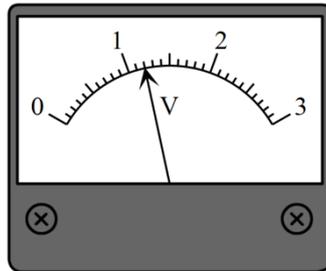


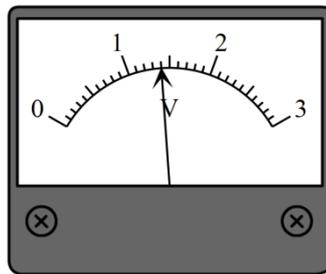
$I = 0.2 \text{ A}$
 $V = \underline{\hspace{2cm}}$

Diagram 1.3



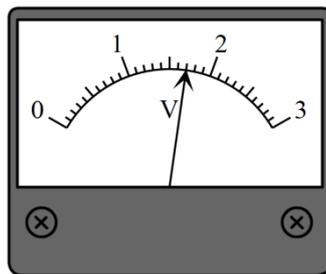
$I = 0.3 \text{ A}$
 $V = \underline{\hspace{2cm}}$

Diagram 1.4



$I = 0.4 \text{ A}$
 $V = \underline{\hspace{2cm}}$

Diagram 1.5



$I = 0.5 \text{ A}$
 $V = \underline{\hspace{2cm}}$

Diagram 1.6

(a) For the experiment described, identify:

(i) The manipulated variable

_____ [1 mark]

(ii) The responding variable

_____ [1 mark]

(iii) The constant variable

_____ [1 mark]

(b) Write your answers in the spaces provided in Diagram 1.2, 1.3, 1.4, 1.5 and 1.6. Based on Diagram 1.2, 1.3, 1.4, 1.5 and 1.6, record the voltmeter readings, V.

[2 marks]

I Tabulate your results for *all* values of I and V in the space below.

[3 marks]

(d) On the graph paper, draw a **graph of V against I**.

[5 marks]

(e) Based on the graph in 1(d), state the relationship between V and I.

[1 mark]

(f) State **two** precautions that should be taken when carrying out electrical experiments.

1.

2.

[2 marks]

2 A student carries out an experiment to investigate the relationship between the separation, a , of two coherent sources and the distance, x , between two consecutive antinodes of the interference pattern of

water waves in a ripple tank.

The results of this experiment are shown in the graph of a against $\frac{1}{x}$ in Diagram 2.

