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BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH
DAN SEKOLAH KECEMERLANGAN
KEMENTERIAN PELAJARAN MALAYSIA

PENTAKSIRAN DIAGNOSTIK SBP
SIJIL PELAJARAN MALAYSIA 2012 4531/1

PHYSICS

Kertas 1
OGOS
2012
1 ¼ jam **Satu jam lima belas minit**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consist of 50 questions.
   Kertas soalan ini mengandungi 50 soalan.

2. Answer all questions.
   Jawab semua soalan.

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

4. You may use non-programmable scientific calculator.
   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.

Kertas ini mengandungi 32 halaman bercetak

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The following information may be useful. The symbols have their usual meaning.
Maklumat berikut mungkin berfaedah. Simbol-simbol menpunyai 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 $= \frac{1}{2} mv^2$
Tenaga kinetik

7. Potential energy $= mgh$
Tenaga keupayaan

8. Elastic potential energy $= 1/2\ Fx$
Tenaga keupayaan kenyal

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

10. Pressure, $P = h\rho g$
Tekanan, P

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

12. Heat, $Q = mc\Theta$

13. Heat, $Q = ml$

14 $\frac{PV}{T} = constant$

15 $E = mc^2$

16 $v = f\lambda$

17 Power, $P = \frac{\text{energy}}{\text{time}}$
Kuasa, $P = \frac{\text{tenaga}}{\text{masa}}$

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

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

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

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

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

22. $Q = It$

23. $V = IR$

24. Power, $P = IV$
Kuasa,

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

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

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

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

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1 Which of the following is a derived SI unit?
Yang manakah berikut adalah unit SI terbitan?

A Newton
Newton

B Kilogram
Kilogram

C Celcius
Celcius

D Second
Saat

2 Which of the following is a vector quantity?
Antara berikut yang manakah kuantiti vektor?

A Energy
Tenaga

B Electric current
Arus elektrik

C Momentum
Momentum

D Volume of gas
Isipadu gas

3 Diagram 1 shows the scale of a micrometer screw gauge.
Rajah 1 menunjukkan skala pada satu tolok skru mikrometer.

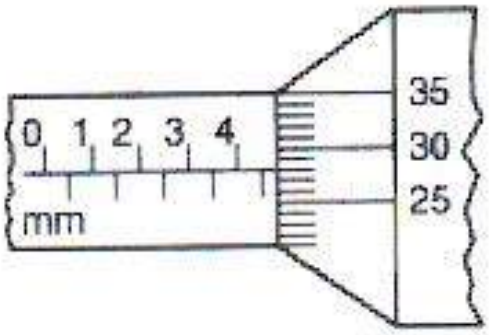

Diagram 1
Rajah 1

What is the reading of the micrometer?
Berapakah bacaan mikrometer itu?

A 4.28 mm

B 4.32 mm

C 4.78 mm

D 4.82 mm

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4 Diagram 2 shows a tape chart of a moving object.
Rajah 2 menunjukkan sebuah carta pita bagi suatu objek yang bergerak.

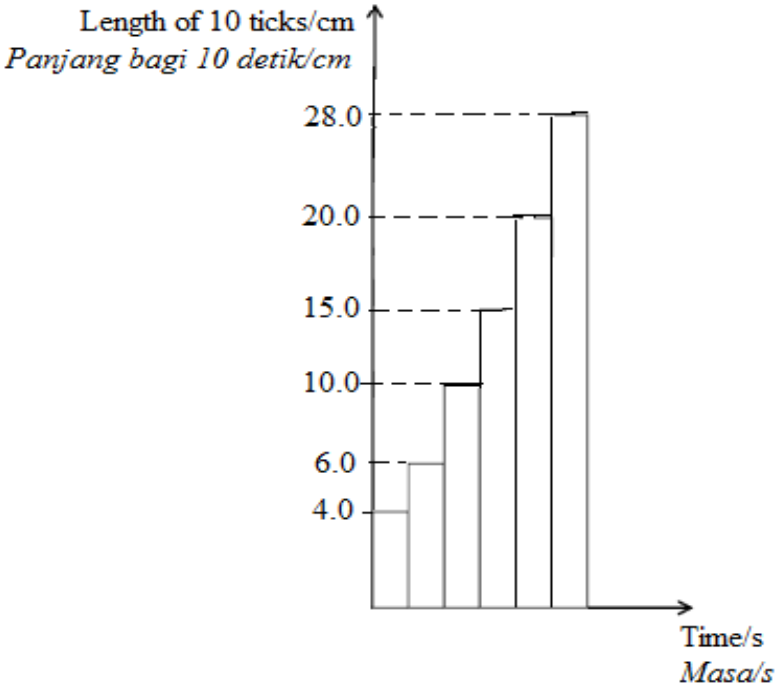

Diagram 2
Rajah 2

What is the acceleration of the object?
Berapakah pecutan bagi objek itu?

A 100 cm s^{-2} **B** 120 cm s^{-2}

C 1 000 cm s^{-2} **D** 1 200 cm s^{-2}

5 Diagram 3(a) shows an empty bottle rolling when a train started to move forward.
Diagram 3(b) shows the same empty bottle rolling in the opposite direction when the train stopped suddenly.
Rajah 3(a) menunjukkan sebiji botol kosong bergolek apabila keretapi mula bergerak kehadapan.
Rajah 3(b) menunjukkan keadaan botol kosong yang sama bergolek dalam arah bertentangan apabila keretapi itu berhenti secara tiba-tiba.

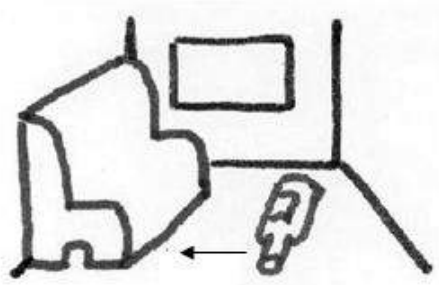

Diagram 3(a)
Rajah 3(a)

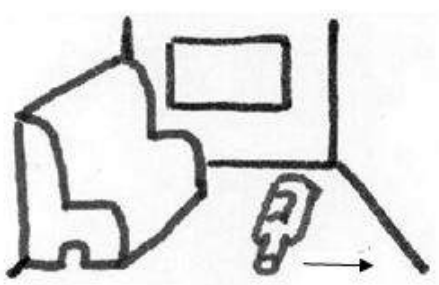

Diagram 3(b)
Rajah 3 (b)

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This situation is due to
Situasi ini adalah disebabkan oleh

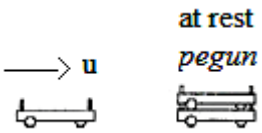
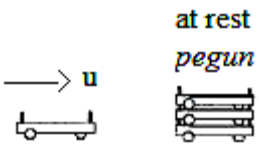
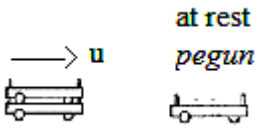
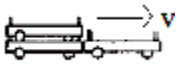
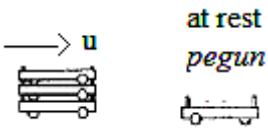
A Inertia
Inersia

B Impulse
Impuls

C Acceleration
Pecutan

D Impulsive force
Daya impuls

6 Which of the following will produce the highest common velocity, *v*, after collision? The trolleys are identical and of the same initial velocity.
Yang manakah antara berikut akan menghasilkan halaju sepunya yang paling tinggi selepas perlanggaran? Trolo-troli adalah serupa dan mempunyai halaju awal yang serupa.

	Before collision *Sebelum perlanggaran*	After collision *Selepas perlanggaran*
A		
B		
C		
D		

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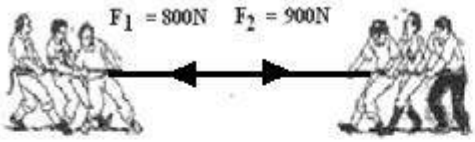
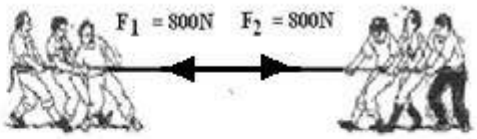
7 Which situation produced zero net force?
Situasi yang manakah menghasilkan daya bersih sifar?

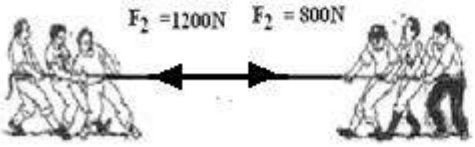
A



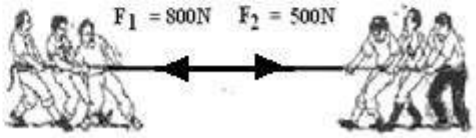
C



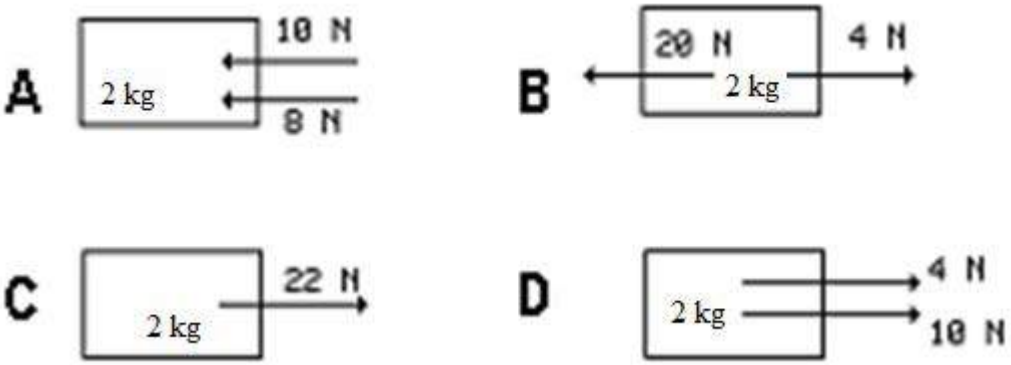
B



D



8 Which of the following produces the largest acceleration when forces are applied on a block?
Antara berikut yang manakah menghasilkan pecutan yang paling besar apabila daya-daya dikenakan ke atas sebuah blok?



9 Diagram 4 shows a ball is rolling down a smooth slope
Rajah 4 menunjukkan satu bola menuruni suatu cerun yang licin.

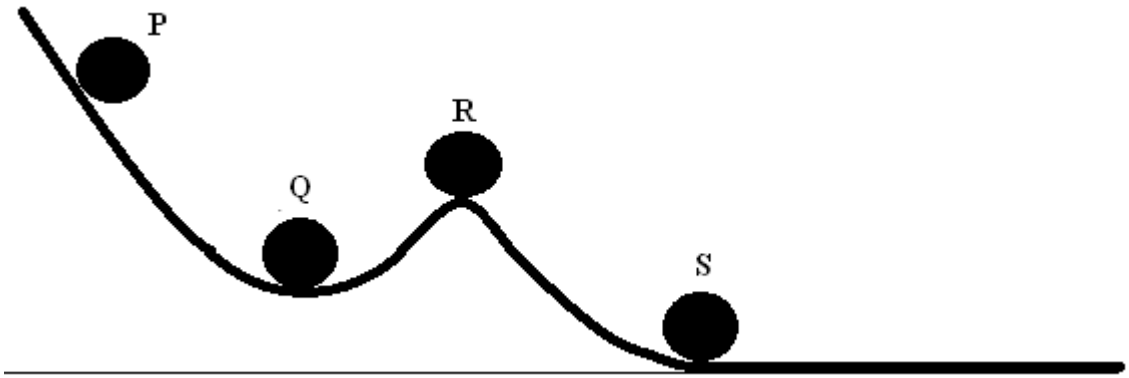


Diagram 4
Rajah 4

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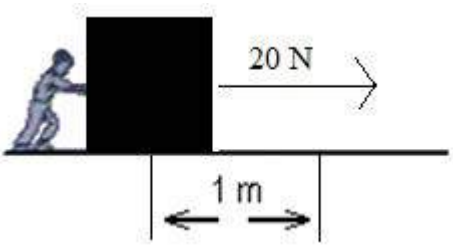
At which point P, Q, R or S the kinetic energy is the highest?
Pada tititk manakah P, Q, R *atau* S *tenaga kinetik adalah paling tinggi?*

A P **B** Q

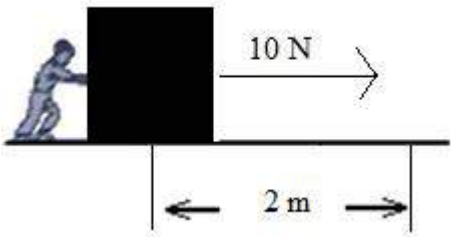
C R **D** S

10 A student is pushing an identical block on a smooth floor? Which diagram shows the student is doing the maximum work?
Seorang pelajar sedang menolak sebuah blok yang serupa di atas lantai yang licin. Rajah manakah menunjukkan pelajar melakukan kerja yang paling maksimum?

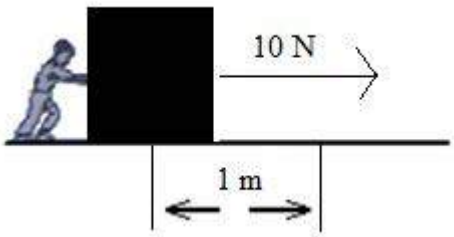
A



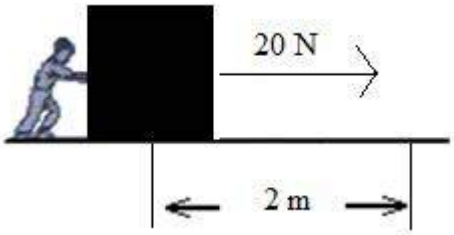
B



C



D



11 Diagram 5 shows a toy car is pushed to compress a spring that attached to a wall.
Rajah 5 menunjukkan sebuah kereta mainan ditolak ke belakang untuk memampatkan sebuah spring yang dilekatkan pada dinding.

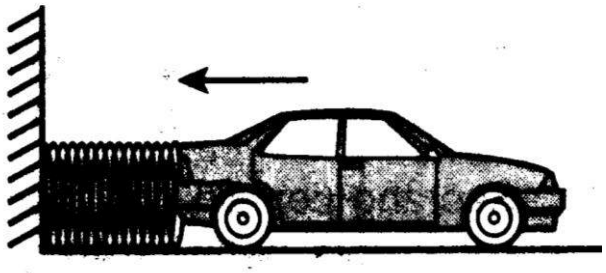


Diagram 5
Diagram 5

What is the transformation of energy when the toy car is released?
Apakah perubahan tenaga yang berlaku apabila kereta mainan itu dilepaskan?

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A Kinetic energy to elastic potential energy
Tenaga kinetik kepada tenaga keupayaan kenyal

B Elastic potential energy to kinetic energy
Tenaga keupayaan kenyal kepada tenaga kinetik

C Gravitational potential energy to kinetic energy
Tenaga keupayaan graviti kepada tenaga kinetic

D Elastic potential energy to gravitational potential energy
Tenaga keupayaan kenyal kepada tenaga keupayaan graviti

12 Diagram 6 shows two types of shoes which has different size of soles.
Rajah 6 menunjukkan dua jenis kasut yang mempunyai saiz tapak yang berbeza.

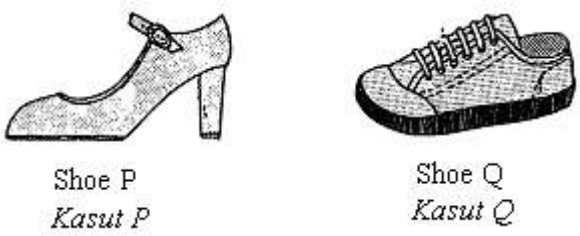

Diagram 6
Rajah 6

Which shoe, P or Q sinks more into the soft ground when worn by the same lady?
Kasut yang manakah, P atau Q yang akan tenggelam lebih ke dalam tanah yang lembut apabila dipakai oleh wanita yang sama?

A P because less pressure on the ground
P kerana tekanan yang kurang ke atas tanah

B P because more pressure on the ground
P kerana tekanan yang lebih keatas tanah

C Q because less pressure on the ground
Q kerana tekanan yang kecil ke atas tanah

D Q because more pressure on the ground
Q kerana tekanan yang lebih ke atas tanah

13 Diagram 7 shows a fish in sea water at depth, *h*. The water pressure, *P* is acting on the fish.
Rajah 7 menunjukkan seekor ikan di dalam laut pada kedalaman, h. Tekanan air, P bertindak ke atas ikan itu.

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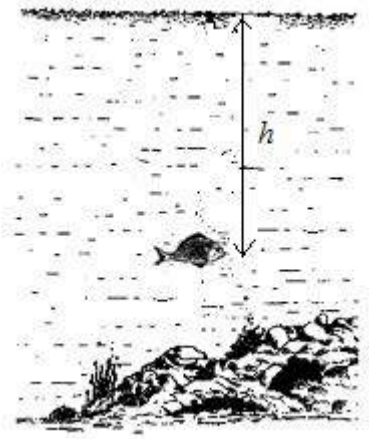
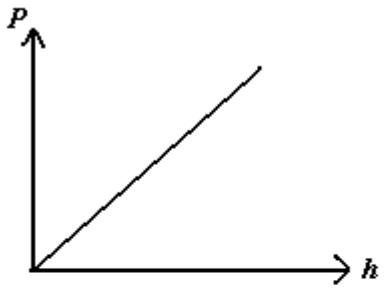


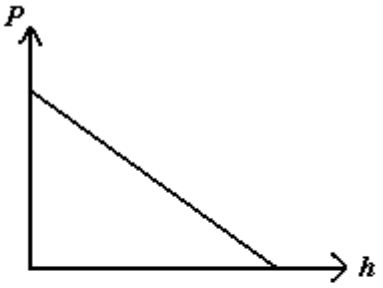
Diagram 7
Rajah 7

Which graph shows the correct relationship between *P* and *h*?
Graf yang manakah menunjukkan hubungan yang betul antara P dengan h?

A

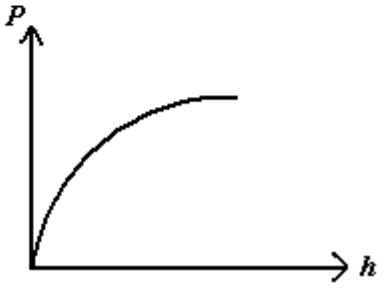


B



C

D



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14 Diagram 8 shows a water tank that supplies water to a three storey building.
Rajah 8 menunjukkan sebuah tangki air yang membekalkan air ke sebuah bangunan tiga tingkat.

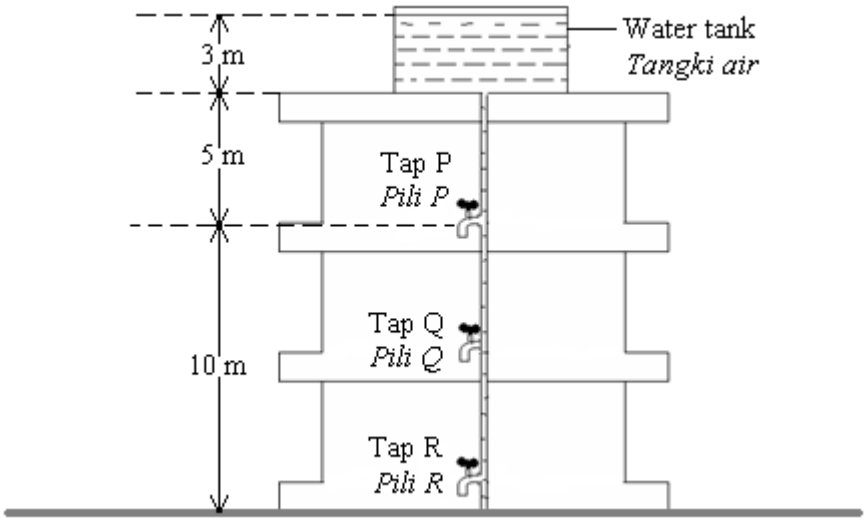

Diagram 8
Rajah 8

What is the total pressure at tap P?
(Density of water = 1000 kg m^{-3} , atmospheric pressure = 1.0 X 10^5 Pa)
Berapakah jumlah tekanan pada pili P?
(Ketumpatan air = 1000 kg m^{-3} , tekanan atmosfera = 1.0 X 10^5 Pa)

A 1.5 x 10^5 Pa

B 1.8 x 10^5 Pa

C 2.0 x 10^5 Pa

D 2.8 x 10^5 Pa

15 Diagram 9 shows a rubber sucker is attached to a wall to hang a toy.
Rajah 9 menunjukkan sebuah penyedut getah dilekatkan pada dinding untuk menggantungkan sebuah patung permainan.

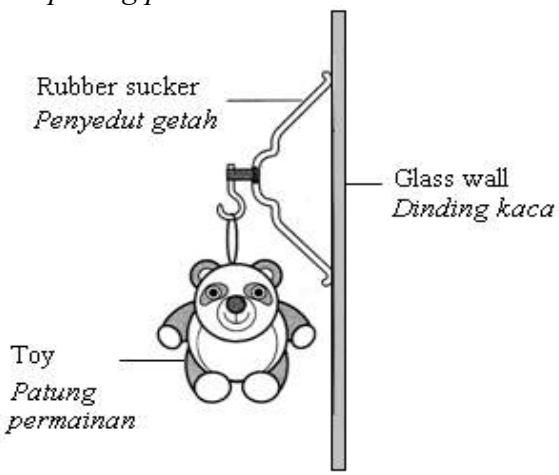

Diagram 9
Rajah 9

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The rubber sucker sticks to the wall because
Penyedut getah melekat pada dinding kerana

A the atmospheric pressure is equal to the pressure inside the rubber sucker
tekanan atmosfera sama dengan tekanan di dalam penyedut getah

B the atmospheric pressure is less than the pressure inside the rubber sucker
tekanan atmosfera lebih rendah daripada tekanan di dalam penyedut getah

C the atmospheric pressure is more than the pressure inside the rubber sucker
tekanan atmosfera lebih tinggi daripada tekanan di dalam penyedut getah

16 Diagram 10 shows two identical test tubes, X and Y containing ball bearings P and Q which have the same size but of different densities. The upthrust, F_X and F_Y are exerted on the test tube X and Y respectively.
Rajah 10 menunjukkan dua tabung uji yang serupa, X dan Y yang mengandungi alas bebola P dan Q yang mempunyai saiz yang sama tetapi berbeza ketumpatan. Tujah ke atas, F_X dan F_Y bertindak ke atas tabung uji X dan Y masing-masing.

