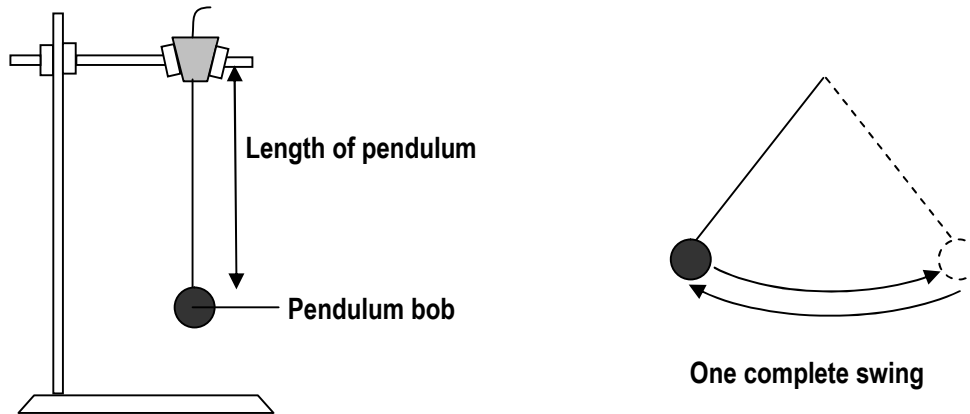


# EXPERIMENTING

1. A student carried out an experiment to study the relationship between the length of a pendulum and the time taken for the pendulum to make one complete swing. The apparatus set-up is shown in Figure 1.1.  
(Seorang pelajar telah menjalankan eksperimen untuk mengkaji hubungan antara panjang bandul dengan masa yang diambil untuk membuat satu ayunan lengkap. Susunan alat radas seperti dalam Rajah 1.1)



**FIGURE 1.1.**

The procedures to carry out the experiment are as follows:

(Prosedur eksperimen seperti berikut : )

- S 1 A pendulum bob is tied to a string and hung on a retort stand as shown in Figure 1.1  
(Bandul diikat dengan benang dan digantung pada kaki retot seperti dalam Rajah 1.1 )
- S 2 The time taken for the pendulum to make 10 complete swings is taken.  
(Masa bagi bandul membuat 10 ayunan lengkap diambil )
- S 3 The experiment is repeated with different lengths of the pendulum string.  
( Eksperimen diulang untuk panjang bandul yang berbeza )
- S 4 The results are tabulated in Table 1.2  
(Keputusan dicatatkan dalam Jadual 1.2 )

- (a) State the variables involved in this experiment.  
(Nyatakan pembolehubah-pembolehubah dalam eksperimen ini )

Manipulated variable: (Pembolehubah dimanipulasi)	
Responding variable: (Pembolehubah bergerakbalas)	
Fixed variable: (Pembolehubah dimalarkan)	

[3 marks]

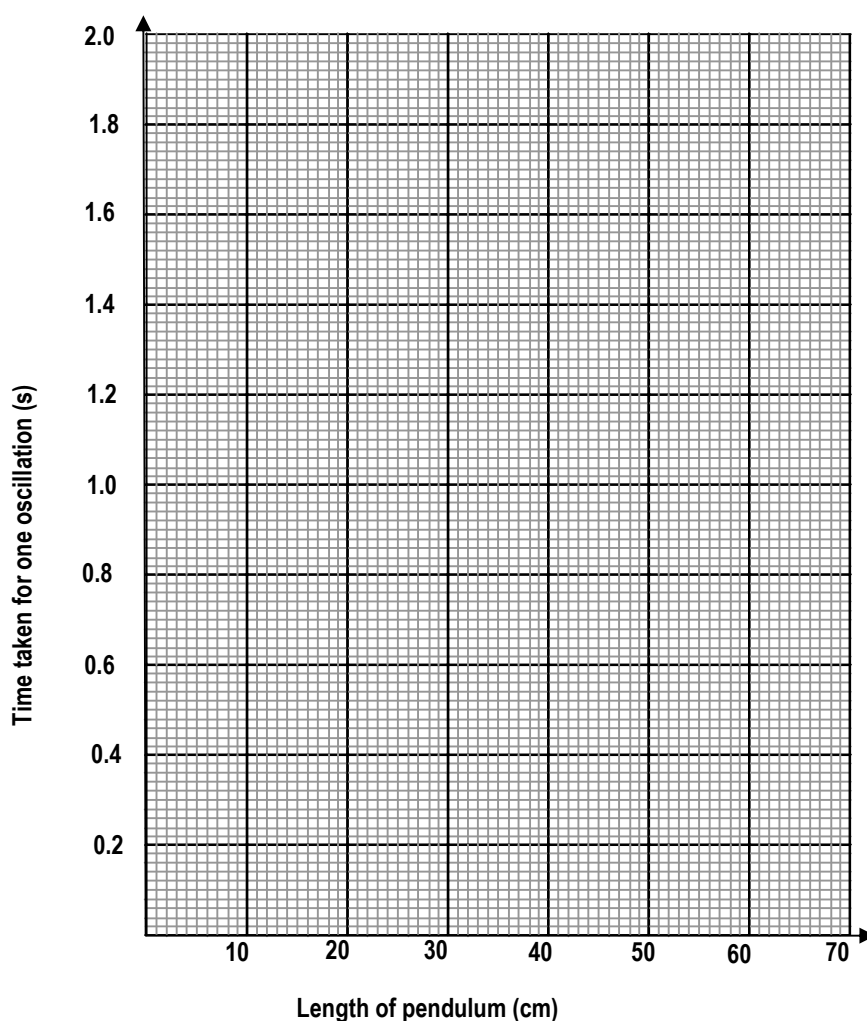
- (b) Table 1.2 shows the results of the experiment. Calculate the time taken for one complete swing and complete table 1.2.  
( Jadual 1.2 menunjukkan keputusan eksperimen. Kirakan masa yang diambil untuk satu ayunan lengkap dan lengkapkan Jadual 1.2 )

Length of the pendulum (Panjang bandul ) (cm)	Time taken for 10 complete swings (Masa untuk 10 ayunan lengkap ) (s)	Time taken for 1 complete swing (Masa untuk 1 ayunan lengkap) (s)
10	8.0	
20	10.0	
30	12.0	
40	14.0	
50	16.0	
60	18.0	

TABLE 1.2

[3 marks]

- (c) Using Table 1.2, draw a line graph to show the relationship between the length of the pendulum and the time taken for one complete swing.  
(Dengan menggunakan Jadual 1.2, lukiskan graf menunjukkan hubungan antara panjang bandul dengan masa untuk satu ayunan lengkap )



[2 marks]

- (d) Based on the graph, what can be said about the time taken for the pendulum to make one complete swing ?

(Berdasarkan graf, apa yang boleh anda nyatakan tentang tempoh masa untuk satu ayunan lengkap ? )

[1 mark]

- (e) What can you infer from the experiment ?

( Apakah inferens daripada eksperimen ?)

[1 mark]

- (f) From the graph, predict the time taken for the pendulum to make one complete swing if the length of the pendulum is 70 cm.

( Dari graf ,ramalkan masa yang diambil oleh bandul untuk membuat satu ayunan lengkap jika panjangnya 70 cm )

[1 mark]

- (g) State the relationship between the length of the pendulum and the time taken to make one complete swing.

( Nyatakan hubungan antara panjang bandul dengan masa yang diambil untuk membuat satu ayunan lengkap )

[1 mark]

1. Figure 2.1 shows an experiment to show that living things give out carbon dioxide during respiration.

Test tubes A, B, and C were set up and kept in a dark cupboard for 3 hours.

(Rajah 2.1 menunjukkan satu eksperimen untuk mengkaji benda hidup membebaskan karbon dioksida semasa respirasi. Tabung uji A,B dan C diletakkan dalam almari gelap selama 3 jam.)

