

FIZIK TINGKATAN 4

BAB 1 PENGENALAN KEPADA FIZIK

MODUL CEMERLANG

KERTAS 1

1. Diagram 1 shows the scale of a Vernier caliper.
Rajah 1 menunjukkan skala pada sebuah Angkup vernier.

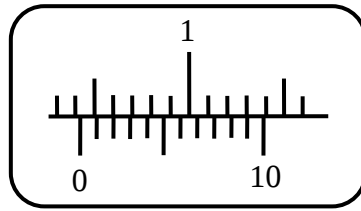
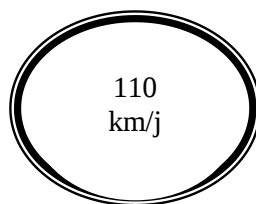


Diagram 1

Rajah 1

What is the reading of the Vernier caliper?
Berapakah bacaan angkup Vernier itu?

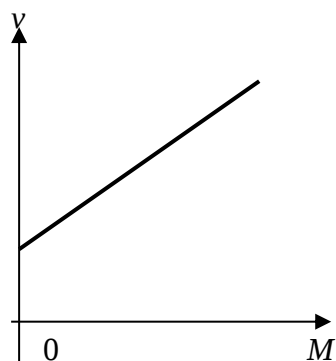
- A. 0.49 cm
B. 4.41 cm
C. 3.42 cm
D. 4.42 cm
2. Which is the unit for Impulse ?
Yang manakah unit bagi Impuls?
- A. Nkg^{-1}
B. Nms^{-1}
C. Nm
D. Ns
3. Diagram shows a signboard nearly to the highway.
Rajah menunjukkan satu papan tanda di tepi sebuah lebuh raya.



What is the velocity in meter per second unit ?
Berapakah halaju dalam unit meter per saat?

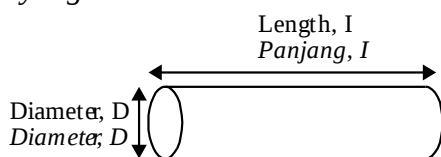
- A. 1.8
B. 6.6
C. 30.6
D. 39.6

4. Diagram shows graph v against M represents by equation $v = f (M + 1)$.
Rajah menunjukkan graf v melawan M yang diwakili oleh rumus , $v = f (M + 1)$.



The value of f can be determine from
Nilai f boleh ditentukan daripada

- A. intercept v-axis
pintasan paksi- v
 - B. intercept M-axis
pintasan paksi- M
 - C. intercept v-axis or gradient of graph
pintasan paksi- v atau kecerunan graf
 - D. intercept M-axis or gradient of graph
pintasan paksi- M atau kecerunan graf
5. The dimensions of the cylinder in diagram below are measured by using different measuring instruments.
Dimensi sebuah silinder pada rajah diukur dengan menggunakan alat pengukur yang berlainan.



The following readings are obtained :
Bacaan-bacaan berikut diperolehi :

Diameter, D <i>Diameter, D</i>	2.16 cm
Length, l <i>Panjang, l</i>	11.9 cm

Which measuring instruments are most suitable for obtaining the readings?

Alat pengukur manakah yang paling sesuai untuk memperolehi bacaan-bacaan itu?

	Diameter, D <i>Diameter, D</i>	Length, l <i>Panjang, l</i>
A.	Micrometer screw gauge <i>Tolok skrew mikrometer</i>	Vernier calipers <i>Angkup vernier</i>
B.	Metre rule <i>Pembaris meter</i>	Vernier calipers <i>Angkup vernier</i>
C.	Vernier calipers <i>Angkup vernier</i>	Metre rule <i>Pembaris meter</i>

KERTAS 2
BAHAGIAN A. (SOALAN 1)

1. Diagram below shows a vernier calipers with zero error.
Rajah di bawah menunjukkan sebuah angkup vernier yang mempunyai ralat sifar.

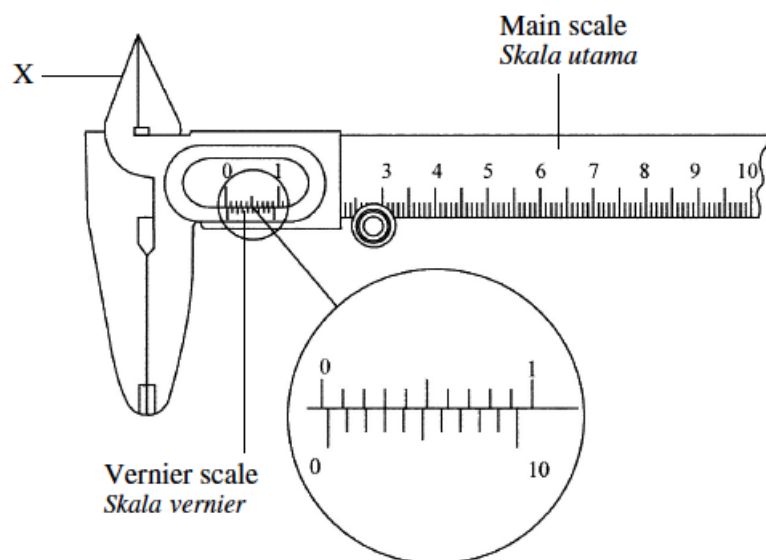


Diagram 1
Rajah 1

- (a) Underline the correct answer in the bracket to complete the sentence below.
Garis jawapan yang betul dalam kurungan untuk melengkapi ayat di bawah.