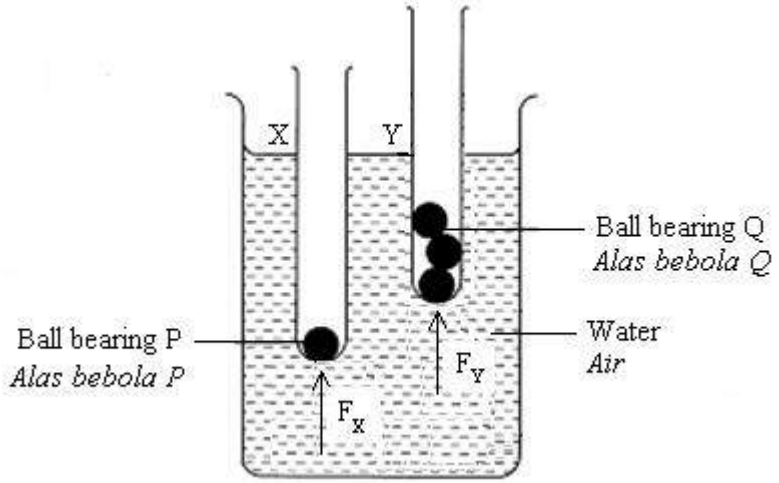

Diagram 10
Rajah 10

Which comparison of upthrust is correct?
Perbandingan tujah ke atas manakah yang betul?

A $F_X < F_Y$

B $F_X = F_Y$

C $F_X > F_Y$

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17 Diagram 11 shows the roof of a house being lifted during a storm.
Rajah 11 menunjukkan bumbung sebuah rumah terangkat semasa ribut taufan.

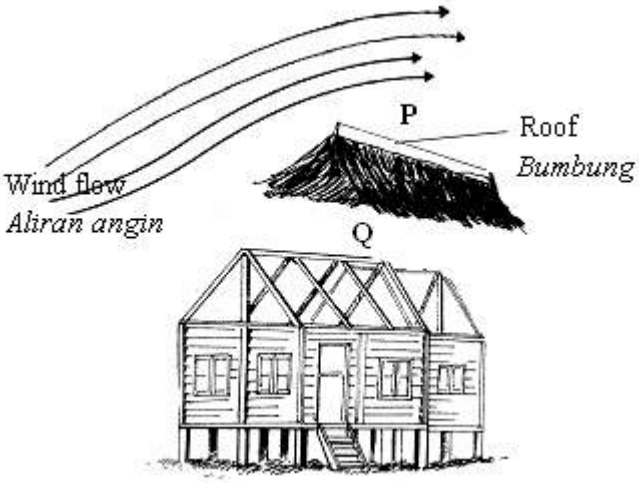

Diagram 11
Rajah 11

Which statement is correct to explain the phenomenon?
Pernyataan manakah yang betul untuk menerangkan fenomena itu?

A Speed of air at Q is lower, causing lower air pressure
Laju udara di Q lebih rendah, menyebabkan tekanannya udara lebih rendah

B Speed of air at Q is higher, causing higher air pressure
Laju udara di Q lebih tinggi, menyebabkan tekanan udara lebih tinggi

C Speed of air at P is higher, causing lower air pressure
Laju udara di P lebih tinggi, menyebabkan tekanan udara lebih rendah

D Speed of air at P is lower, causing lower air pressure
Laju udara di P lebih rendah, menyebabkan tekanan udara lebih rendah

18 Diagram 12 shows a brake system of a car.
Rajah 12 menunjukkan system brek sebuah kereta.

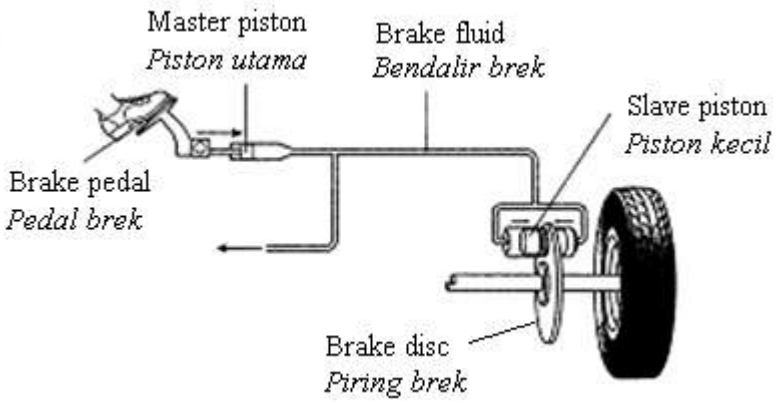

Diagram 12

Rajah 12

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Which principle is used in this system?
Prinsip yang manakah digunakan dalam sistem ini?

A Pascal's Principle
Prinsip Pascal

B Bernoulli's Principle
Prinsip Bernoulli

C Archimedes' Principle
Prinsip Archimedes

D Principle of conservation of momentum
Prinsip keabadian momentum

19 Diagram 13 shows an oven is used to bake a cake.
After 40 minutes, the cake reaches thermal equilibrium.
Rajah 13 menunjukkan sebuah ketuhar yang digunakan untuk memasak kek.
Selepas 40 minit, kek itu mencapai keseimbangan termal.

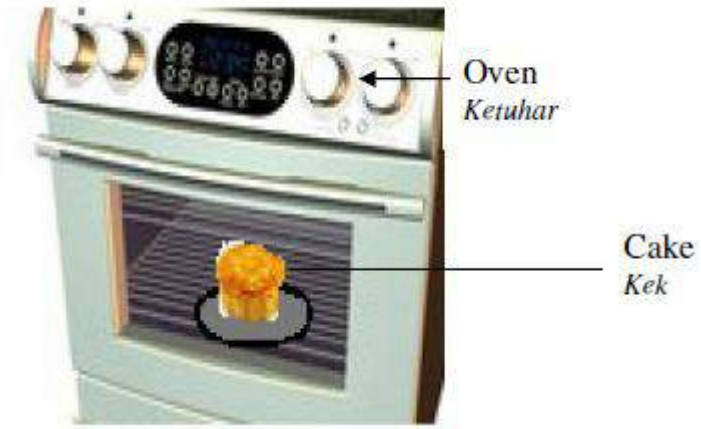

Diagram 13
Rajah 13

When is thermal equilibrium reached?
Bilakah keseimbangan terma dicapai?

A When the oven has reached its maximum temperature.
Bila ketuhar telah mencapai suhu maksimum.

B When all the heat from the oven has transferred to the cake.
Bila semua haba dari ketuhar telah dipindahkan kepada kek.

C When the temperature of the cake is equal to the temperature of the oven.
Bila suhu kek sama dengan suhu ketuhar.

D When the net rate of heat transfer between the cake and the oven is equal.
Bila kadar pemindahan haba bersih antara kek dan ketuhar adalah sama.

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20 Diagram 14 shows the air current of land breeze.
Rajah 14 menunjukkan aliran udara dalam bayu laut.

Diagram 14
Rajah 14

This phenomenon is due to
Fenomena ini disebabkan

A sea is as warm as land
laut sama panas dengan daratan

B sea is warmer than land
laut lebih panas daripada daratan

C land is warmer than sea
daratan lebih panas daripada laut

21 Diagrams 15 shows three beakers P,Q and R contain 100 g of water , 200 g of water and 100 g of ethanol respectively at the same initial temperature. The heat is supplied at the same rate. After 5 minutes the temperature of liquid in beakers P,Q, and R are recorded.
Rajah 15 menunjukkan tiga bikar P,Q dan R yang berisi 100 g air, 200 g air dan 100 g etanol masing-masing pada suhu awal yang sama. Haba dibekalkan pada kadar yang sama. Selepas 5 minit suhu cecair dalam bikar P,Q, dan R di rekodkan.

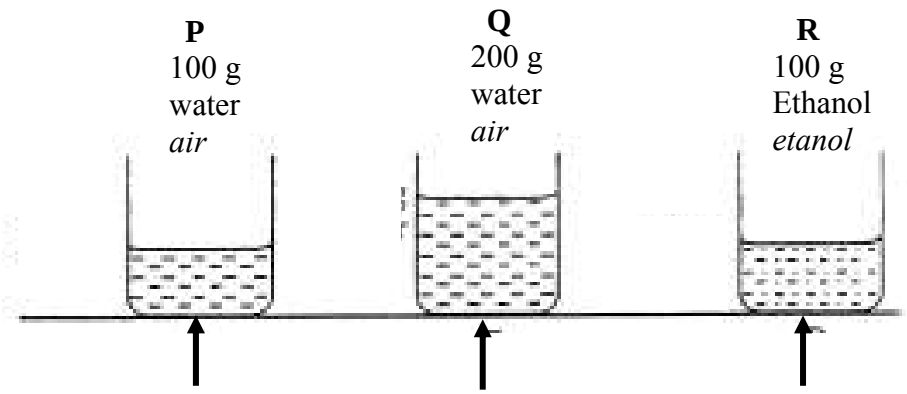

Diagram 15
Rajah 15

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Which comparison is correct about the temperature of liquid in beaker P,Q, and R, if the specific heat of water is greater than the specific heat of ethanol?.
Perbandingan yang manakah betul tentang suhu bagi cecair di dalam bikar P,Q, dan R, jika muatan haba tentu air lebih besar dari muatan haba tentu ethanol?

A $\theta_P > \theta_Q > \theta_R$

B $\theta_Q > \theta_P > \theta_R$

C $\theta_R > \theta_P > \theta_Q$

22 Diagram 16 shows a cylinder containing gas. The piston is held fixed and the cylinder is heated.
Rajah 16 menunjukkan sebuah bekas silinder yang mengandungi gas. Kedudukan piston ditetapkan dan bekas silinder itu dipanaskan.

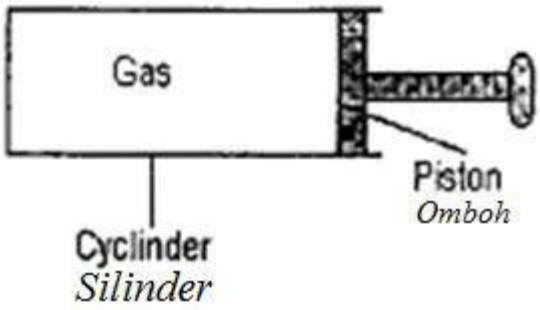

Diagram 16
Rajah 16

Why does the pressure of the gas in the cylinder increase?
Mengapakah tekanan gas di dalam bekas silinder meningkat

A The molecules gas expand
Molekul gas mengembang

B The number of molecules of gas increases
Bilangan molekul gas bertambah

C The molecules move faster and hit the walls more often
Molekul gas bergerak dengan laju dan menghentam dinding bekas dengan lebih kerap

D The molecules move at the same speed, but hit the walls more often
Molekul gas bergerak dengan kelajuan yang sama tetapi menghentam dinding bekas dengan kerap

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23 Diagram 17 shows a capillary tube containing some trapped air inside it. At 27° C , the vertical column of trapped air is 10 cm.
Rajah 17 menunjukkan satu tiub kapilari mengandungi udara terperangkap. Pada suhu 27^0 C, panjang turus udara terperangkap itu adalah 10 cm.

Diagram 17
Rajah 17

The capillary tube is heated until the vertical column of trapped air expands to 10.9 cm. What is the final temperature of the trapped air?
Tiub kapilari itu dipanaskan sehingga turus udara udara yang terperangkap mengembang kepada 10.9 cm. Berapakah suhu akhir bagi turus udara terperangkap itu?

A 42°C **B** 48°C

C 54°C **D** 57°C

24 Diagram 18 shows student A and student B standing in front of a plane mirror at a distance of 2 m and 5 m respectively.
Rajah 18 menunjukkan pelajar A *dan pelajar* B *berdiri di hadapan sebuah cermin satah pada jarak* 2 m *dan* 5 m *masing-masing.*

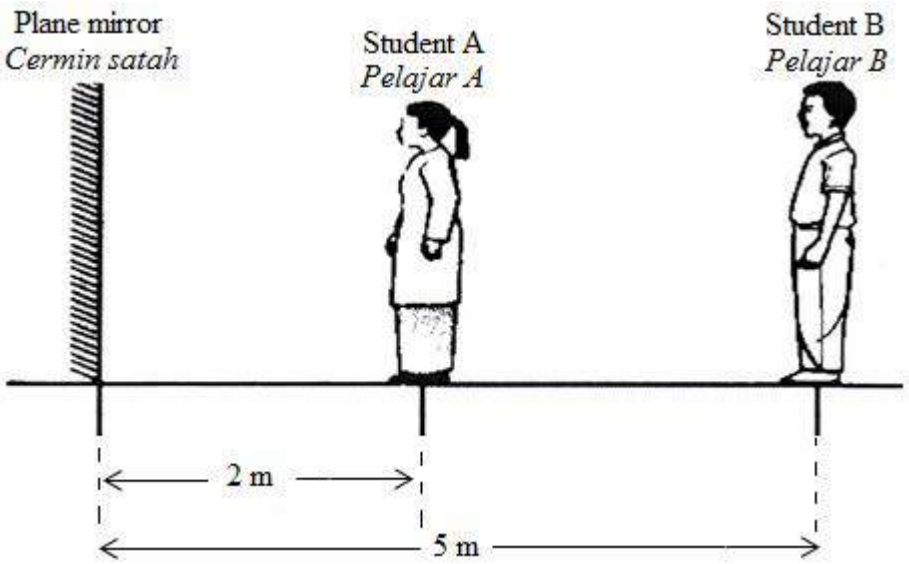

Diagram 18
Rajah 18

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What is the distance between student B to the image of student A?
Berapakah jarak antara pelajar B ke imej pelajar A?

A 3 m **B** 4 m

C 7 m **D** 10 m

25 Diagram 19(a) shows a ray of light propagates from medium Q to medium P .
Diagram 19(b) shows a ray of light propagates from medium R to medium P .
Rajah 19(a) menunjukkan sinar cahaya merambat dari medium Q ke medium P .
Rajah 19(b) menunjukkan sinar cahaya merambat dari medium R ke medium P.

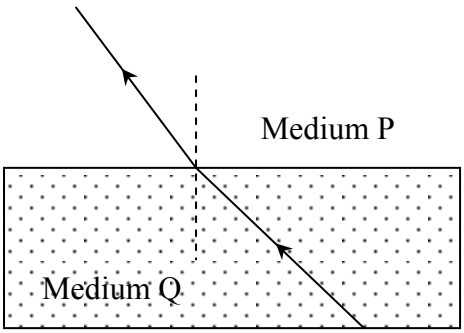

Diagram 19(a)
Rajah 19(a)

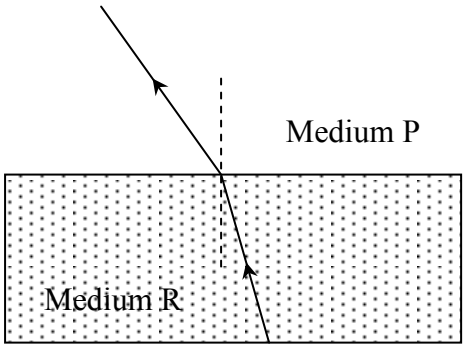

Diagram 19(b)
Rajah 19(b)

Arrange the optical density of the mediums, in ascending order.
Susunkan ketumpatan optik bagi medium-medium, mengikut tertib menaik.

A P , Q , R **B** Q , R , P

C Q , P , R **D** R , P , Q

26 Diagram 20 shows a light ray passing through a glass prism.
Rajah 20 menunjukkan cahaya bergerak melalui satu prisma kaca.

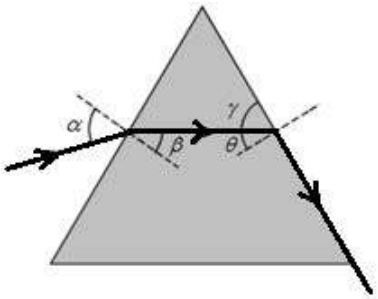

Diagram 20
Rajah 20

Which angle is known as the critical angle of the prism?
Sudut manakah dinamakan sebagai sudut genting prisma itu?

A α **B** β

C γ **D** θ

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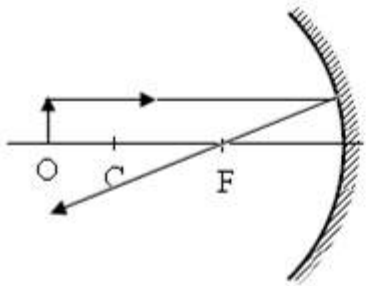
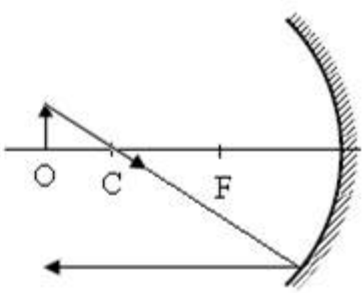
27 Which ray diagram shows the correct reflection of light by a concave mirror?
Rajah sinar yang manakah menunjukkan pantulan cahaya yang betul oleh sebuah cermin cekung?

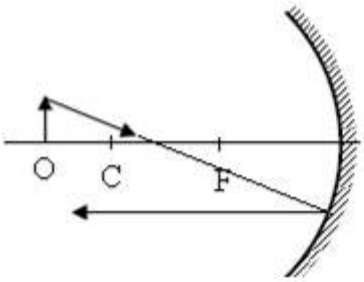
A



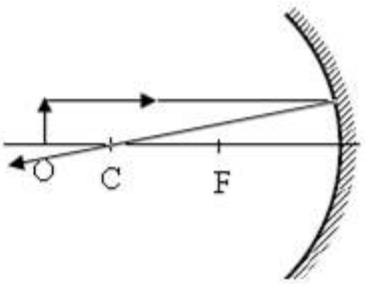
B



C



D



28 Diagram 21 shows the arrangement of two convex lenses P and Q of an astronomical telescope at normal adjustment. The power of lens P is 5 D and lens Q is 25 D.
Rajah 21 menunjukkan susunan dua buah kanta cembung P dan Q pada pelarasan normal dalam sebuah teleskop astronomi. Kuasa kanta P ialah 5 D dan kanta Q ialah 25 D.]

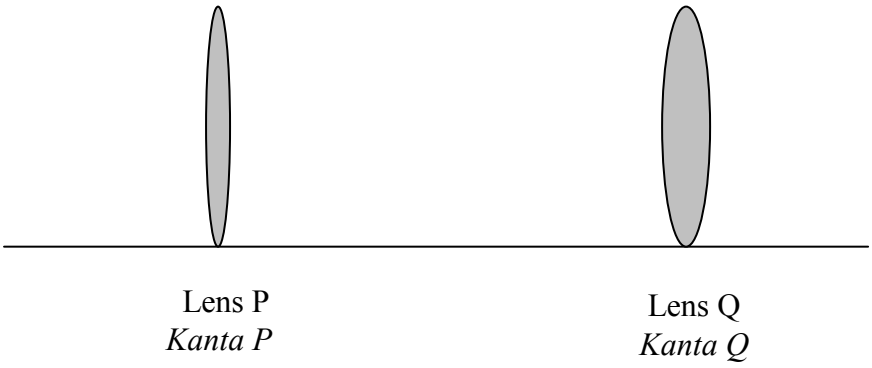


Diagram 21
Rajah 21

Calculate the distance between lenses P and Q.
Hitungkan jarak antara dua kanta P dan Q itu.

A 5 cm **B** 20 cm

C 24 cm **D** 30 cm

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29 Diagram 22 shows a sound wave is reflected by a barrier. Which statement is true about the reflected wave?
Rajah 22 menunjukkan satu gelombang bunyi dipantulkan oleh satu penghalang. Pernyataan yang manakah betul berkenaan gelombang terpantul itu?

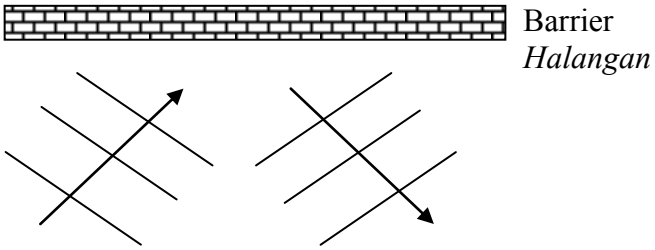


Diagram22
Rajah 22

The reflected wave has

A a smaller velocity
halaju yang lebih kecil

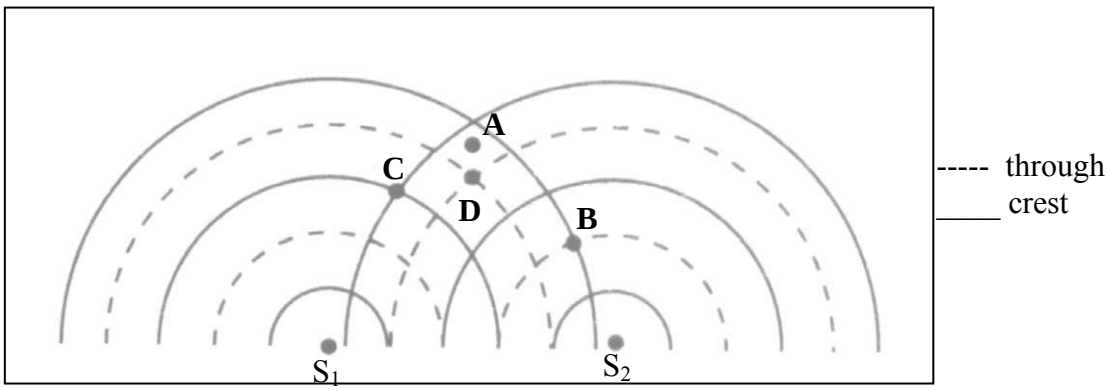
B the same frequency
frekuensi yang sama

C a bigger amplitude
amplitud yang lebih besar

D a shorter wavelength
jarak gelombang yang lebih pendek

30 Diagram 23 shows the interference pattern of water waves from two coherent sources S_1 and S_2 in a ripple tank.
Rajah 23 menunjukkan corak interferen gelombang air dari dua sumber koheren S_1 dan S_2 dalam sebuah tangki riak.

Which point has zero amplitude?
Titik yang manakah mempunyai amplitud sifar?



Rajah 23
Rajah 23

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31 Diagram 24 shows a graph of wave motion.
Rajah 24 menunjukkan satu graf perambatan gelombang.