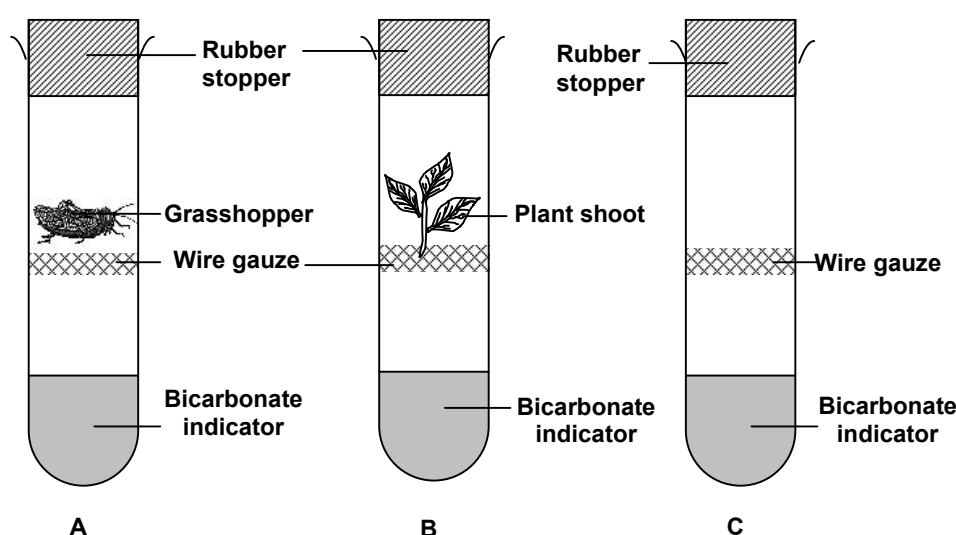


FIGURE 2.1

- (a) State the variables involved in the experiment. (Nyatakan pembolehubah yang terlibat )

Manipulated variable: ( P.U dimanipulasi )	.....
Responding variable: (P.U bergerakbalas)	.....
Fixed variable: (P.U dimalarkan )	.....

[3 marks]

- (b) Table 2.2 shows the results of the experiment.  
(Jadual 2.2 menunjukkan keputusan eksperimen)

Test tube (Tabung uji)	Colour of bicarbonate indicator (Warna penunjuk bikarbonat)	
	Initial ( Awal)	End (Akhir)
A	Red (Merah)	Yellow(Kuning)
B	Red(Merah)	Yellow(Kuning)
C	Red(Merah)	Red(Merah)

Table 2.2

- (b)(i) Based on Table 2.2, what can be said about the changes in the colour of the bicarbonate indicator?  
(Berdasarkan Jadual 2.2,apakah yang boleh dikatakan tentang perubahan warna penunjuk bikarbonat ?)

---



---

[1 mark]

- (b)(ii) What can you infer from the experiment?  
(Apakah inferens daripada eksperimen ?)

---



---

[1 mark]

- (b)(iii) What causes the change in the colour of the bicarbonate indicator ?  
(Apakah yang menyebabkan perubahan waran penunjuk bikarbonat ? )

---

[1 mark]

- (c) Why is there no change in test tube C ?  
(Mengapakah tiada perubahan dalam tabung uji C ?)

---



---

[1 mark]

- (d) What is the function of test tube C ?  
( Apakah fungsi tabung uji C? )

---

[1 mark]

- (e) What can you conclude from this experiment ?  
(Apakah kesimpulan eksperimen ini ? )

---



---

[1 mark]

- (f) Why are the test-tubes kept in a dark cupboard ?  
(Mengapa tabung uji disimpan dalam almari gelap ?)

---



---

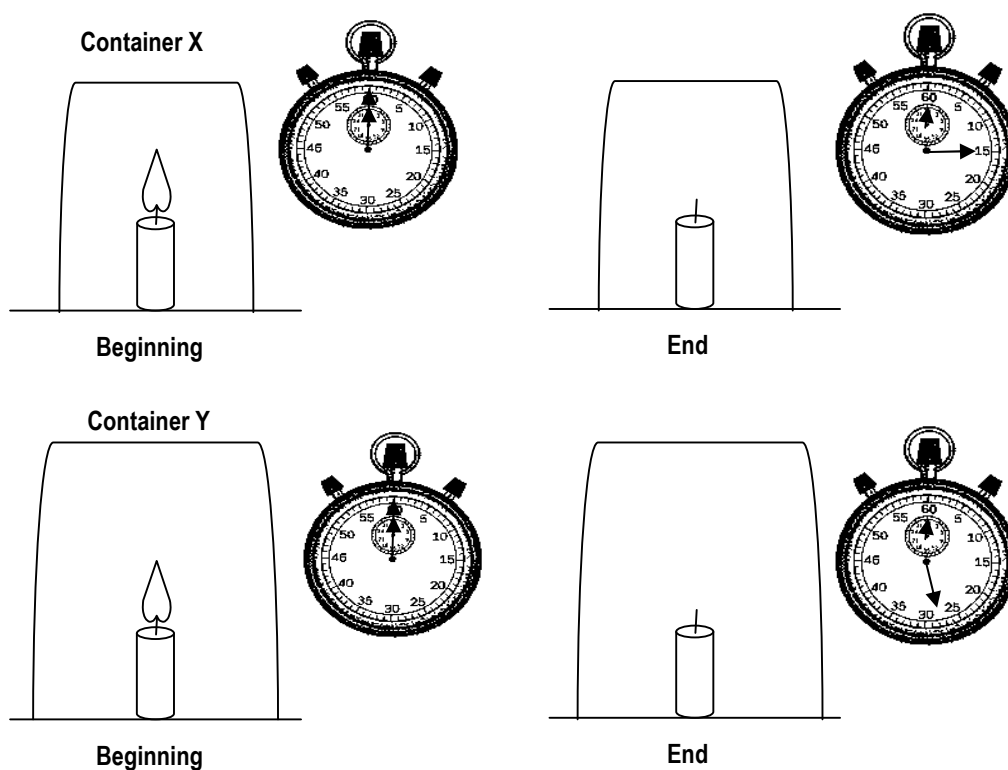
[1 mark]

- (g) Predict the colour of the bicarbonate indicator if the test-tubes are kept in a bright place for 3 hours instead of a dark cupboard.  
( Ramalkan warna penunjuk bikarbonat jika tabung uji disimpan di tempat terang selama 3 jam )

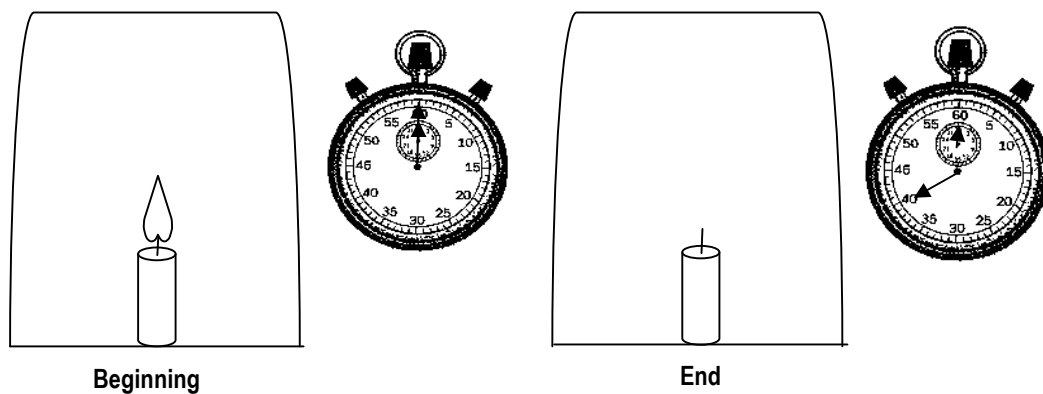
Test-tube (Tabung uji )	Colour of bicarbonate indicator (Warna penunjuk bikarbonat)
A	
B	
C	

[2 marks]

2. A student carried out an experiment to investigate the combustion of candle in containers of different sizes as shown in Figure 3.1  
(Seorang pelajar menjalankan eksperimen untuk mengkaji pembakaran lilin dalam bekas yang berlainan saiz seperti dalam Rajah 3.1)



**Container Z**



**FIGURE 3.1**

- (a) State the variables involved in this experiment.  
(Nyatakan pembolehubah-pembolehubah eksperimen)

Manipulated variable: (P.U dimanipulasi)	.....
Responding variable: (P.U bergerakbalas)	.....
Controlled variable: (P.U dimalarkan)	.....

