Nama: _____ Tingkatan: _____

SMK SEKSYEN 4 KOTA DAMANSARA

FIZIK
Kertas 1
OGOS
$1\frac{1}{4}$ jam

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2013

FIZIK

KERTAS 1

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris diikuti dengan soalan dalam bahasa Malaysia.*
3. *Kertas soalan ini mengandungi **50** soalan.*
4. *Jawab **semua** soalan.*
5. *Jawab setiap soalan dengan menghitamkan ruangan yang betul pada kertas jawapan.*
6. *Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan.*
7. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.*
8. *Satu senarai rumus disediakan di halaman 2.*

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

1. $a = \frac{v-u}{t}$

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

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

4. Momentum = mv

5. $F = ma$

6. Kinetic energy / *Tenaga kinetik* = $\frac{1}{2}mv^2$

7. Gravitational Potential energy / *Tenaga keupayaan graviti* = mgh

8. Elastic potential energy / *Tenaga keupayaan kenyal* = $\frac{1}{2}Fx$

9. $\rho = \frac{m}{v}$

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

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

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

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

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

15. $E = mc^2$

16. $v = f\lambda$

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

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

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

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

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

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

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

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

22. $Q = It$

23. $V = IR$

24. Power / $Kuasa, P = IV$

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

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

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

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

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

1 Which of the following is **NOT** a base unit?
*Yang manakah antara berikut **BUKAN** merupakan unit bagi kuantiti asas?*

A Ampere / *Ampere*
B Kilogram / *Kilogram*
C Joule / *Joule*
D Second / *Saat*

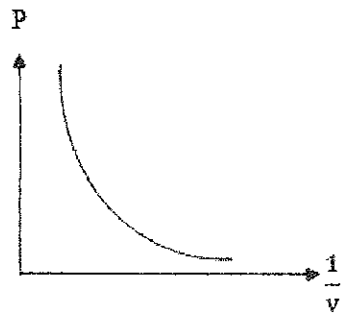
2 108 km h^{-1} is equivalent to
108 km h^{-1} adalah bersamaan dengan
A 20 m s^{-1}
B 30 m s^{-1}
C 50 m s^{-1}
D 60 m s^{-1}

3 Mm, nm, m, km and dm are distance units.
Which of the following is their correct order from the smallest to the largest?
Mm, nm, m, km, dm adalah unit untuk jarak.
Antara yang berikut, yang manakah adalah urutan yang betul dari yang paling kecil kepada yang paling besar?

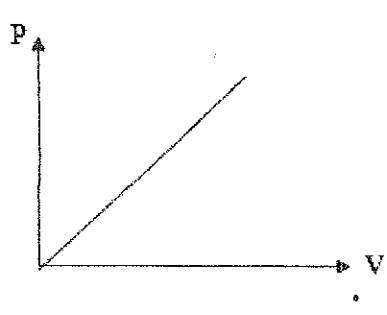
A Mm, nm, m, km, dm
B Mm, km, m, dm, nm
C dm, km, m, nm, Mm
D nm, dm, m, km, Mm

4 The pressure, P of gas is inversely proportional to the volume, V when mass and temperature is kept constant. Which graph shows the correct relationship between P and V?
Tekanan gas, P berkadar songsang dengan Isipadu, V apabila jisim dan suhu tetap. Graf yang manakah menunjukkan hubungan P dan V?

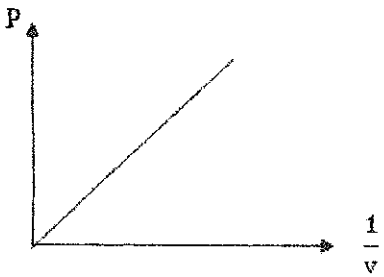
A



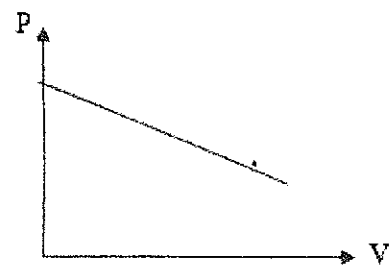
B



C



D



5 Diagram 1 shows a velocity-time graph of a moving bicycle.
Rajah 1 menunjukkan graf halaju-masa bagi sebuah basikal yang sedang bergerak.

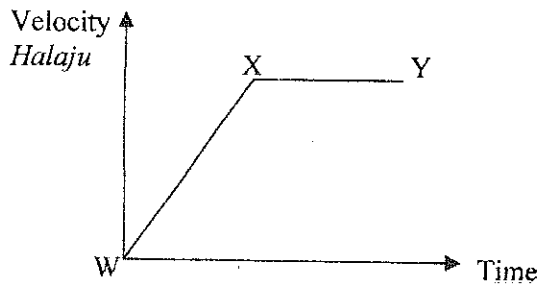


Diagram 1 / *Rajah 1*

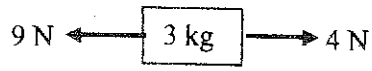
Which statement describes the motion of the bicycle in the region WX and XY?
Pernyataan yang manakah menerangkan pergerakan basikal tersebut dalam bahagian WX dan XY?

	WX	XY
A	Increasing acceleration *Pecutan bertambah*	Decreasing acceleration *Pecutan berkurang*
B	Increasing acceleration *Pecutan bertambah*	Uniform acceleration *Pecutan seragam*
C	Zero acceleration *Pecutan sifar*	Uniform acceleration *Pecutan seragam*
D	Uniform acceleration *Pecutan seragam*	Zero acceleration *Pecutan sifar*

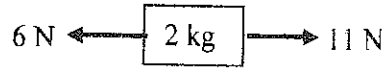
6 Which object moves with the largest acceleration?
Objek yang manakah bergerak dengan pecutan paling besar?

A

B



C



D

7 Diagram 2 shows an object at rest on a rough inclined plane.
Rajah 2 menunjukkan satu objek dalam keadaan pegun di atas permukaan condong yang kasar.

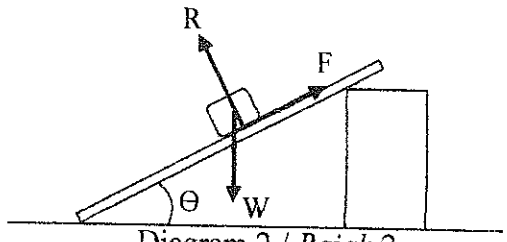


Diagram 2 / *Rajah 2*

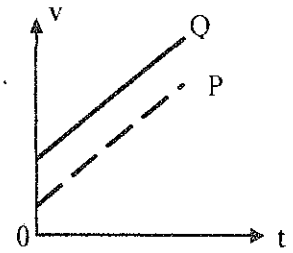
Which relationship is correct?
Hubungan yang manakah betul?

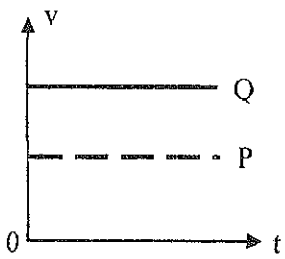
A $R = F\cos\theta$
B $R = W\sin\theta$
C $F = W\cos\theta$
D $F = W\sin\theta$

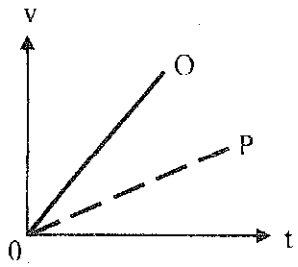
8 Diagram 3 shows two steel ball bearings, P and Q, being dropped near the surface of the earth.
Rajah 3 menunjukkan dua biji bebola keluli, P *dan* Q, *dijatuhkan berhampiran dengan permukaan bumi.*

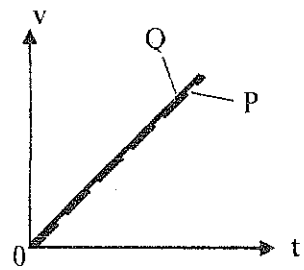
Diagram 3 / *Rajah* 3

Which velocity-time graph shows the correct motion of P and Q?
Antara graf halaju-masa berikut, yang manakah betul bagi gerakan P *dan* Q*?*

A


B


C


D


9 Diagram 4 shows a man diving into the water.
Rajah 4 menunjukkan seorang lelaki yang sedang terjun ke dalam air.

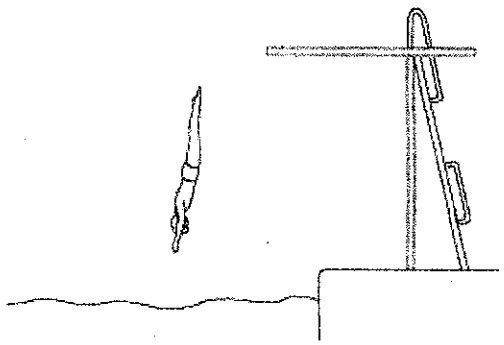


Diagram 4 / *Rajah* 4

Which form of energy is increasing as he falls?
Apakah jenis tenaga yang semakin bertambah semasa dia membuat penerjunan?

A Chemical Energy
Tenaga Kimia

B Gravitational Potential Energy
Tenaga Keupayaan Graviti

C Kinetic Energy
Tenaga Kinetik

D Elastic Potential Energy
Tenaga Keupayaan Elastik

10 Diagram 5 shows two springs, P and Q which are made of the same material. When objects M and N of similar mass are placed on the springs, the compressions of P and Q are X_P and X_Q respectively.

Rajah 5 menunjukkan dua spring P dan Q yang diperbuat dari bahan yang sama. Bila objek-objek M dan N yang sama jisim diletakkan di atas P dan Q, mampatan spring P dan Q masing-masing ialah X_P dan X_Q.

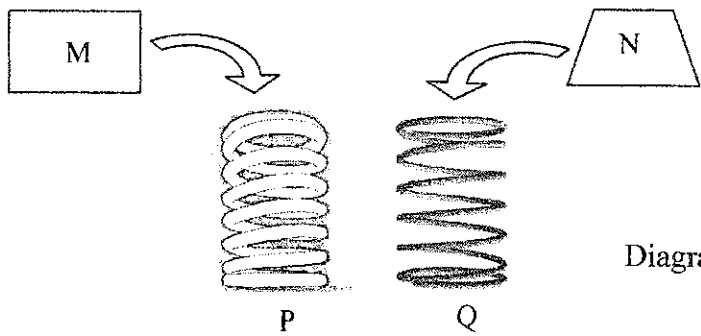


Diagram 5 / *Rajah* 5

Which comparison is correct about X_P and X_Q?
Perbandingan yang manakah betul tentang X_P dan X_Q?

A $X_P < X_Q$
B $X_P = X_Q$
C $X_P > X_Q$

11 Diagram 6 represents gas molecules contained in a cylinder. The piston is moved slowly downwards and the temperature of the gas stays the same.
Rajah 6 menunjukkan molekul-molekul gas di dalam sebuah silinder. Omboh digerakkan perlahan-lahan ke bawah dan suhu gas tidak berubah.

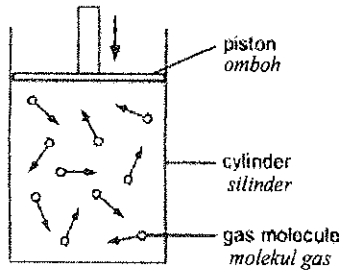


Diagram 6 / *Rajah* 6

Why does the pressure of the gas increase?
Mengapakah tekanan gas meningkat?

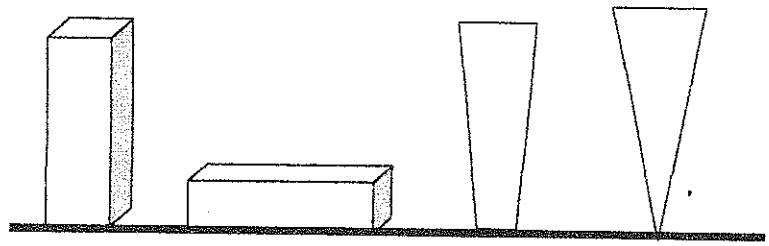
A The molecules collide harder with the walls
Molekul-molekul berlanggar dengan lebih kuat pada dinding bekas

B The molecules collide more often with the walls
Molekul-molekul berlanggar dengan kebih kerap dengan dinding bekas

C The molecules move more quickly
Molekul-molekul bergerak dengan lebih laju

D The number of molecules increase
Bilangan molekul-molekul bertambah

12 Which of the following wooden rod exert the least pressure on the floor?
Each rod has the same mass.
Manakah antara rod kayu berikut mengenakan tekanan yang paling kecil terhadap lantai?
Setiap rod mempunyai jisim yang sama.



13 Why the atmospheric pressure at higher altitude is lower?
Mengapa tekanan atmosfera semakin berkurang pada tempat yang semakin tinggi altitudnya?

A Temperature is decreasing
Suhu semakin berkurang

B The layer of air is thinner
Lapisan udara semakin nipis

C Density of air increasing
Ketumpatan udara meningkat.

D The volume of air does not change
Isipadu udara tidak berubah

14 Diagram 7 shows a mercury filled manometer connected to a gas cylinder.
Rajah 7 menunjukkan manometer berisi merkuri disambungkan pada satu silinder gas.

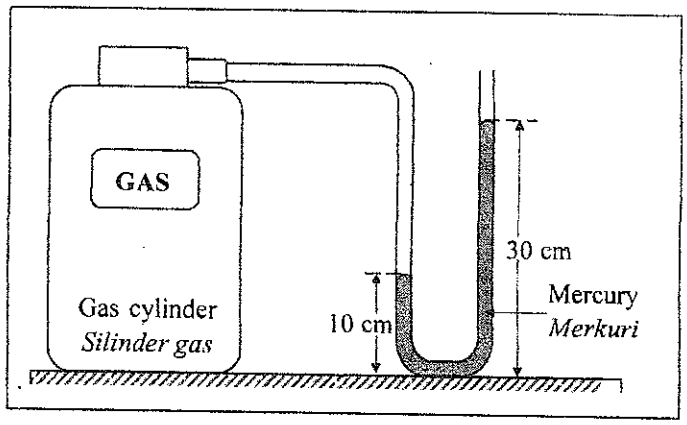


Diagram 7 / *Rajah 7*

Determine the gas pressure in the manometer.
Tentukan tekanan dalam manometer.

[Atmospheric Pressure = 75 cm Hg]
[Tekanan Atmosfera = 75 cm Hg]

A 55 cm Hg
B 85 cm Hg
C 95 cm Hg
D 105 cm Hg

15 Diagram 8 shows a floating object.
Rajah 8 menunjukkan suatu objek yang sedang terapung.

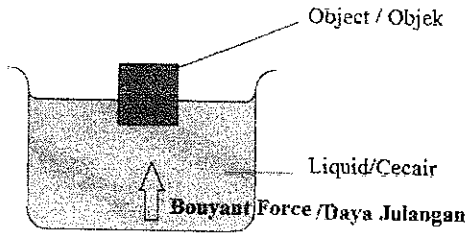


Diagram 8 / *Rajah 8*

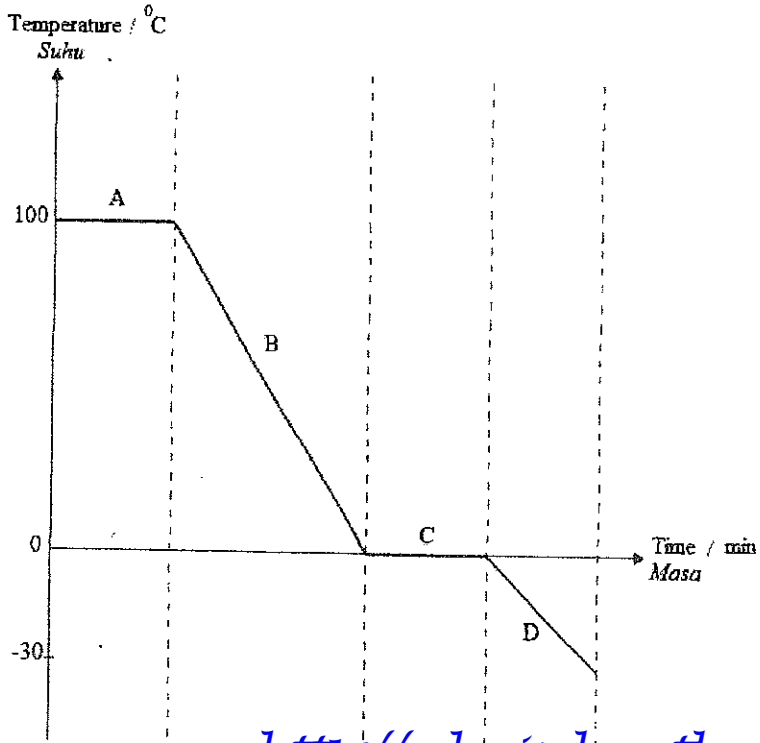
The buoyant force acting on the object will decrease when the
Daya julangan yang bertindak ke atas objek itu berkurang jika

A weight of the object decrease / *berat objek itu berkurang*
B depth of the liquid decrease / *kedalaman cecair itu berkurang*
C density of the liquid decrease / *ketumpatan cecair itu berkurang*
D volume of the object increase / *isipadu objek itu meningkat*

16 The temperature of 5 kg of water rises by 50 °C when heated. What is the temperature rise when 8 kg of water is heated by the same amount of heat energy?
Suhu bagi 5 kg air meningkat sebanyak 50 °C apabila dipanaskan. Berapakah peningkatan suhu apabila 8 kg air dipanaskan dengan jumlah tenaga haba yang sama?

A 20.75 °C
B 31.25 °C
C 40.00 °C
D 80.00 °C

17 Diagram 9 shows the cooling curve of a substance.
Rajah 9 menunjukkan lengkung penyejukan suatu bahan.



At which phase is the substance is in solid and liquid at the same time?

Pada fasa manakah bahan itu dalam keadaan pepejal dan cecair pada masa yang sama?

Diagram 9 / *Rajah 9*

18 When water boils at 100°C, the heat absorbed by the water
Apabila air mendidih pada suhu 100°C, haba yang diserap oleh air

A increases the kinetic energy of the water molecules
meningkatkan tenaga kinetik molekul-molekul air

B makes the steam molecules moves randomly
membuat molekul-molekul stim bergerak secara rawak

C breaks the bonds between the water molecules
memutuskan ikatan antara molekul-molekul air

D is lost to the surroundings
hilang ke persekitaran

19 Diagram 10 shows a glass tube contains 10 cm length of air column trapped at 27 °C.
Rajah 10 menunjukkan satu tiub kaca mengandungi 10 cm panjang turus udara yang terperangkap pada suhu 27 °C.