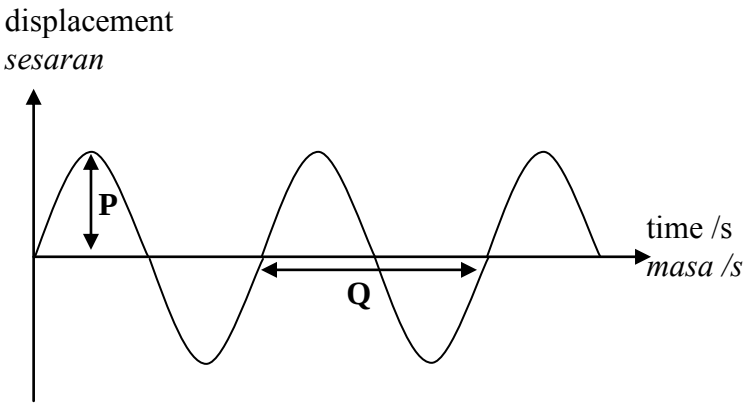
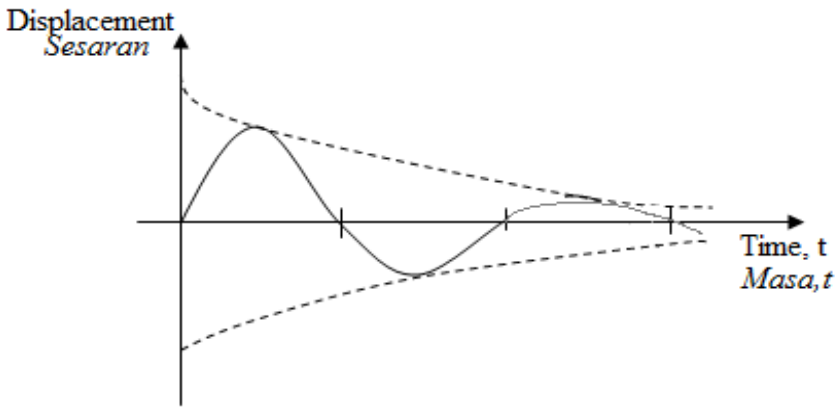


Diagram 24
Rajah 24

What quantities are shown by P and Q?
Apakah kuantiti yang ditunjukkan oleh P *dan* Q*?*

	P	Q
A	amplitude *amplitud*	period *tempoh*
B	amplitude *amplitud*	wavelength *jarak gelombang*
C	wavelength *jarak gelombang*	period *tempoh*
D	wavelength *jarak gelombang*	frequency *frekuensi*

32 Diagram 25 shows a graph of an oscillation system experiences damping.
Rajah 25 menunjukkan satu graf suatu sistem ayunan yang mengalami pelembapan.



Rajah 25
Rajah 25

Which of the following quantity does not change?
Yang mana di antara berikut tidak berubah?

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A Size of oscillation
Saiz ayunan

B Period of oscillation
Tempoh ayunan

C Energy of oscillation
Tenaga ayunan

D Amplitude of oscillation
Amplitud ayunan

33 Diagram 26 shows radio waves being received at a house at the bottom of a hill.
Rajah 26 menunjukkan gelombang radio sedang diterima oleh sebuah rumah di kaki bukit.

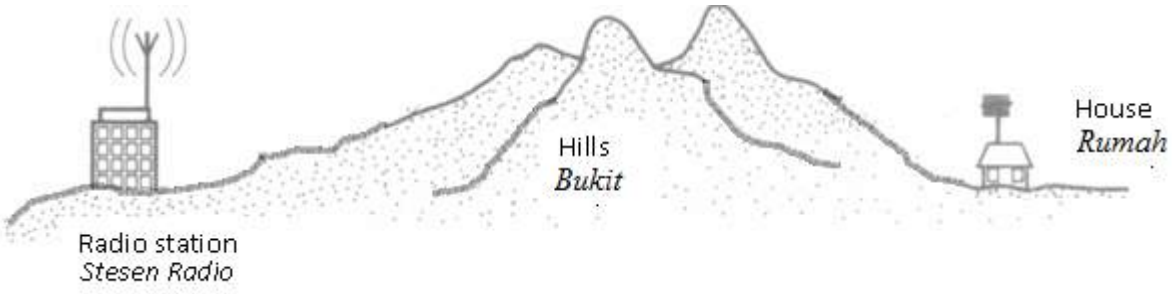

Diagram 26
Rajah 26

This phenomenon is due to
Fenomena ini disebabkan oleh

A reflection
pantulan

B refraction
pembiasan

C diffraction
pembelauan

D interference
interferens

34 Which of the following factors affecting the pitch of a sound?
Faktor yang manakah berikut mempengaruhi kelangsingan bunyi?

A Amplitude
Amplitud

B Frequency
Frekuensi

C Speed
Kelajuan

D Distance
Jarak

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35 Diagram 27 shows a circuit that consist of 3 bulbs P, Q and R. Which of the following is true about the brightness of the lamps, when the rheostat is changed?
(Neglect internal resistance of the cell)
Rajah menunjukkan satu litar yang mempunyai 3 mentol P, Q dan R. Di antara berikut, yang manakah benar tentang kecerahan mentol apabila nilai rintangan reostat itu diubah?

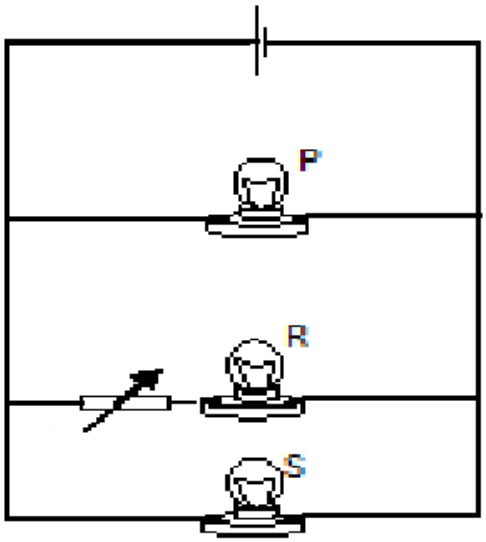

Diagram 27
Diagram 27

	Brightness Unchanged *Kecerahan tidak berubah*	Brightness Changed *Kecerahan berubah*
A	P only P *sahaja*	R and S R *and* S
B	P and R P dan R	S only S *sahaja*
C	P and S P *dan* S	R only R *sahaja*
D	S only S *sahaja*	P, R and S P, R *dan* S

36 The unit for potential difference, V can also be written as…
Unit bagi beza keupayaan, V juga boleh ditulis sebagai…

A $Q\ s^{-1}$ **B** $\Omega\ m$

C $J\ A^{-1}$ **D** $J\ C^{-1}$

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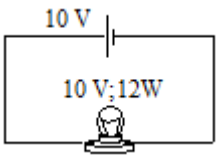
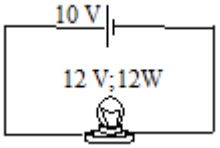
37 In the following circuits, which lamp lights up with normal brightness?
Dalam litar-litar berikut, lampu yang manakah menyala dengan kecerahan biasa?

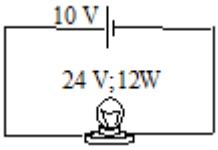
A



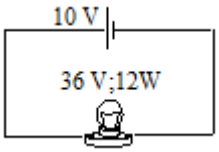
B



C



D



38 Diagram 28 shows a squirrel perched on a high voltage cable.
Gambarajah 28 menunjukkan seekor tupai bertenggek pada kabel bervoltan tinggi.

Diagram 28
Rajah 28

The squirrel does not experience an electric shock because
Tupai itu tidak mengalami renjatan elektrik kerana

A the potential difference across X and Y is high
beza keupayaan merentasi X dan Y tinggi

B the resistance of the cable across X and Y is very high
rintangan kabel antara X dan Y sangat tinggi

C the body of the bird has a low resistance
badan burung mempunyai rintangan yang kecil

D the current flowing through its body is very small.
arus yang mengalir melalui badan burung sangat kecil

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39 Diagram 29 shows a bar magnet is moving towards a solenoid.
Rajah 29 menunjukkan satu magnet bar digerakkan mendekati gegelung.

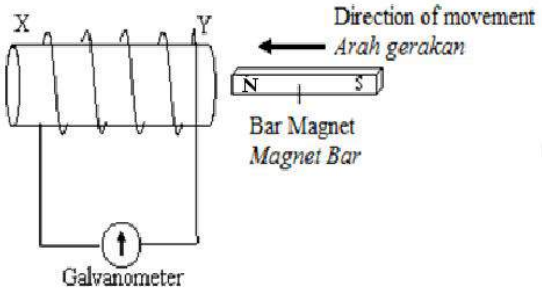

Diagram 29
Rajah 29

What is the magnetic polarity at both ends of the solenoid, X and Y?
Apakah polariti medan magnet pada kedua-dua hujung solenoid, X dan Y?

	X	Y
A	South *Selatan*	South *Selatan*
B	South *Selatan*	North *Utara*
C	North *Utara*	North *Utara*
D	North *Utara*	South *Selatan*

40 Diagram 30 shows two coils are wounded on an iron ring. When the switch is closed, what will happen to the bulb connected to the secondary coil?
Rajah 30 menunjukkan dua gegelung dililitkan pada satu gelang besi. Apabila suis dipasang, apakah yang berlaku kepada mentol yang disambung kepada gegelung sekunder?

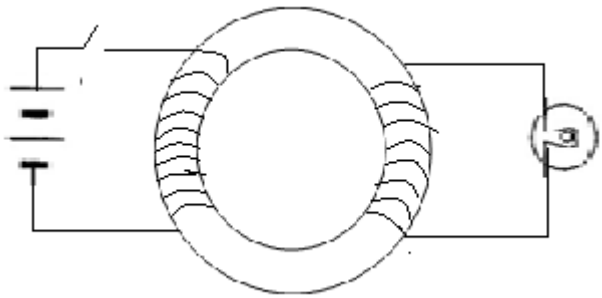

Diagram 30
Rajah 30

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A Lighted up with increasing brightness.
Menyala dengan kecerahan yang semakin meningkat

B Flashed at a constant frequency
Berkelip pada frekuensi yang tetap

C Flashed only ones
Berkelip hanya sekali

D Not lighted up
Tidak menyala.

41 Diagram 31 shows the number of turns between each pair of output terminals of a transformer. Between which pair of output terminals, the output voltage is 12 V?
Gambarajah 31 menunjukkan bilangan lilitan pada pasangan terminal output suatu transformer. Pasangan terminal output yang manakah, voltan output adalah 12 V?

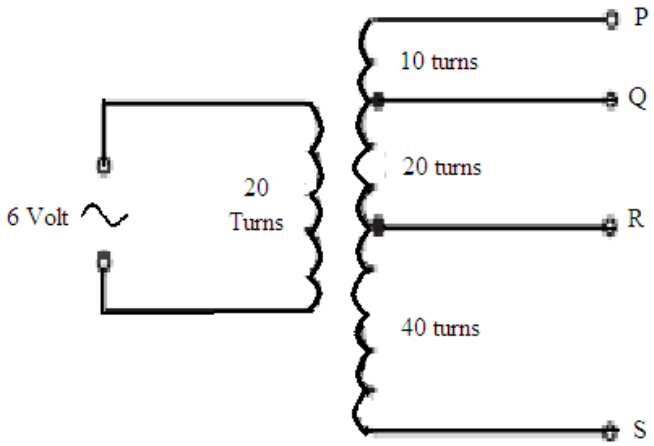

Diagram 31
Diagram 31

A R and S **B** P and Q

C Q and R **D** P and R

42 Which of the following can be used to determine the direction of magnetic field produced by a current-carrying conductor?
Antara berikut yang manakah boleh digunakan untuk menentukan arah medan magnet bagi suatu konduktor yang mengalirkan arus?

A Lenz's law
Hukum Lenz

B Faraday's law
Hukum Faraday

C Fleming's Left-hand rule
Peraturan Tangan Kiri Fleming

D Right-hand Grip rule
Peraturan Gengaman Tangan Kanan

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43 Diagram 32 shows an electric dynamo. Which graph describe the variation of the current displayed on the CRO screen.
Rajah 32 menunjukkan satu dinamo elektrik. Graf yang manakah menunjukkan variasi arus yang dipaparkan pada skrin OSK.

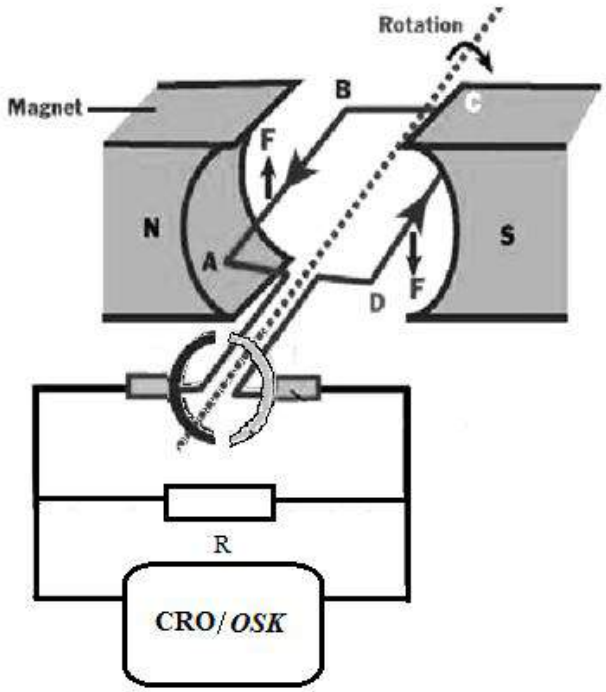
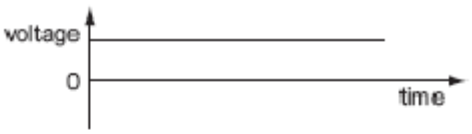
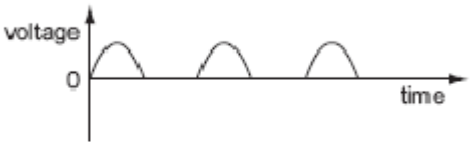
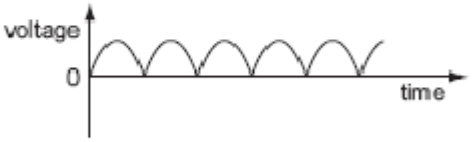
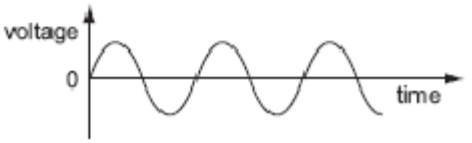


Diagram 32
Rajah 32

A.


B.


C.


D.


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44 Diagram 33 shows the output waveform on cathode ray oscilloscope (CRO) screen.
Rajah 33 menunjukkan bentuk gelombang output pada skrin osiloskop sinar katod (OSK)

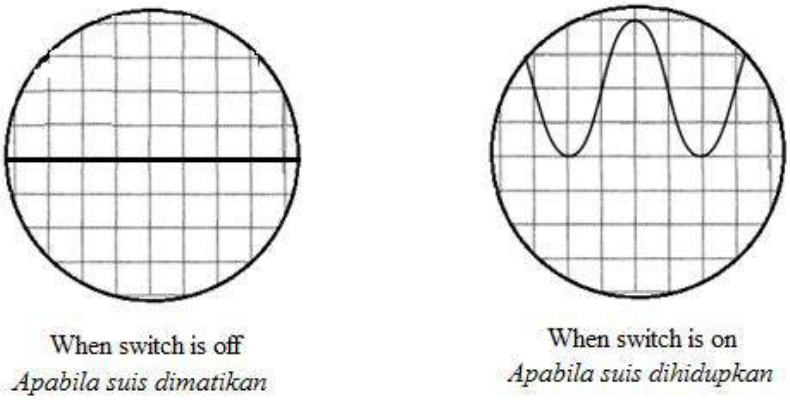
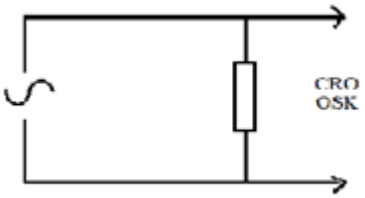


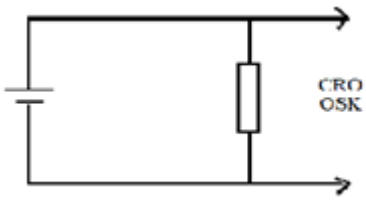
Diagram 33
Rajah 33

Which circuit will display the output waveform shown in Diagram 33?
Litar yang manakah akan mempamerkan bentuk gelombang output Rajah 33?

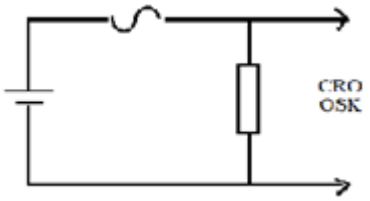
A



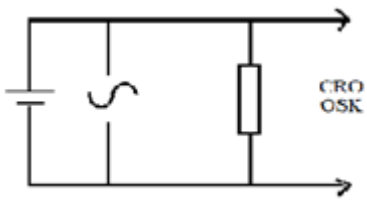
B



C

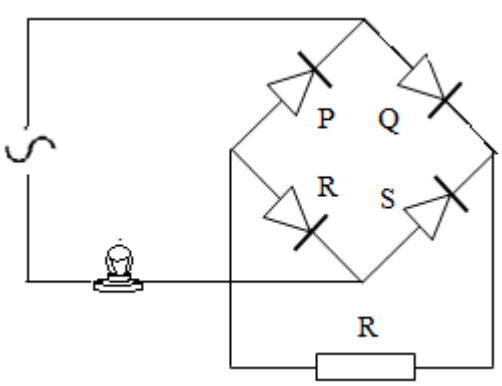


D

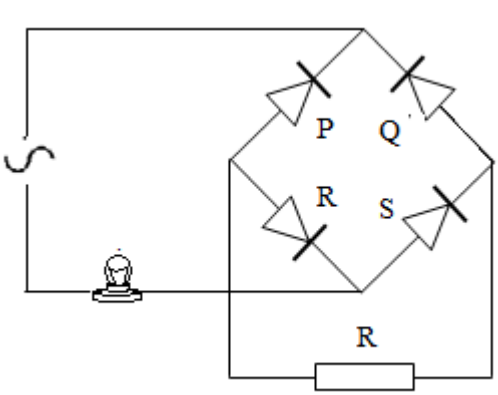


45 The following circuit diagrams show four diodes connected to an ac power supply. Which circuit will make the bulb lights up with maximum brightness?
Rajah litar berikut menunjukkan empat diod yang disambung kepada bekalan kuasa au. Litar yang manakah akan menyebabkan mentol menyala dengan kecerahan yang maksimum?

A



B



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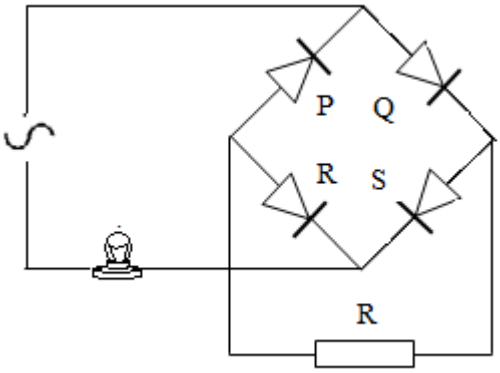
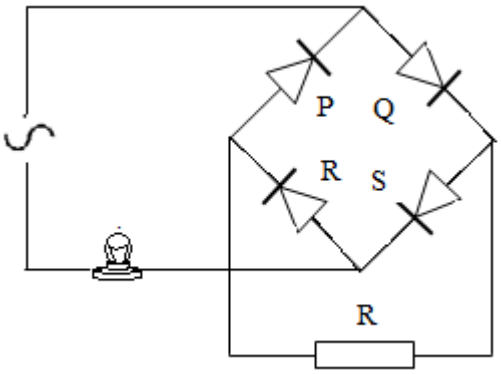
C

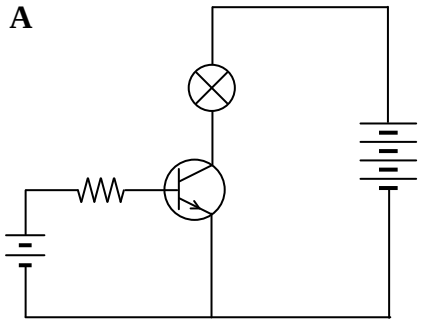


D

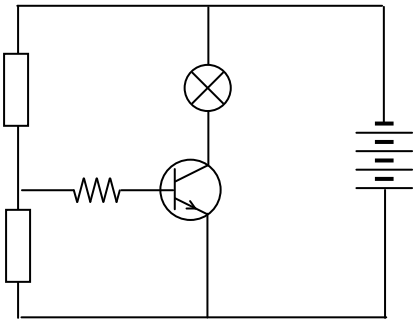


46 Which circuit will **not** light up the bulb?
*Litar yang manakah **tidak** akan menyalakan mentol?*

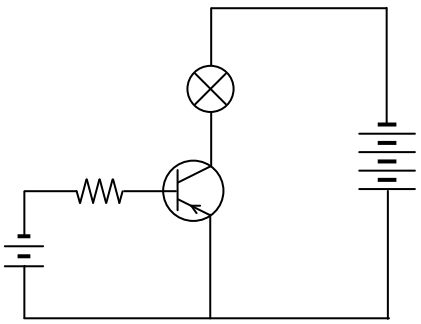
A



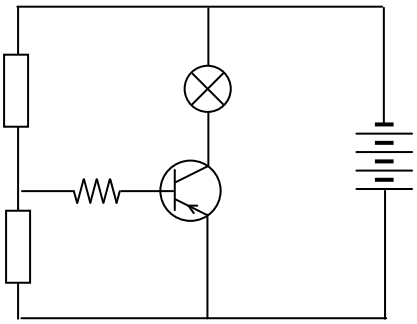
B



C



D



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47 Diagram 34.1 shows the combination of three logic gates.
Rajah 34.1 menunjukkan kombinasi tiga get logik.

Diagram 34.2 shows the input signals P and Q .
Rajah 34.2 menunjukkan isyarat input P dan Q .

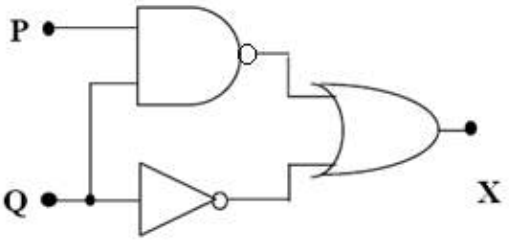


Diagram 34.1
Rajah 34.1

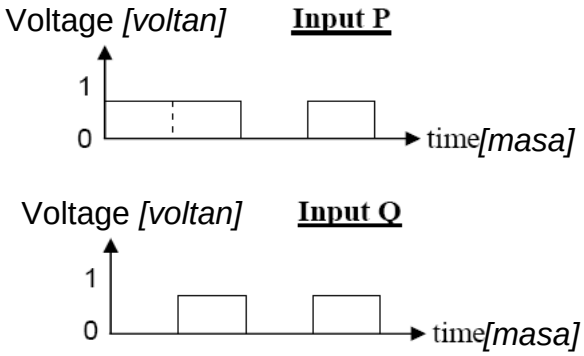
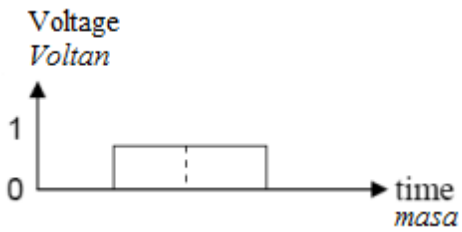


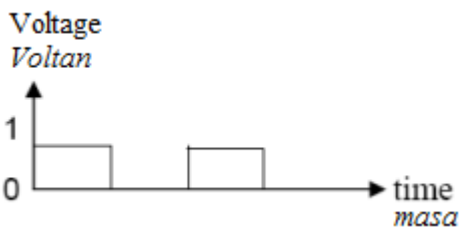
Diagram 34.2
Rajah 34.2

Which of the following shows the output signal X?
Antara berikut yang manakah menunjukkan isyarat output X?