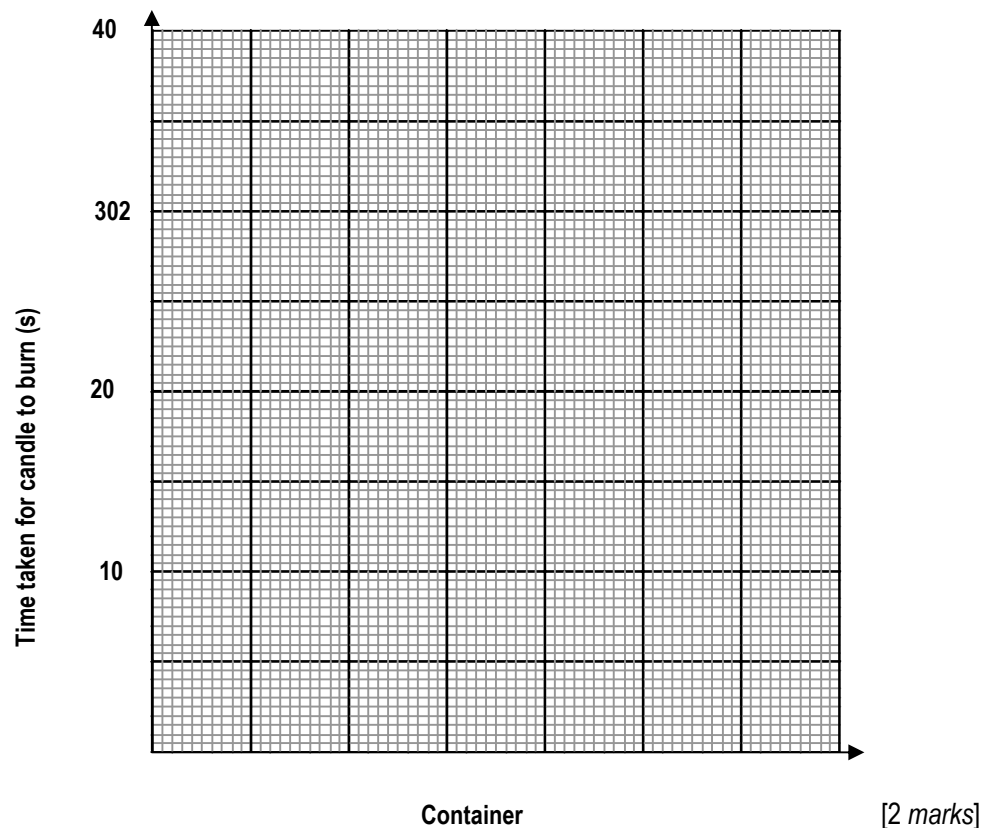
[3 marks]

- (b) Based on Figure 3.1, record the time taken for the candle to burn in different containers.  
(Berdasarkan Rajah 3.1, rekodkan masa lilin menyala dalam bekas yang berlainan)

Container (Bekas)	Time taken for candle to burn (s) (Masa lilin menyala)
X	
Y	
Z	

[3 marks]

- (b) Based on the table in (b), draw a bar chart to show the time taken for the candle to burn in different containers.  
(Berdasarkan jadual dalam (b), lukis carta bar untuk menunjukkan masa lilin menyala dalam bekas berlainan).



- (d) Based on the bar chart in (c), what can be said about the time taken for the candles to burn?  
(Berdasarkan carta bar dalam (c), apakah yang boleh dinyatakan tentang masa bagi lilin menyala ?)

---



---

[1 mark]

- (e) State one inference from the experiment.  
(Nyatakan satu inferens untuk eksperimen ini )

---



---

[1 mark]

- (f) State the relationship between the size of the container and the time taken for the candle to burn.  
(Nyatakan hubungan antara saiz bekas dengan masa yang diambil untuk lilin menyala)

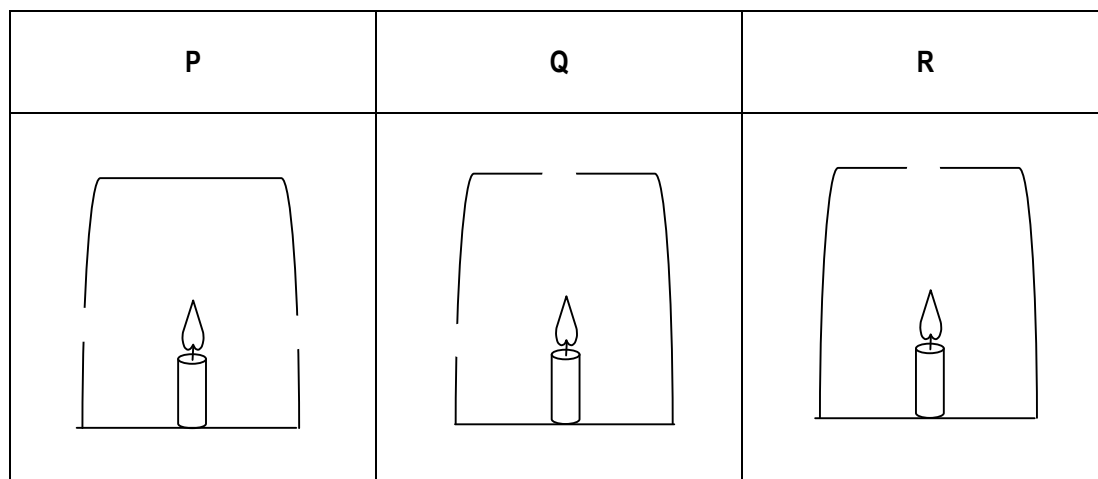
---



---

[1 mark]

- (g) A student drilled some holes on a container as shown in Figure 3.2. In which container will the candle burn the longest? Circle the correct answer. (Seorang pelajar membuat beberapa lubang pada bekas seperti ditunjukkan dala Rajah 3.2. Dalam bekas yang mana lilin menyala lebih lama ? Bulatkan jawapan anda.)