Zero error is an example of (random, systematic) error.
Ralat sifar merupakan satu contoh ralat (rawak, sistematik).

[1 mark]

- (b) Based on diagram above,
Berdasarkan rajah di atas,
(i) What is the reading of the zero error?
Berapakah bacaan ralat sifar?

_____ cm

[1 mark]

- (ii) What is the function of X?
Apakah fungsi X?

[1 mark]

- (c) When the vernier calipers is used to measure the thickness of a book, the reading is 3.23 cm.

What is the actual reading of the measurement?

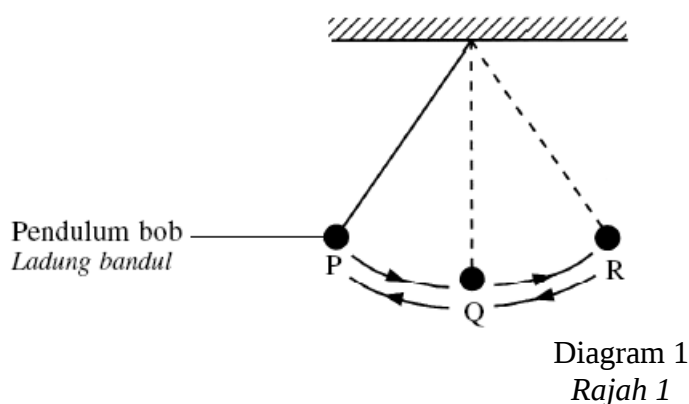
Apabila angkup vernier digunakan untuk mengukur ketebalan sebuah buku, bacaan yang diperoleh adalah 3.23 cm.

Berapakah bacaan sebenar ukuran tersebut?

_____ cm.

[1 mark]

1. Diagram below shows an oscillating pendulum
Rajah di bawah menunjukkan ayunan sebuah bandul.



- (a) Based on Diagram above, choose the correct path for one complete oscillation. Tick (✓) the correct answer in the box provided.
Berdasarkan Rajah di atas, pilih lintasan yang betul untuk satu ayunan lengkap. Tanda (✓) jawapan yang betul dalam petak yang disediakan.

☐ P → Q

☐ P → Q → R

☐ P → Q → R → Q → P

[1 mark]

- (b) The stop watch in Diagram below shows the time taken for the pendulum to make 20 complete oscillations.
Jam randik dalam Rajah di bawah menunjukkan masa yang diambil untuk bandul itu membuat 20 ayunan lengkap.

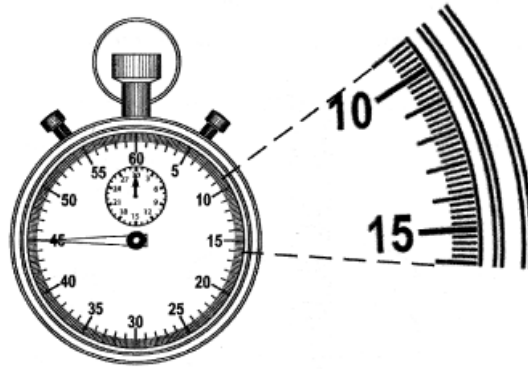


Diagram 1
Rajah 1

Based on Diagram 1 above, state
Berdasarkan Rajah 1 di atas, nyatakan

- (i) sensitivity of the stop watch
kepekaan bagi jam randik itu

[1 mark]

- (ii) Period of oscillation
Tempoh ayunan

[1 mark]

- (c) What is the type of physical quantity for time?
Tick (✓) the correct answer in the box provided
.Apakah jenis kuantiti fizik bagi masa?
Tanda (✓) jawapan yang betul dalam petak yang disediakan.

- ☐ Scalar quantity
Kuantiti skalar
- ☐ Vector quantity
Kuantiti vektor

[1 mark]

KERTAS 3 BAHAGIAN A

1. A student carries out an experiment to investigate the relationship between the length of a wire, l , and its resistance, R .

The arrangement of the apparatus is shown in Diagram A. An ammeter, dry cells, a rheostat, a switch and a piece of constantan wire are connected in series. A voltmeter is used to measure the potential difference, V , across the constantan wire between P and Q.

Seorang murid menjalankan satu eksperimen untuk mengkaji hubungan antara panjang suatu dawai, l , dengan rintangan, R .

Susunan radas ditunjukkan pada Rajah A. Sebuah ammeter, sel kering, reostat, suis dan dawai konstantan disambung secara sesiri.

Sebuah voltmeter digunakan untuk mengukur beza keupayaan, V , merentasi dawai konstantan antara P dan Q.

