

SULIT

NO. KAD PENGENALAN

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ANGKA GILIRAN

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SOALAN PRAKTIS BESTARI
PROJEK JAWAB UNTUK JAYA (JUJ) 2015



SIJIL PELAJARAN MALAYSIA

PHYSICS

Kertas 2 – Set A

4531/2

2½ jam

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis nombor kad pengenalan dan angka giliran anda pada petak yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

<i>Untuk Kegunaan Pemeriksa</i>			
Kod Pemeriksa:			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	4	
	2	5	
	3	6	
	4	7	
	5	8	
	6	8	
	7	10	
	8	12	
B	9	20	
	10	20	
C	11	20	
	12	20	
<i>Jumlah</i>			

Kertas soalan ini mengandungi 32 halaman bercetak

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

1. $a = \frac{v-u}{t}$
2. $v^2 = u^2 + 2as$
3. $s = ut + \frac{1}{2}at^2$
4. Momentum = mv
5. $F = ma$
6. Kinetic energy = $\frac{1}{2}mv^2$
7. Gravitational potential energy = mgh
8. Elastic potential energy = $\frac{1}{2}Fx$
9. Power, $P = \frac{\text{energy}}{\text{time}}$
10. $\rho = \frac{m}{V}$
11. Pressure, $p = h\rho g$
12. Pressure, $p = \frac{F}{A}$
13. Heat, $Q = mc\theta$
14. Heat, $Q = m\ell$
15. $P_1V_1 = P_2V_2$
16. $\frac{V_1}{T_1} = \frac{V_2}{T_2}$
17. $\frac{P_1}{T_1} = \frac{P_2}{T_2}$
18. $\frac{PV}{T} = \text{constant}$
19. $n = \frac{\sin i}{\sin r}$
20. $n = \frac{\text{real depth}}{\text{apparent depth}}$
21. $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
22. Linear magnification, $m = \frac{v}{u}$
23. $P = I/f$
24. $v = f\lambda$
25. $\lambda = \frac{ax}{D}$
26. $Q = It$
27. $E = VQ$
28. $V = IR$
29. $E = V + Ir$
30. Power, $P = VI$
31. $\frac{N_S}{N_P} = \frac{V_S}{V_P}$
32. Efficiency = $\frac{I_S V_S}{I_P V_P} \times 100\%$
33. $eV = \frac{1}{2}mv^2$
34. $E = mc^2$
35. $g = 10 \text{ ms}^{-2}$

Bahagian A
Section A

[60 markah]
[60 marks]

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

- 1 Diagram 1.1 shows a reading from a microammeter when it is not connected to any circuit.
Diagram 1.2 shows the reading of the microammeter when it is connected to measure a very small current flowing through it.

Rajah 1.1 menunjukkan bacaan pada sebuah mikroammeter apabila tidak disambung pada sebarang litar.

Rajah 1.2 menunjukkan bacaan pada mikroammeter itu apabila disambung untuk mengukur arus yang sangat kecil.

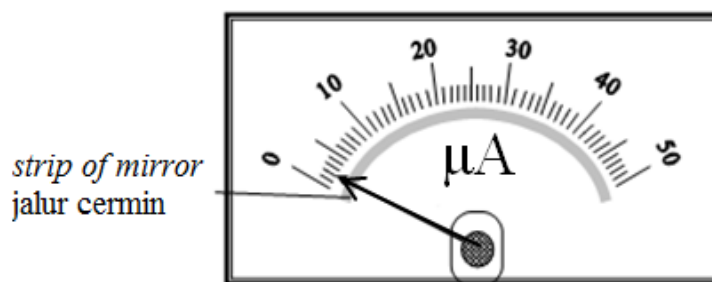


Diagram 1.1
Rajah 1.1

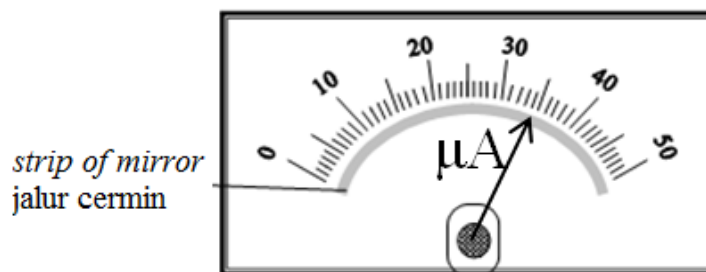
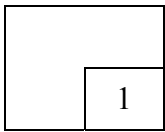


Diagram 1.2
Rajah 1.2

Based on Diagram 1.1
Berdasarkan Rajah 1.1

|

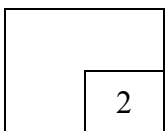
1(a)



- (a) What is the sensitivity of the instrument?
Berapakah kepekaan alat itu?

[1 mark/markah]

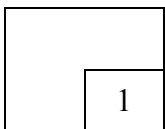
1(b)



- (b) What is the actual current that flows through the circuit?
Berapakah bacaan sebenar arus yang mengalir dalam litar tersebut?

[2 marks/markah]

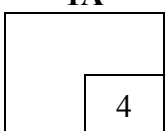
1(c)



- (c) Explain how the strip of mirror can increase the accuracy of the measured current.
Terangkan bagaimana jalur cermin dapat membantu menambahbaik kejituan arus yang diukur.

[1 mark/markah]

TOTAL
1A



2 Diagram 2 shows a rock is dropped from a cliff. It undergoes free falling. Pretend that a falling rock is equipped with a speedometer. The speedometer shows the speed of the rock.

Rajah 2 menunjukkan sebiji batu dijatuhkan dari sebuah tebing. Ia mengalami jatuh bebas. Bayangkan batu yang jatuh itu dilengkapi meterlaju. Meterlaju menunjukkan laju batu itu.

(a) What is the external force acts on the rock?
 Apakah daya luar yang bertindak ke atas batu itu?

.....

 [1 mark/markah]

2(a)

1

(b) Based on Diagram 2,
 Berdasarkan Rajah 2,
 (i) sketch in the missing speedometer needle at $t = 5$ s
 lakarkan penunjuk meterlaju yang tidak lengkap pada $t = 5$ s

[1 mark/markah]

2(b)(i)

1

(ii) what is the rate of change of velocity.
 berapakah kadar perubahan halaju.

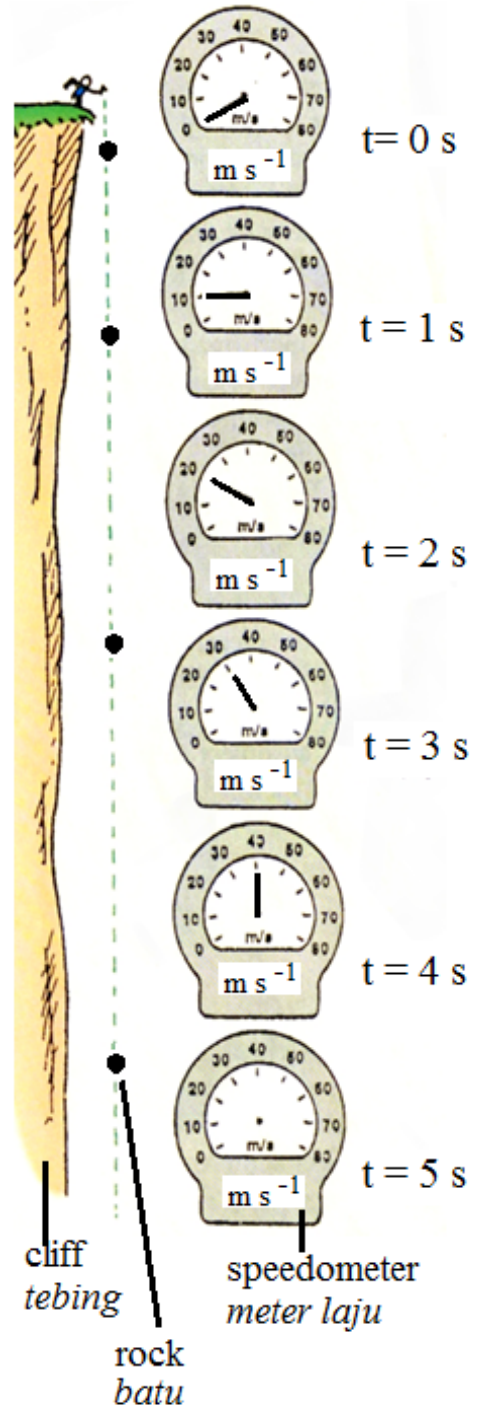


Diagram 2
 Rajah 2

2(b)(ii)

