

4531/3  
PHYSICS  
Paper 3  
Ogos/Sept.  
2012  
1½ hours



JABATAN PELAJARAN NEGERI PERAK

PEPERIKSAAN PERCUBAAN  
SIJIL PELAJARAN MALAYSIA  
NEGERI PERAK 2012

PHYSICS

PAPER 3

One hour thirty minutes

DO NOT OPEN THE QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO

1. Write down your **name** and **class** at the space given.
2. This question paper is bilingually set.
3. The questions in Bahasa Malaysia have same meaning to the questions in English Language.
4. Candidates are allowed to answer all or part of the questions either in English Language or Bahasa Malaysia.

| Examiner's Code |          |            |                |
|-----------------|----------|------------|----------------|
| Section         | Question | Total mark | Marks obtained |
| A               | 1        | 16         |                |
|                 | 2        | 12         |                |
| B               | 3        | 12         |                |
|                 | 4        | 12         |                |
| Total           |          |            |                |

Kertas soalan ini mengandungi 15 halaman bercetak dan 1 halaman tidak bercetak.

Section A  
[28 marks]

Answer all questions

1. A student carries out an experiment to investigate the relationship between the base current,  $I_B$ , and the collector current,  $I_C$ .

Diagram 1.1 shows the connected circuit that is used to carry out the experiment.

There is no zero error in the measuring instruments used.

*Seorang murid menjalankan satu eksperimen untuk mengkaji hubungan antara arus tapak,  $I_B$  dan arus pengumpul,  $I_C$ .*

*Rajah 1.1 menunjukkan sambungan litar yang digunakan untuk menjalankan eksperimen tersebut. Semua alat mengukur yang digunakan tiada ralat sifar.*

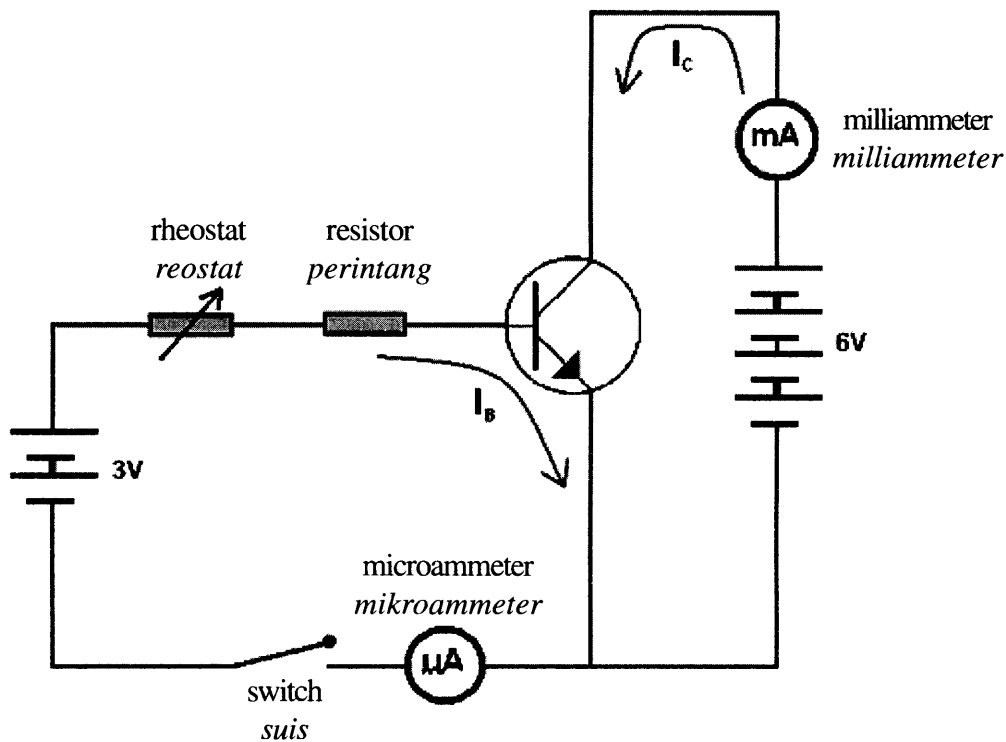


Diagram 1.1  
Rajah 1.1

The switch is on and the rheostat is adjusted until the microammeter reads  $10.0 \mu\text{A}$ .

Then the reading on the milliammeter is recorded.

The procedure is repeated with different  $I_B$ :  $20.0 \mu\text{A}$ ,  $30.0 \mu\text{A}$ ,  $40.0 \mu\text{A}$  and  $50.0 \mu\text{A}$ .

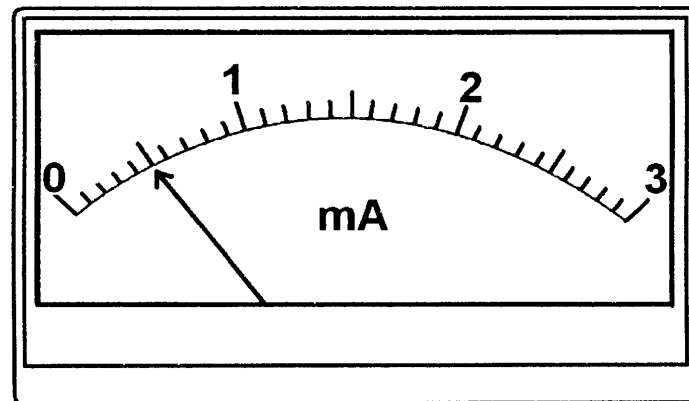
The actual corresponding readings of milliammeter are shown in Diagrams 1.2, 1.3, 1.4, 1.5 and 1.6.

*Suis dihidup dan reostat dilaras sehingga bacaan arus pada mikroammeter menunjukkan  $10.0 \mu\text{A}$ . Kemudian bacaan pada milimeter dicatat.*

*Prosedur tersebut diulangi dengan  $I_B$ :  $20.0 \mu\text{A}$ ,  $30.0 \mu\text{A}$ ,  $40.0 \mu\text{A}$  dan  $50.0 \mu\text{A}$ .*

*Bacaan sebenar pada milimeter yang sepadan masing-masing ditunjukkan pada Rajah 1.2, 1.3, 1.4, 1.5 dan 1.6.*

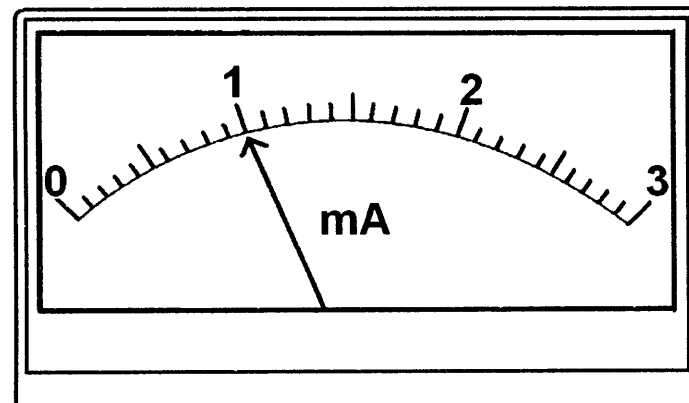
Diagram 1.2  
Rajah 1.2



Milliammeter reading is..... when  $I_B$  is  $10.0 \mu\text{A}$

*Bacaan miliammeter.....apabila  $I_B$  bernilai  $10.0 \mu\text{A}$*

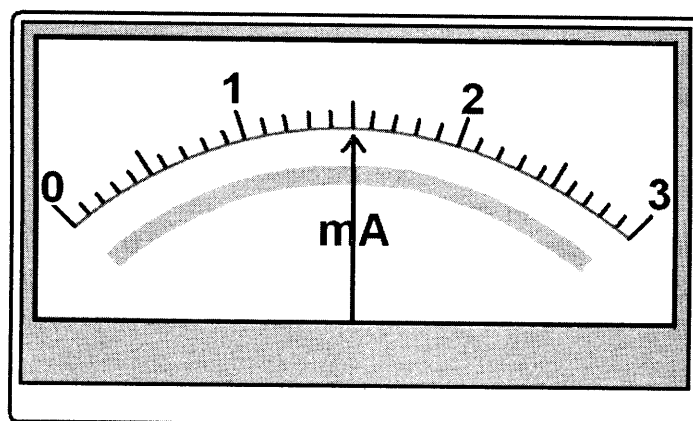
Diagram 1.3  
Rajah 1.3



Milliammeter reading is..... when  $I_B$  is  $20.0 \mu\text{A}$

*Bacaan miliammeter.....apabila  $I_B$  bernilai  $20.0 \mu\text{A}$*

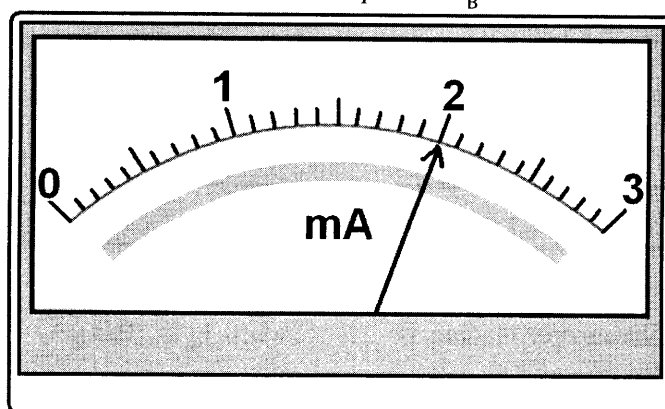
Diagram 1.4  
Rajah 1.4



Milliammeter reading is..... when  $I_B$  is  $30.0 \mu A$

Bacaan miliammeter.....apabila  $I_B$  bernilai  $30.0 \mu A$

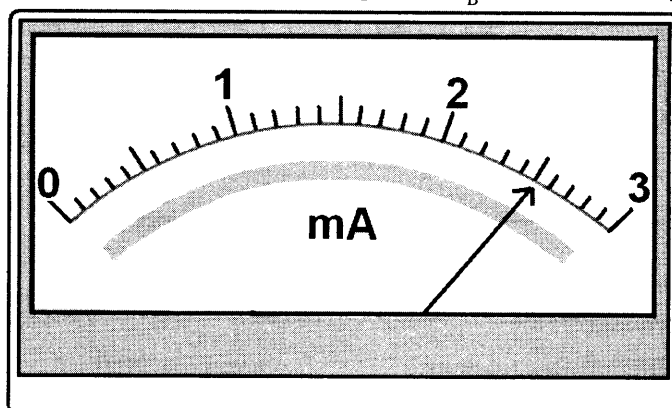
Diagram 1.5  
Rajah 1.5



Milliammeter reading is..... when  $I_B$  is  $40.0 \mu A$

Bacaan miliammeter.....apabila  $I_B$  bernilai  $40.0 \mu A$

Diagram 1.6  
Rajah 1.6



Milliammeter reading is..... when  $I_B$  is  $50.0 \mu A$

Bacaan miliammeter.....apabila  $I_B$  bernilai  $50.0 \mu A$

- (a) For the experiment described on page 2, identify:  
*Bagi eksperimen yang diterangkan di halaman 2, kenal pasti:*

(i) The manipulated variable  
*Pembolehubah dimanipulasikan*

1(a) (i)

[1 mark]

[1 markah]

(ii) The responding variable  
*Pembolehubah bergerak balas*

1(a) (ii)

[1 mark]

[1 markah]