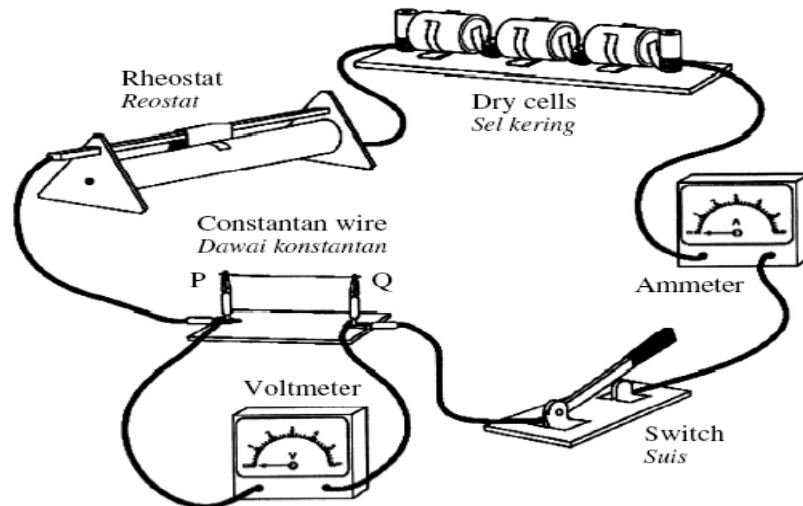


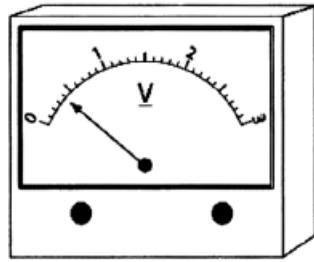
Diagram A
Rajah A

A constantan wire of length, $l = 20.0$ cm is connected between P and Q. When the switch is on, the rheostat is adjusted until the ammeter reading is 0.50 A. The voltmeter reading, V , is as shown in Diagram B. The procedure is **repeated** with constantan wires of length, **$l = 40.0$ cm, 60.0 cm, 80.0 cm and 100.0 cm**. The corresponding voltmeter readings across P and Q are shown in Diagrams C, D, E, and F.

Dawai konstantan yang mempunyai panjang, $l = 20.0$ cm disambung antara P dan Q. Apabila suis dihidupkan, reostat dilaraskan sehingga bacaan ammeter adalah 0.50 A. Bacaan voltmeter, V , adalah seperti yang ditunjukkan pada Rajah B.

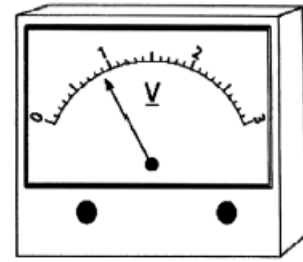
*Prosedur **diulangi** dengan dawai konstantan yang mempunyai panjang, **$l = 40.0$ cm, 60.0 cm, 80.0 cm dan 100.0 cm**.*

Bacaan voltmeter yang sepadan, yang merentasi P dan Q, ditunjukkan pada Rajah C, D, E dan F.



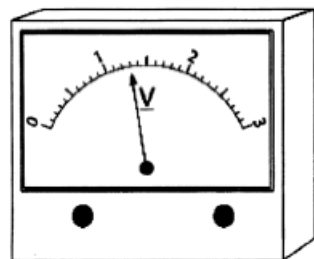
$V = \dots\dots\dots$
 Length of wire, $l = 20.0 \text{ cm}$
Panjang dawai, $l = 20.0 \text{ cm}$

Diagram B
Rajah B



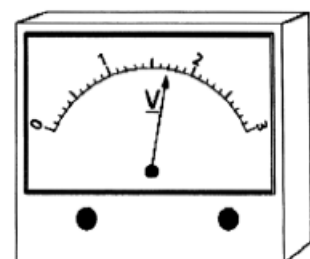
$V = \dots\dots\dots$
 Length of wire, $l = 40.0 \text{ cm}$
Panjang dawai, $l = 40.0 \text{ cm}$

Diagram C
Rajah C



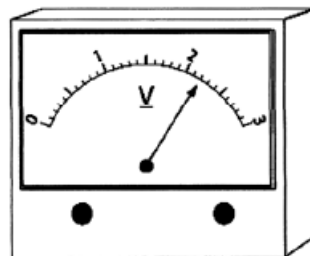
$V = \dots\dots\dots$
 Length of wire, $l = 60.0 \text{ cm}$
Panjang dawai, $l = 60.0 \text{ cm}$

Diagram D
Rajah D



$V = \dots\dots\dots$
 Length of wire, $l = 80.0 \text{ cm}$
Panjang dawai, $l = 80.0 \text{ cm}$

Diagram E
Rajah E



$V = \dots\dots\dots$
 Length of wire, $l = 100.0 \text{ cm}$
Panjang dawai, $l = 100.0 \text{ cm}$

Diagram F
Rajah F

- (a) For the experiment described above, identify:
Bagi eksperimen yang diterangkan di atas, kenal pasti:
 (i) The manipulated variable
Pembolehubah dimanipulasikan

- (ii) The responding variable
Pembolehubah dimalarkan

[1 mark]

- (iii) The constant variable
Pembolehubah dimalarkan

[1 mark]

- (b) Based on Diagrams B, C, D, E and F:
Berdasarkan Rajah B, C, D, E dan F :

- (i) Record the voltmeter readings, V, in the spaces provided.
Catatkan bacaan voltmeter, V, dalam ruang yang disediakan.