1

[1 mark/markah]

- (c) Based on your answer in (b)(ii) and Diagram 2, determine the displacement of the rock at $t = 5$ s.
Berdasarkan Rajah 2 dan jawapan anda dalam (b)(ii) dan Rajah 2, tentukan sesaran batu pada $t = 5$ s.

2(c)

	2
--	---

[2 marks/markah]

**TOTAL
2A**

	5
--	---

- 3 Diagram 3.1 shows an arrangement of apparatus of an experiment to determine the relationship between weight of load, F and the extension of a spring, x .

Diagram 3.2 shows graph of F against x from the experiment.

Rajah 3.1 menunjukkan susunan radas bagi eksperimen untuk menentukan hubungan antara berat beban, F dengan pemanjangan spring, x

Rajah 3.2 menunjukkan graf F lawan x dari eksperimen berkenaan.

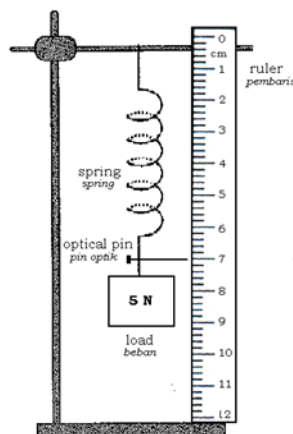


Diagram 3.1
Rajah 3.1

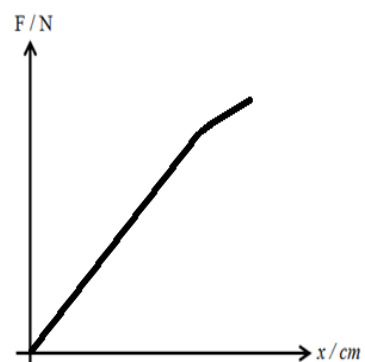


Diagram 3.2
Rajah 3.2

- (a) Define *Hooke's law*.
Takrifkan Hukum Hooke.

.....
.....

[1 mark/markah]

3(a)

1

- (b) Based on Diagram 3.1, determine the spring constant if the initial length of the spring is 5 cm.
Berdasarkan Rajah 3.1, tentukan pemalar spring jika panjang asal spring ialah 5 cm.

[2 marks/markah]

3(b)

2

- (c) In Diagram 3.2, mark the elastic limit of the spring with (x)
Dalam Rajah 3.2, tandakan had kenyal spring dengan tanda (x).

[1 mark/markah]

3(c)

1

- (d) The experiment is repeated using a load M. Length of the spring becomes 8 cm. Calculate the energy stored in the spring.
Eksperimen itu diulang menggunakan sebuah beban M. Panjang spring menjadi 8 cm. Hitungkan tenaga tersimpan di dalam spring.

[2 marks/markah]

3(d)

2

TOTAL
3A

6

- 4 Diagram 4.1 shows a combination of logic gates.
Diagram 4.2 shows signals of input A and input B of the combination.

*Rajah 4.1 menunjukkan kombinasi get logik.
Rajah 4.2 menunjukkan isyarat input A dan input B bagi kombinasi itu.*

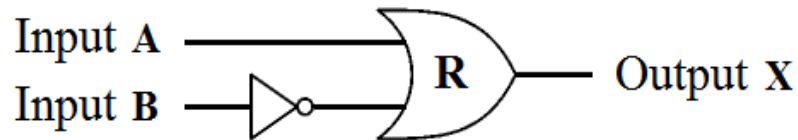


Diagram 4.1
Rajah 4.1

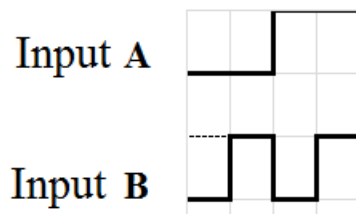


Diagram 4.2
Rajah 4.2

4(a)(i)

1

- (a) (i) Name the R logic gate.
Namakan get logik R.

.....

[1 mark/markah]

4(a)(ii)

2

- (ii) Sketch the output signal X in the diagram below.
Lakarkan isyarat output X dalam rajah di bawah.

Output X



[2 marks/markah]

- (b) A student is planning to design a combination of logic gate to be used as an automatic switch for an air-conditioner unit.

Seorang pelajar sedang merancang untuk mereka kombinasi get logik yang boleh digunakan untuk menghidup suis pendingin hawa secara automatik.

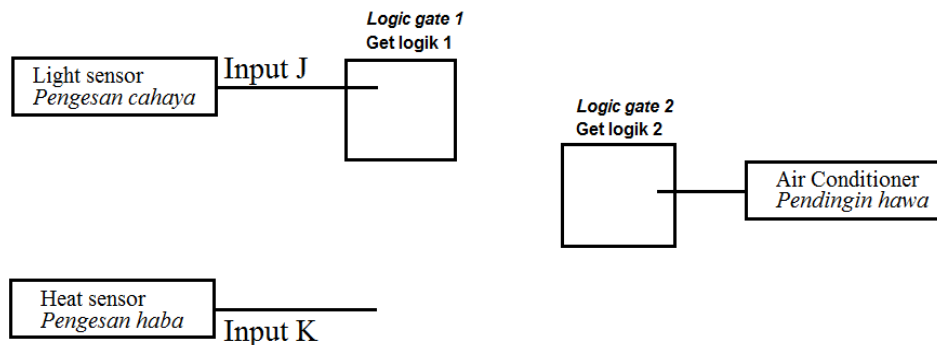


Diagram 4.3

Rajah 4.3

Diagram 4.3 shows input J is connected to a light sensor and input K is connected to heat sensor.

Rajah 4.3 menunjukkan input J yang dihubungkan kepada pengesan cahaya dan input K yang disambung kepada pengesan haba.

Keys:

Kekunci:

Input J	: Bright/ <i>Cerah</i>	Logic "1"
	: Dark / <i>Gelap</i>	Logic "0"
Input K	: Hot / <i>Panas</i>	Logic "1"
	: Cold / <i>Sejuk</i>	Logic "0"
Air Conditioner	: Activated	Logic "1"
	<i>Dihidupkan</i>	
<i>Pendingin hawa</i>	: Not activated	Logic "0"
	<i>Tidak dihidupkan</i>	

The air conditioner unit is only switched on when the weather is hot.

Pendingin hawa hanya akan dihidupkan apabila pada cuaca panas.

