

4531/3
PHYSICS
 Kertas 3
SEPT 2011
 1½ Jam

NAMA :
 TINGKATAN :

PHYSICS

Tingkatan 5

Kertas 3

Satu Jam Tiga Puluh Minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU.

1. Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu
2. Calon dikehendaki membaca maklumat di halaman 2.

<i>Untuk Kegunaan Pemeriksa</i>			
Bahagian	soalan	Markah Penuh	Markah
A	1	16	
	2	12	
B	1	12	
	2	12	
TOTAL			

Kertas soalan ini mengandungi 16 halaman bercetak.

INFORMATION TO CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of two sections : **Section A** and **Section B**
Kertas soalan ini mengandungi dua bahagian: Bahagian A dan Bahagian B.
2. Answer all questions in **Section A**. Write your answers for **Section A** in the spaces provided in the question paper.
Jawab semua soalan dalam Bahagian A. Tuliskan jawapan bagi Bahagian A dalam ruang yang disediakan dalam kertas soalan.
3. Answer one question from **Section B**. Write your answers for **Section B** on the paper provided by invigilators. Answer questions in **Section B** in detail. Answers should be clear and logical. Equations, Diagrams, tables, graphs and other suitable methods can be used to explain your answer. *Jawab satu soalan daripada Bahagian B.*
Tuliskan jawapan bagi Bahagian B pada halaman bergaris yang disediakan di bahagian akhir kertas soalan ini. Jawab Bahagian B dengan lebih terperinci. Jawapan mestilah jelas dan logik. Anda boleh menggunakan persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.
4. Show your working it may help you to get marks.
Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.
5. If you wish to cancel any answer, neatly cross out the answer.
Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu.
6. The Diagrams in the questions provided are not drawn to scale unless stated.
Gambar rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan.
7. The marks allocated for each question or sub-section of a question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.
8. You may use non-programmable scientific calculator. However, steps in calculation must be shown.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.
9. The time suggested to complete **Section A** is 60 minutes and **Section B** is 30 minutes.
Masa yang dicadangkan untuk menjawab Bahagian A ialah 60 minit dan Bahagian B ialah 30 minit.
10. Hand in your answer sheets at the end of examination.
Serahkan semua kertas jawapan anda di akhir peperiksaan.

Bahagian A

[28 marks]

Jawab semua soalan dalam bahagian ini.

Masa yang dicadangkan untuk menjawab bahagian ini ialah 60 minit.

1. A student carries out an experiment to investigate the relationship between the wavelength, λ and depth of water, d for a fixed frequency of water waves.

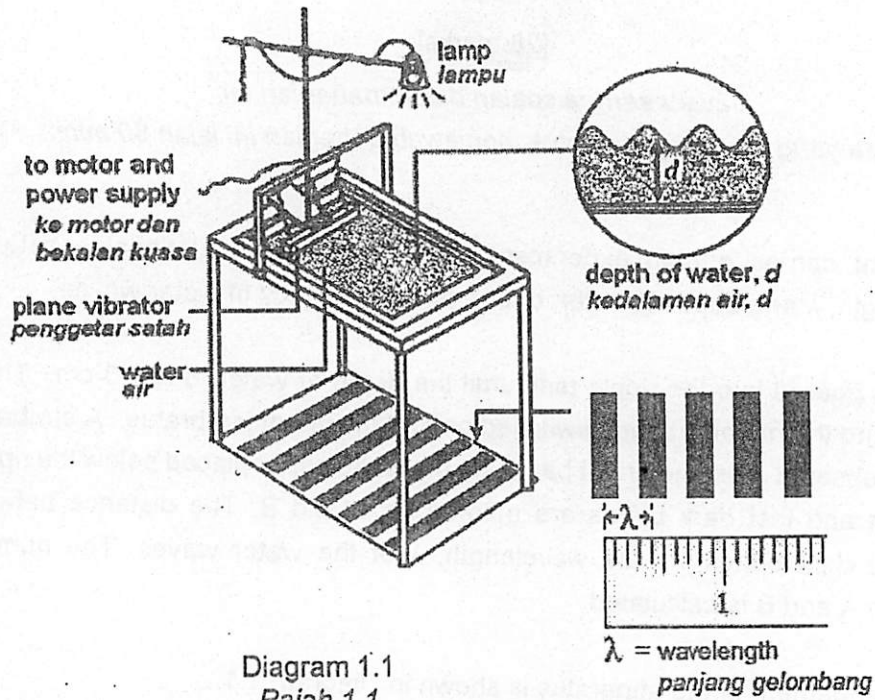
Water is poured into the ripple tank until the depth of water, d is 1.0 cm. The power supply and the motor are then switched on and the vibrator vibrates. A stroboscope is used to observe dark and bright bands on the white paper placed below the ripple tank. The first and last dark bands are marked as A and B. The distance between two adjacent dark bands is the wavelength, λ of the water waves. The number of λ between A and B is calculated.