A



B



C

D

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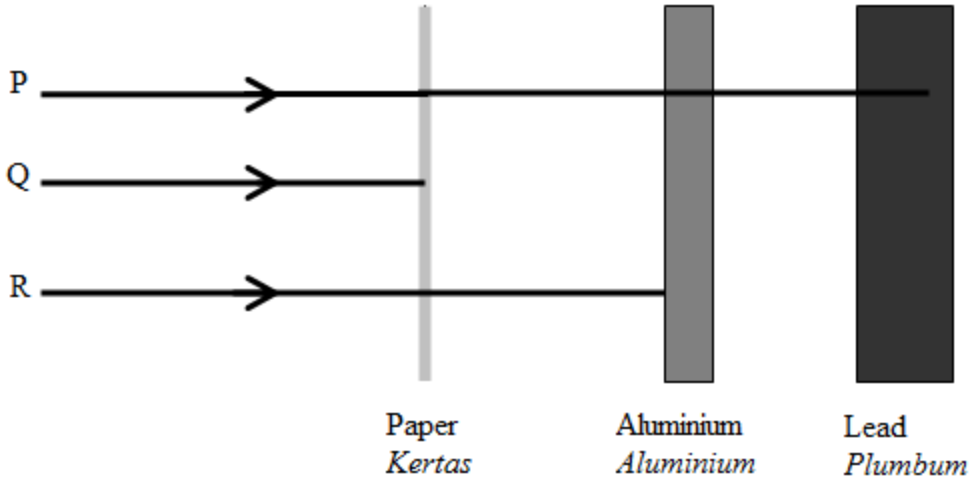
48 Diagram 35 shows three types of radioactive rays, P, Q and R, directed towards a sheet of paper, a sheet of aluminium and a sheet of lead.
Rajah 35 menunjukkan tiga jenis sinaran radioaktif, P,Q dan R, dihalakan kepada kepingan kertas, kepingan aluminium dan kepingan plumbum.



Rajah 35
Rajah 35

Which of the following rays are represented by P, Q and R?
Antara sinaran berikut, yang manakah diwakili oleh P, Q dan R?

	P	Q	R
A	Alpha *Alfa*	Gamma *Gama*	Beta *Beta*
B	Beta *Beta*	Alpha *Alfa*	Gamma *Gama*
C	Gamma *Gama*	Alpha *Alfa*	Beta *Beta*
D	Gamma *Gama*	Beta *Beta*	Alpha *Alfa*

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49 Table 1 shows the half-life of four types of liquid isotopes which radiate gamma ray.
Jadual 1 menunjukkan saparuh hayat bagi empat jenis cecair isotop yang memancarkan sinar gamma.

Isotope *Isotop*	Half-life *Separuh hayat*
P	10 seconds *10 saat*
Q	2 hours *2 jam*
R	5 months *5 bulan*
S	10 years *10 tahun*

Table 1
Jadual 1

Which liquid isotope is suitable to detect blood clotting?
Isotop cecair yang manakah sesuai digunakan untuk mengesan pembekuan darah?

A P **B** Q

C R **D** S

50 Diagram 36 shows a series of radioactive decays for the nucleus of uranium-238 to that of radium-226.
Rajah 36 menunjukkan siri pereputan radioaktif bagi nukles uranium-238 kepada nukleus radium-226.

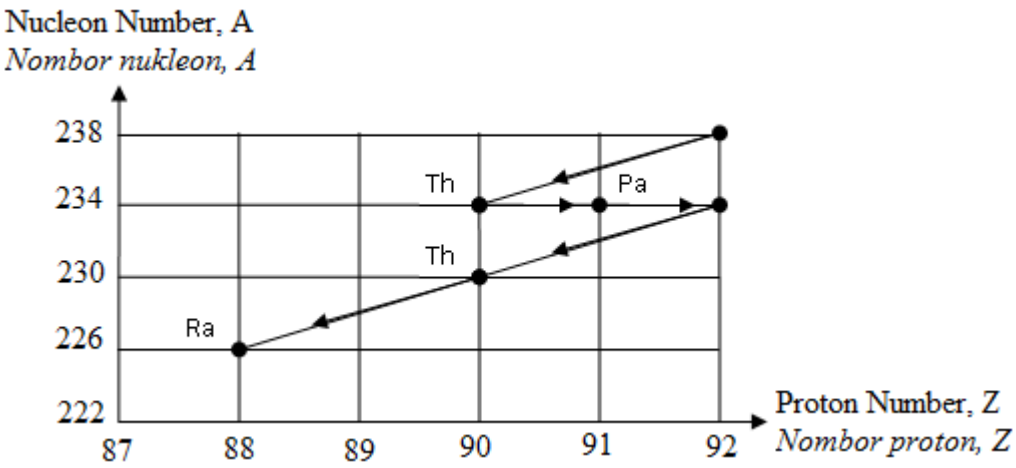

Diagram 36
Diagram 36

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What is the number of the alpha particles and beta particles emitted during this process?
Berapakah bilangan zarah alfa dan zarah beta yang dipancarkan dalam proses ini?

	The number of alpha particles *Bilangan zarah alfa*	The number of beta particles *Bilangan zarah beta*
A	2	3
B	3	2
C	4	1
D	1	1

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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NAMA:..... Tingkatan :.....

Fizik
Kertas 2
OGOS 2012
2 ½ Jam

BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN
KEMENTERIAN PELAJARAN MALAYSIA

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2012
PERCUBAAN SIJIL PELAJARAN MALAYSIA

FIZIK

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis* **nama** *dan* **tingkatan** *anda pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
4. *Jawapan kepada* **Bahagian A** *hendaklah ditulis dalam ruang yang disediakan dalam kertas soalan.*
5. *Rajah tidak dilukis mengikut skala* **kecuali** *dinyatakan.*
6. *Markah maksimum yang diperuntukkan ditunjukkan dalam kurungan pada hujung tiap-tiap soalan atau*
7. *Penggunaan kalkulator saintifik yang* **tidak** *boleh diprogramkan adalah dibenarkan.*

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

Kertas ini mengandungi 30 halaman bercetak

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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 = $\frac{1}{2}mv^2$
   Tenaga kinetik

7. Gravitational potential energy = mgh
   Tenaga keupayaan graviti

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

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

10. Pressure, P = hρg
    Tekanan

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

12. Heat, Q = mcθ
    Haba

13. $\frac{PV}{T}$ = Constant (*pemalar)*

14. $E = mc^2$

15. $v = f\lambda$

16. Power, P = $\frac{\text{energy}}{\text{time}}$
    Kuasa, P = $\frac{tenaga}{masa}$

17. V = IR

18. Power, P = IV
    Kuasa

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

20. Efficiency = $\frac{I_s V_s}{I_p V_p} \times 100$
    Kecekapan

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

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

23. $n = \frac{\text{real depth}}{\text{apparent depth}}$
    $n = \frac{dalam\ nyata}{dalam\ ketara}$

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

25. Q= It

26. E = I (R + r)

27. $eV = \frac{1}{2}mv^2$

28. $\frac{V}{V_T} = \frac{R}{R_T}$

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

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SECTION A
BAHAGIAN A

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

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

1. Diagram 1 shows an incomplete radioactive emission path in an electric field. The radioactive source emits beta particles.
Rajah 1 menunjukkan lintasan pancaran radioaktif yang tidak lengkap di dalam suatu medan elektrik. Sumber radioaktif memancarkan zarah beta.

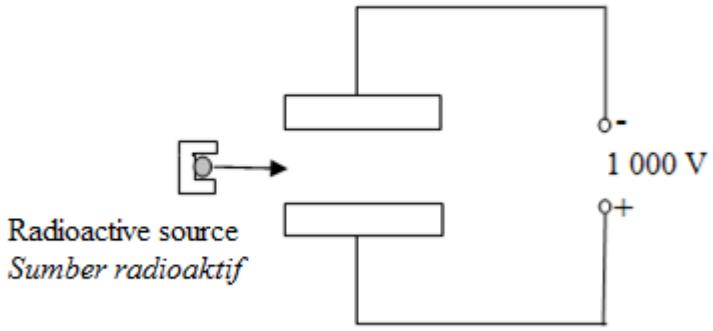

Diagram 1
Rajah 1

(a) What is beta particles?
Apakah zarah beta?

.....

[1 mark]
[*1 markah*]

(b) (i) On Diagram 1, complete the path of deflection of the radioactive emission.
Pada Rajah 1, lengkapkan lintasan bagi pesongan pancaran radioaktif.

[1 mark]
[*1 markah*]

(ii) Give **one** reason to the answer in 1(b)(i).
*Beri **satu** sebab untuk jawapan dalam 1(b)(i).*

.....

[1 mark]
[*1 markah*]

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(c) What happens to the angle of deflection of the radioactive emission path if the power supply is increased to 3 000 V?
Apakah yang berlaku kepada sudut pesongan bagi lintasan pancaran radioaktif jika bekalan kuasa ditambah kepada 3 000 V?

……

[1 mark]
[*1 markah*]

2. Diagram 2 shows a boy of mass 70 kg cycling up a hill from P. The boy takes a rest for a while at Q before continue to R.
Rajah 2 menunjukkan seorang budak lelaki berjisim 70 kg berbasikal menaiki sebuah bukit daripada P. Budak itu berehat seketika di Q sebelum meneruskan ke R.

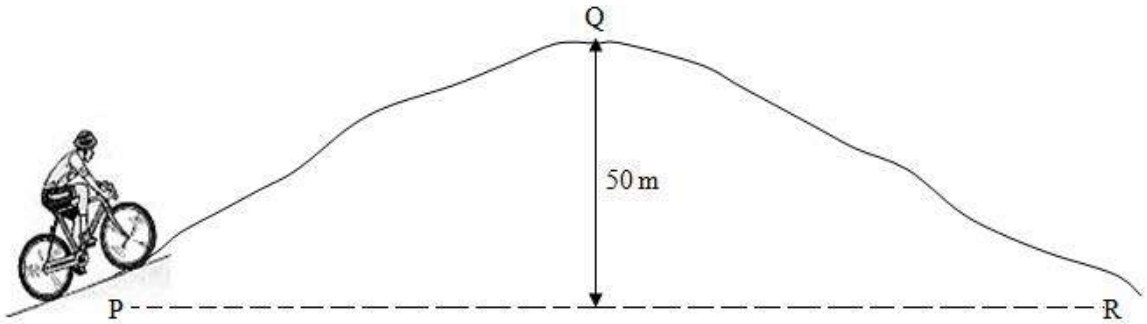

Diagram 2
Rajah 2

(a) State the type of energy of the boy at Q.
Nyatakan jenis tenaga budak itu pada Q.

……

[1 mark]
[*1 markah*]

(b) (i) State the change of energy of the boy when he is cycling down from Q to R.
Nyatakan perubahan tenaga budak itu apabila dia berbasikal turun daripada Q ke R.

……

[1 mark]
[*1 markah*]

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(ii) Calculate the velocity of the boy at R.
Hitung halaju budak itu di R.

[2 marks]
[*2 markah*]

(c) Name the physics concept involved
Namakan konsep fizik yang terlibat

.....

[1 mark]
[*1 markah*]

3. Diagram 3.1 shows a transistor amplifier circuit.
Rajah 3.1 menunjukkan satu litar penguat transistor.

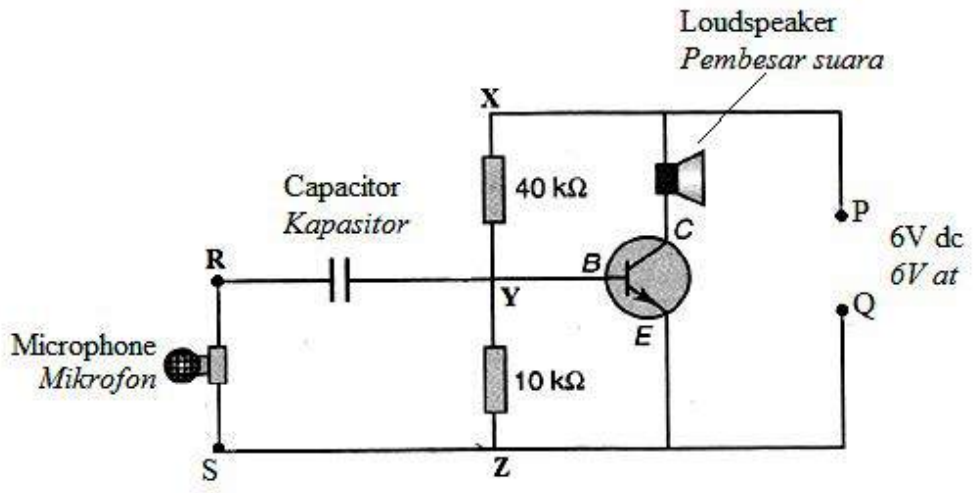

Diagram 3.1
Rajah 3.1

(a) Based on Diagram 3.1, state
Berdasarkan Rajah 3.1, nyatakan

(i) the function of microphone.
fungsi mikrofon.

.....

[1 mark]
[*1 markah*]

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(ii) the terminal of dry cells at point Q
terminal sel kering pada titik Q

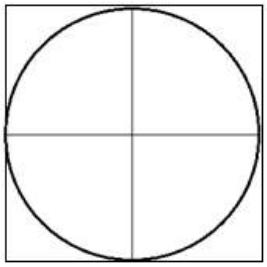
.....

[1 mark]
[*1 markah*]

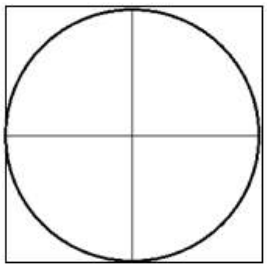
(b) Calculate the potential difference across YZ.
Hitung beza keupayaan antara YZ.

[2 marks]
[2 *markah*]

(c) Two cathode ray oscilloscopes (C.R.O) are connected between points RS and points YZ in Diagram 3.1. A person speaks through the microphone and the time base of the C.R.O is switched on.
Dua osiloskop sinar katod (O.S.K) disambung antara titik RS dan titik YZ dalam Rajah 3.1. Seseorang bercakap melalui mikrofon dan dasar masa pada O.S.K dihidupkan.



(a)
Between points RS
Antara titik RS



(b)
Between points YZ
Antara titik YZ

Diagram 3.2
Rajah 3.2

On Diagram 3.2, draw the signals displayed on the screen of the C.R.O between the points RS and points YZ.
Pada Rajah 3,2, lukiskan isyarat yang dipaparkan pada skrin O.S.K itu antara titik RS dan titik YZ

[2 marks]

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[2 *markah*]

4. Diagram 4 is a set up apparatus used to investigate the relationship between pressure and temperature of air at constant volume and mass.
Rajah 4 menunjukkan susunan radas yang digunakan untuk menyiasat hubungan antara tekanan dengan suhu udara pada isipadu dan jisim tetap.

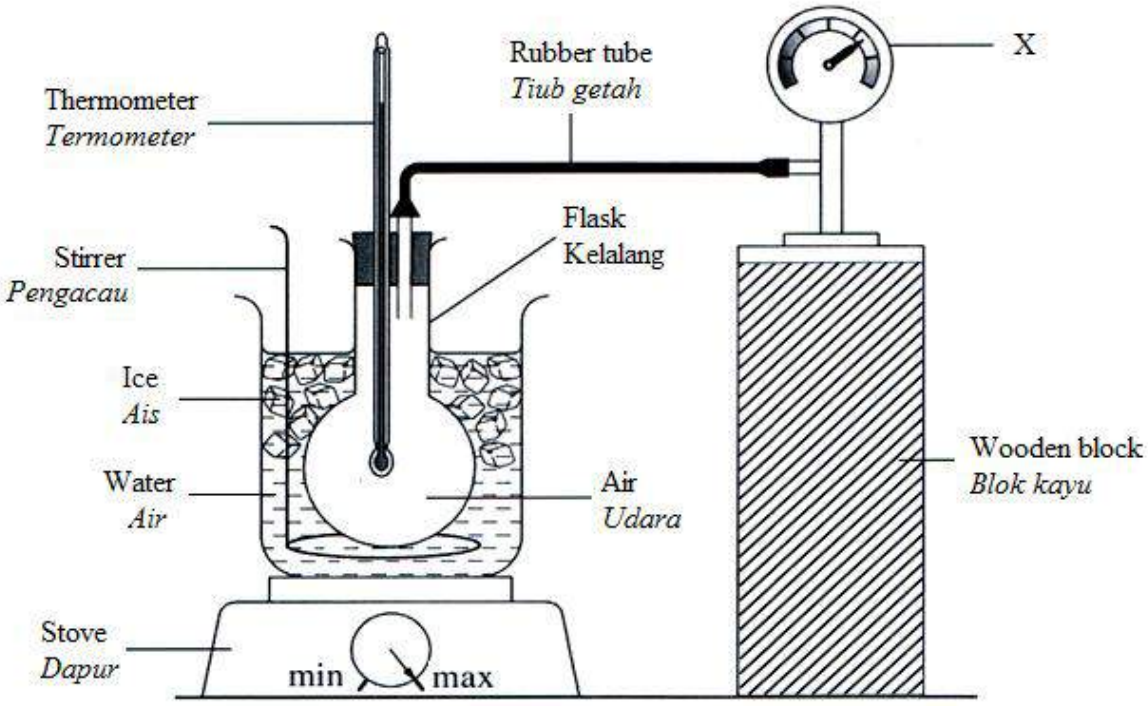

Diagram 4
Rajah 4

(a) Based on Diagram 4, choose the correct measuring instrument labeled X
Tick (/) the correct answer in the box provided.
Berdasarkan Rajah 4, pilih alat pengukur berlabel X yang betul
Tanda (/) jawapan yang betul pada petak yang disediakan.

☐ Barometer
Barometer

☐ Bourdon gauge
Tolok Bourdon

☐ Manometer
Manometer

[1 mark]
[1 markah]

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(b) State the physical quantity measured by X.
Nyatakan kuantiti fizik yang diukur oleh X.

……

[1 mark]
[*1 markah*]

(c) (i) What will happen to the reading of X when the temperature increases?
Apakah yang akan berlaku kepada bacaan X apabila suhu bertambah?

……

[1 mark]
[*1 markah*]

(ii) Give **one** reason for the answer in 4(c)(i).
*Beri **satu** sebab bagi jawapan dalam 4(c)(i).*

……

[1 mark]
[*1 markah*]

(d) A car tyre has a pressure of 130 kPa at a temperature of 27°C.
Calculate the temperature of the air in the tyre if the pressure increases to 136 kPa?
Tayar kereta mempunyai tekanan 130 kPa pada suhu 27^{o}C.
Hitung suhu udara dalam tayar jika tekanan bertambah kepada 136 kPa.

[3 marks]
[3 *markah*]

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5. Diagram 5.1 and Diagram 5.2 show two identical containers filled with water at a different depth. When the tap is opened, water spurts out at different horizontal distance due to the pressure exerted on the wall of the container.
Rajah 5.1 dan Rajah 5.2 menunjukkan dua bekas yang serupa berisi air pada kedalaman berbeza. Apabila pili dibuka, air memancut keluar pada jarak ufuk yang berlainan disebabkan oleh tekanan yang dikenakan ke atas dinding bekas itu.

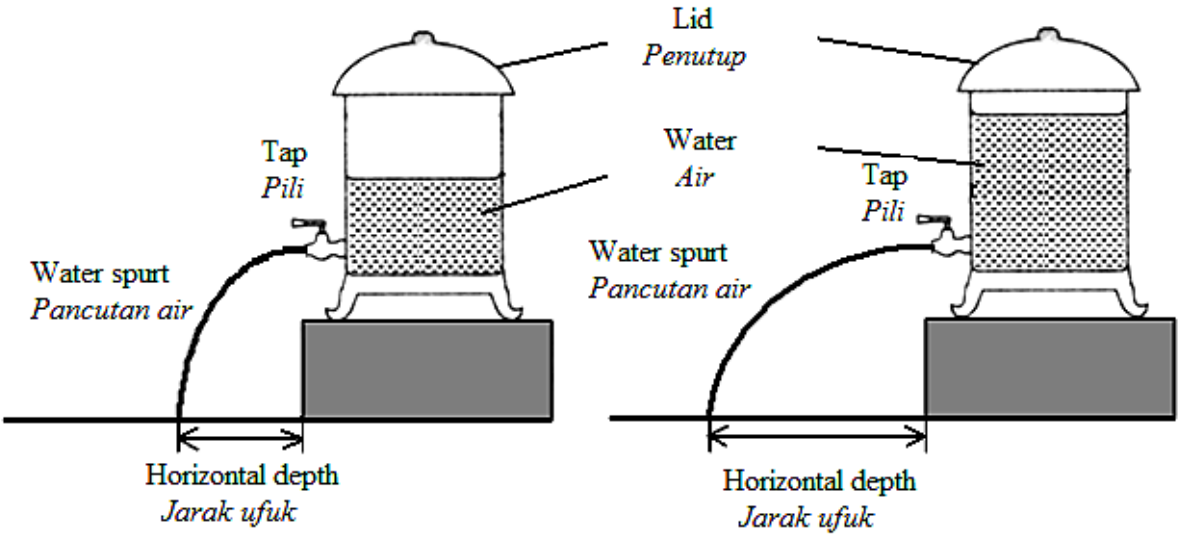

Diagram 5.1
Rajah 5.1

Diagram5.2
Rajah 5.2

(a) What is the meaning of pressure?
Apakah yang dimaksudkan dengan tekanan?

.....

[1 mark]
[*1 markah*]

(b) Observe Diagram 5.1 and Diagram 5.2.
Perhatikan Rajah 5.1 dan Rajah 5.2

(i) Compare the depth of the tap from the surface of the water.
Bandingkan kedalaman pili dari permukaan air.

.....

[1 mark]
[*1 markah*]

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\

(ii) Compare the horizontal distance of the water spurting out.
Bandingkan jarak ufuk pancutan air.

……

[1 mark]
[*1 markah*]

(iii) Relate the horizontal distance of the water spurting out to the pressure of water at the tap.
Hubungkaitkan jarak ufuk pancutan air dengan tekanan air pada pili.

……

[1 mark]
[*1 markah*]

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

……

[1 mark]
[*1 markah*]

(c) (i) What happens to the horizontal distance of the water spurting out in Diagram 5.2 when the lid of the container is opened?
Apakah yang berlaku kepada jarak ufuk pancutan air dalam Rajah 5.2 jika penutup bekas itu dibuka?