- (i) Based on the above description, complete the truth table in Table 1.
Berdasarkan penerangan di atas, lengkapkan jadual kebenaran dalam Jadual 1.

INPUT				OUTPUT
J		K		PENDINGIN HAWA
0	Gelap	0	Sejuk	
0	Gelap	1	Panas	
1	Cerah	0	Sejuk	
1	Cerah	1	Panas	

Table 1
Jadual 1

[2 marks/markah]

- (ii) You are provided an AND and an OR gate. Draw the correct logic gates and their connection in the boxes in Diagram 4.3 so that the combination can produce the output as in (b) (i).

Anda dibekalkan dengan satu get DAN dan satu get ATAU. Lukis logik get yang betul dan sambungannya dalam kotak-kotak pada Rajah 4.3 supaya kombinasi berkenaan mampu menghasilkan output seperti dalam (b)(i)

[2 marks/markah]

4(b)(i)

2

4(b)(ii)

2

TOTAL
4A

7

5 Diagram 5.1(a) shows a hydraulic system that can raise a load. A force, F exerted on the small piston. Maximum load that can be lifted up is 500 g.

Diagram 5.1 (b) shows another hydraulic system with the same size of small piston. The same amount of force exerted on the small piston and it can raise load up to 1000 g.

Rajah 5.1 (a) menunjukkan satu sistem hidraulik. Suatu daya, F dikenakan ke atas omboh kecil. Berat beban maksimum yang boleh diangkat ialah 500 g.

Rajah 5.1(b) menunjukkan sistem hidraulik yang lain yang mempunyai saiz omboh kecil yang serupa. Kuantiti daya yang sama dikenakan ke atas omboh kecil dan ia mampu mengangkat beban sehingga 1000 g.

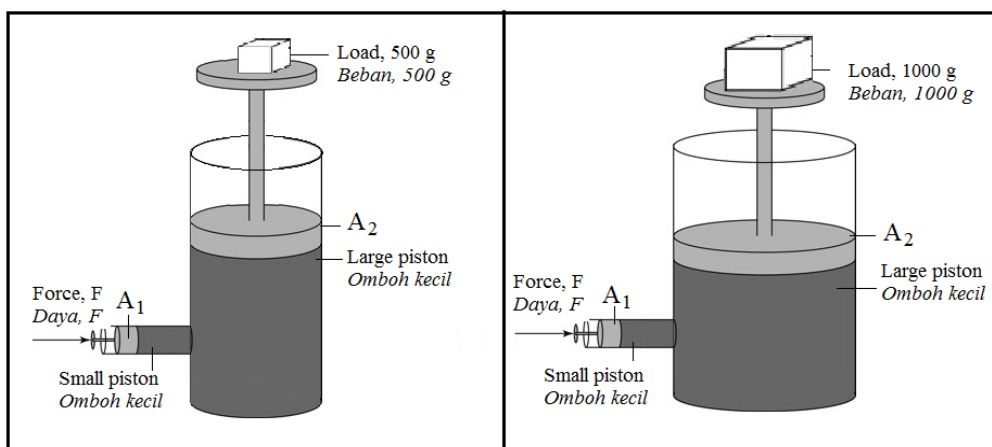


Diagram 5.1(a)
Rajah 5.1(a)

Diagram 5.1 (b)
Rajah 5.1(b)

(a) Name the principle involved in this hydraulic system.
Namakan prinsip yang terlibat dalam sistem hidraulik ini.

.....
[1 mark/markah]

5(a)

1

(b) Observe Diagram 5.1(a) and Diagram 5.1(b), compare
Perhatikan Rajah 5.1(a) dan Rajah 5.1(b), bandingkan

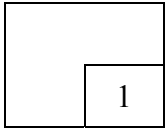
(i) the ratio of the cross sectional area of large piston to the small piston, $A_2:A_1$
Nisbah luas keratan rentas omboh besar kepada omboh kecil, $A_2:A_1$

.....
[1 mark/markah]

5(b)(i)

1

5(b)(ii)



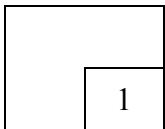
- (ii) the maximum weight that can be lifted up
berat maksimum yang boleh diangkat

.....
[1 mark/markah]

- (c) Based on your answer in (b), state the relationship between the ratio of the cross sectional area of large piston to the small piston, $A_2:A_1$ and the maximum weight that can be lifted up.

Berdasarkan jawapan anda dalam (b), nyatakan hubungan antara nisbah luas keratan rentas omboh besar kepada omboh kecil, $A_2:A_1$ dan berat maksimum yang boleh diangkat.

5(c)



.....
[1 mark/markah]

- (d) Diagram 5.3 shows the hydraulic system in Diagram 5.1(a). When a force, F exerted on the small piston, the piston displaced at d_1 . The large piston displaced at d_2 . The volume of liquid displaced in small piston and large piston are V_1 and V_2 respectively.

Rajah 5.3 menunjukkan sistem hidraulik dalam Rajah 5.1(a). Apabila suatu daya, F bertindak ke atas omboh kecil, omboh itu tersesar sejauh d_1 . Omboh besar pula tersesar sejauh, d_2 . Isipadu cecair yang tersesar dalam omboh kecil dan omboh besar masing-masing ialah V_1 dan V_2 .

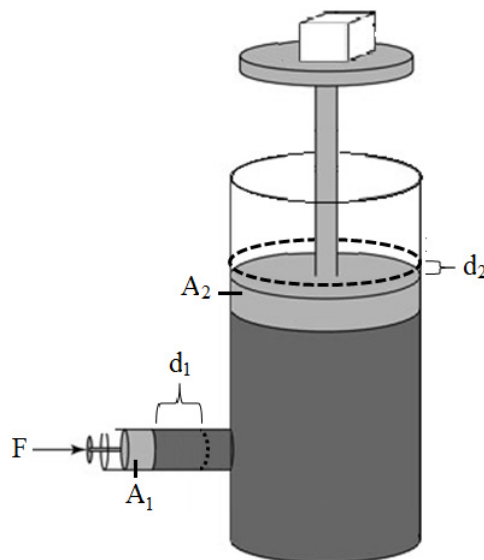


Diagram 5.3
Rajah 5.3

Based on Diagram 5.3, compare:
 Berdasarkan Rajah 5.3, bandingkan:

- (i) luas keratan rentas omboh kecil, A_1 dan omboh besar, A_2
cross sectional area of small piston, A_1 and large piston, A_2

.....
 [1 mark/markah]

5(d)(i)

	1
--	---

- (ii) displacement of the pistons, d_1 and d_2
sesaran omboh, d_1 dan d_2

.....
 [1 mark/markah]

5(d)(ii)

	1
--	---

- (iii) volume of liquid displaced in small piston and large piston, V_1 and V_2
isipadu cecair yang tersesar dalam omboh kecil dan omboh besar, V_1 dan V_2

.....
 [1 mark/markah]

5(d)(iii)

	1
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- (e) Based on your answer in (c), state the relationship between the cross sectional area and the displacement of pistons.

Berdasarkan jawapan anda dalam (b), nyatakan hubungan antara luas keratan rentas dan sesaran omboh.

.....

 [1 mark/markah]

5(e)

	1
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TOTAL
5A

	8
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- 6 Diagram 6.1 and Diagram 6.2 show an experiment to study a current-carrying conductor in a magnetic field.

Rajah 6.1 dan Rajah 6.2 menunjukkan satu eksperimen untuk mengkaji konduktor pembawa arus di dalam medan magnet.

