

**Section A**  
**Bahagian A**  
[60 marks]

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

- 1 Diagram 1 show a word which is seen through a lens.  
*Rajah 1 menunjukkan satu perkataan yang dilihat menerusi sebuah kanta.*



Diagram 1  
*Rajah 1*

- (a) State the type of the lens used.  
*Nyatakan jenis kanta yang digunakan.*
- .....  
[1 mark]
- (b) Name the light phenomenon involved in the formation of the image by the lens.  
*Namakan fenomena cahaya yang terlibat dalam pembentukan imej oleh kanta tersebut.*
- .....  
[1 mark]
- (c) The lens in Diagram 1 is replaced by another lens which has same thickness but larger in diameter.  
*Kanta dalam Rajah 1 digantikan dengan kanta lain yang mempunyai ketebalan yang sama tetapi diameter yang lebih besar.*
- (i) What will happen to the size of the image formed?  
*Apakah terjadi kepada saiz imej yang terbentuk?*
- .....  
[1 mark]
- (ii) Give one reason for your answer in (c)(i).  
*Berikan satu sebab untuk jawapan anda dalam (c)(i).*
- .....  
[1 mark]

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2 Diagram 2 shows a hot air balloon floating stationary in air. Two forces involved are weight and upthrust.

Rajah 2 menunjukkan sebuah belon udara panas terapung pegun di udara. Dua daya yang terlibat adalah berat dan tujah ke atas.

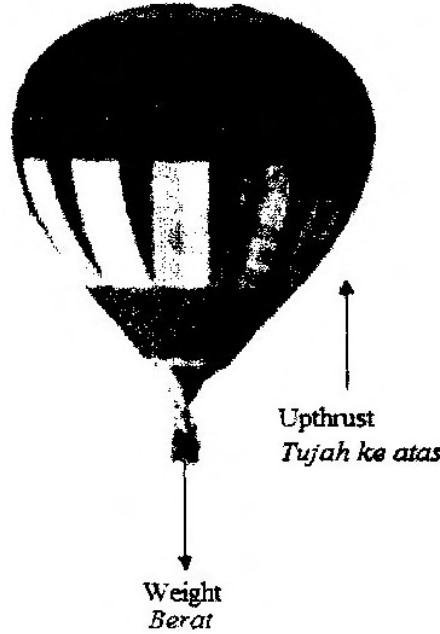


Diagram 2  
Rajah 2

(a) What is the meaning of weight?  
Apakah yang dimaksudkan dengan berat?

.....  
[1 mark]

(b) Using the forces in Diagram 2 explain why the balloon floating stationary in air.  
Menggunakan daya-daya dalam Rajah 2 terangkan mengapa belon terapung pegun di udara.

.....  
.....  
[2 marks]

(c) The weight of the balloon is 2000 N and the upthrust is 3200 N.  
Calculate the acceleration of the balloon.  
Berat belon itu ialah 2000 N dan tujah ke atas ialah 3200 N.  
Hitungkan pecutan belon itu.

[2 marks]

5 Diagram 5.1(a) and 5.2(a) show two trolleys of different masses are placed on surface of identical table before pulled by a slotted mass through a smooth identical pulley.

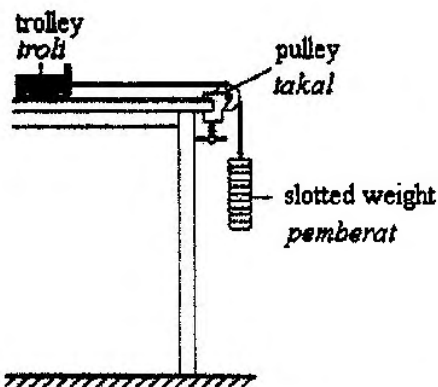
The mass of the slotted weight which pulled both trolleys are same.

Diagram 5.1(b) and 5.2(b) shows the position of both trolleys after released simultaneously

Rajah 5.1(a) dan 5.1(b) menunjukkan dua buah troli yang berlainan jisim berada di atas permukaan meja yang serupa sebelum ditarik oleh pemberat melalui takal licin yang serupa.

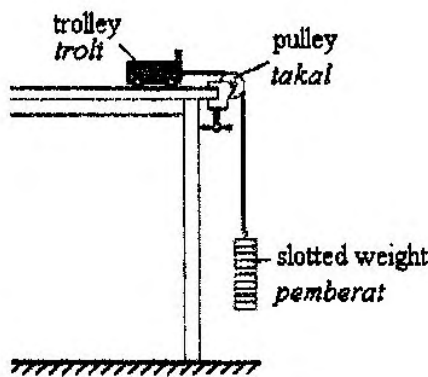
Jisim pemberat yang menarik kedua-dua troli adalah sama.

Rajah 5.1(b) dan 5.2(b) menunjukkan kedudukan kedua-dua troli selepas dilepaskan serentak.



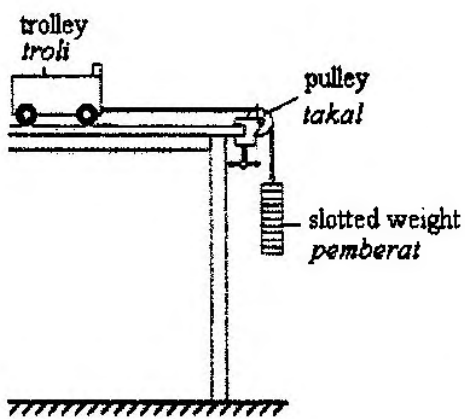
trolley before release  
sebelum troli dilepaskan

Diagram 5.1(a)  
Rajah 5.1(a)



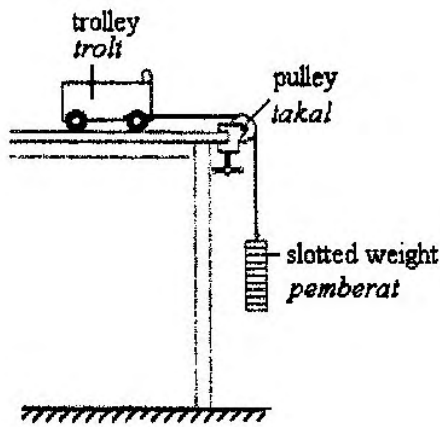
trolley a few moment after released  
selepas troli dilepaskan beberapa ketika

Diagram 5.1(b)  
Rajah 5.1(b)



trolley before release  
sebelum troli dilepaskan

Diagram 5.2(a)  
Rajah 5.2(a)



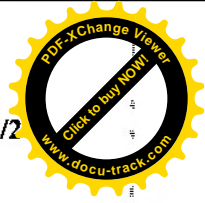
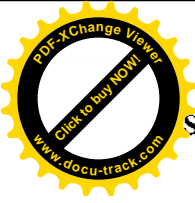
trolley a few moment after released  
selepas troli dilepaskan beberapa ketika

Diagram 5.2(b)  
Rajah 5.2(b)

- (a) What is the meaning of mass?  
Apakah yang dimaksudkan dengan jisim?

[1 mark]

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(b) Using Diagram 5.1 and Diagram 5.2  
*Menggunakan Rajah 5.1 dan Rajah 5.2*

(i) Compare  
*Bandingkan*

the mass of the trolleys  
*jisim kedua-dua troli*

.....  
[1 mark]

distance travel by the trolleys  
*jarak yang dilalui oleh kedua-dua troli*

.....  
[1 mark]

acceleration of the trolleys  
*pecutan kedua-dua troli*

.....  
[1 mark]

(ii) What causes the trolleys move?  
*Apakah yang menyebabkan kedua-dua troli bergerak?*

.....  
[1 mark]

(c) Based on your answer in (b), completes the following sentence:  
*Berdasarkan jawapan anda di (b), lengkapkan ayat berikut:*

The larger the ....., the smaller the....., provided  
the ..... kept constant.

*Semakin tinggi....., semakin berkurang ..... sekiranya  
..... adalah tetap.*

[1 mark]

(d) The mass of the slotted weight is 4 kg and the mass of trolley in Diagram 5.1 is 2.5 kg.  
Calculate the acceleration.

*Jisim pemberat adalah 4 kg dan jisim troli dalam Rajah 5.1 adalah 2.5 kg.  
Hitungkan pecutan.*

[2 marks]

- 7 Diagram 7.1 shows the image of a point 2 metre marked in a swimming pool as seen by an observer standing near the pool. The point appears shallower than the real depth.  
*Rajah 7.1 menunjukkan imej titik bertanda 2 meter dalam kolam renang seperti yang dilihat oleh seorang pemerhati yang berdiri di tepi kolam itu. Tanda itu kelihatan lebih cetek daripada dalam sebenar.*

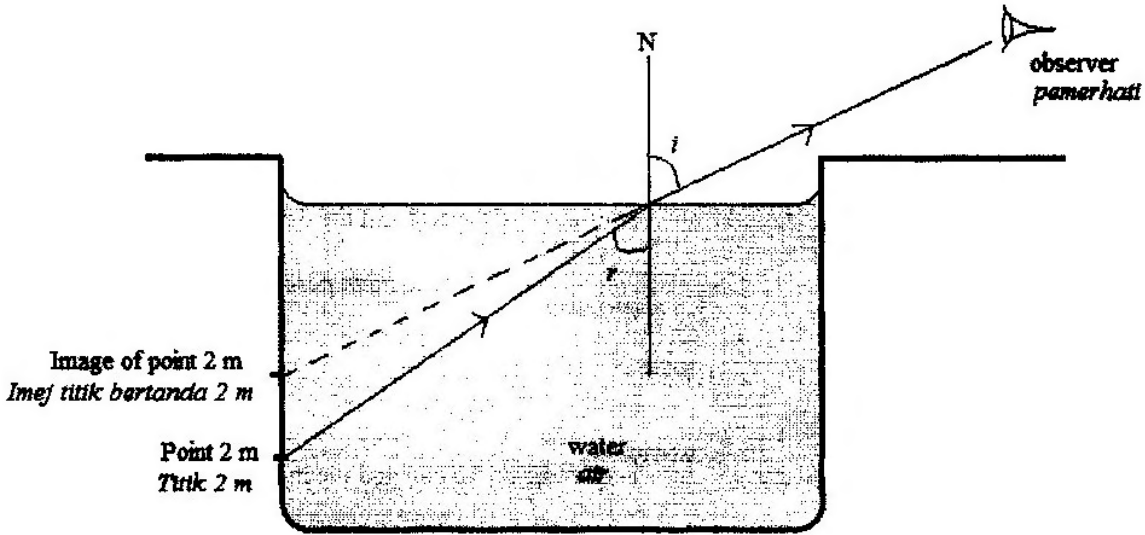


Diagram 7.1  
*Rajah 7.1*

- (a) (i) Name the light phenomenon that cause the observation?  
*Namakan fenomena cahaya yang menghasilkan pemerhatian itu?*