[1 mark]

3. A student carried out an experiment to study the effect of surface area on the evaporation of water. Three equally damp filter papers, P, Q and R are left to dry under the same conditions as shown in Figure 4.1. P is left unfolded, Q is folded into half and R is folded into quarter. The time taken for the filter papers to dry is shown in Table 4.2.  
(Seorang pelajar menjalankan eksperimen untuk mengkaji kesan luas permukaan ke atas penyejatan air. Tiga helai kertas turas yang berlainan bentuk P, Q dan R dibiarkan mengering dalam keadaan yang sama seperti dalam rajah 4.1. Kertas P tidak dilipat manakala Q dilipat menjadi separuh dan R dilipat menjadi satu perempat. Masa untuk kertas turas mongering dicatatkan dalam jadual 4.2 )

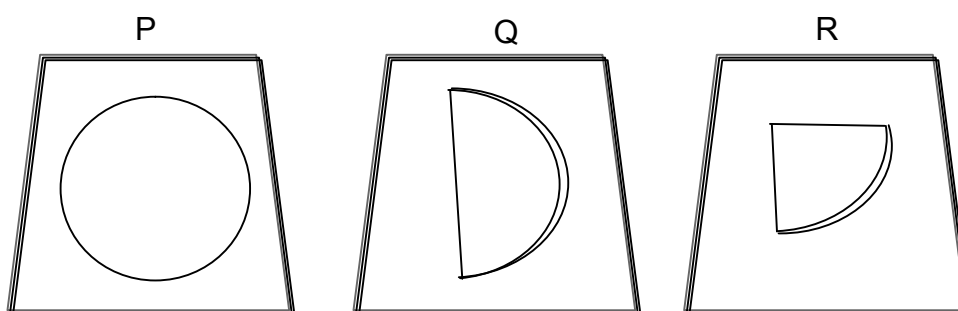


FIGURE 4.1

Filter Paper / Kertas Turas	Time taken for filter paper to dry (s) / Masa yg diambil untuk kertas turas mengering (s)
P	200
Q	320
R	450

TABLE 4.2



- (a) State the variables involved in this experiment.  
(Nyatakan pembolehubah-pembolehubah yang terlibat dalam eksperimen ini)

Manipulated variable: (P.U dimanipulasikan)	.....
Responding variable: (P.U bergerakbalas)	.....
Controlled variable: (P.U dimalarkan)	.....

[3 marks]

- (b) State the hypothesis for the experiment. (Nyatakan hipotesis bagi eksperimen ini )

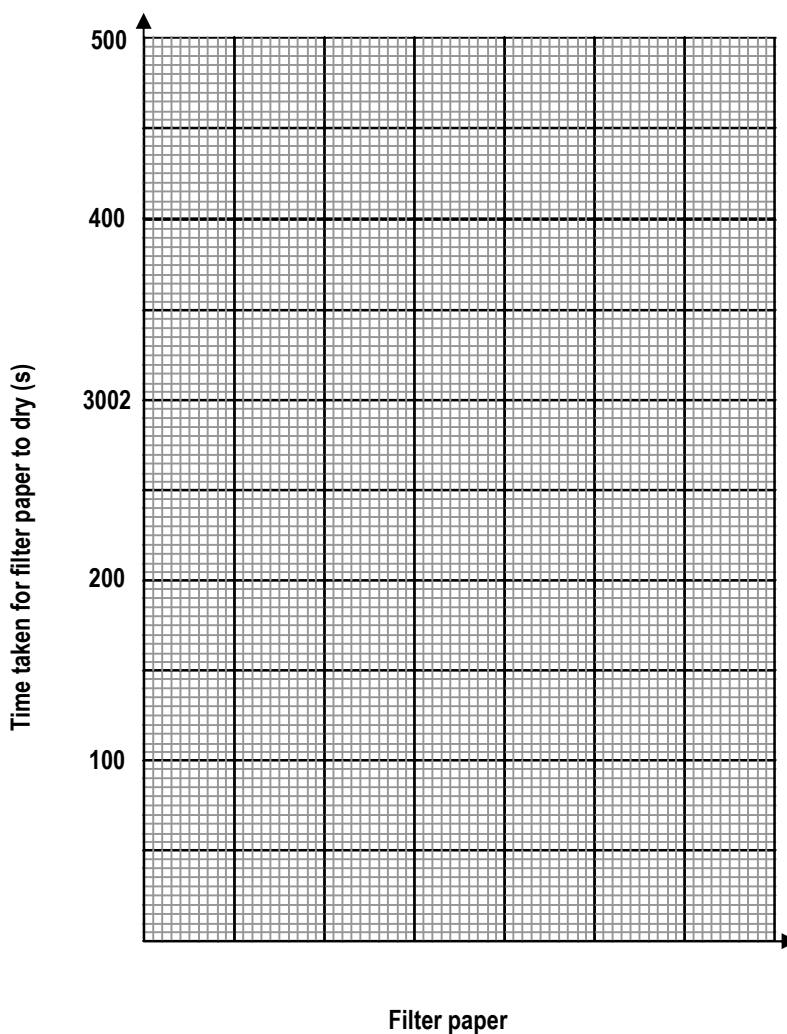
---



---

[1 mark]

- (c) Using Table 4.2, draw a bar chart to show the time taken for the filter papers to dry.  
(Dengan menggunakan jadual 4.2, lukis carta bar untuk menunjukkan masa untuk kertas turas menjadi kering)



[3 marks]

- (d) Based on the bar chart in (c), what can be said about the time taken for the filter papers to dry ? ( Berdasarkan carta bar dalam ( c) apakah yang boleh dikatakan tentang masa yang diambil untuk kertas turas untuk mengering ? )

---



---

[1 mark]

- (e) State **one** inference from the experiment.  
(Nyatakan satu inferens daripada eksperimen )

---



---

[1 mark]

- (f) State the relationship between the surface area of the filter paper and the time taken for the filter paper to dry.  
( Nyatakan hubungan antara luas permukaan dengan masa untuk mengering)

---



---

[1 mark]

- (g) 50 ml of water is poured into each of the three different containers, X Y and Z as shown in Figure 4.3. The three containers are left under the Sun.  
(50 ml air dituangkan ke dalam bekas yang berlainan X,Y dan Z seperti dalam Rajah 4.3. Ketiga-tiga bekas tersebut di letakkan di bawah sinaran matahari )

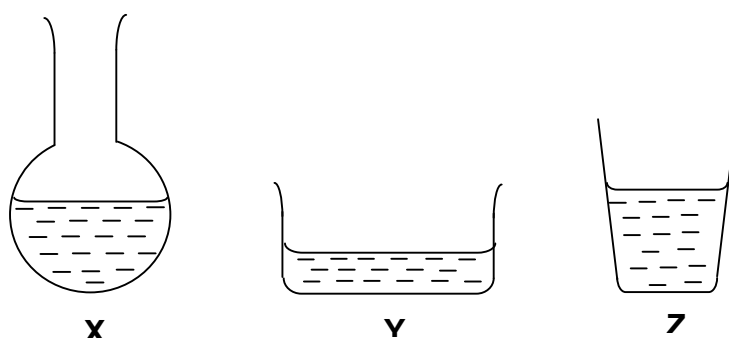


FIGURE 4.3

- (h) In which container will the water evaporate the fastest?  
( Dalam bekas mana air akan menyejat paling cepat ?)

---

[1 mark]

- (ii) Explain your answer in (g)(i).  
(Terangkan jawapan anda dalam (g) ( i ) )

---



---

[1 mark]

4. A student carried out an experiment to study the effect of different types of surfaces on frictional force. The readings of the spring balance when the wooden block is pulled along different surfaces are shown in Figure 5.1.  
( Seorang pelajar menjalankan eksperimen untuk mengkaji kesan perbezaan jenis permukaan dengan daya geseran .Bacaan neraca spring apabila bongkah kayu ditarik di sepanjang permukaan ditunjukkan dalam Rajah 5.1 )