When the switch is closed, the combination of the magnetic field and the current produced a resultant force. The copper rod pushed out at distance, d_1 . When the current is changed, the distance of copper rod change to d_2 .

Apabila suis dihidupkan, kombinasi medan magnet dan arus yang mengalir menyebabkan rod kuprum tertolak keluar pada jarak d_1 . Apabila nilai arus diubah, jarak rod kuprum berubah kepada d_2 .

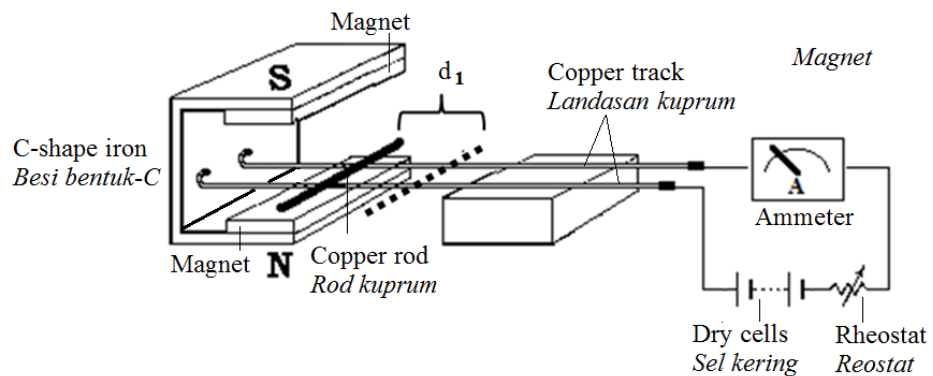


Diagram 6.1
Rajah 6.1

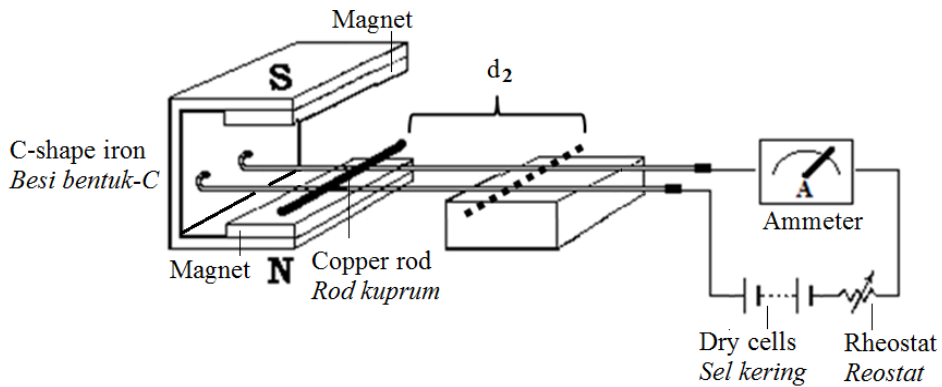


Diagram 6.2
Rajah 6.2

- (a) Name the rule used to determine the direction of the force.
Namakan peraturan yang digunakan untuk menentukan arah daya itu.

.....
 [1 mark/markah]

6(a)

	1
--	---

- (b) Based on Diagram 6.1 and Diagram 6.2, compare
Berdasarkan Rajah 6.1 dan Rajah 6.2, bandingkan

- (i) ammeter reading
bacaan ammeter

.....
 [1 mark/markah]

6(b)(i)

	1
--	---

- (ii) distance of copper rod
jarak rod kuprum

.....
 [1 mark/markah]

6(b)(ii)

	1
--	---

- (iii) the magnitude of force produced
magnitud daya yang dihasilkan

.....
 [1 mark/markah]

6(b)(iii)

	1
--	---

- (c) Based on your answer in (b), state the relationship between
Berdasarkan jawapan anda dalam (b), nyatakan hubungan antara

- (i) electric current and distance of copper rod
arus elektrik dengan jarak gerakan rod kuprum

.....
 [1 mark/markah]

6(c)(i)

	1
--	---

- (ii) electric current and the magnitude of force produced
arus elektrik dengan daya yang dihasilkan

.....
 [1 mark/markah]

6(c)(ii)

	1
--	---

(d) Diagram 6.3 shows a dc motor of a toy car and its inner structure.

Rajah 6.3 menunjukkan sebuah motor a.t. sebuah kereta mainan dan bahagian struktur dalamnya.



Diagram 6.3
Rajah 6.3

The rotation of the motor can be explained using Diagram 6.4
Putaran motor itu, boleh diterangkan menggunakan Rajah 6.4.

In Diagram 6.4, draw a pattern of resultant magnetic field lines or catapult field for a current carrying coil in a magnetic field. Label the direction of rotation.

Dalam Rajah 6.4, lukiskan medan magnet paduan atau medan lastik bagi gegelung pembawa arus di dalam medan magnet. Labelkan arah putaran.



Key/Petunjuk :
 ○ current out of paper
arus keluar dari kertas
 ● current into the paper
arus masuk ke dalam kertas

Diagram 6.4
Rajah 6.4

[2 marks/markah]

6(d)

	2
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TOTAL
6A

	8
--	---

- 7 Diagram 7.1 shows an amount of water in a small pot being heated using a 1000 W immersion heater.
 Diagram 7.2 shows how mass of the liquid change with time t during the heating.

Rajah 7.1 menunjukkan sejumlah air di dalam periuk kecil sedang dipanaskan oleh sebuah pemanas rendam 1000 W.

Rajah 7.2 menunjukkan bagaimana jisim cecair tersebut berubah dengan masa, t ketika pemanasan.

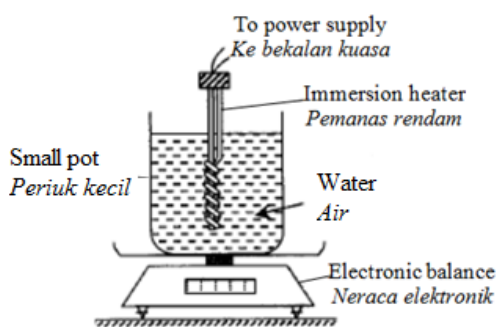


Diagram 7.1
 Rajah 7.1

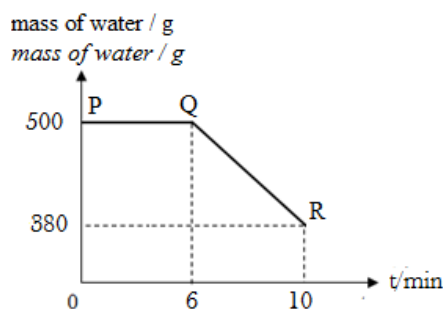


Diagram 7.2
 Rajah 7.2

- (a) What is meant by specific latent heat of vaporisation?
Apakah yang dimaksudkan dengan haba pendam tentu pengewapan?

[1 mark/markah]

7(a)

	1
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- (b) Based on Diagram 7.2, calculate
Berdasarkan Rajah 7.2, hitungkan
- (i) the amount of heat absorbed by the liquid during boiling.
kuantiti haba yang diserap oleh cecair itu ketika sedang mendidih.

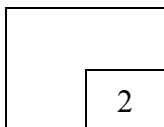
[2 marks/markah]

7(b)(i)

	2
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- (ii) specific latent heat of vaporisation of the liquid.
haba pendam tentu pengewapan cecair itu

7(b)(ii)

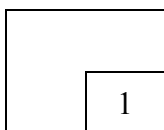


[2 marks/markah]

- (c) What happens to the gradient of QR in Diagram 7.2, when the activity is carried out at a mountaintop?