The arrangement of the apparatus is shown in Diagram 1.1.

Seorang pelajar menjalankan eksperimen untuk mengkaji hubungan antara panjang gelombang, λ dan kedalaman air, d bagi gelombang air yang frekuensinya ditetapkan.

Air dituang ke dalam tangki riak sehingga kedalaman air, d ialah 1.0 cm. Bekalan kuasa dan motor kemudian dihidupkan dan penggetar bergetar. Stroboskop digunakan untuk memerhati jalur cerah dan gelap di atas kertas putih yang diletakkan di bawah tangki riak. Jalur-jalur gelap yang pertama dan terakhir ditanda sebagai A dan B. Jarak diantara dua jalur gelap berturutan ialah panjang gelombang, λ gelombang air tersebut. Bilangan λ diantara A dan B dikira.

Susunan radas ditunjukkan dalam Rajah 1.1.



The procedure is repeated with different depths, $d = 1.5$ cm, 2.0 cm, 2.5 cm and 3.0 cm. The corresponding wavelengths are shown in Diagrams 1.3, 1.4, 1.5 and 1.6.

Langkah di atas diulangi dengan kedalaman air, $d = 1.5$ cm, 2.0 cm, 2.5 cm and 3.0 cm. Panjang gelombang, λ yang sepadan ditunjukkan pada Rajah-rajah 1.3, 1.4, 1.5 dan 1.6.