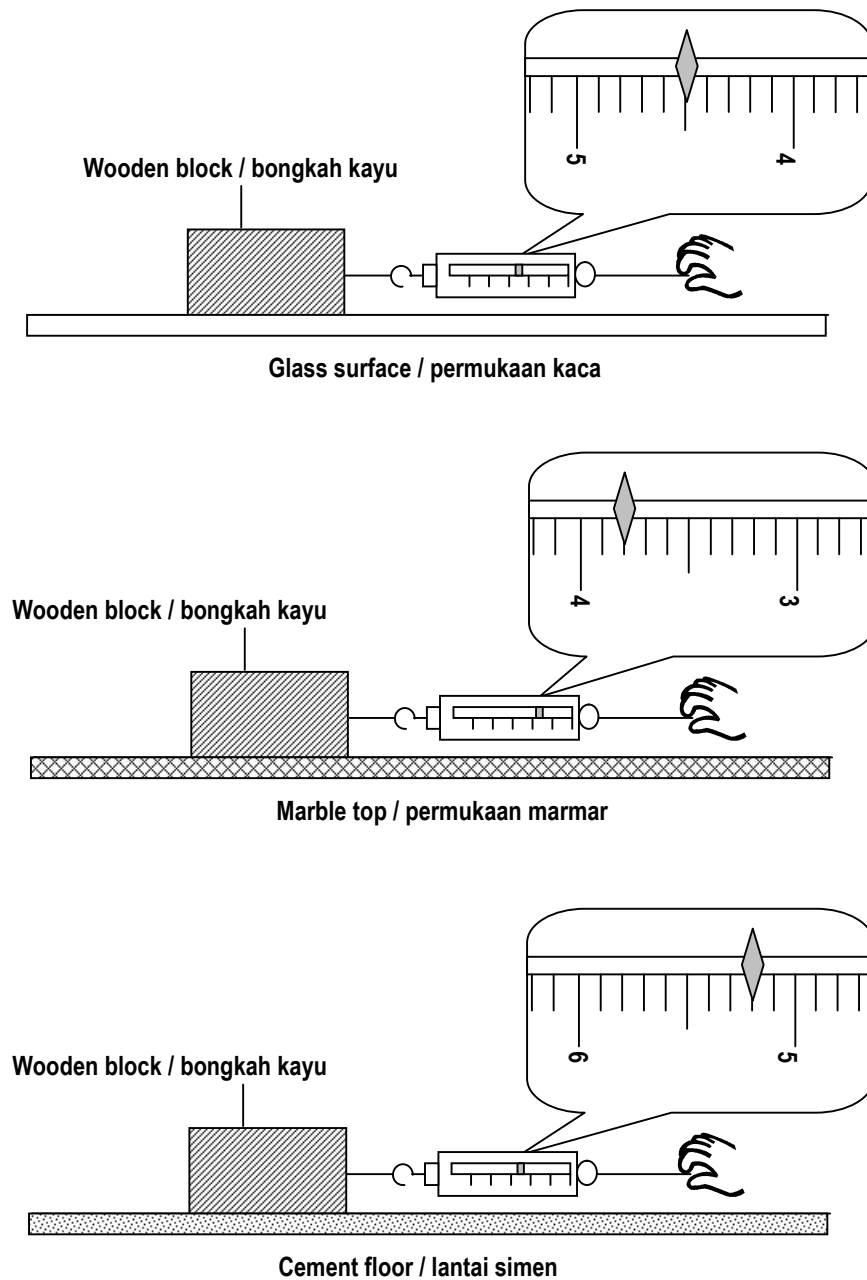


FIGURE 5.1

- (a) State the variables involved in the experiment.  
(Nyatakan pembolehubah-pembolehubah yang terlibat dalam eksperimen ini)

Manipulated variable: (P.U dimanipulasi )	.....
Responding variable: (P.U bergerakbalas )	.....
Controlled variable: (P.U dimalarkan )	.....

[3 marks]

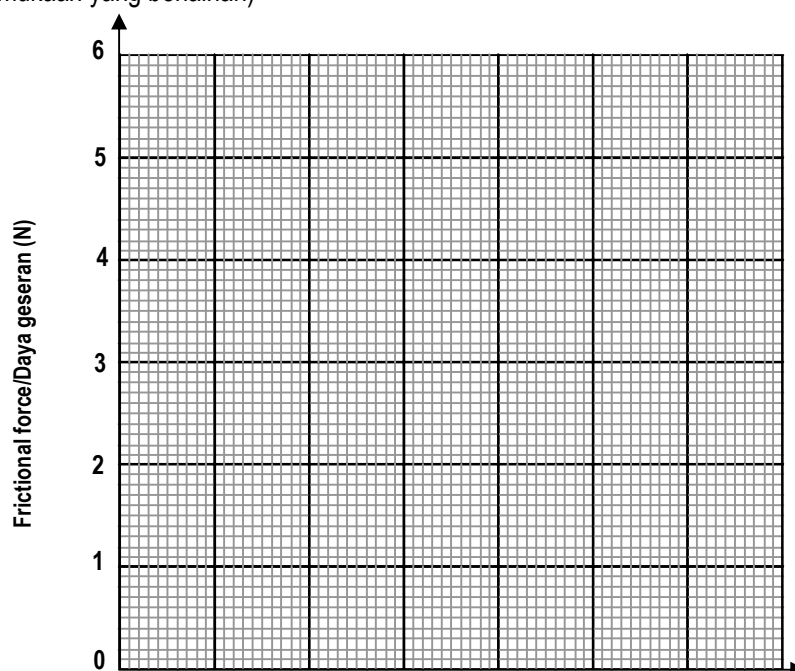
- (b) Based on Figure 5.1, record the readings of the spring balance in Table 5.2.  
(Berdasarkan Rajah 5.1 catatkan bacaan neraca spring dalam Jadual 5.2)

Type of surface Jenis Permukaan	Reading of spring balance (N) Bacaan Neraca spring (N)
Glass surface (Permukaan Kaca)	.....
Marble top (Permukaan marmar)	.....
Cement floor (Lantai simen)	.....

TABLE 5.2

[2 marks]

- (c) Based on Table 5.2 draw a bar chart to show the frictional force acting on the wooden block on different surfaces.  
(Berdasarkan Jadual 5.2 lukis carta bar untuk menunjukkan daya geseran bongkah kayu yang bertindak ke atas permukaan yang berlainan)



[2 marks]

Type of surface /  
Jenis permukaan

- (d) Based on the bar chart in (c), what can be said about the frictional force acting on the wooden block?  
(Berdasarkan carta bar dalam ( c) apakah yang dapat dikatakan tentang daya geseran yang bertindak ke atas bongkah kayu ?)

---



---

[1 mark]

- (e) State **one** inference from the experiment.  
(Nyatakan satu inferens daripada eksperimen )

---



---

[1 mark]

- (f) Predict the reading of the spring balance if the wooden block is pulled along.  
(Ramalkan bacaan neraca spring jika bongkah kayu ditarik di atas permukaan berikut )

(i) a sandy beach / pantai berpasir: \_\_\_\_\_

(ii) a waxed marble floor / lantai marmar licin: \_\_\_\_\_

[2 marks]

- (g) Based on the experiment, state the relationship between the types of surface and the frictional force acting on the wooden block.  
(Berdasarkan eksperimen nyatakan hubungan antara jenis permukaan dengan daya geseran yang bertindak ke atas bongkah kayu )

---



---

[1 mark]

5. A student carried out an experiment to determine a factor that affects the stability of an object. Three similar wooden blocks, P, Q and R with legs of the same length are placed on three boards as shown in Figure 6.1.  
(Seorang pelajar telah menjalankan eksperimen untuk menentukan faktor yang mempengaruhi kestabilan objek )

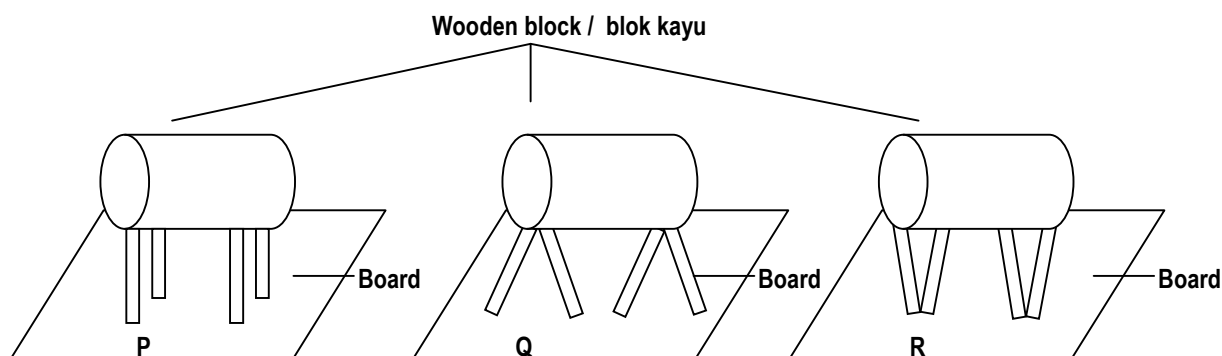


FIGURE 6.1

The board is then slowly tilted until the wooden block topples as shown in Figure 6.2. The angle of inclination of the board is then recorded in Table 6.3.