Apakah yang terjadi kepada kecerunan graf QR dalam Rajah 7.2 apabila aktiviti itu dilaksanakan di puncak gunung?

7(c)



[1 mark/markah]

- (d) An egg is put into the pot. State the modification based on the following aspects so that the egg would cook faster. Explain your answer.

Sebiji telur dimasukkan ke dalam periuk itu. Nyatakan pengubahsuaian yang perlu dilakukan berdasarkan aspek-aspek berikut supaya telur itu cepat masak. Terangkan jawapan anda

- (i) Power of immersion heater:

Kuasa pemanas:

.....

Reason:

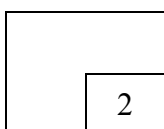
Alasan:

.....

.....

[2 marks/markah]

7(d)(i)



- (ii) Specific heat capacity of the pot
Muatan haba tentu periuk

.....

Reason:

Alasan:

.....

.....

[2 marks/markah]

7(d)(ii)

2

**TOTAL
7A**

10

- 8 A circuit breaker is an automatic switch, which trips when the current flowing exceeds a safe specific safe value.
 Diagram 8 shows how an electric kettle, a bread toaster and a microwave oven are connected to a 20 A circuit breaker.

*Suatu pemutus litar adalah suatu suis automatik, yang akan memutuskan litar apabila arus yang mengalir melampaui suatu had selamat.
 Rajah 8 menunjukkan bagaimana suatu cerek elektrik, suatu pembakar roti dan suatu mikrowave oven disambungkan kepada pemutus litar 20 A.*

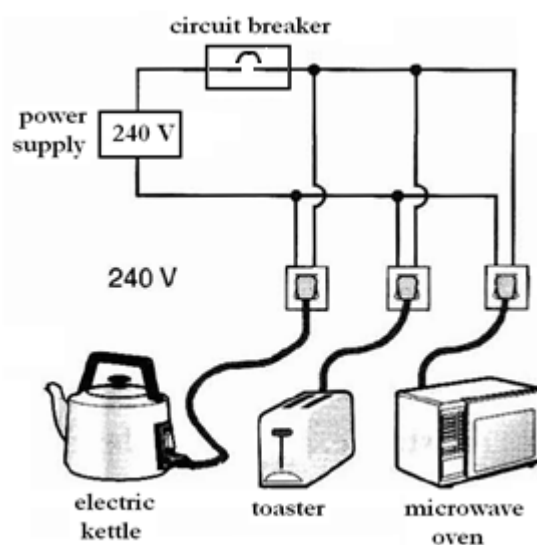
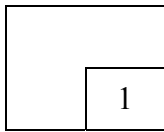


Diagram 8
Rajah 8

8(a)



- (a) Underline the correct answer in the bracket to complete the sentence below.

The electrical appliances in Diagram 8 are connected in (**series, parallel**)

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

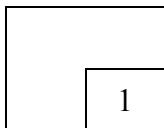
*Alat-alat elektrik dalam Rajah 8 disambung secara (**sesiri, selari**)*

[1 mark/markah]

- (b) The toaster in Diagram 8 is labelled '240 V, 1100 W'.
Pembakar roti dalam Rajah 8 berlabel '240 V, 1100 W'.

- (i) What is meant by '240 V, 1100 W'?
Apakah yang dimaksudkan dengan '240 V, 1100 W'?

8(b)(i)

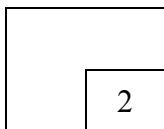


.....
.....

[1 mark/markah]

- (ii) Calculate the current that passes through the toaster.
Hitung arus yang mengalir melalui pembakar roti itu.

8(b)(ii)



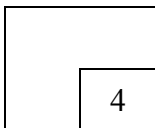
[2 mark/markah]

- (c) Given the resistance of the electric kettle is 28 Ω, the bread toaster is 30 Ω, the microwave oven is 20 Ω and the power supply supplies 240 V to the circuit.

Diberi rintangan bagi cerek elektrik ialah 28 Ω, pembakar roti ialah 30 Ω, ketuhar mikro ialah 20 Ω dan bekalan kuasa membekalkan 240 V kepada litar itu.

- (i) Calculate the current flow through each electrical appliance.
Kira arus yang mengalir pada setiap alat elektrik itu.

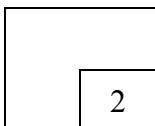
8(c)(i)



[4 marks/markah]

- (ii) Calculate the total current flowing when the three appliances are used concurrently.
Hitung jumlah arus yang mengalir apabila ketiga-tiga alat elektrik dipasang pada masa yang sama.

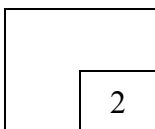
8(c)(ii)



[2 marks/markah]

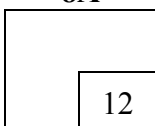
- (iii) Will the circuit breaker trip when all the three appliances are used concurrently? Give a reason for your answer.
Mungkinkah pemutus litar memutuskan bekalan elektrik apabila ketiga-tiga alat elektrik digunakan pada masa yang sama? Berikan satu sebab bagi jawapan anda.

8(c)(iii)



[2 marks/markah]

TOTAL
8A



Bahagian B
Section B

[20 markah]
[20 marks]

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

- 9 Diagram 9.1(a) and Diagram 9.1(b) shows a light ray path entering a semicircular glass block of pyrex and a semicircular glass block of flint glass.

Rajah 9.1(a) dan Rajah 9.1(b) menunjukkan satu sinar cahaya memasuki satu blok semibulatan kaca 'pyrex' dan dan blok semibulatan kaca 'flint'.

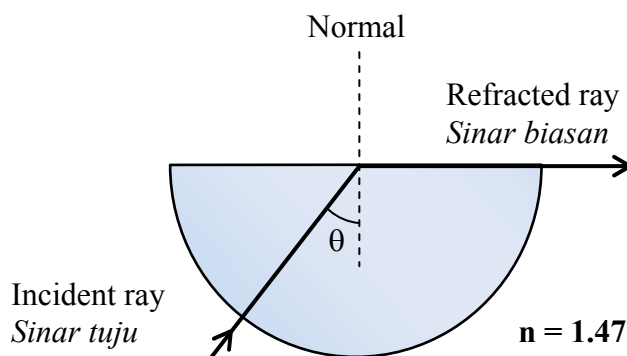


Diagram 9.1(a)
Rajah 9.1(a)

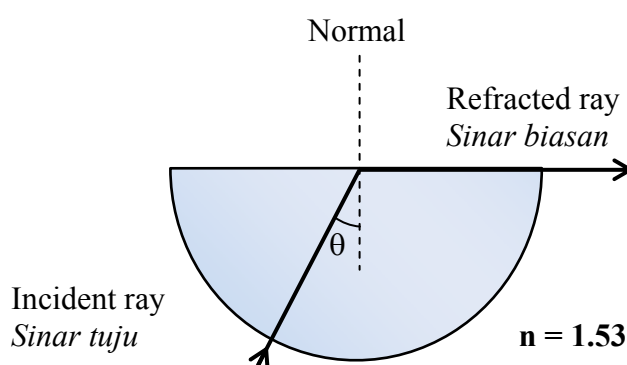


Diagram 9.1(b)
Rajah 9.1(b)

- (a) What is meant by refractive index?
Apakah maksud indeks biasan?

[1 mark/markah]

(b) Based on Diagram 9.1(a) and Diagram 9.1(b),
 Berdasarkan Rajah 9.1(a) dan Rajah 9.1(b),

(i) Compare the refractive index, n , the angle of incidence, θ and the angle of refraction.
 Bandingkan indeks biasan, n , sudut tuju, θ dan sudut biasan cahaya.

Name the angle of incidence, θ , when the incident ray produces refracted ray as shown in Diagram Rajah 9.1(a) and Rajah 9.1(b).

(ii) State the relationship between the respective angle and refractive index of the medium.

Namakan sudut tuju, θ , apabila sinar tuju itu menghasilkan sinar biasan seperti dalam Rajah 9.1(a) dan Rajah 9.1(b).

Nyatakan hubungan antara sudut berkenaan dengan indeks biasan medium.

[5 marks/ markah]

(c) Diagram 9.2(a) shows a part of optical fibre made of glass. Diagram 9.2 (b) shows light signals travelling through the optical fibre.

Rajah 9.2 (a) menunjukkan satu potongan gentian optik yang diperbuat daripada kaca. Rajah 9.2(b) menunjukkan isyarat-isyarat cahaya yang bergerak melalui gentian optik itu.

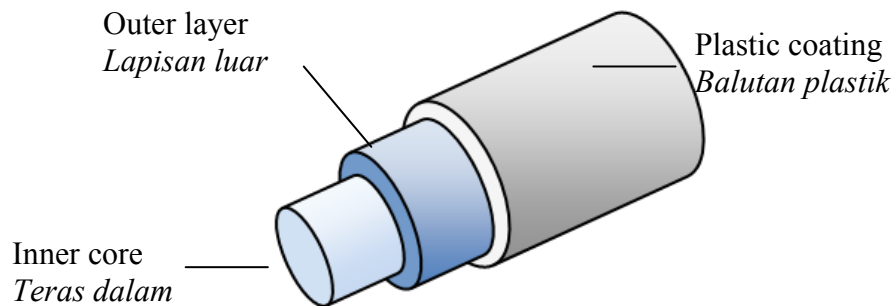


Diagram 9.2(a)
 Rajah 9.2(a)

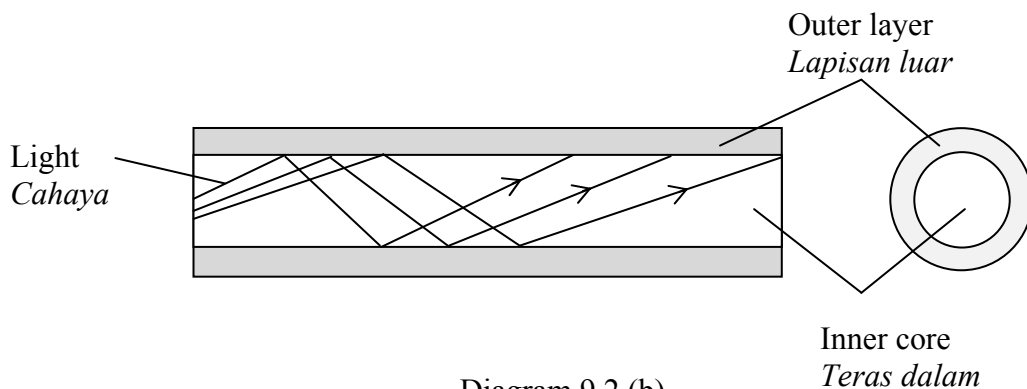


Diagram 9.2 (b)
 Rajah 9.2(b)

Explain how the light rays follow the path as shown in Diagram 9.2 (b).

Terangkan bagaimana sinar cahaya mengikuti lintasan seperti ditunjukkan dalam Rajah 9.2(b).

[4 marks/markah]

- (d) Diagram 9.3 shows two optical fibres used in telecommunications and medicine.
Rajah 9.3 menunjukkan gentian optik yang digunakan dalam bidang komunikasi dan perubatan.

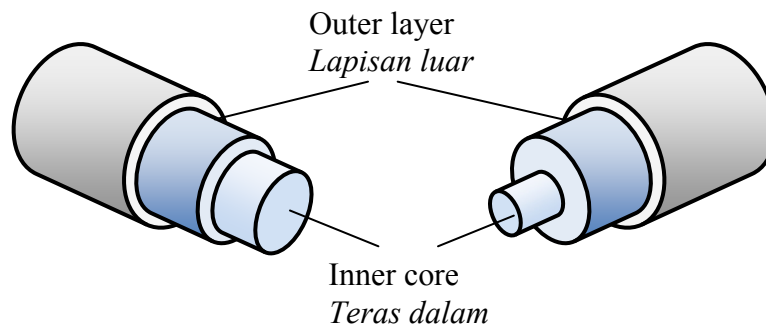


Diagram 9.3
Rajah 9.3

You are required to give suggestions to determine the optical fibre which is capable to transfer a large amount signals in communication simultaneously and for long distance cabling.

Anda dikehendaki memberi cadangan pengubahsuaian gentian optik yang mampu membawa banyak isyarat komunikasi secara serentak dan untuk perkabelan jarak yang jauh.

State and explain suggestions based on following aspect :

Nyata dan terangkan pengubahsuaian berdasarkan aspek-aspek berikut;

- (i) Diameter of inner core
Diameter teras dalam
- (ii) Refractive index of the inner core
Indeks biasan teras dalam
- (iii) Refractive index of the outer layer
Indeks biasan lapisan luar
- (iv) Flexibility
Kelenturan
- (v) Purity of inner core
Ketulenan teras dalam

[10 marks/markah]

10 Diagram 10.1 and Diagram 10.2 show traces on the screen of a Cathode Ray Oscilloscope (C.R.O) when connected to two outputs of an alternating current (ac) generators of different frequency.

Rajah 10.1 dan Rajah 10.2 menunjukkan surihan pada skrin sebuah Osiloskop Sinar Katod (O.S.K) apabila disambung kepada output sebuah penjana arus ulang alik (au) yang berbeza frekuensi.

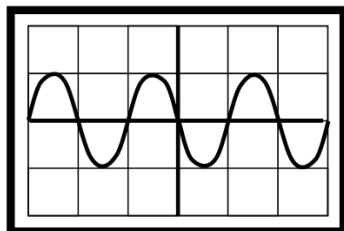


Diagram 10.1
Rajah 10.1

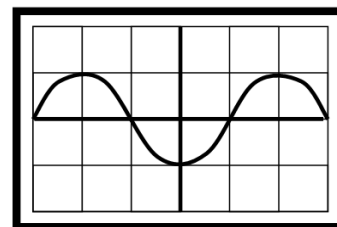


Diagram 10.2
Rajah 10.2

(a) What is meaning of frequency?
Apakah maksud frekuensi?

[1 mark/ markah]

(b) Using Diagram 10.1 and Diagram 10.2, compare the amplitude, number of complete oscillations and period of the traces. Relate the number of complete oscillations with the period of oscillation to make a deduction regarding the relationship between period and frequency.

Menggunakan Rajah 10.1 dan Rajah 10.2, bandingkan amplitud, bilangan ayunan lengkap dan tempoh bagi surihan itu. Hubungkait bilangan ayunan lengkap dengan tempoh ayunan untuk membuat satu deduksi berkaitan dengan hubungan antara tempoh dengan frekuensi.

[5 marks/ markah]

(c) Diagram 10.3 shows a loud speaker that produces sound waves in air.
Rajah 10.3 menunjukkan satu pembesar suara yang menghasilkan gelombang bunyi di udara.