……

[1 mark]
[*1 markah*]

(ii) Explain the answer in **5**(c)(i).
*Terangkan jawapan di **5** (c)(i).*

……

……

[2 marks]
[*2 markah*]

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6. Diagram 6.1 and Diagram 6.2 show traces of the sound waves on the screen of a cathode ray oscilloscope (C.R.O) when an identical guitar's string is plucked with different displacement.
The sound waves heard are of different loudness.
Rajah 6.1 and Rajah 6.2 menunjukkan surihan bagi gelombang bunyi pada skrin sebuah osiloskop sinar katod (O.S.K) apabila tali gitar yang serupa dipetik dengan sesaran yang berlainan.
Gelombang bunyi yang kedengaran adalah mempunyai kenyaringan yang berlainan.

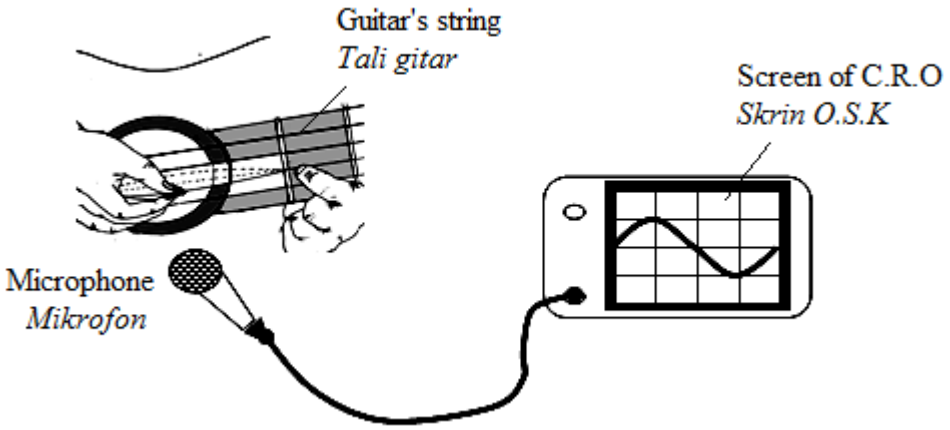

Diagram 6.1
Rajah 6.1

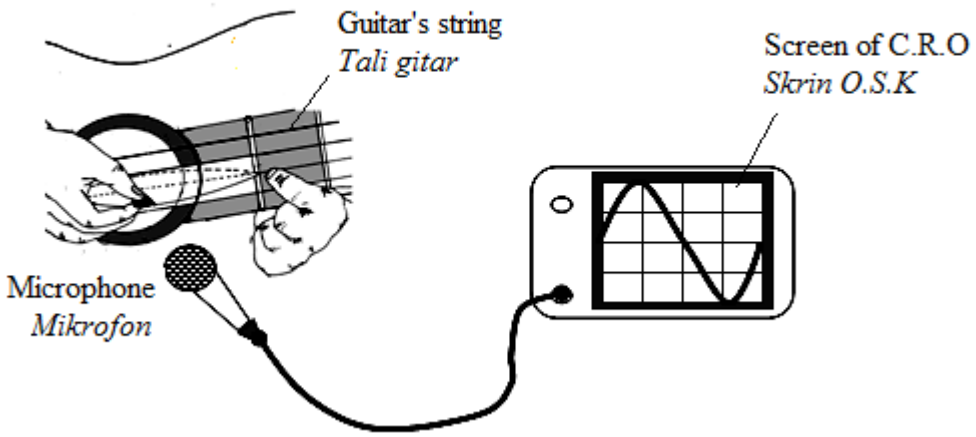

Diagram 6.2
Rajah 6.2

(a) State how sound waves is produced
Nyatakan bagaimana gelombang bunyi dihasilkan.

.....

[1 mark]

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[*1 markah*]

(b) Using Diagram 6.1 and Diagram 6.2,
Menggunakan Rajah 6.1 dan Rajah 6.2,

(i) compare the displacement of the guitar's string.
bandingkan sesaran tali gitar itu.

……

[1 mark]
[*1 markah*]

(ii) compare the amplitude of traces on the screen of the C.R.O.
bandingkan amplitud surihan pada skrin O.S.K.

……

[1 mark]
[*1 markah*]

(iii) compare the frequency of traces on the screen of the C.R.O.
bandingkan frekuensi surihan pada skrin O.S.K.

……

[1 mark]
[*1 markah*]

(c) Relate the amplitude of the traces on the screen of the C.R.O. with
Hubungkaitkan amplitud surihan pada skrin O.S.K. dengan

(i) displacement of the string
Sesaran tali string

……

[1 mark]
[*1 markah*]

(ii) loudness of the sound waves
kenyaringan gelombang bunyi itu

……

[1 mark]
[*1 markah*]

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(d) (i) What happens to the pitch of the sound when the guitar is plucked at a thicker string?
Apakah yang berlaku kepada kelansingan bunyi apabila gitar itu dipetik pada tali yang lebih tebal?

.....

[1 mark]
[*1 markah*]

(ii) Give reason for the answer in 6(d)(i).
Beri sebab untuk jawapan di 6(d)(i).

.....

[1 mark]
[*1 markah*]

7. Diagram 7.1 shows a cat's eye fixed into a road to help drivers during dark or foggy surroundings. Light enters into the cat's eye at B at an angle more than the critical angle of the glass prism.
Rajah 7.1 menunjukkan pemantul cahaya dipasang pada jalanraya untuk membantu pemandu semasa sekitaran gelap atau berkabus. Cahaya memasuki pemantul cahaya di B pada sudut lebih daripada sudut genting bagi prisma kaca itu.

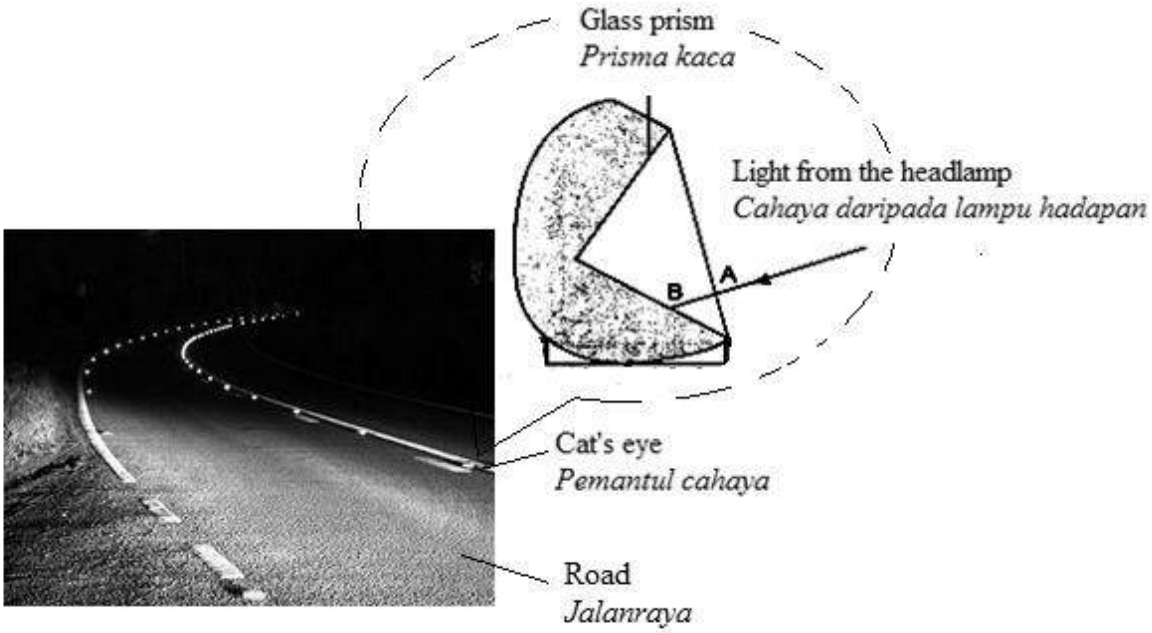

Diagram 7.1
Rajah 7.1

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(a) What is meant by critical angle?
Apakah yang dimaksudkan dengan sudut genting?

.....

[1 mark]
[*1 markah*]

(b) (i) On Diagram 7.1, complete the path of the light rays.
Pada Rajah 7.1, lengkapkan lintasan bagi sinar cahaya.

[1 mark]
[*1 markah*]

(ii) Based on Diagram 7.1, state the light phenomena in the cat's eye.
Berdasarkan Rajah 7.1, nyatakan fenomena cahaya dalam pemantul cahaya.

.....

[1 mark]
[*1 markah*]

(c) Explain why the light ray does not bend when it enters prism at point A.
Terangkan mengapa sinar cahaya tidak dibengkokkan semasa ia memasuki prisma di titik A.

.....

[1 mark]
[*1 markah*]

(d) Diagram 7.2 shows the design of a reflector made by a student to dry shoes using solar energy.
Rajah 7.2 menunjukkan reka bentuk sebuah pemantul yang dibuat oleh seorang pelajar untuk mengeringkan kasut menggunakan tenaga solar.

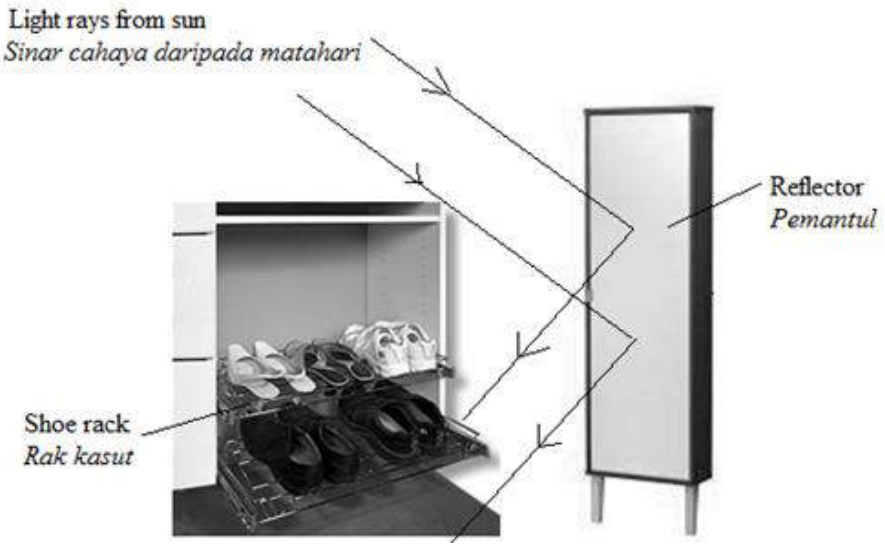

Diagram 7.2

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Rajah 7.2

The reflector in Diagram 7.2 does not dry the shoes effectively
Pemantul pada Rajah 7.2 tidak mengeringkan kasut dengan berkesan.

Suggest a modification that can be made to the reflector to dry shoes more effectively through these aspects,
Cadangkan pengubahsuaian yang boleh dilakukan untuk mengeringkan kasut dengan lebih berkesan melalui aspek-aspek berikut,

(i) Shape of the reflector
Bentuk pemantul

.....

Reason:
Sebab:
.....

[2 marks]
[*2 markah*]

(ii) Type of surface of the reflector
Jenis permukaan pemantul

.....

Reason:
Sebab:
.....

[2 marks]
[*2 markah*]

(iii) Size of the reflector
Saiz pemantul

.....

Reason:
Sebab:
.....

[2 marks]
[*2 markah*]

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8. Diagram 8.1 shows part of an electric iron with specification of 240 V, 1000 W.
Rajah 8.1 menunjukkan bahagian sebuah seterika elektrik dengan spesifikasi 240 V, *1000* W.

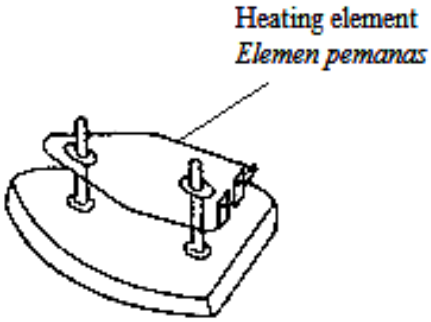

Diagram 8.1
Rajah 8.1

(*a*) What is meant by specification 240 V, 1000 W?
Apakah yang dimaksudkan dengan spesifikasi 240 V, *1000* W?

…….....

[1 mark]
[*1 markah*]

(*b*) The electric iron is connected to a 240 V supply and used to iron clothes for 30 minutes.
Seterika elektrik itu disambungkan kepada bekalan 240 V dan digunakan untuk menggosok pakaian selama 30 minit.

Calculate,
Hitungkan,

(i) current that passes through the heating element in the iron.
arus yang mengalir melalui elemen pemanas di dalam seterika itu.

[2 marks]
[*2 markah*]

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(ii) the cost of using the electric iron in 30 days
(1 unit energy = 23 cents)
kos menggunakan seterika elektrik itu selama 30 hari
(1 unit tenaga = 23 sen)

[2 marks]
[2 *markah*]

(*c*) A student conducts an experiment to compare the heating effect of bread toasters **P**, **Q** and **R**. Two slices of bread is toasted each time.
Table 8.1 shows the result of the experiment.
Seorang pelajar menjalankan eksperimen untuk membandingkan kesan pemanasan pembakar roti, **P***,* **Q** *dan* **R***. Dua keping roti dibakar dalam satu masa.*
Jadual 8.1 menunjukkan keputusan eksperimen tersebut.

Bread Toaster *Pembakar roti*	Potential Difference, ***V*** / V *Beza Keupayaan,* ***V*** / V	Current, ***I*** / A *Arus,* ***I*** / A	Time to toast 2 slices of bread, ***t*** / s *Masa untuk membakar 2 keping roti,* ***t*** / s
P	240	6.0	90
Q	240	5.0	150
R	240	4.0	120

Table 8.1
Jadual 8.1

Calculate the energy supplied by each of bread toaster to toast 2 slices of bread.
Hitungkan tenaga yang dibekalkan oleh setiap pembakar roti untuk membakar 2 keping roti.

(i) P :

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(ii) Q:

(iii) R:

[4 marks]
[4 *markah*]

(d) (i) Using your answer in 8(*c)* state which is the most suitable bread toaster to toast bread.
Menggunakan jawapan di 8(c , nyatakan pembakar roti yang paling sesuai untuk membakar roti.

.....

[1 mark]
[*1 markah*]

(ii) Give **two** reasons for your answer in 8(d)(i).
*Beri **dua** sebab bagi jawapan anda*.

…….....

.....

[2 marks]
[2 *markah*]

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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 shows the heating curves of water and methylated spirit which is a type of alcohol.
Rajah 9.1 menunjukkan lengkung pemanasan bagi air dan metilated spirit yang merupakan sejenis alkohol.

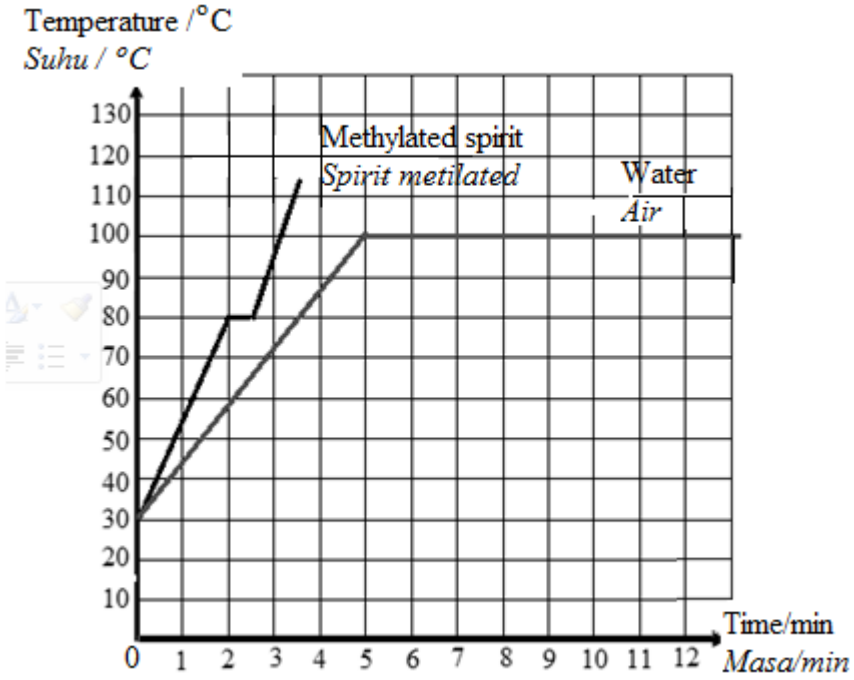

Diagram 9.1
Rajah 9.1

The specific heat capacity of water $= 4200 \text{ J kg}^{-1} \text{ o C}^{-1}$
muatan haba tentu air
The specific heat capacity of methylated spirit $= 2400 \text{ J kg}^{-1} \text{ o C}^{-1}$
muatan haba tentu spirit metilated

The latent heat of vaporisation of water $= 2.26 \times 10^6 \text{ J kg}^{-1}$
haba pendam tentu pengewapan air
The latent heat of vaporisation of methylated spirit $= 1.2 \times 10^3 \text{ J kg}^{-1}$
Haba pendam tentu pengewapan spirit metilated

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(a) What is the meaning of latent heat of vaporisation? [1 mark]
Apakah yang dimaksudkan dengan haba pendam tentu pengewapan?
[*1 markah*]

(b) Based on the heating curves in Diagram 9.1 and the given information,
Berdasarkan lengkung pemanasan dalam Rajah 9.1 dan maklumat yang diberikan,

(i) compare the boiling points of water and methylated spirit, their specific heat capacities and the time taken to boil. [3 *marks*]
bandingkan takat didih air dan spirit metilated, muatan haba tentu dan masa untuk mendidihkan air dan spirit metilated. [*3 markah*]

(ii) relate the boiling point of liquid with their specific heat capacity. [1 *mark*]
hubungkaitkan takat didih cecair dengan muatan haba tentu. [*1 markah*]

(iii) deduce a relationship between specific heat capacity and the time to boil the liquid. [1 *mark*]
d*eduksikan hubungan antara muatan haba tentu dan masa untuk cecair mendidih.* [*1 markah*]

(c) Using Diagram 9.1 and the information given, explain why we feel much cooler when alcohol such as methylated spirit spills on our hand as compared to water of the same amount. [4 *marks*]
Menggunakan Rajah 9.1 dan maklumat yang diberikan, terangkan mengapa kita berasa lebih sejuk apabila alkohol seperti spirit metilated tertumpah di atas tangan berbanding dengan air yang berjumlah sama . [*4 markah*]

(d) Diagram 9.2 shows a frozen fish is put on a plate to defrost. The time taken to defrost the fish is more than two hours.
Rajah 9.2 menunjukkan ikan yang beku diletakkan di atas sebuah pinggan kaca untuk dinyahbekukan. Masa yang diambil untuk menyahbeku adalah melebihi daripada 2 jam.

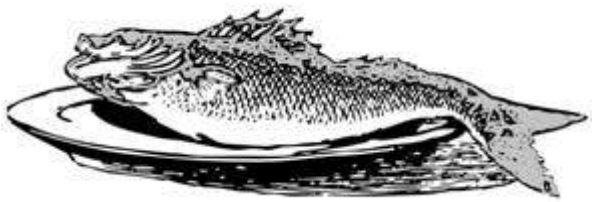

Diagram 9.2
Rajah 9.2

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Using appropriate physics concepts, explain the suitable characteristics of a plate that can defrost more frozen fishes in a shorter time. The plate can be moved from one place to another.

Your answer should include the following aspects:
Menggunakan konsep-konsep fizik yang sesuai, terangkan sifat-sifat pinggan yang sesuai yang boleh menyahbeku lebih banyak ikan beku dalam masa yang lebih singkat. Pinggan itu boleh digerakkan dari satu tempat ke tempat yang lain.

Jawapan anda hendaklah mengandungi aspek-aspek yang berikut:

- ability to conduct heat
  kemampuan untuk mengalirkan haba
- specific heat capacity of plate
  muatan haba tentu pinggan
- colour of plate
  warna pinggan
- density of plate
  ketumpatan pinggan
- surface area of plate
  luas permukaan pinggan.

10 marks]
[*10 markah*]

10. Diagram 10.1 and 10.2 show insulated copper wire is wrapped around identical iron nails to form solenoids.
The solenoids are each connected to an ammeter, a rheostat and a d.c power supply.
Rajah 10.1 dan 10.2 menunjukkan dawai kuprum berpenebat dililit pada paku besi yang serupa untuk membentuk solenoid.
Solenoid disambung kepada ammeter, reostat dan bekalan kuasa arus terus.

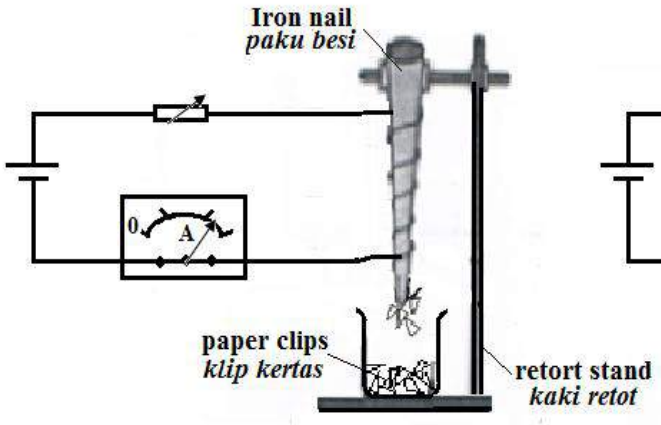

Diagram 10.1
Rajah 10.1

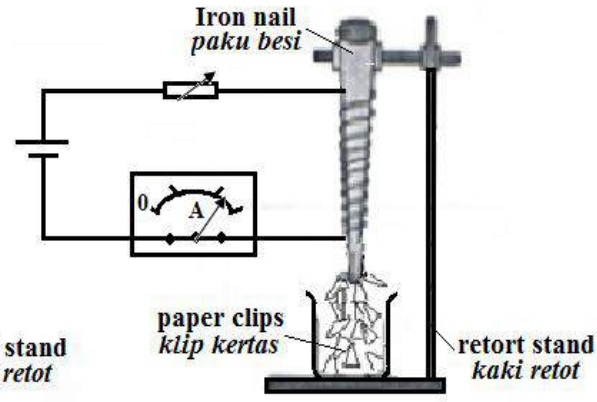

Diagram 10.2
Rajah 10.2

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When the switch is on, the iron nails become electromagnet and the paper clips are attracted to the iron nails.
Bila suis ditutup, paku besi menjadi elektromagnet dan klip kertas tertarik kepada paku besi.