(iii) The constant variable  
*Pembolehubah dimalarkan*

1(a) (iii)

[1 mark]

[1 markah]

- (b) Based on Diagrams 1.2, 1.3, 1.4, 1.5 and 1.6 on page 3 and page 4:  
*Berdasarkan Rajah 1.2, 1.3, 1.4, 1.5 dan 1.6 di halaman 3 dan 4:*

(i) Record the reading of each collector current,  $I_C$ , in the spaces provided on page 3 and page 4 respectively.  
*Catatkan bacaan miliammeter,  $I_C$ , dalam ruang yang disediakan di halaman 3 dan 4.*

1(b) (i)

[2 marks]

[2 markah]

(ii) Tabulate your results for  $I_B$  and  $I_C$  in the space below.  
*Jadualkan keputusan anda bagi  $I_B$  dan  $I_C$  pada ruang di bawah.*

1(b) (ii)

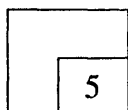
[3 marks]

[3 markah]

For  
Examiner's  
Use

- (c) On the graph paper on page 7, plot a graph of  $I_C$  against  $I_B$ .  
Pada kertas graf di halaman 7, lukiskan graf  $I_C$  melawan  $I_B$ .

1 (c)

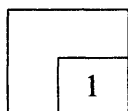


[5 marks]

[5 markah]

- (d) Based on your graph in 1(c), state the relationship between  $I_C$  and  $I_B$ .  
Berdasarkan graf anda di 1(c), nyatakan hubungan antara  $I_C$  and  $I_B$ .

1 (d)

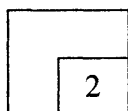


[1 mark]

[1 markah]

- (e) State **two** precautions that should be taken to obtain the accurate readings of  $I_C$  and  $I_B$ .  
Nyatakan **dua** langkah berjaga-jaga yang perlu diambil untuk mendapatkan bacaan  $I_C$  dan  $I_B$  yang jitu.

1 (e)



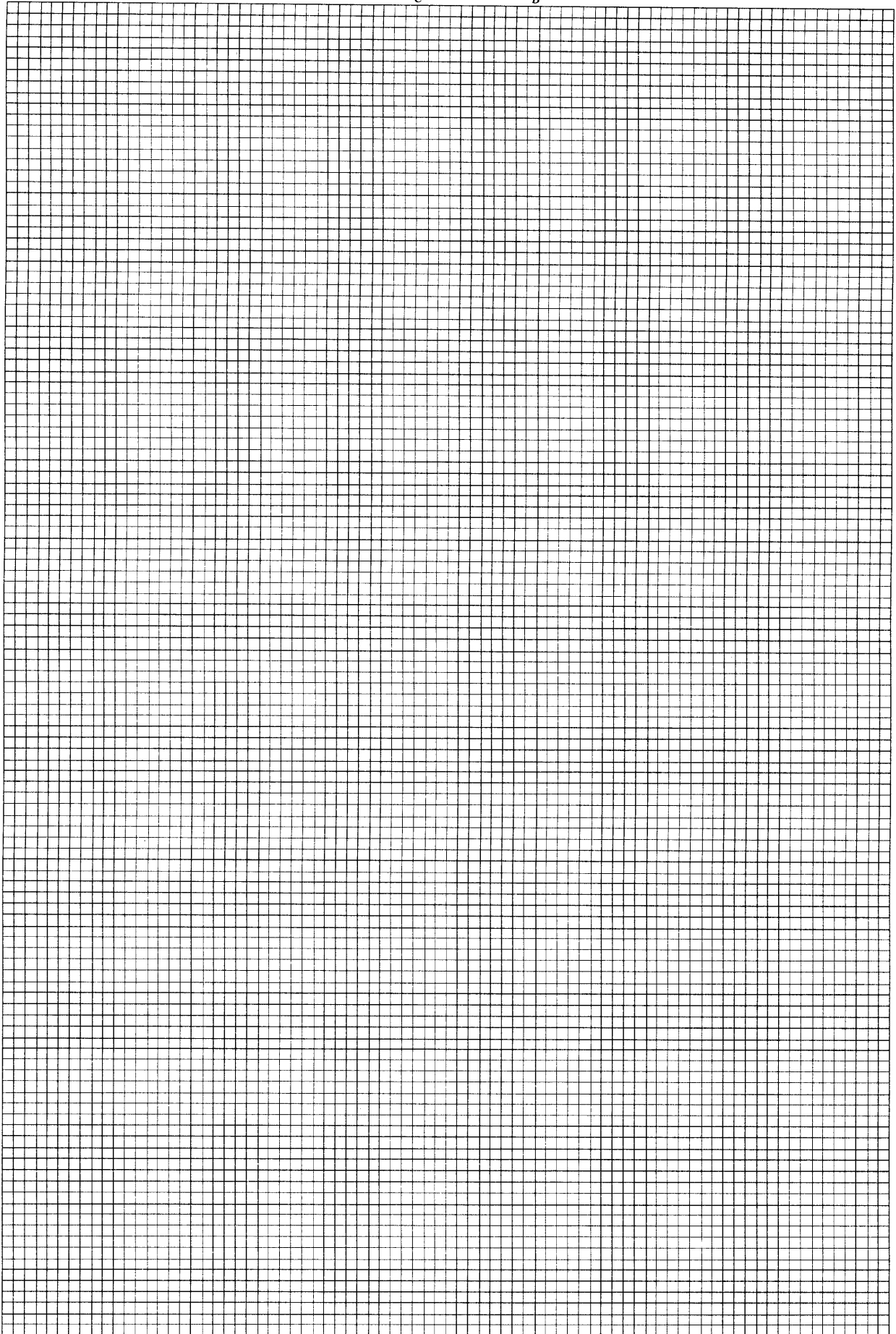
1. ....