Graph of a against $\frac{1}{x}$

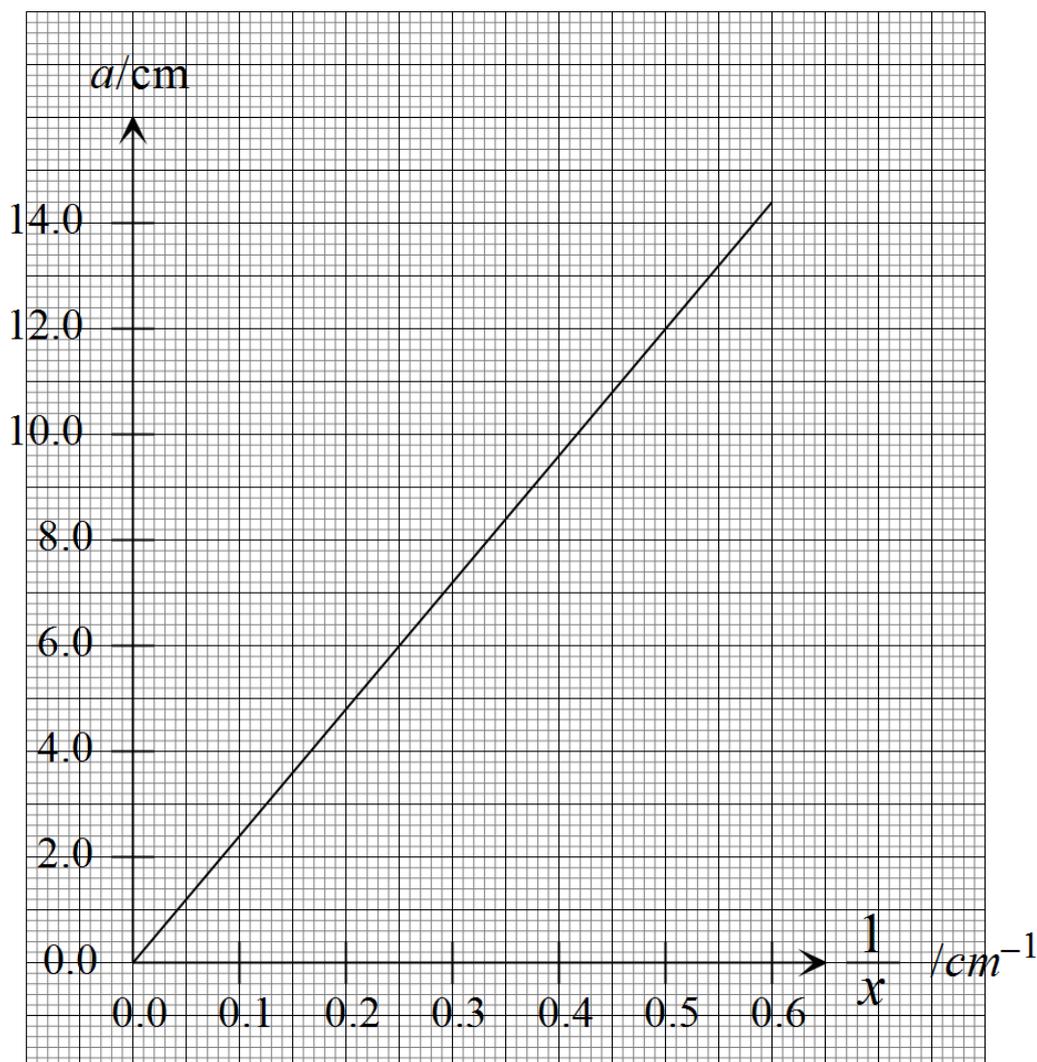


Diagram 2

(a) Based on the graph in Diagram 2:

(i) State the relationship between a and $\frac{1}{x}$.

_____ [1 mark]

(ii) Determine the value of x when $a = 6 \text{ cm}$.
 Show on the graph, how you determine the value of x .
 $x =$ _____ cm

[3 marks]

(iii) Calculate the gradient, m , of the graph.
 Show on the graph how you calculate m .
 $m =$ _____ cm^2

[3 marks]

- (b) The wavelength, λ , of the water waves is given by the formula $\lambda = \frac{m}{\ell}$, where m is the gradient of the graph and ℓ is the distance from the wave sources to the plane where x is measured. In this experiment, $\ell = 16.0$ cm.
Calculate the value of λ .

$\lambda =$ _____

[2 marks]

- I The relationship between the velocity, v of the water waves and their wavelength, λ , is $v = f\lambda$, where f is the frequency. In this experiment, $f = 12.0$ Hz.
Using the answer in (b), calculate the velocity of the water waves.

$v =$ _____

[2 marks]

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

[1 mark]

SECTION B: Answer *ONE* question in this section. (12 marks)

- 3 Diagram 3.1 shows a boy diving in a swimming pool. His ears experience a little pain.



Diagram 3.1

Diagram 3.2 shows the boy diving in a river at the same depth. His ears experience more pain.

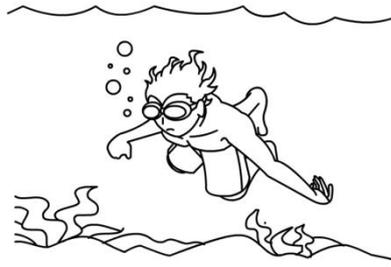


Diagram 3.2

Based on the information and observation:

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

[1 mark]

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

[1 mark]

I With the use of apparatus such as a tall tin with holes on its side, liquids of different densities and other apparatus, describe an experiment to investigate the hypothesis stated in (b).

In your description, state clearly the following:

- (i) The aim of experiment
- (ii) The variables in the experiment
- (iii) The list of apparatus and materials
- (iv) The arrangement of the apparatus
- (v) The procedure of the experiment which include **one** method of controlling the manipulated variable and **one** method of measuring the responding variable
- (vi) The way to tabulate the data
- (vii) The way to analyse the data

[10 marks]

- 4 Diagram 4.1 shows a piece of zinc sheet left in the sun. In the beginning, the zinc sheet feels cold to the touch.
Diagram 4.2 shows the piece of zinc sheet left in the sun after a few minutes. The zinc sheet now feels hot to the touch.