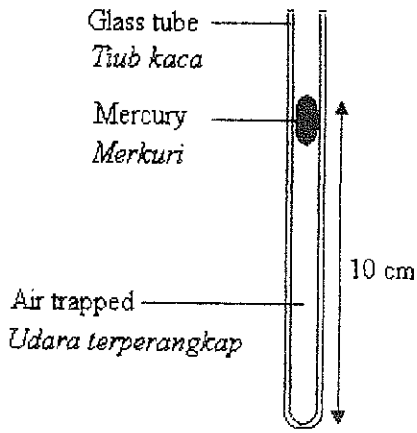


Diagram 10 / *Rajah* 10

What is the temperature of air trapped when the length of air is 10.5 cm?
Berapakah suhu udara yang terperangkap itu bila panjang turus udara menjadi 10.5 cm?

A 28.4 °C
B 42.0 °C
C 48.0 °C
D 52.0 °C

20 The air pressure in a car tyre is 210 kPa at a temperature of 27°C . What is the air pressure in the tyre when the temperature is 37°C?
Tekanan udara dalam tayar kereta ialah 210 kPa pada suhu 27°C. Berapakah tekanan dalam tayar tersebut pada suhu 37°C?

[Assume the volume of the air in the tyre is constant]
[Anggap isipadu udara dalam tayar adalah tetap]

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

21 Diagram 11 shows an object in front of a convex lens and its image.
Rajah 11 menunjukkan suatu objek di hadapan sebuah kanta cembung dan imejnya.

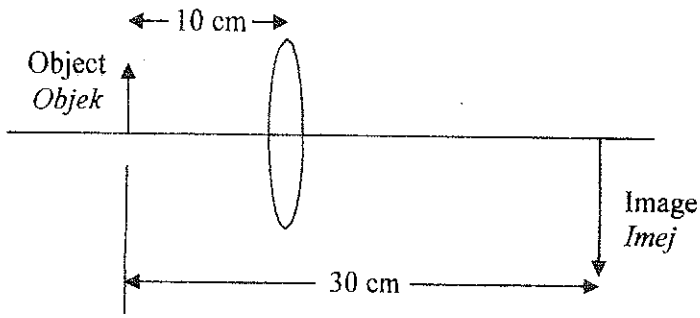


Diagram 11 / *Rajah 11*

What is the focal length of the lens?
Berapakah panjang fokus kanta itu?

A 0.15 cm
B 6.67 cm
C 7.50 cm
D 20.00 cm

22 Diagram 12 shows a graph of sin *i* against sin *r* for three different materials, **A, B** and **C**.
Rajah 12 menunjukkan satu graf sin i melawan sin r untuk tiga bahan berbeza, A, B dan C.

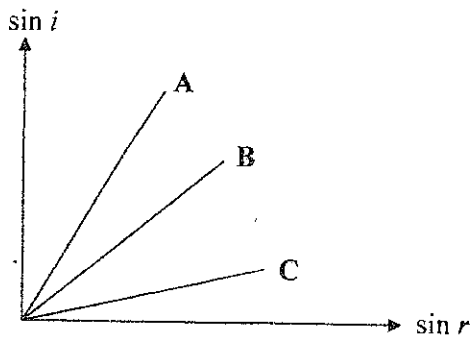


Diagram 12 / *Rajah 12*

Which material has the highest refractive index?
Bahan manakah yang mempunyai indeks pembiasan yang paling tinggi?

23 Diagram 13 shows a light ray traveling from air into a semi-circular glass block.
If the critical angle of the glass is 42°, which path of the ray of light is correct?
Rajah 13 menunjukkan satu sinar cahaya merambat dari udara menuju blok kaca semi bulatan. Jika sudut genting kaca ialah 42°, sinar cahaya yang manakah yang betul?

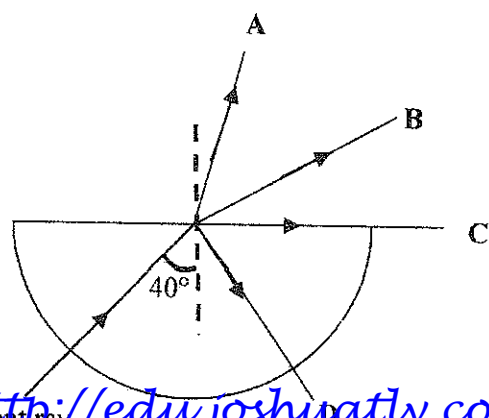
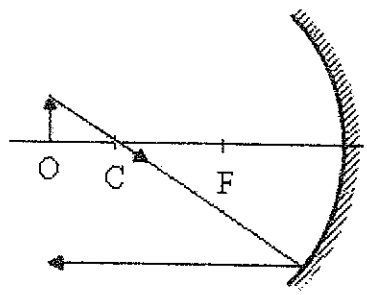


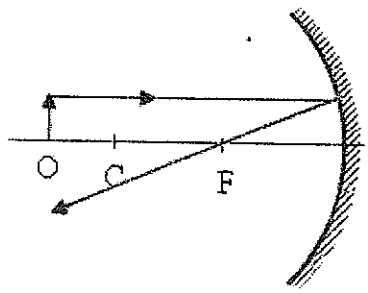
Diagram 13 / *Rajah 13*

24 Which diagram shows the correct reflection of light by a concave mirror?
Rajah manakah yang menunjukkan pantulan cahaya yang betul oleh sebuah cermin cekung?

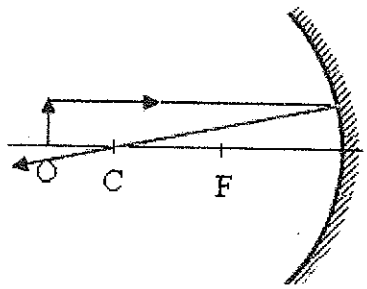
A



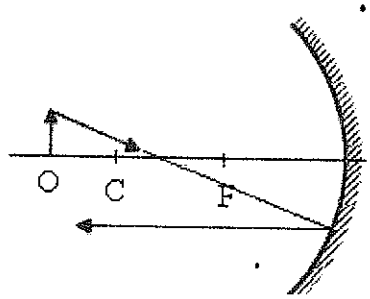
B



C



D



25 Diagram 14 shows a ray diagram of a convex lens with focal length, f.
Rajah 14 menunjukkan rajah sinar sebuah kanta cembung yang mempunyai panjang fokus, f.

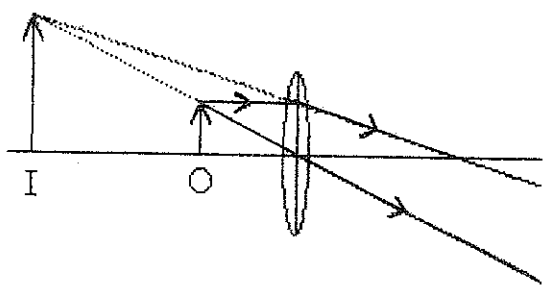


Diagram 14 / *Rajah* 14

Which statement is correct to explain the diagram?
Pernyataan yang manakah betul untuk menerangkan rajah di atas?

A The object distance is equal to f.
Jarak objek adalah kurang dari f

B The object distance is equal to 2f.
Jarak objek adalah sama dengan 2f.

C The convex lens acts as a magnifying glass.
Kanta cembung bertidak sebagai kanta pembesar.

D The characteristics of image are real, magnified and upright.
Ciri-ciri imej yang terbentuk adalah sahih, lebih besar dan tegak.

26 Diagram 15 shows a transverse wave propagating from P to Q.
Rajah 15 menunjukkan suatu gelombang melintang yang merambat dari P ke Q.

Diagram 15 / *Rajah* 15

Which is the correct direction of vibration and the direction of energy transfer between P and Q?
Manakah arah getaran dan arah pemindahan tenaga yang betul antara P dan Q?

	Direction of vibration *Arah getaran*	**Direction of energy transfer** *Arah pemindahan tenaga*
A	↔	→
B	↔	←
C	↕	→
D	↕	←

27 Diagram 16 shows water waves propagating from region P to region Q.
Rajah 16 menunjukkan gelombang air merambat dari kawasan P ke kawasan Q.

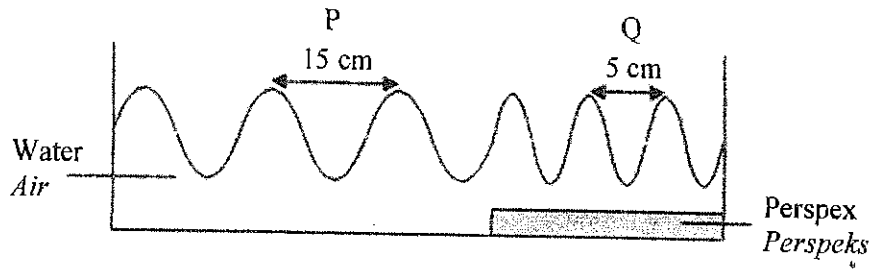


Diagram 16 / *Rajah* 16

What is the wave speed in region Q if the wave speed in region P is 9 m s^{-1}?
Berapakah laju gelombang dalam kawasan Q jika laju gelombang dalam kawasan P ialah 9 m s^{-1}?

A 3.0 m s^{-1}
B 6.0 m s^{-1}
C 27.0 m s^{-1}
D 45.0 m s^{-1}

28 Diagram 17 shows water waves change direction when they move from shallow water to deep water.
Rajah 17 menunjukkan arah gelombang air berubah apabila merambat dari kawasan air cetek ke kawasan air dalam.

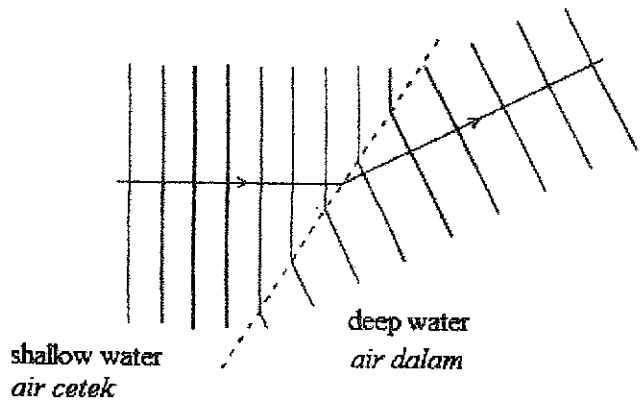


Diagram 17/ *Rajah* 17

What is the name of this phenomenon?
Apakah nama fenomena ini ?

A Interference / *interferens*
B Reflection / *pantulan*
C Diffraction /*belauan*
D Refraction / *pembiasan*

29 Diagram 18 shows an inteference pattern of water waves from two coherent sources P and Q.
Rajah 18 menunjukkan corak interferens gelombang air dari dua sumber koheren P dan Q.

Which point is the node ?
Titik yang manakah nod ?

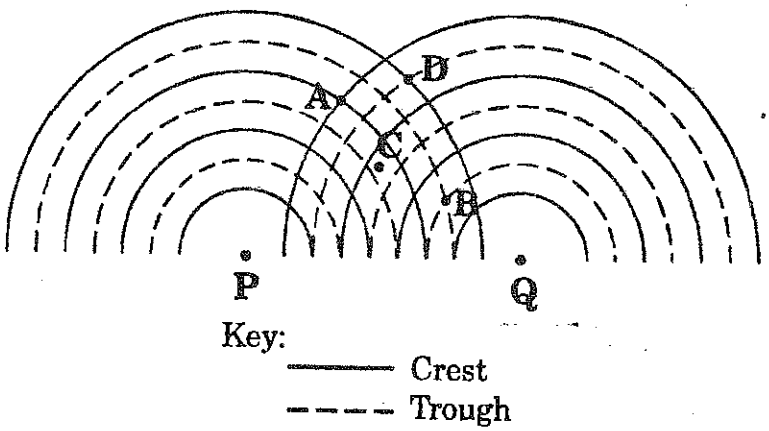


Diagram 18/ *Rajah* 18

30 Which is not a property of an electromagnetic wave?
Yang manakah bukan ciri gelombang elektromagnet?

A It is a transverse wave. / *Ia adalah gelombang melintang.*
B It is a longitudinal wave. / *Ia adalah gelombang membujur.*
C It can travel through vacuum. / *Ia boleh bergerak melalui vakum.*
D It can travel through air. / *Ia boleh bergerak melalui udara.*

31 Diagram 19 shows a climber starts a stopwatch as he shouts. He hears an echo from the opposite side of the valley after 1.0 s.
Rajah 19 menunjukkan seorang pendaki menghidupkan jam randik sambil menjerit. Dia mendengar gema dari hujung lurah selepas 1.0 s.

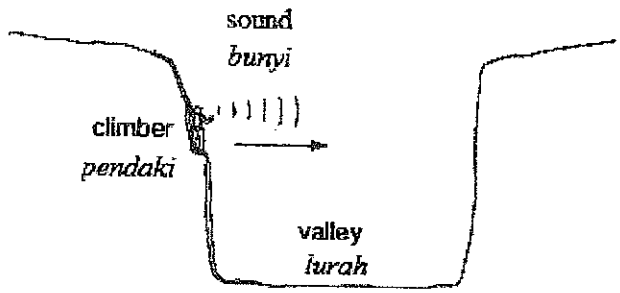


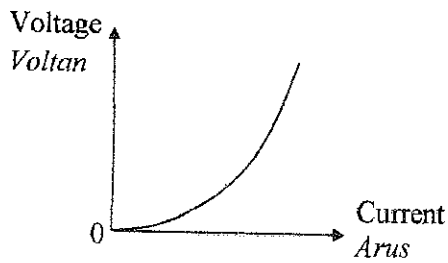
Diagram 19/ *Rajah* 19

The sound travels at 340 ms^{-1}. What is the width of the valley?
Halaju gelombang bunyi ialah 340 ms^{-1}. Berapakah lebar lurah tersebut?

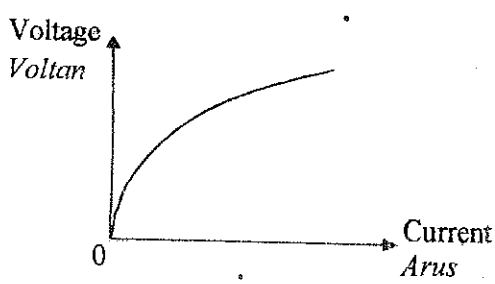
A 85 m
B 170 m
C 340 m
D 680 m

32 Which voltage-current graph shows that resistance increases when current increases?
Graf voltan-arus yang manakah menunjukkan rintangan bertambah apabila arus bertambah?

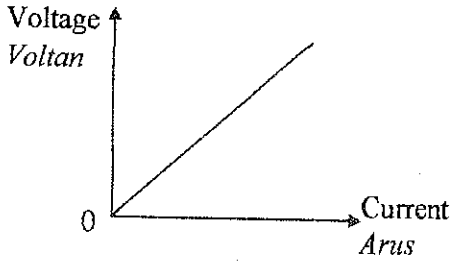
A



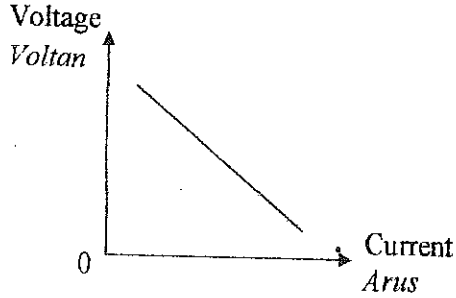
B



C



D



33 What is the electrical energy used by a '12V, 0.5A' lamp in every second?
Berapakah tenaga elektrik yang digunakan oleh mentol '12V, 0.5A' dalam setiap saat?

A 6 J
B 12 J
C 24 J
D 60 J

34 Diagram 20 shows current flowing through two resistors in series. A_1 and A_2 are ammeters while V_1 and V_2 are voltmeters.
Rajah 20 menunjukkan arus mengalir melalui dua perintang yang disambung sesiri. A_1 dan A_2 adalah ammeter manakala V_1 dan V_2 adalah voltmeter.

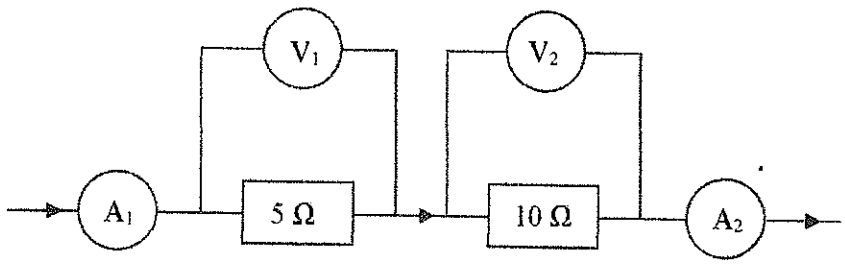


Diagram 20/ *Rajah* 20

Which is the correct comparison of the ammeter and voltmeter readings?
Perbandingan yang manakah benar tentang bacaan ammeter dan voltmeter?

	Ammeter reading / *Bacaan ammeter*	**Voltmeter reading / *Bacaan voltmeter***
A	$A_1 < A_2$	$V_1 < V_2$
B	$A_1 > A_2$	$V_1 = V_2$
C	$A_1 = A_2$	$V_1 > V_2$
D	$A_1 = A_2$	$V_1 < V_2$

35 Diagram 21 shows an electric circuit consisting of a battery with e.m.f 1.5 V and internal resistance 0.5 Ω is connected to a resistor 2 Ω.
Rajah 21 menunjukkan satu litar elektrik yang mengandungi sebuah bateri dengan d.g.e 1.5 V dan rintangan dalam 0.5 Ω disambung kepada sebuah perintang 2 Ω.

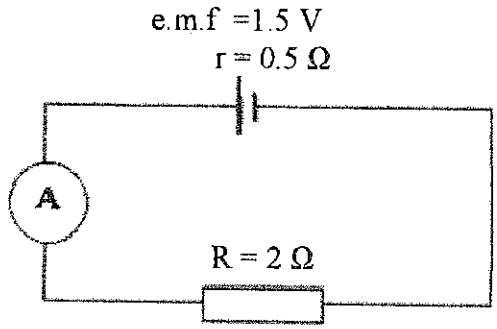


Diagram 21/ *Rajah* 21

What is the reading of the ammeter in the circuit?
Berapakah bacaan ammeter di dalam litar itu?