2. ....

[2 marks]

[2 markah]

Graph of  $I_C$  against  $I_B$   
*Graf  $I_C$  melawan  $I_B$*



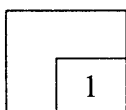
For  
Examiner's  
Use

2. A student carries out an experiment to investigate the relationship between the object distance,  $u$ , and the image distance,  $v$ .  
The results of the experiment is shown in the graph of  $uv$  against  $u + v$  as in Diagram 2.1 on page 9.

*Seorang murid menjalankan eksperimen untuk mengkaji hubungan antara jarak objek,  $u$ , dengan jarak imej,  $v$ .*

*Keputusan eksperimen ini ditunjukkan oleh graf  $uv$  melawan  $u + v$  pada Rajah 2.1 di halaman 9.*

2 (a)



- (a) Based on the graph in Diagram 2.1,  
*Berdasarkan graf pada Rajah 2.1,*  
what happen to  $uv$  as  $u + v$  increases?  
*apakah yang berlaku pada  $uv$  apabila  $u + v$  bertambah?*

.....

[1 mark]

[1 markah]

- (b) The relationship of the graph is given by  
*Hubungan graf diberi sebagai*

$$f = \frac{uv}{u + v}$$

where  $f$  is focal length of the convex lens.

*di mana  $f$  ialah jarak fokus kanta penumpu yang digunakan.*

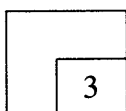
Calculate the gradient,  $f$ , of the graph.

Show on the graph how you determine  $f$ .