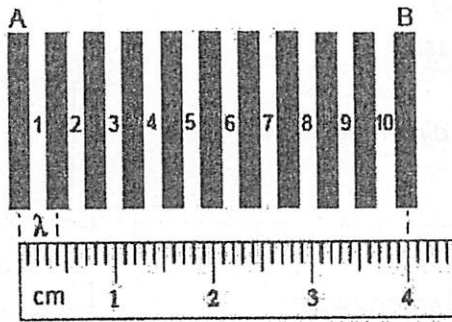


Diagram 1.2/Rajah 1.2

Depth of water/kedalaman air, $d = 1.0$ cm

Distance between AB/
Jarak antara AB, = 4.0 cm

Number of λ between AB/
Bilangan λ diantara AB = 10

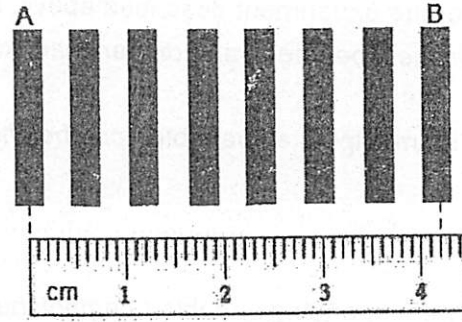


Diagram 1.3/Rajah 1.3

Depth of water/kedalaman air, $d = 1.5$ cm

Distance between AB/
Jarak antara AB, =

Number of λ between AB/
Bilangan λ diantara AB =

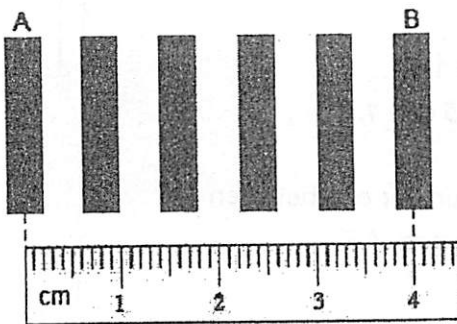


Diagram 1.4/Rajah 1.4

Depth of water/kedalaman air, $d = 2.0$ cm

Distance between AB/
Jarak antara AB, =

Number of λ between AB/
Bilangan λ diantara AB =

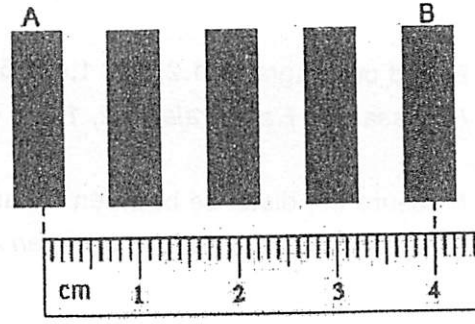


Diagram 1.5/Rajah 1.5

Depth of water/kedalaman air, $d = 2.5$ cm

Distance between AB/
Jarak antara AB, =

Number of λ between AB/
Bilangan λ diantara AB =

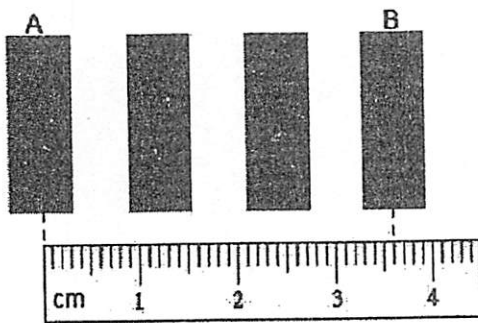


Diagram 1.6/Rajah 1.6

Depth of water/kedalaman air, $d = 3.0$ cm

Distance between AB/
Jarak antara AB, =

Number of λ between AB/
Bilangan λ diantara AB =

(a) For the experiment described above, identify
Bagi eksperimen yang diterangkan, kenalpasti

(i) The manipulated variable / *pembolehubah dimanipulasikan*

.....
 [1 mark]

(ii) The responding variable / *pembolehubah bergerakbalas*

.....
 [1 mark]

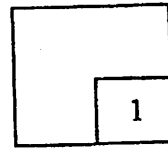
(iii) The constant variable / *pembolehubah yang dimalarkan*

.....
 [1 mark]

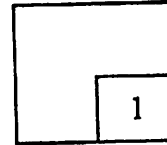
(b) Based on Diagrams 1.2, 1.3, 1.4, 1.5 and 1.6:
Berdasarkan Rajah-rajah 1.2, 1.3, 1.4, 1.5 dan 1.6:

(i) Measure the distance between AB and number of λ between AB
Kira jarak diantara AB dan bilangan λ diantara AB

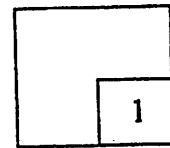
1(a)(i)



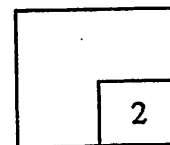
1(a)(ii)



1(a)(iii)



2(b)(i)



[2 marks]

- (ii) Calculate the wavelength, λ of the water waves, where
Kira panjang gelombang, λ bagi gelombang air itu, dimana

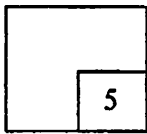
$$\text{The wavelength, } \lambda = \frac{\text{Distance between AB}}{\text{Number of } \lambda}$$

$$\text{Panjang gelombang, } \lambda = \frac{\text{Jarak antara AB}}{\text{Bilangan } \lambda}$$

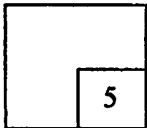
Tabulate your results for depth of water, d , distance between AB, number of λ and its wavelength, λ .

Jadual keputusan anda bagi kedalaman air, d , jarak diantara AB, bilangan λ dan panjang gelombang, λ .

2(b)(ii)



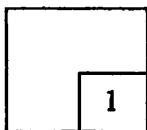
1(c)



- (c) On the graph paper on page 8, plot a graph of λ against d .
Pada kertas graf di halaman 8, lukiskan graf λ melawan d .

[5 marks]

1(d)

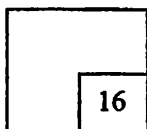


- (d) Based on your graph in (c), state the relationship between λ and d .
Berdasarkan graf anda dalam (c), nyatakan hubungan antara λ dan d .