( Kepingan kertas dicondongkan perlahan-lahan sehingga blok kayu tumbang seperti dalam Rajah 6.2.Sudut kecondongan kepingan kertas dicatatkan dalam Jadual 6.3)

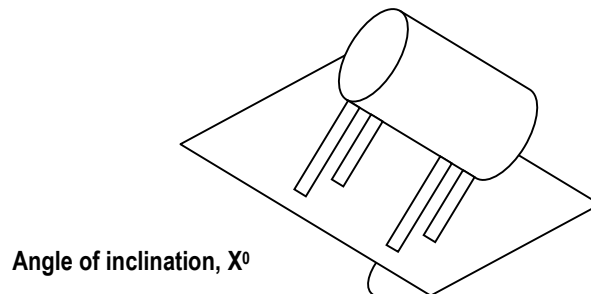


FIGURE 6.2

Block	Angle of inclination ( $X^\circ$ ) Sudut Kecondongan
P	$45^\circ$
Q	$66^\circ$
R	$25^\circ$

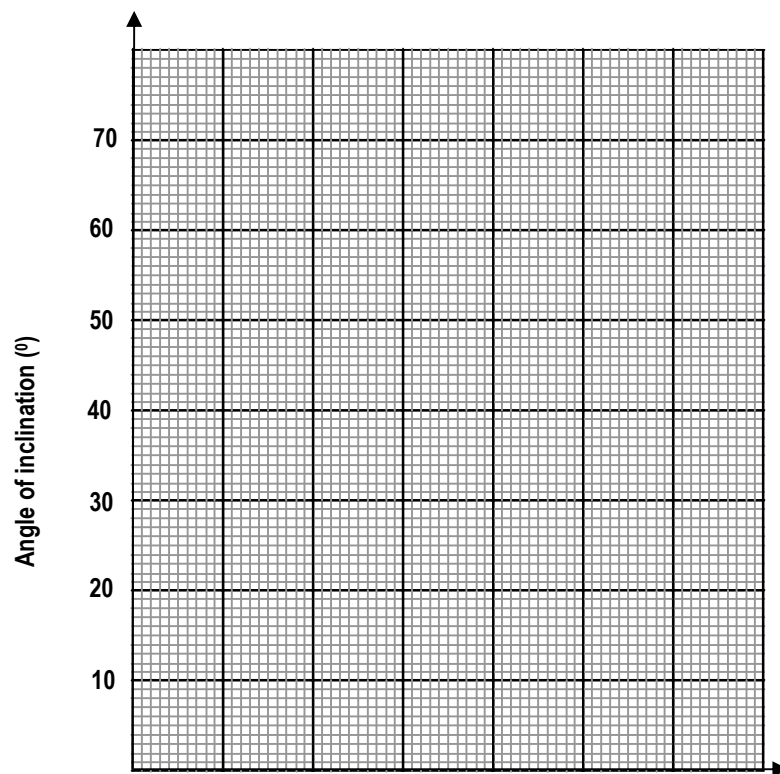
TABLE 6.3

- (a) State the variables involved in the experiment.  
(Nyatakan pembolehubah-pembolehubah yang terlibat dalam eksperimen ini)

Manipulated variable: (P.U dimanipulasi )	.....
Responding variable: (P.U bergerakbalas )	.....
Controlled variable: (P.U dimalarkan )	.....

[3 marks]

- (b) Using Table 6.3, draw a bar chart to show the angle of inclination for each of the models to topple.  
(Dengan menggunakan Jadual 6.3, lukis carta bar untuk menunjukkan sudut kecondongan setiap blok kayu akan tumbang)



[3 marks]

Wooden block

- (c) Based on the bar chart in (c), what can be said about the angle of inclination to topple each wooden block?  
(Berdasarkan carta bar dalam ( c ),apakah yang boleh dikatakan tentang sudut kecondongan yang menyebabkan blok kayu tumbang)

---



---

[1 mark]

- (c) (i) Based on your observation, which wooden block is the most stable?  
(Berdasarkan pemerhatian, blok kayu yang mana paling stabil ?)

- (ii) Explain your answer in (e)(i).  
(Terangkan jawapan anda dalam (e) (i) )

---



---

[1 mark]

- (d) Based on Figure 6.4, predict the angle of inclination for block S to topple.  
(Berdasarkan Rajah 6.4,ramalkan sudut kecondongan blok S akan tumbang)

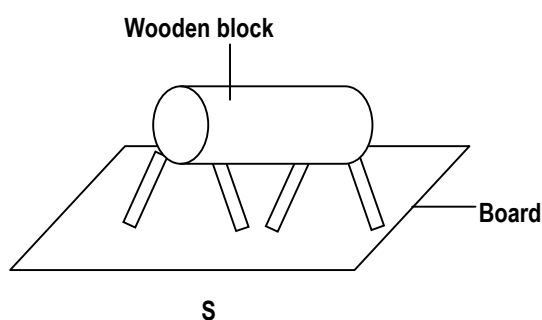


FIGURE 6.4

- (e) State the relationship between the angle of inclination of the board to the stability of the wooden block.  
(Nyatakan hubungan antara sudut kecondongan kepingan papan dengan kestabilan blok kayu )

[1 mark]

- (f) What can you conclude from the experiment?  
(Apakah kesimpulan daripada eksperimen ini ?)

[1 mark]

6. Figure 7.1 shows an apparatus set-up to study the effect of wind on the rate of transpiration.  
(Rajah 7.1 menunjukkan set alat radas untuk mengkaji kesan udara bergerak terhadap kadar transpirasi)

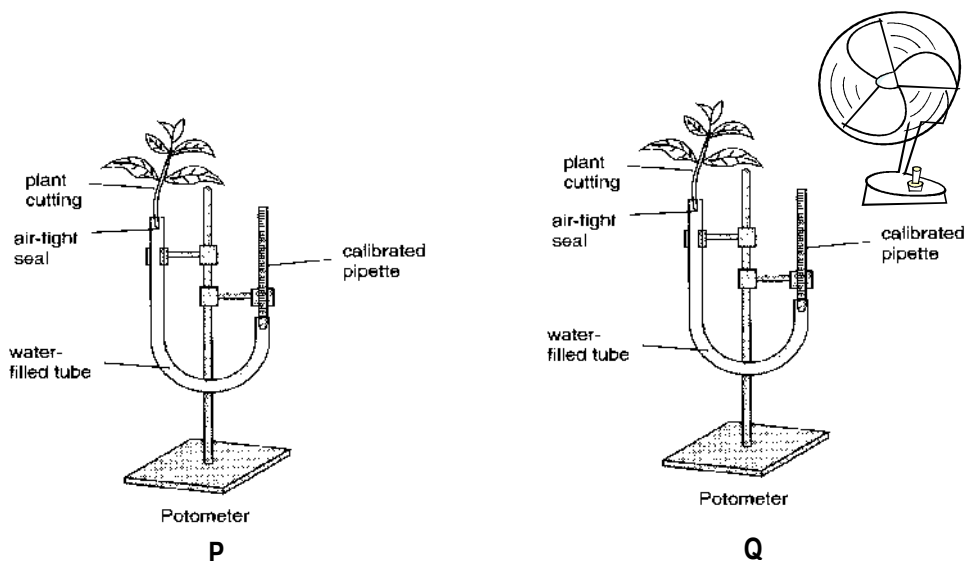


FIGURE 7.1

The procedure of experiment is as follows: (Berikut adalah prosedur yang dijalankan )