.....  
[1 mark]

- (ii) Explain how the image of the 2 metre marked appear shallower?  
*Terangkan bagaimana imej titik bertanda 2 meter kelihatan cetek?*

.....  
.....  
.....  
[3 marks]



- (b) The refractive index of the water is 1.33  
*Indeks biasan air ialah 1.33*

Calculate the apparent depth of the point 2 metre marked.  
*Hitungkan dalam ketara titik bertanda 2 meter.*

[2 marks]

- (c) Diagram 7.2 shows a reflector made by a student. The light rays reflected by the plane mirror to heat the water in a cylinder container.  
The heat produced by the reflector is not enough to increase the water temperature to a desired value. Some modifications need to be done the mirror to increase the water temperature.  
*Rajah 7.2 menunjukkan sebuah pemantul yang dibuat oleh seorang pelajar. Sinar cahaya dipantulkan oleh cermin satah itu untuk memanaskan air dalam takungan silinder. Haba yang dihasilkan oleh pemantul itu tidak mencukupi untuk menaikkan suhu air kepada nilai yang diinginkan. Beberapa pengubahsuaian perlu dilakukan kepada cermin untuk meningkatkan suhu air.*

State the suitable modification and give one reason for each modifications.  
*Nyatakan pengubahsuaian yang sesuai dan berikan satu sebab bagi setiap pengubahsuaian itu.*

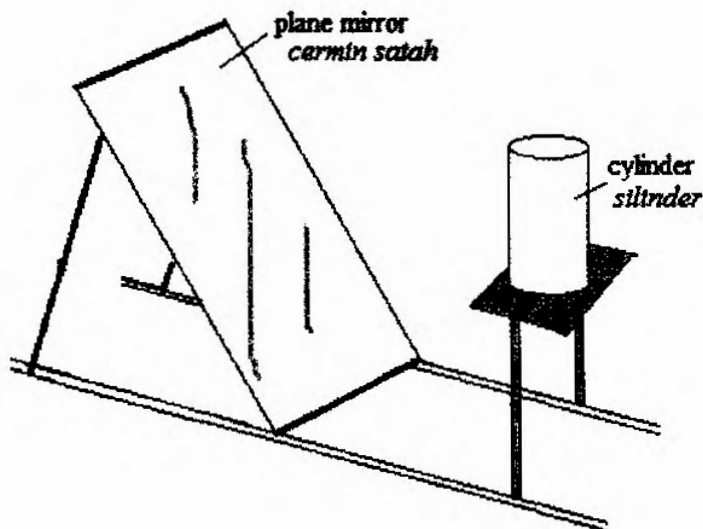


Diagram 7.2  
*Rajah 7.2*

- (i) Type of the mirror.  
*Jenis cermin*

.....

Reason  
*Sebab*

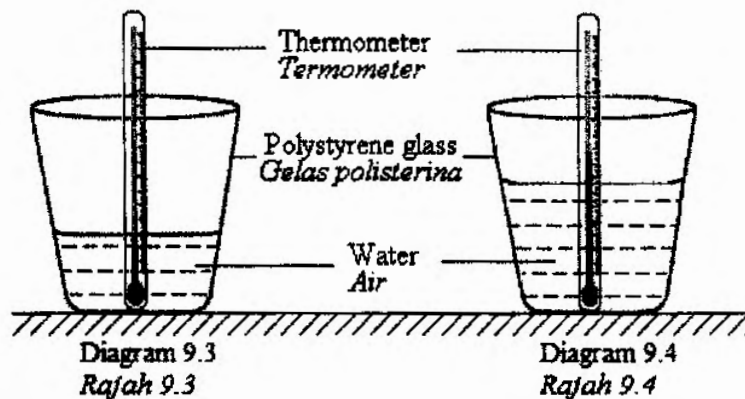
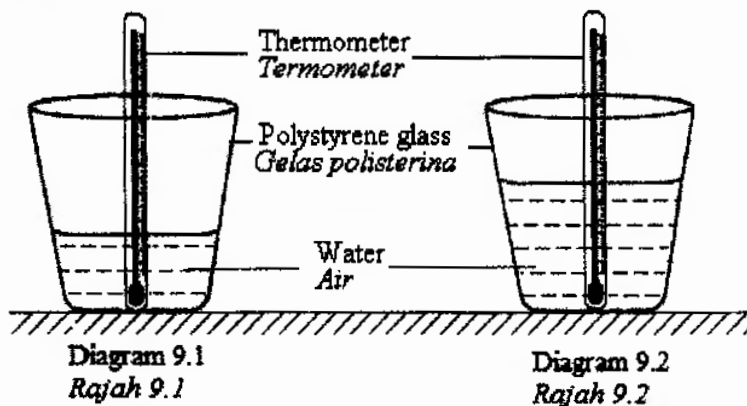
.....

[2 marks]

**Section B**  
**Bahagian B**  
[20 marks]

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

- 9 Diagram 9.1 and Diagram 9.2 show two identical polystyrene glasses are filled with hot water at the same temperature.  
Diagram 9.3 and Diagram 9.4 shows the changes in temperature of the water after 5 minutes the water are cooled.  
*Rajah 9.1 dan Rajah 9.2 menunjukkan dua biji gelas polisterina diisikan dengan air panas pada suhu yang sama.*  
*Rajah 9.3 dan 9.4 menunjukkan perubahan suhu air itu selepas 5 minit disejukkan.*



- (a) State the principle involved when the thermometer measure the temperature of water.  
*Nyatakan prinsip yang terlibat apabila termometer itu digunakan untuk mengukur suhu air.*  
[1 mark]



- (b) Using Diagram 9.1 and Diagram 9.2, compare the mass of water in the both glasses. Using Diagram 9.3 and Diagram 9.4, compare the reading of the thermometer and the rate of loss of heat from the water in the glasses after 5 minutes. Relate the mass of water and the rate of loss of heat from water to make a deduction regarding the relationship between the mass of water and the quantity of heat in water.

*Menggunakan Rajah 9.1 dan Rajah 9.2, bandingkan jisim air dalam kedua-dua gelas, Menggunakan Rajah 9.3 dan Rajah 9.4, bandingkan bacaan termometer dan kadar kehilangan haba daripada air dalam kedua-dua gelas selepas 5 minit. Hubungkan jisim air dengan kadar kehilangan haba daripada air untuk membuat deduksi tentang hubungan jisim air dengan kuantiti haba didalam air.*

[5 marks]

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

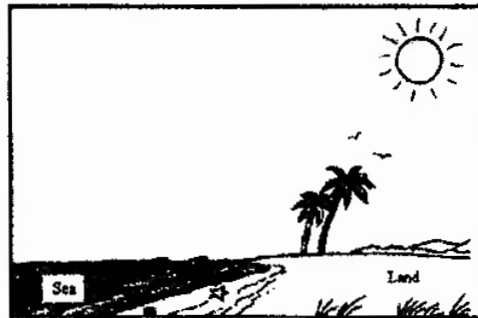


Diagram 9.3  
Rajah 9.3

Explain how the phenomenon of sea breeze occurs. *Terangkan bagaimana fenomena bayu laut berlaku.*

[4 marks]

- (d) Diagram 9.4 shows a cooling system of a motorcycle engine. *Rajah 9.4 menunjukkan sistem penyejukan sebuah enjin motosikal.*

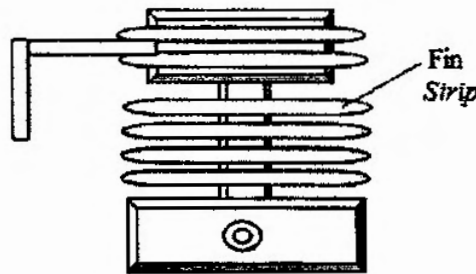
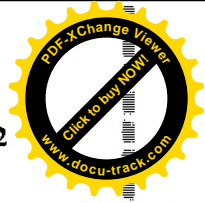
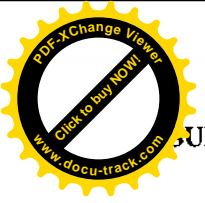


Diagram 9.4  
Rajah 9.4





You are required to modify the fins in Diagram 9.4 so that it can cool the motorcycle engine faster.