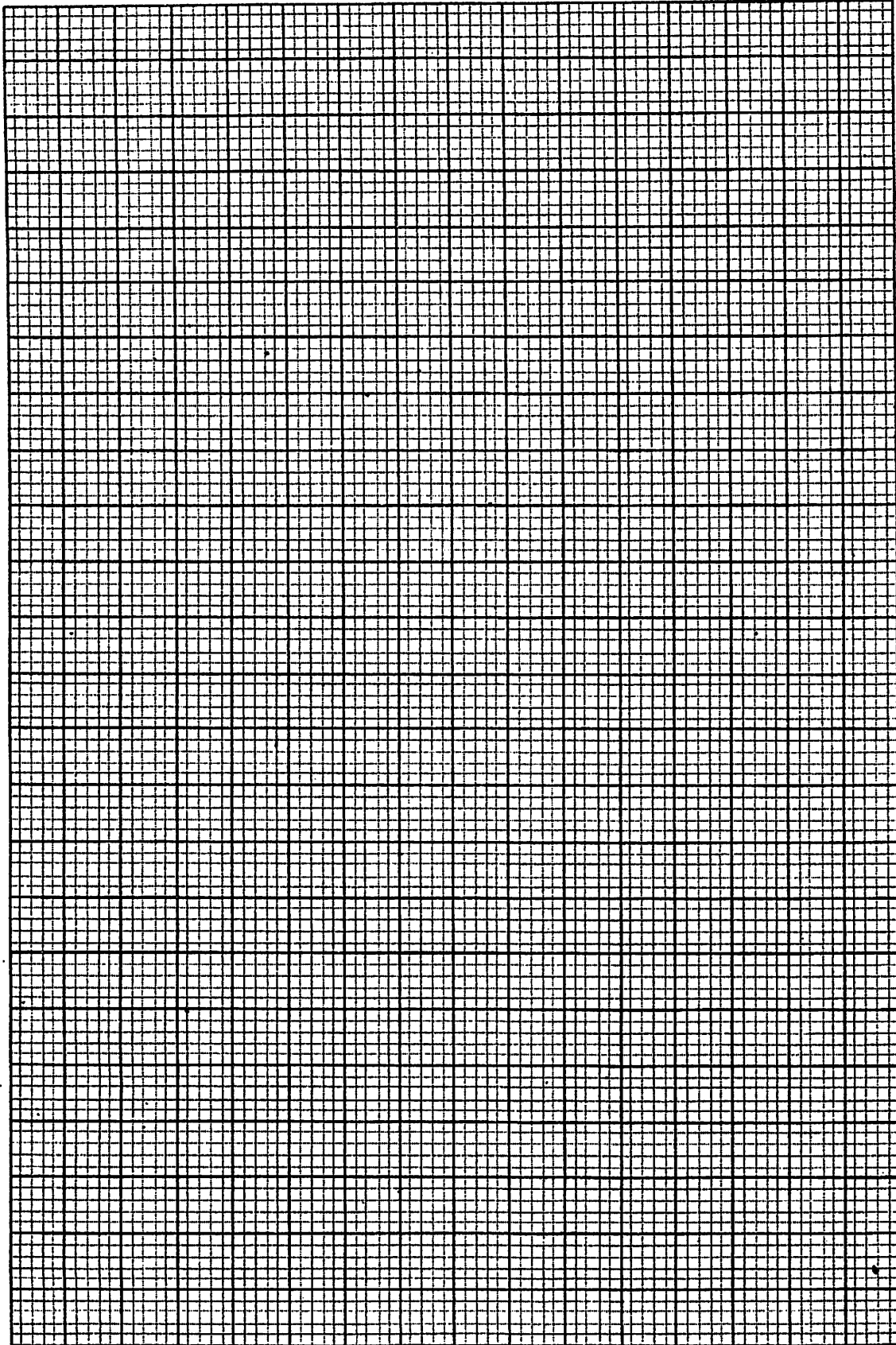
.....

[1 mark]

Q1



Graph of λ against d



2. A student carried out an experiment to investigate the relationship between object distance, u , and image distance, v , for a convex lens. The student used various values of u and recorded the corresponding values of v . The student then plotted the graph of uv against $u + v$ as shown in Diagram 2.

Seorang pelajar menjalankan eksperimen untuk mengkaji hubungan antara jarak objek, u dan jarak imej, v , bagi sebuah kanta cembung. Pelajar itu mengubah beberapa kedudukan jarak objek, u dan merekodkan nilai jarak imej yang sepadan. Pelajar itu memplotkan graf uv melawan $u+v$ seperti ditunjukkan dalam Rajah 2.