A 0.3 A
B 0.5 A
C 0.6 A
D 0.8 A

36 Diagram 22 shows the galvanometer pointer deflects when a magnet is pushed into a coil of wire.
Rajah 22 menunjukkan jarum penunjuk sebuah galvanometer terpesong apabila sebatang magnet ditolak memasuki satu gelung dawai.

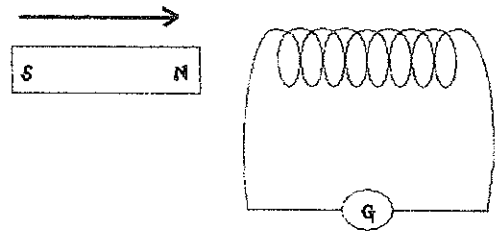


Diagram 22/ *Rajah* 22

Which action will cause the deflection of galvanometer increases?
Langkah yang manakah akan menyebabkan pesongan galvanometer bertambah?

A increase the number of coils / *menambah bilangan lilitan*
B push the magnet slower towards the coil / *menolak magnet perlahan kearah gegelung.*
C use coil that is made from insulated wire / *menggunakan gegelung yang dibuat daripada wayar bertebat.*
D reverse the magnetic pole of the magnet / *menyongsangkan kekutuban magnet.*

37 Diagram 23 shows an electric bell without a solenoid.
Rajah 23 menunjukkan sebuah loceng elektrik tanpa solenoid.

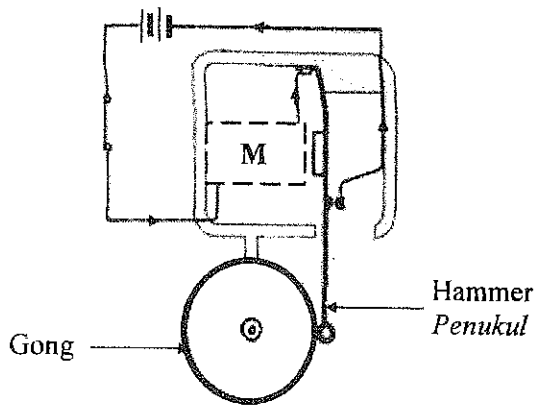
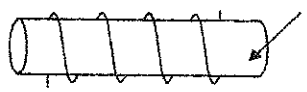


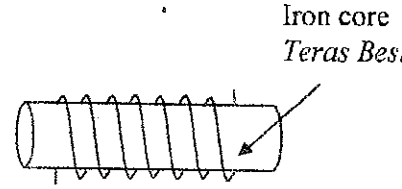
Diagram 23/ *Rajah* 23

Which solenoid is suitable to be placed at **M** in order to produce the loudest sound?
Solenoid manakah yang sesuai diletakkan pada M untuk menghasilkan bunyi yang paling kuat?

A

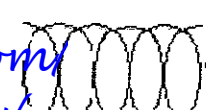


B



C

D



38 Diagram 24 shows a current – carrying conductor in magnetic field.
What is the direction of the force that acts on the conductor?
Rajah 24 menunjukkan konduktor pembawa arus di dalam medan magnet.
Pada arah manakah daya itu bertindak ke atas konduktor?

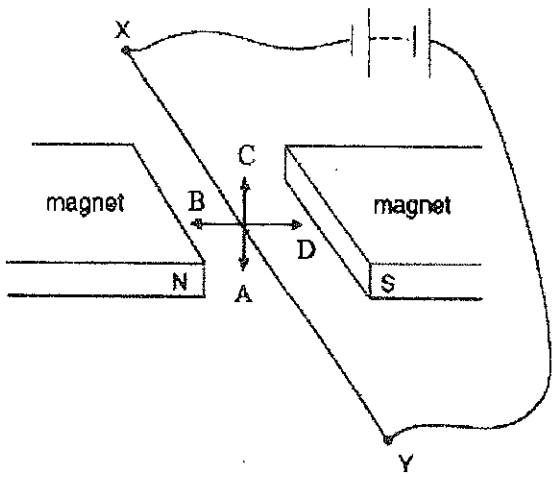
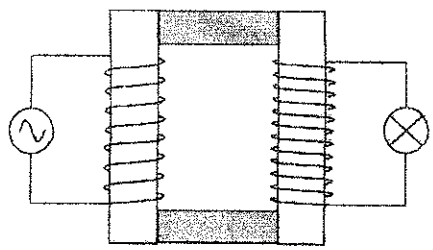


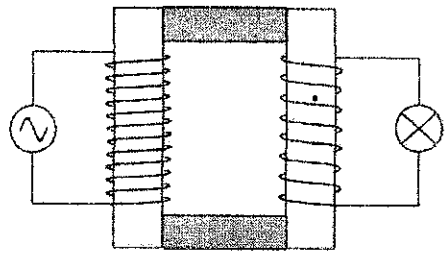
Diagram 24 / *Rajah* 24

39 Which circuit shows voltage being stepped up?
Litar manakah menunjukkan voltan diinjak naik?

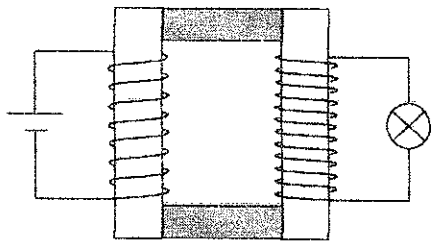
A



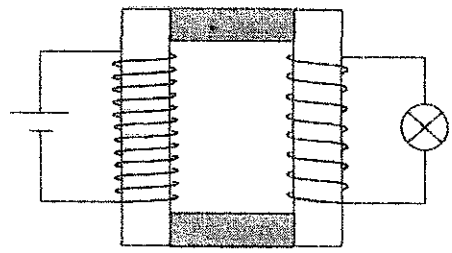
B



C



D



40 The purpose of using laminated iron core in a transformer is to
Tujuan penggunaan teras besi berlamina dalam transformer ialah untuk

A reduce resistance / *mengurangkan rintangan*
B reduce eddy current / *mengurangkan arus pusar*
C prevent flux leakage / *menghalang kebocoran fluks*
D magnetized and demagnetized iron core easily. / *senang memagnet dan menyahmagnetkan teras besi.*

41 In a model of transmission of electricity, 24 W of power is transmitted at 48 V using cables with a resistance of 2 Ω.
What is the current in the cables and the power loss?

Dalam suatu model penghantaran elektrik, kuasa 24 W dihantar pada 48 V menggunakan kabel dengan rintangan 2 Ω.
Berapakah arus dalam kabel dan kehilangan kuasa?

	Current in the cables / *Arus dalam kabel*	**Power loss / *Kehilangan kuasa***
A	0.5 A	0.5 W
B	0.5 A	1.0 W
C	2.0 A	4.0 W
D	2.0 A	8.0 W

42 Diagram 25.1 shows the oscilloscope trace produced by an input of 2 V at a frequency of 50 Hz.
Rajah 25.1 menunjukkan surihan osiloskop yang dihasilkan oleh input 2 V pada frekuensi 50 Hz.

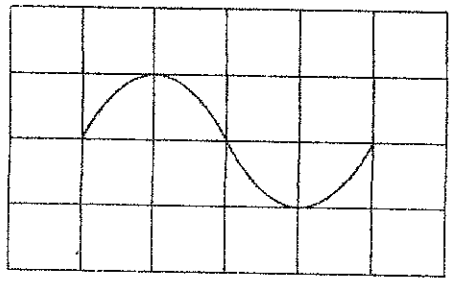


Diagram 25.1 / *Rajah* 25.1

Diagram 25.2 shows the trace from a new input on the same oscilloscope.
Rajah 25.2 menunjukkan surihan dari input baru pada osiloskop yang sama.

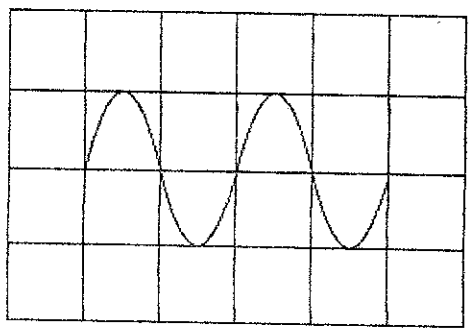


Diagram 25.2 / *Rajah* 25.2

What is the value of the new input ?
Berapakan nilai input yang baru ?

A 1 V at 50 Hz / *1 V pada 50 Hz*
B 2 V at 50 Hz / *2 V pada 50 Hz*
C 2 V at 100 Hz / *2 V pada 100 Hz*
D 4 V at 50 Hz / *4 V pada 50 Hz*

43 Diagram 26 shows a circuit where the bulb does not light up.
Rajah 26 menunjukkan litar di mana mentol tidak menyala.

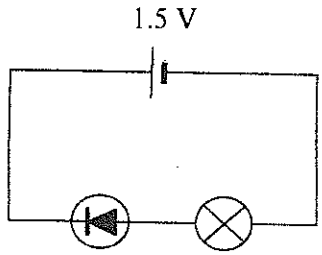


Diagram 26 / *Rajah 26*

Which step will make the bulb light up?
Langkah manakah akan menyalakan mentol?

A Inserting a fuse in the circuit
Memasang fius

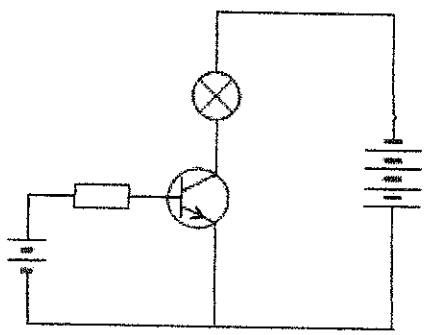
B Reversing the battery connection
Menyongsangkan sambungan bateri

C Changing the power supply to a 3 V battery
Menukar bekalan kuasa kepada bateri 3 V

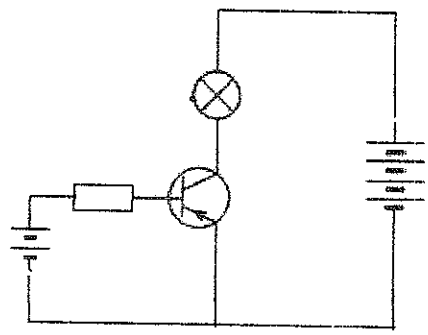
D Reversing the bulb connection
Menyongsangkan sambungan mentol

44 Which circuit will light up the bulb?
Litar yang manakah menyalakan mentol?

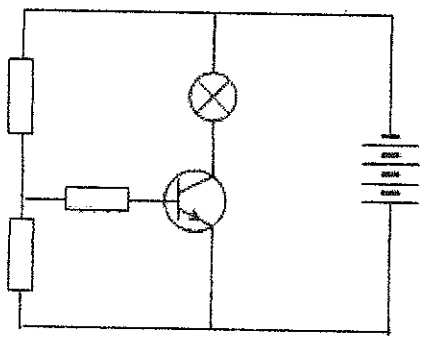
A.



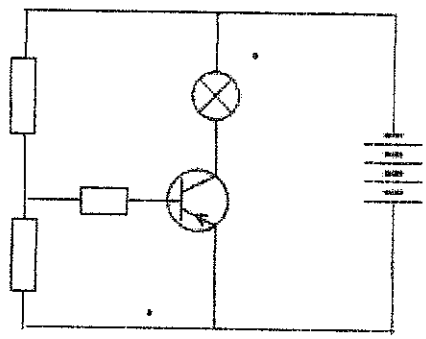
B.



C.



D.



45 Diagram 27 shows a combination of logic gates. The input logics at A, B and C are respectively 1, 0 and 0.
Rajah 27 menunjukkan satu kombinasi get logik. Logik input di A, B *dan* C *adalah masing-masing* 1, 0 *dan* 0.

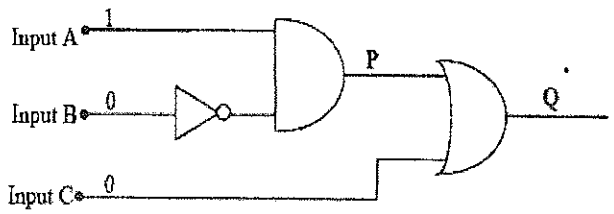


Diagram 27 / *Rajah* 27

The output logics at **P** and **Q** are
Logik output di **P** *dan* **Q** *adalah*

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

46 Diagram 28 shows a combination of three logic gates.
Rajah 28 menunjukkan kombinasi tiga get logik.

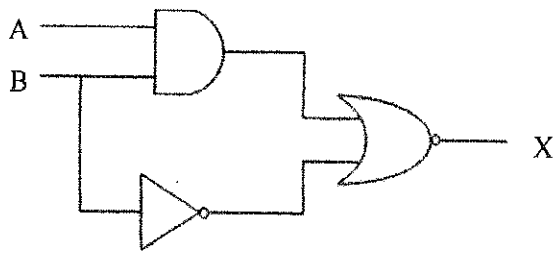


Diagram 28 / *Rajah* 28

Which truth table is correct for the combination of the three logic gates ?
Jadual kebenaran yang manakah betul bagi kombinasi tiga get logik itu?

A

A	B	X
0	0	0
0	1	1
1	0	0
1	1	0

B

A	B	X
0	0	1
0	1	0
1	0	1
1	1	1

C

A	B	X
0	0	1
0	1	1
1	0	0
1	1	0

D

A	B	X
0	0	0
0	1	0
1	0	1
1	1	1

47 Diagram 29 shows a combination circuit of four logic gates.
Rajah 29 menunjukkan kombinasi empat get logik.

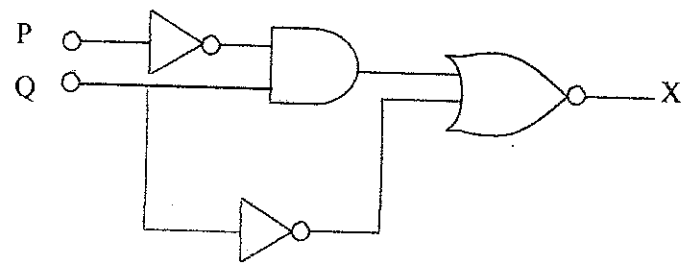


Diagram 29 / *Rajah 29*

The correct truth table for output X is...
Jadual kebenaran untuk output X adalah...

A

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

B

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

C

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

D

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

48 Which correctly describe the ionising power of α, β and γ radiation in descending order?
Yang manakah menerangkan kuasa pengionan bagi pancaran α, β dan γ mengikut susunan menurun?

A α , β , γ
B γ , β , α
C α , γ, β
D β , γ , α

49 Diagram 30 shows the radioactivity decay graph for a radioactive material.
Rajah 30 menunjukkan graf pereputan radioaktif bagi satu bahan radioaktif.

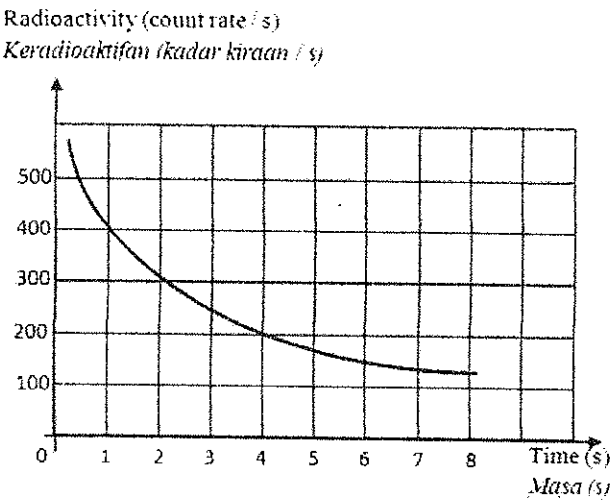


Diagram 30 / *Rajah* 30

What is the half-life of the radioactive material?
Berapakah separuh hayat bahan radioaktif itu?

A 1.0 s
B 2.0 s
C 3.0 s
D 4.0 s

50 In a nuclear fission reaction, the mass defect is 0.02 u.
What is the energy released?
Dalam satu tindakbalas pembelahan nuklear, cacat jisim yang terhasil ialah 0.02u. Berapakah tenaga yang dibebaskan?

[speed of light = 3×10^8 m s^{-1} , 1u = 1.66×10^{-27} kg]
[halaju cahaya = 3×10^8 m s^{-1} , $1u = 1.66 \times 10^{-27}$ kg]

A 1.80×10^{17} J
B 6.00×10^{6} J
C 2.99×10^{-12} J
D 9.96×10^{-21} J

END OF QUESTION PAPER
SOALAN TAMAT

Penyedia soalan:	Disemak oleh:	Disahkan oleh:
.....	.....	.....
Pn. Chow Sed Lie	Pn. Mazlaina bt Talib	Pn. Azimah bt Muhammad
Guru Fizik	Ketua Bidang Sains dan Matematik	Penolong Kanan Pentadbiran

SULIT

4531/2

Nama: _____ Tingkatan: _____

SMK SEKSYEN 4 KOTA DAMANSARA

FIZIK
Kertas 2
OGOS
$2\frac{1}{2}$ *jam*

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2013

FIZIK

KERTAS 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
3. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
4. *Kertas soalan ini mengandungi tiga bahagian: Bahagian A, Bahagian B dan Bahagian C.*
5. *Anda dinasihati supaya mengambil masa 90 minit untuk menjawab soalan dalam Bahagian A, 30 minit untuk Bahagian B dan 30 minit untuk Bahagian C.*

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

Kertas soalan ini mengandungi 26 halaman bercetak

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

1. $a = \frac{v-u}{t}$

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

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

4. Momentum = mv

5. $F = ma$

6. Kinetic energy / *Tenaga kinetik* = $\frac{1}{2}mv^2$

7. Gravitational Potential energy / *Tenaga keupayaan graviti* = mgh

8. Elastic potential energy / *Tenaga keupayaan kenyal* = $\frac{1}{2}Fx$

9. $\rho = \frac{m}{v}$

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

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

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

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

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

15. $E = mc^2$

16. $v = f\lambda$

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

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

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

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

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

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

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

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

22. $Q = It$

23. $V = IR$

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

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

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

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

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

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

Section A / *Bahagian* A

[60 marks / 60 *markah*]

Answer **all** questions in this section. / *Jawab* **semua** *soalan dalam bahagian ini.*

1 Diagram 1 shows a stopwatch.
Rajah 1 menunjukkan sebuah jam randik.

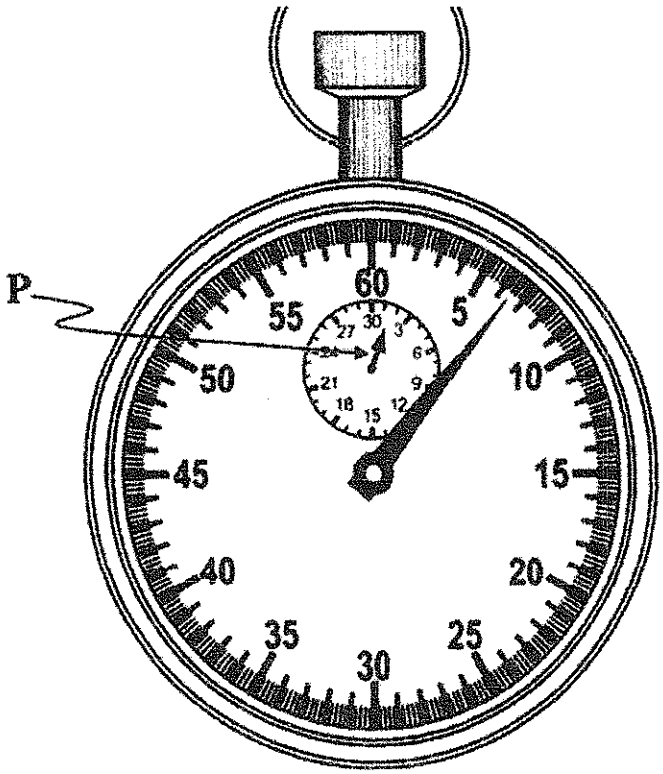


Diagram 1 / *Rajah 1*

(a) Name the physical quantity measured by the stopwatch.
Namakan kuantiti fizik yang diukur oleh jam randik.