(a) What is meant by electromagnet? [1 mark]
Apakah yang dimaksudkan dengan electromagnet? [*1 markah*]

(b) Using Diagram 10.1 and Diagram 10.2, compare the number of turns of the coil, the number of paper clips attached to the electromagnet and the reading of ammeter.
Relate the number of turns of the coil with the number of paper clips attached to the electromagnet to make a deduction regarding the relationship between the number of turns of the coil and the strength of electromagnet. [5 marks]
Menggunakan Rajah 10.1 dan Rajah 10.2, bandingkan bilangan lilitan gegelung, bilangan klip kertas melekat pada elektromagnet dan bacaan ammeter.
Hubungkait bilangan lilitan gegelung dengan bilangan klip kertas yang melekat pada elektromagnet untuk membuat deduksi tentang hubungan antara bilangan lilitan gegelung dengan kekuatan elektromagnet. [*5 markah*]

(c) Diagram 10.3 shows two aluminium rods connected to two different circuits and hung close to each other.
Rajah 10.3 menunjukkan dua rod aluminiun disambung kepada dua litar yang berlainan dan digantung berhampiran antara satu sama lain.

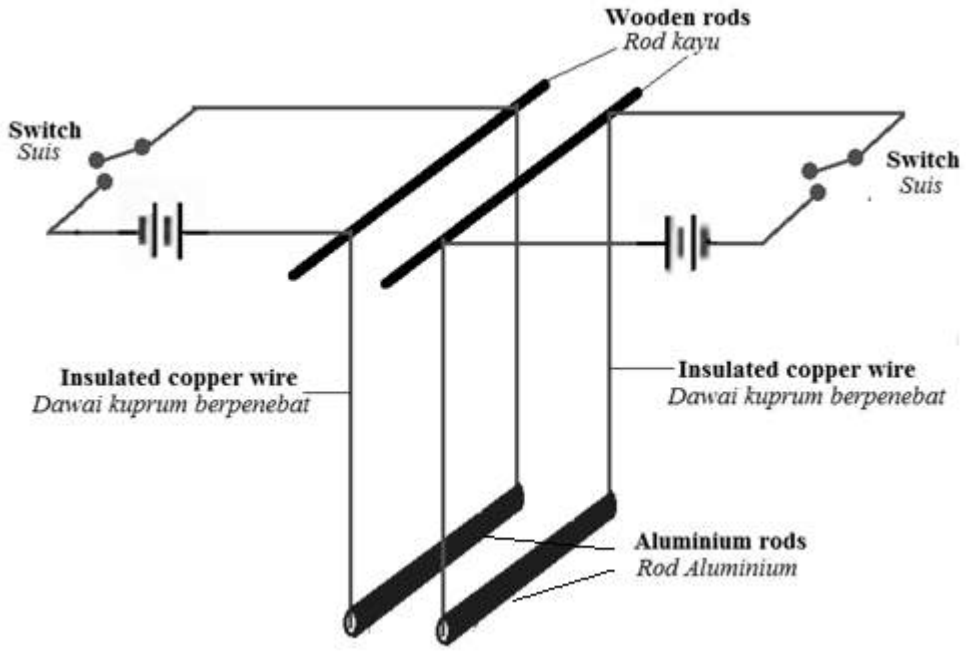

Diagram 10.3
Rajah 10.3

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State what happens to the aluminium rods when both switches are closed.
Explain your answer. [4 marks]
Nyatakan apakah yang berlaku kepada rod-rod aluminium apabila kedua-dua suis ditutup .
Terangkan jawapan anda. [4 *markah*]

(d) Diagram 10.4 shows a simple transformer which is not efficient.
Rajah 10.4 menunjukkan sebuah transformer ringkas yang tidak cekap.

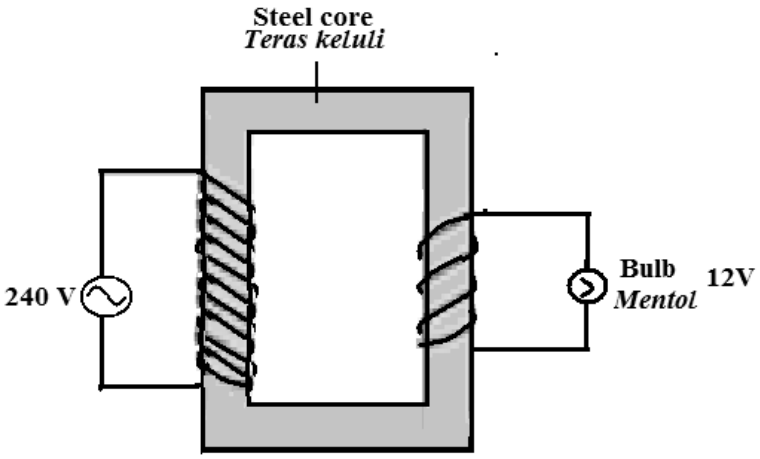

Diagram 10.4
Rajah 10.4

Using appropriate physics concepts, explain how you would modify the transformer in Diagram 10.4 to increase its efficiency.
Your answer should include the following aspects:
Menggunakan konsep fizik yang sesuai, terangkan bagaimana anda boleh mengubahsuai transformer dalam Rajah 10.4 untuk meningkatkan kecekapannya.
Jawapan anda hendaklah mengandungi aspek-aspek berikut:

- the type and characteristic of the coiled wire
  jenis dan ciri-ciri dawai yang dililitkan
- the type and characteristic of the core
  jenis dan ciri-ciri teras
- the arrangement of the primary and the secondary coils
  susunan gegelung primer dan gegelung sekunder

[10 *marks/markah*]

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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 two different sizes syringes filled with water are connected by a rubber tube. This set-up is used to demonstrate Pascal's Principle.
Rajah 11.1 menunjukkan dua picagari yang berbeza saiz dipenuhi dengan air dan disambung dengan satu tiub getah. Susunan ini digunakan untuk demonstrasi Prinsip Pascal.

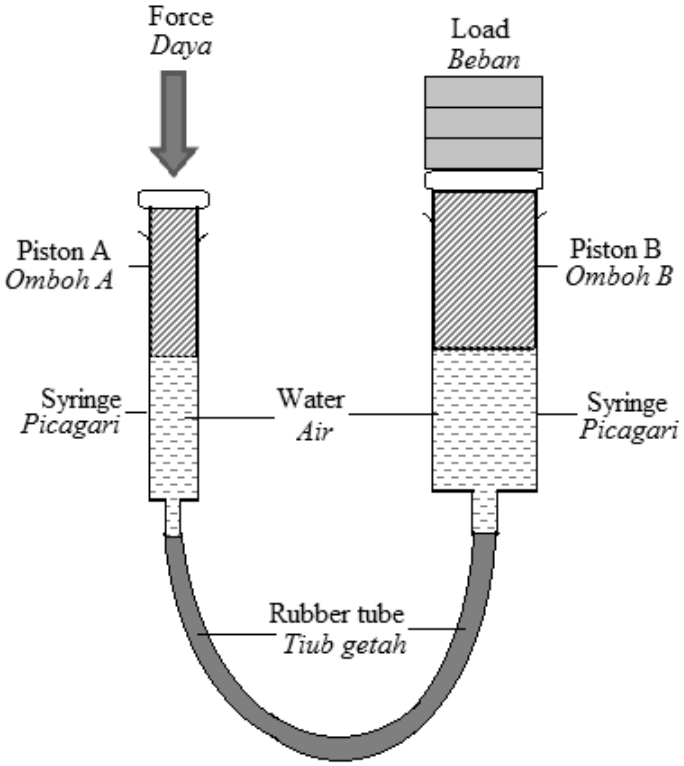

Diagram 11.1
Rajah 11.1

(a) State the Pascal's Principle. [1 mark]
Nyatakan Prinsip Pascal. [*1markah*]

(b) Explain how a bigger load can be lifted up when a small force is exerted on piston A? [4 marks]
Terangkan bagaimana beban yang lebih besar boleh diangkat apabila daya yang kecil dikenakan ke atas omboh A? [*4 markah*]

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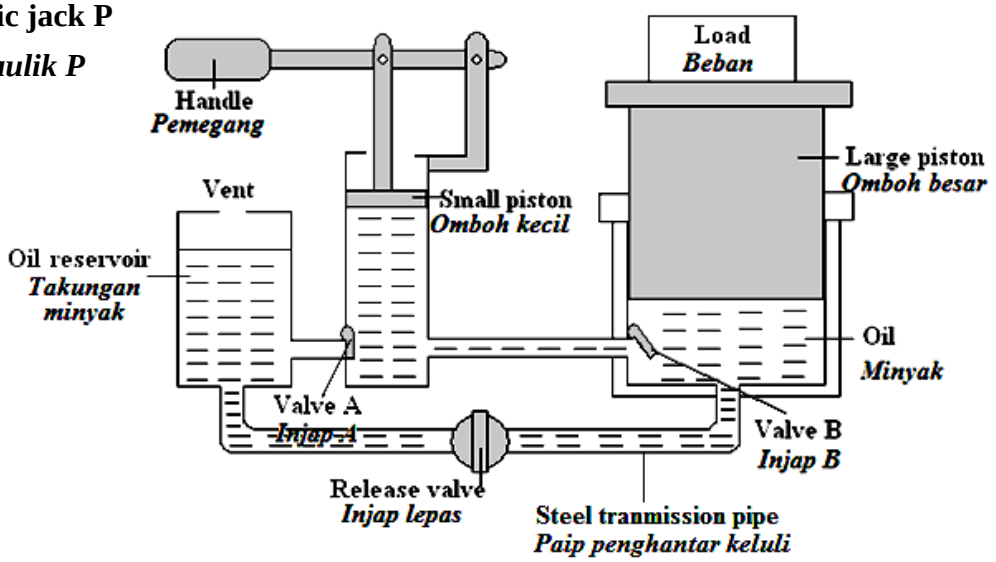
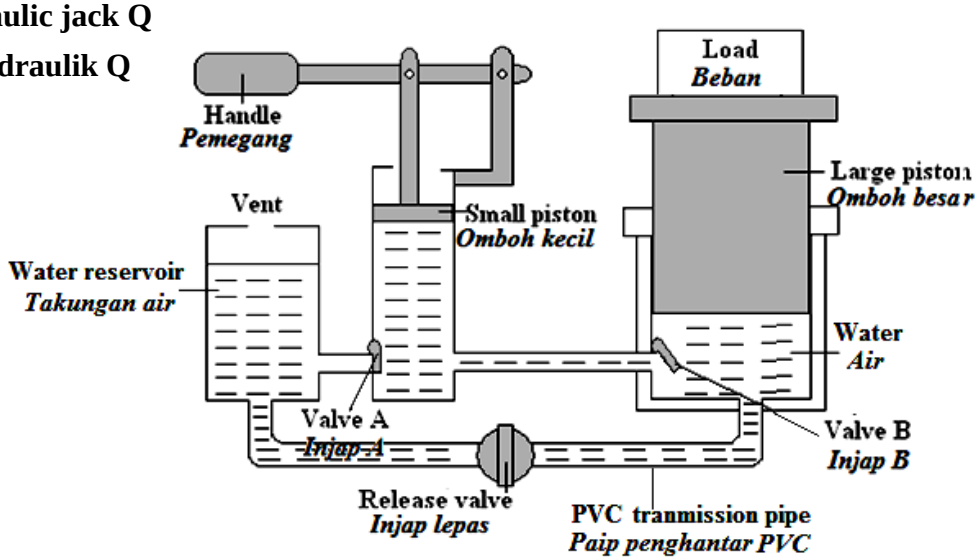
(c) Table 11 shows four hydraulic jacks P, Q, R and S with different specifications. You are required to determine the most suitable hydraulic jack that can lift up heavy load effectively.
Jadual 11 menunjukkan jek empat hidraulik P, Q, R,dan S dengan spesifikasi yang berbeza.
Anda dikehendaki untuk menentukan jek hidraulik yang paling sesuai yang dapat mengangkat beban yang berat dengan berkesan.

Hydraulic jack P
Jek hidraulik P



Surface area of small piston = 0.04 m^2 *Luas permukaan omboh kecil = 0.04 m^2*	Surface area of large piston = 0.15 m^2 *Luas permukaan omboh besar = 0.15 m^2*

Hydraulic jack Q
Jek hidraulik Q



Surface area of small piston = 0.04 m^2 *Luas permukaan omboh kecil = 0.04 m^2*	Surface area of large piston = 0.1m^2 *Luas permukaan omboh besar = 0.1m^2*

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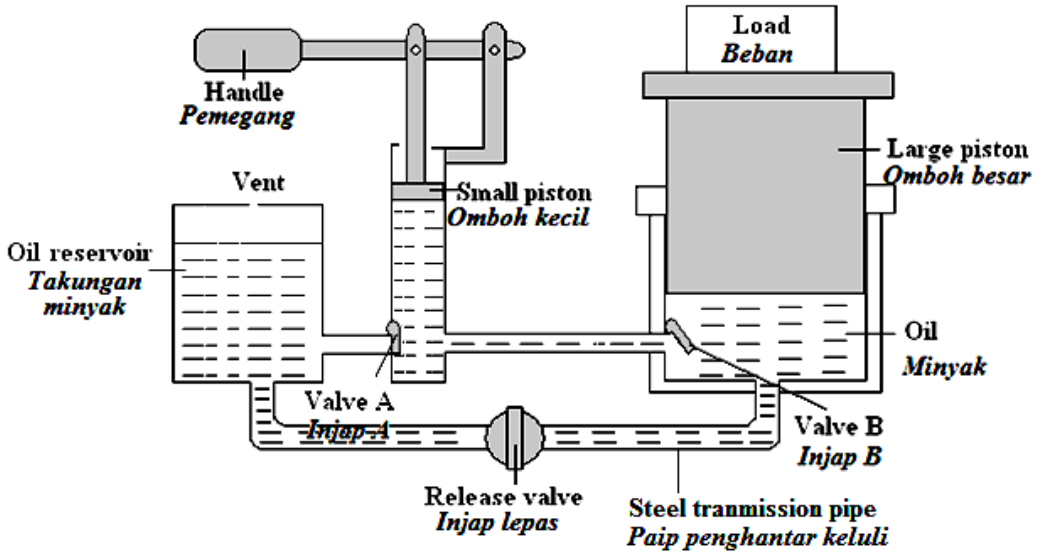
Hydraulic jack R

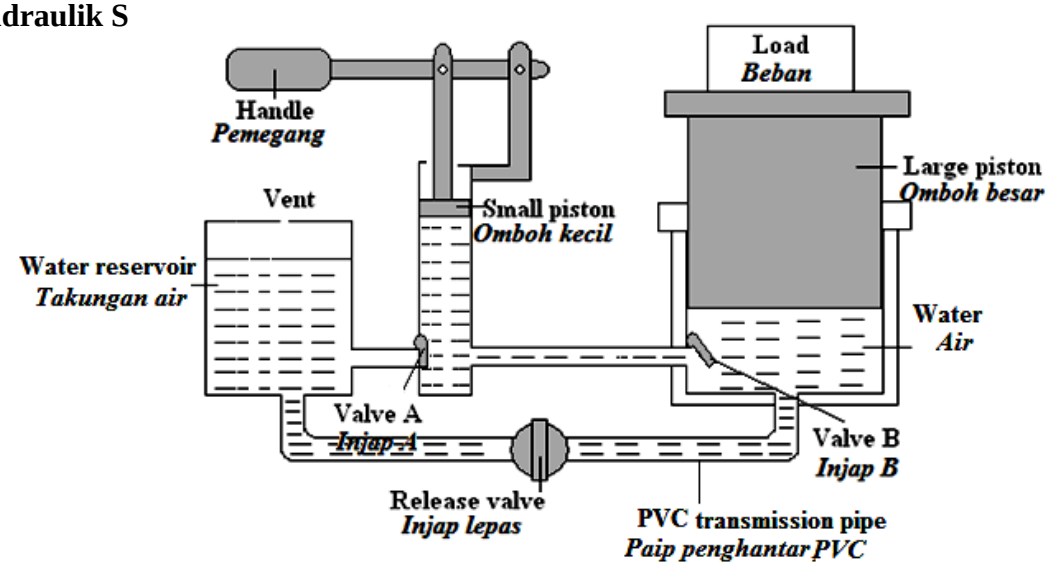
Jek hidraulik R



Surface area of small piston = 0.01 m^2 *Luas permukaan omboh kecil = 0.01 m^2*	Surface area of large piston = 0.15m^2 *Luas permukaan omboh besar = 0.15m^2*

Hydraulic jack S

Jek hidraulik S



Surface area of small piston = 0.01 m^2 *Luas permukaan omboh kecil = 0.01 m^2*	Surface area of large piston = 0.15m^2 *Luas permukaan omboh besar = 0.15m^2*

Table 11
Jadual 11

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Study the specifications of the four hydraulic jacks based on following aspects:
Kaji spesifikasi keempat-empat hidraulik jek berdasarkan aspek-aspek berikut:

(i) The ratio of surface area of the large piston to the small piston
Nisbah bagi luas permukaan omboh besar kepada omboh kecil
(ii) Type of liquid used
Jenis cecair yang digunakan
(iii) Material used for the transmission pipe
Bahan yang digunakan untuk paip penghantar
(iv) Size of liquid reservoir
Saiz takungan cecair

Explain the suitability of each aspect and then determine the most suitable hydraulic jack.
Give reasons for your choice.
Terangkan kesesuaian setiap aspek dan seterusnya tentukan jek hidraulik yang paling sesuai.
Beri sebab untuk pilihan anda.

[10 marks]
[*10 markah*]

(d) Diagram 11.2 shows a simple hydraulic system. The cross sectional area of small piston X and large piston Y are 0.004 m^2 and 0.2 m^2 respectively.
Rajah 11.2 menunjukkan sebuah system hidraulik ringkas. Luas keratan rentas omboh kecil X dan omboh besar Y adalah 0.004 m^2dan 0.2 m^2 masing-masing.

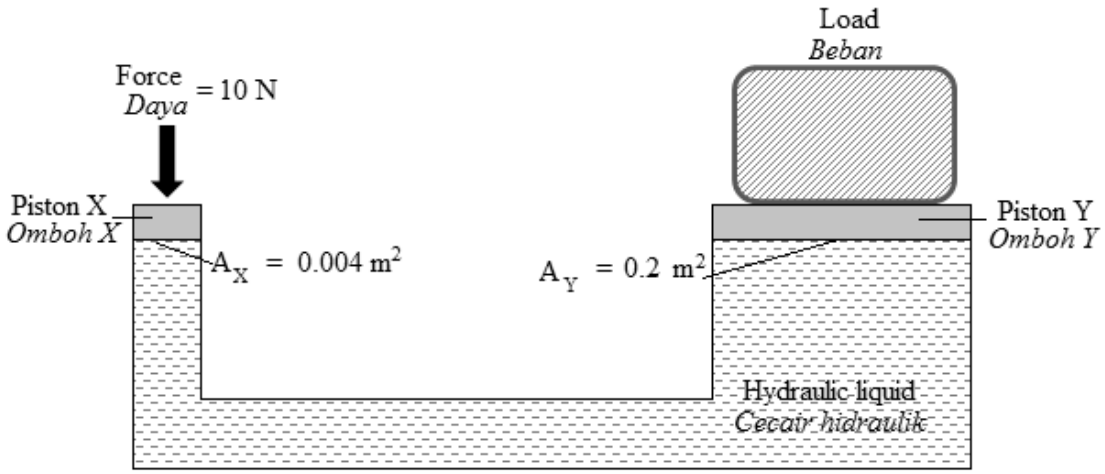

Diagram 11.2
Rajah 11.2

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Calculate
Hitung

(i) pressure transmitted in the hydraulic liquid.
tekanan yang dipindahkan dalam cecair hidraulik

(ii) weight of the load.
berat beban.

(iii) distance moved by large piston Y when the small piston X is pushed down 0.3 m.
jarak pergerakan omboh besar Y apabila omboh kecil X ditolak ke bawah 0.3 m

[5 marks]
[*5 markah*]

12. (a) Diagram 12.1 shows how a system is used in a factory to ensure the thickness of paper sheets are uniform. The system uses radioisotope as the radioactive source.
Rajah 12.1 menunjukkan bagaimana satu sistem digunakan di sebuah kilang untuk memastikan ketebalan kertas adalah seragam. Sistem itu menggunakan radioisotop sebagai sumber radioaktif..

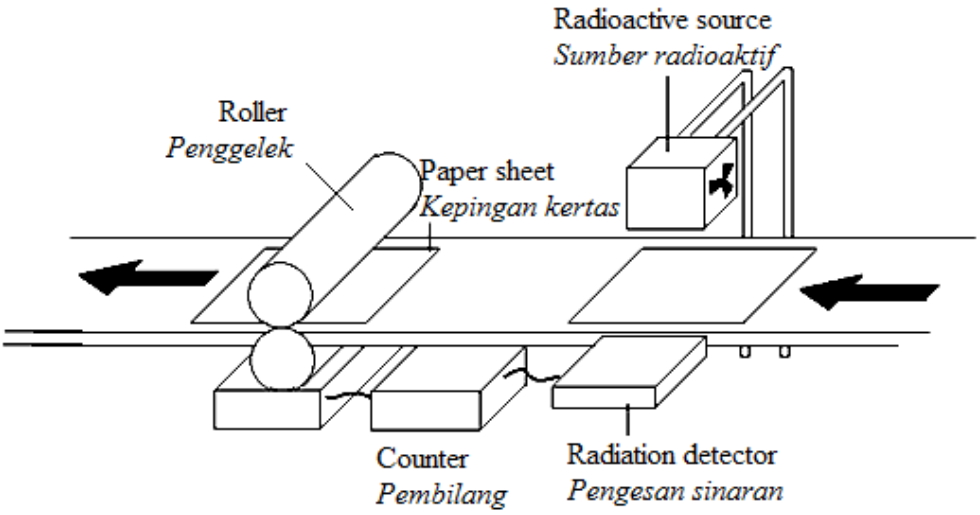

Diagram 12.1
Rajah 12.1

(i) What is the meaning of radioisotope? [1 mark]
Apakah yang dimaksudkan dengan radioisotop? [*1 markah*]

(ii) Based on Diagram 12.1, explain how the system can be used to ensure the thickness of the paper is uniform? [4 marks]

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Berdasarkan Rajah 12.1, terangkan bagaimana sistem itu dapat digunakan untuk memastikan ketebalan kertas adalah seragam?

[*4 markah*]

(b) Diagram 12.2 shows a nuclear reactor which is used to generate nuclear energy.
Rajah 12.2 menunjukkan sebuah reaktor nuklear yang digunakan untuk menjana tenaga nuklear.

