



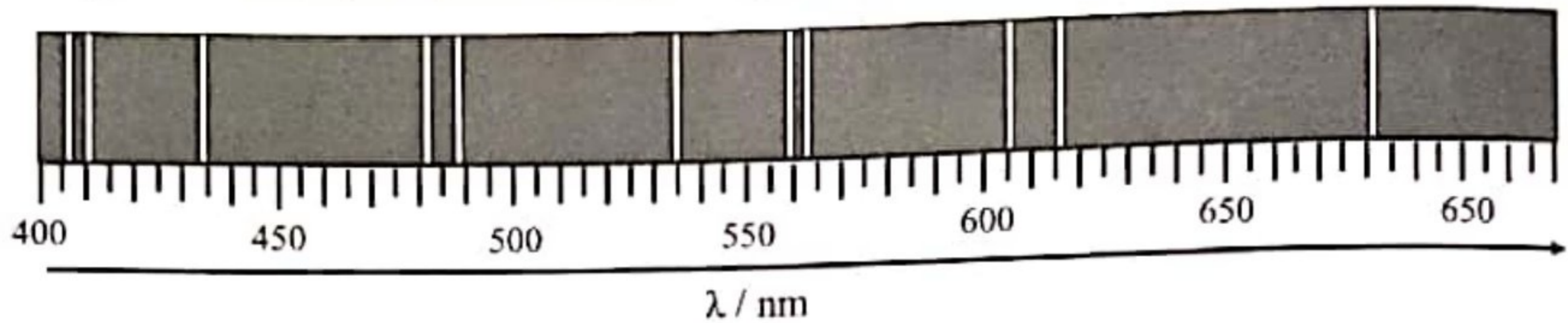
PHYSICS
Workshop
2022

SEMINAR
FIZIK
SMAKL
2022

Bahagian A
Section A
[60 markah]
[60 marks]

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

1 Rajah 1 menunjukkan sebahagian daripada spektrum elektromagnet.
Diagram 1 shows part of electromagnetic spectrum.



Rajah 1
Diagram 1

(a) Tandakan (✓) untuk jawapan yang betul dalam petak yang disediakan.
Tick (✓) for the correct answer in the box provided.

Jenis spektrum yang ditunjukkan dalam Rajah 1 adalah
The type of spectrum shown in Diagram 1 is

- spektrum selangar
continous spectrum
- spektrum garis
line spectrum

[1 markah]
[1 mark]

1(a)

	1
--	---

(b) Berdasarkan Rajah 1, namakan kuantiti fizik yang diwakili oleh anak panah.
Based on Diagram 1, name the physics quantity represented by the arrow.

.....
[1 markah]
[1 mark]

1(b)

	1
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- (c) (i) Gariskan jawapan yang betul pada pernyataan di bawah:
Underline the correct answer at the statement below:

Selain Max Planck dan Albert Einstein, (Isaac Newton / Louis de Broglie) juga merupakan ahli fizik yang memperkenalkan idea tentang teori kuantum.
Besides Max Planck and Albert Einstein, (Isaac Newton / Louis de Broglie) also one of the physicist who introduced the idea of quantum theory.

[1 markah]
[1 mark]

1(c)(i)

	1
--	---

- (ii) Apakah yang berlaku kepada tenaga foton sekiranya frekuensi cahaya bertambah?

What happens to the photon energy if the frequency of light increases?

[1 markah]
[1 mark]

1(c)(ii)

	1
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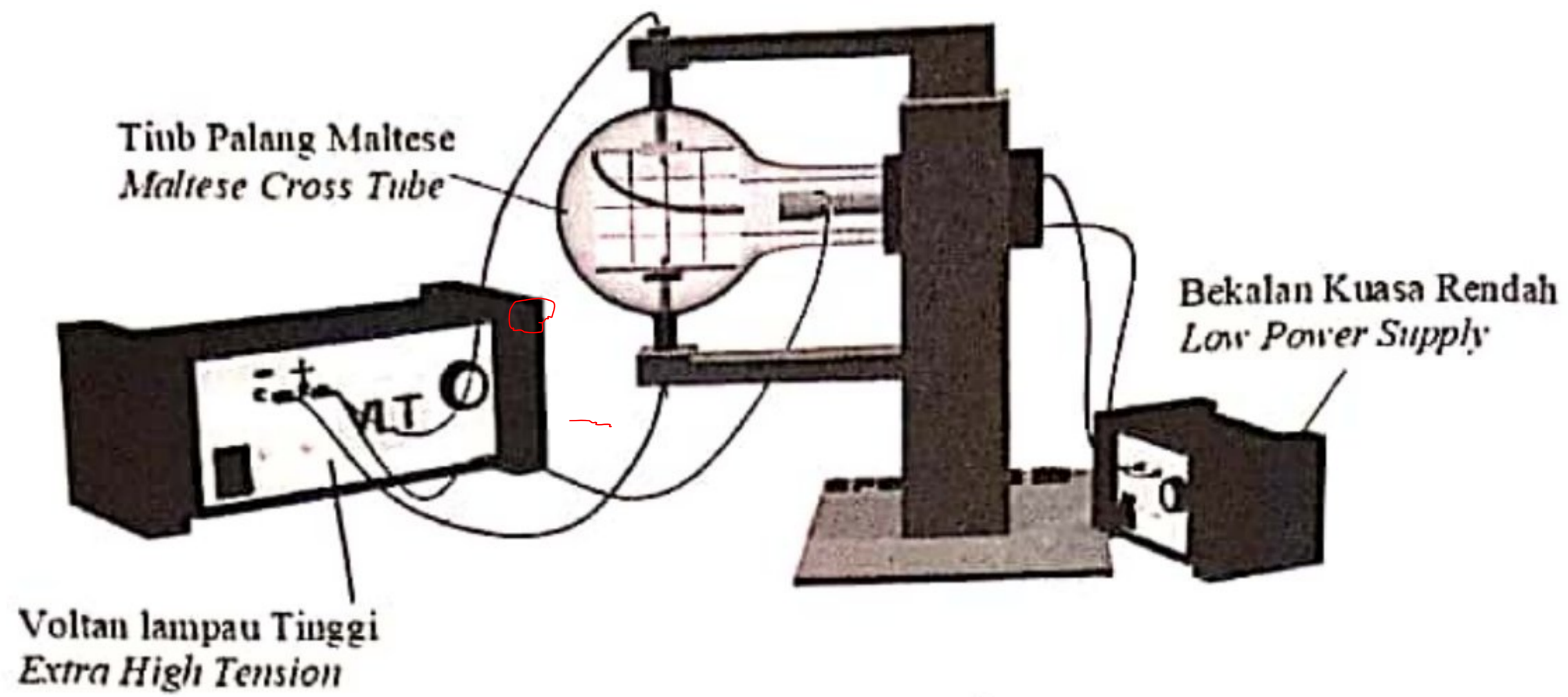
Jumlah
A1

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SULIT

	4
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- 2 Rajah 2.1 menunjukkan sebuah tiub pemesongan yang digunakan untuk memerhatikan sifat elektron (sinar katod) dengan bekalan kuasa voltan lampau tinggi (VLT) 6 000V.

Diagram 2.1 shows a deflection tube used to observe the properties of electrons (cathode ray) with a 6 000 V extra high tension (EHT) power supply.



Rajah 2.1
Diagram 2.1

2(a)

1

- (a) Nyatakan maksud sinar katod.
State the meaning of cathode ray.



.....

[1 markah]

[1 mark]

- (b) Hitungkan tenaga elektrik yang dimiliki oleh setiap elektron.
Calculate the electrical energy possessed by each electron.



2(b)

2

[2 markah]

[2 marks]

(c) Pertambahan nilai voltan bekalan kuasa rendah tidak meningkatkan sudut pesongan elektron. Jelaskan mengapa.

Increasing the value of power supply does not increase the angle of deflection of the electron. Explain why.



.....

.....

.....