*Hitungkan kecerunan graf,  $f$ , bagi graf itu.*

*Tunjukkan pada graf itu bagaimana anda menentukan nilai  $f$ .*

2 (b)



$$f = \dots\dots\dots$$

[3 marks]

[3 markah]



Graph of  $uv$  against  $u + v$   
*Graf  $uv$  melawan  $u + v$*

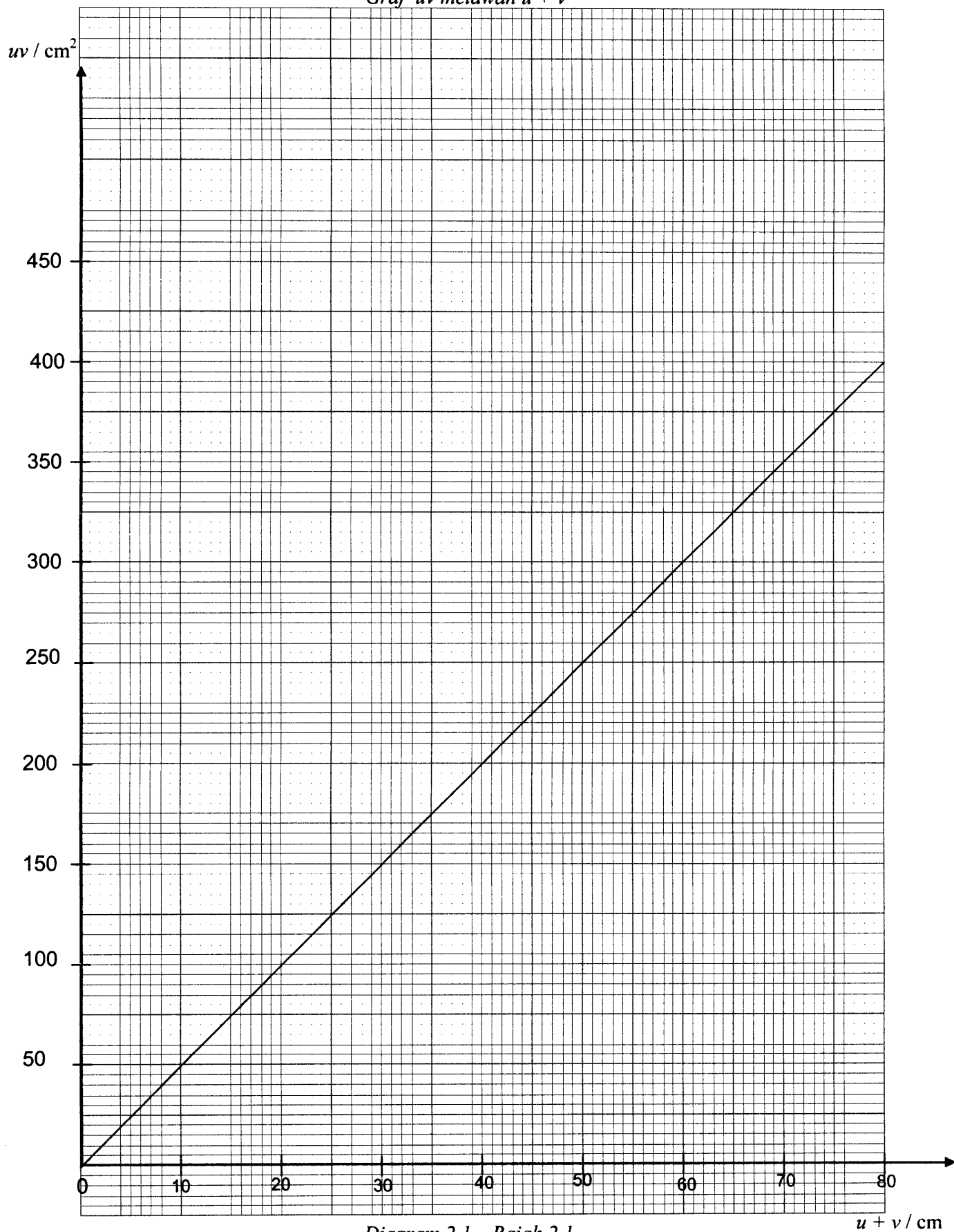


Diagram 2.1 Rajah 2.1

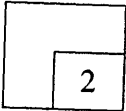
For  
Examiner's  
Use

- (c) The image distance,  $v$ , of an object distance,  $u$ , is given by the formula

$$v = \frac{(u + v) + 59.16}{2}$$

- (i) Determine the value of  $u + v$  when  $uv = 350 \text{ cm}^2$ .  
Show on the graph, how you determine the value of  $u + v$ .  
*Tentukan nilai  $u + v$  apabila  $uv = 350 \text{ cm}^2$ .  
Tunjukkan pada graf itu bagaimana anda menentukan nilai  $u + v$ .*