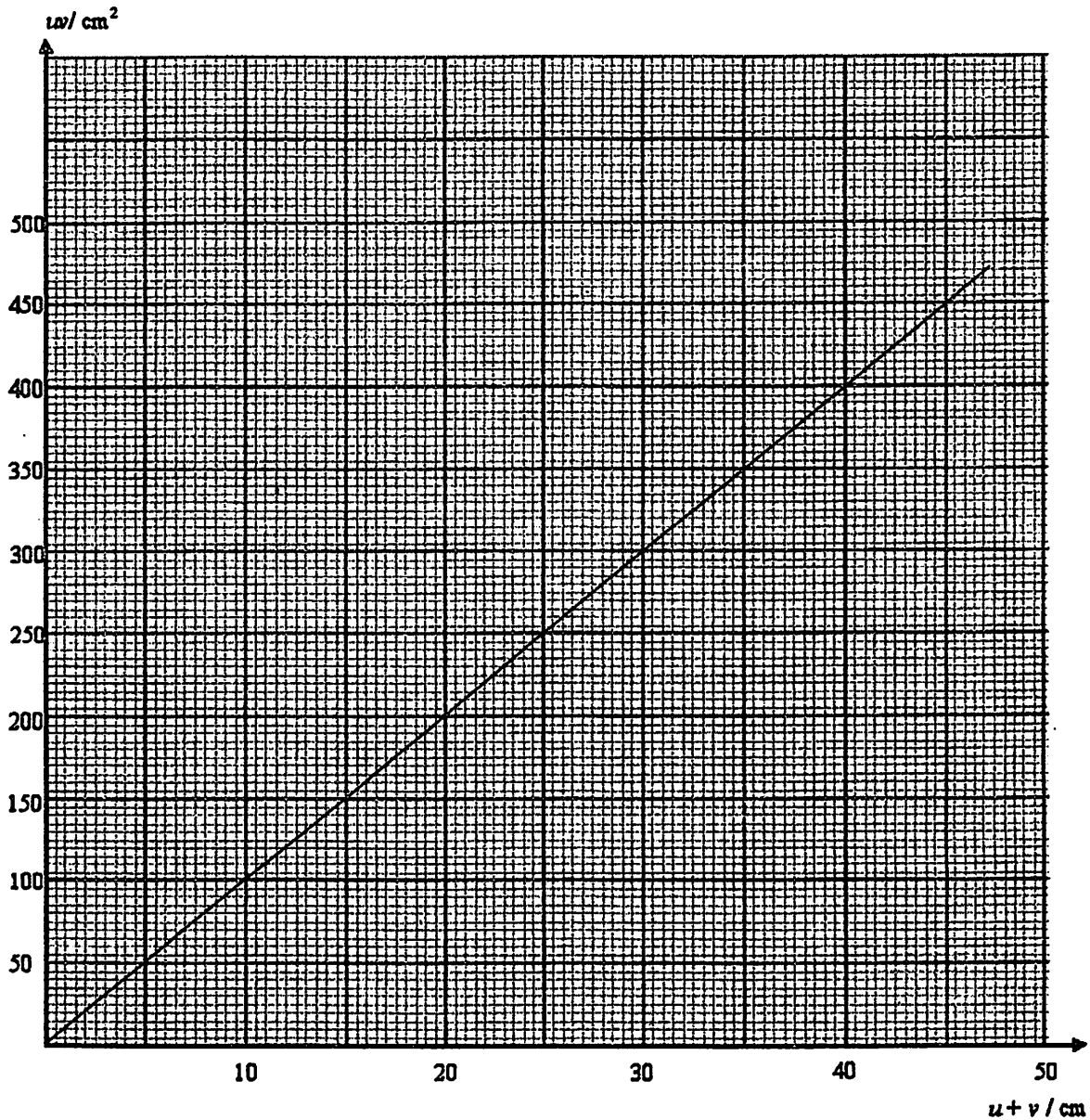


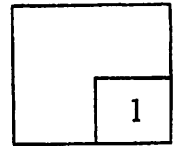
Diagram 2 / Rajah 2

a) Based on the graph in Diagram 2,
Berdasarkan graf pada Rajah 2,

(i) State the relationship between uv and $u + v$
Nyatakan hubungan antara uv dan $u + v$

[1 mark]

2(a)(i)

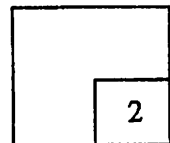


(ii) Determine the value of $u + v$ when the value of $uv = 400 \text{ cm}^2$.
 Show on the graph how you obtained the value of $u + v$.