[2 markah]
[2 marks]

2(c)

2

Jumlah
A2

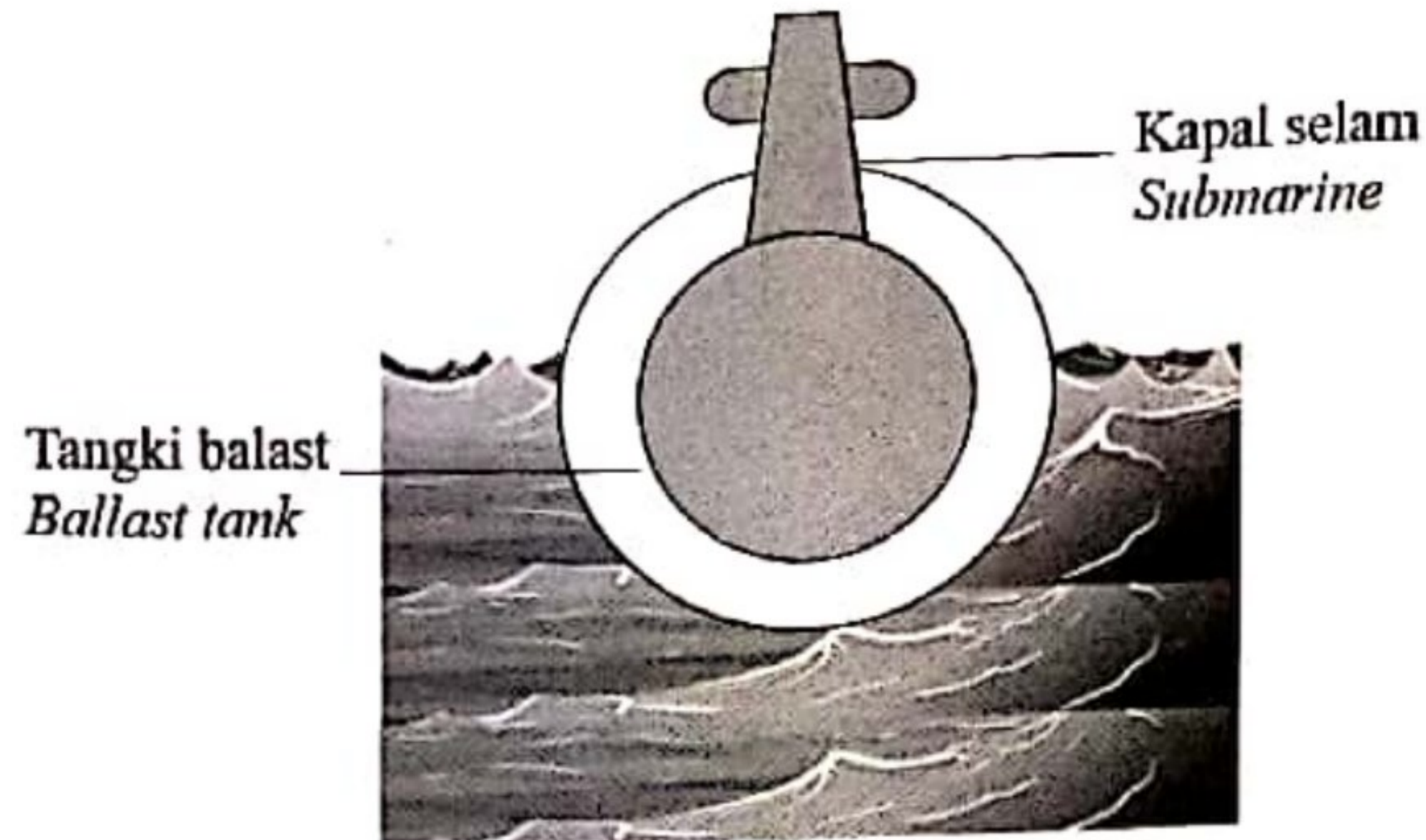
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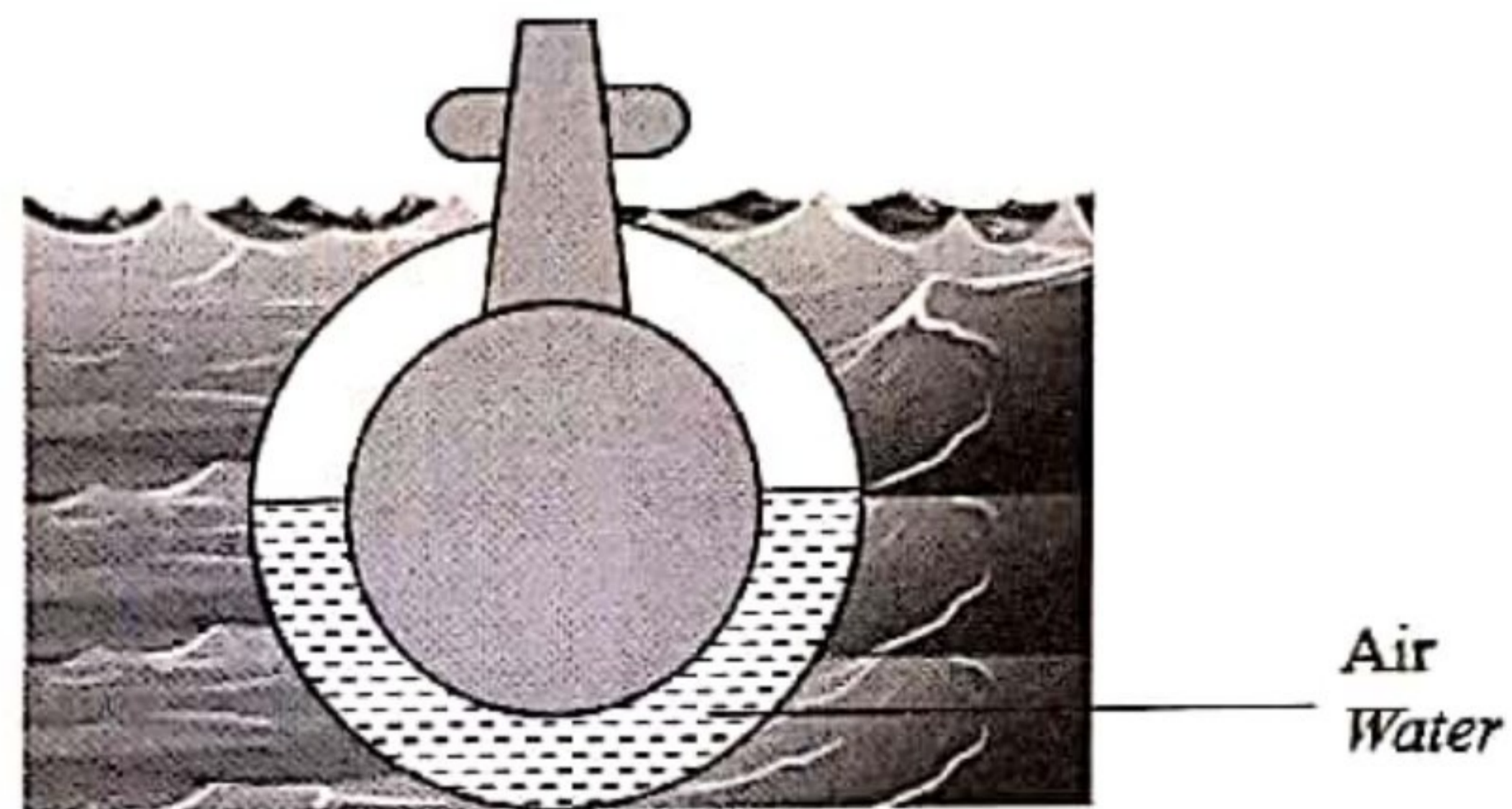
5 Rajah 5.1 menunjukkan sebuah kapal selam dengan tangki balast yang kosong terapung di dalam laut. Rajah 5.2 menunjukkan kapal selam itu tenggelam apabila air dimasukkan ke dalam tangki balast.

Diagram 5.1 shows a submarine with an empty ballast tank floating in the sea.

Diagram 5.2 shows the submarine submerged when water is filled into the ballast tank.



Rajah 5.1
Diagram 5.1



Rajah 5.2
Diagram 5.2

(a) Tandakan (✓) untuk jawapan yang betul dalam petak yang disediakan.
Tick (✓) for the correct answer in the box provided.

Daya apungan ialah
Buoyant force is

Daya yang bertindak ke arah atas pada objek yang tenggelam dalam cecair
The force acting upwards on an object immersed in a liquid

Berat air yang disesarkan apabila suatu objek tenggelam dalam cecair
The weight of water displaced when an object immersed in a liquid

[1 markah]

[1 mark]

5(a)

1

(b) Perhatikan Rajah 5.1 dan Rajah 5.2, bandingkan
Observe Diagram 5.1 and Diagram 5.2, compare

(i) Berat kapal selam
Weight of the submarine



.....
[1 markah]
[1 mark]

5(b)(i)

	1
--	---

(ii) Berat air disesarkan
Weight of water displaced



.....
[1 markah]
[1 mark]

5(b)(ii)

	1
--	---

(iii) Daya apungan
Buoyant force



.....
[1 markah]
[1 mark]

5(b)(iii)

	1
--	---

(c) Hubungkaitkan berat air disesarkan dengan daya apungan
Relate weight of water displaced and buoyant force



.....
[1 markah]
[1 mark]

5(c)

	1
--	---

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



.....
[1 markah]
[1 mark]

5(d)

	1
--	---

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SULIT

- (e) Berdasarkan Rajah 5.2, jika isipadu air laut yang disesarkan oleh kapal selam ialah $1.2 \times 10^9 \text{ cm}^3$,
Based on Diagram 5.2, if the volume of sea water displaced by the submarine is $1.2 \times 10^9 \text{ cm}^3$,

[Diberi ketumpatan air laut = $1\,020 \text{ kgm}^{-3}$]

[Given the density of sea water = $1\,020 \text{ kgm}^{-3}$]

- (i) kira berat air laut yang disesarkan oleh kapal selam.
calculate the weight of sea water displaced by the submarine.