.....

[1 mark / 1 *markah*]

(b) State the unit used by this stopwatch.
Nyatakan unit yang digunakan oleh jam randik ini.

.....

[1 mark / 1 *markah*]

(c) What does the pointer P indicate?
Apakah yang ditunjukkan oleh jarum P?

.....

[1 mark / 1 *markah*]

(d) What is the reading of the stopwatch?
Apakah bacaan jam randik?

.....

[1 mark / 1 *markah*]

2 Diagram 2 shows a bar magnet is being pushed towards a solenoid.
Rajah 2 menunjukkan sebatang magnet bar ditolak masuk ke satu solenoid.

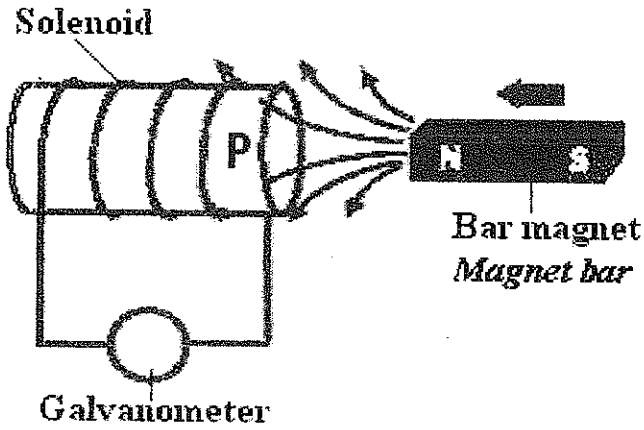


Diagram 2 / *Rajah 2*

(a) State the magnetic pole at P when the magnet is moved towards the solenoid.
Nyatakan kutub magnet pada P apabila magnet itu digerakkan mendekati solenoid.

.....

[1 mark / 1 *markah*]

(b) In Diagram 2, when the magnet is pushed towards the solenoid;
Pada Rajah 2, apabila magnet ditolak masuk ke dalam solenoid itu;

(i) mark the direction of induced current on the solenoid.
tandakan arah arus aruhan pada solenoid. [1 mark / 1 *markah*]

(ii) show the direction of pointer on the zero centered galvanometer.
tunjukkan arah jarum penunjuk pada galvanometer sifar di tengah.

[1 mark / 1 *markah*]

(c) Name the physics law involved in determining the poles in (a) above
Namakan hukum fizik yang terlibat dalam menentukan kutub pada (a) di atas.

.....

[1 mark / 1 *markah*]

(d) State one method to increase the induced current in the solenoid.
Nyatakan satu kaedah untuk meningkatkan arus aruhan pada solenoid.

.....

[1 mark / 1 *markah*]

3 Diagram 3 shows a wet towel is placed on the forehead of a boy who has high fever.
Rajah 3 menunjukkan tuala yang basah diletakkan di atas dahi seorang budak lelaki yang mengalami demam panas.

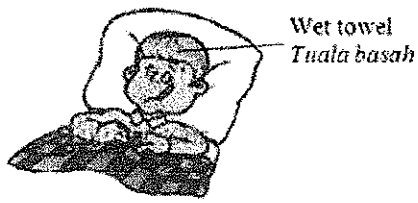


Diagram 3 / *Rajah 3*

(a) What is the meaning of **thermal equilibrium**?
*Apakah maksud **keseimbangan terma**?*

.....

[1 mark / 1 *markah*]

(b) Explain how a thermal equilibrium is achieved in Diagram 3.
Terangkan bagaimana keseimbangan terma tercapai dalam Rajah 3.

.....

.....

[2 marks / 2 *markah*]

(c) The mass of water used to wet the towel is 0.3 kg and the specific heat capacity for water is 4 200 J kg^{-1} $°C^{-1}$. The initial temperature of the towel is 30°C and the final temperature is 38°C. Find the amount of heat energy from the boy is removed by the wet towel.
Jisim air yang digunakan untuk membasahkan tuala adalah 0.3 kg dan muatan haba tentu air adalah 4 200 J $kg^{-1}°C^{-1}$. Suhu awal tuala adalah 30°C dan suhu akhir adalah 38°C. Hitung jumlah tenaga haba yang telah dibebaskan daripada budak itu oleh tuala basah.

[2 marks / 2 *markah*]

(d) What happens to the final temperature if the water used to wet the towel is mixed with ice cubes?
Apakah yang berlaku kepada suhu akhir jika air yang digunakan untuk membasahkan tuala dicampurkan dengan ketulan ais?

.....

[1 mark / 1 *markah*]

4 Diagram 4 shows the decay series of Radon-222.
Rajah 4 menunjukkan siri reputan bagi Radon-222.

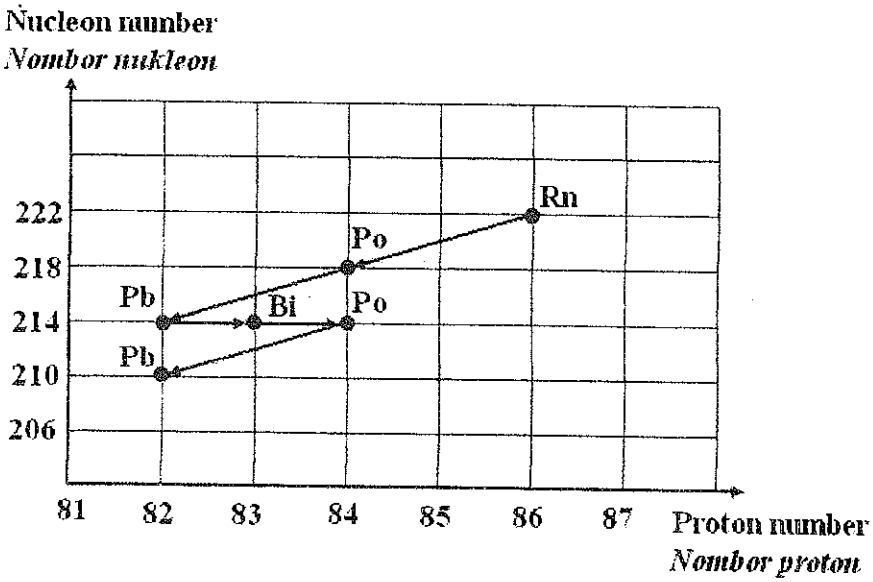


Diagram 4
Rajah 4

(a) What is the meaning of nucleon number?
Apakah yang dimaksudkan dengan nombor nukleon?

.....

[1 mark / 1 *markah*]

(b) Write an equation to show the decay of Rn-222 to Po-218.
Tuliskan satu persamaan untuk menunjukkan reputan Rn-222 kepada Po-218.

[3 marks / 3 *markah*]

(c) Based on Diagram 4, state the most stable nuclide.
Berdasarkan Rajah 4, nyatakan nuklide yang paling stabil.

.....

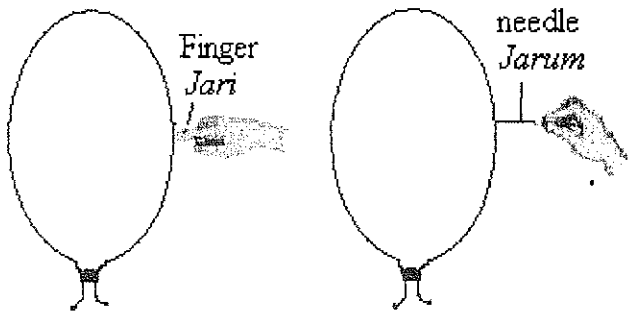
[1 mark / 1 *markah*]

(d) Determine the number of alpha particles and beta particles produced in the decay.
Tentukan bilangan zarah alfa dan zarah beta yang dihasilkan dalam reputan tersebut.

.....

[2 marks / 2 *markah*]

5 Diagram 5.1 and Diagram 5.2 show two balloons A and B exerted with the same force.
Rajah 5.1 dan Rajah 5.2 menunjukkan dua belon A dan B dikenakan daya yang sama.



Balloon A
Belon A

Balloon B
Belon B

Diagram 5.1
Rajah 5.1

Diagram 5.2
Rajah 5.2

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

.....

[1 mark / 1 *markah*]

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

(i) Which balloon will burst easily?
Belon manakah yang akan mudah pecah?

.....

[1 mark / 1 *markah*]

(ii) Compare the pressure exerted to the balloon.
Bandingkan tekanan yang dikenakan ke atas belon.

.....

[1 mark / 1 *markah*]

(iii) Compare the surface area of finger and needle which in contact with the balloon.
Bandingkan luas permukaan jari dan jarum yang bersentuh pada belon.

.....

[1 mark / 1 *markah*]

(iv) Relate the pressure exerted on the balloon with the surface area.
Hubungkaitkan antara tekanan yang dikenakan pada belon dengan luas permukaan.

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

(v) What happen to the pressure on the balloon if force exerted is increased?
Apakah yang akan berlaku kepada tekanan yang dikenakan ke atas belon, jika daya yang dikenakan bertambah?

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

(c) State the physics concept involved in Diagram 5.1 and Diagram 5.2.
Nyatakan konsep fizik yang terlibat dalam Rajah 5.1 dan Rajah 5.2

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

(d) State **one** application of physics concept in 5 (c) in our daily life.
*Nyatakan **satu** aplikasi konsep fizik dalam 5 (c) dalam kehidupan seharian kita.*

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

6 Diagram 6.1 and Diagram 6.2 show fringes are formed when identical monochromatic lights pass through the double slits.
Rajah 6.1 dan Rajah 6.2 menunjukkan corak pinggir yang dihasilkan apabila cahaya monokromatik yang sama melalui dwicelah.

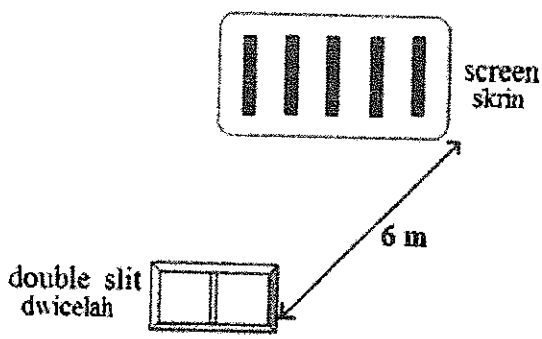


Diagram 6.1
Rajah 6.1

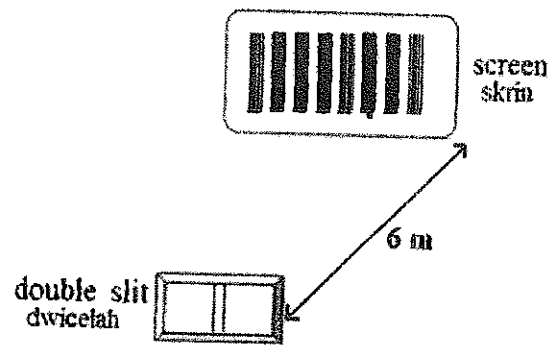


Diagram 6.2
Rajah 6.2

(a) What is the meaning of monochromatic light?
Apakah yang dimaksudkan dengan cahaya monokromatik?

.....

[1 mark / 1 *markah*]

(b) Explain how fringes are formed on the screen.
Terangkan bagaimana pinggir-pinggir terbentuk di atas skrin.

.....

.....

[2 marks / 2 *markah*]

(c) Using Diagram 6.1 and Diagram 6.2:
Menggunakan Rajah 6.1 dan 6.2:

(i) Compare the distance between the slits, ***a***.
Bandingkan jarak di antara dua celah, ***a***.

.....

[1 mark / 1 *markah*]

(ii) Compare the wavelength of the light, λ, that passes through the double slits.
Bandingkan panjang gelombang cahaya, λ, *yang melalui dwicelah.*

.....

[1 mark / 1 *markah*]

(iii) Compare the distance between the double slits and the screen, ***D***.
Bandingkan jarak di antara dwicelah dan skrin, ***D***.

.....

[1 mark / 1 *markah*]

(iv) Compare the distance between the fringes, ***x***.
Bandingkan jarak di antara pinggir-pinggir, ***x***.

.....

[1 mark / 1 *markah*]

(d) Using your answers in 6 (c), state the relationship between **a** and **x**.
Menggunakan jawapan anda di 6(c), nyatakan hubungan antara ***a*** *dan* ***x***.

.....

[1 mark / 1 *markah*]

7 Diagram 7 shows an electric motor lifting a 2.0 kg load. When the motor is switched on, the load moved through a height of 1.5 m in 2.5 s with constant speed. The current flowing in the circuit is 1.7 A and the potential difference across the motor is 10.0 V.
Rajah 7 menunjukkan sebuah motor elektrik sedang mengangkat satu beban 2.0 kg. *Apabila motor itu dihidupkan, beban itu bergerak melalui ketinggian* 1.5 m *dalam* 2.5 s *dengan laju malar. Arus yang mengalir dalam litar ialah* 1.7 A *dan beza keupayaan merentasi motor itu ialah* 10.0 V.

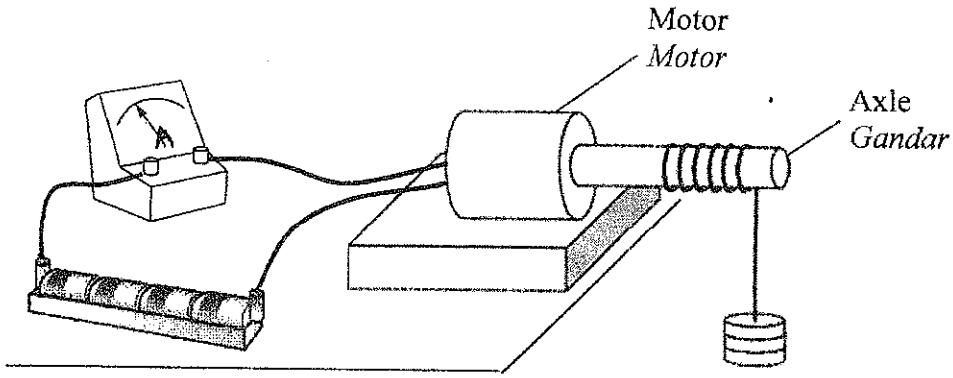


Diagram 7 / *Rajah 7*

(a) State the changes in energy that occur when the motor is switched on.
Nyatakan perubahan tenaga yang berlaku apabila motor itu dihidupkan.

.....

[1 mark / 1 *markah*]

(b) Calculate,
Hitung,

(i) the electrical power supplied when the motor is lifting the load,
kuasa elektrik yang dibekalkan semasa motor itu mengangkat beban.

[2 marks / 2 *markah*]

(ii) the output power of the motor when the load moved through a height of 1.5 m in 2.5 s.
kuasa output motor apabila beban itu melalui ketinggian 1.5 m *dalam* 2.5 s.

[2 marks / 2 *markah*]

(iii) the efficiency of the electric motor.
kecekapan motor itu.

[2 marks / 2 *markah*]

(c) If some of the load is removed while the motor is still lifting the load, what change is observed on the ammeter? Explain your answer.
Jika sebahagian daripada beban dikeluarkan semasa motor itu mengangkat beban, apakah perubahan yang diperhatikan pada ammeter? Jelaskan jawapan anda.

.....

.....

[2 marks / 2 *markah*]

(d) Suggest **one** way to increase the efficiency of the motor.
*Cadangkan **satu** cara untuk menambah kecekapan motor itu.*

.....

[1 mark / 1 *markah*]

8 Diagram 8.1 shows an electrical transmission system from the power station to the consumers.
Rajah 8.1 *menunjukkan sistem penghantaran elektrik dari stesen janakuasa kepada pengguna.*

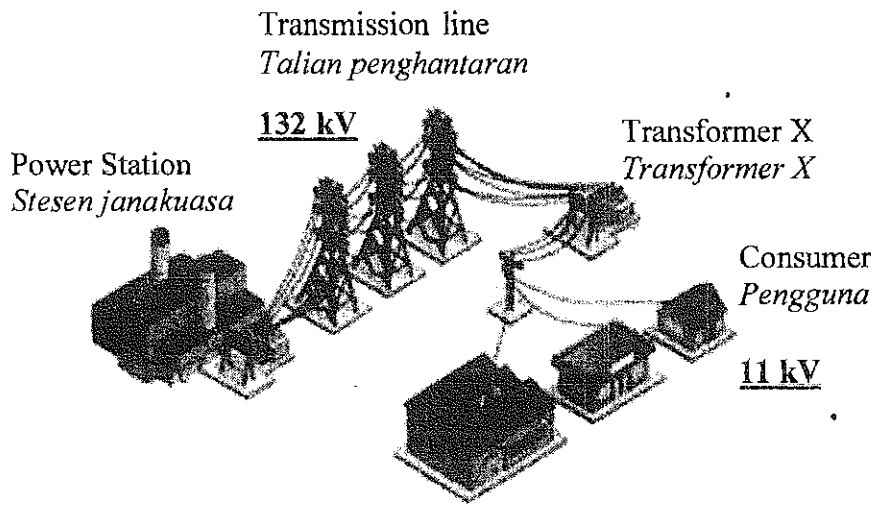


Diagram 8.1 / *Rajah 8.1*

(a) What is the function of a transformer?
Apakah kegunaan tranformer?