*Anda dikehendaki untuk mengubahsuai sirip pada Rajah 9.4 supaya ia dapat menyejukkan enjin motosikal dengan lebih cepat.*

State and explain the modifications based on the following aspects:

*Nyata dan terangkan pengubahsuaian berdasarkan aspek-aspek berikut.*

- (i) the specific heat capacity of the fin  
*Muatan haba tentu bagi sirip*
- (ii) the melting point of the fin  
*takat lebur sirip*
- (iii) the rate of expansion of the fin  
*kadar pengembangan sirip*
- (iv) the heat conductivity of the fin  
*kekonduksian haba sirip*
- (v) the number of the fin  
*bilangan sirip*

[10 marks]

**Section C**  
**Bahagian C**

[20 marks]

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

- 11 Diagram 11.1 shows a submarine in a sea water. The submarine applies Archimedes' Principle to enable it to float and submerged in the sea water.  
*Rajah 11.1 menunjukkan sebuah kapal selam di lautan. Kapal selam menggunakan Prinsip Archimedes yang membolehkannya terapung dan tenggelam di dalam laut.*

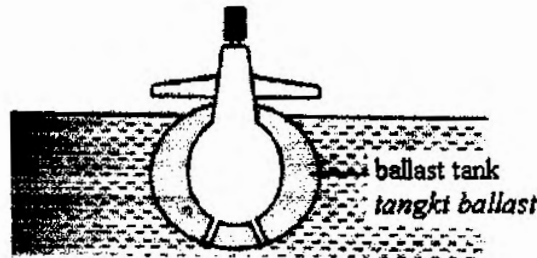


Diagram 11.1  
*Rajah 11.1*

- (a) State Archimedes' Principle.  
*Nyatakan Prinsip Archimedes.* [1 mark]
- (b) Explain how the submarine float and submerge in the sea water  
*Terangkan bagaimana kapal selam itu terapung dan tenggelam di dalam air laut.* [4 marks]
- (c) Table 11.1 shows four boats, P, Q, R, and S with different specifications. You are required to determine the most suitable boat that can carry many passengers, move with high speed and safe.  
*Jadual 11.1 menunjukkan empat buah bot, P, Q, R, dan S dengan spesifikasi yang berbeza. Anda dikehendaki menentukan bot yang paling sesuai digunakan untuk membawa penumpang yang ramai, bergerak dengan laju yang tinggi dan selamat.*

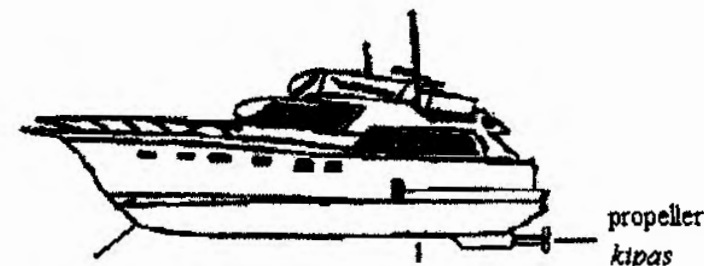
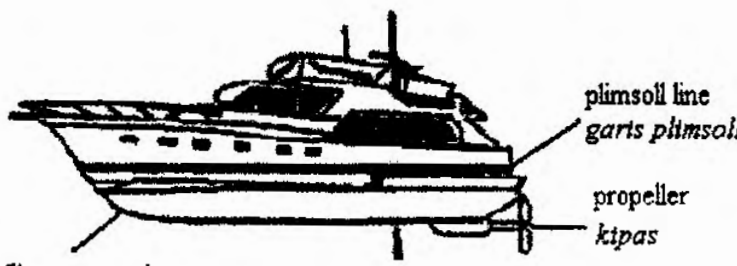
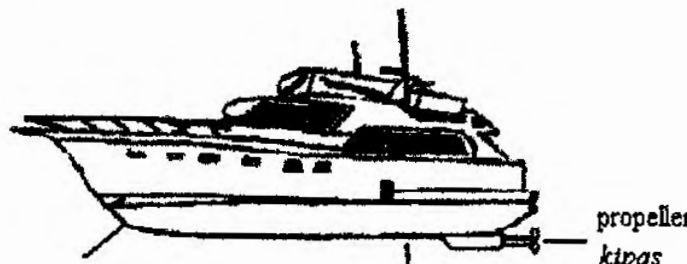
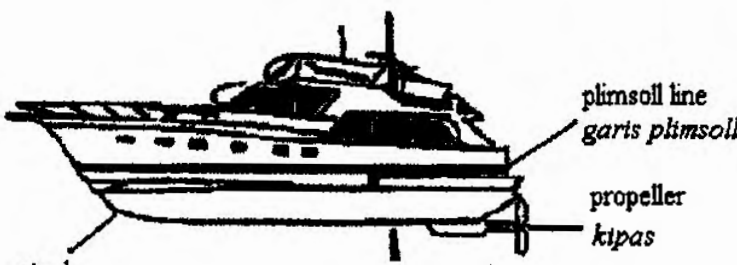
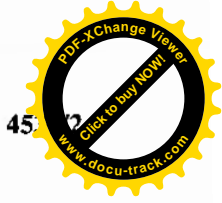
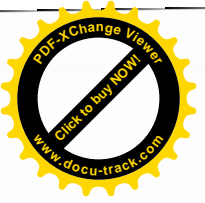
<p>P</p>	 <p>propeller kipas</p> <p>steel kekulit</p> <p>volume of air space = <math>80 \text{ m}^3</math> isipadu ruang udara = <math>80 \text{ m}^3</math></p>
<p>Q</p>	 <p>plimsoll line garis plimsoll</p> <p>propeller kipas</p> <p>fibre composite gentian komposit</p> <p>volume of air space = <math>100 \text{ m}^3</math> isipadu ruang udara = <math>100 \text{ m}^3</math></p>
<p>R</p>	 <p>propeller kipas</p> <p>fibre composite gentian komposit</p> <p>volume of air space = <math>100 \text{ m}^3</math> isipadu ruang udara = <math>100 \text{ m}^3</math></p>
<p>S</p>	 <p>plimsoll line garis plimsoll</p> <p>propeller kipas</p> <p>steel kekulit</p> <p>volume of air space = <math>80 \text{ m}^3</math> isipadu ruang udara = <math>80 \text{ m}^3</math></p>

Table 11.1  
Jadual 11.1

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Study the specifications of all the four boats based on the following aspects:

*Kaji spesifikasi keempat-empat bot itu dari aspek berikut :*

- The material used to build the body of the boat  
*Bahan yang digunakan untuk membina badan bot*
  
- The volume of air space in the boat  
*Isipadu ruangan udara dalam bot*
  
- The existence of plimsoll line  
*Kewujudan garis plimsol*
  
- The size of the propeller  
*Saiz kipas*

Explain the suitability of each aspects and then determine the most suitable boat.

Give a reason for your choice.

*Terangkan kesesuaian setiap aspek dan seterusnya tentukan bot yang paling sesuai.*

*Beri sebab untuk pilihan anda.*

[10 marks]

- (d) The weight of a boat without load is 12 000 N and the volume of the immersed portion of the boat is  $5.0 \text{ m}^3$ . [ Density of sea water is  $1020 \text{ kg m}^{-3}$  ]  
*Berat sebuah bot tanpa beban ialah 12000 N dan isipadu bahagian tenggelam bagi bot itu ialah  $5.0 \text{ m}^3$ . [ Ketumpatan air ialah  $1020 \text{ kg m}^{-3}$  ]*

Calculate

*Hitungkan*

- (i) The buoyant force exerted to the boat.  
*Tujah ke atas yang dikenakan pada bot itu.*
  
- (ii) The maximum mass of load that can be supported by the boat so that it will not sink completely.  
*Jisim maksima beban yang boleh ditampung oleh bot supaya ia tidak tenggelam sepenuhnya.*

[5 marks]

**Section A**  
**Bahagian A**

[28 marks]  
[28 markah]

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

Time suggestion in this section is 60 minutes  
Masa yang dicadangkan untuk menjawab bahagian ini ialah 60 minit.

- 1 A student carries out an experiment to investigate the relationship between the object distance,  $u$  and the linear magnification,  $m$ , of a convex lens. The apparatus is set up as shown in Diagram 1.1  
Seorang pelajar menjalankan satu eksperimen untuk mengkaji hubungan antara jarak objek,  $u$  dan pemebesaran linear,  $m$ , bagi kanta cembung. Radas disediakan seperti Rajah 1.1.

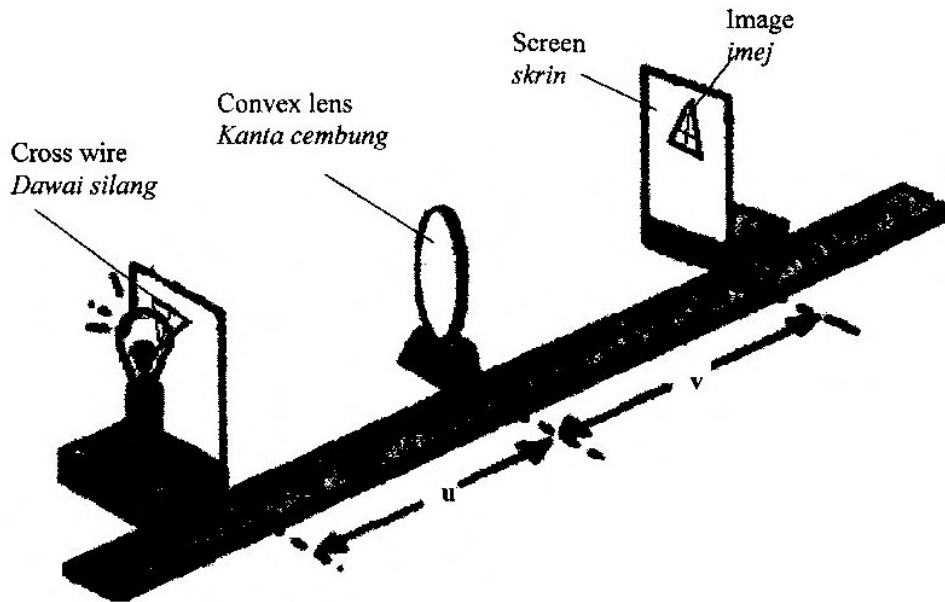


Diagram 1.1  
Rajah 1.1

The object distance,  $u$ , is fixed at 30 cm and the image distance,  $v$ , is measured as shown in Diagram 1.1. The linear magnification,  $m$ , is calculated by using equation

$$m = \frac{v}{u}$$



Jarak objek,  $u$ , ditetapkan pada 30 cm dan jarak imej,  $v$ , diukur seperti yang ditunjukkan dalam Rajah 1.1. Pembesaran linear,  $m$ , dikira dengan menggunakan persamaan

$$m = \frac{v}{u}$$

Experiment is repeated with object distance 25 cm, 20 cm, 15 cm and 10 cm.  
Eksperimen diulang dengan jarak objek 25 cm, 20 cm, 15 cm dan 10 cm

(a) For the experiment described above, identify:  
Daripada penerangan eksperimen di atas, kenalpasti:

(i) The manipulated variable  
Pembolehubah manipulasi

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

(ii) The responding variable  
Pembolehubah bergerak balas

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

(iii) The constant variable  
Pembolehubah dimalarkan

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

Diagram 1.2, 1.3, 1.4, 1.5 and 1.6 shows the position of the lens and the screen for object distance,  $u$ , 30 cm, 25 cm, 20 cm, 15 cm and 10 cm, respectively.