[2 marks]

- (ii) Calculate the values of R for each length of wire using the formula $R = \frac{V}{0.5}$.
Hitung nilai-nilai R bagi setiap panjang dawai menggunakan formula $R = \frac{V}{0.5}$.

[2 marks]

- (iii) Tabulate your results for V and R for all values of l, in the space below.
Jadualkan keputusan anda bagi V dan R untuk semua nilai l, pada ruang di bawah.

Table TIPS

1✓- l, V and R
 1✓- unit
 1✓- all l, V, R correct
 1✓- consistency

[3 marks]

(c) On the graph paper below, plot a graph of R against l.

Pada kertas graf di bawah, lukis graf R melawan l.

[5 marks]

(d) Based on your graph in (c), state the relationship between R and l.

Berdasarkan graf anda di (c), nyatakan hubungan antara R dengan l.

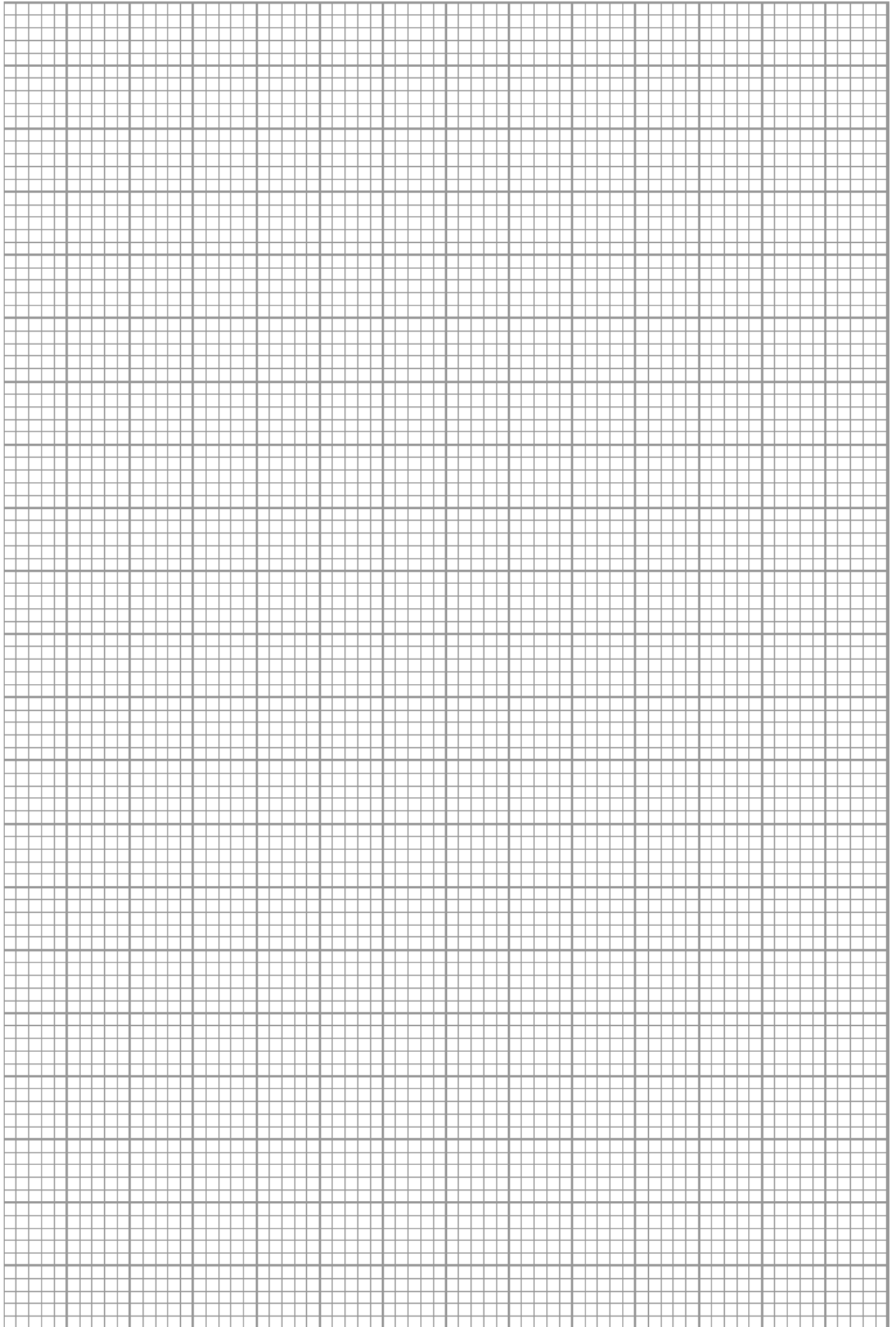
[1 mark]

Graph tips

- 1✓- axis
- 1✓-axis unit
- 1✓-uniform scale
- 1✓✓-plot
- 1✓-best fit line
- 1✓-size of graph

- 7✓ - 5m
- 6-5✓ - 4m
- 4-3✓ - 3m
- 2✓ - 2m
- 1✓ - 1m

Graph of R against l
Graf R melawan l



- 1 An experiment is conducted to investigate the relationship between the increases of temperature, $\Delta \theta$ with the mass of water, m , as shown in Diagram 1.1.
 Satu eksperimen dijalankan untuk menyiasat hubungan di antara kenaikan suhu, $\Delta \theta$ dengan jisim air, m , seperti ditunjukkan dalam Rajah 1.1.