.....

[1 mark / 1 *markah*]

(b) Table 8 shows the information of the components in an electrical transmission system.
Jadual 8 menunjukkan maklumat tentang komponen suatu sistem penghantaran elektrik.

Electrical transmission system model ***Model system penghantaran elektrik***	P	Q	R
Number of turns of the primary coil ***Bilangan lilitan gegelung primer***	100	3600	1200
Number of turns of the secondary coil ***Bilangan lilitan gegelung sekunder***	1200	1200	100
Type of transformer core ***Jenis teras transformer***	Laminated soft iron *Besi lembut berlamina*	Soft iron *Besi lembut*	Laminated soft iron *Besi lembut berlamina*
Material of transmission wire ***Bahan bagi kabel penghantaran***	Constantan *Konstantan*	Aluminium *Aluminium*	Aluminium *Aluminium*

Table 8 / *Jadual 8*

Based on Table 8, state the suitable characteristics for electric transmission system as shown in Diagram 8.
Berdasarkan pada Jadual 8, nyatakan ciri-ciri yang sesuai bagi sistem penghantaran elektrik seperti dalam Rajah 8.

(i) Number of turns of primary and secondary coil for Transformer X.
Bilangan lilitan bagi gegelung primer dan sekunder Transformer X.

.....

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

Reason
Sebab

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

(ii) Type of core of the transformer.
Jenis teras transformer.

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

Reason
Sebab

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

(iii) Material of transmission wire
Bahan bagi kabel penghantaran.

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

Reason
Sebab

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

(iv) Based on your answers in (*b*)(i),(*b*)(ii) and (*b*)(iii), determine the most suitable electric transmission model.
Berdasarkan jawapan anda dalam (*b*)(i), (*b*)(ii) *dan* (*b*)(iii), *tentukan model penghantaran elektrik yang paling sesuai.*

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

(c) Diagram 8.2 shows a transformer which changes the mains supply from 240 V to 9 V.
Rajah 8.2 menunjukkan sebuah transformer yang mengubah bekalan tenaga elektrik 240 V kepada 9 V.

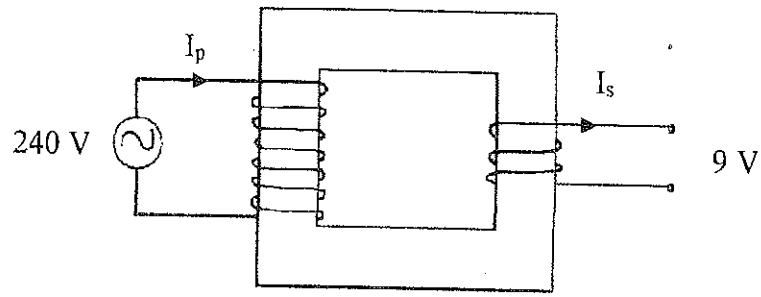


Diagram 8.2 / *Rajah 8.2*

The electric current in the primary coil, I_p, and the secondary coil, I_s, is 0.1 A and 2.0 A respectively.
Arus elekrik yang mengalir dalam gegelung primer, I_p dan gegelung sekunder, I_s masing-masing adalah 0.1 A *dan* 2.0 A.

(i) Calculate the efficiency of the transformer.
Kirakan kecekapan transformer tersebut.

[2 marks / 2 *markah*]

(ii) What is the power loss in the transformer?
Berapakah kehilangan kuasa transformer tersebut?

[2 marks / 2 *markah*]

Section B / *Bahagian* B

[20 marks / 20 *markah*]

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

9 Diagram 9.1 and Diagram 9.2 show the heating curves obtained when 50 g and 80 g of the solid substance are heated respectively. The melting point of the substance is 78°C.

Rajah 9.1 dan Rajah 9.2 menunjukkan graf pemanasan yang diperolehi apabila 50 g dan 80 g bahan itu dipanaskan masing-masing. Takat lebur bahan itu adalah 78°C.

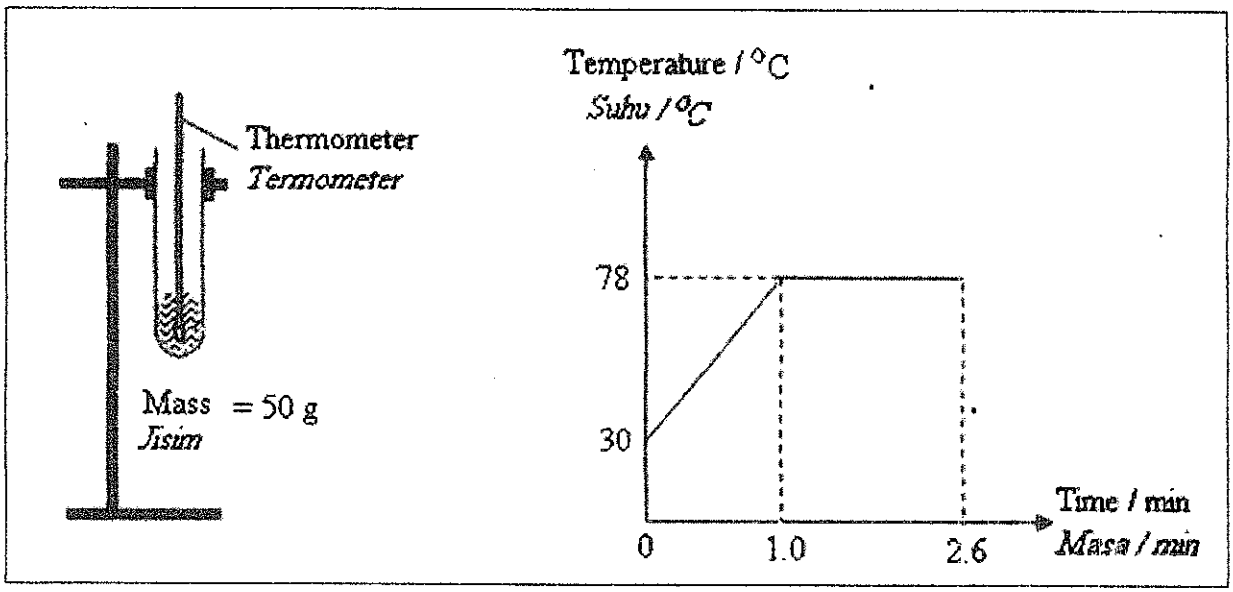


Diagram 9.1 / *Rajah 9.1*

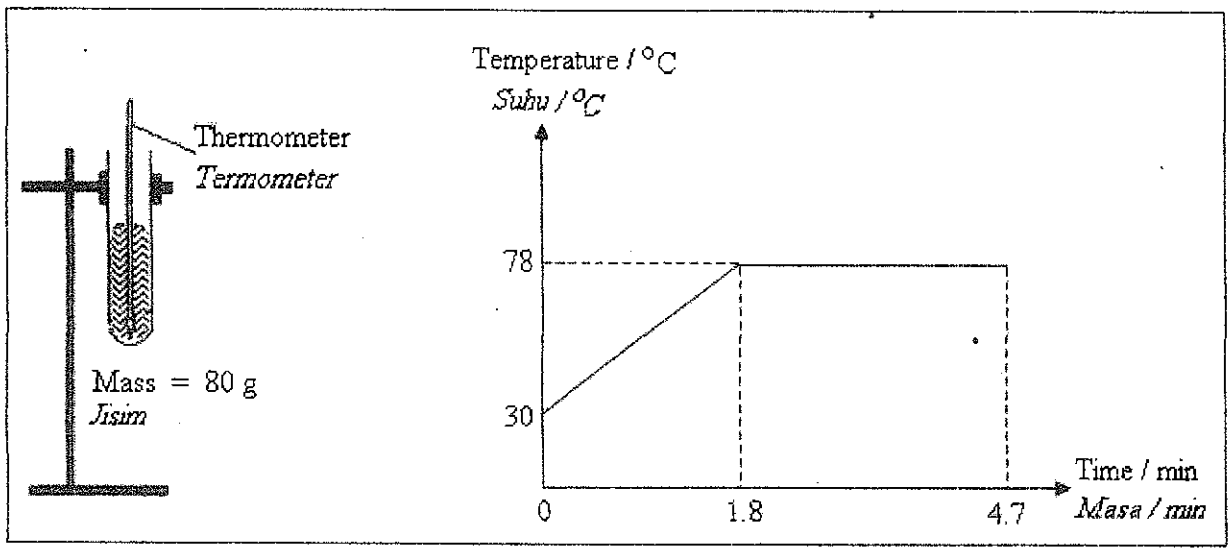


Diagram 9.2 / *Rajah 9.2*

(c) Diagram 9.4 shows a pressure cooker, you are required to give some suggestions to modify and design a cooking pot which can cook food faster and keep food warm for a long time.

Rajah 9.4 menunjukkan sebuah periuk tekanan, anda dikehendaki memberi beberapa cadangan untuk mengubahsuai dan mereka bentuk sebuah periuk masak yang boleh memasak makanan dengan lebih cepat dan mengekalkan kepanasan makanan dengan lebih lama.

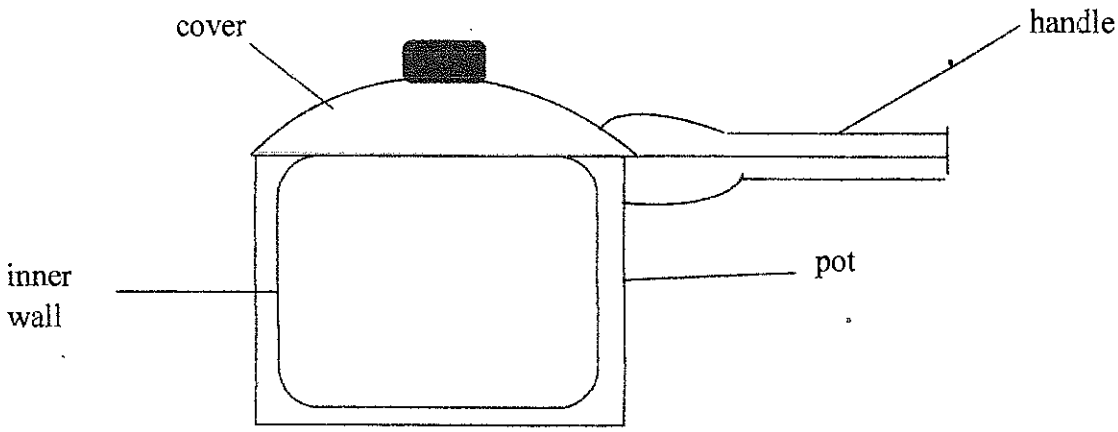


Diagram 9.4 / *Rajah 9.4*

Using the knowledge on heat, force, pressure and properties of materials, explain your suggestions based on the following aspects:

Menggunakan pengetahuan tentang haba, daya, tekanan dan ciri-ciri bahan, terangkan cadangan anda berdasarkan aspek-aspek berikut :

(i) Material used for the body of the pressure cooker.
Bahan yang digunakan untuk badan periuk tekanan.

(ii) Material used for the handle of the pressure cooker.
Bahan yang digunakan untuk pemegang periuk tekanan.

(iii) The tightness of the cover of the pressure cooker to enable it to cook food faster.
Tahap kekedapan udara penutup periuk tekanan yang membolehkannya memasak makanan dengan lebih cepat.

(iv) The colour of the inner wall of the pressure cooker.
Warna permukaan dalam periuk tekanan.

(v) The length of the handle of the pressure cooker to enable it to be opened easily.
Panjang pemegang periuk tekanan yang membolehkannya dibuka dengan mudah.

[10 marks / 10 *markah*]

(a) (i) What is the meaning of melting point?
Apakah maksud takat lebur?

[1 mark / 1 *markah*]

(ii) Based on the information and the observation on Diagram 9.1 and Diagram 9.2, compare the mass, the time taken to reach the melting point and the time taken by the substance to change into liquid completely.

Relate the mass and the time taken by the substance to change into liquid completely to make a deduction on the relationship between the mass and the latent heat of fusion absorbed by the substance.

Berdasarkan maklumat dan pemerhatian pada Rajah 9.1 dan Rajah 9.2, bandingkan jisim, masa yang diambil untuk mencapai takat lebur dan masa yang diambil untuk bahan itu berubah kepada cecair sepenuhnya.

Hubungkaitkan antara jisim dengan masa yang diambil untuk bahan berubah kepada cecair sepenuhnya untuk membuat kesimpulan tentang hubungan antara jisim dengan haba pendam peleburan yang diserap oleh bahan itu.

[5 marks / 5 *markah*]

(b) Diagram 9.3 shows the phenomenon of sea breeze.
Rajah 9.3 menunjukkan fenomena bayu laut.

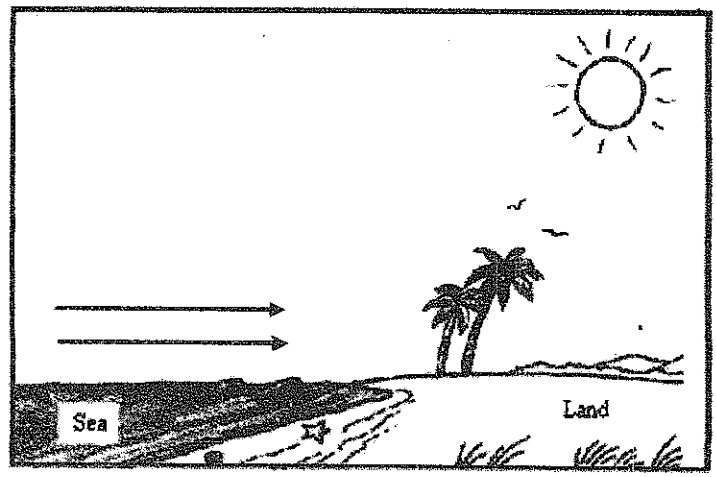


Diagram 9.3 / *Rajah 9.3*

Using the concept of specific heat capacity, explain how the phenomenon of sea breeze occurs.
Menggunakan konsep muatan haba tentu, terangkan bagaimana fenomena bayu laut berlaku.

[4 marks / 4 *markah*]

10 Diagram 10.1 and Diagram 10.2 show the deflection of the galvanometer when bar magnets are pushed into two identical solenoids.
Rajah 10.1 dan Rajah 10.2 menunjukkan pesongan galvanometer apabila magnet bar ditolak ke dalam dua solenoid yang serupa.

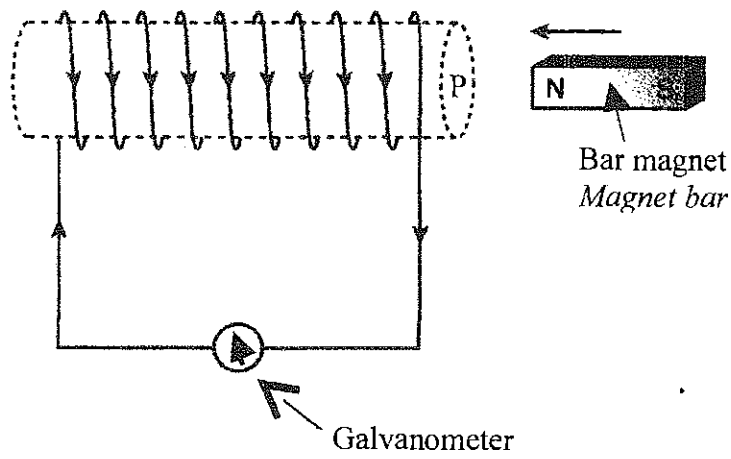


Diagram 10.1 / *Rajah 10.1*

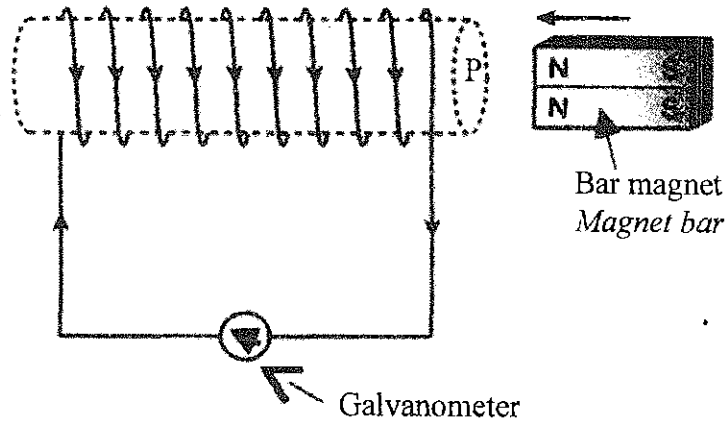


Diagram 10.2 / *Rajah 10.2*

(a) What is meant by electromagnetic induction?
Apakah maksud aruhan elektromagnet?

[1 mark / 1 *markah*]

(b) Using Diagram 10.1 and Diagram 10.2,
Menggunakan Rajah 10.1 dan Rajah 10.2,

(i) state the magnetic pole at the end **P** when the bar magnets are pushed into the solenoids.
*nyatakan kutub magnet pada hujung **P** apabila magnet bar ditolak ke dalam solenoid.*
[1 mark / 1 *markah*]

(ii) compare the number of the bar magnet and the deflection of the galvanometer.
bandingkan bilangan magnet bar dengan pesongan galvanometer.
[2 marks / 2 *markah*]

(c) State the relationship between
Nyatakan hubungan antara

(i) the number of bar magnets and the strength of the magnetic field,
bilangan magnet bar dengan kekuatan medan magnet,

(ii) the strength of the magnetic field and the deflection of the galvanometer.
kekuatan medan magnet dengan pesongan galvanometer.
[2 marks / 2 *markah*]

(d) Diagram 10.3 shows an ideal transformer.
Rajah 10.3 menunjukkan satu transformer unggul.

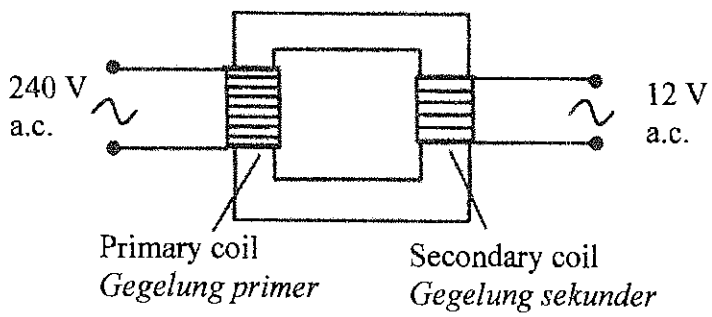


Diagram 10.3 / *Rajah 10.3*

(i) Name the type of transformer.
Namakan jenis transformer ini.
[1 mark / 1 *markah*]

(ii) Explain how current is induced in the secondary coil?
Terangkan bagaimana arus diaruh di dalam gegelung sekunder?
[3 marks / 3 *markah*]

(e) Diagram 10.4 shows an a.c. generator.
Rajah 10.4 menunjukkan sebuah penjana a.u.

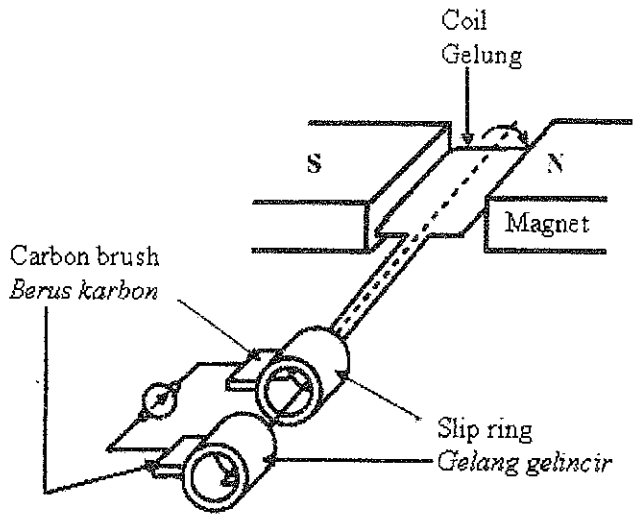


Diagram 10.4 / *Rajah 10.4*

Suggest modifications that can be made to increase the output current to the generator in Diagram 10.4.
State and explain the modifications based on the following aspects:

Cadangkan pengubahsuaian yang boleh dilakukan pada penjana dalam Rajah 10.4. Nyatakan dan beri penerangan tentang pengubahsuaian itu berdasarkan aspek- aspek berikut:

(i) Strength of the magnet
Kekuatan magnet

(ii) Shape of the magnet
Bentuk magnet

(iii) Number of turns of the coil
Bilangan lilitan gegelung

(iv) Diameter of the wire of the coil
Diameter dawai pada gelung

(v) The speed of rotation
Laju putaran gelung

[10 marks / 10 *markah*]

Section C / *Bahagian* C

[20 marks / 20 *markah*]

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

11 Diagram 11.1 shows a plasticine ball being dropped onto a metal block. The plasticine ball changes its shape after the impact.
Rajah 11.1 menunjukkan sebiji bola plastisin dijatuhkan ke atas sebuah bongkah logam. Bola plastisin berubah bentuk selepas hentaman.

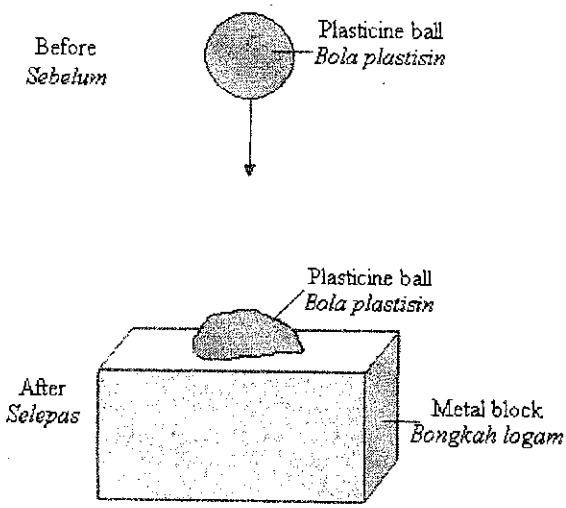


Diagram 11.1 / *Rajah 11.1*

(a) (i) Name the force involved during the impact.
Namakan daya yang terlibat semasa hentaman.

[1 mark / 1 *markah*]

(ii) Explain why the plasticine ball changes its shape after the impact.
Terangkan kenapa bola plastisin berubah bentuk selepas hentaman.

[3 marks / 3 *markah*]

(iii) Give one suggestion to avoid the plasticine ball from changing its shape when dropped from the same height.
Beri satu cadangan bagaimana untuk mengelak bola plastisin daripada berubah bentuk apabila dijatuhkan pada ketinggian yang sama.

[1 mark / 1 *markah*]

(b) Diagram 11.2 shows four arrangements of piling systems P, Q, R and S that being used to insert a pile into the ground.
Rajah 11.2 menunjukkan empat susunan sistem cerucuk P, Q, R dan S yang digunakan untuk memasukkan suatu cerucuk ke dalam tanah.

Study the specification of the four arrangements of piling system based on the following aspects:
Kaji spesifikasi keempat-empat susunan sistem cerucuk berdasarkan aspek-aspek berikut:

(i) Mass of the pile driver used to push the pile into the ground.
Jisim pelantak cerucuk yang digunakan untuk menolak cerucuk ke dalam tanah.

(ii) Height of the pile driver.
Ketinggian pelantak cerucuk.

(iii) Pile material.
Bahan cerucuk.

(iv) Shape at the base of the pile.
Bentuk pada dasar cerucuk

Explain the suitability of each aspect and then determine the most suitable arrangement to be used to insert the pile effectively.
Give reasons for your choice.

Terangkan kesesuaian setiap aspek dan seterusnya tentukan sistem cerucuk yang paling sesuai digunakan untuk memasukkan cerucuk dengan cekap.
Beri sebab untuk pilihan anda.

[10 marks / 10 *markah*]

(c) A metal block with mass 50 kg is being dropped onto a pile to build a tall building. The height of the metal block from the pile is 20 m. Calculate:
Satu bongkah logam berjisim 50 kg dijatuhkan keatas satu cerucuk untuk membina sebuah bangunan tinggi. Tinggi blok logam dari cerucuk ialah 20 m. Hitungkan:

(i) Weight of the metal block.
Berat bongkah logam.

[1 mark / 1 *markah*]

(ii) Velocity of the metal block just before it hits the pile.
Halaju bongkah logam sejurus sebelum menghentam cerucuk.

[2 marks / 2 *markah*]

(iii) Impulsive force acted on the pile if the time impact is 0.5 s.
Daya impuls yang bertindak ke atas cerucuk sekiranya masa hentaman ialah 0.5 s.

[2 marks / 2 *markah*]

12 Diagram 12.1 shows a system used in a factory to ensure the volume of guava juice in a bottle is uniform.
Rajah 12.1 menunjukkan satu sistem yang digunakan di sebuah kilang untuk memastikan isipadu jus buah jambu yang diisi ke dalam botol adalah seragam.

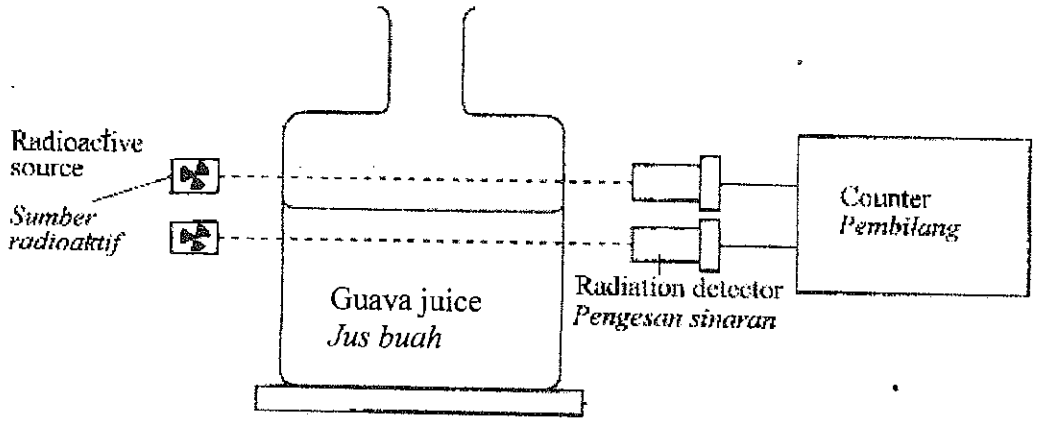


Diagram 12.1 / *Rajah 12.1*

The radioactive source, radiation detector and counter are used to detect the volume of guava juice. The radioactive source contains a radioisotope.
Sumber radioaktif, pengesan sinaran dan pembilang digunakan untuk mengesan isipadu jus buah jambu. Sumber radioaktif itu mengandungi radioisotop.

(a) What is meant by a radioisotope?
Apakah yang dimaksudkan dengan radioisotop?

[1 mark / 1 *markah*]

(b) Table 12.2 shows the characteristics of five radioisotopes P, Q, R, S and T.
Jadual 12.2 menunjukkan ciri-ciri bagi lima radioisotop P, Q, R, S dan T.

Radioisotope ***Radioisotop***	**Half life** ***Separuh hayat***	**Type of ray** ***Jenis sinar***	**State of matter** ***Keadaan jirim***	**Ioning power** ***Kuasa pengionan***
P	7 hours *7 jam*	alfa	solid *pepejal*	high *tinggi*
Q	10 days *10 hari*	beta	liquid *cecair*	moderate *sederhana*
R	100 days *100 hari*	gamma	solid *pepejal*	low *rendah*
S	10 years *10 tahun*	gamma	liquid *cecair*	high *tinggi*
T	30 years *30 tahun*	beta	solid *pepejal*	low *rendah*

Table 12.2 / *Rajah 12.2*

(d) In a radioactive decay series, Uranium-238 decays to become Radium-226 by emitting alpha and beta.
Dalam siri reputan radioaktif, Uranium-238 mereput menjadi Radium-226 dengan menghasilkan alfa dan beta.

$$^{238}_{92}U \rightarrow {}^{226}_{88}Ra + \underline{X}\,\alpha + \underline{Y}\,\beta$$

Determine the values of X and Y.
Tentukan nilai X dan Y.

[5 marks / 5 *markah*]

END OF QUESTION PAPER
SOALAN TAMAT

Penyedia soalan:	Disemak oleh:	Disahkan oleh:
Pn. Chow Sed Lie	Pn. Mazlaina bt Talib	Pn. Azimah bt Muhammad
Guru Fizik	Ketua Bidang Sains dan Matematik	Penolong Kanan Pentadbiran

Nama: _____ Tingkatan: _____

SMK SEKSYEN 4 KOTA DAMANSARA

FIZIK
Kertas 3
OGOS
$1\frac{1}{2}$ jam

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2013

FIZIK

KERTAS 3

Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
3. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
4. *Kertas soalan ini mengandungi dua bahagian: Bahagian A dan Bahagian B.*
5. *Anda dinasihati supaya mengambil masa 60 minit untuk menjawab soalan dalam Bahagian A dan 30 minit untuk Bahagian B.*

Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	16	
	2	12	
B	3	12	
	4	12	
Jumlah			

Section A / *Bahagian A*

[28 marks / 28 *markah*]

Answer **all** questions. / *Jawab **semua** soalan.*

1 A student carries out an experiment to investigate the relationship between the angle of refraction, r, and the angle of incidence, i, when a light ray passes from air to a rectangular glass block.

Seorang murid menjalankan satu eksperimen untuk menyiasat hubungan antara sudut biasan,r,dan sudut tuju, i,apabila sinar cahaya merambat dari udara ke bongkah kaca.

Diagram 1.1 shows the apparatus set-up for this experiment.
Rajah 1.1 menunjukkan susunan radas bagi eksperimen ini.

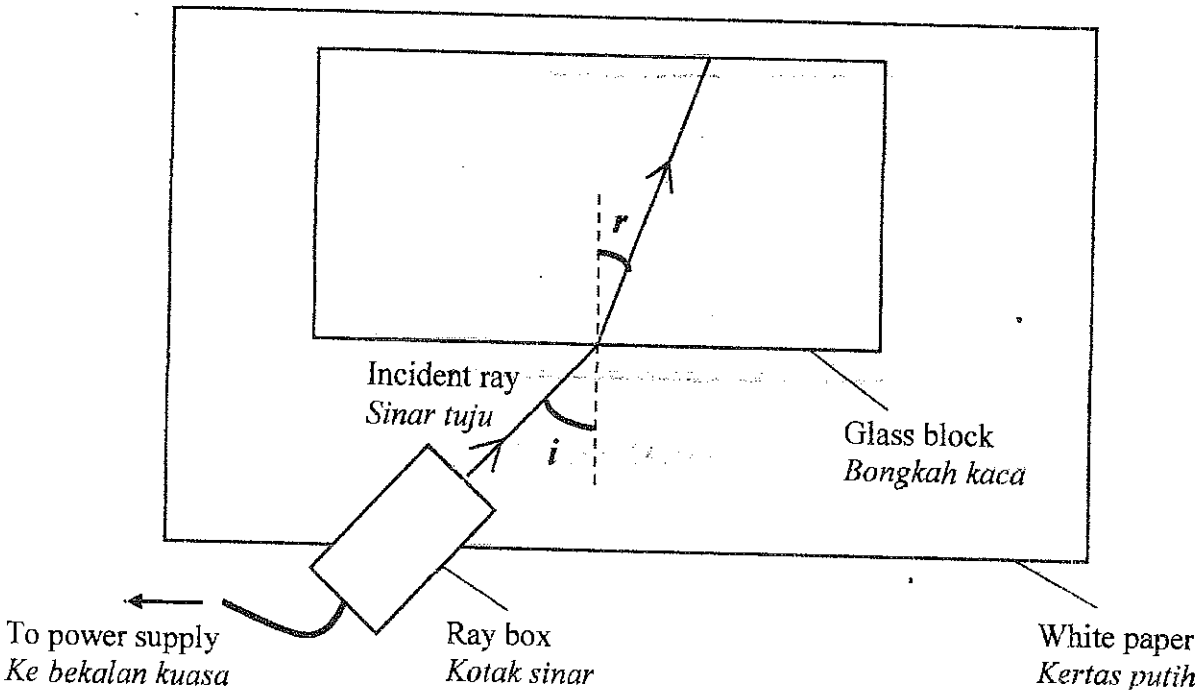
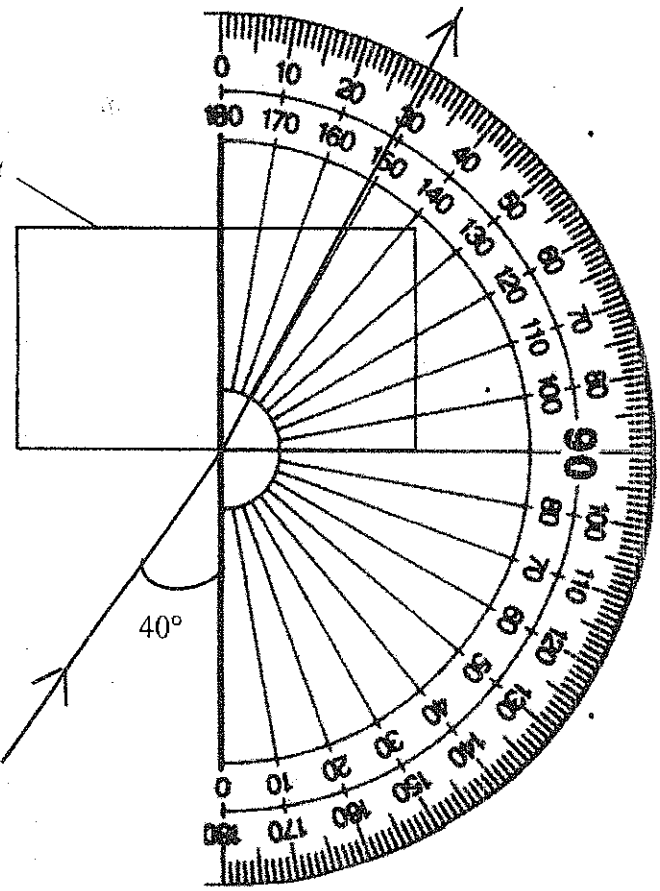


Diagram 1.1 / *Rajah 1.1*

The student starts the experiment with the angle of incidence, $i = 20°$ and the position of the refracted ray is marked on the paper.
The angle of refraction, r, is measured with a protractor.
The experiment is repeated with angles of incidence, $i = 30°$, $40°$, $50°$ and $60°$.
The corresponding angles of refraction measured are shown in Diagrams 1.2, 1.3, 1.4 and 1.5.

Murid itu memulakan eksperimen dengan sudut tuju, i =20° dan kedudukan sinar biasan ditandakan pada kertas.
Sudut biasan,r, diukur dengan menggunakan sebuah protraktor.
Eksperimen diulangi dengan sudut tuju, i = 30°, 40°, 50° and 60°.
Pengukuran sudut biasan yang sepadan ditunjukkan pada Rajah 1.2, 1.3, 1.4 dan 1.5.