2 (c) (i)



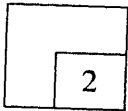
$$u + v = \dots\dots\dots$$

[2 marks]

[2 markah]

- (ii) using the given formula, calculate the image distance,  $v$ .  
*Dengan menggunakan rumus yang diberikan, hitungkan jarak imej,  $v$ .*

2 (c) (ii)



$$v = \dots\dots\dots$$

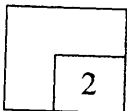
[2 marks]

[2 markah]

- (iii) using the formulae  $P = \frac{1}{f}$ , calculate the value of  $P$ , the power of the convex lens.

*Dengan menggunakan rumus  $P = \frac{1}{f}$ , hitungkan  $P$ , kuasa kanta penumpu yang digunakan.*

2 (c) (iii)



$$P = \dots\dots\dots$$

[2 marks]

[2 markah]

- (d) State **two** precautions that can be taken to improve the accuracy of the readings in this experiment.

*Nyatakan **dua** langkah berjaga-jaga yang boleh diambil untuk memperbaiki ketepatan bacaan dalam eksperimen ini.*

1. ....

.....

2. ....

.....

[2 marks]

[2 markah]

*For  
Examiner's  
Use*

2(d)

|   |
|---|
|   |
| 2 |

## Section B

[12 marks]

Answer any **one** question.*Jawab mana-mana satu soalan.*

3. Diagram 3 shows a model of a water tank in a house. Water flow from the pipes with different speeds when the water tap P and R are turned on simultaneously.  
*Rajah 3 menunjukkan model tangki air di sebuah rumah. Kelajuan aliran air berbeza apabila paip air P dan R dipasang pada masa yang sama.*

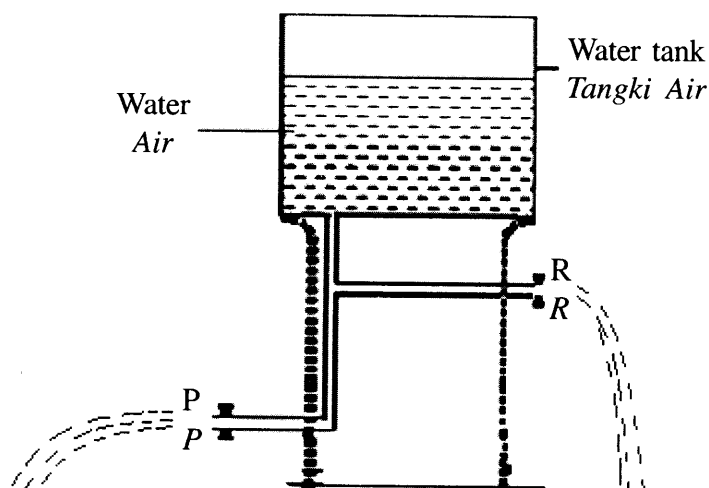


Diagram 3

*Rajah 3*

Based on the above information and observation:

*Berdasarkan maklumat dan pemerhatian di atas :*

- (a) State **one** suitable inference.

*Nyatakan **satu** inferens yang sesuai.*

[1 mark]

[1 markah]

- (b) State **one** suitable hypothesis.

*Nyatakan **satu** hipotesis yang sesuai*

[1 mark]

[1 markah]

- (c) With the use of apparatus such as measuring cylinder, thistle funnel, rubber tube and other apparatus, describe an experiment framework to investigate the hypothesis stated in 3 (b).