Tentukan nilai $u+v$ apabila nilai $uv = 400 \text{ cm}^2$. Tunjukkan pada graf bagaimana nilai $u+v$ ditentukan.

[2 marks]

2(a)(ii)

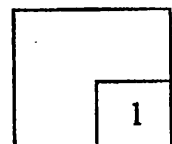


(iii) From the value of $u + v$ obtained in (ii), calculate the image distance, v when $u=20 \text{ cm}$.

Dari nilai $u+v$ yang diperoleh dalam (ii), kira jarak imej, v apabila $u=20 \text{ cm}$.

[1 mark]

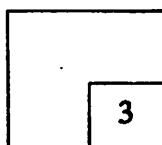
2(a)(iii)



- (iv) Calculate the gradient of the graph. Show clearly on the graph how you obtained the values needed for the calculation.

Kira kecerunan graf. Tunjukkan dengan jelas bagaimana anda menentukan nilai untuk pengiraan.

2(a)(iv)



[3 marks]

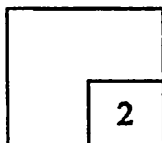
- b) Given that the relationship between u , v and focal length, f of the convex lens used, is represented by the equation:

Diberi hubungan antara u, v dan jarak fokus, f untuk kanta cembung yang digunakan, diwakili oleh persamaan:

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

Derive an equation which gives the relationship between uv and $(u + v)$.
Terbitkan persamaan yang menghubungkan antara uv dan $(u+v)$

2(b)



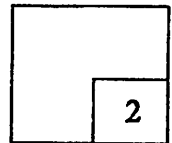
[2 marks]

- c) Using equation produced in (b) and the gradient in (a)(iv), determine the focal length of the lens used in the experiment.

Menggunakan persamaan yang diterbitkan dalam (b) dan nilai kecerunan dalam (a)(iv), tentukan panjang fokus kanta cembung yang digunakan dalam eksperimen tersebut.

[2 marks]

2(c)

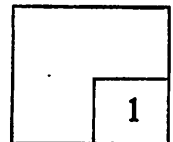


- d) State one precaution taken to ensure the accuracy of the experiment.

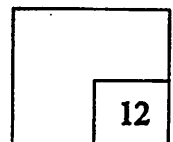
Nyatakan satu langkah berjaga-jaga bagi memastikan kejituan eksperimen tersebut.

[1 mark]

2(d)



Q2



Bahagian B

[12 marks]

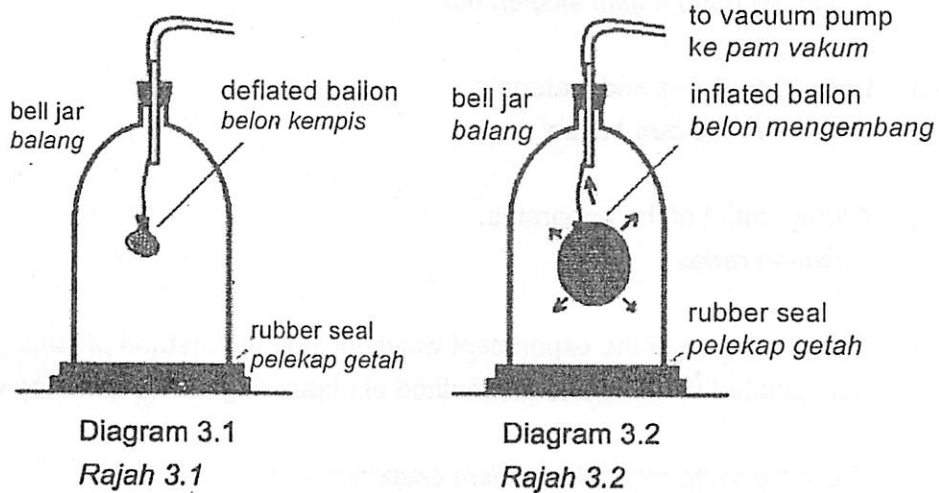
Answer any one question from this section.

The time suggested to complete this section is 30 minutes.

3. Diagram 3.1 shows a deflated balloon in a bell jar.
Diagram 3.2 shows the balloon when the air in bell jar is sucked out.