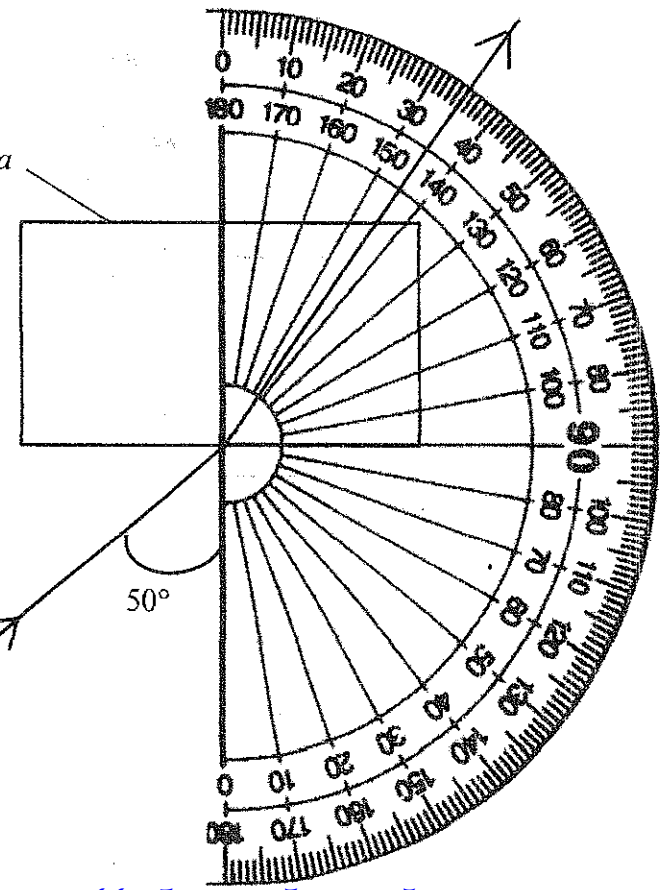
i = 40°

sin i = _____

r = _____

sin r = _____

Diagram 1.4
Rajah 1.4



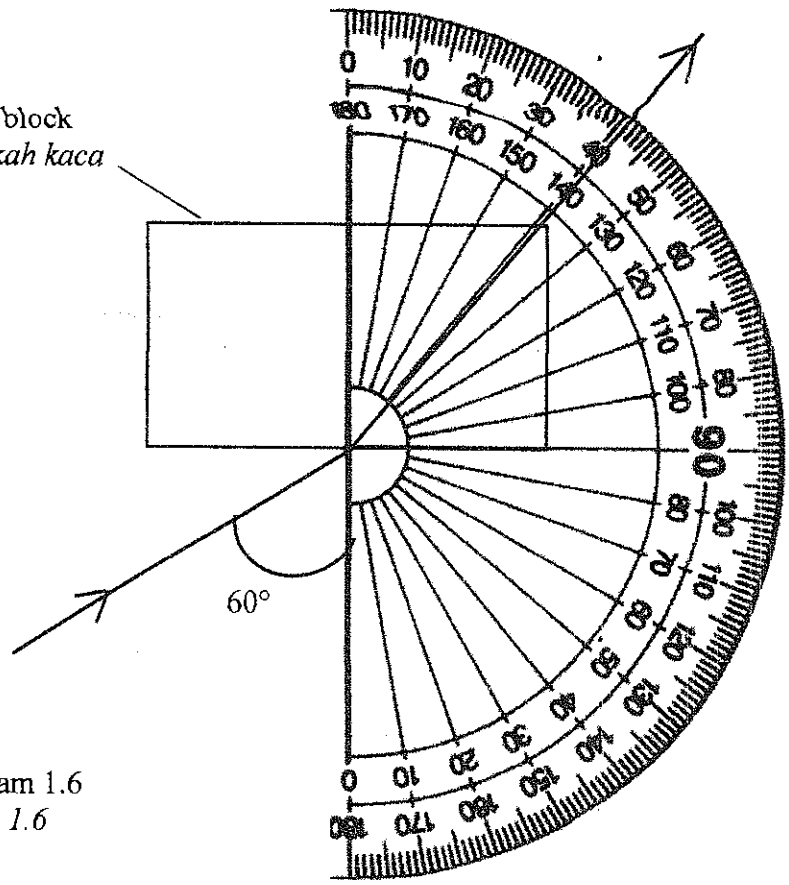
i = 50°

sin i = _____

r = _____

sin r = _____

Diagram 1.5
Rajah 1.5



i = 60°

sin i = _____

r = _____

sin r = _____

Diagram 1.6
Rajah 1.6

(a) For the experiment described on page 2, 3, 4 and 5, identify
Bagi eksperimen yang diterangkan pada halaman 2, 3, 4 dan 5, kenal pasti:

(i) The manipulated variable
Pembolehubah dimanipulasikan

_____

[1 mark / *1 markah*]

(ii) The responding variable
Pembolehubah bergerak balas

_____

[1 mark / *1 markah*]

(iii) The constant variable
Pembolehubah dimalarkan

_____

[1 mark / *1 markah*]

(b) Based on Diagrams 1.2, 1.3, 1.4, 1.5 and 1.6:
Berdasarkan Rajah 1.2, 1.3, 1.4, 1.5 *dan* 1.6:

(i) Record the readings, r, of the protractor.
Catat bacaan, r, bagi protraktor itu.

[2 marks / *2 markah*]

(ii) For each value of *i*, calculate and record the values of sin *i*.
Bagi setiap nilai i, hitung dan catat nilai sin i.

[1 mark / *1 markah*]

(iii) Calculate sin *r* for each value of *r* in 1(b)(i). Record the value of sin *r*.
Hitung sin *r untuk setiap nilai r di* 1(b)(i). *Catat nilai* sin *r*.

[2 marks / *2 markah*]

(c) Tabulate your results for all values of *i*, sin *i*, *r* and sin *r* in the space below.
Jadualkan keputusan anda bagi semua nilai i, sin *i, r dan* sin *r dalam ruang di bawah.*

[2 marks / *2 markah*]

(d) On the graph paper provided, plot a graph of sin *i* against sin *r*.
Pada kertas graf yang dibekalkan, lukis graf sin *i melawan* sin *r*.

[5 marks / *5 markah*]

(e) Based on your graph in 1(d), state the relationship between sin *i* and sin *r*.
Berdasarkan graf anda di 1(d), *nyatakan hubungan antara* sin *i dan* sin *r*.

[1 mark / *1 markah*]

2 A student carries out an experment to investigate the relationship between the electromotive force, E and the internal resistance, *r* of a cell. The results of this experiment are shown in the graph of V against I in Diagram 2.1.
Seorang murid menjalankan satu eksperimen untuk mengkaji hubungan di antara daya gerak elektrik, E dan rintangan dalam, r bagi satu sel. Keputusan eksperimen ini ditunjukkan oleh graf V *melawan* I *pada Rajah 2.1.*

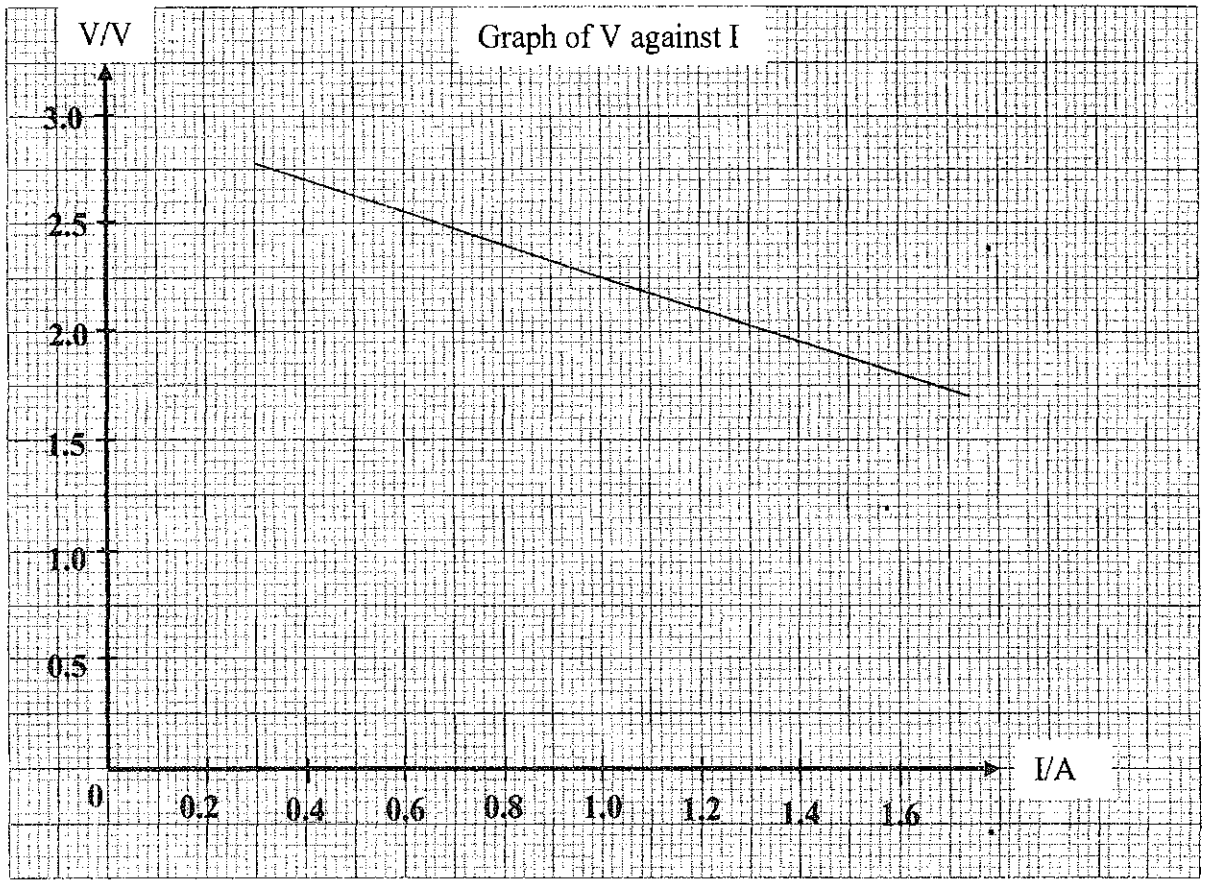


Diagram 2.1 / *Rajah 2.1*

(a) Based on the graph in Diagram 2.1:
Berdasarkan graf pada Rajah 2.1:

(i) State the relationship between V and I.
Nyatakan hubungan antara V dan I.

_____

[1 mark / *1 markah*]

(ii) When there is no current passing through the circuit, the voltmeter across the cell gives a reading. Using the graph shown above, determine the potential difference, V_o, when there is no current in the circuit. Show on the graph, how you determine the value of V_o.
Apabila tiada arus mengalir melalui litar itu, voltmeter menunjukkan satu bacaan. Dengan menggunakan graf di atas, tentukan beza keupayaan, V_o, apabila tiada arus mengalir dalam litar. Tunjukkan pada graf itu bagaimana anda menentukan nilai V tersebut.

V = _____ [2 marks / *2 markah*]

(iii) What is the name given to represent the value in (b)(ii).
Apakah nama yang diberikan untuk mewakili nilai di (b)(ii).

_____ [1 mark / *1 markah*]

(b) The potential difference, V is given by the formula:
Beza keupayaan, V diberi oleh formula:

$$V = -rI + E$$

where r is the gradient of the graph.
di mana r ialah kecerunan graf itu.

(i) Calculate the gradient, r of the graph. Show on the graph how you determine r.
Hitung kecerunan, r bagi graf itu. Tunjukkan pada graf itu bagaimana anda menentukan r.

r = _____ [3 marks / *3 markah*]

(ii) Determine the value of V when I = 1.4 A. Show on the graph how you determine the value of V.
Tentukan nilai V *apabila* I = 1.4 A. *Tunjukan pada graf itu bagaimana anda menentukan nilai V.*

V = _____ [2 marks / *2 markah*]

(c) A resistor R is connected to the circuit. Using the formula $R = \frac{V}{I}$ and the value of V in (c)(ii) when I = 1.4 A, calculate the resistance R.

Satu perintang R disambungkan pada litar itu. Dengan menggunakan formula $R = \frac{V}{I}$ *dan nilai* V *di (c)(ii) apabila* I = 1.4 A, *hitung rintangan R.*

[2 marks / *2 markah*]

(d) State **one** precaution that should be taken to improve the results of this experiment.
Nyatakan satu langkah berjaga-jaga yang perlu diambil untuk memperbaiki keputusan eksperimen ini.

_____ [1 mark / *1 markah*]

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 and Diagram 3.2 show two different nails of same mass is knocked into a softwood by using a constant force from a hammer.

Rajah 3.1 dan Rajah 3.2 menunjukkan dua batang paku yang berbeza yang berjisim sama diketuk ke dalam kayu lembut menggunakan daya yang seragam daripada sebatang penukul.

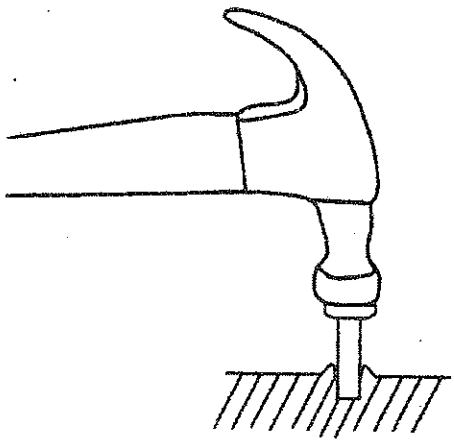


Diagram 3.1 / *Rajah* 3.1

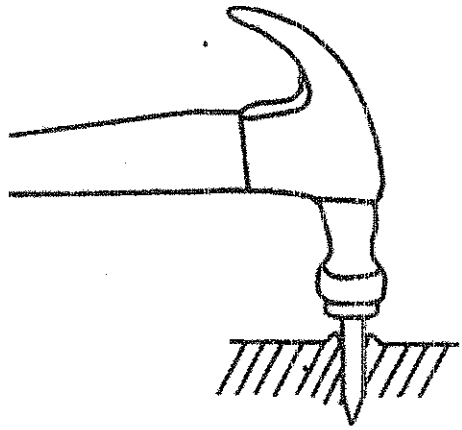


Diagram 3.2 / *Rajah* 3.2

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

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

[1 mark / *1 markah*]

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

[1 mark / *1 markah*]

(c) With the use of apparatus such as a slotted mass, plasticine and other apparatus, describe **one** experiment to investigate the hypothesis stated in 3(b).
Dengan menggunakan radas seperti jisim berslot, plastisin 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 dan bahan.

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

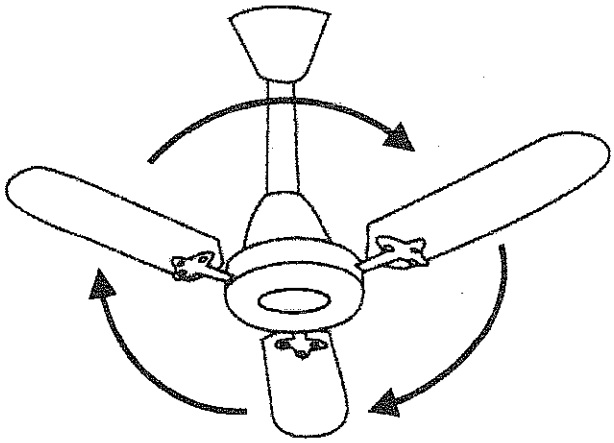
(vi) The way to tabulate the data.
Cara untuk menjadualkan data.

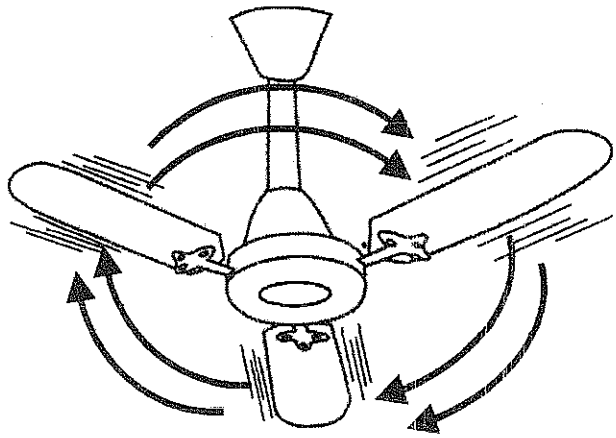
(vii) The way to analyse the data.
Cara untuk menganalisis data.

[10 marks / *10 markah*]

4 Diagram 4.1 and Diagram 4.2 show a ceiling fan respectively.
In Diagram 4.1, the dial is set at minimum current and the blades are rotating.
In Diagram 4.2, the dial is set at maximum current and the blades spins faster and produced a stronger force.

Rajah 4.1 dan Rajah 4.2 masing-masing menunjukkan sebuah kipas siling.
Dalam Rajah 4.1, pelarasnya dilaraskan pada arus minimum dan bilahnya berputar.
Dalam Rajah 4.2, pelarasnya dilaraskan pada arus maksimum dan bilahnya berputar lebih laju dan menghasilkan suatu daya yang lebih besar.





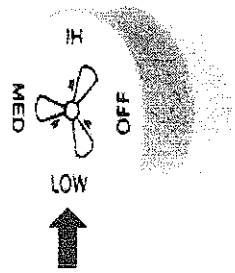


Diagram 4.1
Rajah 4.1

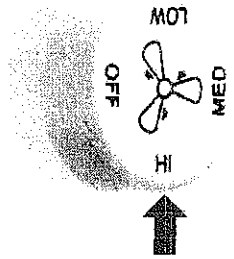


Diagram 4.2
Rajah 4.2

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

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

[1 mark / *1 markah*]

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

[1 mark / *1 markah*]

(c) With the use of apparatus such as a d.c. power supply, magnets, C-shaped iron yoke, bare copper wire, connecting wires and other apparatus, describe **one** experiment to investigate the hypothesis stated in 4(b).

*Dengan menggunakan radas seperti bekalan arus a.t., magnet, dening besi berbentuk-C, dawai kuprum tak berpenebat, wayar penyambung 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 dan bahan.