Diagram 4.1

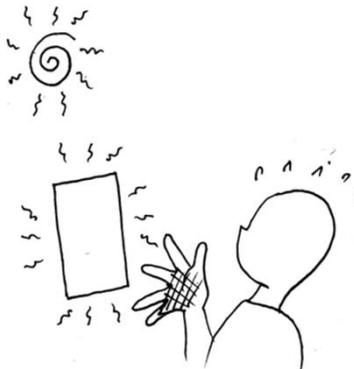


Diagram 4.2

Based on the information and observation:

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

[1 mark]

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

[1 mark]

- I With the use of apparatus such as thermometer, immersion heater, power supply and other suitable apparatus, describe **one** experiment to investigate the hypothesis stated in 4(b).

In your description, state clearly the following:

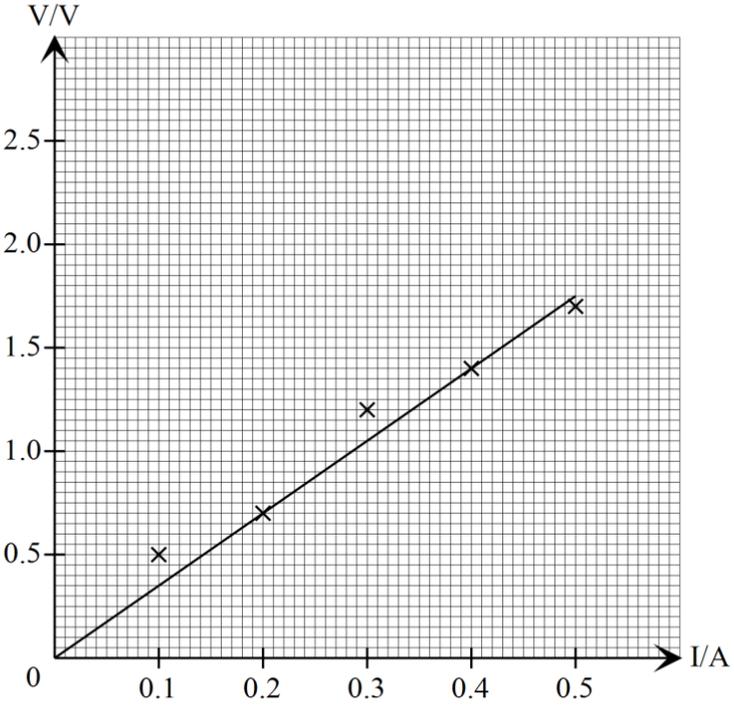
- (i) aim of the experiment,
- (ii) variables in the experiment,
- (iii) list of apparatus and materials,
- (iv) arrangement of the apparatus,
- (v) the procedures of the experiment, which includes **one** method of controlling the manipulated variable and **one** method of measuring the responding variable,
- (vi) the way to tabulate the data,
- (vii) the way to analyse the data.

[10 marks]

~END OF QUESTONS~

PHYSICS FORM 5 MID YEAR EXAM 2017

MARKING SCHEME

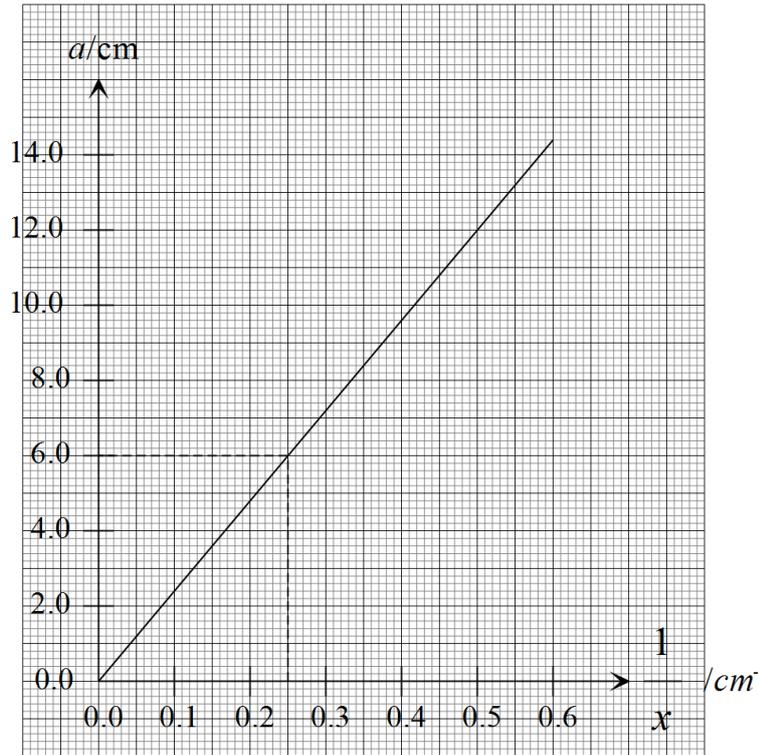
No.	Answer	Marks												
Q1	<p>(a) (i) Current 1m (ii) Potential difference 1m (iii) Diameter of constantan wire 1m</p> <p>(b) Diagram 1.2: 0.5V 1.3: 0.7V 1.4: 1.2V 1.5: 1.4V 1.6: 1.7 V (all correct get 2m)</p> <p>(c) <table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th style="width: 50px;">I/A</th> <th style="width: 50px;">V/V</th> </tr> </thead> <tbody> <tr> <td>0.1</td> <td>0.5</td> </tr> <tr> <td>0.2</td> <td>0.7</td> </tr> <tr> <td>0.3</td> <td>1.2</td> </tr> <tr> <td>0.4</td> <td>1.4</td> </tr> <tr> <td>0.5</td> <td>1.7 (3m)</td> </tr> </tbody> </table></p> <p>(d) </p> <p>(5m)</p> <p>(e) V is directly proportional to I. (1m)</p> <p>(f) - Disconnect the circuit when not taking a reading to prevent the temperature from rising. (1m) - All electrical connections must be tight. (1m)</p>	I/A	V/V	0.1	0.5	0.2	0.7	0.3	1.2	0.4	1.4	0.5	1.7 (3m)	
I/A	V/V													
0.1	0.5													
0.2	0.7													
0.3	1.2													
0.4	1.4													
0.5	1.7 (3m)													

Q2

(a) (i) a is directly proportional to $\frac{1}{x}$

(1m)

(ii)

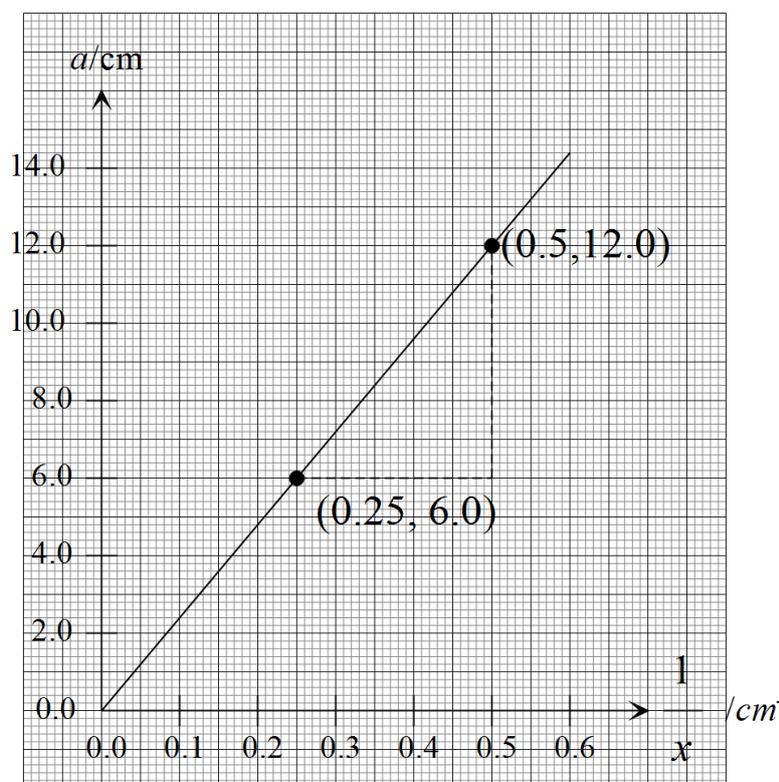


When $a = 6.0$ cm,

$$\frac{1}{x} = 0.25 \quad (\text{show on graph- 1m})$$

$$x = \frac{1}{0.25} = 4.0 \text{ cm} \quad (2\text{m})$$

(iii)



Gradient, m (show on graph- 1m)

$$= \frac{12.0 - 6.0}{0.5 - 0.25} \quad (\text{step- 1m})$$

$$= 24 \text{ cm}^2 \quad (1\text{m})$$

(b) $\lambda = \frac{m}{\ell} = \frac{24}{16.0} = 1.50 \text{ cm} \quad (2\text{m})$

(c) $v = \lambda f = 1.50 \times 12.0 = 18 \text{ cm s}^{-1} \quad (2\text{m})$

(d) When taking the reading of x , the eye should be vertically above the scale of the metre rule to avoid parallax error. (1m)

Q3

(a) The density of a liquid affects the pressure of the liquid

(1m)

(b) As the density of a liquid increases, the pressure in the liquid increases

(1m)

(c) (i) Aim of experiment:

To study the relationship between the liquid pressure and its density

(1m)

(ii) Variables in the experiment:

Manipulated: Density, ρ

Responding: Pressure in the liquid

Constant: Depth of the water

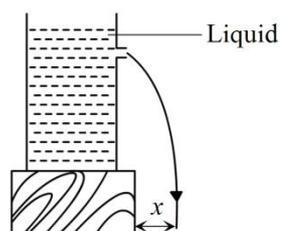
(2m)

(iii) List of apparatus and materials:

Alcohol (800 kg m^{-3}), water (1000 kg m^{-3}), glycerine (1300 kg m^{-3}), tall tin with a hole on one side, metre rule

(1m)

(iv) Arrangement of the apparatus:



(1m)

(v) Procedure:

1. The experiment is set up as shown in the diagram.
2. Alcohol is added into the tall tin with a hole at the side.
(1m)
3. The distance, x , to which the alcohol spurts out from the hole is recorded.
(1m)
4. Step 2 and 3 are repeated using water and glycerine.
(1m)

(vi) Tabulate the data:

(1m)

Density of liquid, $\rho/\text{kg m}^{-3}$	Distance, x/cm

(vii) Analyse the data: (1m)

graph of distance, x , against density of liquid, ρ

Q4

- (a) The temperature depends on the time the zinc sheet is exposed to the sun.
(1m)
- (b) The longer the time the water is heated, the larger the change in temperature of the water.
(1m)
- (c) (i) To investigate the relationship between time and the change in temperature.

(1m)

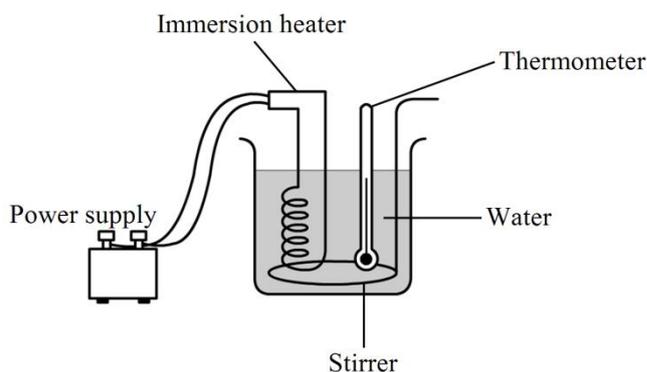
- (ii) - Manipulated variable: Time
 - Responding variable: Change in temperature
 - Constant variable: Volume of water

(2m)

- (iii) Thermometer, immersion heater, stopwatch, power supply, beaker, water, stirrer.

(1m)

(iv)



(1m)

- (v) Method to control the manipulated variable:
 - The initial temperature of the water is recorded. The circuit is **switched on** and the stopwatch is started. After $t = 2$ minutes, the power supply is switched off.

(1m)

Method to measure the responding variable:

- The water is stirred and the maximum temperature, T , reached by the thermometer is **recorded**. The rise in temperature, θ , from the initial temperature is calculated. (1m)

Repeat the experiment at least 4 times with different values (1m)

- The experiment is repeated with time of heating of 4 min, 6 min, 8 min and 10 min.

(vi)

t/min	$T/^\circ\text{C}$	$\theta/^\circ\text{C}$
2		
4		
6		
8		
10		(1m)

(vii)

$\theta/^{\circ}\text{C}$



t/min

(1m)