Rajah 3.1 menunjukkan sebiji belon yang kempis di dalam balang.

Rajah 3.2 menunjukkan belon di dalam balang itu apabila udara di dalamnya disedut keluar.



Based on the above information and observation:

Berdasarkan pernyataan dan pemerhatian di atas:

- (a) State one suitable inference.
Nyatakan satu inferens yang sesuai.
- (b) State one suitable hypothesis.
Nyatakan satu hipotesis yang sesuai

[2 marks]

- (c) With the use of apparatus such as a syringe, slotted weights and other apparatus, describe an experiment framework to investigate the hypothesis stated in 3(b)

Dengan menggunakan radas seperti picagari, pemberat dan radas lain, terangkan satu eksperimen untuk menyiasat hipotesis yang dinyatakan 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 yang digunakan dalam eksperimen.

Terangkan bagaimana mengawal dan mengukur pembolehubah dimanipulasi dan bagaimana mengukur pembolehubah 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]

- 4 Diagram 4(a)(i) shows a rheostat being connected to a simple electric circuit consist a bulb. The brightness of the bulb is shown in Diagram 4(a)(ii).

The experiment is repeated by adjusting the slider of the rheostat further as shown in Diagram 4(b)(i). The brightness of the bulb changes as shown in Diagram 4(b)(ii).

[The simple electric circuit is not in the diagram]

Diagram 4(a)(i) menunjukkan sebuah reostat disambungkan kepada suatu litar elektrik ringkas mengandungi sebuah mentol. Kecerahan mentol ditunjukkan dalam Rajah 4(a)(ii).

Eksperimen diulang dengan mengubah kedudukan gelongsor lebih jauh seperti ditunjukkan dalam Rajah 4(b)(i). Kecerahan mentol berubah seperti ditunjukkan dalam Rajah 4(b)(ii).

[Litar elektrik ringkas berkaitan tiada dalam gambar]

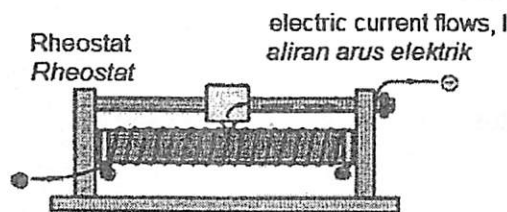


Diagram 4 (a)(i)
Rajah 4(a)(i)



Diagram 4(a)(ii)
Rajah 4(a)(ii)

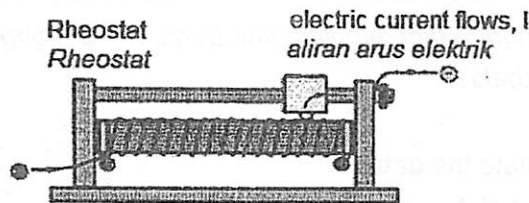


Diagram 4 (b)(i)
Rajah 4 (b)(i)

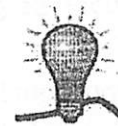


Diagram 4 (b)(ii)
Rajah 4 (b)(ii)

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

- (a) State one suitable inference.
Nyatakan satu inferens yang sesuai.
- (b) State one suitable hypothesis.
Nyatakan satu hipotesis yang sesuai

[2 marks]

- (c) With the use of apparatus such as constantan wire and other apparatus, describe an experiment framework to investigate the hypothesis stated in 4(b).

Dengan menggunakan radas seperti wayar konstantan dan radas lain, terangkan satu eksperimen untuk menyiasat hipotesis yang dinyatakan 4(b).

In your description, state clearly the following:

Dalam penerangan anda, jelaskan perkara berikut:

- (i) Aim of the experiment
Tujuan eksperimen.
- (i) Variables in the experiment
Pembolehubah dalam eksperimen
- (ii) List of apparatus and materials
Senarai radas dan bahan
- (iii) Arrangement of the apparatus
Susunan radas
- (iv) The procedure of the experiment which include the method of controlling the manipulated variable and the method of measuring the responding variable.
Prosedur yang digunakan dalam eksperimen. Terangkan bagaimana mengawal dan mengukur pembolehubah dimanipulasi dan bagaimana mengukur pembolehubah bergerakbalas.
- (v) The way you would tabulate the data.
Cara untuk menjadualkan data.
- (vi) The way you would analyse the data.
Cara untuk menganalisis data.

[10 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT