



4531/3
Physics
Paper 3
Sept
2009

Name:..... Tingkatan:.....

1 1/2 hours

JABATAN PELAJARAN NEGERI SELANGOR
PROGRAM PENINGKATAN PRESTASI
SAINS DAN MATEMATIK SPM
2009

Physics

Paper 3

One hour and thirty minutes

DO NOT OPEN THIS QUESTION PAPER UNLESS TOLD

1. This question paper consists of two sections:
Section A dan Section B.

2. Answer all questions in **Section A**. Write your answers for **Section A** in the space provided on the question paper.

3. Answer one question from **section B**. Write your answer for **Section B** on the lined pages at the end of this question paper. Answer **Section B** in detail. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.

For examiner only			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	16	
	2	12	
B	3	12	
	4	12	
Jumlah			

4. Show your working, it may help you to get marks.

5. If you wish to cancel any answer, neatly cross out the answer.

6. The marks allocated for each question or part of a question is shown in brackets.

7. You may use a non-programmable scientific calculator for your calculations.

8. The time suggested answering, **Section A** is 60 minutes and **Section B** is 30 minutes.

9. Hand in this question paper at the end of the examination

Kertas ini mengandungi 10 halaman bercetak.

Section A
[BAHAGIAN A]
[28 marks]
[28 markah]

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

Suggested time for 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 length, ℓ , of a constantan wire and the potential difference across it, V . The wire is connected to a steady direct current power supply provided by an accumulator. The set up of the apparatus is shown in Diagram 1.1

Seorang pelajar menjalankan suatu eksperimen untuk mengkaji hubungan panjang, ℓ dawai konstantan dengan beza keupayaan yang merentasinya, V . Dawai itu disambungkan kepada bekalan arus terus dari sebuah akumulator. Susunan radas ditunjukkan dalam Rajah 1.1

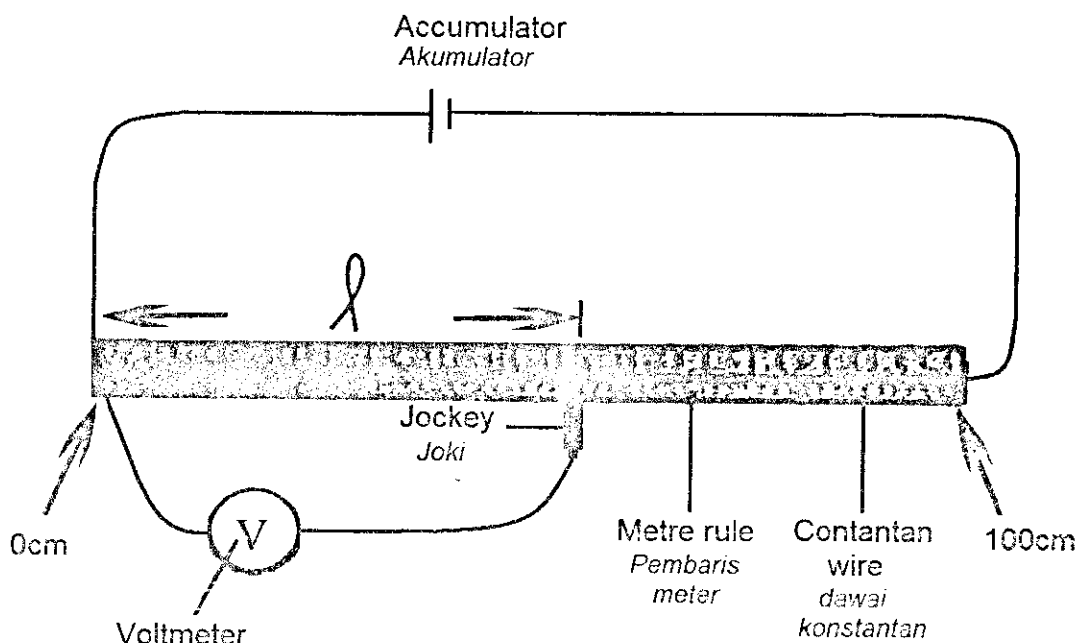


Diagram 1.1

The jockey is placed at the points where $\ell = 20.0$ cm, 40.0 cm, 60.0 cm, 80.0 cm and 100.0 cm. The readings of the voltmeter are as shown in Diagram 1.2, Diagram 1.3, Diagram 1.4, Diagram 1.5 and Diagram 1.6 on page 3.

Joki diletakkan pada titik 20.0 cm, 40.0 cm, 60.0 cm, 80.0 cm dan 100.0 cm dari tanda 0 hujung pembaris meter itu. Bacaan voltmeter yang sepadan ditunjukkan pada Rajah 1.2, 1.3, 1.4, 1.5 dan 1.6 di halaman 3.

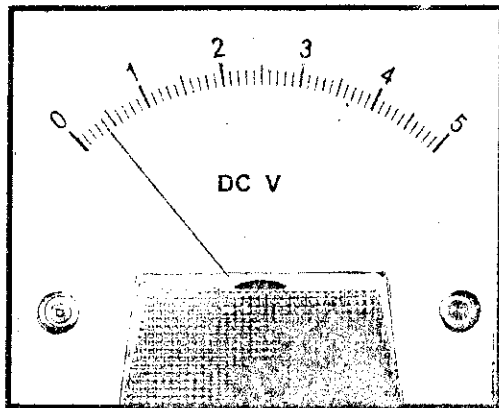


Diagram 1.2 ($\ell = 20.0$ cm)

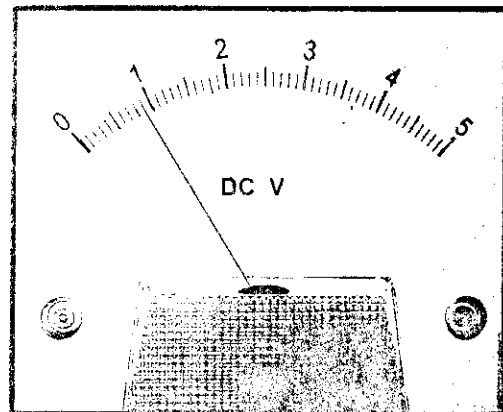


Diagram 1.3 ($\ell = 40.0$ cm)

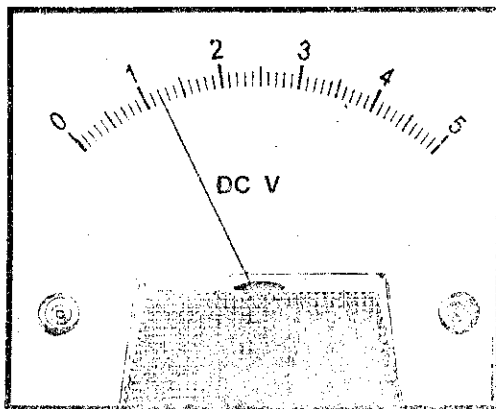


Diagram 1.4 ($\ell = 60.0$ cm)

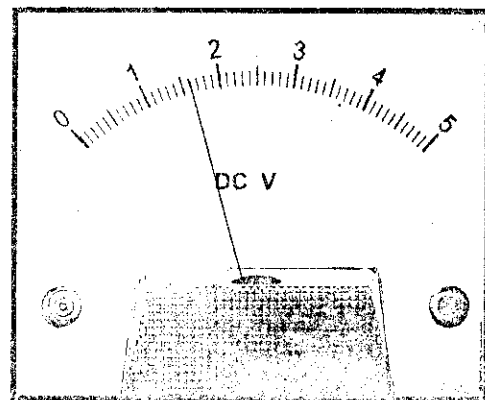


Diagram 1.5 ($\ell = 80.0$ cm)

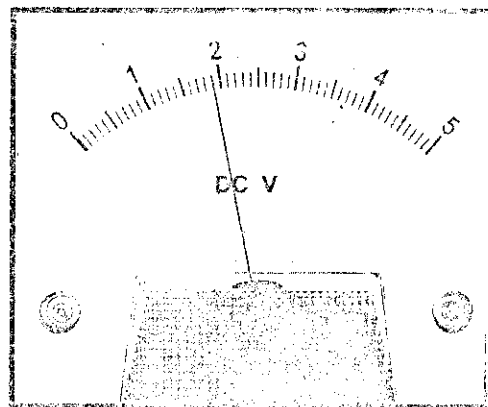
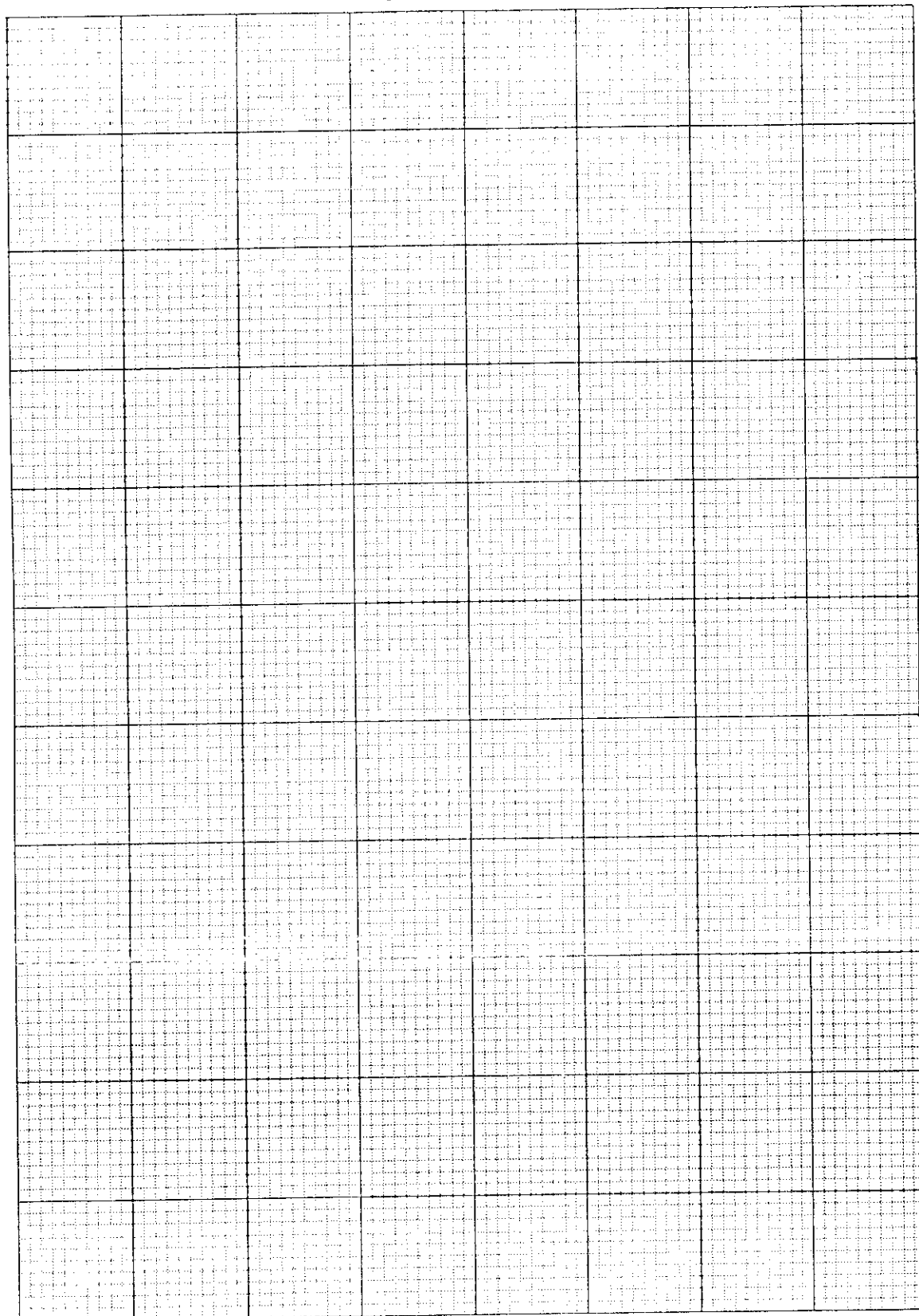


Diagram 1.6 ($\ell = 100.0$ cm)

- (a) For the experiment described on page 2, identify
Bagi eksperimen yang diterangkan pada halaman 2, kenalpasti:
- (i) the manipulated variable
pembolehubah dimanipulasikan
 [1 mark]
- (ii) the responding variable
pembolehubah bergerakbalas
 [1 mark]
- (iii) the constant variable
pembolehubah dimalarkan
 [1 mark]
- (b) Determine the voltage, V when the length of the constantan wires, $\ell = 20.0$ cm, 40.0 cm, 60.0 cm, 80.0 cm and 100.0 cm respectively.
 Tabulate your results for ℓ and V in the space below.
Rekodkan bacaan voltmeter yang sepadan dengan panjang dawai $\ell = 20.0$ cm, 40.0 cm, 60.0 cm, 80.0 cm dan 100.0 cm. Jadualkan keputusan ℓ dan V dalam ruang di bawah.
 [5 marks]
- (c) On the graph paper on page 5, plot a graph of V against ℓ
Pada kertas graf di halaman 5, plot graph V lawan ℓ
 [5 marks]
- (d) Based on the graph, state the relationship between V and ℓ
Berdasarkan graf itu, nyatakan hubungan antara V dengan ℓ
 [1 mark]
- (e) The experiment is repeated using thicker constantan wire.
Eksperimen tersebut diulang dengan menggunakan dawai konstantan yang lebih tebal.
- (i) What happens to the voltmeter readings when the jockey is placed at $\ell = 20$ cm? Assume the current that flow through the wire is constant.
Apakah yang berlaku kepada bacaan voltmeter apabila joki diletakkan pada $\ell = 20$ cm? Anggapkan arus yang mengalir melalui dawai itu adalah malar.
 [2 marks]
- (ii) Give a reason for your answer.
Beri satu sebab bagi jawapan anda.
 [2 marks]

Graph of V against ℓ
Graf V melawan ℓ



2. An experiment to investigate the time taken, t by a metal sphere falling from a height, h was conducted. The graph of h against t^2 is in Diagram 2.1.

Satu eksperimen untuk mengkaji hubungan antara masa, t yang diambil oleh satu sfera logam yang jatuh bebas dari ketinggian, h telah dijalankan. Graf h melawan t^2 yang diperolehi adalah seperti dalam Rajah 2.1.

Graph of h against t^2
Graf h melawan t^2

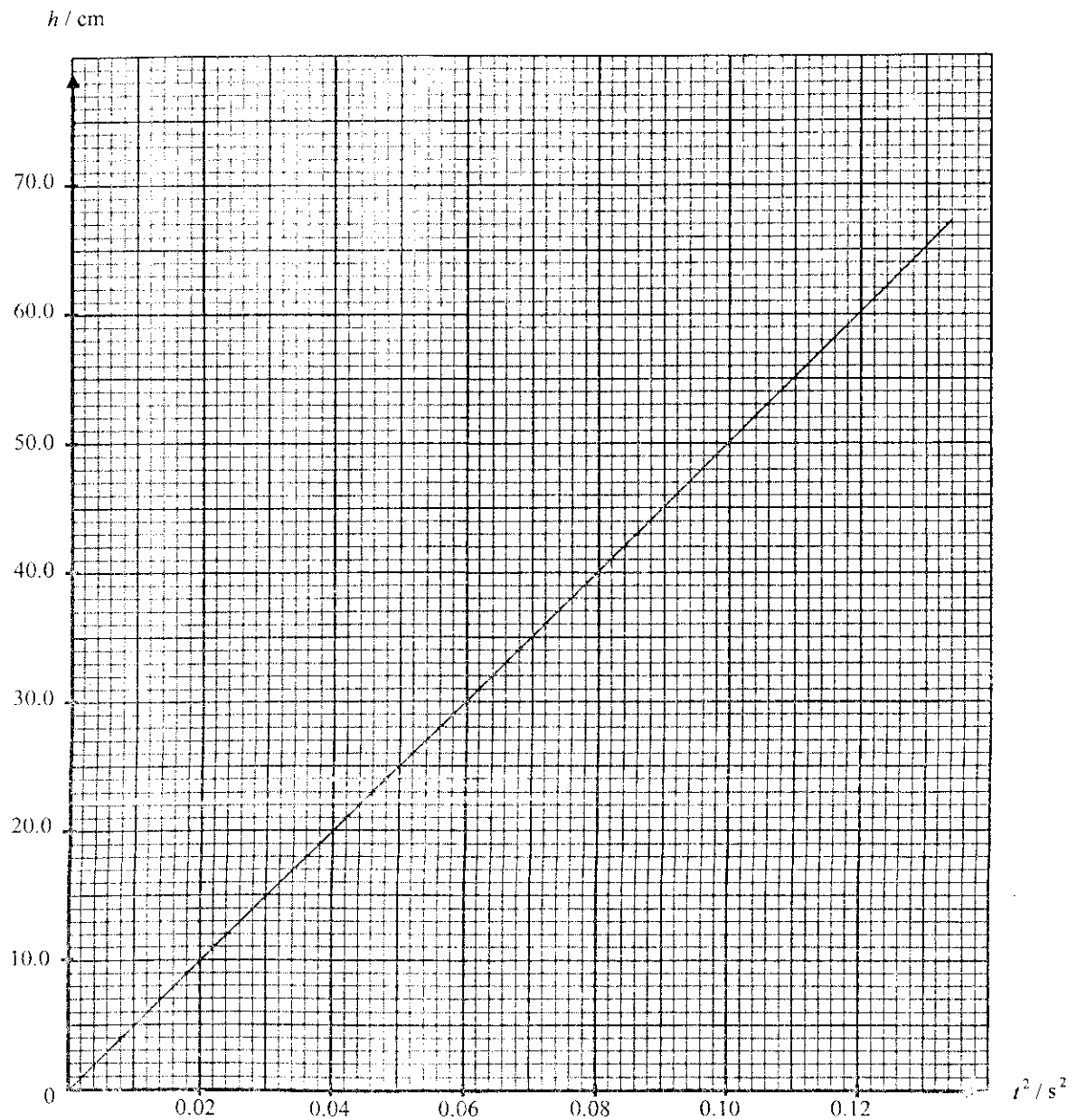


Diagram 2.1
Rajah 2.1

(a) Based on the graph h against t^2 on page 6,
Berdasarkan graf h melawan t^2 pada halaman 6,

(i) state the relationship between h and t ,
nyatakan hubungan antara h dan t

.....
.....

[1 mark]

(ii) determine the time taken, t by the sphere when dropped from a height,
 $h = 44.0$ cm
tentukan masa, t bila sfera itu dijatuhkan dari ketinggian, $h = 44.0$ cm.

Show on the graph how you determine the value of t
Tunjukkan pada graf bagaimana anda menentukan nilai t .

$t = \dots\dots\dots$

[3 marks]

(b) Calculate the gradient of the graph.
Hitung kecerunan graf

Show on the graph, how you calculate the gradient.
Tunjukkan pada graf, bagaimana anda menghitung kecerunan.

[3 marks]

- (c) The motion equation of a falling object with an initial velocity, u is given as
Persamaan gerakan bagi satu jasad yang jatuh bebas dengan halaju awal, u diberi seperti berikut.

$$h = ut + \frac{1}{2}gt^2$$

where g is the gravitational acceleration.
Dimana g adalah pecutan graviti.

- (i) State the initial velocity, u of the sphere.
Nyatakan nilai halaju awal, u sfera tersebut.

.....
[1 mark]

- (ii) By using the gradient of the graph in (b) and equation in (c), calculate the gravitational acceleration, g .
Menggunakan nilai kecerunan graf dalam (b) dan persamaan dalam (c), hitung pecutan graviti, g

.....
[3 marks]

- (d) State **one** precaution that should be taken in this experiment to improve the accuracy of the readings in the experiment.

Nyatakan satu langkah berjaga-jaga yang perlu diambil untuk memperbaiki keputusasan dalam eksperimen ini.

.....
[1 mark]

Section B
[BAHAGIAN B]
 [12 marks]
 [12 markah]

Answer one questions in this section.
 Jawab **satu** soalan dalam bahagian ini.

3. Diagram 3.1 shows a boy pouring boiling water into a cup. The boy's hand is not scalded by the water droplets splashing out of the cup. Diagram 3.2 shows the boy accidentally pouring the boiling water directly onto his hand. His hand is scalded.
 Rajah 3.1 menunjukkan seorang budak sedang menuang air mendidih ke dalam sebuah cawan. Tangan budak itu tidak melecur apabila terkena titisan air mendidih yang terkeluar daripada cawan tersebut. Rajah 3.2 menunjukkan tangan budak itu melecur apabila terkena tumpahan air mendidih.

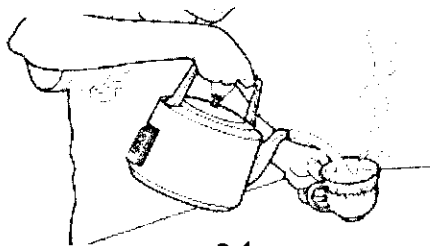


Diagram 3.1
 Rajah 3.1

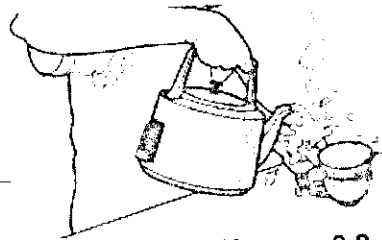


Diagram 3.2
 Rajah 3.2

Based on the above observation and your knowledge on heat and the factors affecting heat;
 Berdasarkan pemerhatian di atas dan pengetahuan anda mengenai haba;

- (a) make one suitable inference
 bentukkan suatu inferens yang sesuai [1 mark]
- (b) state an appropriate hypothesis that could be investigated
 nyatakan suatu hipotesis yang sesuai untuk penyiasatan [1 mark]
- (c) With the use of apparatus such as an immersion heater, beakers and other suitable apparatus, design an experiment to test the hypothesis.
 In your description, state clearly the following:
 Dengan menggunakan radas seperti pemanas rendam, termometer, bikar, dan peralatan lain yang sesuai, rangkakan suatu eksperimen yang sesuai untuk menguji hipotesis.
 Dalam penjelasan anda, nyatakan dengan jelas:
- (i) The aim of the experiment
 Tujuan eksperimen
 - (ii) The variables in the experiment
 Pembolehubah dalam eksperimen
 - (iii) The list of apparatus and materials
 Senarai radas dan bahan
 - (iv) The arrangement of the apparatus
 Susunan radas
 - (v) The procedure of the experiment, including one method of controlling the manipulated variable and one method of measuring the responding variable
 Prosedur eksperimen, termasuk satu cara mengawal pembolehubah dimanipulasikan dan satu kaedah mengukur pembolehubah bergerakbalas
 - (vi) The way you tabulate the data, and
 Cara anda menjadualkan data, dan
 - (vii) The way you analyse the data
 Cara anda menganalisis data

[10 marks]

- 4 Diagram 4.1 and 4.2 show two different thickness of guitar string. When the guitar string in Diagram 4.1 is plucked, higher pitch of sound is heard.

Rajah 4.1 (b) dan 4.2 (b) menunjukkan dua tali gitar yang berbeza ketebalannya. Apabila tali gitar pada Rajah 4.1 dipetik, bunyi yang lebih langsing kedengaran.

thin guitar string



Diagram 4.1

thick guitar string



Diagram 4.2

Based on the information and observation;
Berdasarkan maklumat dan pemerhatian tersebut;

- (a) State one suitable inference
Nyatakan satu inferens yang sesuai [1 mark]

- (b) State suitable hypothesis
Nyatakan satu hipotesis yang sesuai [1 mark]

- (c) With the use of apparatus such as a microphone, cathode ray oscilloscope, constantan wires and other suitable apparatus, design an experiment to test the hypothesis,

In your description, state clearly the following:

Dengan menggunakan radas seperti mikrofon, osiloskop sinar katod, dawai konstantan dan peralatan lain yang sesuai, rangkakan suatu eksperimen yang sesuai untuk menguji hipotesis.

Dalam penjelasan anda, nyatakan dengan jelas:

- (i) The aim of the experiment
Tujuan eksperimen
- (ii) The variables in the experiment
Pembolehubah dalam eksperimen
- (iii) The list of apparatus and materials
Senarai radas dan bahan
- (iv) The arrangement of the apparatus
Susunan radas
- (v) The procedure of the experiment, including one method of controlling the manipulated variable and one method of measuring the responding variable
Prosedur eksperimen, termasuk satu cara mengawal pembolehubah dimanipulasikan dan satu kaedah mengukur pembolehubah bergerakbalas
- (vi) The way you tabulate the data, and
Cara anda menjadualkan data, dan
- (vii) The way you analyse the data
Cara anda menganalisis data

[10 marks]

END OF QUESTION PAPER
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