5(e)(i)

2

[2 markah]

[2 marks]

- (ii) Berapakah daya apungan yang bertindak ke atas kapal selam?
What is the buoyant force acted on the submarine?



5(e)(ii)

1

[1 markah]

[1 mark]

Jumlah

A5

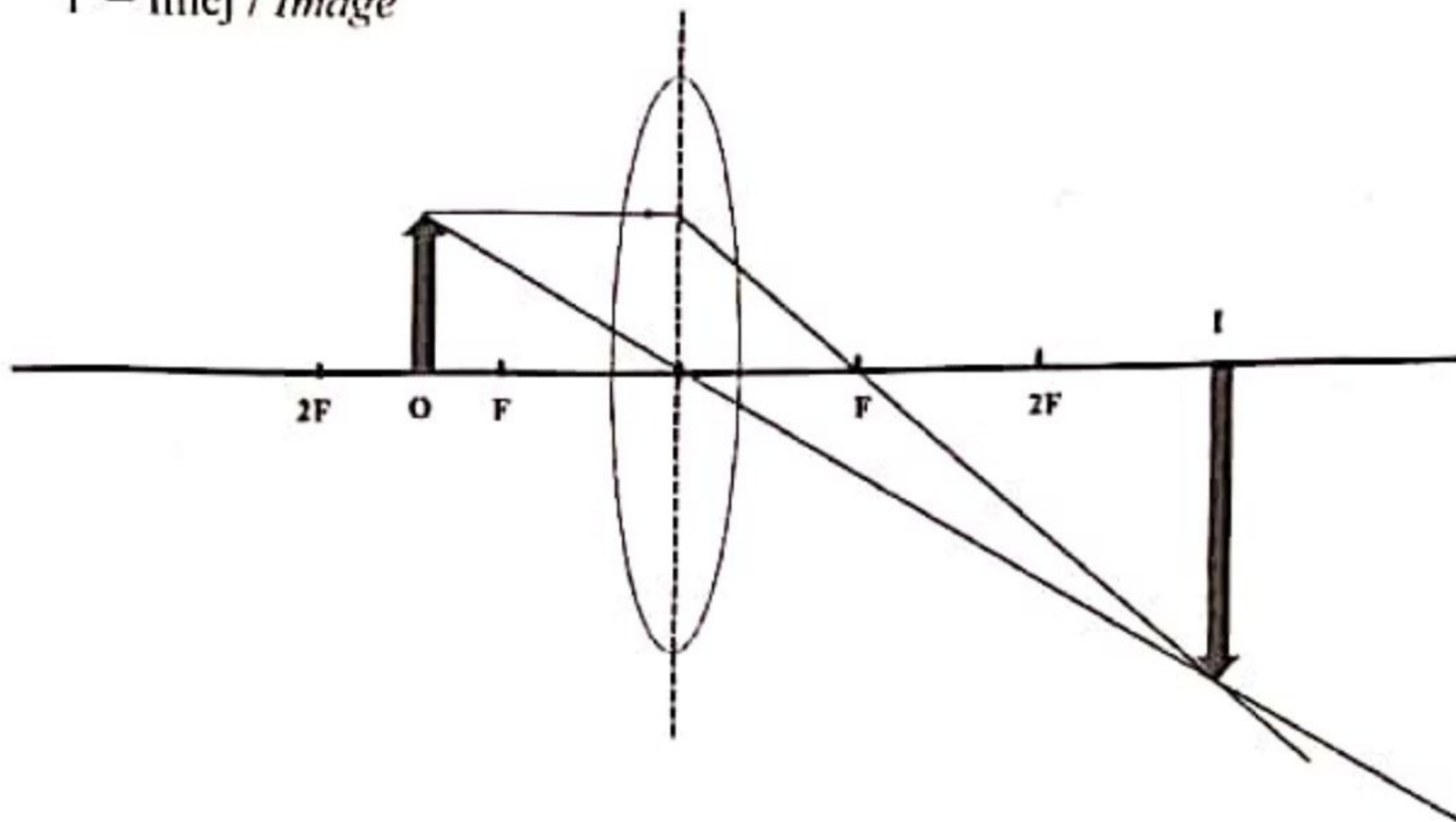
9

- 6 Rajah 6.1 and Rajah 6.2 menunjukkan rajah sinar bagi satu objek tegak yang berada pada dua jarak yang berbeza di hadapan satu kanta cembung yang sama.

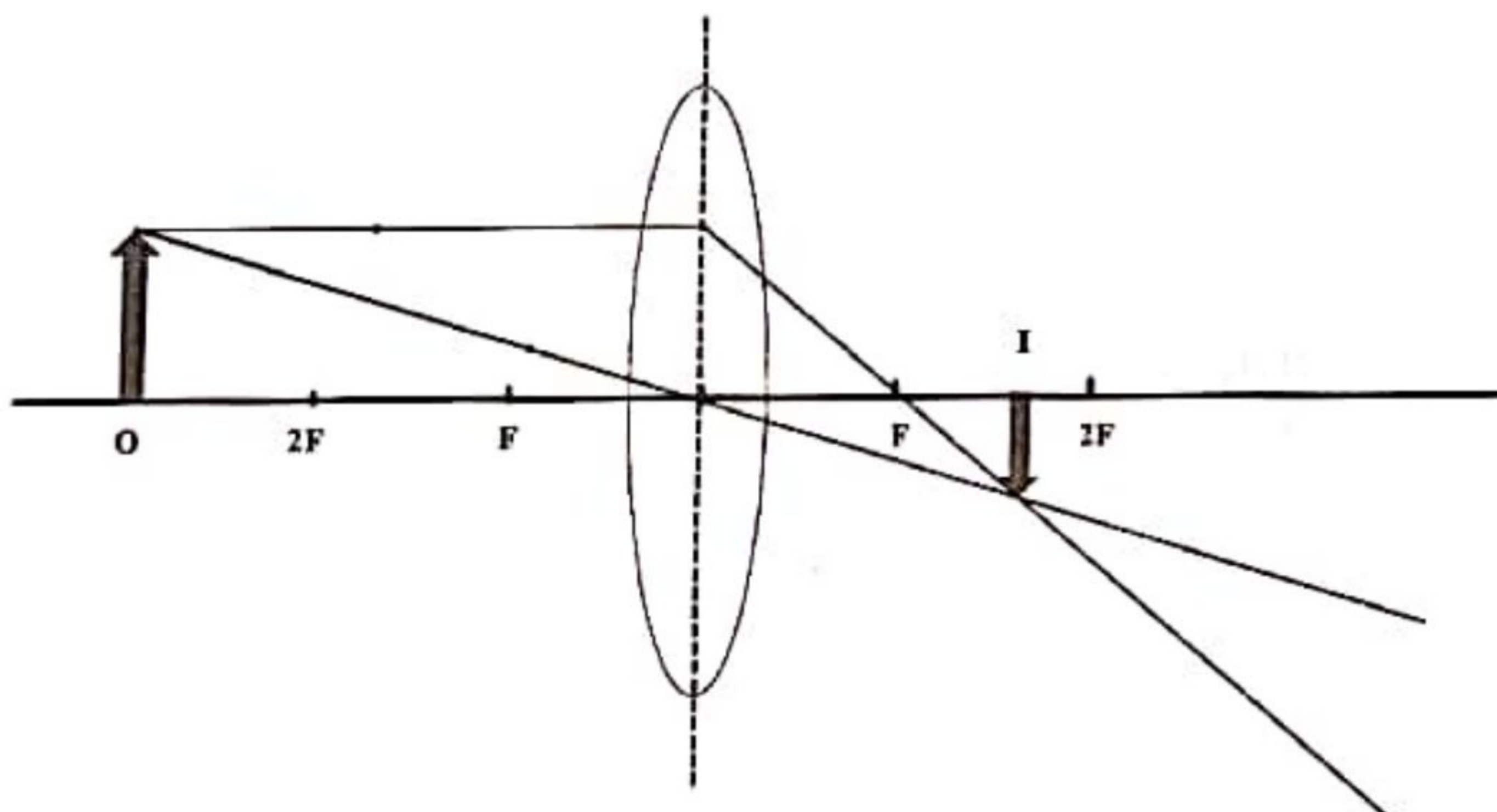
Diagram 6.1 and Diagram 6.2 show the ray diagram for an upright object that is at two different distances in front of an identical convex lens.

O = Objek / Object

I = Imej / Image

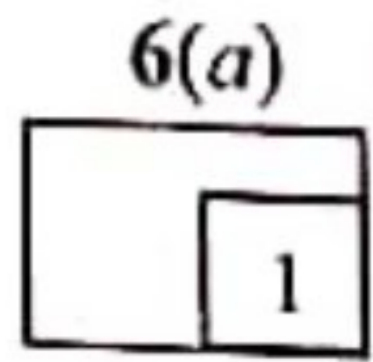


Rajah 6.1
Diagram 6.1



Rajah 6.2
Diagram 6.2

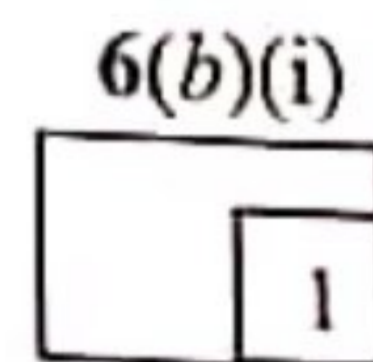
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(a) Namakan fenomena cahaya yang terlibat
Name the light phenomenon involved.