- S1 Two potometers were set-up as shown in Figure 7.1.  
( Dua fotometer disediakan seperti dalam Rajah 7.1 )  
S2 The initial water level in the potometers was recorded.  
( Bacaan awal aras air dalam fotometer dicatatkan )  
S3 P was put in still air while Q was put in the wind for 30 minutes.  
( P diletakkan dalam udara tidak bergerak dan Q diletakkan dalam udara bergerak selama 30 minit )  
S4 The distance moved by the water level in the calibrated pipette in P and Q were recorded in Table 7.2.  
( Perubahan aras air dalam pipet P dan Q dicatatkan Jadual 7.2 )

Potometer	Water level (mℓ) ( Aras air )		
	Initial reading (Bacaan awal)	Final reading (Bacaan akhir)	Water lost ( Kehilangan air)
P	69.8	69.0	
Q	73.0	71.8	

Table 7.2



- (a) Calculate the amount of water lost from P and Q and complete Table 7.2.  
( Kirakan jumlah kehilangan air daripada P dan Q serta lengkapkan Jadual 7.2) [2 marks]
- (b) Figure 7.3 shows the reading of a calibrated pipette when the potometer is left for a period of time.  
(Rajah 7.3 menunjukkan bacaan skala pipet bila fotometer dibiarkan untuk tempoh masa tertentu)

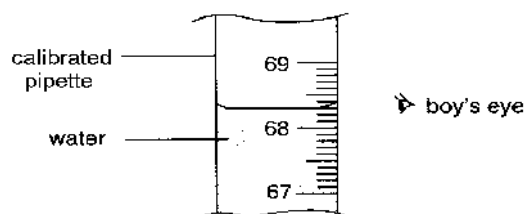


FIGURE 7.3

The reading shown is \_\_\_\_\_ mL.  
(Bacaan yang ditunjukkan ialah)

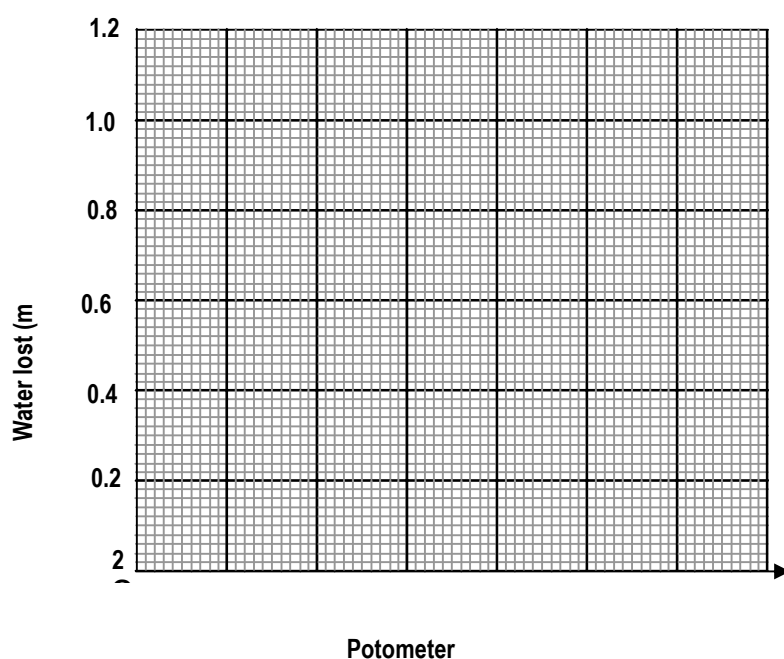
[1 mark]

- (c) State the variables involved in the experiment.  
(Nyatakan pembolehubah-pembolehubah yang terlibat dalam eksperimen ini)

Manipulated variable: (P.U dimanipulasi )	.....
Responding variable: (P.U bergerakbalas )	.....
Controlled variable: (P.U dimalarkan )	.....

[3 marks]

- (d) Based on Table 7.2, draw a bar chart to show the water lost from P and Q.  
(Berdasarkan Jadual 7.2, lukis carta bar menunjukkan kehilangan air daripada P dan Q )



[2 marks]

- (e) From the bar chart, what can you say about the water lost from P and Q?  
(Daripada carta bar apakah yang boleh dikatakan tentang kehilangan air daripada P dan Q )

---



---

[1 mark]

- (f) What can be said about the wind and the rate of transpiration?  
( Apakah boleh dikatakan tentang udara bergerak dan kadar transpirasi ?)

---

[ 1 mark ]

- (g) State the relationship between the wind and the rate of transpiration.  
(Nyatakan hubungan antara udara bergerak dengan kadar transpirasi )

---



---

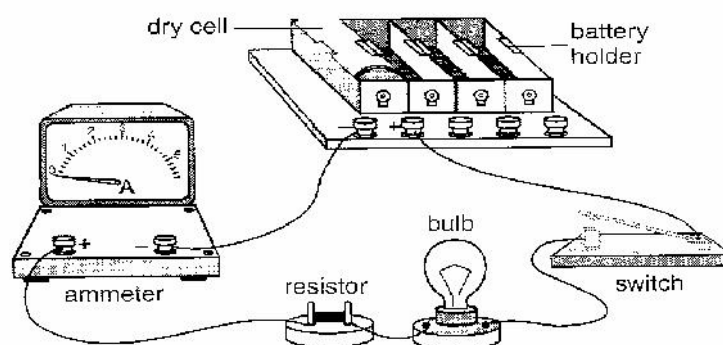
[1 mark]

- (h) What can you conclude from this experiment?  
(Apakah kesimpulan eksperimen ini ?)

---

[1 mark]

7. A student carried out an experiment to study the relationship between resistance and current. Figure 8.1 shows the arrangement of apparatus for the experiment.  
(Seorang pelajar telah menjalankan eksperimen untuk mengkaji hubungan antara rintangan dengan arus elektrik. Raiah 8.1 menunjukkan susunan alat radas eksperimen )



**FIGURE 8.1**

The procedure of experiment is as follows:  
(Prosedur eksperimen adalah seperti berikut : )

- Step 1: Set up the circuit using the  $1\ \Omega$  resistor.  
(Litar disediakan menggunakan perintang  $1\ \Omega$  )  
Step 2: Close the switch and observe the brightness of the bulb and record the ammeter reading.  
( Suis ditutup dan kecerahan mentol dan bacaan ammeter dicatatkan )  
Step 3: Repeat step 2 with a  $2\ \Omega$ ,  $5\ \Omega$  and  $10\ \Omega$  resistor respectively.  
( Ulang langkah 2 dengan menggunakan perintang  $2\ \Omega$  ,  $5\ \Omega$  dan  $10\ \Omega$  )

- (a) State the variables involved in the experiment.  
(Nyatakan pembolehubah-pembolehubah yang terlibat dalam eksperimen ini)

Manipulated variable: (P.U dimanipulasi )	.....
Responding variable: (P.U bergerakbalas )	.....
Controlled variable: (P.U dimalarkan )	.....