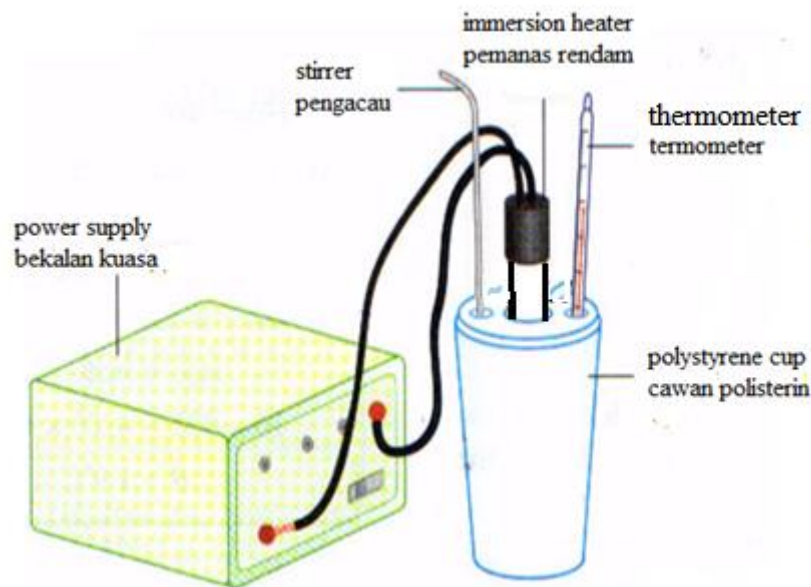


Diagram 1.1
 Rajah 1.1

0.125 kg of water poured into the polystyrene cup and the initial temperature, θ_0 , is recorded ,
 as shown in Diagram 1.2 .

0.125 kg air dituang ke dalam cawan polisterina dan suhu awal direkodkan, θ_0 , seperti ditunjukkan dalam Rajah 1.2.

A heater is immersed in the water and the power supply switched on. At the same time, the stopwatch is started. The water is stirred continuously. After one minute, the power supply is switched off and the stopwatch is stopped. The maximum temperature, θ_1 , is then recorded as shown in Diagram 1.3 .

The experiment is repeated using the mass of water, $m = 0.225 \text{ kg}$, 0.325 kg , 0.425 kg and 0.525 kg of water. The corresponding maximum temperatures of the water measured are shown Diagram 1.4, 1.5, 1.6 and 1.7 .

The increase of the temperature, $\Delta \theta = \theta_1 - \theta_0$ is calculated.

Satu pemanas rendam dimasukkan ke dalam air dan bekalan kuasa dihidupkan. Pada masa yang sama, jam randik dimulakan. Air itu dikacau berterusan. Selepas satu minit, suhu maksimum, θ_1 , dicatatkan seperti yang ditunjukkan dalam Rajah 1.3. Eksperimen diulang dengan menggunakan jisim air, $m = 0.125 \text{ kg}$, 0.225 kg , 0.325 kg , 0.425 kg dan 0.525 kg air. Pengukuran suhu maksimum yang sepadan ditunjukkan dalam Rajah 1.2, 1.3, 1.4, 1.5 dan 1.6.
 Kenaikan suhu, $\Delta \theta = \theta_1 - \theta_0$ dihitung

(a) For the experiment described identify:
Bagi eksperimen yang diterangkan kenal pasti:

(i) The manipulated variable,
Pembolehubah dimanipulasikan,

.....

[1 mark]

(ii) The responding variable,
Pembolehubah bergerak balas,

.....

[1 mark]

(iii) The constant variable.
pembolehubah dimalarkan.

.....

[1 mark]