.....
[1 markah]
[1 mark]

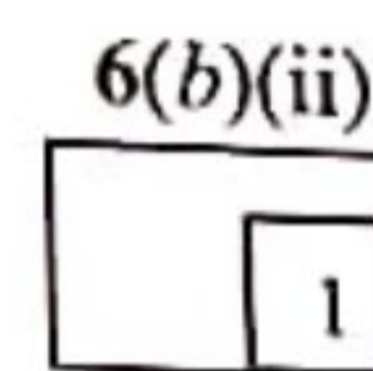


(b) Berdasarkan Rajah 6.1 dan Rajah 6.2,
Based on Diagram 6.1 and Diagram 6.2,

(i) Bandingkan jarak objek
Compare the object distance



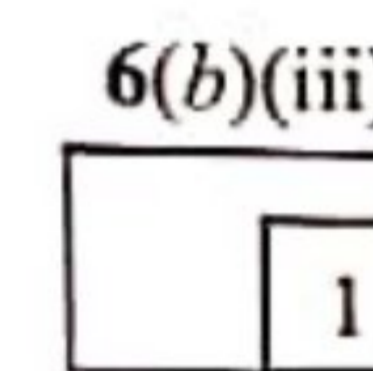
.....
[1 markah]
[1 mark]



(ii) Bandingkan jarak imej
Compare the image distance



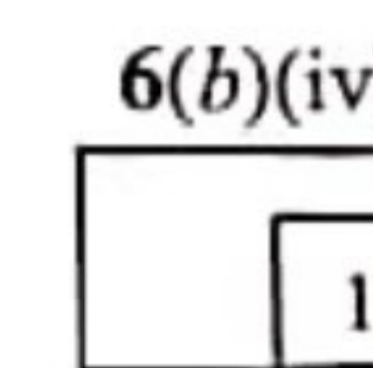
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[1 markah]
[1 mark]



(iii) Bandingkan saiz imej
Compare the size of image



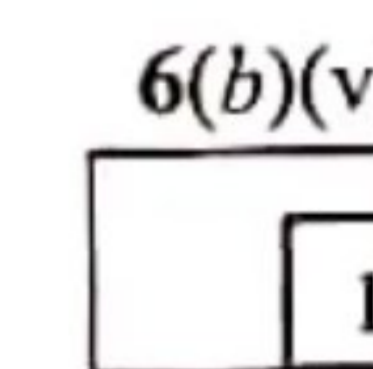
.....
[1 markah]
[1 mark]



(iv) Hubungkan jarak objek dengan jarak imej
Relate the object distance with the image distance



.....
[1 markah]
[1 mark]

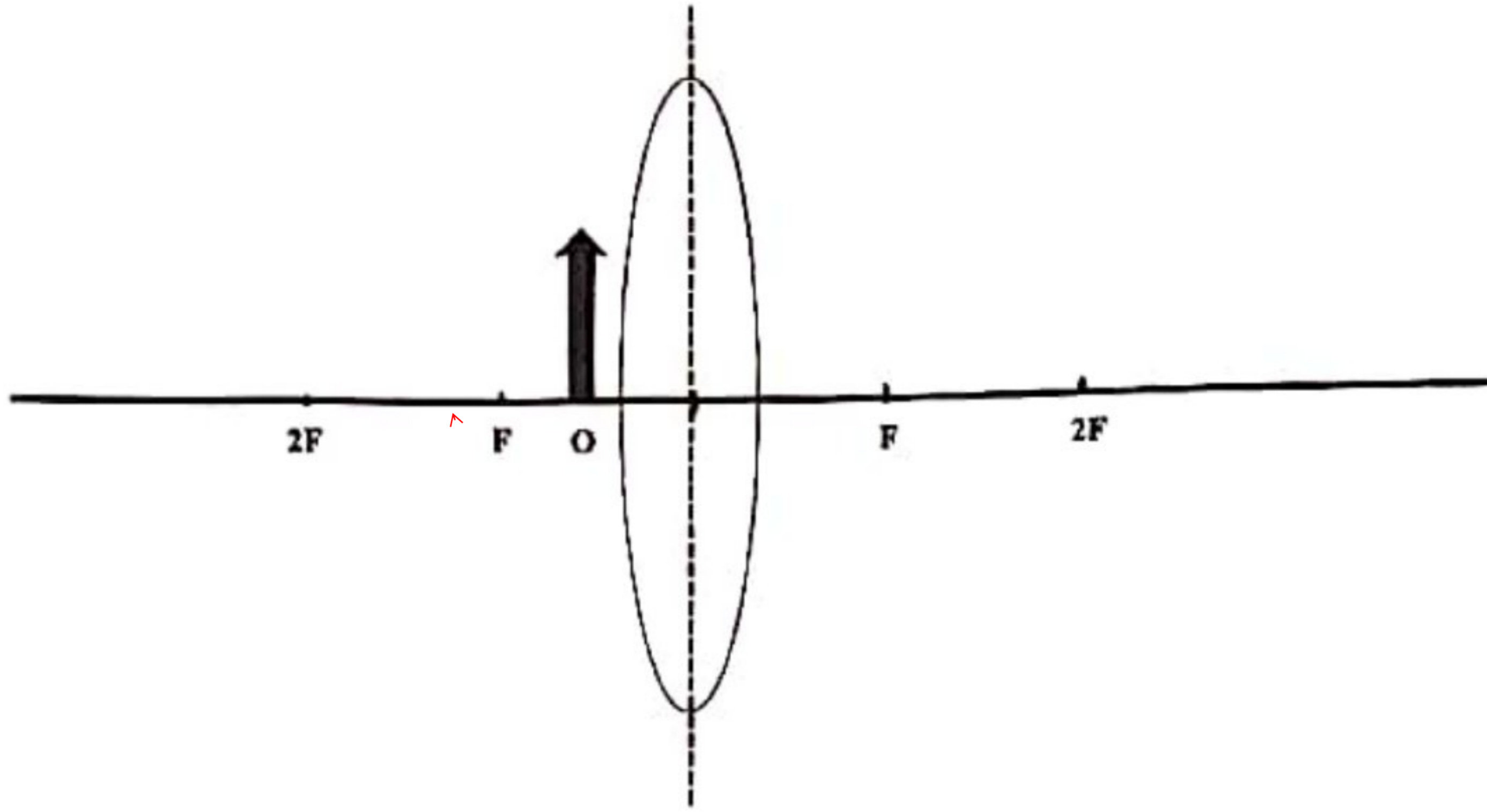


(v) Hubungkan jarak objek dengan saiz imej
Relate the object distance with the size of image



.....
[1 markah]
[1 mark]

- (c) Rajah 6.3 menunjukkan satu rajah sinar yang tidak lengkap.
Diagram 6.3 shows an incomplete ray diagram.



Rajah 6.3
Diagram 6.3

Lengkapkan rajah sinar dalam Rajah 6.3.
Complete the ray diagram in Diagram 6.3.

[3 markah]
[3 marks]

6(c)	
	3

Jumlah
A6

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SULIT

	9
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- 8 Rajah 8.1 menunjukkan sebuah alat pemanas air berlabel 240 V, 3 kW.
Diagram 8.1 shows a water heater labelled 240 V, 3 kW.



Rajah 8.1
Diagram 8.1

- (a) Takrifkan 240 V, 3 kW.
Define label 240 V, 3 kW.

[1 markah]
[1 mark]

- (b) Pemanas air mandian digunakan selama 4 jam sehari. Hitung tenaga yang digunakan dalam unit kWj selama 30 hari.
The water heater is used 4 hours per day. Calculate the energy used in unit kWh for 30 days.

[2 markah]
[2 marks]

10 Rajah 10.1 menunjukkan seekor ikan yang dimasak menggunakan sebuah dapur induksi.
Diagram 10.1 shows a fish is cooked by using an induction cooker.