*Dengan menggunakan radas seperti silinder penyukat, corong tisel, tiub getah dan lain-lain radas yang sesuai, terangkan satu rangka kerja untuk menyiasat hipotesis yang dinyatakan 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 the method of controlling the manipulated variable and the method of measuring the responding variable.  
*Prosedur eksperimen yang mengandungi cara mengawal pembolehubah yang dimanipulasikan dan cara mengukur pembolehubah yang bergerakbalas.*
- (vi) The way you would tabulate the data.  
*Cara untuk menjadualkan data.*
- (vii) The way you would analyse the data.  
*Cara untuk menganalisis data*

[10 marks]

[10 markah]

4. The bulb in Diagram 4.1 lights brighter than the bulb in Diagram 4.2  
 Mentol dalam rajah 4.1 menyala lebih cerah daripada mentol di dalam rajah 4.2

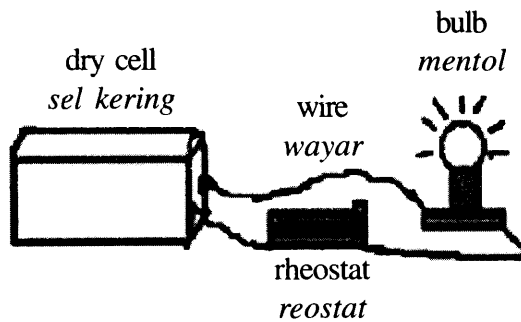


Diagram 4.1  
 Rajah 4.1

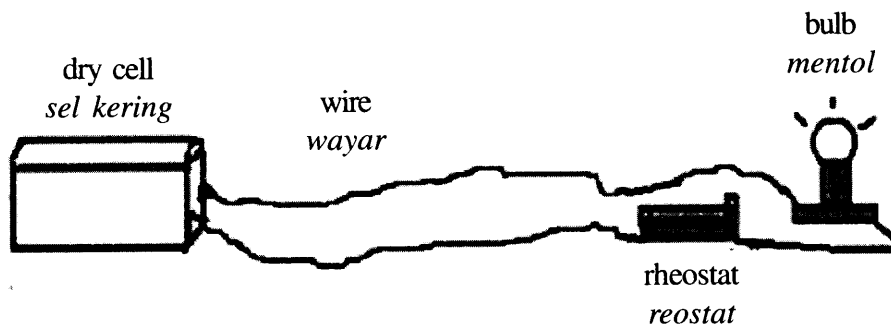


Diagram 4.2  
 Rajah 4.2

Based on the above information and observation:  
 Berdasarkan maklumat dan pemerhatian di atas:

- (a) State **one** suitable inference.  
 Nyatakan **satu** inferens yang sesuai. [1 mark]  
[1 markah]
- (b) State **one** suitable hypothesis.  
 Nyatakan **satu** hipotesis yang sesuai [1 mark]  
[1 markah]
- (c) With the use of apparatus such as ammeter, voltmeter, constantan wire and other apparatus, describe an experiment framework to investigate the hypothesis stated in 4 (b).  
 Dengan menggunakan radas seperti ammeter, voltmeter, dawai konstantan dan lain-lain radas yang sesuai, terangkan satu rangka kerja untuk menyiasat hipotesis yang dinyatakan di 4 (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 the method of controlling the manipulated variable and the method of measuring the responding variable.  
*Prosedur eksperimen yang mengandungi cara mengawal pembolehubah yang dimanipulasikan dan cara mengukur pembolehubah yang bergerakbalas.*
- (vi) The way you would tabulate the data.  
*Cara untuk menjadualkan data.*
- (vii) The way you would analyse the data.  
*Cara untuk menganalisis data*

[10 marks]

[10 markah]

**END OF QUESTION PAPER**  
**KERTAS SOALAN TAMAT**