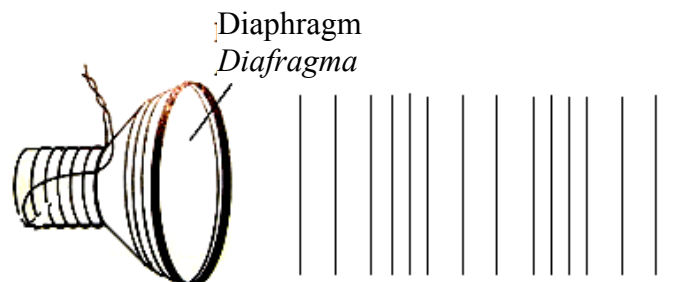


Diagram 10.3
Rajah 10.3

Explain how a sound wave is produced.

Terangkan bagaimana gelombang bunyi dihasilkan.

[4 marks/ markah]

(d) Diagram 10.4 shows a wireless router.

Rajah 10.4 menunjukkan satu penghala tanpa wayar.

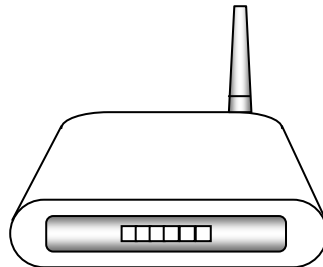


Diagram 10.4

Rajah 10.4

As an electronic engineer you are required to design a new wireless router. Using appropriate physics concepts, explain the modifications should be done on the wireless router so that it can be transmitted data efficiently.

Sebagai seorang jurutera elektronik, anda diminta mereka bentuk penghala tanpa wayar. Dengan menggunakan konsep-konsep fizik yang sesuai, terangkan pengubahsuaian yang perlu dilakukan ke atas penghala tanpa wayar itu supaya ia boleh menghantar data dengan lebih cekap.

Your answer should include the following aspects:

Jawapan anda hendaklah merangkumi aspek-aspek berikut:

- (i) Suggestion location of wireless should be installed
Cadangan lokasi penghala tanpa wayar dipasang
- (ii) Type of electromagnetic wave transmitted
Jenis gelombang electromagnet yang dipancarkan
- (iii) Frequency of the wave transmitted
Frekuensi gelombang yang dipancarkan
- (iv) Density of material used
Ketumpatan bahan yang digunakan
- (v) Number of antenna equipped
Bilangan antena dipasang

[10 marks/markah]

Bahagian C
Section C
[20 mark/marks]

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

- 11 (a) Diagram 11.1 show a pestle and mortar.
Rajah 11.1 menunjukkan satu lesung batu.

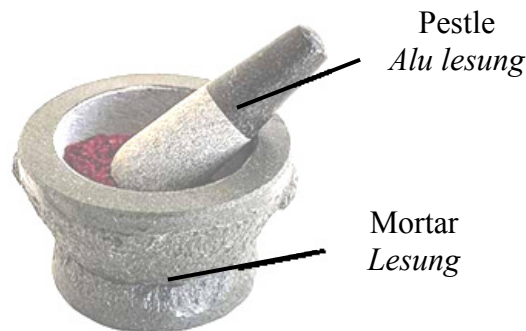


Diagram 11.1
Rajah 11.1

- (i) What is meant by impulsive force?
Apakah maksud daya impuls?
- [1 mark/markah]
- (ii) Explain how the pestle and mortar can be used to grind food easily.
Terangkan bagaimana alu dan lesung dapat digunakan untuk menghancurkan makanan dengan mudah.
- [4 marks/markah]

- (b) Diagram 11.2 shows a pile planter model used in a construction site. You are required to study the characteristics of the models pile K, L, M and N in Table 2.

Rajah 11.2 menunjukkan satu model penanam cerucuk yang digunakan pada satu tapak pembinaan bangunan. Anda dikehendaki mengkaji ciri-ciri model-model pelantak cerucuk K, L, M dan N dalam Jadual 2.

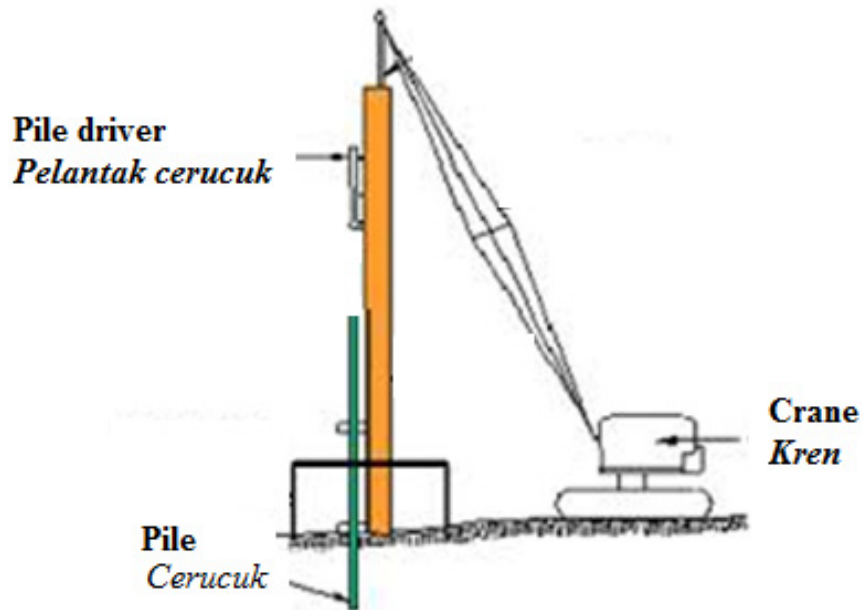


Diagram 11.2
Rajah 11.2

Explain the suitability of each characteristic pile driver that will make the piling works in the construction site will be more efficient.

Terangkan kesesuaian setiap ciri pelantak cerucuk yang akan menjadikan kerja menanam cerucuk di kawasan pembinaan menjadi lebih berkesan.

Determine the most suitable pile driver.

Tentukan pelantak cerucuk yang paling sesuai.

Pile Driver <i>elantak cerucuk</i>	Mass of pile driver <i>Jisim pelantak cerucuk /kg</i>	Maximum height from pile <i>Ketinggian maksimum dari cerucuk /m</i>	Hardness of pile driver <i>Kekerasan Pelantak cerucuk</i>	Engine power of crane <i>Kuasa enjin kren</i>
K	700	6.5	Hard <i>Keras</i>	Moderate <i>Sederhana</i>
L	800	6.0	Very hard <i>Sangat keras</i>	Low <i>Rendah</i>
M	850	7.0	Very hard <i>Sangat keras</i>	High <i>Tinggi</i>
N	870	6.0	Hard <i>Keras</i>	Moderate <i>Sederhana</i>

Table 2
Jadual 2

[10 marks/markah]

- (c) Diagram 11.3 shows a pile driver and a pile is used at building location. The mass of the pile driver is 500 kg.

Rajah 11.3 menunjukkan satu pelantak cerucuk dan cerucuk yang digunakan di tempat pembinaan. The mass of the pile driver is 500 kg.

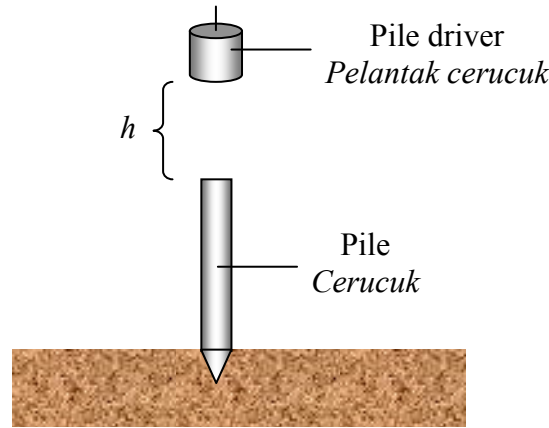


Diagram 11.3
Rajah 11.3

The pile driver is released from a height, h , to hit a pile. The velocity of the pile driver just before it hits the pile is 12 m s^{-1} .

Pelantak cerucuk itu dilepaskan dari ketinggian, h , untuk menghentam cerucuk. Halaju pelantak cerucuk sebelum menghentam cerucuk ialah 12 ms^{-1} .

- (i) By using the principle of conservation of energy, calculate the height, h .
Dengan menggunakan prinsip keabadian tenaga, hitung tinggi h .

[2 marks/markah]

- (ii) The pile driver and the pile move together with velocity 2.0 m s^{-1} just after the collision. Calculate the change of momentum of the pile driver.
Pelantak cerucuk dan cerucuk bergerak bersama sebaik selepas hentaman dengan halaju 2.0 m s^{-1} . Hitungkan perubahan momentum yang dialami oleh pelantak

[2 marks/markah]

- (iii) Calculate the impulsive force acts on the pile.
Hitungkan daya impuls yang bertindak ke atas cerucuk.

[1 marks/markah]

- 12 (a) Diagram 12.1 shows a nuclear reaction.
Rajah 12.1 menunjukkan satu tindak balas nuklear.

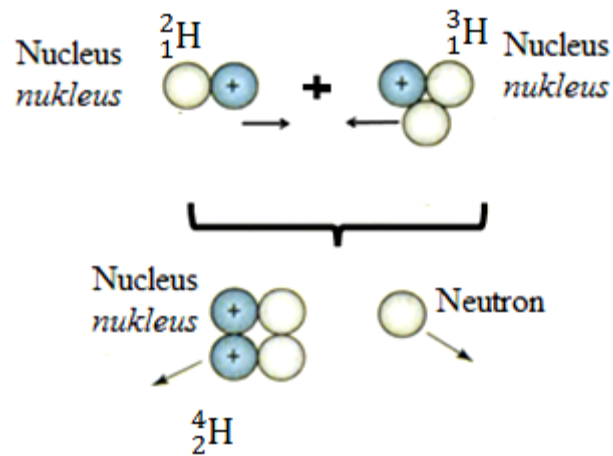


Diagram 12.1
Rajah 12.1

- (i) What is the type the nuclear reaction as shown in Diagram 12.1?
Apakah jenis tindakbalas nuklear yang ditunjukkan dalam Rajah 12.1?
- [1 mark/markah]
- (ii) Nuclear fusion produces a lot of energy. With the aid of an example, explain how nuclear fusion reaction occurs.
Pelakuran nukleus menghasilkan tenaga nuklear yang tinggi. Dengan bantuan contoh, terangkan bagaimana pelakuran nukleus berlaku.

[4 marks/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.

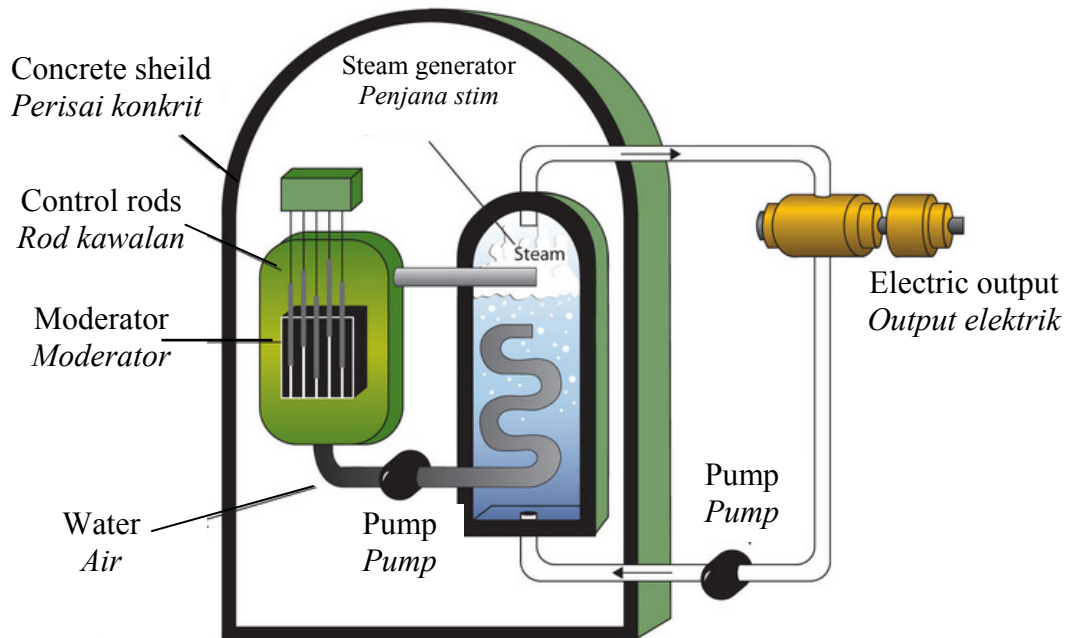


Diagram 12.2/ *Rajah 12.2*

You are required to investigate the characteristics of the features in the nuclear reactor as shown in Table 3.

Anda dikehendaki menyiasat ciri-ciri bahagian dalam reaktor nuklear seperti yang ditunjukkan dalam Jadual 3.

Reactor Reaktor	Material for the moderator <i>Bahan untuk moderator</i>	Material for the control rod <i>Bahan untuk rod Pengawal</i>	Material for the coolant <i>Bahan untuk penyejuk</i>	Thickness of concrete shield <i>Ketebalan perisai Konkrit</i>
P	Graphite <i>Grafit</i>	Krypton <i>Krypton</i>	Oil <i>Minyak</i>	Thin <i>Nipis</i>
Q	Iron <i>Besi</i>	Boron <i>Boron</i>	Oil <i>Minyak</i>	Thin <i>Nipis</i>
R	Graphite <i>Grafit</i>	Boron <i>Boron</i>	Heavy water <i>Air berat</i>	Thick <i>Tebal</i>
S	Iron <i>Besi</i>	Krypton <i>Krypton</i>	Heavy water <i>Air berat</i>	Thick <i>Tebal</i>

Table 3
Jadual 3

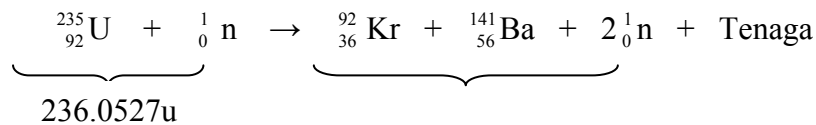
Explain the suitability of each characteristic of the features in the nuclear reactor which can generate a controlled nuclear reaction safely. Determine the most suitable reactor to be used. Give reasons for your choice.

Terangkan kesesuaian ciri setiap bahagian dalam reaktor nuklear 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:



Total mass of the particles involved before and after the reaction is given.

Jumlah jisim zarah-zarah yang terlibat sebelum dan selepas tindak balas diberikan.

[1 u = 1.66 x 10⁻²⁷ kg]

Hitung,

Calculate,

- (i) Cacat jisim
Mass defect
- (ii) Energy released,
Tenaga yang dibebaskan
- (iii) Power generated in 5 μs.
Kuasa yang dijanakan dalam 5 μs.

[5 marks/markah]

**END OF QUESTION PAPER
KERTAS SOALAN TAMAT**