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

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

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

[10 marks / *10 markah*]

END OF QUESTION PAPER
SOALAN TAMAT

Penyedia soalan:	Disemak oleh:	Disahkan oleh:
.....	.....	.....
Pn. Chow Sed Lie	Pn. Mazlaina bt Talib	Pn. Azimah bt Muhammad
Guru Fizik	Ketua Bidang Sains dan Matematik	Penolong Kanan Pentadbiran

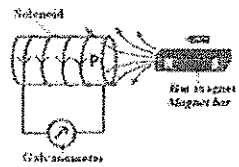
SMK SEKSYEN 4 KOTA DAMANSARA
Peperiksaan Percubaan SPM 2013
Skema Jawapan

PAPER 1

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

PAPER 2

Section A

No.	Answer	Mark
1 (a)	Time	1
(b)	Seconds // Minutes	1
(c)	Minutes // The pointer has passed 1 minute / 60 s	1
(d)	66.4 s // 1 minute 6.4 second	1
	TOTAL	**4**
2 (a)(i)	North	1
(b)(i)(ii)		1(induced current) 1(pointer)
(c)	Lenz's Law	1
(d)	Move the magnet faster // Use a stronger magnet	1
	TOTAL	**5**
3 (a)	Net heat flow is zero / Temperature is equal.	1
(b)	- The initial temperature of cloth is lower than the body temperature. - Heat energy is transferred until temperature is equal.	1 1
(c)	Heat energy, Q = mcΘ = 0.3 (4200) (38 – 30) = 10080 J	1(sub) 1(ans+unit)
(d)	Decreases.	1
	TOTAL	**6**
4 (a)	Total number of proton and number of neutron.	1
(b)	$^{222}_{86}Rn \rightarrow {}^{218}_{84}Po + {}^{4}_{2}He$	1(equation) 1(symbol) 1(A & Z)
(c)	Pb-210	1
(d)	3 α and 2 β	1(α) 1(β)
	TOTAL	**7**

No.	Answer	Mark
5 (a)	Perpendicular force acting on a unit area. OR Pressure = Force/Area	1
(b)(i)	Balloon B / Balloon in Diagram 5.2 is will burst easily.	1
(b)(ii)	The pressure exerted on the balloon in Diagram 5.2 is more than in Diagram 5.1.	1
(b)(iii)	The surface area of needle which in contact with the balloon is less than finger.	1
(b)(iv)	When the surface area decreases, the pressure increases.	1
(b)(v)	Pressure increases.	1
(c)	Pressure // Pressure depends on force and surface area.	1
(d)	The handle of the bag has large area to reduce the pressure on the hand. / The edge of knife's blade is small to increase the pressure. /(Any suitable answer)	1
	TOTAL	8
6 (a)	Light with only one colour/wavelength/frequency of light.	1
(b)	- Light that passes through the slits is diffracted and interfered - resulting in constructive and destructive interference.	1 1
(c)(i)	The distance between the slits, a in Diagram 6.2 is more than in Diagram 6.1.	1
(c)(ii)	The wavelength of the light, λ, that passes through the double slits is the same in both diagrams.	1
(c)(iii)	The distance between the double slits and the screen, D, is the same in both diagrams.	1
(c)(iv)	The distance between the fringes, x in Diagram 6.2 is less than in Diagram 6.1.	1
(d)	When a increases, x decreases.	1
	TOTAL	8
7 (a)	Electrical energy to (gravitational) potential energy	1
(b)(i)	$P = VI$ $= 10 \times 1.7$ $= 17$ W	1(sub) 1(ans+unit)
(b)(ii)	$P = \frac{mgh}{t}$ $= \frac{2 \times 10 \times 1.5}{2.5}$ $= 12$ W	1(sub) 1(ans+unit)
(b)(iii)	$\text{efficiency} = \frac{12}{17} \times 100\%$ $= 70.59\ \%$	1(sub) 1(ans+unit)
(c)	- Ammeter reading decreases. - Less work done // Less power required.	1 1
(d)	Lubricate the moving parts to reduce friction.	1
	TOTAL	10
8 (a)	To change the potential difference of an a.c. source.	1
(b)(i)	-- The number of turns of secondary coil is less than the primary coil. -- So that it can reduce the potential difference.	1 1
(b)(ii)	-- The type of transformer core is laminated soft iron. -- So that it can reduce the eddy current.	1 1
(b)(iii)	-- Material of transmission wire is aluminium. -- It has better electrical conductivity. // It is light.	1 1
(b)(iv)	The most suitable electric transmission model is R.	1
(c)	$\text{efficiency} = \frac{9 \times 2}{240 \times 0.1} \times 100\%$ $= 75\%$	1(sub) 1(ans+unit)
(d)	Power loss = $(240 \times 0.1) - (9 \times 2)$ $= 6$ W	1(sub) 1(ans+unit)
	TOTAL	12

Section B

<table>
<tr><th>No.</th><th>Answer</th><th>Mark</th></tr>
<tr><td>9(a)(i)</td><td>The temperature in which a solid substance change to liquid at atmospheric pressure.</td><td>1</td></tr>
<tr><td>(a)(ii)</td><td>- The mass of substance in Diagram 9.2 is more than in Diagram 9.1.
- The time taken to reach the melting point in Diagram 9.2 is more than in Diagram 9.1.
- The time taken by the substance to change into liquid completely in Diagram 9.2 is more than in Diagram 9.1
- When the mass of substance increases, the time taken by the substance to change into liquid completely increases.
- When the mass of substance increases, the latent heat of fusion absorbed increases.</td><td>1
1
1
1
1</td></tr>
<tr><td>(b)</td><td>- In daytime, the sun warms the land to higher temperature than the sea.
- The land has a lower specific heat capacity than sea water.
- The air above the land is heated and rises
- The cooler air above the sea moving to land.</td><td>1
1
1
1</td></tr>
<tr><td>(c)</td><td>
<table>
<tr><th>Aspects</th><th>Reason</th></tr>
<tr><td>(i) Material of the body
- Low specific heat capacity // High melting point</td><td>Heat up faster //
Does not melt easily under high temperature</td></tr>
<tr><td>(ii) Material of the handle
- High specific heat capacity</td><td>Heat up slowly / It does not become hot quickly</td></tr>
<tr><td>(iii) The tightness of the cover
– Air tight / very tight</td><td>Create high pressure in the pot//
Increase the boiling point</td></tr>
<tr><td>(iv)The colour of the inner wall
- Shinny</td><td>Good reflector of heat //
Maintain high temperature</td></tr>
<tr><td>(v) The length of the handle
- Longer</td><td>Use less force to open the cover</td></tr>
</table>
</td><td>1
1
1
1
1
1
1
1
1
1</td></tr>
<tr><td></td><td>TOTAL</td><td>20</td></tr>
<tr><td>10(a)</td><td>The effect of producing emf /current, when there is a relative motion/cutting between conductor and magnetic field.</td><td>1</td></tr>
<tr><td>(b)(i)</td><td>North pole</td><td>1</td></tr>
<tr><td>(b)(ii)</td><td>- The number of bar magnet in Diagram 10.2 is more than in Diagram 10.1.
- The deflection of the galvanometer in Diagram 10.2 is more than in Diagram 10.1.</td><td>1
1</td></tr>
<tr><td>(c)(i)</td><td>When the number of bar magnets increases, the strength of magnetic field increases.</td><td>1</td></tr>
<tr><td>(c)(ii)</td><td>When the strength of magnetic field increases, the deflection of the galvanometer increases.</td><td>1</td></tr>
<tr><td>(d)(i)</td><td>Step down transformer.</td><td>1</td></tr>
<tr><td>(d)(ii)</td><td>- When an alternating current flows through the primary coil, a changing magnetic field will be produced.
- The changing magnetic field will 'cut' through the secondary coil,
- An alternating emf /current of the same frequency to be induced in the coil.</td><td>1
1
1</td></tr>
</table>

No.	Answer	Mark
(e)		

Modification / Aspect	Explanation / Reason	
(i) Strength of the magnet - Use strong magnet	Strong magnet produced **strong magnetic field,** when a conductor cutting through a strong magnetic field, **high emf/current will be induced**.	1 1
(ii) Shape of the magnet - Concave poles of magnet.	Concave **poles provide a radial field** which ensures the **cutting of the magnetic field is always maximum.**	1 1
(iii) Number of turns of the coil - Coil with more turns.	More turns mean **more conductor cutting through magnetic field,** therefore **more emf/current is induced**.	1 1
(iv) Diameter of the wire of the coil - Larger diameter of wire.	The larger the diameter of the wire, the **more the magnetic field will be cut through**, therefore **more emf/current is induced**.	1 1
(v) The speed of rotation - Speed of rotation is high.	**More emf/current is induced**.	1 1

	TOTAL	**20**

Section C

No.	Answer	Mark
11(a)(i)	Impulsive force	1
(a)(ii)	- The surface of metal block is hard. - The time of impact is shorter. - The impulsive force is bigger to change the shape of plasticine ball.	1 1 1
(a)(iii)	Drop on a soft surface. (Any suitable answer)	1
(b)		

Aspect	Reason	
Big mass of the pile driver	Produce bigger force during impact.	1
Height of the pile driver is high	Produce high velocity when strike the pile	1
Steel pile	Stronger // Stiffer	1
Base of the pile is sharp	Produce high pressure // Easy to push the pile into the ground.	1 1
Arrangement of piling system Q is chosen	Because piling system Q has big mass of pile driver, height of the pile driver is high, steel pile and the base of the pile is sharp.	1 1 1

(c)(i)	$W = mg$ $= 50 \times 10$ $= 500$ N	1(ans+unit)
(c)(ii)	$v^2 = u^2 + 2gs$ $= 0 + (2 \times 10 \times 20)$ $= 400$ $v = 20$ m s^{-1}	1(sub) 1(ans+unit)
(c)(iii)	$F = \frac{mv - mu}{t}$ $= \frac{50(0 - 20)}{0.5}$ $= 2000$ N	1(sub) 1(ans+unit)
	TOTAL	**20**

<table>
<tr><th>No.</th><th>Answer</th><th>Mark</th></tr>
<tr><td>12(a)</td><td>Radioisotopes are isotopes which have unstable nuclei.</td><td>1</td></tr>
<tr><td>(b)</td><td>
<table>
<tr><th>Characteristics</th><th>Explanation</th></tr>
<tr><td>Has a long half-life</td><td>Can be used for a long time hence save cost</td></tr>
<tr><td>Emits beta</td><td>Can penetrate box and liquid and is less dangerous than gamma</td></tr>
<tr><td>Solid form</td><td>Easy to handle</td></tr>
<tr><td>Low ionizing power</td><td>Does not change the state and taste of juice</td></tr>
<tr><td>Radioisotope T</td><td>It has long half-life, emits beta, in solid form and has low ionizing power</td></tr>
</table>
</td><td>1
1
1
1
1
1
1
1
1</td></tr>
<tr><td>(c)(i)</td><td>Geiger Muller Tube</td><td>1</td></tr>
<tr><td>(c)(ii)</td><td>- Bottle E
- It is because rate meter reading is the highest.
- Thus, most radiation can reach the detector without being blocked by juice.</td><td>1
1
1</td></tr>
<tr><td>(d)</td><td>- Alpha is $^{4}_{2}He$

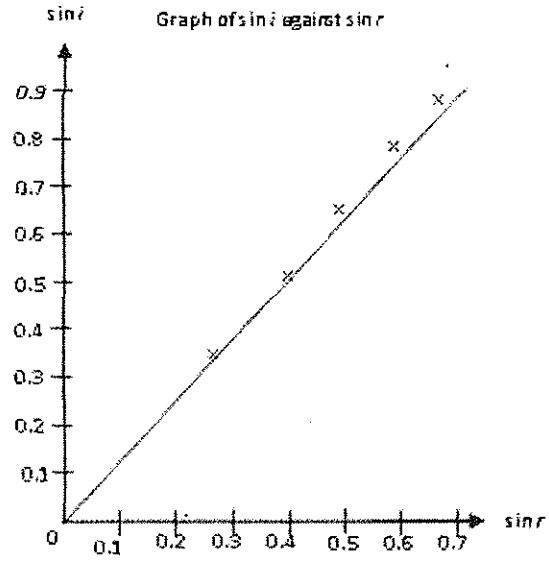
- Beta is $^{0}_{-1}e$
- For nucleon number, $\frac{238-226}{4} = 3$. So, there are 3 alpha.
- For proton number, $92 - [88 + (3\times2)] = -2$. So, there are 2 beta.</td><td>1(α)

1(β)
1(α)
1(β)
1(β)</td></tr>
<tr><td></td><td>TOTAL</td><td>20</td></tr>
</table>

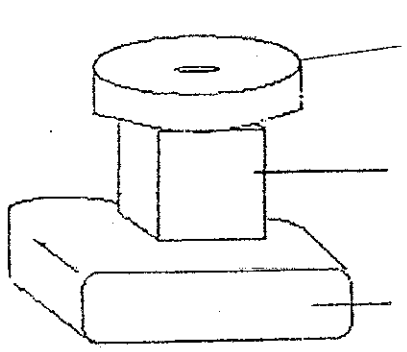
PAPER 3

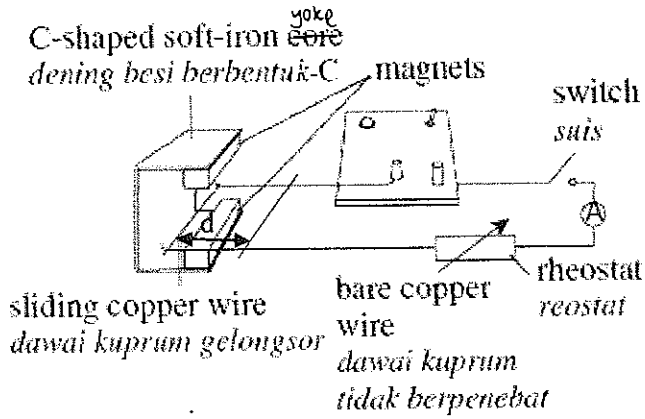
Section A

<table>
<tr><th>No.</th><th>Answer</th><th>Mark</th></tr>
<tr><td>1 (a)(i)</td><td>Angle of incidence, i</td><td>1</td></tr>
<tr><td>(a)(ii)</td><td>Angle of refraction, r</td><td>1</td></tr>
<tr><td>(a)(iii)</td><td>Refractive index, n</td><td>1</td></tr>
<tr><td>(b)(i)</td><td>Diagram 1.2 : 15°
Diagram 1.3 : 23°
Diagram 1.4 : 29°
Diagram 1.5 : 35°
Diagram 1.6 : 41°</td><td>2</td></tr>
<tr><td>(b)(ii)</td><td>Diagram 1.2 : 0.3420
Diagram 1.3 : 0.5000
Diagram 1.4 : 0.6428
Diagram 1.5 : 0.7660
Diagram 1.6 : 0.8660</td><td>1</td></tr>
<tr><td>(b)(iii)</td><td>Diagram 1.2 : 0.2588
Diagram 1.3 : 0.3907
Diagram 1.4 : 0.4848
Diagram 1.5 : 0.5736
Diagram 1.6 : 0.6561</td><td>2</td></tr>
<tr><td>(c)</td><td>
<table>
<tr><th>i/°</th><th>sin i</th><th>r/°</th><th>sin r</th></tr>
<tr><td>20</td><td>0.3420</td><td>15</td><td>0.2588</td></tr>
<tr><td>30</td><td>0.5000</td><td>23</td><td>0.3907</td></tr>
<tr><td>40</td><td>0.6428</td><td>29</td><td>0.4848</td></tr>
<tr><td>50</td><td>0.7660</td><td>35</td><td>0.5736</td></tr>
<tr><td>60</td><td>0.8660</td><td>41</td><td>0.6561</td></tr>
</table>
</td><td>2</td></tr>
</table>

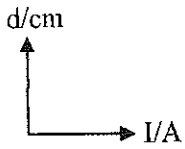
No.	Answer	Mark
(d)		5
(e)	Sin *i* is directly proportional to sin *r*.	1
	TOTAL	**16**
2 (a)(i)	When I increases, V decreases.	1
(a)(ii)	-- Extrapolation to y-axis -- V = 3.0 V	1 1
(a)(iii)	Electromotive force (e.m.f)	1
(b)(i)	-- Show the triangle. $-- gradient = \frac{3-2}{0-1.32} = -0.76\Omega$ $r = 0.76\Omega$	1 1(ans) 1(unit)
(b)(ii)	-- Show the value of V in the graph. -- V =1.95 V	1 1
(c)	$R = \frac{1.95}{1.4} = 1.39\Omega$	1(sub) 1(ans+unit)
(d)	-- All connections must be tightly fixed. -- Avoid parallax error by making sure that the position of the eye is perpendicular to the scale of voltmeter or ammeter. -- Repeat the experiment and get the average value.	1
	TOTAL	**12**

Section B

No.	Answer	Mark
3 (a)	Pressure depends on the surface area	1
(b)	When surface area decreases, pressure decreases.	1
(c)(i)	To investigate the relationship between surface area and pressure.	1
(c)(ii)	MV : surface area, A / Diameter / Radius RV : pressure (represented by the depth of wooden block sinking into the plasticine, d) FV : mass/ force/ weight	1(MV&RV) 1(FV)
(c)(iii)	**Ruler**, slotted mass, plasticine and wooden blocks	1
(c)(iv)		1 (with label)
(c)(v)	- The apparatus is set up as shown in the diagram. - A wooden block with a surface area of 4 cm^2 is placed on the plasticine. - A 100 g of slotted mass is put on top of the wooden block. - The depth of the wooden block sinks into the plasticine is measured using a ruler. - The experiment is repeated using wooden block with surface area of 9 cm^2, 16 cm^2, 25 cm^2 and 36 cm^2. - The data is recorded and tabulated. - A graph of depth against surface area is plotted.	1(MV) 1(RV) 1(Repeat)
(c)(vi)	$A(cm^2)$ / Depth (cm): 4 / ; 9 / ; 16 / ; 25 / ; 36 /	1
(c)(vii)	Depth /cm Surface Area /cm^2	1
	TOTAL	**12**
4 (a)	Force depends on current.	1
(b)	When current increases, force increases	1
(c)(i)	To investigate the relationship between the current and force.	1
(c)(ii)	MV : current, I RV : force (represented by the distance moved by the sliding copper wire, d) FV : strength of electromagnet	1(MV&RV) 1(FV)
(c)(iii)	**Metre rule, sliding copper wire,** d.c power supply, magnets , C-shaped iron yoke, bare copper wire, connecting wires, ammeter and rheostat.	1

<table>
<tr><th>No.</th><th>Answer</th><th>Mark</th></tr>
<tr><td>(c)(iv)</td><td> 
</td><td>1</td></tr>
<tr><td>(c)(v)</td><td>- The apparatus is set up as shown in the diagram.
- The magnets are placed as shown in diagram.
- The d.c. power supply is switched on.
- The rheostat is adjusted until the reading of ammeter is I = 0.5 A
- The distance of sliding copper wire moves on the bare copper wire from the initial position to final position, d is measured using a metre rule.
- The experiment is repeated with current, I = 1.0 A, 1.5 A, 2.0 A, and 2.5 A
- The data is recorded and tabulated.
- A graph of distance moved by the sliding copper wire against current is plotted.</td><td>1(MV)

1(RV)

1(Repeat)</td></tr>
<tr><td>(c)(vi)</td><td><table><tr><th>Current, I (A)</th><th>Distance moved by the sliding copper wire, d (cm)</th></tr><tr><td>0.5</td><td></td></tr><tr><td>1.0</td><td></td></tr><tr><td>1.5</td><td></td></tr><tr><td>2.0</td><td></td></tr><tr><td>2.5</td><td></td></tr></table></td><td>1</td></tr>
<tr><td>(c)(vii)</td><td> 
</td><td>1</td></tr>
<tr><td></td><td>TOTAL</td><td>12</td></tr>
</table>

END OF MARKING SCHEME