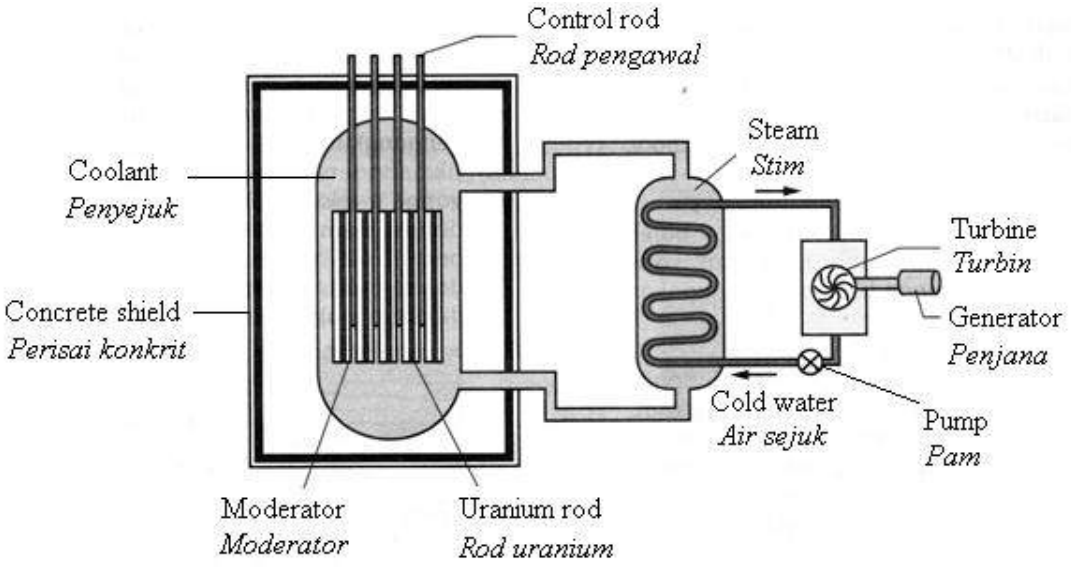

Diagram 12.2
Rajah 12.2

You are required to investigate the characteristics of the features in the nuclear reactor as shown in Table 12.
Anda dikehendaki menyiasat ciri-ciri bahagian dalam reaktor nuklear seperti yang ditunjukkan dalam Jadual 12.

Nuclear Reactor ***Reaktor nuklear***	**Material for the moderator** ***Bahan untuk moderator***	**Material for the control rod** ***Bahan untuk rod pegawal***	**Material for the coolant** ***Bahan untuk penyejuk***	**Thickness of concrete shield** ***Ketebalan perisai konkrit***
P	Graphite *Grafit*	Krypton *Kripton*	Oil *Minyak*	Thin *Nipis*
Q	Iron *Besi*	Boron *Boron*	Oil *Minyak*	Thin *Nipis*
R	Graphite *Grafit*	Boron *Boron*	Heavy water *Air berat*	Thick *Tebal*
S	Iron *Besi*	Krypton *Kripton*	Heavy water *Air berat*	Thick *Tebal*

Table 12
Jadual 12

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Explain the suitability of each characteristic of the features in the nuclear reactor which can generate a controlled nuclear reaction safely.
Determine the most suitable reactor to be used.
Give reasons for your choice.
Terangkan kesesuaian ciri setiap bahagian dalam reaktor nukler itu yang dapat menghasilkan tenaga nuklear yang terkawal dan selamat.
Tentukan reaktor yang paling sesuai untuk digunakan.
Berikan sebab-sebab bagi pilihan anda.

[10 *marks/markah*]

(c) A nuclear reaction is represented by the following equation:
Satu tindakbalas nuklear diwakili oleh persamaan berikut:

$$^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{141}_{55}Cs + {}^{93}_{37}Rb + 2\ {}^{1}_{0}n + \text{energy}$$

The mass defect produced in the reaction is 0.19585 u.
Cacat jisim yang dihasilkan dalam tindakbalas adalah 0.19585 u.
[1 u = 1.66 x 10^{-27} kg]

Calculate,
Hitungkan,

(i) energy released
tenaga yang dibebaskan

(ii) power generated in 5 μs. [5 marks]
kuasa yang dijanakan dalam 5 μs. [5 *markah*]

END OF QUESTION
SOALAN TAMAT

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NAMA:..... Tingkatan :.....

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Fizik
Kertas 3
Ogos
2012
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BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN SPM 2012

FIZIK

KERTAS 3

Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini mengandungi dua bahagian :* ***Bahagian A*** *dan* ***Bahagian B****.*
2. *Jawab semua soalan dalam* ***Bahagian A****. Tuliskan jawapan bagi* ***Bahagian A*** *dalam ruang yang disediakan dalam kertas soalan.*
3. *Jawab* ***satu*** *soalan daripada* ***Bahagian B****. Tuliskan jawapan* ***Bahagian B*** *pada ruangan yang disediakan..*
   Jawab ***Bahagian B*** *dengan lebih terperinci. Jawapan mestilah jelas dan logik.*
4. *Tunjukkan kerja mengira, ini membantu anda mendapat markah.*
5. *Gambarajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*
6. *Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.*
7. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh di programkan.*
8. *Masa yang dicadangkan untuk menjawab* ***Bahagian*** *ialah 60 minit dan* ***Bahagian B*** *ialah 30 minit.*

Kegunaan Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah
A	1	16	
	2	12	
B	3	12	
	4	12	
JUMLAH			

Kertas soalan ini mengandungi **13** halaman bercetak

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

1. A student carries out an experiment to study the relationship between the final velocity of a trolley, *v* and the initial height of the trolley on an inclined plane , h. The arrangement of apparatus is shown in Diagram 1.1. The frequency of the ticker timer is 50 Hz.

Seorang pelajar menjalankan satu eksperimen untuk mengkaji hubungan antara halaju akhir troli, v dan ketinggian permulaan troli di atas landasan condong, h. Susunan radas seperti yang ditunjukkan pada Rajah1.1. Frekuensi jangka masa detik ialah 50 Hz.

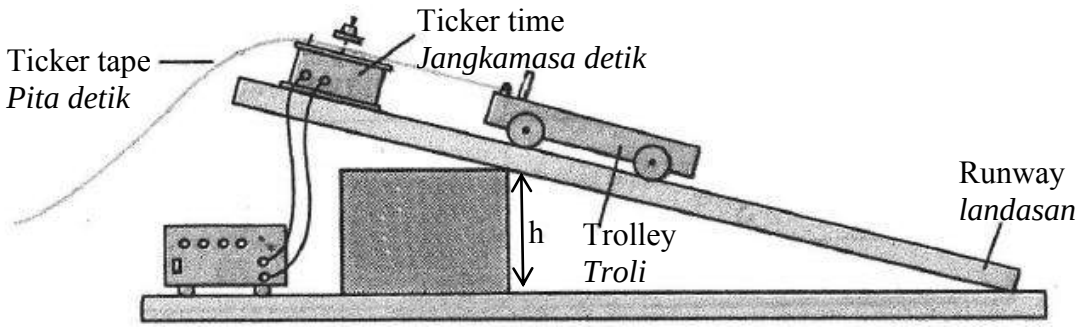

Diagram 1.1 / Rajah 1.1

The experiment is started with the initial height of the trolley, *h* = 10.0 cm. The final 2 ticks from the ticker tape is taken to determine the final velocity, *v* as shown in Diagram 1.2.
The experiment is repeated by varying the height of the trolley, *h*, to be 15.0 cm, 20.0 cm, 25.0 cm and 30.0 cm.
The final 2 ticks of the ticker tape are obtained as shown in Diagram 1.3, 1.4, 1.5 and 1.6 on page 3 and page 4.

Eksperimen dimulakan the ketinggian awal troli, h= 10.0 cm. 2 detik terakhir pada pita detik diambil untuk menentukan halaju akhir seperti yang ditunjukkan di Rajah 1.2.
Eksperimen diulangi dengan mengubah ketinggian troli,h, menjadi 15.0 cm, 20.0 cm, 25.0 cm dan 30.0 cm.
Keratan 2 detik terakhir pada pita detik diperoleh seperti ditunjukkan pada Rajah 1.3, 1.4, 1.5 dan 1.6. pada halaman 3 dan halaman 4.

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h = 10.0 cm
s = cm
v = ms^{-1}
v^2 = m^2s^{-2}

Diagram 1.2 / Rajah 1.2

h = 20.0 cm
s = cm
v = ms^{-1}
v^2 = m^2s^{-2}

Diagram 1.3 / Rajah 1.3

h = 30.0 cm
s = cm
v = ms^{-1}
v^2 = m^2s^{-2}

Diagram 1.4 / Rajah 1.4

h = 40.0 cm
s = cm
v = ms^{-1}
v^2 = m^2s^{-2}

Diagram 1.5 / Rajah 1.5

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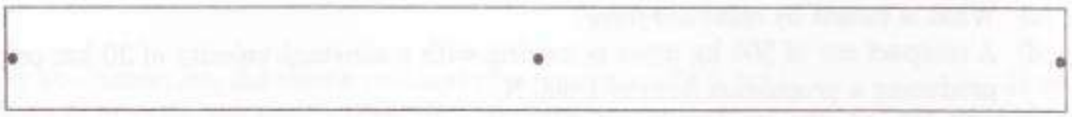

h	= 50.0 cm
s	= cm
v	= ms^{-1}
v^2	= m^2s^{-2}

Diagram 1.6 / Rajah 1.6

(a) For the experiment described on page 3, identify,
Bagi eksperimen yang diterangkan di halaman 3, kenal pasti ;

(i) The manipulated variable,
pembolehubah yang dimanipulasikan,

.....

[*1 mark*]

(ii) The responding variable
pembolehubah bergerak balas,

.....

[*1 mark*]

(iii) A fixed variable,
pembolehubah yang dimalarkan,

.....

[*1 mark*]

(b) (i) Based on Diagram 1.2, 1.3, 1.4, 1.5 and 1.6 on page 3 and page 4, measure the length of ticker-tape, s .
Berdasarkan rajah di 1.2, 1.3, 1.4, 1.5 dan 1.6 pada halaman3 dan 4, ukur pajang pita detik, s.

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(ii) For each value of *s*, in 1 b(i), calculate the final velocity using the formula below:

$$\text{Velocity} = \frac{\text{Length of ticker tape(s)}}{4}$$

Untuk setiap nilai s di b(i), hitung halaju akhir dengan mengunakan rumus di bawah:

$$\textit{Halaju akhir} = \frac{\textit{Panjang pita detik(s)}}{4}$$

(iii) For each value v, calculate v^2.
Untuk setiap nilai v, hitung v^2.

Tabulate your results for ***h, s,v and*** v^2 in the space below.
Jadualkan data anda bagi semua nilai h, s, v dan v^2 dalam ruang di bawah.

[7 *marks*]

(c) On the graph paper on page 6, draw a graph of v^2 against *h.*
Pada kertas graf di halaman 6, lukiskan graf v^2 melawan h.

[*5 marks*]

(d) Based on the graph on page 6, state the relationship between v^2 and *h.*
Berdasarkan graf anda di halaman 6, nyatakan hubungan antara v^2 dan h.

.....

[*1 mark*]

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Graph of v^2 against h
Graf v^2 *melawan h*

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2. A student carries out an experiment to determine the electromotive force, *E* and the internal resistance, *r* of a dry cell. The student uses four resistors with different values of resistance, *R* but the same number of dry cells and e.m.f, *E* of the cell.

Seorang pelajar telah menjalankan satu eksperimen untuk menentu daya gerak elektrik, E dan rintangan dalam, r sebuah sel kering. Pelajar itu telah menggunakan empat perintang dengan nilai rintangan, R yang berbeza tetapi bilangan sel kering dan daya gerak elektrik, E sel yang sama.

(a) Based on the graph on page 8
Berdasar pada graf pada halaman 8

(i) state the relationship between $\frac{1}{I}$ and *R*.

Nyatakan hubungan di antara $\frac{1}{I}$ *dan R.*

.....

[1 mark]

(ii) determine the value of $\frac{1}{I}$, when the R = 0 Ω.

tentukan nilai $\frac{1}{I}$, *apabila R = 0 Ω.*

Show on the graph, how you determine $\frac{1}{I}$.

Tunjukkan pada graf bagaimana anda menentu $\frac{1}{I}$.

.....

[2 marks]

(iii) The value of $\frac{1}{I}$, when the R = 0 Ω is given by the formula $\frac{1}{I} = 0.4r$, where *r* is the internal resistance of the cell.

Nilai $\frac{1}{I}$ *, apabila R = 0Ω diberi oleh formula* $\frac{1}{I}$ *= 0.4r, dimana r ialah rintangan dalam sel.*

Calculate r.
Hitung r.

[2 marks]

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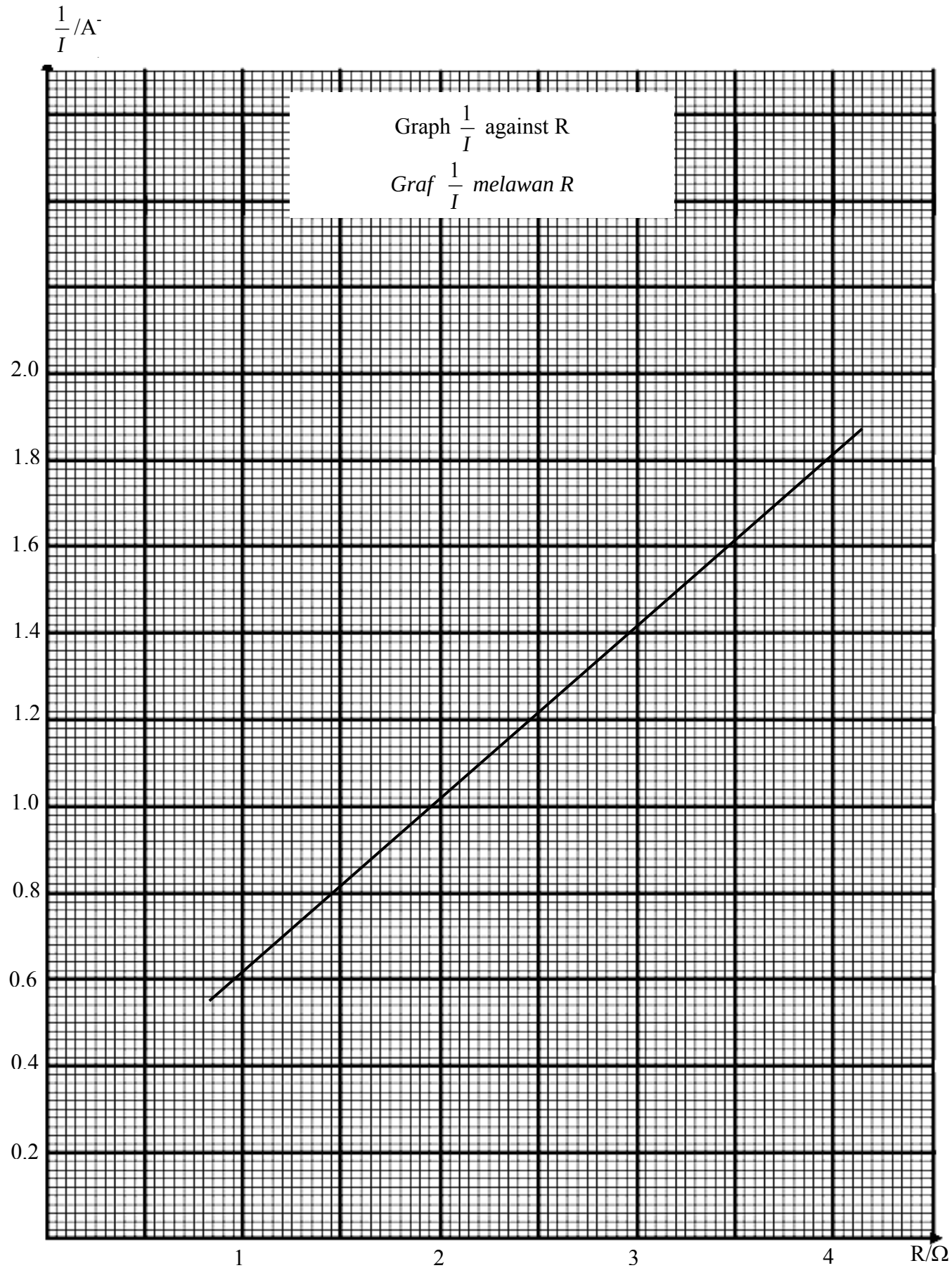

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(b) The electromotive force, *E*, of the cell is given by the formula, $m = \frac{1}{E}$, where, *m*, is the gradient of the graph.

Daya gerak elektrik, E , diberi oleh formula, $m = \frac{1}{E}$, *di mana, m, ialah kecerunan graf.*

(i) Calculate the gradient, *m*, of the graph.
Hitungkan kecerunan, m, bagi graf itu.

Show on the graph how you calculate *m*.
Tunjukkan pada graf itu bagaimana anda menghitung, m.

m = ……..

[3 marks]

(ii) By using your answer in b(i), determine the value of emf *E*.
Dengan mengunakan jawapan b(i), tentukan nilai dge E.

[2 marks]

(c) State **two** precautions to be taken in this experiment.
*Nyatakan **dua** langkah berjaga yang perlu diambil dalam eksperimen ini.*

……

……

……

[2 marks]

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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 a car which fell into a canal is being pulled by a rescue crane.
It is observed that the force needed by the crane to pull the car shown in Diagram 3.1 is less than in Diagram 3.2

Rajah 3.1 dan Rajah 3.2 menunjukkan sebuah kereta yang terjatuh dalam sebuah tali air sedang ditarik oleh sebuah kren penyelamat. Didapati daya yang diperlukan oleh kren untuk menarik kereta yang ditunjukkan pada Rajah 3.1 adalah lebih kecil berbanding dengan rajah 3.2.

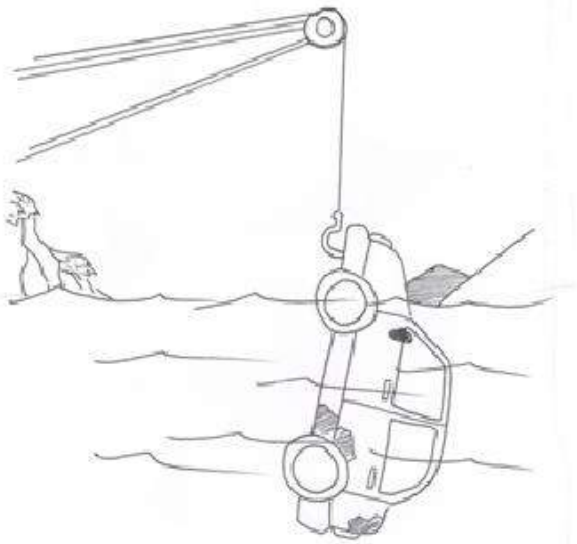

Diagram 3.1
Rajah 3.1

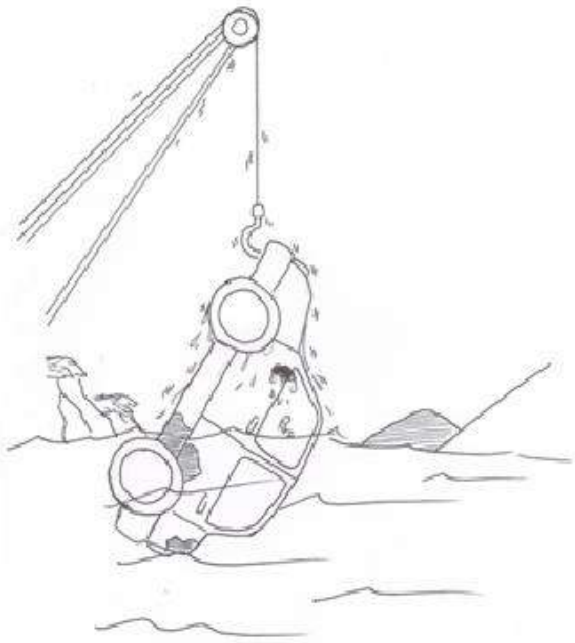

Diagram 3.2
Rajah 3.2

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

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

[1 *mark*]

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(b) State one suitable hypothesis.
*Nyatakan **satu** hipotesis yang sesuai.*

[1 *mark*]

(c) With the use of apparatus such as iron rod, beaker and other suitable apparatus, describe **one** experiment to investigate the hypothesis stated in 3(b).

*Dengan menggunakan radas seperti rod besi, bikar dan lain-lain radas yang sesuai, terangkan **satu** ekperimen untuk menyiasat hipotesis yang anda nyatakan dalam 3(b)*

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

i) The aim of the experiment.
Tujuan eksperimen.

ii) The variables in the experiment.
Pembolehubah yang terlibat.

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

iv) The arrangement of the apparatus.
Susunan radas.

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

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4 Diagram 4.1 shows a step down transformer in a hand phone charger. Its secondary coil or output is connected to a hand phone of 5 V.
Diagram 4.2 shows a step down transformer in a notebook charger. Its secondary coil or output is connected to a computer notebook of 19 V.

Rajah 4.1 menunjukkan sebuah transformer injak turun yang terdapat di dalam pengecas bateri telefon bimbit. Gegelung sekundernya atau output disambungkan kepada sebuah telefon bimbit 5 V.
Rajah 4.2 menunjukkan sebuah transformer injak turun yang terdapat di dalam pengecas komputer riba. Gegelung sekundernya atau output disambungkan kepada komputer riba 19 V.

