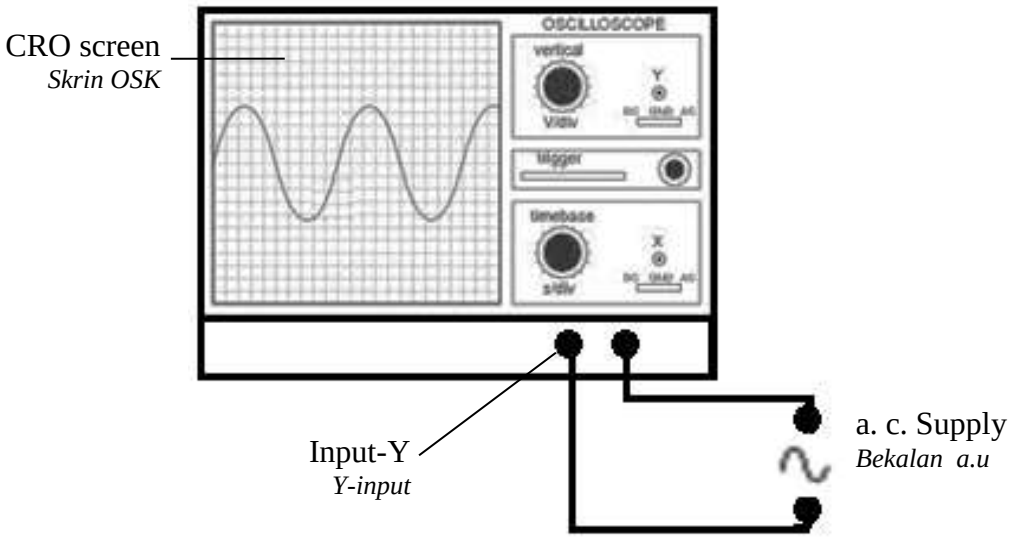
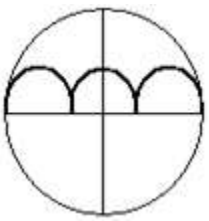


Diagram 33
Rajah 33

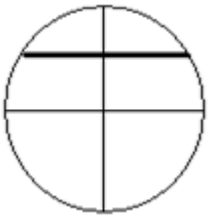
Which trace is formed on the CRO screen, if the time-base is off?

Surihan manakah akan terbentuk di atas skrin OSK, jika tapak-masa dimatikan ?

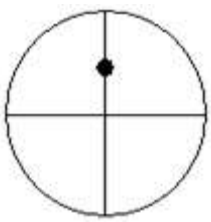
A



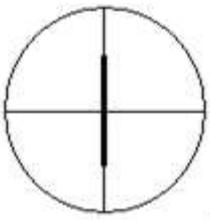
B



C



D



44 Diagram 34 shows the depletion layer of a p-n junction diode. When it is in forward-bias, the depletion layer becomes narrower.

Rajah 34 *di bawah menunjukkan satu simpang p-n diod. Apabila diod dalam sambungan pincang ke depan, lapisan susutan menjadi lebih nipis.*

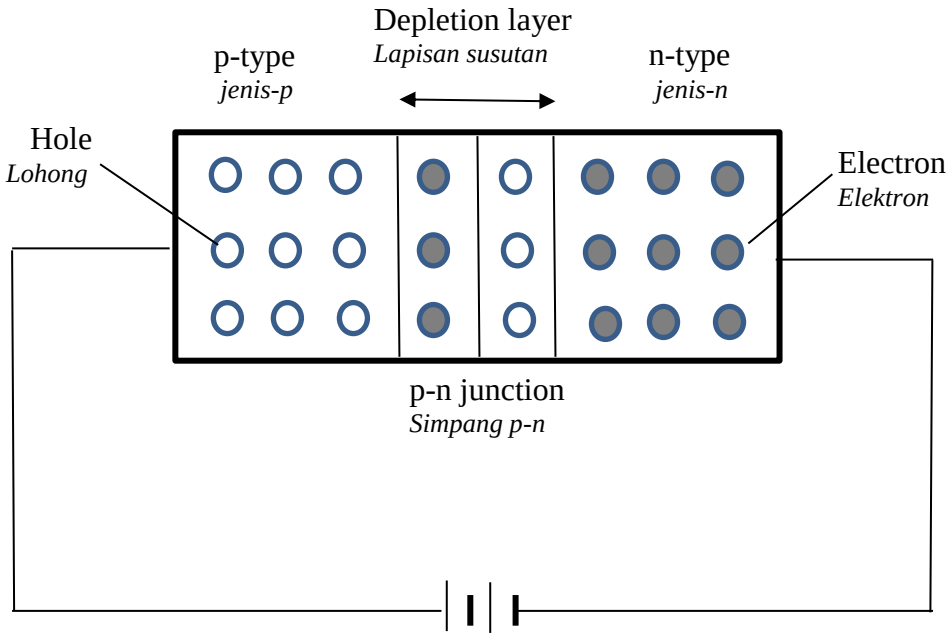


Diagram 34

Diagram 34

Which statement explains the situation?

Pernyataan manakah yang menerangkan situasi itu?

A Electrons and holes are pulled away from the p-n junction
Elektron dan lohong ditarik menjauhi simpang p-n

B Electrons from the n-type are pulled across the p-n junction
Elektron dari jenis-n ditarik merentasi simpang p-n

C Negative charges flow from the negative terminal to the p-type semiconductor
Cas negatif mengalir dari terminal negatif ke semikonduktor jenis-p

D Positive charges flow from the positive terminal to the p-type semiconductor
Cas positif mengalir dari terminal positif ke semikonduktor jenis-p

45 Diagram 35 shows a simple sound amplifier circuit.

Rajah 35 *menunjukkan litar penguat bunyi yang ringkas.*

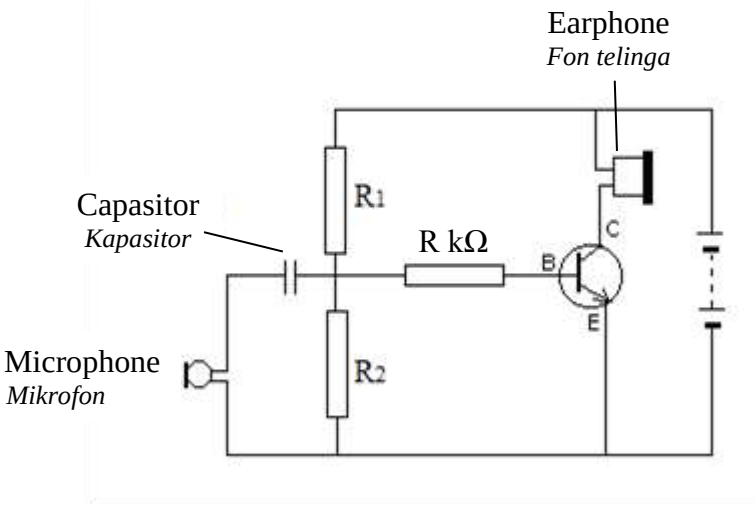


Diagram 35
Rajah 35

What is the function of the capasitor?

Apakah fungsi kapasitor?

A To amplify the sound signal
Menguatkan isyarat bunyi

B To change the sound signal to electrical signal
Menukarkan isyarat bunyi kepada isyarat elektrik

C To change alternating current to direct current
Menukarkan arus ulang alik kepada arus terus

D To block direct current flow from the cell to the microphone
Menghalang arus terus dari sel mengalir ke mikrofon.

46 Table 1 shows a truth table for a logic gate.

Jadual 1 *di bawah menunjukkan jadual kebenaran bagi satu get logik.*

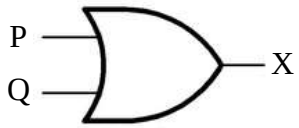
P	Q	X
0	0	1
0	1	0
1	0	0
1	1	0

Table 1
Jadual 1

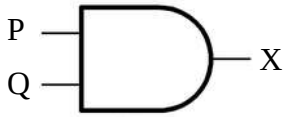
Which logic gate is represented by the truth table above?

Get logik manakah yang diwakili oleh jadual kebenaran di atas?

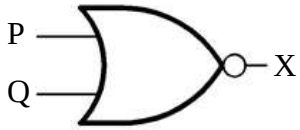
A



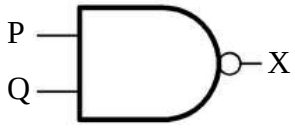
B



C



D



47 The equation below shows a Polonium nucleus emitting an alpha particle and gamma rays to become a Plumbum nucleus.

Persamaan di bawah menunjukkan satu nukleus Polonium memancarkan zarah alfa dan sinar gamma untuk membentuk nukleus Plumbum.

$$^{210}_{84}\mathrm{Po} \rightarrow {}^{x}_{82}\mathrm{Pb} + {}^{4}_{y}\mathrm{He} + \gamma$$

Which combination is correct for *x* and *y*?
Kombinasi manakah yang betul bagi x dan y?

	x	***y***
A	214	2
B	214	4
C	206	2
D	206	4

48 Diagram 36 shows a primate fossil.

Rajah 36 *menunjukkan satu fosil primat*

Diagram 36
Rajah 36

Which radioactive can be used to determine the age of the fossil?

Radioaktif manakah yang boleh digunakan untuk menentukan usia suatu fosil?

A Iodin - 131

B Carbon - 14

C Radium - 226

D Uranium - 235

49 Table 2 shows the nuclides of hydrogen and carbon.
Jadual 2 *menunjukkan nuklid hidrogen dan karbon.*

Stable nuclide ***Nuklid stabil***	**Unstable nuclide** ***Nuklid tak stabil***
$^{1}_{1}H$, $^{2}_{1}H$	$^{3}_{1}H$
$^{16}_{8}O$	$^{15}_{8}O$, $^{19}_{8}O$

Table 2
Jadual 2

Which combination of isotope and radioisotope is correct?
Kombinasi manakah yang betul bagi isotop dan radioisotop?

	Isotope ***Isotop***	**Radioisotope** ***Radioisotop***
A	$^{3}_{1}H$, $^{16}_{8}O$	$^{1}_{1}H$, $^{2}_{1}H$, $^{15}_{8}O$, $^{19}_{8}O$
B	$^{1}_{1}H$, $^{2}_{1}H$, $^{16}_{8}O$	$^{3}_{1}H$, $^{15}_{8}O$, $^{19}_{8}O$
C	$^{3}_{1}H$, $^{15}_{8}O$, $^{19}_{8}O$	$^{1}_{1}H$, $^{2}_{1}H$, $^{16}_{8}O$
D	$^{1}_{1}H$, $^{2}_{1}H$, $^{15}_{8}O$, $^{19}_{8}O$	$^{3}_{1}H$, $^{16}_{8}O$

50 The following equation represents a nuclear fusion:

Persamaan berikut mewakili pelakuran nukleus:

$$^{1}\mathbf{H} + {}^{2}\mathbf{H} \longrightarrow {}^{3}\mathbf{H} + \gamma$$

mass of ^{1}H = 1.007825 u
jisim ^{1}H

mass of ^{2}H = 2.014102 u
jisim ^{2}H

mass of ^{3}H = 3.016029 u
jisim ^{2}H

What is the mass defect in the reaction?

Berapakah cacat jisim dalam tindakbalas itu ?

[1 u = 1.66 x 10^{-27} kg]

A 1.002 x 10^{-26} kg

B 5.007 x 10^{-27} kg

C 5.016 x 10^{-27} kg

D 9.791 x 10^{-30} kg

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 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 anda.*

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 menukarkan 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 non-programmable scientific calculator.
   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

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

4531/2
PHYSICS
Paper 2
September 2014
2 ½ hours

Index Number : .....

Name : .....

Class : .....

MAKTAB RENDAH SAINS MARA

PEPERIKSAAN SIJIL PENDIDIKAN MRSM 2014

4531/2

PHYSICS

Paper 2

Two hours and thirty minutes

DO NOT OPEN THIS BOOKLET UNTIL TOLD TO DO SO

1. Write down your name and class in the space provided.
2. The questions are written in English and *bahasa Melayu.*
3. Candidates are required to read the information at the back of the booklet

For Examiner's Use			
Section	Question	Total Marks	Score Obtained
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	
		Total	

This booklet consists of 35 printed pages and 1 blank page

The following information may be useful. The symbols have their usual meaning.
(Maklumat berikut mungkin berfaedah. Simbol-simbol mempunyai makna yang biasa.)

1 $v = \frac{s}{t}$

2 $a = \frac{v-u}{t}$

3 $v^2 = u^2 + 2as$

4 $s = ut + \frac{1}{2}at^2$

5 Momentum = mv

6 $F = ma$

7 Kinetic energy/*Tenaga kinetik* = ½ mv^2

8 Gravitational potential energy/ *Tenaga keupayaan gravity* = mgh

9 Elastic potential energy/ *Tenaga keupayaan kenyal* = ½ Fx

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

11 Pressure/*Tekanan*, $P = \frac{F}{A}$

12 Pressure/*Tekanan*, $P = h\rho g$

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

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

15 $\frac{PV}{T}$ = constant/*pemalar*)

16 Atmospheric pressure at sea level/ *Tekanan atmosfera pada aras laut* = 1 x 10^5 Pa

17 $v = f\lambda$

18 Wavelength/*Panjang gelombang*, $\lambda = \frac{ax}{D}$

19 Power/*Kuasa*, $P = \frac{\text{energy / } tenaga}{\text{time/ } masa}$

20 $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

21 Linear magnification/*Pembesaran linear*, $M = \frac{v}{u}$

22 Refractive index/*Indeks biasan*, $\eta = \frac{\sin i}{\sin r}$

23 Refractive index/*Indeks biasan*, $\eta = \frac{\text{real depth/}dalam\ nyata}{\text{apparent depth/}dalam\ ketara}$

24 $Q = It$

25 $V = IR$

26 $E = VQ$

27 Power/*Kuasa*, $P = IV$

28 $\frac{N_s}{N_p} = \frac{V_s}{V_p}$

29 $E = mc^2$

30 Efficiency/*Kecekapan* $= \frac{I_s V_s}{I_p V_p} \times 100\%$

31 g = 10 m s^{-2}

32 c = 3.0 x 10^8 m s^{-1}

For Examiner's use

Section A
Bahagian A

[60 *marks*]
[60 *markah*]

Answer **all** questions in this section

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

1 Diagram 1.1 shows a boy throwing a baseball vertically upwards. After a few seconds, the baseball falls vertically downwards.
Diagram 1.2 is a stroboscopic photograph showing the position of the baseball in the state of free-fall.