[3 marks]

Figure 8.2 shows the reading of the ammeter when different resistors are connected to the circuit.  
(Rajah 8.2 menunjukkan bacaan ammeter bila perintang berlainan disambungkan pada litar)

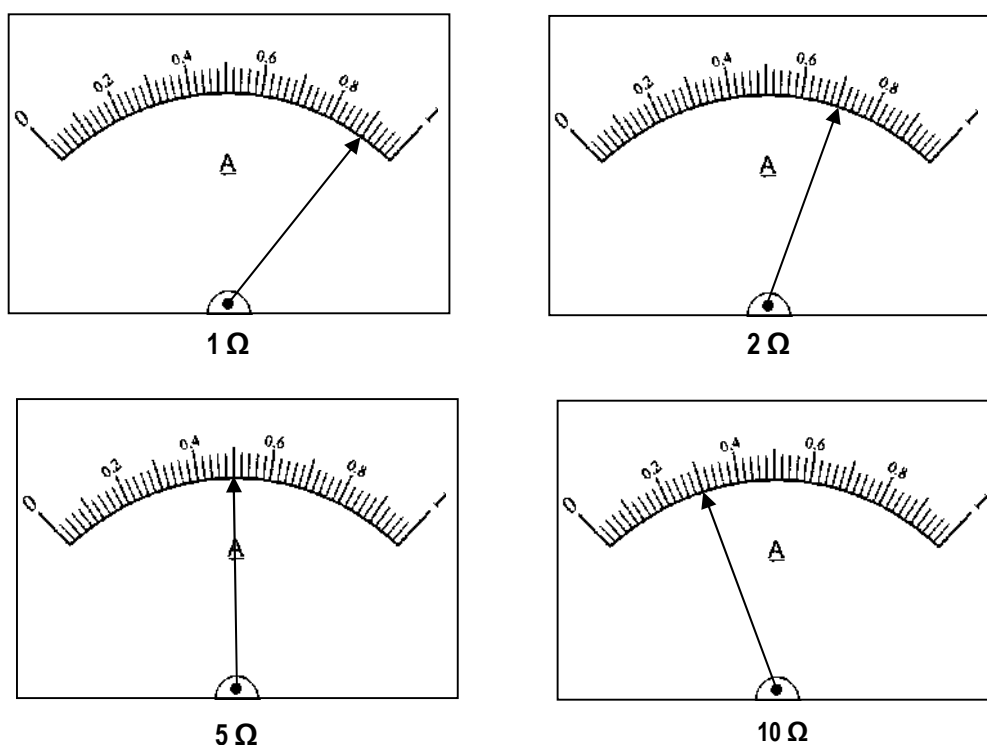


FIGURE 8.2

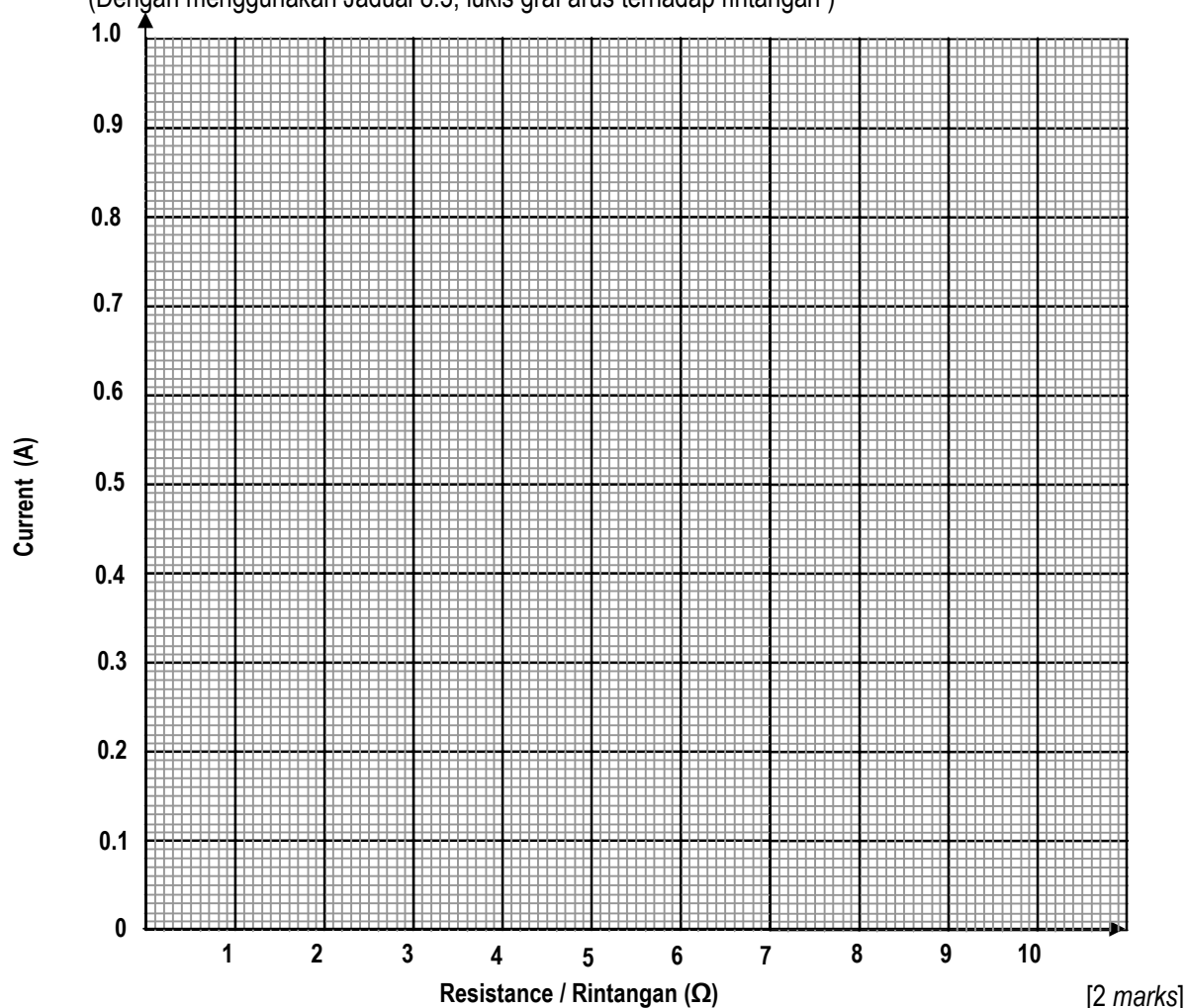
- (b) Complete Table 8.3 by recording the reading of the ammeter as shown in Figure 8.2.  
(Lengkapkan Jadual 8.3 dengan mencatatkan bacaan ammeter dalam Rajah 8.2)

Resistor ( $\Omega$ ) ( Perintang )	1	2	5	10
Reading of ammeter (A) (Bacaan ammeter)				

TABLE 8.3

[2 marks]

- (c) Using Table 8.3, draw a line graph of current against resistance.  
(Dengan menggunakan Jadual 8.3, lukis graf arus terhadap rintangan )



- (d) What can be said about the current and resistance?  
(Apakah yang boleh dikatakan tentang arus dan rintangan? )

\_\_\_\_\_ [1 mark]

- (e) Based on the graph in (e), predict the ammeter reading when the resistance is 8  $\Omega$ .  
(Berdasarkan graf dalam ( e ), ramalkan bacaan ammeter bila rintangan adalah 8  $\Omega$  )

\_\_\_\_\_ [1 mark]

- (f) State the relationship between resistance and the brightness of the bulb.  
(Nyatakan hubungan antara rintangan dengan kecerahan mentol )

\_\_\_\_\_

- (g) State the relationship between resistance and the current flowing through the circuit.  
(Nyatakan hubungan antara rintangan dengan arus yang mengalir melalui litar )

\_\_\_\_\_

\_\_\_\_\_ [1 mark]