Rajah 1.2, 1.3, 1.4, 1.5 dan 1.6 menunjukkan kedudukan kanta dan skrin bagi setiap jarak objek,  $u$ , 30 cm, 25 cm, 20 cm, 15 cm dan 10 cm.

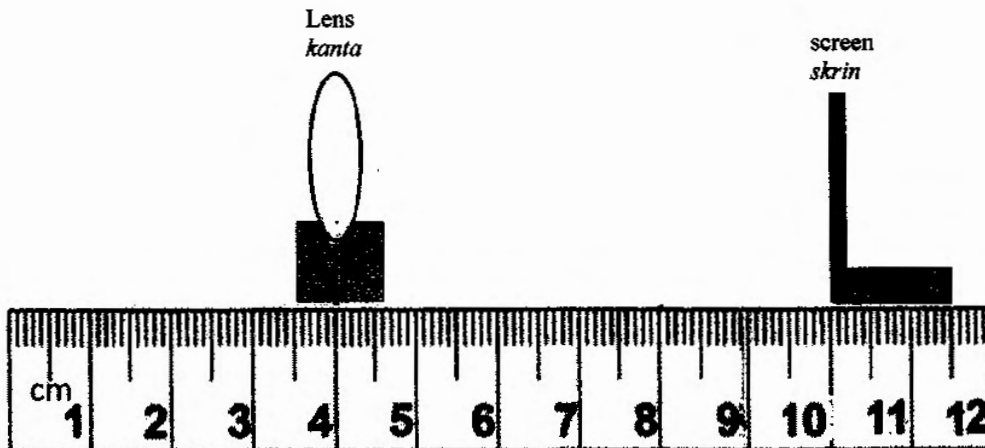


Diagram 1.2 : object distance,  $u = 30$  cm  
Rajah 1.2 : jarak objek,  $u = 30$  cm

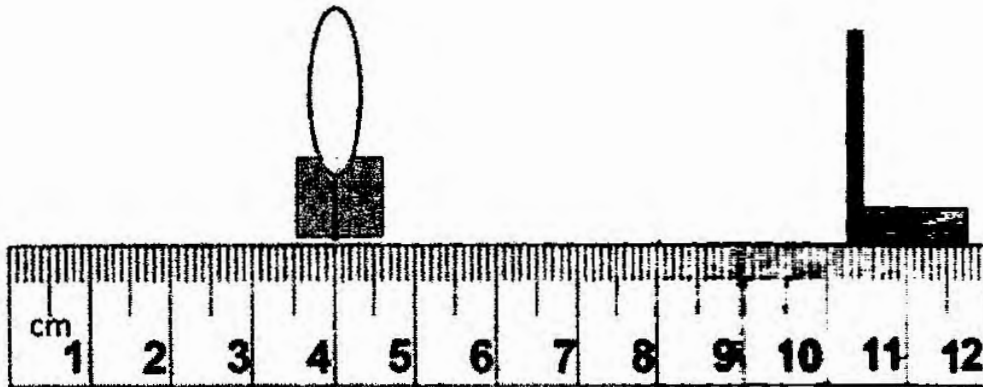


Diagram 1.3 : object distance,  $u = 25 \text{ cm}$   
Rajah 1.3 : jarak objek,  $u = 25 \text{ cm}$

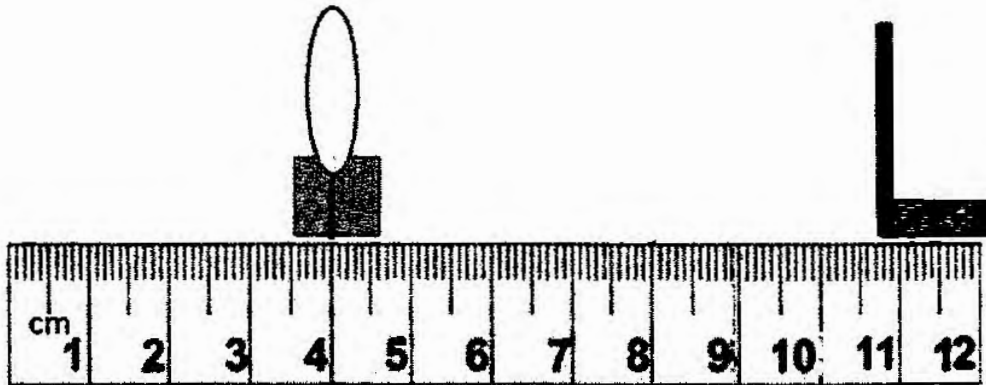


Diagram 1.4 : object distance,  $u = 20 \text{ cm}$   
Rajah 1.4 : jarak objek,  $u = 20 \text{ cm}$

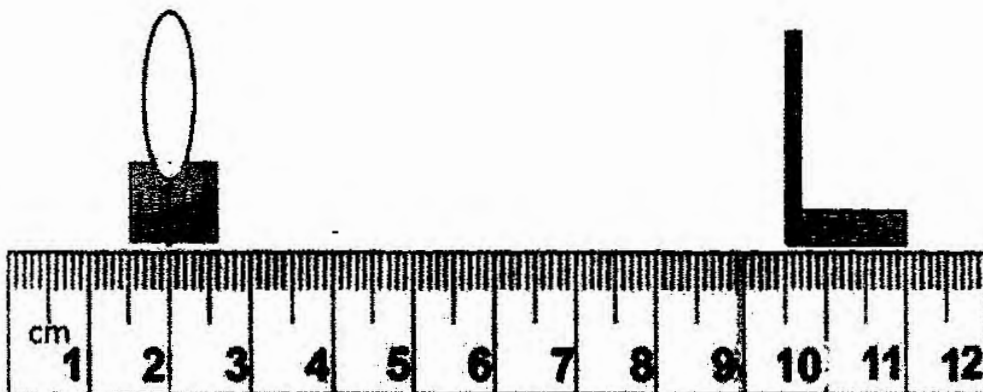


Diagram 1.5 : object distance,  $u = 15 \text{ cm}$   
Rajah 1.5 : jarak objek,  $u = 15 \text{ cm}$

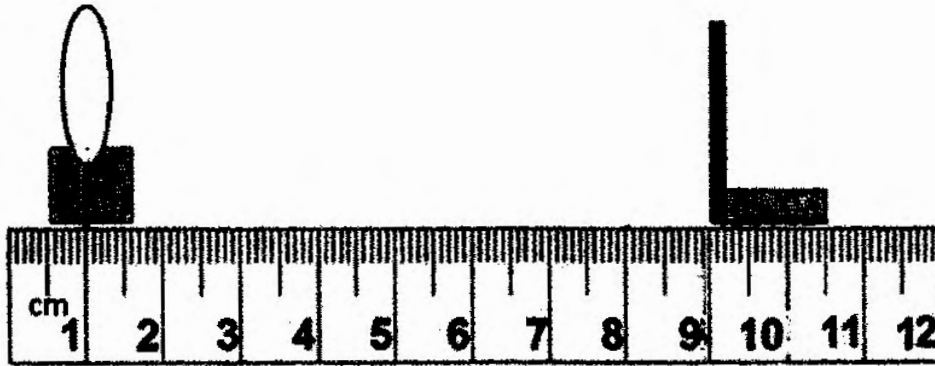


Diagram 1.6 : object distance,  $u = 10$  cm  
Rajah 1.6 : jarak objek,  $u = 10$  cm

(b) Based on diagram 1.2, 1.3, 1.4, 1.5 and 1.6, determine the magnitude of  $v$ , of each object distance,  $u = 30$  cm, 25 cm, 20 cm, 15 cm and 10 cm. Hence, calculate  $\frac{1}{u}$  and linear magnification,  $m$ .

Berdasarkan Rajah 1.2, 1.3, 1.4, 1.5 and 1.6, tentukan nilai  $v$ , bagi setiap jarak objek,  $u = 30$  cm, 25 cm, 20 cm, 15 cm and 10 cm. Seterusnya kirakan  $\frac{1}{u}$  dan pembesaran linear,  $m$ .

Tabulate the values of  $u$ ,  $v$ ,  $\frac{1}{u}$  and  $m$  in the space below.

Jadualkan nilai-nilai bagi  $u$ ,  $v$ ,  $\frac{1}{u}$  dan  $m$  pada ruangan di bawah.

[6 marks]  
[6 markah]

(c) On the graph paper, plot a graph of  $m$  against  $\frac{1}{u}$

*Di atas kertas graf plotkan graf  $m$  lawan  $\frac{1}{u}$ .*

[5 marks]  
[5 markah]

(d) Based on your graph, state the relationship between  $m$  and  $\frac{1}{u}$ .