Rajah 1.1 *menunjukkan seorang budak lelaki melontar sebiji bola lisut menegak ke atas. Selepas beberapa saat, bola lisut itu jatuh ke bawah secara menegak.*
Rajah 1.2 *ialah gambarfoto dari sebuah stroboskop yang menunjukkan kedudukan bola lisut dalam keadaan jatuh bebas.*

Diagram 1.1
Rajah 1.1

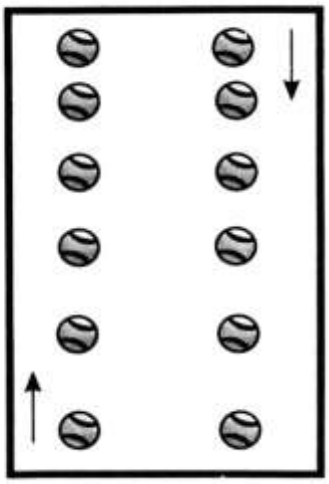


Diagram 1.2
Rajah 1.2

(a) Name the force acting on the ball as it falls to the ground.

Namakan daya yang bertindak ke atas bola ketika ia jatuh ke tanah.

.....

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

1(*a*)
1

[Turn page over

For Examiner's use

(b) Name the physical quantity which is constant in Diagram 1.2.

Namakan kuantiti fizik yang malar dalam Rajah 1.2.

1(*b*)

1

.....

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

(c) (i) If the baseball is replaced with a football, what happens to the value of the physical quantity stated in **1** (*b*)? Tick (√) for the correct answer.

*Jika bola lisut itu ditukar dengan bola sepak, apakah yang terjadi kepada nilai kuantiti fizik dinyatakan dalam **1** (b)? Tanda (√) jawapan yang betul.*

☐	Unchanged *Tidak berubah*	☐	Increases *Bertambah*	☐	Decreases *Berkurang*

1(*c*)(i)

1

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

(ii) Give **one** reason for the answer in **1**(*c*)(i).

*Beri **satu** sebab bagi jawapan di* **1**(c)(i).

1(*c*)(ii)

1

.....

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

Total A1

4

For Examiner's use

2 Diagram 2 shows an optical device.

Rajah 2 *menunjukkan satu alat optik.*

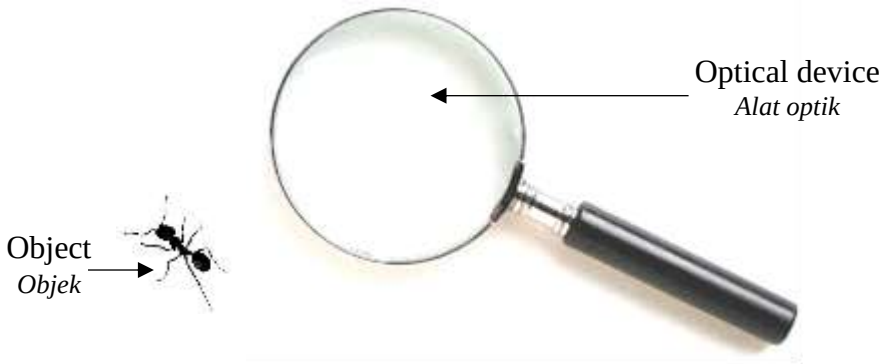


Diagram 2
Rajah 2

(a) Name the type of lens used in Diagram 2.

Namakan jenis kanta yang digunakan dalam Rajah 2.

……

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

2(*a*)

1

(*b*) State the function of the optical device.
Suggest a suitable object distance to produce an upright image.

Nyatakan fungsi alat optik tersebut.
Cadangkan kedudukan objek yang sesuai untuk menghasilkan imej tegak.

……

……

[2 *marks*]
[2 *markah*]

2 (*b*)

2

(c) An object is placed 15 cm from the optical device which has a focal length of 10 cm.
Calculate the image distance.

Satu objek diletakkan 15 cm *dari alat optik yang mempunyai panjang fokus* 10 cm.
Hitung jarak imej tersebut.

[2 *marks*]
[2 *markah*]

2(*c*)

2

Total A2

5

For Examiner's use

3 Diagram 3.1 shows a magnet being pulled away from solenoid P

Rajah 3.1 *menunjukkan sebatang magnet sedang ditarik keluar daripada solenoid* P

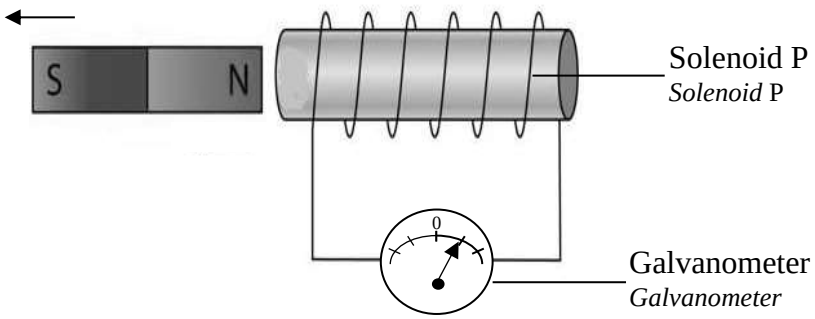


Diagram 3.1
Rajah 3.1

(a) State the physical quantity shown by the galvanometer in Diagram 3.1.

Nyatakan kuantiti fizik yang ditunjukkan oleh galvanometer dalam Rajah 3.1.

3 (*a*) 1

……..……...

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

(b) What causes the physical quantity stated in **3** (*a*) to flow in the circuit?

Apa yang menyebabkan kuantiti fizik pada **3**(*a*) *mengalir di dalam litar?*

3 (*b*) 1

…….……

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

(*c*) Name the physics concept involved in Diagram 3.1.

Namakan konsep fizik yang terlibat pada Rajah 3.1.

3 (*c*) 1

.....
.

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

For Examiner's Use

(d) Diagram 3.2 shows the solenoid P being replaced with solenoid Q. The number of turns in solenoid Q is greater than in solenoid P.

Rajah 3.2 *menunjukkan solenoid* P *digantikan dengan solenoid* Q. *Bilangan lilitan dalam solenoid* Q *lebih banyak berbanding pada solenoid* P.

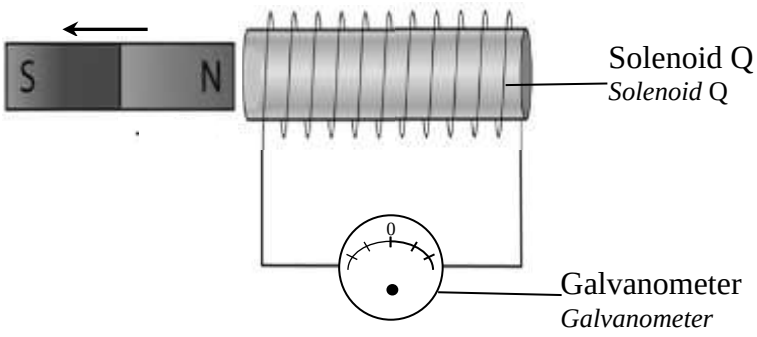


Diagram 3.2
Rajah 3.2

On Diagram 3.2,
Pada Rajah 3.2,

(*i*) mark the direction of current flow in solenoid Q.
tandakan arah arus mengalir dalam solenoid Q.

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

3(*d*)(i)
1

(*ii*) draw the deflection of the galvanometer pointer.
lukis pemesongan penunjuk galvanometer.

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

3*(d)*(ii)
1

(e) Predict what will happen to the galvanometer pointer if the magnet is pushed towards solenoid Q.

Ramalkan apa yang akan berlaku kepada penunjuk galvanometer jika magnet ditolak ke arah solenoid Q.

……..

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

3(*e*)
1

Total A3
6

For Examiner's use

4 Diagram 4.1 shows two identical resistors P and Q. Ammeter A_2 shows a reading of 0.5A.

Rajah 4.1 *menunjukkan dua perintang* P *dan* Q *yang serupa. Ammeter* A_2 *memberi bacaan* 0.5A.

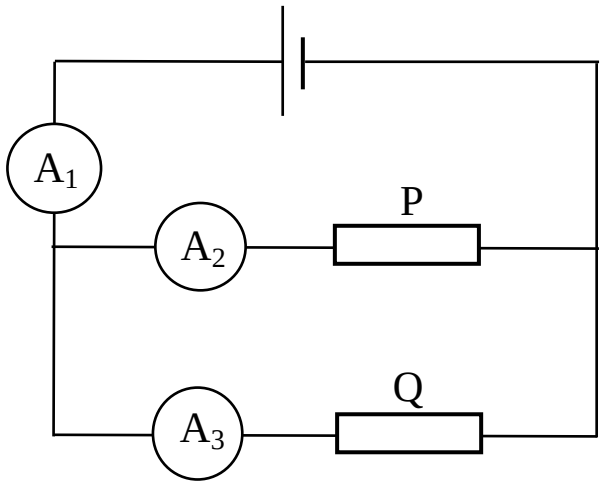


Diagram 4.1
Rajah 4.1

(*a*) Name the type of connection of the resistors in Diagram 4.1.

Namakan jenis sambungan perintang-perintang dalam Rajah 4.1.

4(*a*)

1

……..

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

(*b*) What are the readings of ammeter A_1 and A_3?

Apakah bacaan ammeter A_1 *dan* A_3*?*

4(*b*)

2

A_1 : ……..

A_3 : ……..

[2 *marks*]
[2 *markah*]

(*c*) If the resistance of resistor Q is 3 Ω, calculate the potential difference across the resistor Q.

Jika rintangan perintang Q *ialah* 3 Ω*, hitung beza keupayaan melalui perintang* Q.

4(*c*)

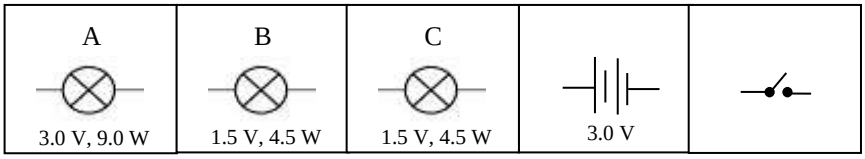
2

[2 *marks*]
[2 *markah*]

For Examiner's use

(*d*) You are provided with a switch, two dry cells and three bulbs as shown below. Draw and label an electrical circuit that can light up the bulbs with normal brightness.

Anda dibekalkan dengan satu suis, dua sel kering dan tiga biji mentol seperti di bawah. Lukis satu rajah litar yang dapat menyalakan mentol pada kecerahan normal.



[2 *marks*]
[2 *markah*]

4(*d*)

2

Total A4

7

For Examiner's use

5 Diagram 5.1 shows the different altitudes of a mountain. An instrument is used to measure the atmospheric pressure at M and N.

Rajah 5.1 *menunjukkan ketinggian berbeza sebuah gunung. Sebuah alat digunakan untuk mengukur tekanan atmosfera di* M *dan* N.

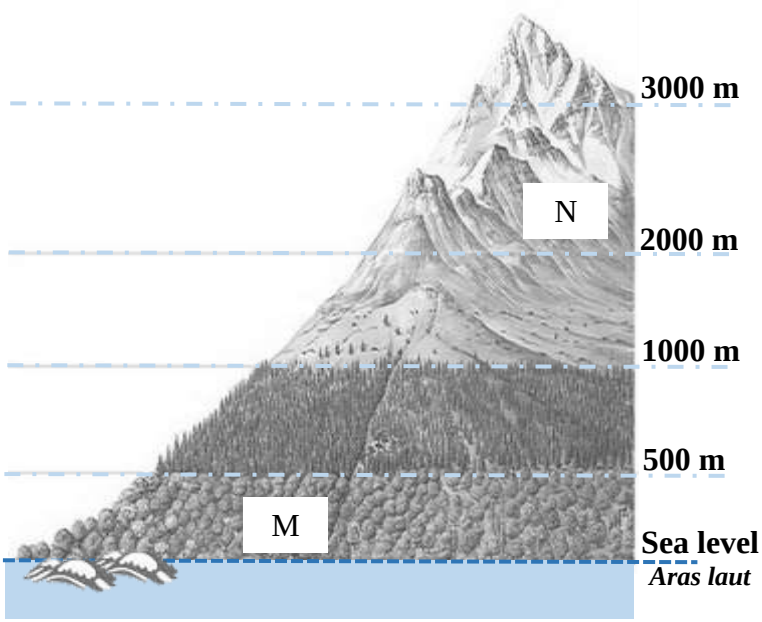


Diagram 5.1
Rajah 5.1

Diagram 5.2 shows the cross section of the vacuum chamber in the instrument stated, when it is at M.

Rajah 5.2 *menunjukkan keratan rentas kotak vakum alat tersebut, ketika ia berada di* M.

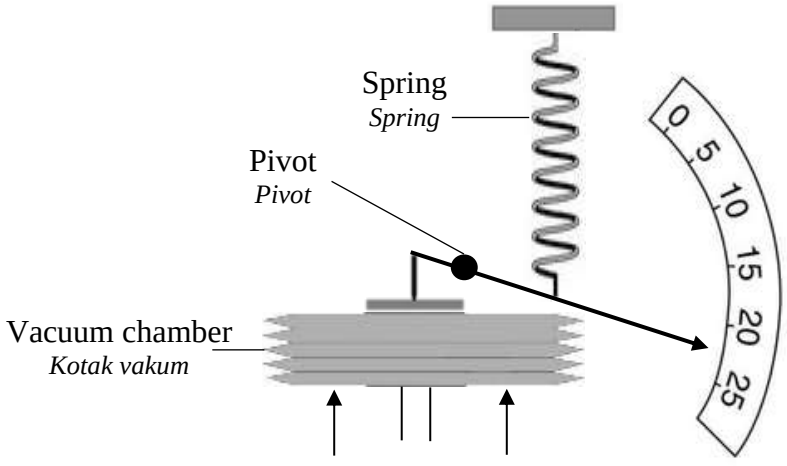


Diagram 5.2
Rajah 5.2

For Examiner's Use

Diagram 5.3 shows the cross section of the vacuum chamber of the same instrument when it is at N.

Rajah 5.3 *menunjukkan keratan rentas kotak vakum alat yang sama ketika ia berada di* N.

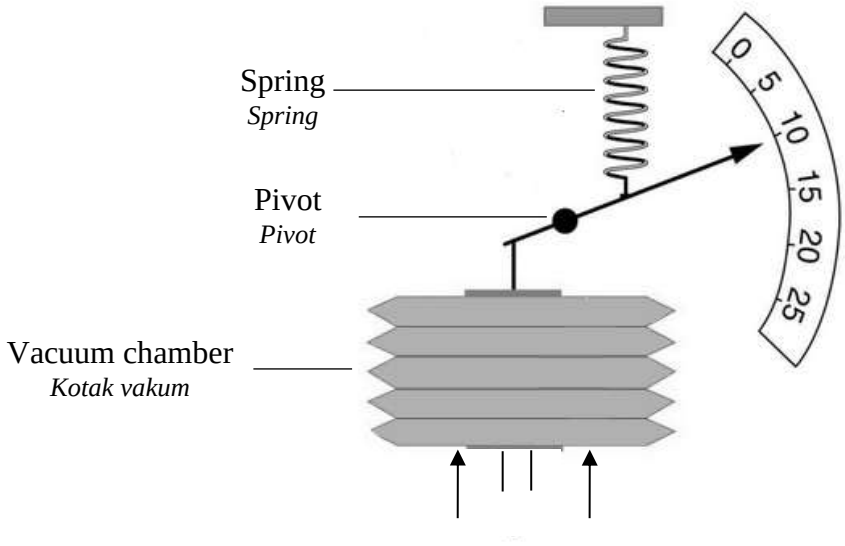


Diagram 5.3
Rajah 5.3

(*a*) Name the instrument above.

Namakan alat di atas.

.....

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

5(*a*)

1

(*b*) Compare the altitudes of M and N.

Bandingkan ketinggian M *dan* N.

.....

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

5(*b*)

1

For Examiner's use

(*c*) Observe Diagrams 5.2 and 5.3,

Perhatikan Rajah 5.2 *dan* 5.3,

(i) Compare the volume of the vacuum chamber.

Bandingkan isipadu kotak vakum.

5(*c*)(i) 1

.....

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

(ii) Compare the atmospheric pressure at M and N.

Bandingkan tekanan atmosfera di M *dan* N.

5(*c*)(ii) 1

.....

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

(iii) State the relationship between the altitude and the volume of the vacuum chamber.

Nyatakan hubungan di antara ketinggian dengan isipadu kotak vakum.

5(*c*)(iii) 1

……

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

(*iv*) State the relationship between the atmospheric pressure exerted and the volume of the vacuum chamber.

Nyatakan hubungan di antara tekanan atmosfera yang dikenakan dengan isipadu kotak vakum.

5(*c*)(iv) 1

……

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

(*d*) Based on the kinetic theory, explain the reason for the answer in **5**(*c*) (iv).

Berdasarkan teori kinetik jirim, terangkan sebab bagi jawapan di **5**(*c*) (*iv*).

5(*d*) 2

……

……

……

[2 *marks*]
[2 *markah*]

Total A5 8

For Examiner's use

6 Diagram 6.1 and Diagram 6.2 show a p-n junction diode connected to a dry cell. Both diagrams show the movement of charge carriers in the diode.

Rajah 6.1 *dan Rajah* 6.2 *menunjukkan satu diod simpang p-n disambungkan kepada sel kering. Kedua-dua rajah menunjukkan pergerakan pembawa cas di dalam diod tersebut.*

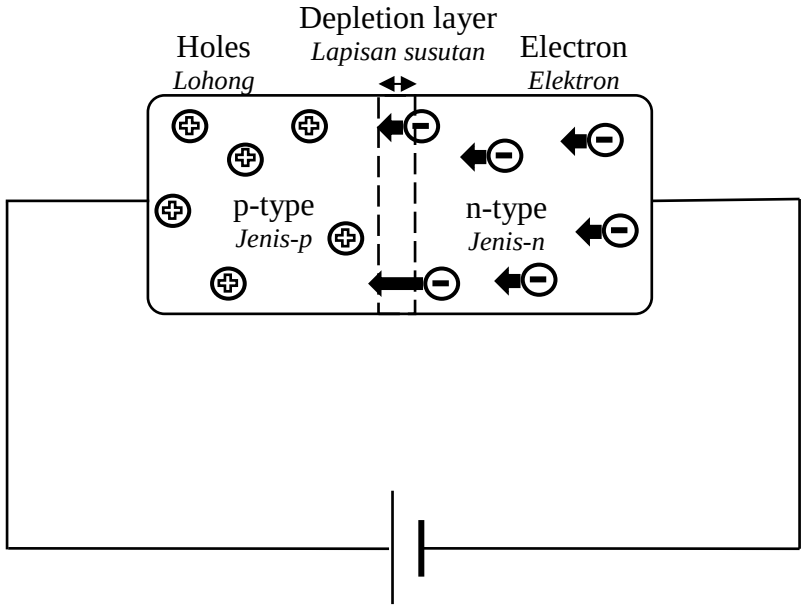


Diagram 6.1
Rajah 6.1

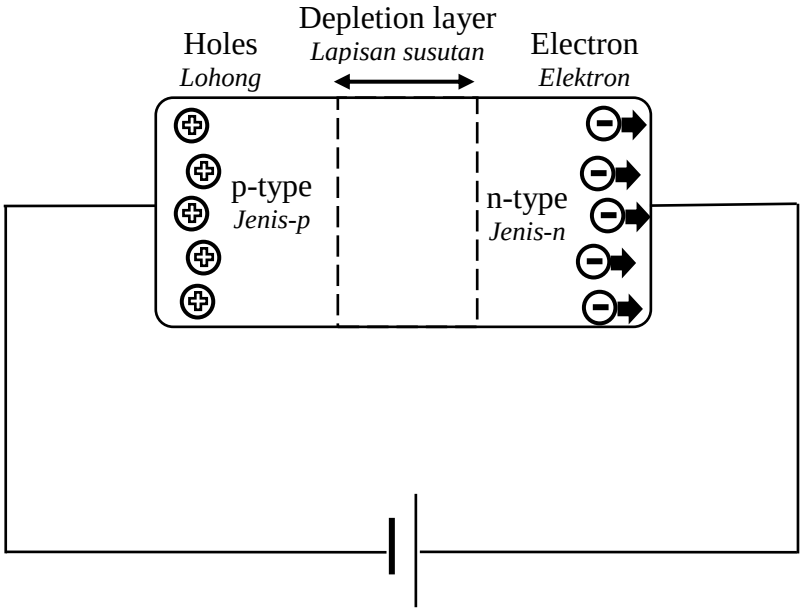


Diagram 6.2
Rajah 6.2

[Turn page over

For Examiner's Use

6(*a*)

1

(a) What is meant by the term diode?

Apakah yang dimaksudkan oleh istilah diod?

.....

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

(b) Observe Diagram 6.1 and Diagram 6.2,

Perhatikan Rajah 6.1 *dan Rajah* 6.2,

(i) Compare the direction of electron flow in the n-type semiconductor.

Bandingkan arah pengaliran elektron dalam semikonduktor jenis-n.

6(*b*)(i)

1

.....

.....

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

(ii) Compare the connection of the dry cell terminals to the n-type semiconductor.

Bandingkan sambungan terminal-terminal sel kering ke semikonduktor jenis-n.

6(*b*)(ii)

1

.....

.....

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

(iii) Compare the depletion layer of the semiconductors.

Bandingkan lapisan susutan antara semikonduktor.

6(*b*)(iii)

1

.....

.....

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

(iv) Relate the connection of the dry cell terminals to the state of the depletion layer.

Hubungkaitkan sambungan ke terminal-terminal sel kering dengan keadaan lapisan susutan.

6(*b*)(iv)

1

.....

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

For Examiner's Use

(c) Name the type of connection of the diode in Diagram 6.1.

Namakan jenis sambungan diod dalam Rajah 6.1.

.....

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

6*(c)*
1

(d) (i) If another p-type semiconductor is connected to the diode, it will form a new device.

Name this device.

Apabila satu semikonduktor jenis-p disambungkan kepada diod, satu komponen baru akan terbentuk.

Namakan komponen tersebut.

.....

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

6(*d*)(i)
1

(ii) Give **one** function of this new device.

*Berikan **satu** fungsi komponen ini.*

.....

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

6(*d*)(ii)
1

Total A6
8

For Examiner's use

7 Diagram 7 shows a large pot with noodles being cooked in lots of hot water.

Rajah 7 menunjukkan sebuah periuk besar yang mengandungi mi dimasak dalam air panas yang banyak.

Diagram 7
Rajah 7

(*a*) (i) What is the meaning of **heat**?

*Apakah maksud **haba**?*

7(*a*)(i)

1

……

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

(ii) Why is the noodle being cooked in a large amount of hot water?

Mengapakah mi dimasak dalam air panas yang banyak?

7*(a)*(ii)

2

……

……

[2 *marks*]
[2 *markah*]

(*b*) The hawker added 2 kg of water at 30˚C to 9 kg of hot water at 95˚C.
What is the final temperature when the water mixture achieves thermal equilibrium?

Penjaja itu menambahkan 2 kg air bersuhu 30˚C ke dalam 9 kg air panas bersuhu 95˚C.
Berapakah suhu akhir campuran air itu apabila telah mencapai keseimbangan terma?

7*(b)*

2

[2 *marks*]
[2 *markah*]

For Examiner's Use

(*c*) A hawker plans to buy a new slow cooker pot for cooking porridge.
After the porridge is cooked, the porridge will be kept warm for a long period.

Table 7.1 shows the characteristics of two types of inner pot for a slow cooker with mass 2 kg.

Seorang penjaja bercadang untuk membeli sebuah periuk 'slow cooker' yang baru untuk memasak bubur. Selepas bubur dimasak, bubur akan disimpan panas untuk masa yang lama.

Jadual 7.1 *menunjukkan ciri- ciri dua jenis bekas dalam periuk 'slow cooker' yang berjisim 2 kg.*

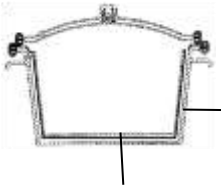
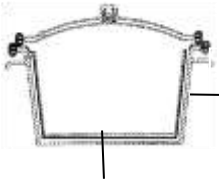
	P	Q
Inner pot *Bekas dalam*	 Outer pot *Bekas luar* Inner pot (ceramic) *Bekas dalam (seramik)*	 Outer pot *Bekas luar* Inner pot (glass) *Bekas dalam (kaca)*
Power *Kuasa*	180 W	70 W
Temperature change of inner pot *Perubahan suhu bekas dalam*	60^{o}C	60^{o}C
Time for temperature change *Masa untuk perubahan sushu*	10 min	15 min

Table 7.1
Jadual 7.1

For Examiner's Use

(*c*) (i) Calculate the specific heat capacity of the inner pot for each slow cooker.

Hitungkan muatan haba tentu bagi bekas dalam untuk setiap 'slow cooker'.

7(*c*)(i)

3

[3 *marks*]
[3 *markah*]

(ii) Based on the answer in 7 (*c*) (i), which inner pot is the most suitable?

Berdasarkan jawapan di 7 (*c*) (i), *bekas dalam periuk manakah yang paling sesuai?*

……

Reason:

Sebab:

……

7(c)(ii)

2

[2 *marks*]
[2 *markah*]

Total A7

10

For Examiner's use

8 Diagram 8.1 shows the radioactive decay of Uranium-238 to Thorium (Th) by emitting an alpha particle.

Rajah 8.1 *menunjukkan reputan radioaktif Uranium*-238 *kepada Thorium* (Th) *dengan memancarkan zarah alfa.*

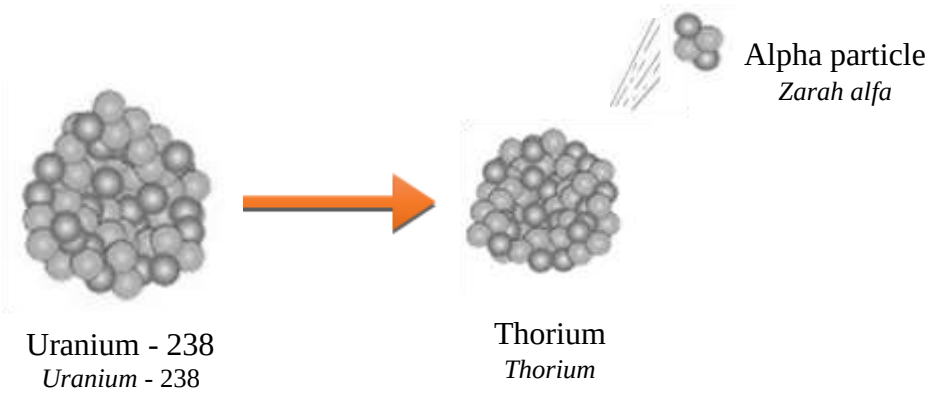


Diagram 8.1
Rajah 8.1

(*a*) What is the meaning of radioactivity?

Apakah yang dimaksudkan dengan keradioaktifan?

……

……

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

8(*a*)
1

(*b*) (i) Write the nuclear equation for the alpha decay of Uranium - 238.
Tuliskan persamaan nuklear bagi pereputan alfa bagi Uranium – 238.

[2 *marks*]
[2 *markah*]

8(*b*)(i)
2

(ii) What happens to the proton number and the neutron number of Uranium - 238 after the decay process? Explain why.

Apakah yang berlaku kepada nombor proton dan nombor neutron Uranium - 238 selepas proses pereputan ?Jelaskan mengapa.

……

……

……

[2 *marks*]
[2 *markah*]

8(*b*)(ii)
2

For Examiner's Use

(*c*) A company which manufactures self-raising flour wishes to check the level of flour in the packed boxes. A radioactive source and a detector are used to detect the level of flour in the boxes as shown in Diagram 8.2.

Sebuah kilang yang menghasilkan tepung naik sendiri mahu membuat pemeriksaan bagi aras tepung di dalam kotak tersebut. Sumber radioaktif dan pengesan digunakan untuk mengesan aras tepung di dalam kotak seperti dalam Rajah 8.2.

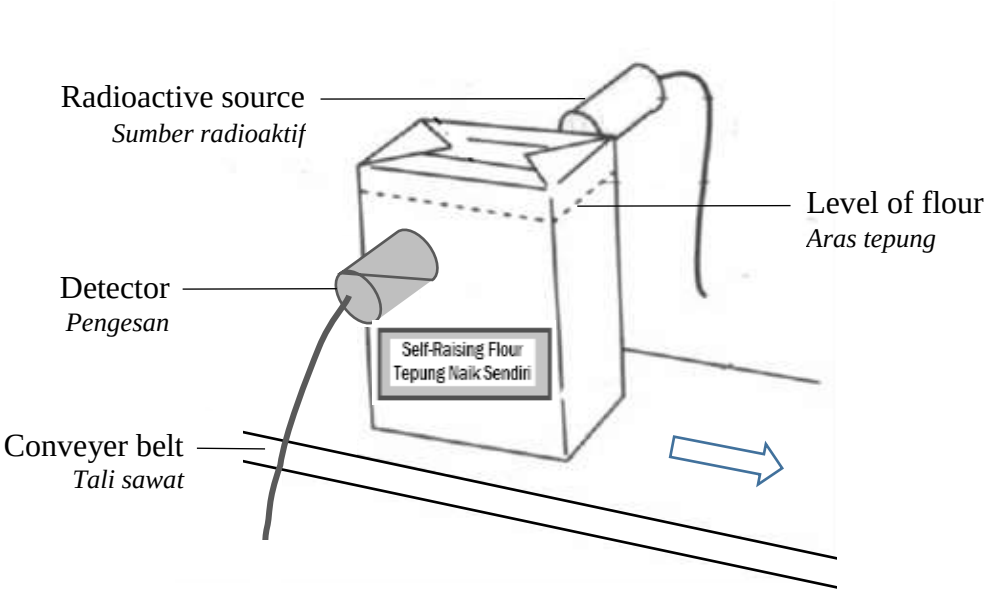


Diagram 8.2
Rajah 8.2

Table 8 shows the graph of radioactivity against time and type of radiation for radioactive sources P, Q and R.

Jadual 8 *menunjukkan graf keradioaktifan melawan masa serta jenis radiasi bagi sumber-sumber radioaktif* P, Q *dan* R.

For Examiner's use

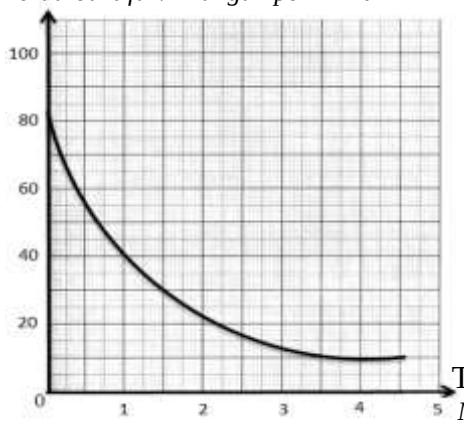
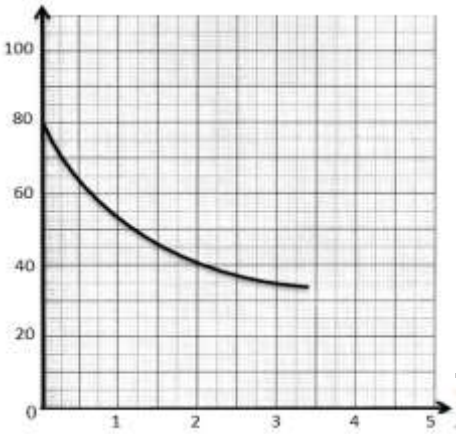
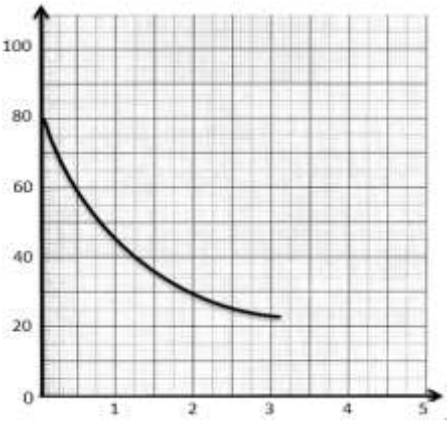
Radioactive Source *Sumber radioaktif*	Graph of Radioactivity against Time *Graf Keradioaktifan melawan Masa*	Type of Radiation *Jenis Radiasi*
P	Radioactivity/Counts per minute *Keradioaktifan/Bilangan per minit*  	Alpha *Alfa*
Q	Radioactivity/Counts per minute *Keradioaktifan/Bilangan per minit*  	Beta *Beta*
R	Radioactivity/Counts per minute *Keradioaktifan/Bilangan per minit*  	Gamma *Gama*

Table 8
Jadual 8

For Examiner's use

On the graphs in Table 8 on page 21, show how you determine half-life for each radioactive source.

Di graf-graf pada Jadual 8 di halaman 21, *tunjukkan bagaimana anda menentukan separuh hayat bagi setiapsumber radioaktif.*

State the half life for:

Nyatakan separuh hayat bagi:

(i) Radioactive source P
Sumber radioaktif P

$T_{1/2}$ = ...

(ii) Radioactive source Q
Sumber radioaktif Q

$T_{1/2}$ = ...

(iii) Radioactive source R
Sumber radioaktif R

$T_{1/2}$ = ...

8(*c*) 4

[4 *marks*]
[4 *markah*]

(*d*) (i) Based on Table 8, state the most suitable radioactive source for detecting the level of flour in the flour boxes.

Berdasarkan Jadual 8, *nyatakan sumber radioaktif yang paling sesuai untuk mengesan aras tepung di dalam kotak tepungn.*

8(*d*)(i) 1

.....

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

(ii) State **two** reasons for your answer in **8** (*d*)(i).

Nyatakan **dua** *sebab jawapan anda di* **8** *(d)(i).*

8(*d*)(ii) 2

.....

.....

.....

[2 *marks*]
[2 *markah*]

Total A8 1

Section B
Bahagian B

[20 marks]
[20 *markah*]

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

9 Diagrams 9.1 and 9.2 show light rays from two identical objects reflected by the two convex mirrors X and Y. Both mirrors produce virtual images, *f* is the focal length and *C* is the centre of curvature for each mirror.

Rajah 9.1 *dan* 9.2 *menunjukkan sinar cahaya dari dua objek yang serupa dipantulkan oleh dua cermin cembung* X *dan* Y. *Kedua-dua cermin itu menghasilkan imej maya, f ialah panjang fokus dan* C *ialah pusat kelengkungan bagi setiap cermin itu.*

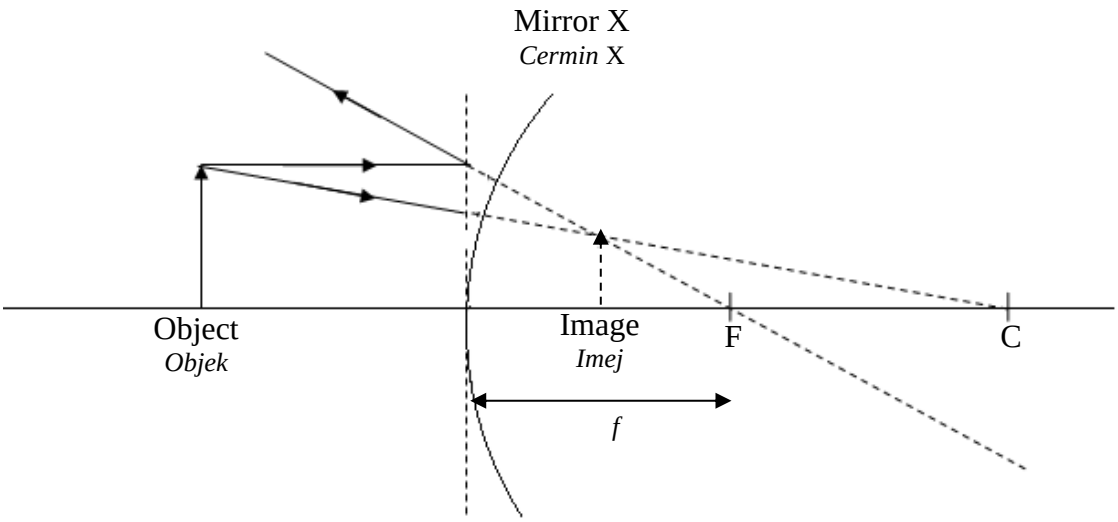


Diagram 9.1
Rajah 9.1

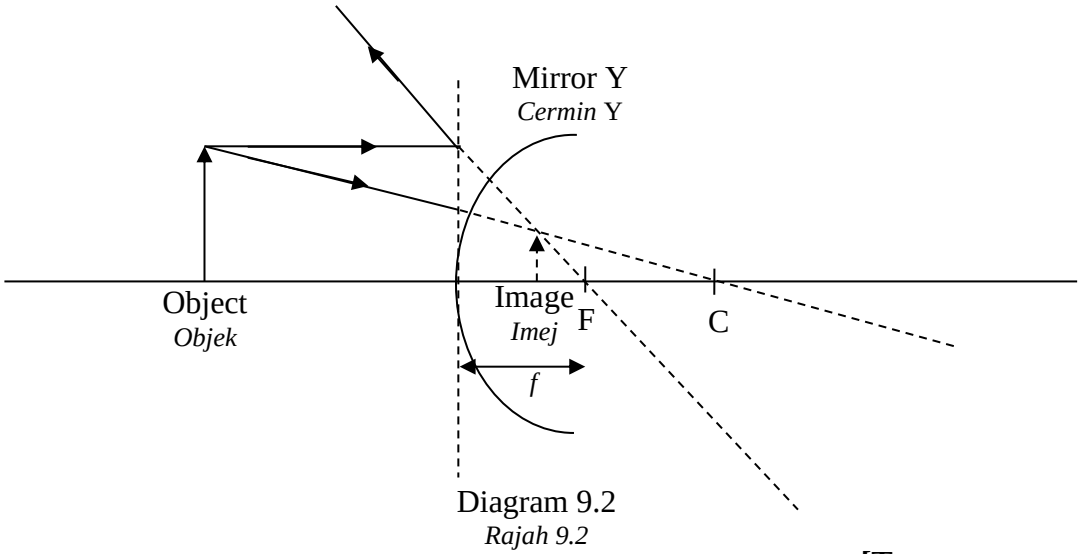


Diagram 9.2
Rajah 9.2

[Turn page over

(*a*) What is the meaning of virtual image? [1 mark]

Apakah yang dimaksudkan dengan imej maya? [1 *markah*]

(*b*) Observe Diagram 9.1 and Diagram 9.2,
Compare the focal length, *f*, curvature of the mirror and the height of the image produced by mirrors X and Y.

Perhatikan Rajah 9.1 *dan Rajah* 9.2
Bandingkan panjang fokus, f, kelengkungan cermin dan tinggi imej yang dihasilkan oleh cermin X *dan* Y.

[3 marks]
[3 *markah*]

Relate the height of image to the focal length and the curvature of the mirror.

Hubungkaitkan tinggi imej dengan panjang fokus,dan kelengkungan cermin

[2 marks]
[2 *markah*]

(*c*) Explain how a ship with sonar system can locate a sunken object in the sea.

Terangkan bagaimana sebuah kapal yang mempunyai sistem sonar dapat mengesan objek yang tenggelam di dalam laut

[4 marks]
[4 *markah*]

(*d*) Diagram 9.3 shows a solar cooker being used to boil water.

Rajah 9.3 *menunjukkan periuk solar digunakan untuk memanaskan air.*

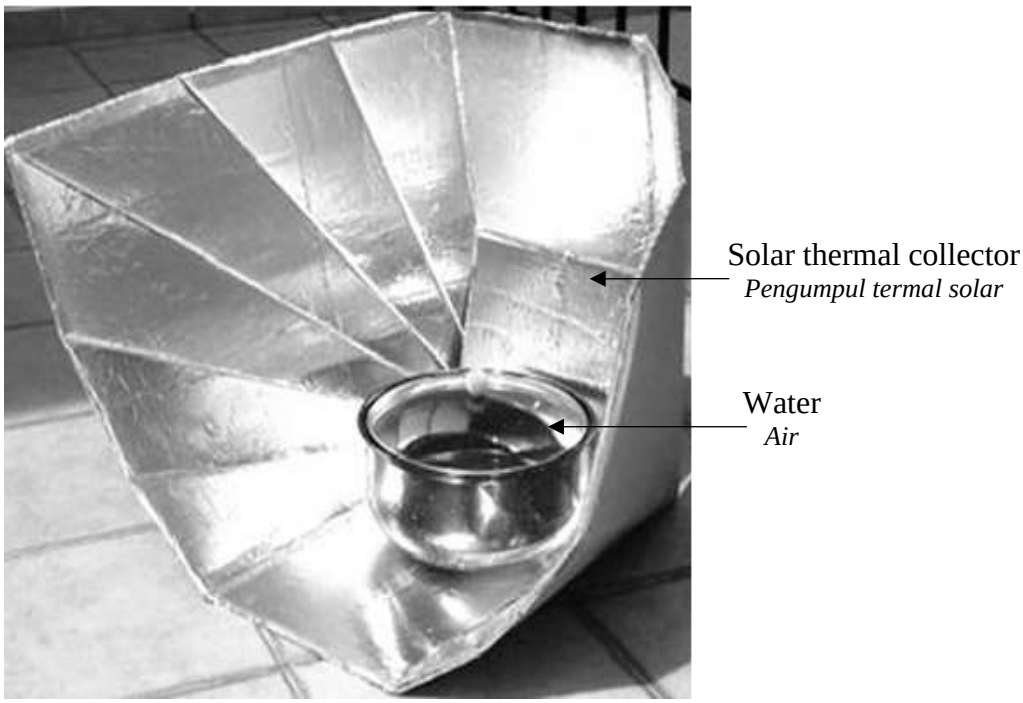


Diagram 9.3
Rajah 9.3

You are required to modify the design of the solar thermal collector in Diagram 9.3 to be used in a solar power station.

State and explain your modifications. [10 marks]

Anda dikehendaki memberi beberapa cadangan untuk mengubahsuai reka bentuk pengumpul termal solar dalam Rajah 9.3 *untuk menjana elektrik di stesen janakuasa solar.*

Nyata dan terangkan pengubahsuaian anda. [10 *markah*]

[Turn page over

10 Diagram 10.1 and Diagram 10.2 show two similar loudspeakers connected to an audio signal generator at different frequencies.

Rajah 10.1 *dan Rajah* 10.2 *menunjukkan dua pembesar suara yang serupa disambung pada suatu penjana isyarat audio yang berbeza frekuensi.*

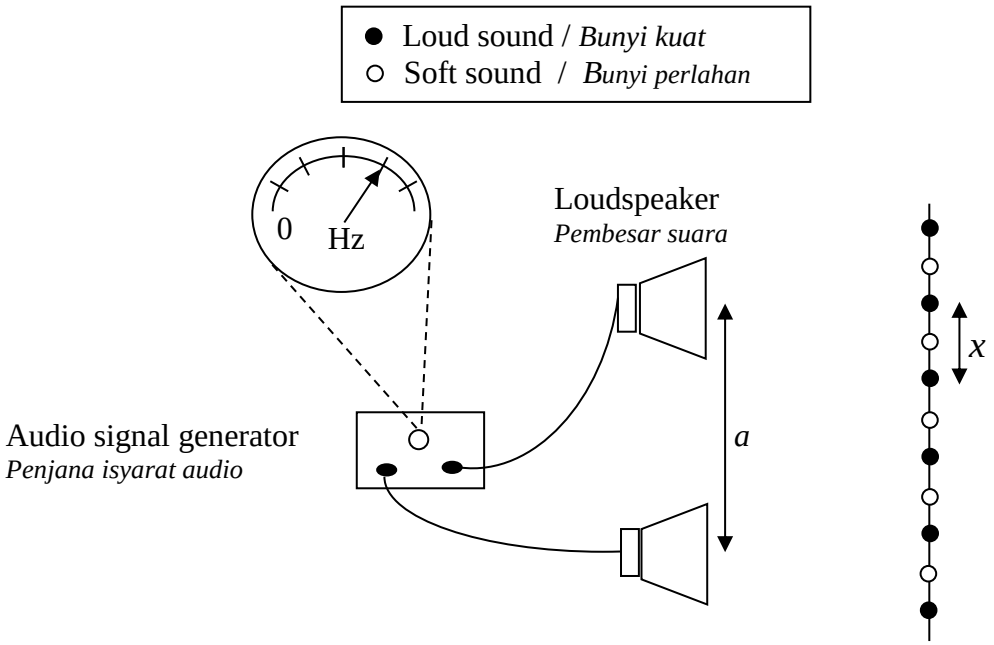


Diagram 10.1
Rajah 10.1

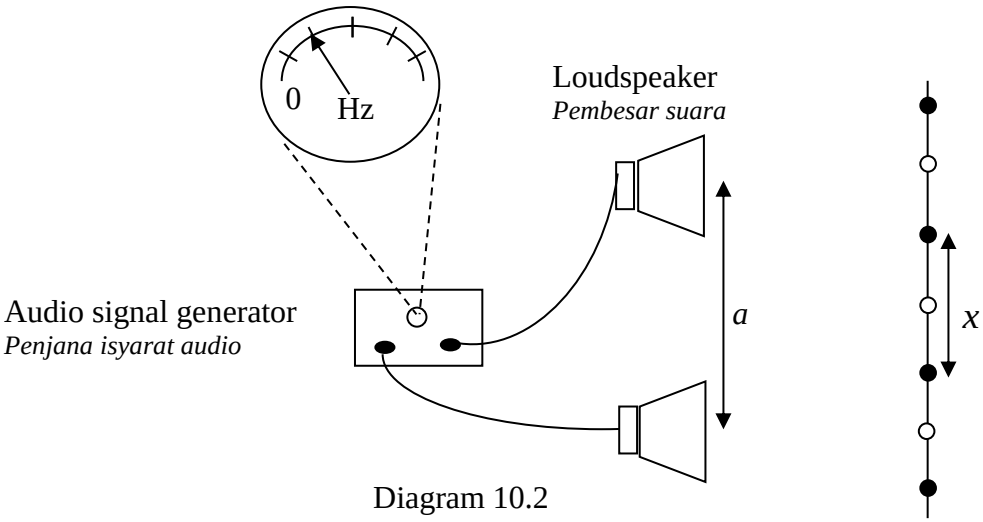


Diagram 10.2
Rajah 10.2

(*a*) What is the meaning of frequency? [1 *mark*]

Apakah maksud frekuensi? [1 *markah*]

(*b*) By using Diagram 10.1 and Diagram 10.2, compare the frequency of the sound waves, the distance between the two loud speakers, *a*, and the distance between two consecutive loud sounds, *x*.

Dengan menggunakan Rajah 10.1 *dan Rajah* 10.2, *bandingkan frekuensi gelombang bunyi, jarak antara dua pembesar suara, a, dan jarak antara dua bunyi kuat yang berturutan, x .*

Relate the wavelength of the sound waves and the distance between two consecutive loud sounds. Name the wave phenomenon involved.

Hubungkaitkan panjang gelombang bunyi dengan jarak antara dua bunyi kuat yang berturutan. Namakan fenomena yang terlibat.

[5 *marks*]
[5 *markah*]

(*c*) Diagram 10.3 shows The Palm Jumeirah at Dubai that are surrounded by wave breakers. The houses and buildings at The Palm Jumeirah are exposed to big waves that could cause destruction.

Rajah 10.3 *menunjukkan 'The Palm Jumeirah' di Dubai yang dikelilingi oleh pemecah ombak. Rumah dan bangunan di 'The Palm Jumeirah' terdedah kepada ombak besar yang boleh menyebabkan kemusnahan.*

Diagram 10.3
Rajah 10.3

Explain how these wave breakers can save The Palm Jumeirah from destruction.

Terangkan bagaimana pemecah ombak dapat menyelamatkan 'The Palm Jumeirah' dari kemusnahan.

[4 *marks*]
[4 *markah*]

[Turn page over

(*d*) Diagram 10.4 shows a large abandoned pond.

Rajah 10.4 *menunjukkan sebuah kolam terbiar.*

Diagram 10.4
Rajah 10.4

You have been assigned as a consultant to design a water park at the abandoned pond site. The new water park should be able to produce conditions similar to the sea and also allow surfing activities twice a day. In your design, include one safety aspect for the water park. Using the wave concept, explain how the new water park can attract many visitors including young children.

Anda ditugaskan sebagai seorang penasihat untuk mereka bentuk sebuah taman air di sebuah kolam terbiar. Taman air yang baru ini seharusnya boleh menghasilkan suasana yang serupa dengan keadaan di laut dan juga membolehkan aktiviti meluncur dilakukan dua kali sehari. Dalam rekabentuk anda, nyatakan juga satu aspek keselamatan bagi taman ini. Menggunakan konsep gelombang, terangkan bagaimana taman air yang baru ini dapat menarik ramai pelawat termasuk kanak kanak.

[10 *marks*]
[10 *markah*]

Section C
Bahagian C

[20 marks]
[20 *markah*]

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

11 Diagram 11.1 shows a load hanging from a rope.
Diagram 11.2 shows the similar rope breaking when another load is hung on it.
Forces are exerted on the ropes when loads are hung on it.

Rajah 11.1 *menunjukkan satu beban digantung dari seutas tali.*
Rajah 11.2 *menunjukkan tali yang serupa terputus apabila satu beban lain digantung padanya.*
Daya- daya dikenakan ke atas tali apabila beban digantung padanya.

Diagram 11.1
Rajah 11.1

Diagram 11.2
Rajah 11.2

(*a*) What is the meaning of force?

Apakah maksud daya?

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

(*b*) (i) Explain why the rope does not break in Diagram 11.1 while the rope breaks in Diagram 11.2.

Terangkan mengapakah tali dalam Rajah 11.1 *tidak putus sementara tali dalam Rajah* 11.2 *terputus?*

[2 *marks*]
[2 *markah*]

[Turn page over

(*b*) (ii) State the energy change when the object in Diagram 11.2 falls to the ground and sketch two graphs to represent the energy change against time.

Nyatakan perubahan tenaga apabila objek dalam Rajah 11.2 *jatuh ke tanah dan lakarkan dua graf bagi mewakili perubahan tenaga melawan masa.*

[3 *marks*]
[3 *markah*]

(*c*) Diagram 11.3 shows a child playing on a swing. The mass of the child is 15 kg and the angle of swing with the vertical is 15^{o}.

Rajah 11.3 *menunjukkan seorang kanak-kanak bermain buaian. Kanak-kanak itu berjisim* 15 *kg dan sudut ayunan menegaknya ialah* 15^{o}.

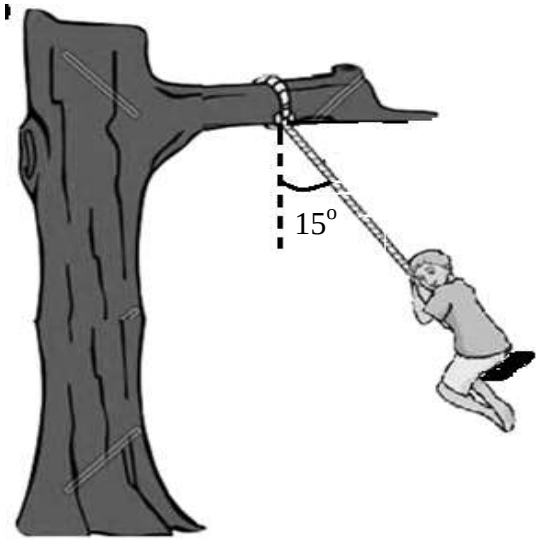


Diagram 11.3
Rajah 11.3

(i) Calculate the tension of the rope.

Hitungkan ketegangan tali.

[3 *marks*]
[3 *markah*]

(ii) If another child of weight 250 N plays on the swing, will the rope break if its maximum tension is 300 N?

Jika seorang kanak-kanak lain dengan berat 250 N *bermain buaian tersebut, adakah tali akan terputus jika ketegangan maksimum adalah* 300 N*?*

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

(*d*) Diagram 11.4 shows the side view of a car.

Rajah 11.4 *menunjukkan pandangan sisi sebuah kereta*.

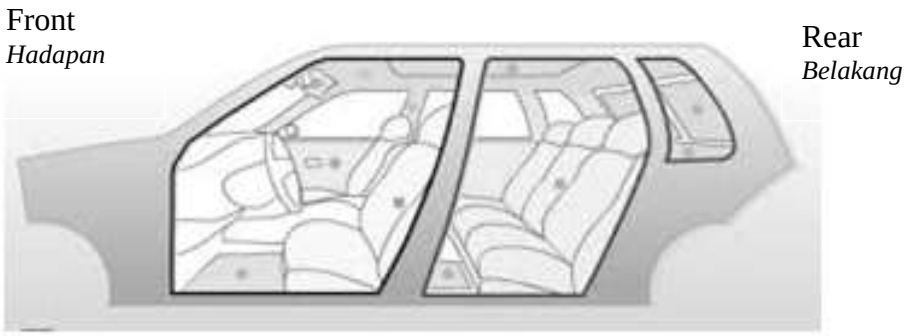


Diagram 11.4
Rajah 11.4

Table 11 shows four safety car seats K, L, M and N with different specifications. You are required to determine the most suitable car seat and the way it is positioned on the front passenger seat, for babies' safe travel.

Explain the suitability of each characteristic of the car seat and position. Determine the most suitable car seat and position.

Give a reason for your choice.

Jadual 11 *menunjukkan empat kerusi keselamatan* K, L, M *dan* N *dengan ciri-ciri yang berbeza. Anda dikehendaki menentukan kerusi keselamatan dan cara pemasangan yang paling sesuai, untuk perjalanan bayi yang selamat.*

Terangkan kesesuaian setiap ciri kerusi keselamatan dan cara pemasangan di tempat duduk penumbang bahagian hadapan.Tentukan kerusi keselamatan dan cara pemasangan yang paling sesuai untuk digunakan.

Beri sebab bagi pilihan anda.

[10 marks]
[10 *markah*]

[Turn page over

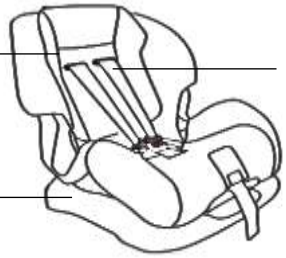
K	 Seat cover (Leather) *Sarung kerusi* (*Kulit*) Seat belt *Tali pingang keselamatan* Seat base (Plastic) *Tapak kerusi* (*Plastik*) Car seat fastened facing the front *Kerusi keselamatan dipasang mengadap ke hadapan*
L	 Seat covers (Leather) *Sarung kerusi* (*Kulit*) Seat belt *Tali pingang keselamatan* Seat base (Plastic) *Tapak kerusi* (*Plastik*) Car seat fastenend facing the rear *Kerusi keselamatan dipasang mengadap ke belakang*
M	 Seat covers (Fabric) *Sarung kerusi* (*Fabrik*) Seat belt *Tali pingang keselamatan* Seat base (Fibre) *Tapak kerusi* (*Fiber*) Car seat fastened facing the rear *Kerusi keselamatan dipasang mengadap ke belakang*
N	 Seat covers (Fabric) *Sarung kerusi* (*Fabrik*) Seat belt *Tali pingang keselamatan* Seat base (Fibre) *Tapak kerusi* (*Fiber*) Car seat fastened facing the front *Kerusi keselamatan dipasang mengadap ke hadapan*

Table 11
Jadual 11

12 Diagram 12.1 shows a transformer at an electric subpower station.

Rajah 12.1 *menunjukkan sebuah transformer di sub-stesen janakuasa elektrik.*

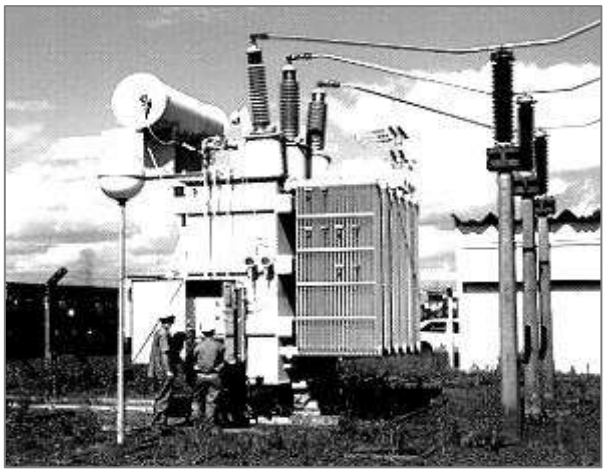


Diagram 12.1
Rajah 12.1

(*a*) Diagram 12.2 shows 2 types of transformer.

Rajah 12.2 *menunjukkan* 2 *jenis transformer.*

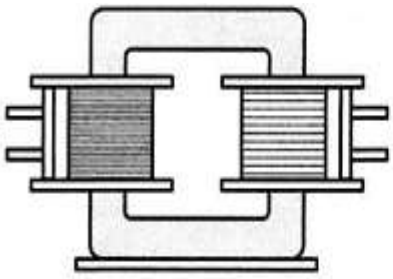
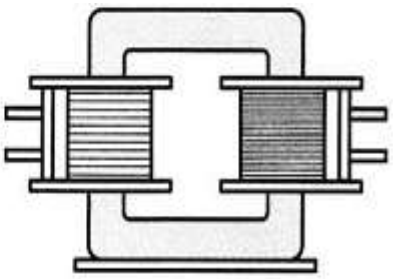
Transformer P	Transformer Q
	
Primary voltage = 240 V *Voltage primer*	Primary voltage = 110 V *Voltage primer*
Number of primary coil = 2000 *Bilangan lilitan primer*	Number of primary coil = 500 *Bilangan lilitan primer*
Number of secondary coil = 500 *Bilangan lilitan sekunder*	Number of secondary coil = 1000 *Bilangan lilitan sekunder*

Diagram 12.2
Rajah 12.2

[Turn page over

(i) Referring to transformer P and transformer Q, which one is a step-down transformer? Give one reason for your choice.

Merujuk kepada transformer P *dan transformer* Q*, yang manakah transformer injak-turun? Nyatakan satu sebab bagi pilihan anda.*

[2 *marks*]
[2 *markah*]

(ii) Explain how a transformer works.

Jelaskan bagaimana transformer berfungsi.

[4 *marks*]
[4 *markah*]

(*b*) Based on transformer P in Diagram 12.2
Berdasarkan transformer P *dalam Rajah* 12.2

Calculate
Hitungkan

(i) the output voltage [2 *marks*]
voltan output [2 *markah*]

(ii) the secondary current, if the primary current is 2 A. [2 *marks*]
arus sekunder, sekiranya diberi arus primer ialah 2 A. [2 *markah*]

(*c*) Diagram 12.3 shows a wind turbine for generating electricity.

Rajah 12.3 *menunjukkan turbin angin untuk menjana elektrik.*

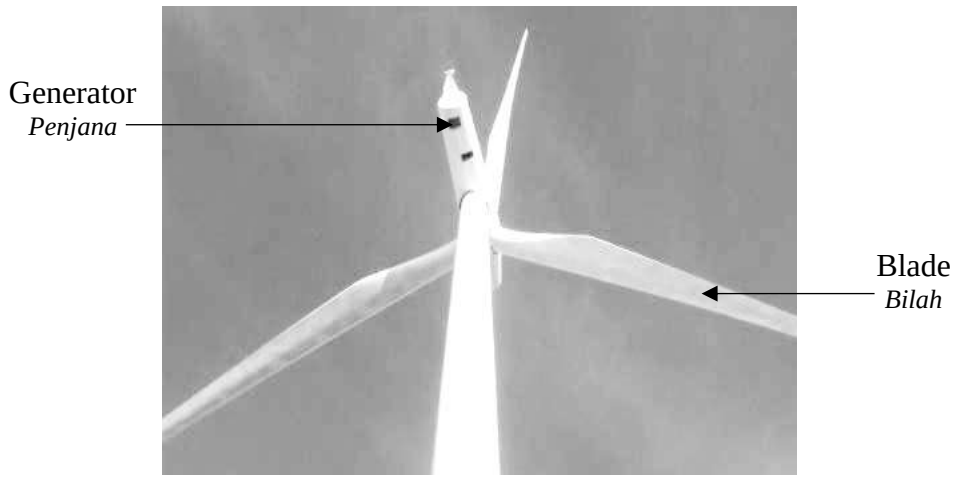


Diagram 12.3
Rajah 12.3

You are required to investigate the characteristics of a wind turbine shown in Table 12.

Anda dikehendaki menyiasat ciri-ciri turbin angin yang ditunjukkan dalam Jadual 12.

Wind turbine generator *Penjana turbin angin*	Material of blade *Bahan bilah*	Shape of blade *Bentuk bilah*	Type of generator *Jenis penjana*	Height of wind turbine *Ketinggian turbin angin*
P	Metal *Logam*	Aerodynamic	AC Generator *Penjana AC*	High *Tinggi*
Q	Fiber glass *Gentian kaca*	Aerofoil	DC Generator *Penjana DC*	Low *Rendah*
R	Fiber glass *Gentian kaca*	Aerodynamic	AC Generator *Penjana AC*	High *Tinggi*
S	Metal *Logam*	Aerofoil	DC Generator *Penjana DC*	Low *Rendah*

Table 12
Jadual 12

Explain the suitability of each characteristic and determine the most efficient wind turbine.

Give a reason for your choice.

Terangkan kesesuaian setiap ciri dan tentukan turbin angin yang mempunyai kecekapan tertinggi.

Beri sebab untuk pilihan anda.

[10 marks]
[10 *markah*]

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

INFORMATION TO 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 daripada* **Bahagian A**. *Jawapan kepada* **Bahagian A** *hendaklah ditulis dalam ruang yang disediakan dalam kertas soalan.*

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 by the invigilators. Answer questions in **Section B** and **Section C** in detail. Answers should be clear and logical. Equations, diagrams, tables, graphs and other suitable methods can be used to explain your answer.
Jawab **satu** *soalan daripada* **Bahagian B** *dan* **satu** *soalan daripada* **Bahagian C**. *Jawapan kepada* **Bahagian B** *dan* **Bahagian C** *hendaklah ditulis dalam kertas yang disediakan oleh pengawas peperiksaan. Anda diminta menjawab dengan lebih terperinci untuk* **Bahagian B** dan **Bahagian C**. *Jawapan mestilah jelas dan logik. Persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda boleh digunakan.*

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 provided are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan.

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

7. If you wish to cancel any answer, neatly cross out the answer. Then write down the new answer.
Jika anda anda hendak menukar sesuatu jawapan,,batalkan jawapan yang telah dibuat . Kemudian tulis jawapan yang baru.

8. A list of formulae is provided on page 2.
Satu senarai rumus disediakan di halaman 2.

9. You may use non-programmable scientific calculator. However, steps in calculation must be shown.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram. Walau bagaimanapun, langkah mengira perlu ditunjukkan.

10. The time suggested to complete **Section A** is 90 minutes, **Section B** is 30 minutes and **Section C** is 30 minutes.
Masa yang dicadangkan untuk menjawab **Bahagian A** *ialah* 90 *minit,* **Bahagian B** *ialah* 30 *minit dan* **Bahagian C** *ialah* 30 *minit.*

11. Attach all your answers together and hand them in at the end of the examination.
Lekatkan semua kertas jawapan dan serahkan di akhir peperiksaan.

4531/3
Physics
Paper 3
Ogos/Sept 2014
1 ½ hours

NAME:…….....

COLLEGE NO. : …....……..... CLASS: .....

MAKTAB RENDAH SAINS MARA

PEPERIKSAAN SIJIL PENDIDIKAN MRSM 2014

PHYSICS

Paper 3

One hour and thirty minutes

4 5 3 1 3

DO NOT OPEN THIS QUESTION BOOKLET UNTIL TOLD TO DO SO

1. Write down your name, college no. and your class in the space provided.
   Tulis nama, no. maktab dan kelas anda pada ruang yang disediakan.

2. The questions are written in English and bahasa Melayu.
   Kertas soalan ini adalah dalam dwibahasa.

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

Examiner's Code			
Section	Question	Marks	Score
A	1	16	
	2	12	
B	1	12	
	2	12	
Total			

This booklet consists of 16 printed pages

Section A
Bahagian A

[28 *marks*]
[28 *markah*]

Answer **all** questions in this section

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

1 A student carries out an experiment to investigate the relationship between the angle of deflection, $\Delta\Theta$ and the length of the wire, l.

Seorang pelajar menjalankan satu eksperimen untuk menyiasat hubungan antara sudut pesongan, $\Delta\Theta$ dan panjang dawai , l.

The arrangement of the apparatus for this experiment is shown in Diagram 1.1.

Susunan radas bagi eksperimen ini ditunjukkan pada Rajah 1.1.

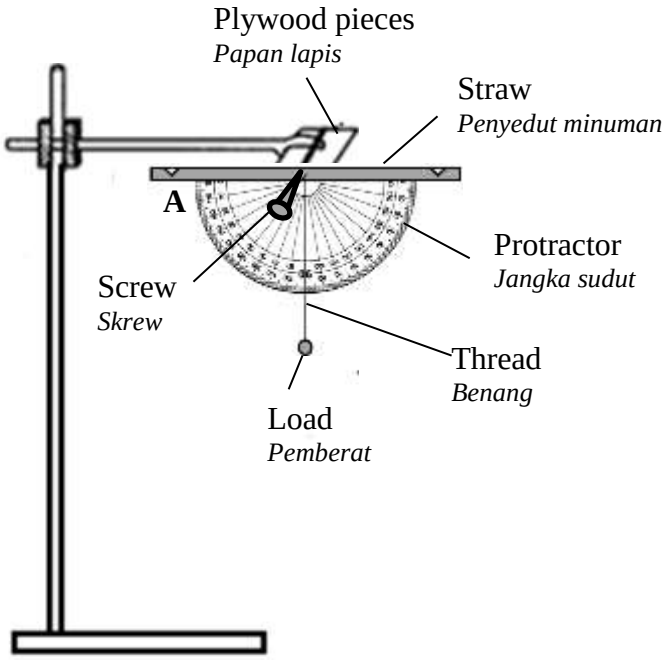


Diagram 1.1
Rajah 1.1

The thread of the load lies exactly aligned with the 90° mark on the protractor.

Benang beban berada segaris dengan tanda sudut 90° pada jangka sudut.

A wire length of, l =10.0 cm is hung from A and the final angle of deflection, Θ_f is measured using a protractor as shown in Diagram 1.2.

Seutas dawai dengan panjang, l =10.0 cm *digantungkan pada A dan sudut pesongan akhir, Θ_f diukur menggunakan jangka sudut seperti ditunjukkan dalam Rajah* 1.2.

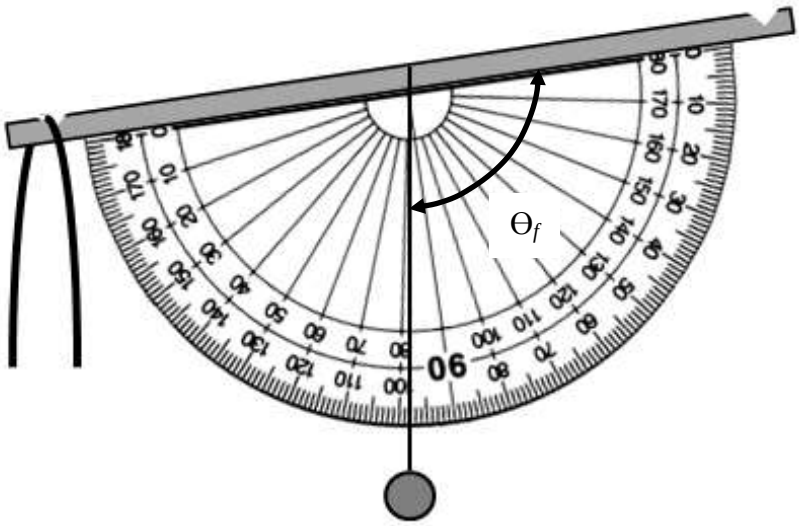


Diagram 1.2
Rajah 1.2

The procedure is repeated with different lengths of wire, l = 20.0 cm, 30.0 cm, 40.0 cm and 50.0 cm. The corresponding final angles of deflection, Θ_f are shown in Diagrams 1.4, 1.5, 1.6 and 1.7 on pages **4** and **5**.

Prosedur ini diulang dengan panjang dawai yang berlainan, l = 20.0 cm, 30.0 cm, 40.0 cm *dan* 50.0 cm. *Bacaan sudut akhir, Θ_f yang sepadan ditunjukkan pada Rajah* 1.4, 1.5, 1.6 *dan* 1.7 *di halaman* **4** *dan* **5**.

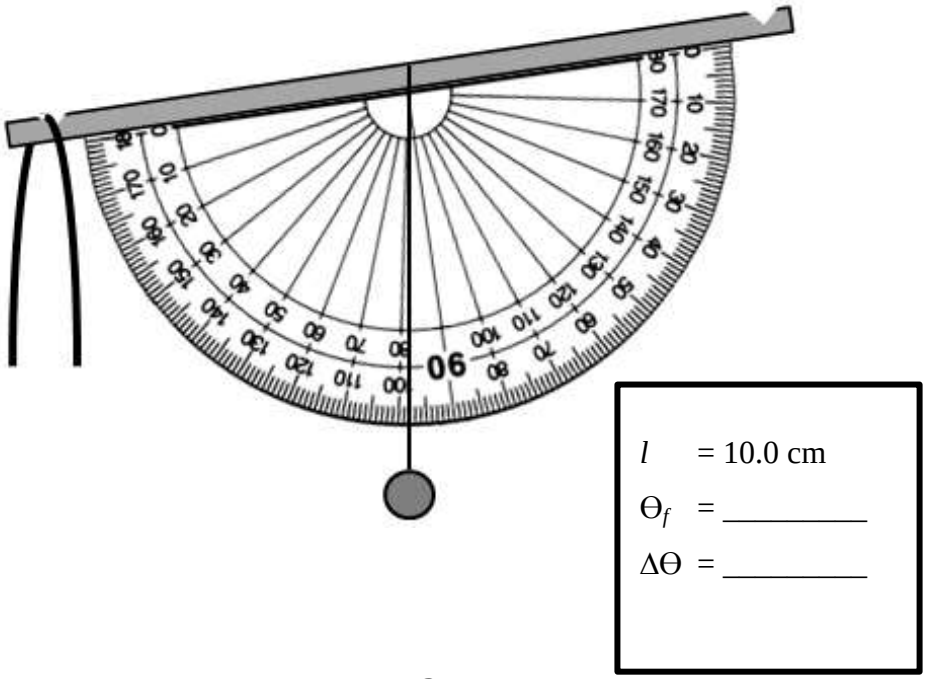
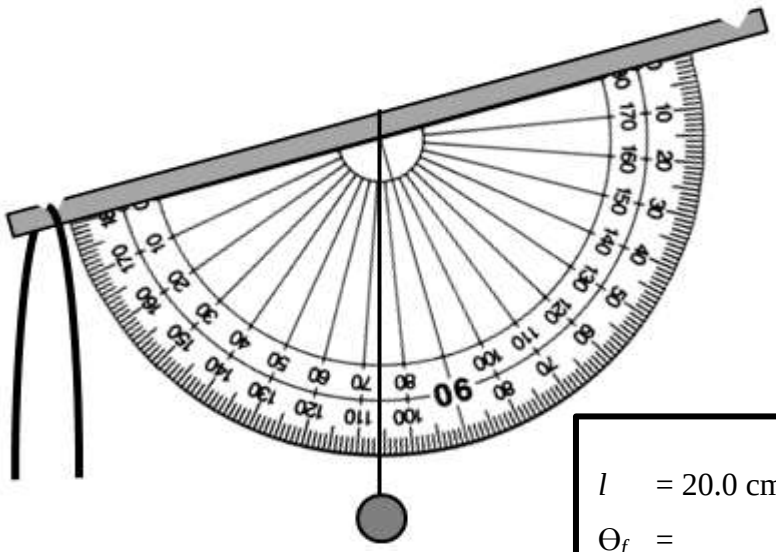


Diagram 1.3
Rajah 1.3

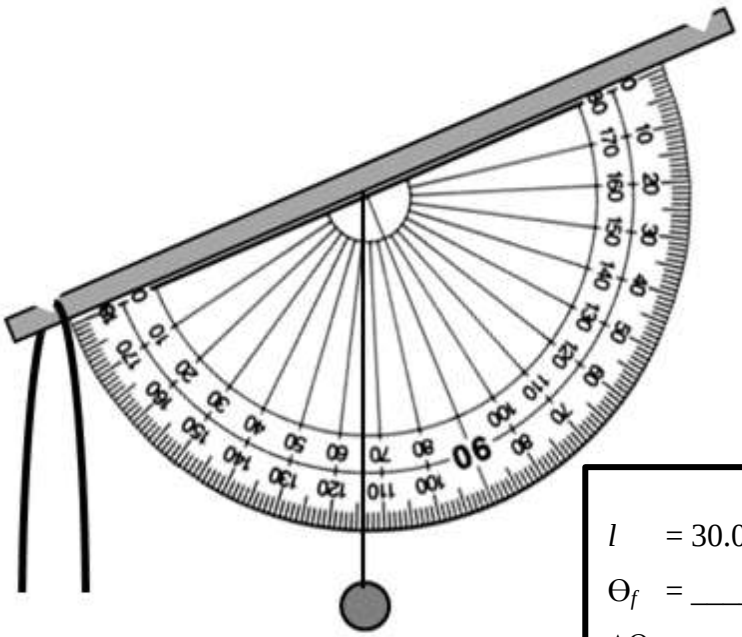


l = 20.0 cm

Θ_f = _____

$\Delta\Theta$ = _____

Diagram 1.4
Rajah 1.4

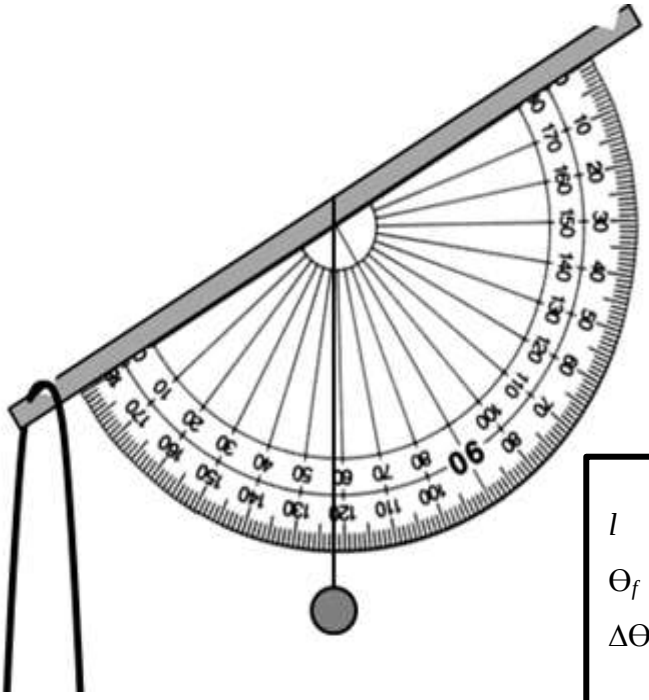


l = 30.0 cm

Θ_f = _____

$\Delta\Theta$ = _____

Diagram 1.5
Rajah 1.5

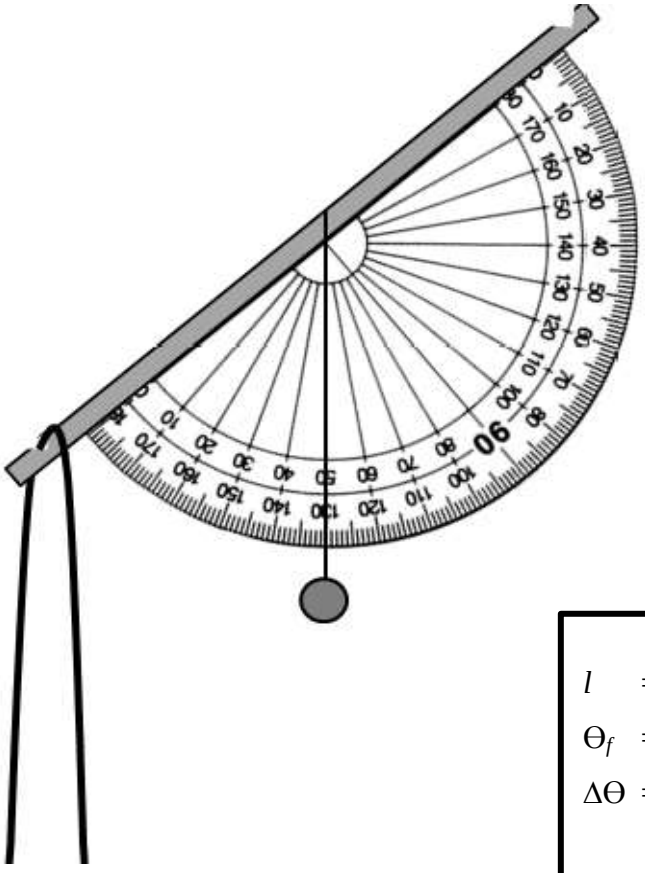


l = 40.0 cm

Θ_f = _____

$\Delta\Theta$ = _____

Diagram 1.6
Rajah 1.6



l = 50.0 cm

Θ_f = _____

$\Delta\Theta$ = _____

Diagram 1.7
Rajah 1.7

[Turn over

For Examiner's Use.

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

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

1(*a*)(i)

1

(i) The manipulated variable
Pembolehubah dimanipulasikan

.....

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

1(*a*)(ii)

1

(ii) The responding variable
Pembolehubah bergerak balas

.....

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

1(*a*)(iii)

1

(iii) The constant variable
Pembolehubah dimalarkan

.....

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

(*b*) Based on Diagrams 1.3, 1.4, 1.5, 1.6 and 1.7 on pages **3**, **4** and **5**,

Berdasarkan Rajah 1.3, 1.4, 1.5, 1.6 *dan* 1.7 *pada halaman* **3**, **4** *dan* **5**,

1(*b*)(i)

2

(i) record the reading of the final angle of deflection, θ_f for each value of length of wire, *l* in the space provided on each diagram.

catat bacaan sudut pesongan akhir, θ_f *untuk setiap panjang dawai, l dalam ruang yang disediakan pada setiap rajah.*

[2 *marks*]
[2 *markah*]

For Examiner's Use.

(ii) For each value of l in **1**(b) (i), calculate the value of the angle of deflection, $\Delta\theta$ using the formula:

Hitung nilai sudut pesongan, $\Delta\theta$ bagi semua nilai l di dalam soalan **1** *(b) (i) dengan menggunakan formula:*

$$\Delta\theta = \theta_f - 90°$$

Record each value of $\Delta\theta$ in the space provided for each diagram.

Rekod nilai $\Delta\theta$ dalam ruang yang disediakan untuk setiap Rajah.

[2 *marks*]
[2 *markah*]

1(*b*)(ii)

2

(*c*) Tabulate your results for all values of l, θ_f and $\Delta\theta$ in the space below.

Jadualkan keputusan anda bagi semua nilai l, θ_f dan $\Delta\theta$ dalam ruang di bawah.

[3 *marks*]
[3 *markah*]

1(*c*)

3

(d) On the graph paper on page **8**, plot a graph of $\Delta\theta$ against l.

Pada kertas graf di halaman **8**, *lukis graf $\Delta\theta$ melawan l.*

[5 *marks*]
[5 *markah*]

1(*d*)

5

(*e*) Based on your graph in **1***(d)*, state the relationship between $\Delta\theta$ and l.

Berdasarkan graf anda di **1***(d) , nyatakan hubungan antara $\Delta\theta$ dan l.*

……..

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

1*(e)*

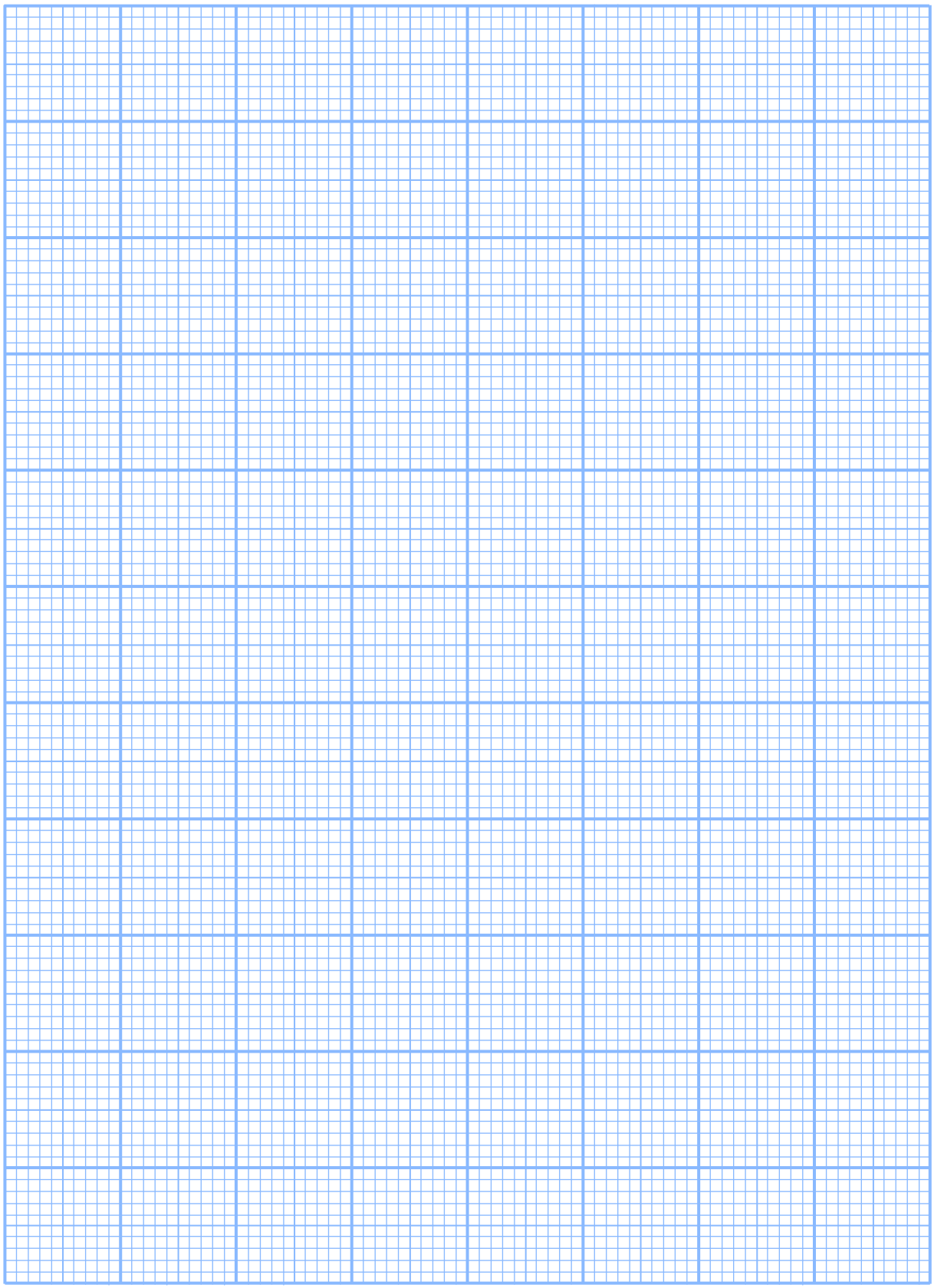
1

Total A1

16

Graph of $\Delta\theta$ against l

Graf $\Delta\theta$ melawan l



For Examiner's Use

2 A student carries out an experiment to investigate the relationship between the apparent depth, *h* and the real depth, *H* for images found.

The results of this experiment are shown in the graph of *h* against *H* in Diagram 2.1 on page 10.

Seorang pelajar menjalankan satu eksperimen untuk mengkaji hubungan antara dalam ketara, h dan dalam nyata, H bagi imej yang dihasilkan.

Keputusan eksperimen ditunjukkan oleh graf h melawan H pada Rajah 2.1 *di halaman* 10.

(a) Based on the graph in Diagram 2.1 :

Berdasarkan graf pada Rajah 2.1:

(i) State the relationship between *h* and *H*.

Nyatakan hubungan antara h dan H.

…….....

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

2(*a*)(i) 1

(ii) Determine the value of *h* when *H* = 10.0 cm.
Show on the graph how you determine the value of *h*.

Tentukan nilai h apabila H = 10.0 cm
Tunjukkan pada graf bagaimana anda menentukan nilai ini.

h = …….....…. cm

[2 *marks*]
[2 *markah*]

2(*a*)(ii) 2

(iii) Determine the value of *H* when *h* = 50.0 cm.
Show on the graph how you determine the value of *H*.

Tentukan nilai H apabila h = 50.0 cm
Tunjukkan pada graf bagaimana anda menentukan nilai ini.

H = …….. cm

[2 *marks*]
[2 *markah*]

2(*a*)(iii) 2

(*b*) Calculate the gradient of the graph, m.
Show on the graph how you determine m.

Hitungkan kecerunan graf, m.
Tunjukkan pada graf bagaimana anda menentukan nilai m.

m = ……..

[3 *marks*]
[3 *markah*]

2*(b)* 3

[Turn over

Graph of h against H

Graf h melawan H

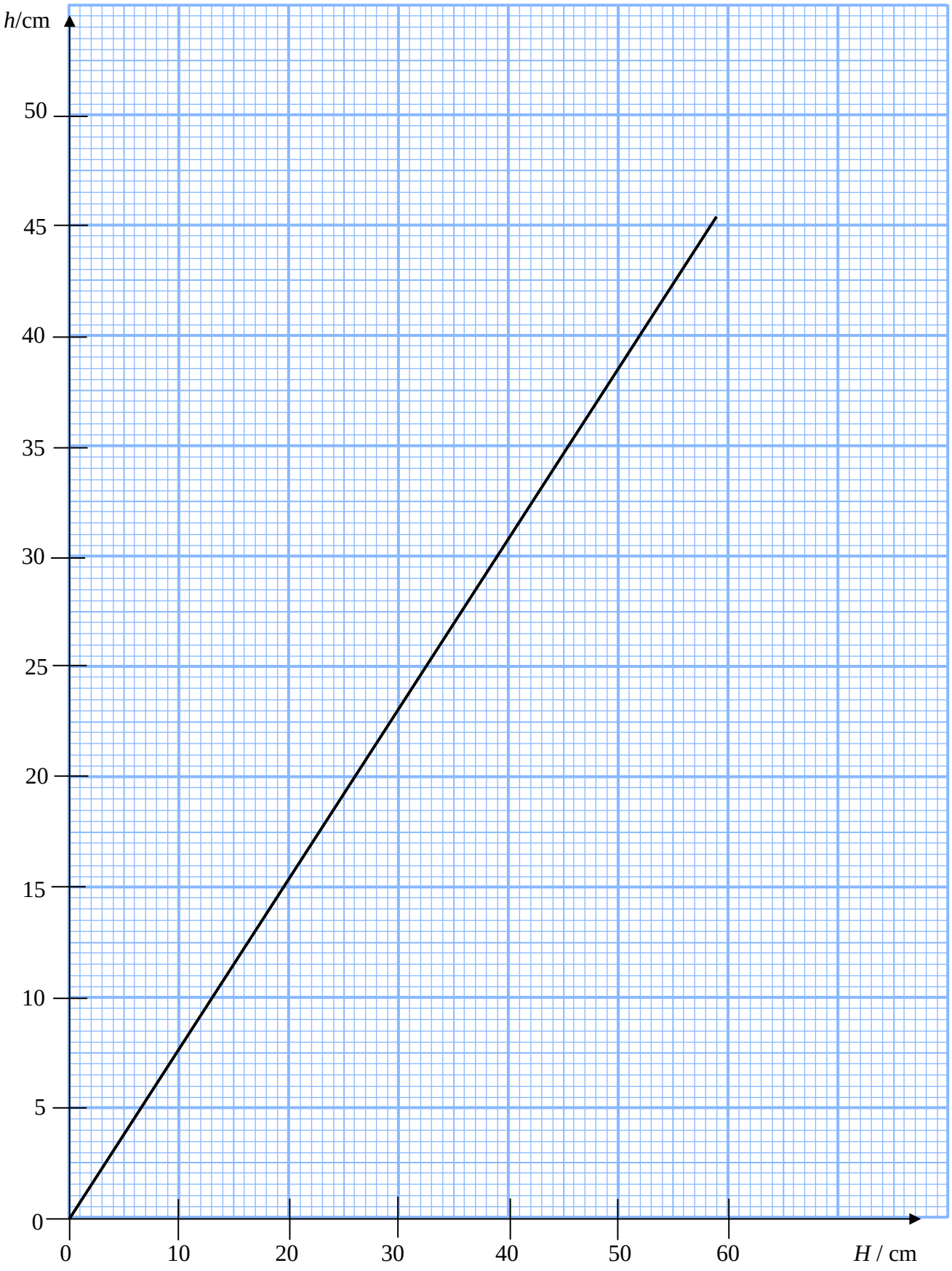


Diagram 2.1

***Rajah* 2.1**

For Examiner's Use

(c) The refractive index, *n* is calculated using the formula :

$$n = \frac{\text{Real depth, } H}{\text{Apparent depth, } h}$$

By using the answer in (*b*), calculate the refractive index, *n* of the water.

Indeks biasan, n boleh ditentukan dengan menggunakan formula:

$$n = \frac{Dalam\ nyata, H}{Dalam\ ketara, h}$$

Dengan menggunakan jawapan di (b), hitungkan indeks biasan, n bagi air.

2*(c)*

[3 *marks*]
[3 *markah*]

3

(d) State **one** precaution that can be taken to increase the accuracy of the measurements.

*Nyatakan **satu** langkah berjaga-jaga yang boleh diambil untuk meningkatkan kejituan pengukuran*.

……...

……...
[1 mark]
[1 *markah*]

2*(d)*

1

Total A2

12

Section B
Bahagian B

[12 *marks*]
[*12 markah*]

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

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

3 Diagram 3.1 shows a boy holding a balloon in a cold surrounding.
Diagram 3.2 shows a boy holding a similar balloon in a hot surrounding.

Rajah 3.1 *menunjukkan seorang budak lelaki memegang belon di tempat sejuk.*
Rajah 3.2 *menunjukkan seorang budak lelaki memegang belon yang sama ditempat panas.*

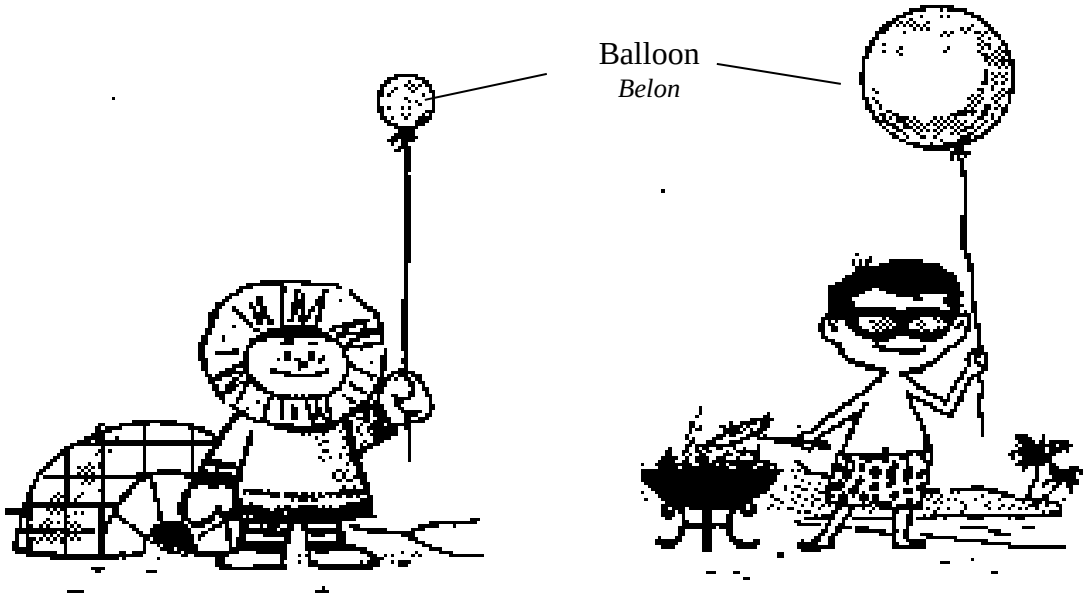


Diagram 3.1
Rajah 3.1

Diagram 3.2
Rajah 3.2

Based on the information and observation :

Berdasarkan maklumat dan pemerhatian tersebut :

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

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

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

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

(*c*) With the use of apparatus such as capillary tube, thermometer and other apparatus, describe **one** experiment to investigate the hypothesis stated in 3*(b).*

*Dengan menggunakan radas seperti tiub kapilari, termometer dan lain-lain radas, 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 dimanipulasikan dan **satu** kaedah mengukur pembolehubah bergerakbalas.*

(vi) The way to tabulate the data.

Cara untuk menjadualkan data.

(vii) The way to analyse the data.

Cara menganalisis data.

[10 *marks*]
[10 *markah*]

4 Diagram 4.1 shows the electric circuit in the Motor Controller Knob of a running machine that is used by a man to exercise.

Diagram 4.2 shows the electric circuit in the Motor Controller Knob of the running machine that had been adjusted by the man to increase speed of the running machine.

Rajah 4.1 *menunjukkan litar elektrik dalam Panel Kawalan Motor mesin larian yang digunakan untuk bersenam.*

Rajah 4.2 *menunjukkan litar elektrik dalam Panel Kawalan Motor mesin larian yang diubah untuk meningkatkan kelajuan mesin larian.*

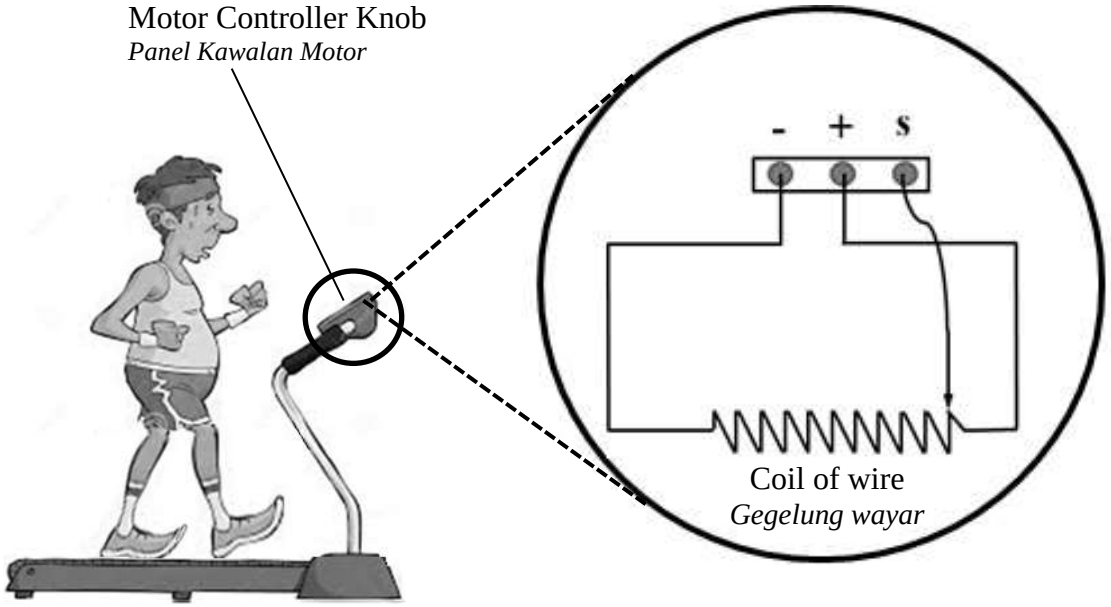


Diagram 4.1
Rajah 4.1

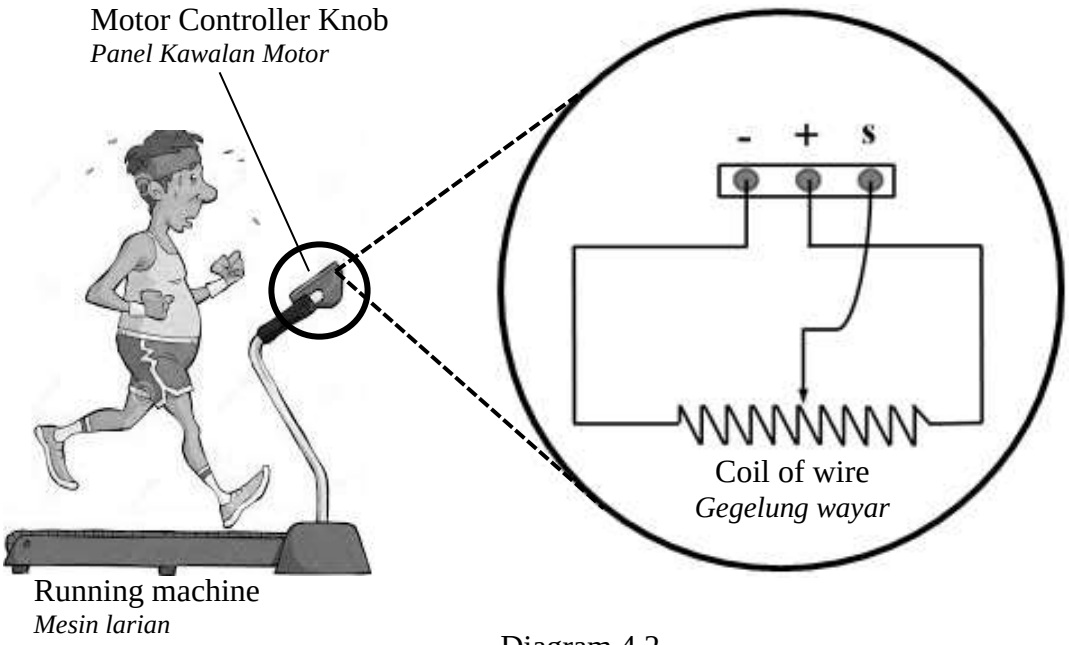


Diagram 4.2
Rajah 4.2

Based on the observation:

Berdasarkan pemerhatian tersebut :

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

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

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

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

(c) With the use of apparatus such as constantan wire, ammeter and other apparatus, describe an experiment to investigate the hypothesis stated in **4**(*b*).

Dengan menggunakan radas seperti dawai konstantan, ammeter dan lain-lain radas, terangkan satu eksperimen untuk menyiasat hipotesis yang dinyatakan di **4**(*b*).

In your description, state clearly the following:

Dalam penerangan anda , nyatakan dengan jelas perkara berikut :

(i) The aim of the experiment.

Tujuan eksperimen.

(ii) The variables in the experiment.

Pembolehubah dalam eksperimen.

(iii) The list of apparatus and materials.

Senarai radas dan bahan.

(iv) The arrangement of the apparatus.

Susunan radas.

(v) The procedure used in the experiment.
Describe how to control the manipulated variable and how to measure the responding variable.

Prosedur eksperimen yang digunakan dalam eksperimen.
Terangkan bagaimana mengawal pembolehubah dimanipulasikan dan bagaimana mengukur pembolehubah bergerak balas.

(vi) The way to tabulate the data.

Cara untuk menjadualkan data.

(vii) The way to analyse the data.

Cara untuk menganalisis data.

[10 *marks*]
[10 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

[Turn over

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of **two** sections: **Section A** and **Section B.**

   *Kertas soalan ini mengandungi **dua b**ahagian: **Bahagian A** dan **Bahagian B.***

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.** Jawapan anda bagi **Bahagian A** hendaklah ditulis pada ruang yang disediakan dalam kertas soalan ini.*

3. Answer **one** question from **Section B**. Write your answers for **Section B** on the paper provided by the invigilators. Answer questions in **Section B** in detail. Answers should be clear and logical. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.

   *Jawab **satu** soalan daripada Bahagian B. Jawapan bagi **Bahagian B** hendaklah ditulis pada helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Anda diminta menjawab dengan lebih terperinci. Jawapan mestilah jelas dan logik. Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda boleh digunakan.*

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

   Tunjukkan kerja mengira, ini mungkin 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 non-programmable scientific calculator.

   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh dipogram.

9. You are advised to spend 60 minutes to answer questions in **Section A** and 30 minutes for **Section B**.

   Anda dinasihatkan supaya mengambil masa 60 *minit untuk menjawab soalan dalam **Bahagian A** dan 30 minit untuk **Bahagian B.***

10. Hand in your answer sheet at the end of the examination

    Serahkan kertas jawapan anda di akhir peperiksaan.