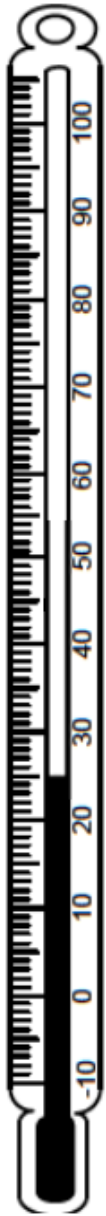


Diagram 1.2
Rajah 1.2

$$m = 0.125 \text{ kg}$$

$$\theta_0 = \dots\dots\dots^\circ\text{C}$$

$$\theta_1 = \dots\dots\dots^\circ\text{C}$$

$$\Delta \theta = \dots\dots\dots^\circ\text{C}$$



Diagram 1.3
Rajah 1.3

$$m = 0.125 \text{ kg}$$

$$\frac{1}{m} = \dots\dots\dots\text{kg}^{-1}$$

$$\theta_1 = \dots\dots\dots^\circ\text{C}$$

$$\Delta \theta = \dots\dots\dots^\circ\text{C}$$

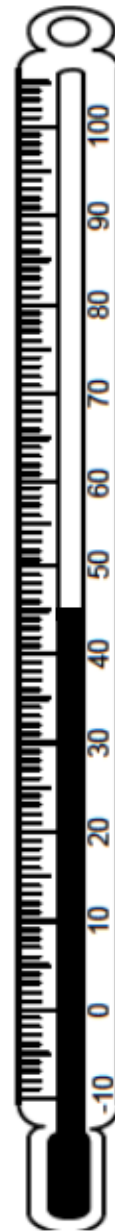


Diagram 1.4
Rajah 1.4

$$m = 0.225 \text{ kg}$$

$$\frac{1}{m} = \dots\dots\dots\text{kg}^{-1}$$

$$\theta_1 = \dots\dots\dots^\circ\text{C}$$

$$\Delta \theta = \dots\dots\dots^\circ\text{C}$$

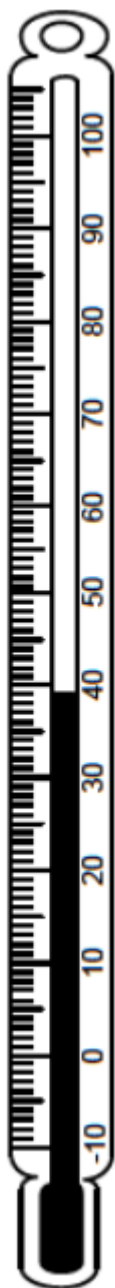


Diagram 1.5
Rajah 1.5

$$m = 0.325 \text{ kg}$$

$$\frac{1}{m} = \dots\dots\dots \text{kg}^{-1}$$

$$\theta_1 = \dots\dots\dots ^\circ\text{C}$$

$$\Delta \theta = \dots\dots\dots ^\circ\text{C}$$



Diagram 1.6
Rajah 1.6

$$m = 0.425 \text{ kg}$$

$$\frac{1}{m} = \dots\dots\dots \text{kg}^{-1}$$

$$\theta_1 = \dots\dots\dots ^\circ\text{C}$$

$$\Delta \theta = \dots\dots\dots ^\circ\text{C}$$



Diagram 1.7
Rajah 1.7

$$m = 0.525 \text{ kg}$$

$$\frac{1}{m} = \dots\dots\dots \text{kg}^{-1}$$

$$\theta_1 = \dots\dots\dots ^\circ\text{C}$$

$$\Delta \theta = \dots\dots\dots ^\circ\text{C}$$

- (b) (i) Based on Diagram 1.2 on page 4, determine the value of θ_0

Berdasarkan Rajah 1.2 di halaman 4, tentukan θ_0

$$\theta_0 = \dots\dots\dots^\circ\text{C}$$

[1 mark]

- (ii) Based on Diagram 1.3, 1.4, 1.5, 1.6 and 1.7 on pages 4 and 5, calculate the value of $\frac{1}{m}$ in spaces provided

Your answer must be in one decimal place

Berdasarkan Rajah 1.3, 1.4, 1.5, 1.6 dan 1.7 pada halaman 4 dan 5, tentukan

nilai $\frac{1}{m}$ dalam ruang yang disediakan

Jawapan anda mesti dalam satu titik perpuluhan.

[1 mark]

- (iii) For each value of $\frac{1}{m}$ in 1(b)(ii), record the reading of θ_1 in spaces provided

Bagi setiap nilai $\frac{1}{m}$ di 1(b)(ii), catat bacaan θ_1 dalam ruang yang disediakan

[1 mark]

- (iv) For each value of θ_1 in (b)(iii), calculate the increase of temperature, $\Delta\theta$ by using equation:

Bagi setiap nilai θ_1 di (b)(iii), hitung kenaikan suhu, $\Delta\theta$ dengan menggunakan persamaan berikut:

$$\Delta\theta = \theta_1 - \theta_0$$

Record the value of $\Delta\theta$, in spaces provided

Catat nilai $\Delta\theta$ dalam ruang yang disediakan

[2 marks]

- (c) Tabulate your results for all values of m , $\frac{1}{m}$, θ_1 and $\Delta \theta$ on the space below.

Jadualkan keputusan anda bagi semua nilai m , $\frac{1}{m}$, θ_1 dan $\Delta \theta$ pada ruang di bawah

[2 marks]

- (d) Plot a graph of $\Delta \theta$ against $\frac{1}{m}$ on a graph paper provided in page **8**.

*Lukis graf $\Delta \theta$ melawan $\frac{1}{m}$ pada kertas graf di halaman **8** yang telah disediakan.*

[5 marks]

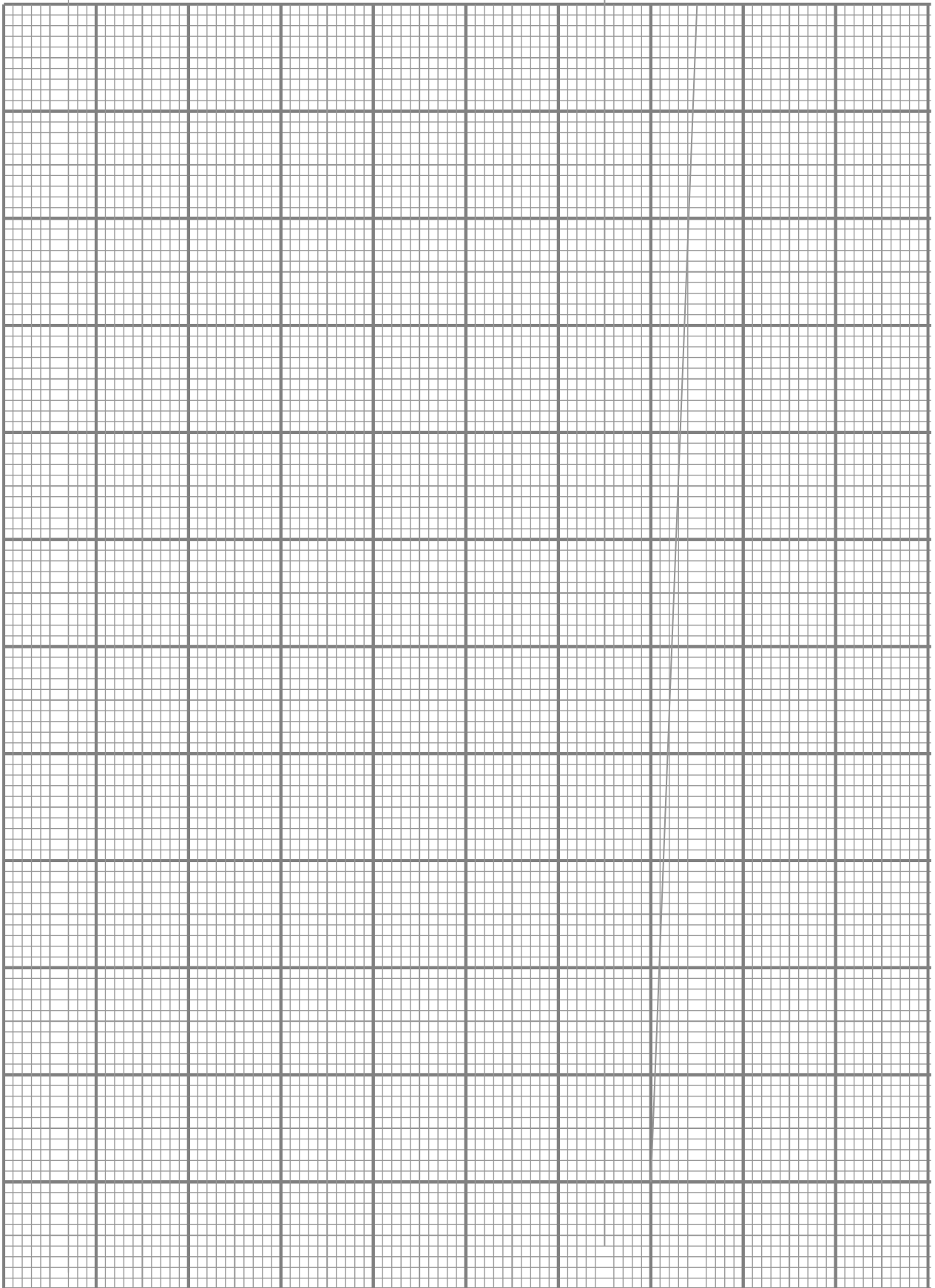
- (e) Based on your graph, state the relationship between $\Delta \theta$ dan $\frac{1}{m}$

Berdasarkan graf anda di 1(e), nyatakan hubungan antara $\Delta \theta$ dan $\frac{1}{m}$

.....

[1 marks]

graph of $\Delta \theta$ against $\frac{1}{m}$



KERTAS 3 BAHAGIAN B

2. A student carries out an experiment to investigate the relationship between the potential difference across a dry cell, V and the current flows, I . He used an ammeter, a rheostat, resistor, P and a voltmeter which are connected as shown in Diagram 2.1.

Seorang pelajar menjalankan suatu eksperimen untuk menyiasat hubungan antara beza keupayaan yang merentasi bateri, V dengan arus yang mengalir, I .

Pelajar itu menggunakan sebuah ammeter, reostat, perintang P dan voltmeter yang disambungkan seperti yang ditunjukkan dalam Rajah 2.1

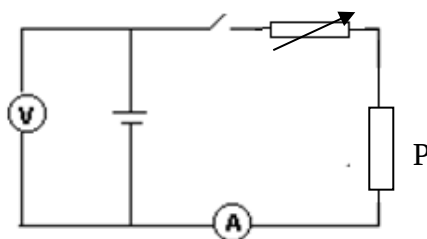


Diagram 2.1/ Rajah 2.1

The results of the experiment is shown in graph V against I as shown in Diagram 2.2 on page 9.

Keputusan eksperimen ditunjukkan dalam graf V melawan I seperti yang ditunjukkan dalam Rajah 2.2 pada halaman 9.

- (a) Based on the graph in Diagram 2.2 ,
Berdasarkan graf pada Rajah 2.2,

- (i) What will happen to the value of V , as I increases?
Apakah yang akan berlaku pada nilai V , jika I bertambah ?

.....

[1 mark/ markah]

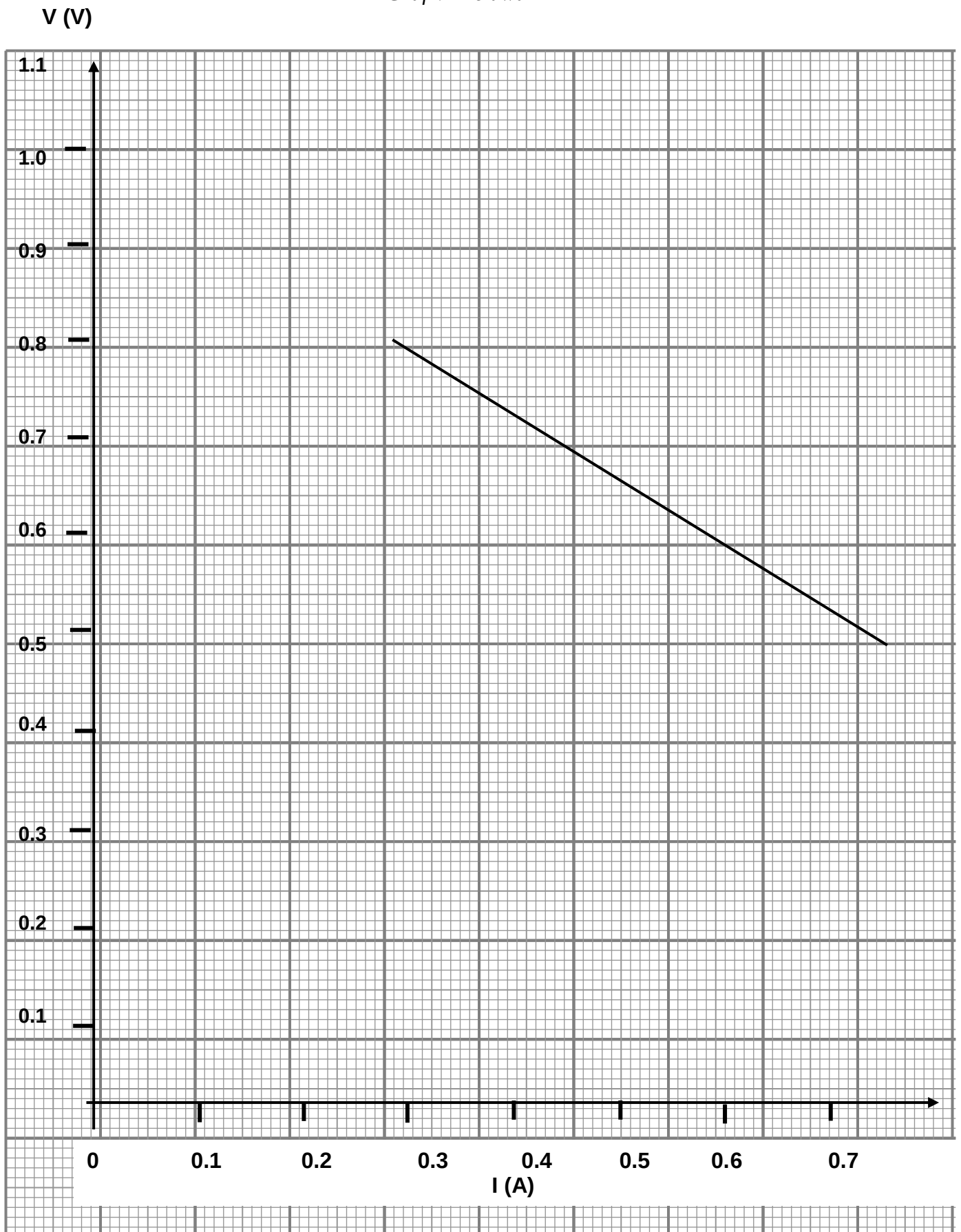
- (ii) Determine the value of potential difference, V when the current, $I = 0.0\text{A}$
Show on the graph, how you determine the value of V .

*Tentukan nilai beza keupayaan, V apabila nilai arus, $I = 0.0\text{ A}$
Tunjukkan di atas graf bagaimana anda menentukan nilai V*

$V =$

[2 marks/ markah]

Graph of V against I
Graf V melawan I



- (iii) Name the physical quantity that represents the value in 2(a)(ii).
Namakan kuantiti fizik yang mewakili nilai pada jawapan 2(a)(ii).

.....

[1 mark/1 markah]

- (b) The internal resistance, r of the dry cell is given by equation $r = -m$ where m is the gradient of the graph.

Rintangan dalaman, r bagi sel kering itu diberi melalui persamaan $r = -m$ dimana m adalah kecerunan bagi graf itu.

- (i) Calculate the gradient, m , of the graph.
Show on the graph how you calculate m .

*Hitung kecerunan, m , bagi graf itu.
Tunjukkan pada graf itu bagaimana anda menghitung m .*

$m =$

[3 marks/markah]