*Berdasarkan graf anda, nyatakan perhubungan di antaram  $m$  dan  $\frac{1}{u}$ .*

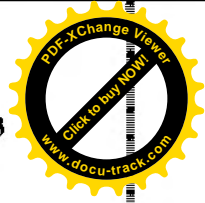
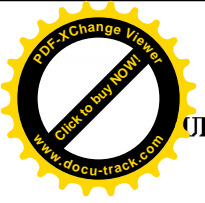
.....  
[1 mark]  
[1 markah]

(e) State **one** precaution that should be taken to obtain the accurate result.

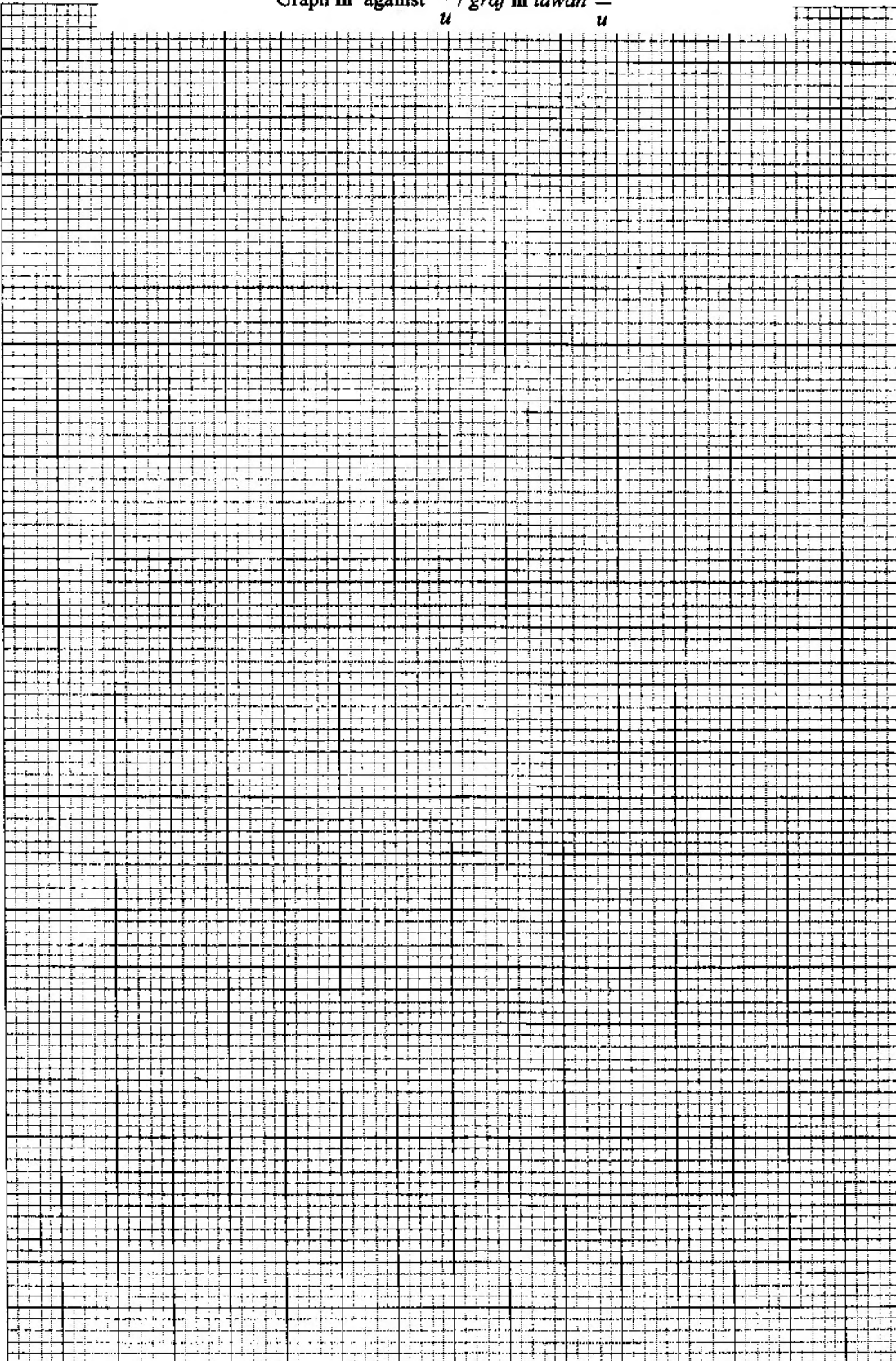
*Nyatakan **satu** langkah berjaga-jaga yang perlu diambil untuk mendapat keputusan yang lebih jitu.*

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





Graph  $m$  against  $\frac{1}{u}$  / graf  $m$  lawan  $\frac{1}{u}$







- 2 A student carries out an experiment to investigate the relationship between the mass,  $m$  and temperature,  $\theta$  of water. The student used different mass of water and corresponding temperature is recorded.

The student then plots a graph of  $\theta$  against  $\frac{1}{m}$  as shown in Diagram 2.1.

*Seorang pelajar menjalankan eksperimen untuk mengkaji hubungan antara jisim,  $m$  dengan suhu,  $\theta$ . Pelajar itu menggunakan jisim air yang berlainan dan suhu yang sepadan direkodkan.*

*Pelajar itu kemudian memplotkan graf  $\theta$  lawan  $\frac{1}{m}$  seperti pada Rajah 2.1.*

Graph  $\theta$  against  $\frac{1}{m}$

Graf  $\theta$  lawan  $\frac{1}{m}$

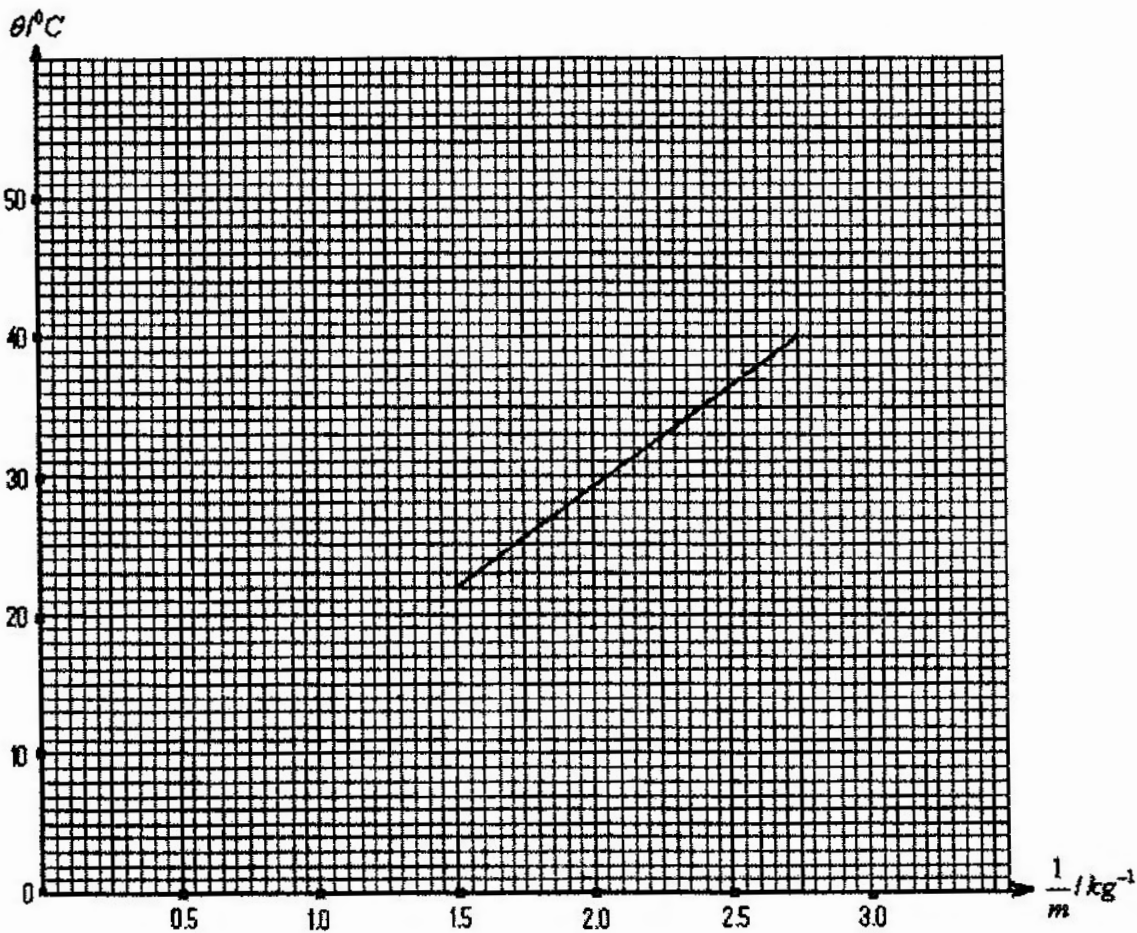
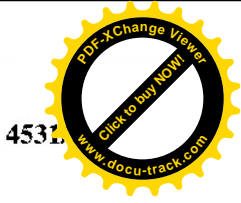
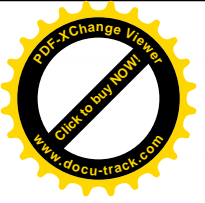


Diagram 2.1  
Rajah 2.1

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(a) Base on the graph in Diagram 2.1,  
*Merujuk kepada graf dalam Rajah 2.1,*

(i) what happen to  $\theta$  when  $m$  increased?  
*apakah yang berlaku kepada  $\theta$  apabila  $m$  bertambah?*

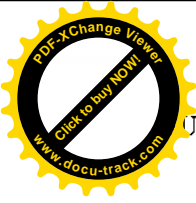
.....  
[1 mark]  
[1 markah]

(ii) determine the temperature,  $\theta$  if the mass of heated water,  $m$  is 0.8 kg. Show on the graph how you determine  $\theta$ .  
*Tentukan suhu  $\theta$  jika jisim air yang dipanaskan ialah 0.8 kg. Tunjukkan pada graf bagaimana anda menentukan  $\theta$ .*

.....  
[3 marks]  
[3 markah]

(iii) calculate the gradient of the graph. Show on the graph how you determine the gradient.  
*hitungkan kecerunan graf. Tunjukkan pada graf bagaimana anda menentukan kecerunan itu.*

[3 marks]  
[3 markah]



- (b) Using the value obtained in (a)(iii) and equation  $h = \frac{Q}{c}$ , calculate the specific heat capacity,  $c$  of the water if  $h$  is gradient of the graph and  $Q$  is the quantity of heat used,  $6.1 \times 10^4 J$ .