Rajah 10.1
Diagram 10.1

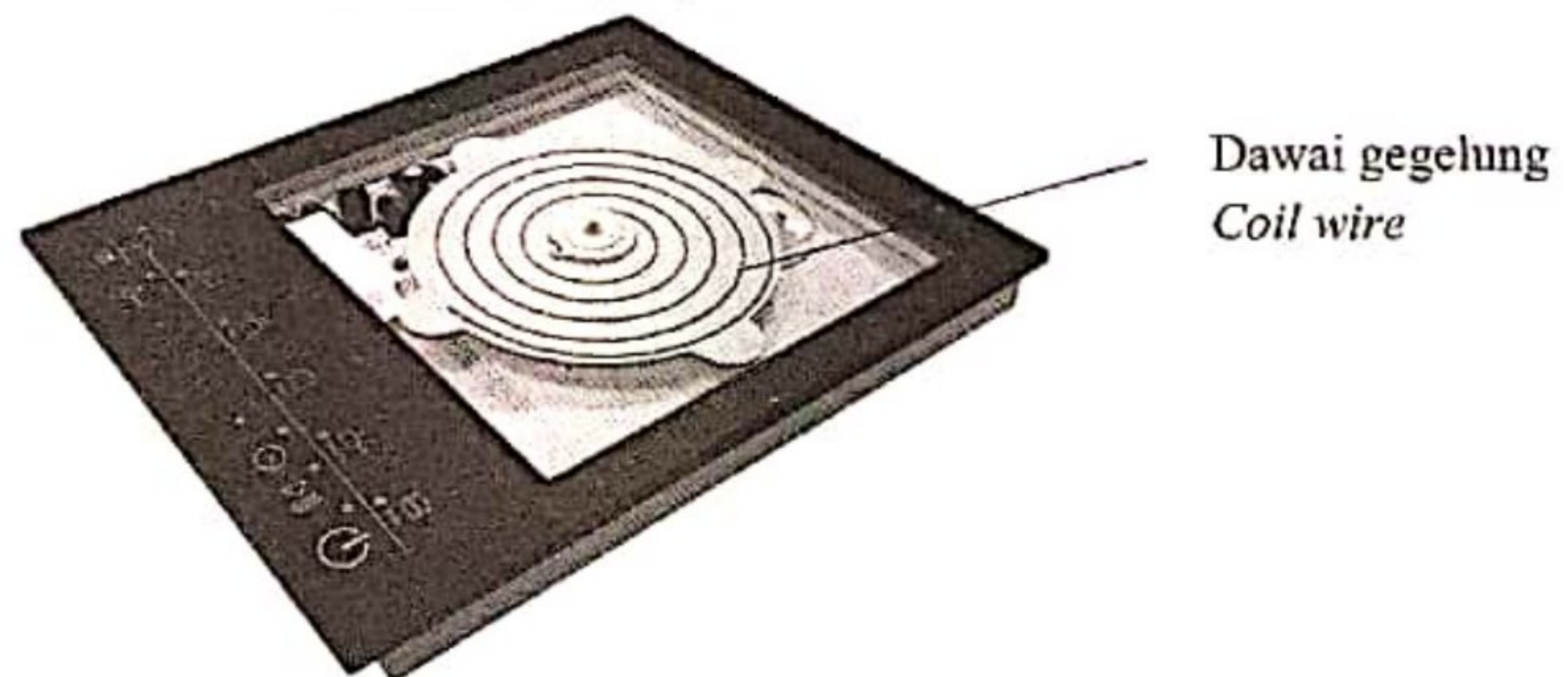
- (a) What is meaning of electromagnetic induction?
Apakah yang dimaksudkan dengan aruhan elektromagnet?

[1 mark]
 [1 markah]

- (b) Berpandukan kepada konsep fizik, terangkan bagaimana dapur induksi berfungsi.
Based on the physics concept, explain how an induction cooker works.

[4 markah]
 [4 marks]

- (c) Rajah 10.2 menunjukkan bahagian dalam dapur induksi.
Diagram 10.2 shows inside the induction cooker.







Rajah 10.2
Diagram 10.2

[Lihat halaman sebelah
 SULIT]

Jadual 10 menunjukkan spesifikasi J, K, L dan M bagi empat dapur induksi dan periuk yang sesuai yang perlu digunakan untuk memasak makanan.

Table 10 shows the specification J, K, L and M of four that can be used to cook food.

Dapur Stove	J	K	L	M
Bahagian lapik atas <i>Top plate</i>	Seramik <i>Ceramic</i>	Kuprum <i>Copper</i>	Seramik <i>Ceramic</i>	Kuprum <i>Copper</i>
Jenis bahan kuali <i>Material of pan</i>	Tidak magnetik <i>Non-magnetic</i>	Feromagnet <i>Ferromagnetic</i>	Feromagnetik <i>Ferromagnetic</i>	Tidak magnetik <i>Non-magnetic</i>
Dawai gegelung <i>Coil wire</i>	 Wayar berpintal <i>Twisted wire</i>	 Dawai tunggal <i>single wire</i>	 Wayar berpintal <i>Twisted wire</i>	 Wayar berpintal <i>Twisted wire</i>
Jenis Bekalan Kuasa <i>Type of power supply</i>	Arus terus (a.t) <i>Direct current (d.c)</i>	Arus ulang alik (a.u) <i>Alternating current (a.c)</i>	Arus ulang alik (a.u) <i>Alternating current (a.c)</i>	Arus terus (a.t) <i>Direct current (d.c)</i>

Jadual 10

Table 10

Anda dikehendaki untuk mengkaji spesifikasi bagi empat dapur dan tentukan dapur manakah yang paling sesuai digunakan untuk memasak makanan dengan cekap. Beri sebab bagi pilihan anda.

You are required to study the specification of four stove and determine the most suitable to be used for cooking food efficiently. Give reasons for your choice.

[10 markah]

[10 marks]

Bahagian C
Section C

[20 markah]

[20 marks]

Jawab soalan daripada bahagian ini
Answer the question from this section

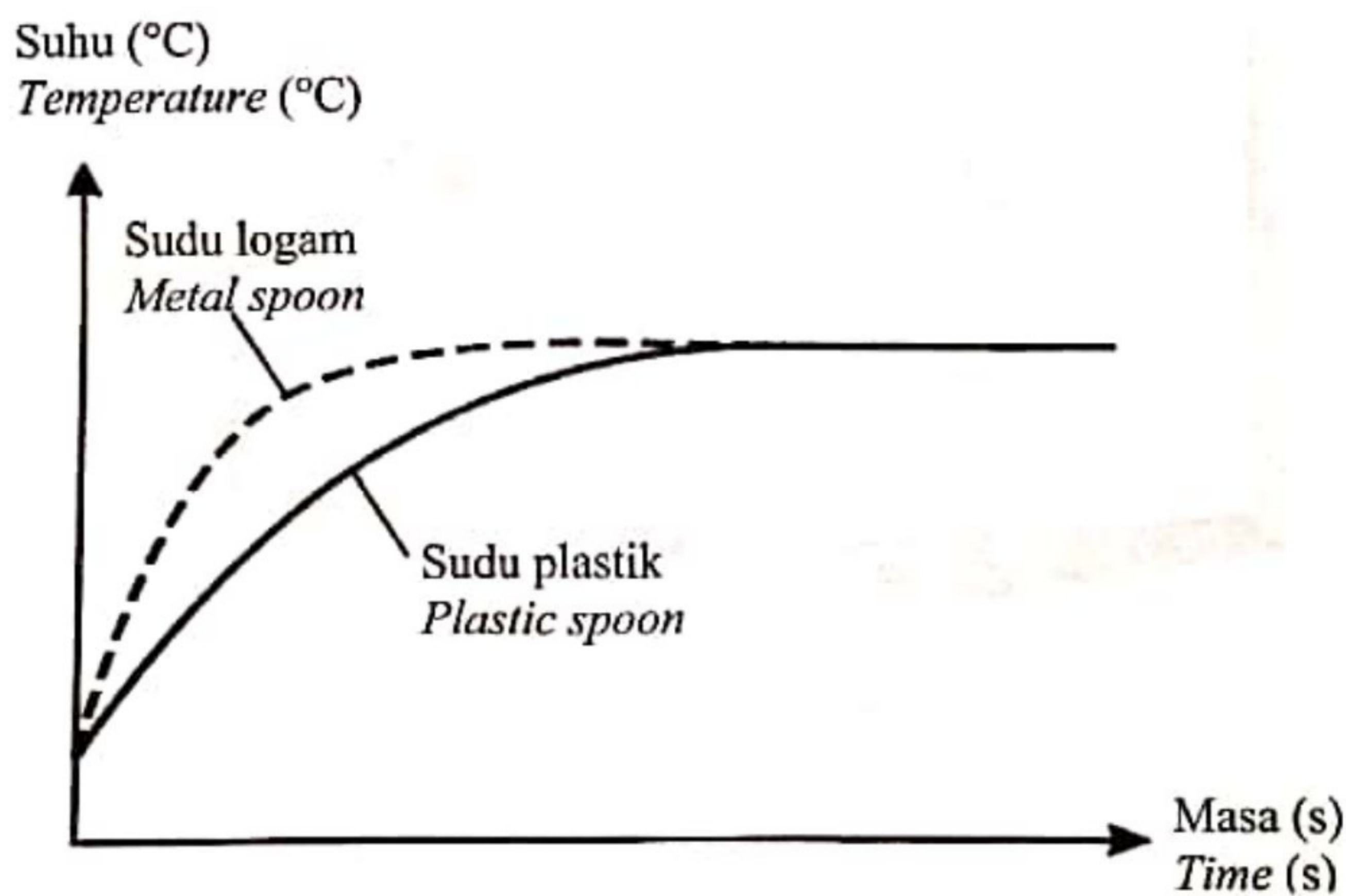
11 Rajah 11.1 menunjukkan dua cawan kopi panas yang sama jisim dan suhu awal yang sama. Sebatang sudu logam dan sebatang sudu plastik yang sama jisim diletakkan dalam cawan kopi masing-masing. Suhu kopi berkurang selepas beberapa minit.

Diagram 11.1 shows two cups of hot coffee of the same mass and same initial temperature. A metal spoon and a plastic spoon of the same mass were placed in each cup respectively. The temperature of coffee decreases after a few minutes.



Rajah 11.1
Diagram 11.1

Rajah 11.2 menunjukkan graf suhu melawan masa bagi kedua-dua sudu itu.
Diagram 11.2 shows a graph of temperature against time for both spoons.



Rajah 11.2
Diagram 11.2

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SULIT

- (a) (i) Apakah maksud muatan haba?
What is the meaning of heat capacity?

[1 markah]

[1 mark]

- (ii) Berdasarkan Rajah 11.2, bandingkan suhu akhir, masa yang diambil untuk menjadi panas dan kadar perubahan suhu bagi setiap sudu.
Hubungkan muatan haba tentu dan masa untuk sudu-sudu itu menjadi panas. Seterusnya, hubungkan muatan haba tentu dan kadar perubahan suhu sudu.
Based on Diagram 11.2, compare the final temperature, time taken to become hot and rate of change of temperature of each spoon.
Relate the specific heat capacity and the time of spoons become hot. Hence, relate the specific heat capacity with the rate of change of temperature of the spoon.

[5 markah]

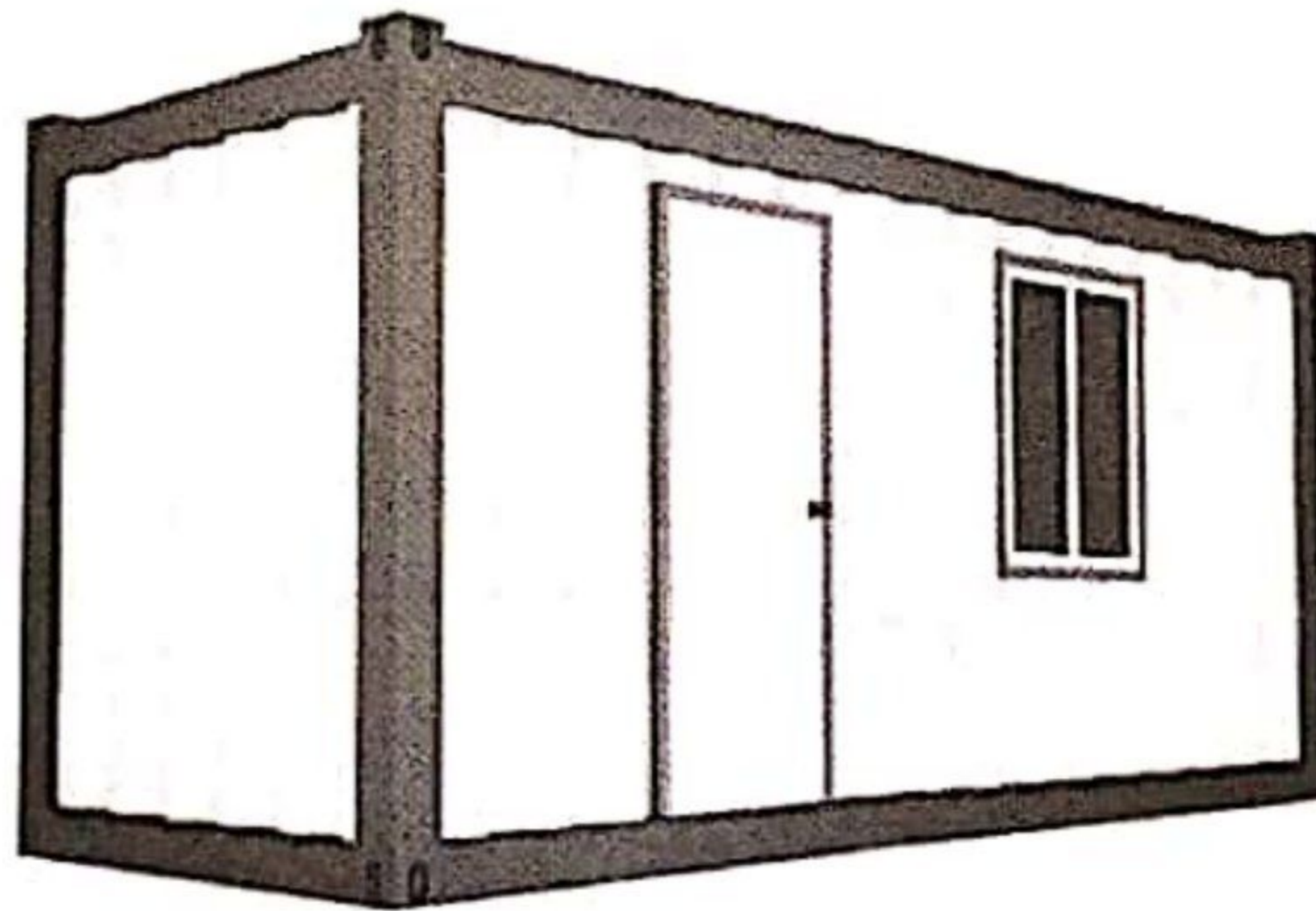
[5 marks]

- (b) Selepas satu jam, suhu kopi dalam kedua-dua cawan adalah sama dengan suhu persekitaran. Terangkan bagaimana ia berlaku.
After an hour, the temperature of coffee inside both cups are the same as surrounding temperature. Explain how it happen.

[4 markah]

[4 marks]

- (c) Rajah 11.3 menunjukkan sebuah rumah kontena.
Diagram 11.3 shows a container house.



Rajah 11.3
Diagram 11.3

Dengan menggunakan konsep fizik yang sesuai, terangkan kegunaan bahan-bahan yang sesuai dan rekabentuk tertentu bagi meningkatkan lagi sistem peredaran udara dalam rumah dan memastikan suhu dalam rumah tidak tinggi. Jawapan anda hendaklah merangkumi aspek-aspek berikut:

By using appropriate physics concepts, explain the use of suitable material and design to improve the ventilation of the house and to ensure the temperature inside the house is not high. Your answer should include the following aspects:

- Bilangan tingkap
Number of windows
- Saiz tingkap
Size of windows
- Bahan untuk dinding dan bumbung
Materials for the wall and roof
- Ciri tambahan yang boleh menyejukkan rumah itu
Additional feature that can cool the house

[10 markah]
[10 marks]

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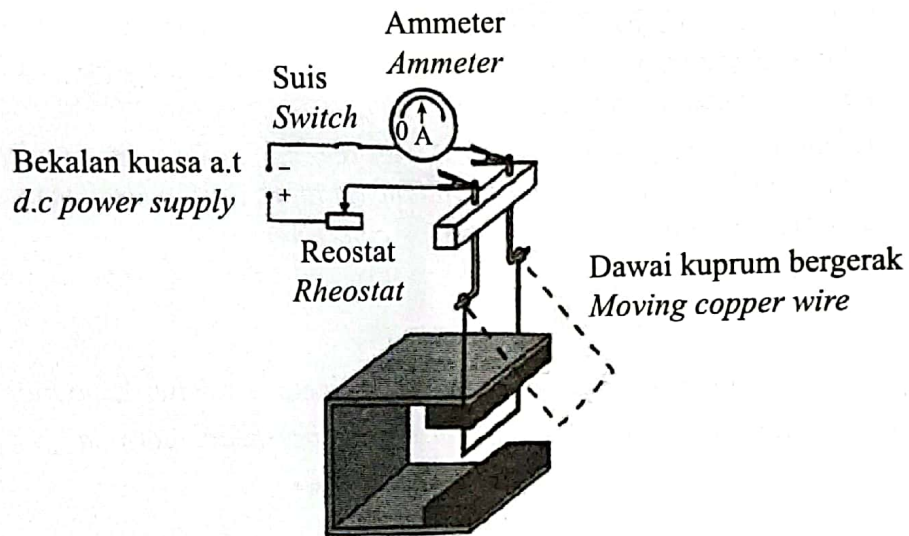
Bahagian C
Section C

[20 markah]
[20 marks]

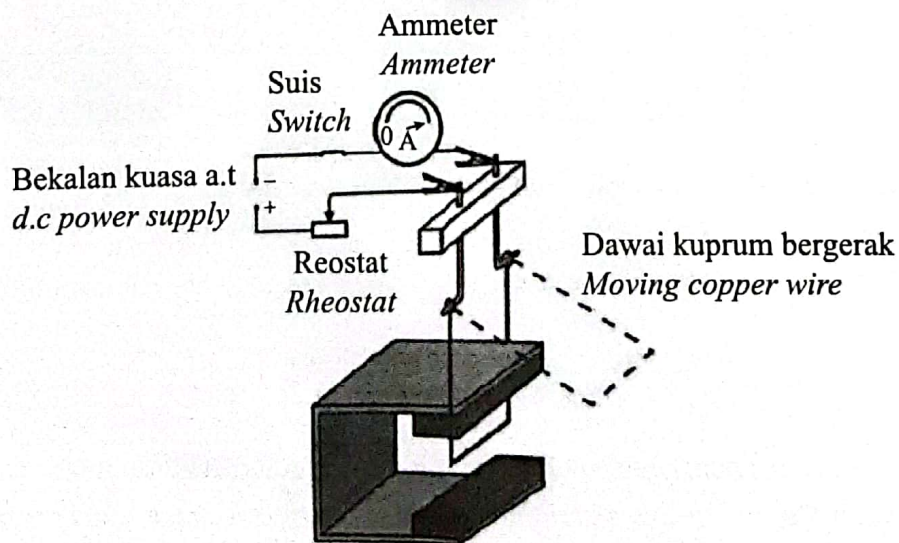
Jawab **semua** soalan dalam bahagian ini.
Answer all question in this section.

- 11 Rajah 11.1 dan Rajah 11.2 menunjukkan dawai kuprum bergerak disambungkan kepada ammeter, reostat, suis dan bekalan kuasa. Dawai kuprum itu diletakkan di antara dua magnet Magnadur.

Diagram 11.1 and Diagram 11.2 show a moving copper wire connected to an ammeter, rheostat, switch and power supply. The copper wire is placed between two Magnadur magnets.



Rajah 11.1
Diagram 11.1



Rajah 11.2
Diagram 11.2

- (a) Apakah maksud medan lastik?
What is the meaning of catapult field?

[1 markah]
[1 mark]

- (b) Berdasarkan Rajah 11.1 dan Rajah 11.2,
Based on Diagram 11.1 and Diagram 11.2,

- (i) bandingkan bacaan ammeter, sudut pesongan dawai kuprum bergerak dan kekuatan medan magnet.
compare the reading of the ammeter, angle of deflection of the moving copper wire and the strength of the magnetic field.

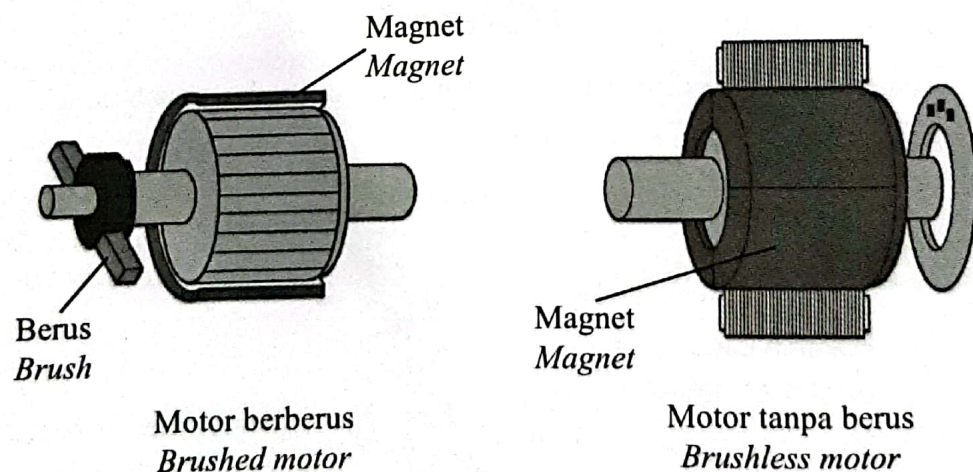
compare the reading of the ammeter, angle of deflection of the moving copper wire and the strength of the magnetic field.

- (ii) hubung kaitkan bacaan ammeter dengan sudut pesongan dawai kuprum bergerak untuk membuat deduksi tentang hubungan antara magnitud arus dengan daya ke atas konduktor pembawa arus.
relate the reading of the ammeter with the angle of deflection of the moving copper wire to make a deduction regarding the relationship between the magnitude of current and the force on the current-carrying conductor.

relate the reading of the ammeter with the angle of deflection of the moving copper wire to make a deduction regarding the relationship between the magnitude of current and the force on the current-carrying conductor.

[5 markah]
[5 marks]

- (c) Rajah 11.3 menunjukkan dua jenis motor iaitu motor berberus dan motor tanpa berus.
Diagram 11.3 shows two types of motor namely brushed motor and brushless motor.



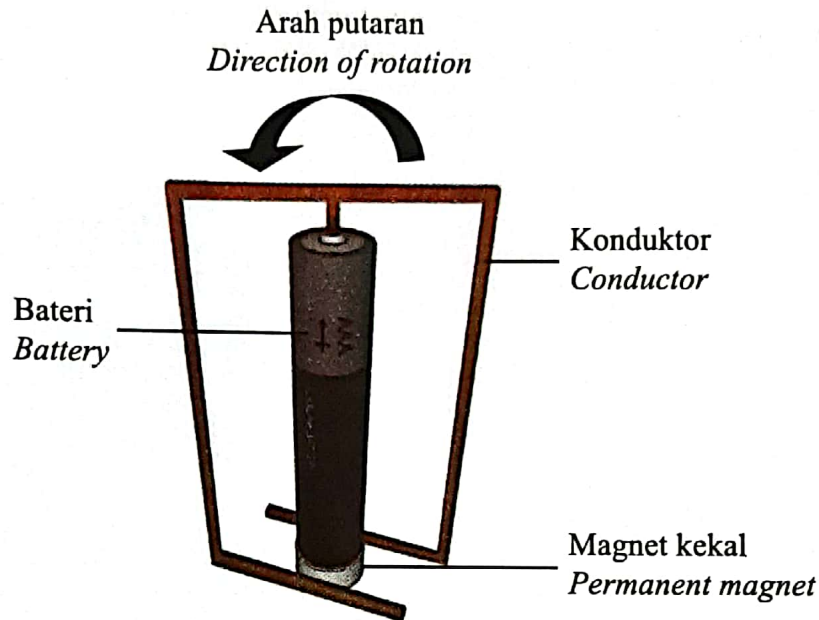
Rajah 11.3
Diagram 11.3

Terangkan persamaan dan perbezaan antara motor berberus dan motor tanpa berus.
Explain the similarities and differences between brushed motor and brushless motor.

[4 markah]
[4 marks]

- (d) Rajah 11.4 menunjukkan satu motor homopolar ringkas yang terdiri daripada magnet, bateri dan konduktor. Interaksi antara medan magnet daripada arus elektrik dalam konduktor dan medan magnet daripada magnet kekal menghasilkan daya, yang menyebabkan konduktor berputar mengelilingi bateri.

Diagram 11.4 shows a simple homopolar motor consisting of a magnet, a battery and a conductor. The interaction between the magnetic field from the electric current in the conductor and the magnetic field from the permanent magnet produces a force, which causes the conductor to rotate around the battery.



Rajah 11.4
Diagram 11.4

Cadangkan pengubahsuaian yang boleh dilakukan pada motor homopolar dalam Rajah 11.4 supaya konduktor berpusing lebih laju.

Nyata dan beri penerangan tentang pengubahsuaian itu berdasarkan jenis bahan dan ciri-ciri magnet, jenis bahan dan ciri-ciri konduktor dan ciri-ciri bateri.

Suggest modifications that can be made to the homopolar motor in Diagram 11.4, so that the conductor can spin faster.

State and explain the modifications based on the type of material and characteristics of the magnet, type of material and characteristics of the conductor and the characteristics of the battery.

[10 markah]
[10 marks]

KERTAS PEPERIKSAAN TAMAT
END OF QUESTION PAPER

- (d) Rajah 9.3 menunjukkan sebuah cermin keselamatan dalam sebuah kedai runcit.
Diagram 9.3 shows a safety mirror in a grocery store.



Rajah 9.3
 Diagram 9.3



- (i) Jelaskan bagaimana imej boleh terbentuk oleh cermin tersebut.
Explain how an image can be formed by the mirror.

[3 markah/marks]

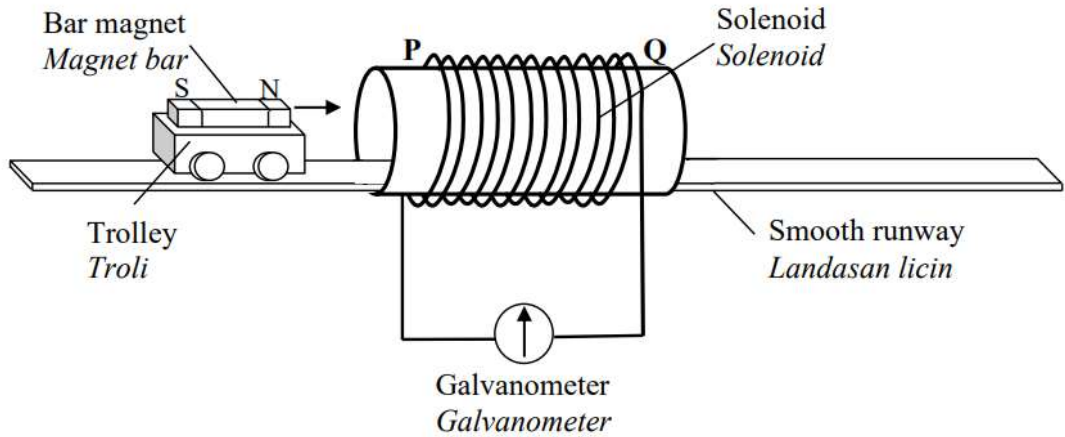
- (ii) Sekiranya jenis cermin keselamatan itu digantikan dengan satu cermin cekung, apakah perubahan yang akan berlaku?
If the type of safety mirror is replaced with a concave mirror, what changes will be happened?



[2 markah/marks]

10. Rajah 10.1 menunjukkan satu magnet bar yang diletakkan di atas satu troli. Troli itu bergerak dengan satu halaju malar di atas landasan licin ke dalam satu solenoid yang bersambung kepada galvanometer.

Diagram 10.1 shows a bar magnet attached on a trolley. The trolley moves with a constant velocity on a smooth runway into a solenoid which is connected to a galvanometer.



Rajah 10.1
Diagram 10.1

- (a) Apakah yang dimaksudkan dengan aruhan elektromagnet?
What is the meaning of electromagnetic induction?

[1 markah/mark]

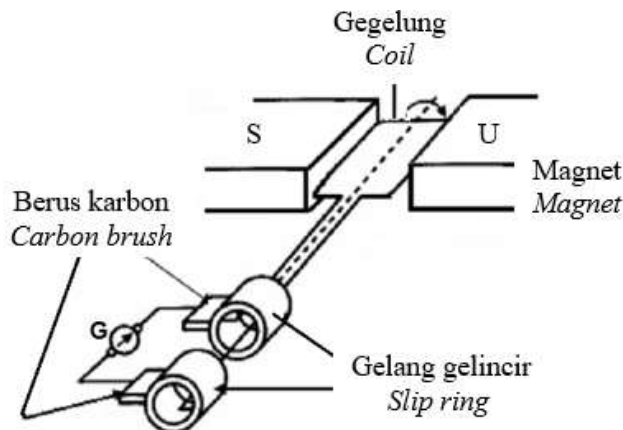
- (b) Berdasarkan Rajah 10.1, apakah yang berlaku ke atas penunjuk galvanometer apabila troli bergerak ke dalam solenoid? Terangkan jawapan anda.

Based on Diagram 10.1, what happens to the pointer of galvanometer when the trolley moves into the solenoid? Explain your answer.


[4 markah/marks]

- (c) Rajah 10.2 menunjukkan satu penjana arus ulang alik yang digunakan untuk membekalkan arus ulang alik.

Diagram 10.2 shows an alternating current generator used to supply alternating current.



Rajah 10.2
Diagram 10.2


-  Apart of the specification of the pressure cooker given in Table above, suggest another one factor for the pressure cooker to enable it to be used safely. Give a reason. [2 marks]

KBAT QUESTIONS

6

(d)

Diagram 9.3 shows Hazim is driving a hydrofoil boat in a lake. As the boat moves, the hydrofoil lift the boat's hull out of the water surface due to its foil attached underneath the boat, hence increase the speed of the boat. Explain how hydrofoil lifts the boat to increase its speed.


Rajah 9.3 menunjukkan Hazim memandu sebuah bot hidrofoil di sebuah tasik. Apabila bot bergerak, hidrofoil mengangkat badan bot keluar dari permukaan air disebabkan oleh penghadang yang dipasang dibawahnya, seterusnya meningkatkan kelajuan bot. Terangkan bagaimana hidrofoil boleh mengangkat bot dan meningkatkan kelajuannya.

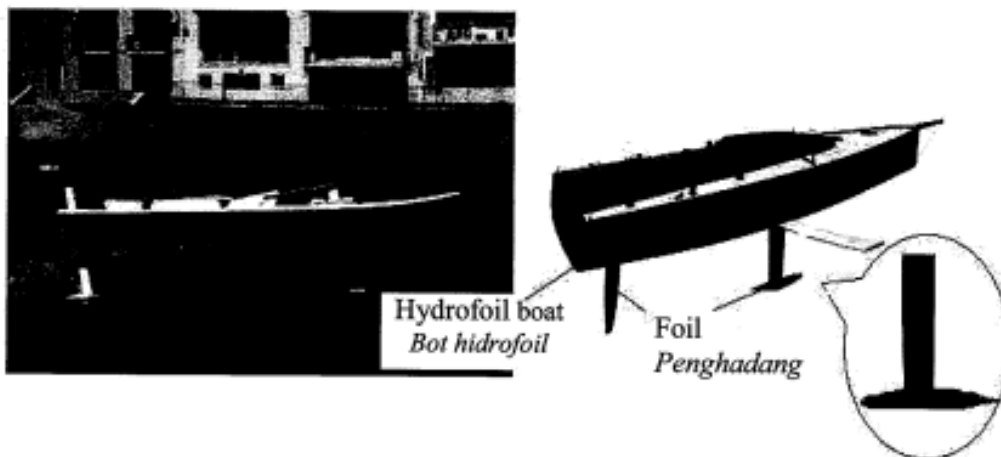


Diagram 9.3
Rajah 9.3

[4 marks]
[4 markah]

Cyberjaya

- 7) Diagram 10.2 shows a potential difference, V , against, electric current, I graph for two electrical components, which are, a filament lamp and a constantan wire conductor.

Rajah 10.2 menunjukkan satu graf beza keupayaan, V , melawan arus elektrik, I , bagi dua komponen elektrik, iaitu, lampu filamen dan konduktor wayar konstantan.

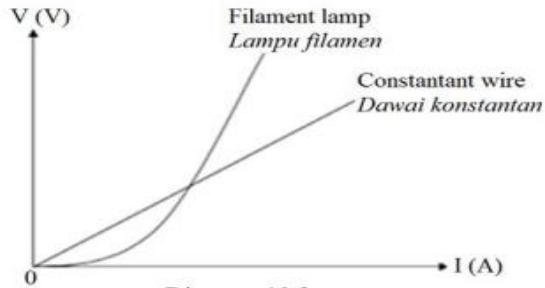


Diagram 10.2
Rajah 10.2

Based on Diagram 10.2, compare the shape of the graphs, the gradient of the graphs and the resistance of the filament lamp and the constantan wire conductor. Relate the shape of the graph and the resistance of the electrical components to make a deduction on which of the conductor is an Ohmic conductor. [5 marks]

8 a) Diagram 10.3 shows a filament lamp in an electrical wiring system in a house

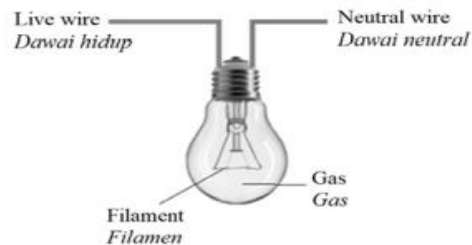


Diagram 10.3

Rajah 10.3 menunjukkan sebuah lampu filamen dalam sistem pendawaian elektrik di sebuah rumah.

It is observed that the filament lamp produces a dim light. As an electrical engineer at Power System Consulting, suggest modifications that can be made to the structure of the filament lamp in Diagram 10.3, so that it can produce a brighter light. State and explain the modifications based on the characteristics of the coil and the characteristics of the gas filled in the filament bulb.

Lampu filamen tersebut didapati menghasilkan cahaya yang malap. Sebagai jurutera elektrik di Power System Consulting, cadangkan pengubahsuaian yang boleh dibuat kepada struktur lampu filamen dalam Rajah 10.3, supaya ia boleh menghasilkan cahaya yang lebih cerah. Nyatakan dan terangkan pengubahsuaian berdasarkan ciri-ciri gegelung dan ciri-ciri gas yang diisi dalam mentol filamen tersebut.

[10 marks]

- (d) Rajah 1.4 menunjukkan pelbagai jenis kabel penyambung
Diagram 1.4 shows variety of connecting cords.



Rajah / *Diagram 1.4*

Sebagai seorang jurutera elektrik, anda diminta untuk menentukan jenis wayar yang sesuai digunakan sebagai kabel penyambung yang digunakan oleh alat elektrik di rumah.

Dengan menggunakan pengetahuan fizik, terangkan cadangan anda berdasarkan ciri-ciri wayar, takat lebur, kadar pengurangan serta lain-lain aspek yang berkaitan.
As an electrical engineer, you are required to determine the type of wire that is suitable to be used as connecting cord for electric devices in a house.

Using your physics knowledge, explain your suggestions according to the characteristics of wire, melting point, rate of rusting and other related aspects.



[10 markah / *marks*]