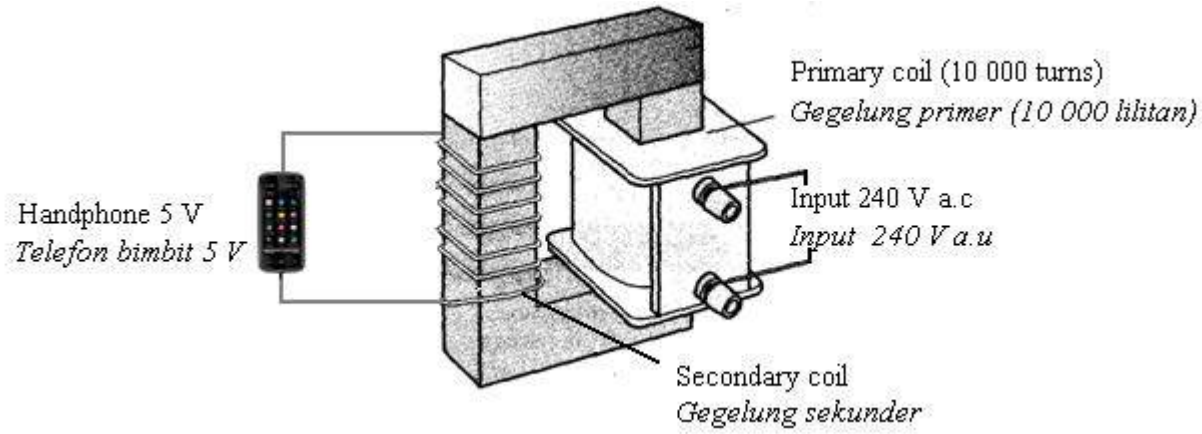

Diagram 4.1
Rajah 4.1

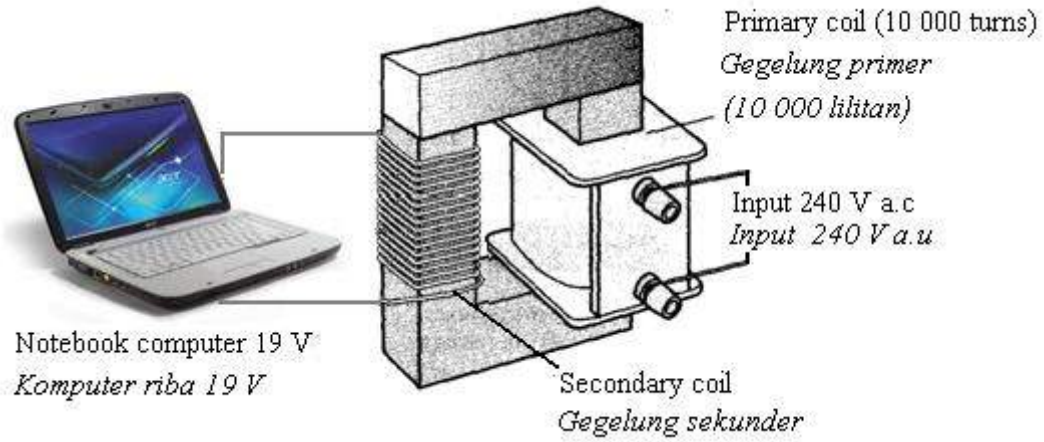

Diagram 4.2
Rajah 4.2

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Based on the information and observation above ;
Berdasarkan maklumat dan pemerhatian di atas;

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

[1 mark]

(b) State **one** suitable hypotesis.
*Nyatakan **satu** hipothesis yang sesuai.*

[1 mark]

(c) With use of apparatus such as soft iron core, insulated copper wire and other suitable apparatus, describe **one** experiment to investigate the hypothesis stated in **4**(b).
*Dengan menggunakan radas seperti teras besi lembut, wayar kuprum bertebat, dan lain-lain radas yang sesuai , terangkan **satu** eksperimen untuk menyiasat hipotesis yang dinyatakan di **4**(b)*

In your description, state clearly the following
Dalam penerangan anda jelaskan perkara berikut :

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

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

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

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

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

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

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

[10 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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PENTAKSIRAN DIAGNOSTIK SBP
SIJIL PELAJARAN MALAYSIA 2012

SKEMA JAWAPAN KERTAS 1

NO. SOALAN	JAWAPAN	NO. SOALAN	JAWAPAN
1	A	26	D
2	C	27	A
3	C	28	C
4	B	29	B
5	A	30	B
6	D	31	A
7	C	32	B
8	C	33	C
9	D	34	B
10	D	35	C
11	B	36	D
12	B	37	A
13	A	38	D
14	B	39	B
15	C	40	D
16	C	41	A
17	C	42	D
18	A	43	C
19	C	44	C
20	B	45	A
21	C	46	B
22	C	47	B
23	C	48	C
24	C	49	B
25	C	50	B

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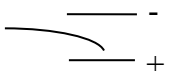
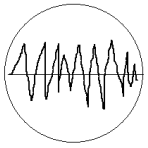
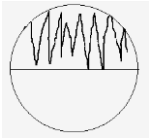
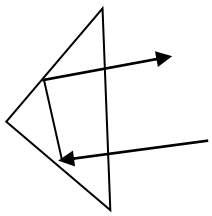
PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2012:
PERCUBAAN SIJIL PELAJARAN MALAYSIA
SKEMA PAPER 2

SECTION A

Question	Mark Scheme	Sub Mark	Total Mark
1(a)	Fast moving electron / Particles with negative charge	1	1
(b)(i)	Diagram shows path is deflected towards +ve plate 	1	
b(ii)	Beta particles has negative charge / attracted to the positive charge at plate	1	2
b(c)	Increases	1	1
		TOTAL	**4 M**
2 (a)	Gravitational potential energy	1	1
(b)(i)	Gravitational potential energy ⟶ Kinetic energy	1	1
(b)(ii)	M1 (10)(50) = ½ v^2	1	
	M2 31.62 ms^{-1}	1	2
(c)	The principal of conservation of energy	1	1
		TOTAL	**5 M**
3 (a)(i)	To convert sound into electrical signals.	1	1
(a)(ii)	negative	1	1
(b)	M1 $V_{YZ} = \frac{6\ V}{(40+10)\ k\Omega} \times 10\ k\Omega$	1	
	M2 1.2 V (answer with unit)	1	2
(c)	RS  YZ 	1 1	2
		TOTAL	**6 M**
4 (a)	Bourdon gauge	1	1
(b)	Air/Gas pressure	1	1
(c)(i)	Increases	1	1
(c)(ii)	K.E increses // Rate of collision increases	1	1

Question	Mark Scheme	Sub Mark	Total Mark
(d)	M1 $\frac{130}{27+273} = \frac{136}{T_2}$	1	
	M2 T_2 = 313.8 K	1	
	M3 40.8 ^oC	1	3
		TOTAL	**7M**
5(a)	$\frac{\text{Force}}{\text{surface area}}$	1	1
(b)(i)	Diagram 5.2 > Diagram 5.1 // vice versa	1	1
(b)(ii)	Diagram 5.2 > Diagram 5.1 // vice versa	1	1
(b)(iii)	Pressure increases, horizontal distance increases	1	1
(b)(iv)	Depth increases, pressure increases	1	1
(c)(i)	Increases	1	1
(c)(ii)	M1 Atmospheric pressure exerted at the surface of water	1	2
	M2 Increases the water pressure	1	
		TOTAL	**8M**
6(a)	Vibration of air molecules	1	1
(b)(i)	Diagram 6.2 > Diagram 6.1 // vice versa	1	1
(b)(ii)	Diagram 6.2 > Diagram 6.1 // vice versa	1	1
(b)(iii)	same	1	1
(c)(i)	Displacement increases, amplitude increases	1	1
(c)(ii)	Amplitude increases, loudness increases	1	1
(d)(i)	decreases	1	1
(d)(ii)	Frequency decreases	1	1
		TOTAL	**8 M**
7(a)	The incidence angle when the refracted angle is 90^o	1	1
(b)(i)		1	1
(b)(ii)	Total internal reflection	1	1

Question	Mark Scheme	Sub Mark	Total Mark
(c)	Light enters at angle 90^o / perpendicular to the boundary // parallel to the normal line	1	1
(d)(i)	Concave Reflected light is focused to a (focal) point	1 1	2
(d)(ii)	Shiny Good reflector	1 1	2
(d)(III)	Big Collect/capture more light	1 1	2
		TOTAL	**10 M**
8(a)	1000 J of energy is consumed in 1 s when connected to a 240V power supply	1	1
(b)(i)	M1 $\frac{1000}{240}$	1	2
	M2 4.17 A (answer with unit)	1	
(b)(ii)	M1 E = 1000 x 10^{-3} x $\frac{30}{60}$ x 30	1	
	M2 Cost = 15 kWh x 0.23	1	3
	M3 RM 3.45	1	
(c)(i)	E = 240 x 6.0 x 90 // 1.296 x 10^5 J	1	
(c)(ii)	E = 240 x 5.0 x 150 // 1.800 x 10^5 J	1	3
(c)(iii)	E = 240 x 4.0 x 120 // 1.152 x 10^5 J	1	
(d)(i)	R		1
(d)(ii)	M1 Use least of energy M2 Save cost	1 1	2
		TOTAL	**12 M**

SECTION B

QUESTION			ANSWER SCHEME	MARKS	
9	(a)		Heat absorb to change 1 kg of liquid to gas without any change in temperature.	1	1
	(b)	(i)	Boiling point of water is higher	1	
			The specific heat capacity of water is higher	1	
			The time taken to boil water is longer.	1	
		(ii)	The lower the boiling point of liquid the smaller the specific heat capacity,	1	
		(iii)	The smaller the specific heat capacity the shorter the time for liquid to boil.	1	5

	(c)		1. Alcohol has lower boiling point than water		1	
			2. Hence alcohol evaporates easily and readily.		1	
			3. Alcohol has lower latent heat of vaporisation		1	
			4. Hence absorb heat from hand at a faster rate.		1	4
	(d)	(i)	Good conductor of heat	Heat can flow easily from plate to fish or from surrounding to plate.	1+1	Any 5 sets of correct answers 10
		(ii)	Low specific heat capacity	Plate increase or decrease in temperature at a faster rate	1+1	
		(iii)	Black colour plate	Good heat absorber	1+1	
		(iv)	Low density plate	Light and easy to handle	1+1	
		(v)	Large surface area of plate	More surface is exposed to heat // more fish can defrost at one time.	1+1	
				TOTAL		**20 M**

10. (a)	An electromagnet is a conductor which can produce magnetic field when current passes through it.	1	1
(b)	- In diagram 10.2 , the number of turns of the coil is more than diagram 10.1. - More paper clips are attracted to the iron nail in diagram 10.2 than 10.1. - current is the same in diagram 10.2 and 10.1 - As the no. of turns increases, more paper clips are attracted to the iron nail. - As the number of turns in the solenoid increases, the strength of the magnetic field increases	1 1 1 1 1	5
(c)	- The two aluminium rods attract. - Current flowing through the aluminium rod are in the same direction // diagram shows current in the same direction . - The magnetic fields produced by the currents in them will combine to form a resultant/catapult field // show diagram of magnetic fields in opposite direction between the currents . - A weak magnetic field is produced in a region between the aluminium rod because the magnetic field lines are in opposite directions // diagram shows forces are inwards	1 1 1 1	4
(d)	- Use copper wire, it is very good conductor/resistance is very low. - Use thicker wire to reduce the resistance - Use a laminated core to ovoid the eddy current in the core. - Use soft iron core as it can be magnetized and demagnetized easily/avoid hysteresis .	2 2 2 2	10

	- Winding the secondary coil on top of the primary coil to reduce the leakage of magnetic flux.	2	
	TOTAL		20

SECTION C

ANSWER QUESTION 11:.	MARKING CRITERIA	MARK SUB	MARK TOTAL
11.(a)	When force is applied to an enclosed fluid, the pressure produced is transmitted equally throughout the enclosed fluid	1	1
(b)	-When a small force is applied to piston A, pressure is produced. -The pressure is transmitted equally throughout the whole liquid -When the pressure exerted on surface area of the large Piston B, a bigger force is produced to lift up the load -The force is bigger due to the bigger surface area //F α A	1 1 1 1	4
(c)	<table><tr><th>Characteristics</th><th>Reason</th></tr><tr><td>The ratio of surface area of large piston to small piston is large</td><td>To produce a bigger output force</td></tr><tr><td>Type of liquid used - oil</td><td>Does not evaporate easily // does not produce bubbles // High viscosity</td></tr><tr><td>Material used for the transmission pipe- steel</td><td>Strong //Not easy to break // long lasting</td></tr><tr><td>Size of liquid reservoir – big</td><td>To occupy a large amount of hydraulic liquid // Able to lift load higher // Avoid spill over</td></tr><tr><td>R is chosen</td><td>Large ratio between large and small piston, use oil, has steel pipe of liquid transmission and has big size of liquid reservoir</td></tr></table>	2 2 2 2 2	10
(d) (i)	$P = \frac{F}{A} = \frac{10}{0.004} = 2500$ Pa	1 1	
(ii)	$F_Y = 2500 \times 0.2$ $= 500$ N	1	
(iii)	$d_y = \frac{0.004 \times 0.3}{0.2}$ $= 0.006$ m	1 1	5
	TOTAL		20 marks

<table>
<tr><th rowspan="2">NO.</th><th rowspan="2">MARKING CRITERIA</th><th colspan="2">MARK</th></tr>
<tr><th>SUB</th><th>TOTAL</th></tr>
<tr><td>12 (a) (i)</td><td>State the meaning of radioisotope
Unstable isotope</td><td>1</td><td>1</td></tr>
<tr><td></td><td>State the explanation</td><td></td><td></td></tr>
<tr><td>(ii)</td><td>1. Beta particles penetrates through the paper and</td><td>1</td><td></td></tr>
<tr><td></td><td>2. detected by the detector</td><td>1</td><td></td></tr>
<tr><td></td><td>3. If the detector detect lower reading the paper is too thick // If the detector detect higher reading the paper is thin</td><td>1</td><td></td></tr>
<tr><td></td><td>4. The roller has to compress harder if the paper is thick // Vice versa</td><td>1</td><td>4</td></tr>
<tr><td>(b)</td><td><table><tr><th>Aspects</th><th>Reasoning</th></tr><tr><td>Graphite</td><td>to slow down the fast neutrons produced by the fission.</td></tr><tr><td>Boron / Cadmium</td><td>to absorb some of the neutrons // reduce the rate of the fission reaction.</td></tr><tr><td>Heavy water</td><td>To absorb heat from the nuclear reaction. // have high specific heat capacity</td></tr><tr><td>Thick</td><td>To prevent leakage of radiation from the reactor core</td></tr><tr><td>R is chosen</td><td>Graphite,Boron, heavy water and thick wall</td></tr></table></td><td>2
2
2
2
2</td><td>10</td></tr>
<tr><td>(c) (i)</td><td></td><td></td><td>3</td></tr>
<tr><td></td><td></td><td>1</td><td></td></tr>
<tr><td></td><td>Show the correct conversion to kg
m = 0.19585 x (1.66 x 10^{-27})</td><td>1</td><td></td></tr>
<tr><td>(ii)</td><td>Show the correct substitution / answer
$E = mc^2$
$= 0.19585 \times (1.66 \times 10^{-27}) \times (3 \times 10^{8})^2$
$= 2.92599 \times 10^{-11}$ J</td><td>1</td><td>2</td></tr>
<tr><td></td><td></td><td>1</td><td></td></tr>
<tr><td></td><td>Show the correct substitution / answer
$P = \frac{E}{t}$</td><td>1</td><td></td></tr>
</table>

	$= \frac{2.92599 \times 10^{-11}}{5 \times 10^{-6}}$ **$= 5.8512 \times 10^{-10}$** W		
	Total		**20**

END OF SCHEME

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MARKING SCHEME TRIAL SPM PAPER 3 2012

SECTION A

<table>
<tr><th>NO.</th><th>ANSWER</th><th>MARK</th></tr>
<tr><td>1(a)</td><td>(i) height of runway // h</td><td>1</td></tr>
<tr><td></td><td>(ii) final velocity // length of ticker tape // v // s</td><td>1</td></tr>
<tr><td></td><td>(iii) mass of trolley// m</td><td>1</td></tr>
<tr><td>(b)</td><td>Tabulate h, s, v and v ^{2} correctly in the table.
A Shows a table h, s, v and v ^{2}.
B State the correct unit of h, s, v and v ^{2}
C All values of s are correct
D All calculations v are correct
E All calculations v^2 are correct
F State s consisten 1 d.p.
G State v and v^2 consistent 1, 2 or 3 d.p

<table>
<tr><th>height, h/cm</th><th>Length of ticker tape, s/cm</th><th>Final velocity, v / ms^{-1}</th><th>v^2/ m^2s^{-2}</th></tr>
<tr><td>10.0</td><td>7.9</td><td>1.975</td><td>3.901</td></tr>
<tr><td>20.0</td><td>9.7</td><td>2.425</td><td>5.881</td></tr>
<tr><td>30.0</td><td>11.2</td><td>2.800</td><td>7.840</td></tr>
<tr><td>40.0</td><td>12.5</td><td>3.125</td><td>9.766</td></tr>
<tr><td>50.0</td><td>13.8</td><td>3.450</td><td>11.903</td></tr>
</table></td><td>7</td></tr>
<tr><td>(c)</td><td>Draw the graph of v ^{2} against h .
A - Label y-axis and x-axis correctly
B - State the unit at the axis correctly
C - Both axes with the even and uniform scale:
D - 5 points correctly plotted:
E - a smooth best straight line
F - minimum size of the graph is 5 x 4 squares of 2 x 2 cm.

<table>
<tr><th>No of ticks</th><th>Score</th></tr>
<tr><td>6</td><td>5</td></tr>
<tr><td>5</td><td>4</td></tr>
<tr><td>3-4</td><td>3</td></tr>
<tr><td>2</td><td>2</td></tr>
<tr><td>1</td><td>1</td></tr>
</table></td><td>5</td></tr>
</table>

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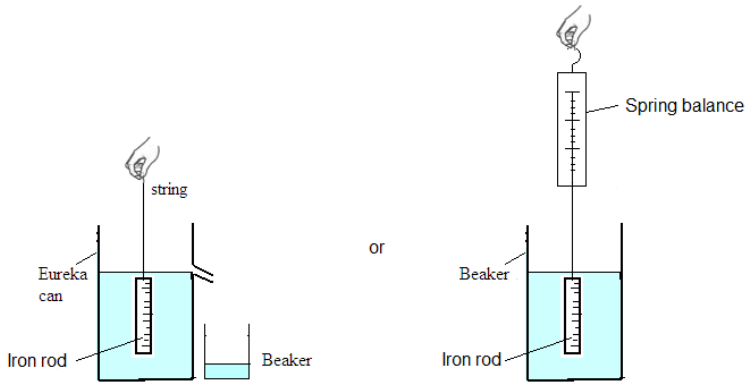
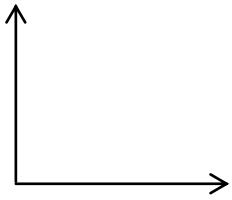
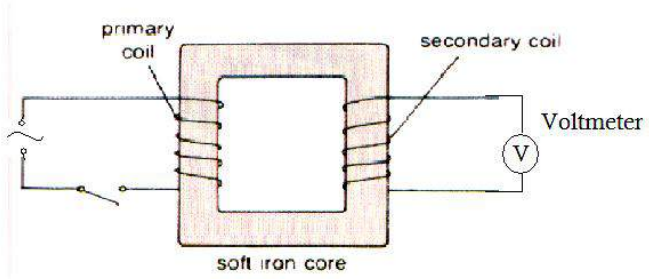
(d)	**State the correct relationship <u>based on the candidate's graph</u>** v^2 is directly proportional to h // v^2 is increasing linearly to h	1
	TOTAL MARK	**16**
2 (a)	(i) R increases linearly with $\frac{1}{I}$	1
	(ii) Show a extrapolation line on graph 0.2 A^{-1}	1 1
	(iii) $\frac{1}{I} = 0.4r$ $\therefore 0.2 = 0.4r$ $r = 0.5\ \Omega$	1 1
(b)	(i) Show a big Δ on the graph to determine the gradient(5 x 5 blocks) The correct $\frac{y_2 - y_1}{x_2 - x_1}$ from the Δ drawn m = 0.4 $A^{-1}\Omega^{-1}$ ---------- Ans + unit	1 1 1
	(ii) *gradient, m* = $\frac{1}{E}$ $\therefore 0.4 = \frac{1}{E}$ E = 2.5 V	1 1
(c)	1. The connection of the wires must be tight. 2. The circuit is switched off whenever the readings were not taken from the meters. This is to reduce energy loss from the cell. 3. The eye is perpendicular to the scale of ammeter // Pointer's image is not seen on the mirror strip of ammeter. Any 2 marks	1 1
	TOTAL MARK	**12**

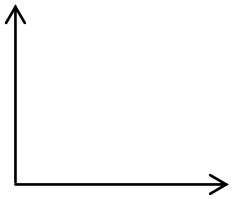
SECTION B

NO	ANSWER	MARK
3 (a)	**State the suitable inference** The volume of water displaced affects the buoyant force // apparent weight.	1
(b)	**State a relevant hypothesis** The greater the volume of water displaced the greater the buoyant force.// The greater the volume of water displaced the smaller the apparent weight.	1
(c)	**State the aim of experiment** To investigate the relationship between the volume of water displaced and the buoyant force// apparent weight.	1
	State the suitable manipulated variables and responding variable (Quantity that can be measured) mv - the depth of iron rod // volume of water displaced rv - buoyant force // apparent weight	1
	State the constant variable cv – the density of water	1
	State the complete list of apparatus and materials Metre rule, eureka can , measuring cylinder / triple beam balance or Metre rule, spring balance	1
	Draw the functional arrangement of the apparatus 	1
	State the method to control the manipulated variable Experiment is started with h = 5 cm	1
	State the method to measure the responding variable Measure the weight/mass/volume of the water displaced // Take the reading of the spring balance	1
	Repeat the experiment at least 4 times with the values	

<table>
<tr><td></td><td>Repeat the depth of rod h = 10, 15, 20 and 25cm</td><td>1</td></tr>
<tr><td></td><td>State how the data tabulated with the title MV and RV
Records the data .
<table><tr><td>Depth of the iron rod// h</td><td>Volume/ mass/ weight of water displaced // Apparent weight/reading of spring balance</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></td><td>1</td></tr>
<tr><td></td><td>State how the data is analysed, plot a graph RV against MV

Plot graph depth of depth of iron rod against Volume/ mass/ weight of water displaced
Volume/ mass/weight // apparent weight
 
Depth//h</td><td>1</td></tr>
<tr><td colspan="2">TOTAL MARK</td><td>12</td></tr>
</table>

NO	ANSWER	MARK
4 (a)	**State a suitable inference** The number of turns of wire in the secondary coil affects the output voltage	1
4 (b)	**State a relevant hypothesis** The greater the number of turns of wire in the secondary coil, the greater the output voltage	1
4 c (i)	**State the aim of experiment** To investigate the relationship between number of turns of wire in the secondary coil and the output voltage	**1**
4c (ii)	**State the manipulated variable and the responding variable** **Manipulated :** number of turns of wire in secondary coil, N **Responding :** output voltage, *V* **State ONE variable that kept constant** The number of turns of wire in the primary coil	**1**
4 c(iii)	**Complete list of apparatus and materials** Ac voltmeter , ac power supply	**1**
4 c(iv)	**Arrangement of apparatus :**  	1
4 c(v)	**State the method of controlling the manipulated variable** 1. The set up of the apparatus is as shown in figure above. 2. Use 900-turns copper coil as the primary coil and 100 turns of secondary coil of a transformer.	**1**
4 c(vi)	**State the method of measuring the responding variable** 3. The switch is on and the output voltage is measured by using a voltmeter.	**1**
4c(vii)	**Repeat the experiment at least 4 times** The experiment is repeated by using copper coil with 200 turns, 300 turns, 400 turns and 500 turns as the secondary coil and same number of primary coil.	**1**

<table>
<tr>
<td>4c(viii)</td>
<td>Tabulation of data:
<table>
<tr><th>Number of turns of wire in secondary coil, N</th><th>Output voltage, V / V</th></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
</table>
</td>
<td>1</td>
</tr>
<tr>
<td>4c(ix)</td>
<td>Analyse the data .
Voltage
 
No. of turns</td>
<td>1</td>
</tr>
<tr>
<td colspan="2">TOTAL MARKS</td>
<td>12</td>
</tr>
</table>