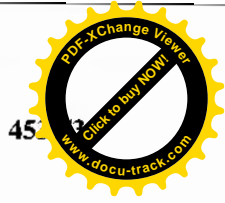
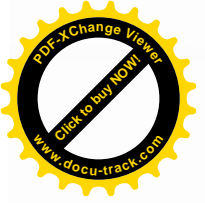
*Dengan menggunakan nilai yang diperolehi dalam (a)(iii) dan persamaan  $h = \frac{Q}{c}$ , hitungkan muatan haba tentu,  $c$  bagi air jika  $h$  ialah kecerunan graf dan  $Q$  ialah kuantiti haba yang digunakan,  $6.1 \times 10^4 J$ .*

[3 marks]  
[3 markah]

- (c) State two precaution taken during the experiment.  
Nyatakan dua langkah berjaga-jaga yang perlu diambil semasa menjalankan eksperimen.

- (i) .....
- .....
- (ii) .....
- .....

[2 marks]  
[2 markah]



**Section B**  
**Bahagian B**

[12 marks]  
[12 markah]

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

- 3 Diagram 3.1 shows a plastic bottle placed in a hot water. The plastic bottle is then put into a basin of ice. It found that the plastic bottle crumpled as shown in Diagram 3.2.

Rajah 3.1 menunjukkan satu botol plastik yang berada dalam air panas. Botol plastik itu kemudiannya diletakkan ke dalam sebuah besen yang mengandungi ais. Didapati bahawa botol itu kemek seperti yang ditunjukkan dalam Rajah 3.2.

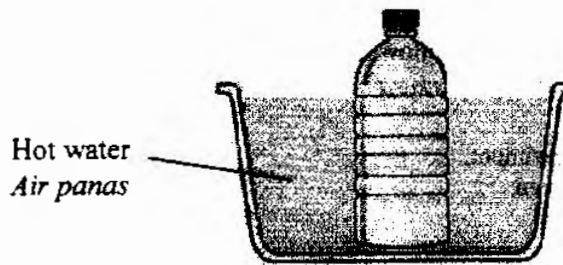


Diagram 3.1  
Rajah 3.1



Diagram 3.2  
Rajah 3.2

Based on the observation on Diagram 3.1 and Diagram 3.2 and using your knowledge of the gas laws:

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Berdasarkan pemerhatian anda pada Rajah 3.1 dan Rajah 3.2 dan menggunakan pengetahuan anda tentang hukum gas:

- (a) State one suitable inference.  
*Nyatakan satu inferens yang sesuai.* [1 mark]  
[markah]
- (b) State one suitable hypothesis.  
*Nyatakan satu hipotesis yang sesuai.* [1 mark]  
[markah]
- (c) With the use of apparatus such as capillary tube, thermometer and other apparatus, describe an experimental framework to investigate the hypothesis stated in 3(b).  
*Dengan menggunakan radas seperti tiub kapilari, thermometer dan radas-radas lain, terangkan satu rangka kerja untuk menyasiat hipotesis yang anda nyatakan di 3(b)*

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

- i) Aim of the experiment.  
*Tujuan eksperimen.*
- ii) Variables in the experiment.  
*Pembolehubah dalam eksperimen.*
- iii) List of apparatus and materials.  
*Senarai radas dan bahan*
- iv) 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.  
*Penjadualan data.*
- vii) The way you would analyse the data.  
*Cara anda menganalisis data.*

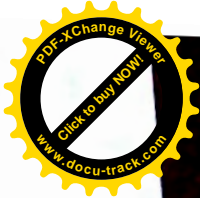
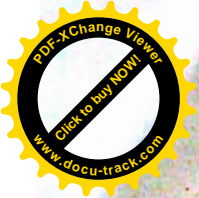
[10 marks]  
[10 markah]

- 4 Diagram 4.1 shows Zamry was switch on the desk fan with speed control number 1. He obtained the fan running slow. Later he press the button speed control to number 3 and he obtained the fan running faster.

*Rajah 4.1 menunjukkan Zamry telah menghidupkan kipas meja dengan kawalan kelajuan nombor 1. Beliau mendapati kipas tersebut berpusing perlahan. Kemudian beliau menekan butang kawalan kelajuan kepada nombor 3 dan didapati kipas berpusing lebih laju.*

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Mark Scheme

Question 1

Q 1 / S 1		Answer	Note
Part	Mrk		
(a)	1	Convex	
(b)	1	Refraction	
(c)(i)	1	Remain unchanged	
(ii)	1	Constant power // same focal length	
Tot/Jum : 4			

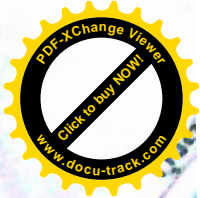
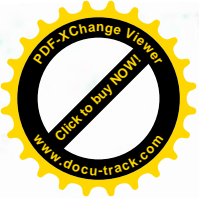


Question 2

Q 2 / S 2		Answer	
Part	Mrk		
(a)	1	Gravitational force// force of gravity// $w=mg$	
(b)(i)	1	Weight = upthrust	
	1	Net force is zero	
(b)(ii)	1	$3200 - 2000 = 1200a$	
	1	$a = 6ms^{-2}$	
Tot/Jum : 5			

Question 3

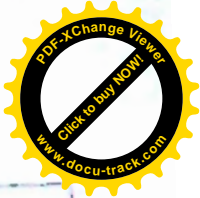
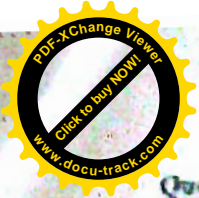
Q 3 / S 3		Answer	Note
Part	Mrk		
(a)	1	Transverse wave.	
(b)(i)	1	Two straight lines from water converge onto screen to form bright band.	
	2	Two straight lines from water diverge onto screen to form dark band.	
(b)(ii)	1	Mark a straight line between two consecutive dark bands and label $\lambda$ .	
(c)	1	Measure distance between $n$ consecutive bright/dark bands, // Using mechanical stroboscope to freeze the water wave.	$n$ at least 3 or more
	2	Calculate average of the wavelength, $\lambda = l / n - 1$ .	
Tot/Jum : 6			



Question 4

QUESTION 4	Mark	Answer	Note
(a)(i)	1	Name the meaning of $\beta$ particle correctly. Fast moving electron // ${}_{-1}^0e$	Reject : electron
(a)(ii)	1	Give the correct explanation Decrease but not to zero Background reading // natural radioactive	
(b)(i)	1	Shows the extrapolation line correctly  <div style="text-align: center;"> </div>	
	1	Correct answer 4 Hours	
(b)(ii)	1	Give the correct number of half life 4 half life // 4 Answer 100% → 50% → 25% → 12.5% → 6.25% // 6.25%	
<b>TOTAL</b>	<b>7</b>		



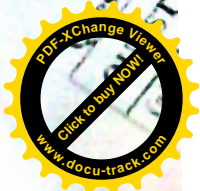


Question 5

QUESTION 5	Mark	Answer	Note
(a)	1	Name the meaning of mass correctly. Amount / quantity of matter // inertia of an object	
(b)(i)	1 1 1	Give the correct comparison Mass of the trolley in Diagram 5.2 > 5.1 Distance travel by the trolley in Diagram 5.2 < 5.1 Acceleration of the trolley in in Diagram 5.2 > 5.1	Vice versa
(b)(ii)	1	Give the correct answer Force // weight of slotted weight	
(c)	1	Give the correct answer Mass , acceleration , force	
(d)	1  1	Correct substitution (4)(10) (4+2.5)  Answer with the correct unit 6.15 ms <sup>-2</sup>	Accept g = 9.81 ms <sup>-2</sup>
<b>TOTAL</b>	<b>8</b>		

Question 6

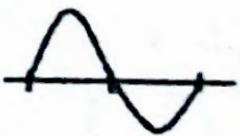
QUESTION 6	Mark	Answer	Note
(a)	1	Induced current	
(b)(i)	1	6.2 > 6.1	
(ii)	1	6.2 > 6.1	
(iii)	1	same	
(iv)	1	Number of turns increases, deflection of the pointer increases	
(v)	1	Number of turns increases, induced current increases	
(c)(i)	1	Increases	
(ii)	1	Velocity increases // relative motion increases	
<b>TOTAL</b>	<b>8</b>		



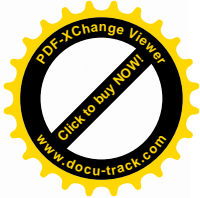
**Question 7**

No. 7	Marks	Answer	notes
Section			
(a)(i)	1	Refraction	
(ii)	1	Light travel from higher density to lower density medium	
	1	Velocity of light increase in lower density medium	
	1	Light refracted away from normal	
(b)	1	2/1.33	Substitution With correct unit
	1	1.5 m	
(c)(i)	1	Concave mirror	
	1	Focus / converged light rays	
(ii)	1	Large surface area / diameter	
	1	Collect / reflect more light	
<b>Total</b>	<b>10</b>		

**Question 8**

8.	(a)		Convert AC to DC	1
	(b)	(i)	Four diode Full wave rectification	1 1
		(ii)	With capacitor Smoother the current	1 1
	(c)		Circuit R	1
	(d)		Allows current flows in one direction	1
	(e)	(i)	$T = 4 \times 0.02$ atau $= 0.08s$	1
		(ii)	$f = 1/0.08$ $= 12.5 \text{ Hz}$	1 1
		(iii)	 <p>no change in amplitude Half periode</p>	1 1
	<b>Total</b>			<b>12</b>

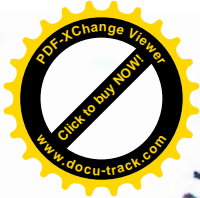
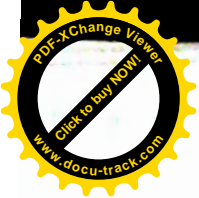




Question 9

QUESTION 9	Mark	Answer	Note
(a)	1	Thermal equilibrium	
	1	Mass of the water in diagram 9.1 < 9.2	
	1	The reading in of thermometer in 9.3 < 9.4	
	1	The rate of heat loss from water in Diagram 9.3 > 9.4	
	1	Mass decreases, the rate of heat loss is increases	
	1	When the mass increases quantity of heat increases	
	1	Specific heat capacity of land is lower	
	1	Temperature of the land is higher	
	1	Air above the land rises	
	1	Cooler air from sea moves to the land	
(c)		Design	Reasons
	1,2	Specific heat capacity is low	Faster to get hot
		Melting point is high	Does not melt easily
	3,4	Good conductor of heat	The heat can be lost easily
	5,6	Rate of expansion is moderate	The shape of the fin unchange
	7,8		
	9,10	The number of fin is many	More heat is released
<b>Total</b>	<b>20</b>		

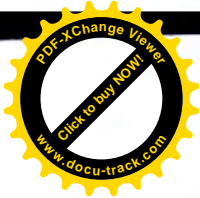




Question 10

Question 10

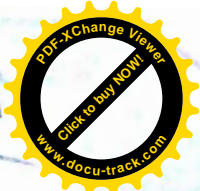
Q 10 / S 10		Rate of flow of charge.	Note
(a)(i)	1		Reject: $I = V/R$ , $I = Q/t$
(b)	1	Bulbs in Diagram 10.2 brighter than bulbs in Diagram 10.1	
	2	Effective resistance in Diagram 10.1 > in Diagram 10.2.	
	3	The ammeter reading in Diagram 10.2 > in Diagram 10.1.	
	4	The greater the magnitude of current, the brighter the bulbs light up.	
	5	The lower the effective resistance, the higher the magnitude of current flows.	
(c)(i)	1	Correct circuit diagram with correct symbols and two bulbs in series.	
	2	Correct circuit diagram with correct symbols and two bulbs in parallel.	
(c)(ii)	1	Magnitude of current flows increased.	
	2	Effective resistance decreased.	
(d)	1, 2	Suggestion / Modification	Explanation / Reason
		Using coiled coils filament.	Increase the length of the filament to increase resistance.
	3, 4	Thin wire of the filament.	To produce high resistance. // To produce more heat / glow more light.
		Large / high melting point of filament material.	Not easily break // To avoid the bulb easily blow up.
	7, 8	Low gas pressure inside the bulb.	To prevent explode when gas in high temperature.
	9, 10	Using copper / aluminum for material of contact points.	Increase current flows through the filament. // Reduce resistance for easily current flows.
Tot/Jum : 20			



## Question 11

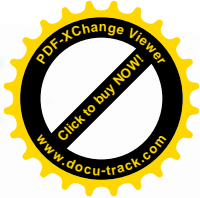
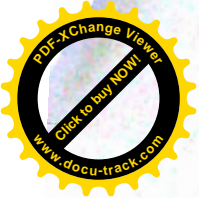
Q11	Mark	Answer	Note	
(a)	1	Archimedes' Principle states that an object which is partially or wholly immersed in a fluid, the buoyant force is equal to the weight of fluid displaced.		
(b)	1 1 1 1	Water is driven out from ballast tank by compressed air Weight of submarine = buoyant force, submarine float Water is filled into ballast tank Weight of submarine bigger than buoyant force, submarine submerge		
(c)	1,1	Characteristics	Explanation	
		Fibre composite	Light and strong	
	1,1	Bigger volume of air space	Higher buoyant force	
	1,1	Has a plimsoll line	To ensure the ship will not be overload	
	1,1	Bigger size of propeller	To produce greater forward thrust	
1,1	Chosen : R because has fibre composite, bigger volume pf air space, plimsoll lie and bgger size of propeller			
(d)(i)	1 1	$F = 1020 \times 5 \times 10$ $= 51\,000\text{ N}$		
(ii)	1 1 1	$12\,000 + W = 51\,000\text{ N}$ $W = 39\,000\text{ N}$ $m = 3\,900\text{ kg}$		
<b>Total</b>	<b>20</b>			





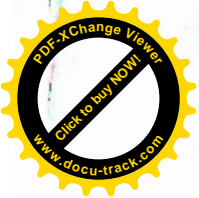
Q1

	Answer	Mark	Max
	Semiconductor is a material with electrical conductivity better than insulator but weaker than a conductor	1	
12(b)	<ul style="list-style-type: none"> <li>- Doping process Silicon is doped with pentavalent atoms/Phosphorus/Antimony</li> <li>- To produce covalent bond</li> <li>- Increase the free electron inside the semiconductor</li> <li>- Majority charge-carriers is negative electron</li> </ul>	1 1 1 1	
		1	Max 4
12(c)(i)	$V_{x-z} = 6\text{ V}$	1	1
12(c)(ii)	$V_{x-y} = 6 - 1 = 5\text{ V}$	1	1
12(c)(iii)	$V_M = \left( \frac{R_M}{R_M + R_N} \right) \times 6V$ $5 = \left( \frac{R_M}{R_M + 1000} \right) \times 6V$ $5R_M + 5000 = 6R_M$ $R_M = 5000\ \Omega$	1  1  1	3
12(d)	<ul style="list-style-type: none"> <li>- LDR is connected at base circuit</li> <li>- When intensity of light is low / dark, resistance of LDR increases / so <math>V_{\text{base}}</math> is large / transistor switched on</li> <li>- Terminal positive of batteries is connected to collector</li> <li>- So that the transistor is forward biased</li> <li>- Bulbs are arranged in parallel circuit</li> <li>- All bulbs are connected to voltage supply of 95V</li> </ul>	1 1  1 1  1 1	10



	<ul style="list-style-type: none"><li>- Relay switch is used</li><li>- So that the secondary circuit will switch on // So that the electromagnet will switch on the secondary circuit</li> <li>- Choose A</li><li>- Because LDR is connected at base circuit, terminal positive of batteries is connected to collector; bulbs are arranged in parallel circuit and relay switch is used.</li></ul>	1 1  1 1	
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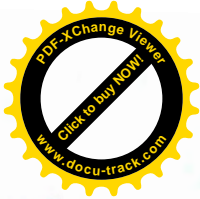
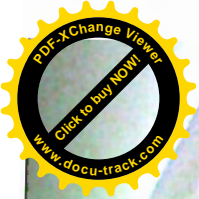




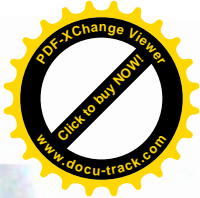
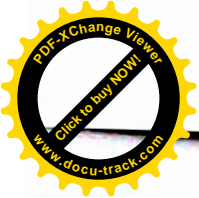
SECTION A

NO	MARKING CRITERIA	MARK																									
		SUB	TOTAL																								
1(a) (i)	State the manipulated variable correctly Object distance/u	1	1																								
(ii)	State the responding variable correctly Image distance/v/ linear magnification/magnification/m	1	1																								
(iii)	State the constant variable correctly focal length/f/ type of lens	1	1																								
	Record the readings of $v$ correctly																										
(b)(i)	Diagram 1.2 : 6.0 Diagram 1.3 : 6.3 Diagram 1.4 : 6.7 Diagram 1.5 : 7.5 Diagram 1.6 : 8.0 Note : 1. All 5 values correct – 2 marks 2. 3 or 4 values correct – 1 mark 3. consistent 1 d.p	2	2																								
(ii)	State the values of linear magnification $m$ correctly																										
	Diagram 1.2 : 0.200 Diagram 1.3 : 0.252 Diagram 1.4 : 0.335 Diagram 1.5 : 0.500 Diagram 1.6 : 0.800 Note : 1. Accept e.c.f. from (b)(i) 2. All 5 values correct – 2 marks 3. 3 or 4 values correct – 1 mark 4. consistence two or three d.p.	2	2																								
(iii)	State the values of $1/u$ correctly All 5 values of $1/u$ correct Diagram 1.2 : 0.033 Diagram 1.3 : 0.040 Diagram 1.4 : 0.050 Diagram 1.5 : 0.067 Diagram 1.6 : 0.100 Note : 1. All 5 values correct – 1 mark 2. consistent two or three d.p.	1	1																								
(c)	Tabulate the results for $u$ , $v$ , $\frac{1}{u}$ and $m$ correctly																										
	<table border="1"> <thead> <tr> <th>u/cm</th> <th>v/cm</th> <th><math>1/u/cm^{-1}</math></th> <th>m</th> </tr> </thead> <tbody> <tr> <td>10.0</td> <td>8.0</td> <td>0.100</td> <td>0.800</td> </tr> <tr> <td>15.0</td> <td>7.5</td> <td>0.067</td> <td>0.500</td> </tr> <tr> <td>20.0</td> <td>6.7</td> <td>0.050</td> <td>0.335</td> </tr> <tr> <td>25.0</td> <td>6.3</td> <td>0.040</td> <td>0.252</td> </tr> <tr> <td>30.0</td> <td>6.0</td> <td>0.033</td> <td>0.200</td> </tr> </tbody> </table>	u/cm	v/cm	$1/u/cm^{-1}$	m	10.0	8.0	0.100	0.800	15.0	7.5	0.067	0.500	20.0	6.7	0.050	0.335	25.0	6.3	0.040	0.252	30.0	6.0	0.033	0.200		
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	Table with 4 columns correctly labelled Unit of each quantities	1 1	2																								





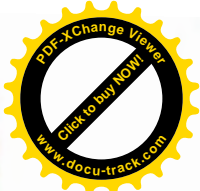
Maximum mark			7												
(d)	<p>Draw a complete graph of <math>m</math> against <math>\frac{1}{u}</math></p> <p>Give a tick (✓) based on the following:</p> <ul style="list-style-type: none"> <li>A • <math>m</math> at the y-axis, <math>\frac{1}{u}</math> at the x-axis</li> <li>B • Uniform scale at both axes</li> <li>C • 5 points plotted correctly [Note : 4 points plotted correctly : ✓]</li> <li>D • Straight line of best fit is drawn (not through the origin)</li> <li>E • Minimum size of graph 5 x 4 big squares (Big square : 2 cm x 2 cm) (From the origin to the last point)</li> </ul> <p>Marks awarded :</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Number of ✓</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>6 ✓</td> <td>5</td> </tr> <tr> <td>4 - 5 ✓</td> <td>4</td> </tr> <tr> <td>3 ✓</td> <td>3</td> </tr> <tr> <td>2 ✓</td> <td>2</td> </tr> <tr> <td>1 ✓</td> <td>1</td> </tr> </tbody> </table>	Number of ✓	Marks	6 ✓	5	4 - 5 ✓	4	3 ✓	3	2 ✓	2	1 ✓	1	✓ ✓ ✓✓ ✓ ✓	5
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3 ✓	3														
2 ✓	2														
1 ✓	1														
(e)	<p>State the correct relationship between <math>\sin i</math> and <math>\sin r</math></p> <p><math>m</math> increase linearly to <math>\frac{1}{u}</math></p>	1	1												
		5	16												

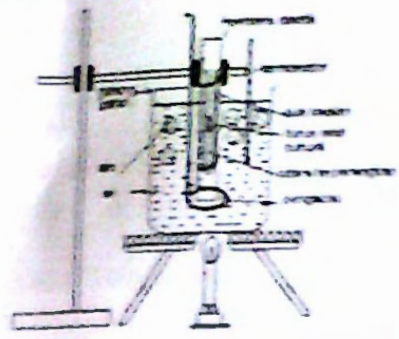


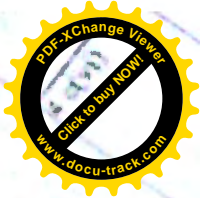
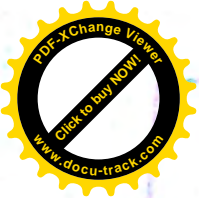
No. 3

N0 2	Mark	Answer
(a) (i)	1	<p><u>State the change correctly</u> Decrease</p>
(a) (ii)	1 1 1	<p><u>State the value of <math>\theta</math></u> -shows graph extrapolation -shows the corresponding arrow -18.5 °C // 18.0°C // 19.0°C (reject without unit)</p>
(a) (iii)	1 1 1	<p><u>Calculate the gradient of the graph, h and state the value of h with the acceptable range</u> -Draw a sufficiently large triangle to calculate the gradient of the graph. -Correct substitution (follow candidate's triangle) -State value of the gradient with correct unit. The gradient of the graph is 14.55 °C kg</p>
(b)	1 1 1	<p><u>Correct substitution to the formula</u></p> $c = \frac{Q}{\text{gradient}}$ $c = \frac{6.1 \times 10^4}{14.55}$
(c)	1 1	<p>4192.44 J kg<sup>-1</sup> °C<sup>-1</sup></p> <p>Stir the water gently with the heater to ensure that heat is distributed uniformly to all part of the water.</p> <p>Make sure the insulating jacket is covered all part of the beaker.</p>
<b>Total</b>	<b>12</b>	





		<b>Answer</b>												
(a)	1	<b>Inference</b> Volume depends on temperature // temperature influences volume												
(b)	1	<b>Hypothesis</b> If the temperature increases, the volume increases												
(c)(i)		<b>Aim</b> To investigate the relationship between volume and temperature												
(ii)	1	<b>Variables</b> Manipulated : temperature Responding : volume Constant Variable : mass of gas // pressure												
(iii)	1	<b>List of apparatus</b> : capillary tube, sulphuric acid, thermometer, ice and bunsen burner												
(iv)	1	<b>Arrangement of apparatus:</b> 												
(v)	1	<b>Control of manipulated variable</b> Put some ice in the beaker and stir until the temperature is 0. Record the reaching of temperature.												
	1	<b>Measurement of responding variable</b> Read and record the length of air trapped												
	1	Repeat the experiment 4 times with the difference temperature.												
(vi)		<b>Tabulation of data</b> <table border="1" data-bbox="399 1400 1348 1646"> <thead> <tr> <th>Temperature, <math>\theta</math> (<math>^{\circ}\text{C}</math>)</th> <th>Length/ cm</th> </tr> </thead> <tbody> <tr> <td><math>\theta_1</math></td> <td></td> </tr> <tr> <td><math>\theta_2</math></td> <td></td> </tr> <tr> <td><math>\theta_3</math></td> <td></td> </tr> <tr> <td><math>\theta_4</math></td> <td></td> </tr> <tr> <td><math>\theta_5</math></td> <td></td> </tr> </tbody> </table> <p style="text-align: center;">Terima jika tak tulis unit</p>	Temperature, $\theta$ ( $^{\circ}\text{C}$ )	Length/ cm	$\theta_1$		$\theta_2$		$\theta_3$		$\theta_4$		$\theta_5$	
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(vii)	1	<b>Analysis of data.</b> Plot the graph of volume against temperature OR												



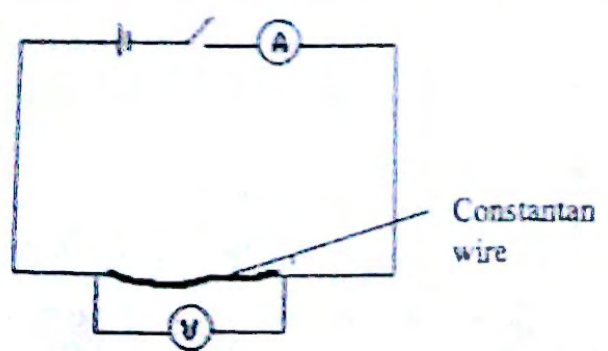
voltage  
 L  
 temperature

Accept the symbols  $\rho$  and  $V$  if the meaning was mentioned before

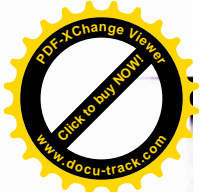
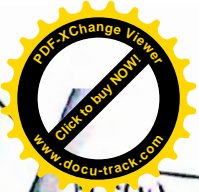
12

**QUESTION 4**

Section	Mark	Answer
4 (a)	1	State a suitable inference <ul style="list-style-type: none"> <li>• Speed of fan influenced of current/</li> <li>• Resistance of conductor influenced of length.</li> </ul>
4 (b)	1	State relevant hypothesis (with direction) <ul style="list-style-type: none"> <li>• If <u>length</u> of conductor <u>increase</u>, the <u>resistance</u> increase.</li> </ul>
4(c)		Describe a complete and suitable experimental framework (10 marks)
4 c (i)	1	<ul style="list-style-type: none"> <li>• <u>State the aim of the experiment(M1)</u> To investigate the relationship between <u>length</u> and <u>resistance</u></li> </ul>
4c (ii)	1	<u>State the manipulated variable and the responding variable(M2)</u> Manipulated variable : length Responding variable : resistance
	1	<u>State the constant variable ( M3)</u> Constant variable : diameter/type of conductor/ temperature/resistivity
4 c(iii)	1	<u>List out the important apparatus and materials (M4)</u> Dry cell, ammeter, voltmeter, constantan wire and meter ruler.
4 c(iv)	1	<u>State a function able arrangement of the apparatus (M5)</u>







c(v)	1	<p><b>State the method of controlling the manipulated variable (M6)</b>          Experiment started by using a constantan wire length of 20 cm .</p>												
4c(vi)	1	<p><b>State the method of measuring the responding variable (M7)</b>          -Switched on the switch and record the reading of ammeter, I, and voltmeter, V          -Calculate the resistance , <math>R = \frac{V}{I}</math></p>												
4c(vii)	1	<p><b>Repeat the experiment at least 4 times with different values (M8)</b>          Repeat the experiment 4 times with different length of constantan wire such as 30 cm, 40 cm , 50 cm and 60 cm.</p>												
4c(viii)	1	<p><b>Tabulate the data (M9)</b></p> <table border="1" data-bbox="662 952 1396 1209"> <thead> <tr> <th>Length/cm</th> <th>Resistance/<math>\Omega</math></th> </tr> </thead> <tbody> <tr><td>20</td><td></td></tr> <tr><td>30</td><td></td></tr> <tr><td>40</td><td></td></tr> <tr><td>50</td><td></td></tr> <tr><td>60</td><td></td></tr> </tbody> </table>	Length/cm	Resistance/ $\Omega$	20		30		40		50		60	
Length/cm	Resistance/ $\Omega$													
20														
30														
40														
50														
60														
4c(ix)	1	<p><b>State how data will be analysed (sketch graph/statement) (M10)</b>          Plot graph Resistance against length</p>												
<b>TOTAL</b>	<b>12</b>	<p>TERIMA Experiment : Magnitude of the force on a current-carrying conductor in a magnetic field with the magnitude of the current</p>												