



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

CANDIDATE  
NAME

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NUMBER

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**PHYSICS**

Paper 4 Alternative to Practical

**5054/04**

**May/June 2008**

**1 hour**

Candidates answer on the Question Paper.

No Additional Materials are required.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams, graphs or rough working.

Do not use staples, paper-clips, highlighters, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
<b>1</b>	
<b>2</b>	
<b>3</b>	
<b>4</b>	
<b>Total</b>	

This document consists of **9** printed pages and **3** blank pages.



- 1 A student investigates the maximum height a ball reaches after bouncing on a hard surface. Fig. 1.1 shows the apparatus used.

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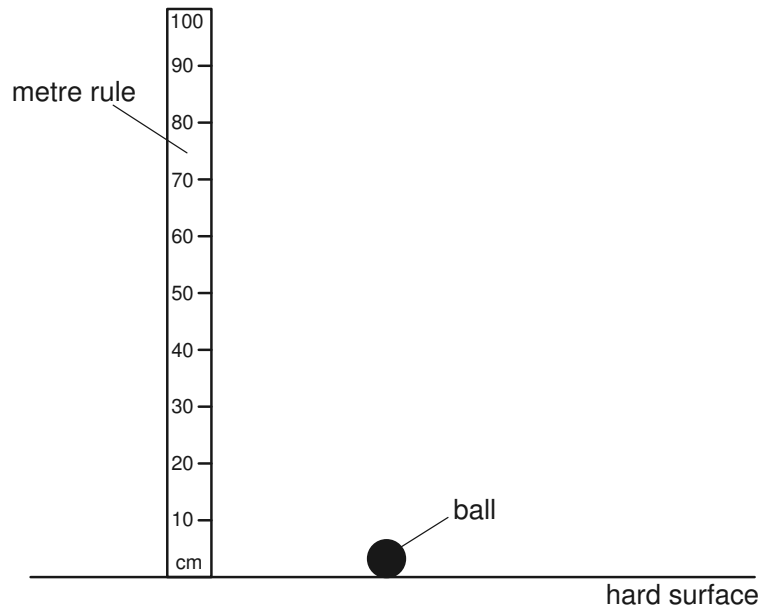


Fig. 1.1

- (a) The ball is dropped from a height of 1.00 m above the hard surface.

State which part of the ball should be used when measuring its height above the surface.

..... [1]

- (b) After the first bounce, the ball reaches a maximum height of 0.66 m.

On Fig. 1.1,

- (i) draw the ball at a height of 0.66 m,  
 (ii) mark where you would position your eye to measure this height. [2]

- (c) Explain

- (i) why the maximum height  $h$  of the ball after the first bounce is difficult to measure,  
 .....  
 ..... [1]

- (ii) how this height can be measured more accurately by two students working together.  
 .....  
 ..... [1]

- (d) The value of  $h$  can be estimated using the time  $t$  between the ball being released and it reaching the top of the first bounce.

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The students measure  $t$  five times. The values obtained are:

0.84 s

0.81 s

0.85 s

0.83 s

0.80 s

- (i) Calculate the average value of  $t$ .

Give your answer to a suitable number of significant figures.

- (ii) An approximate value of  $h$  is given by

$$t = \dots\dots\dots \text{ s [1]}$$

$$h = (2.21t - 1)^2.$$

Calculate  $h$  using this relationship.

$$h = \dots\dots\dots \text{ m [1]}$$

**Question 1 continues on page 4**

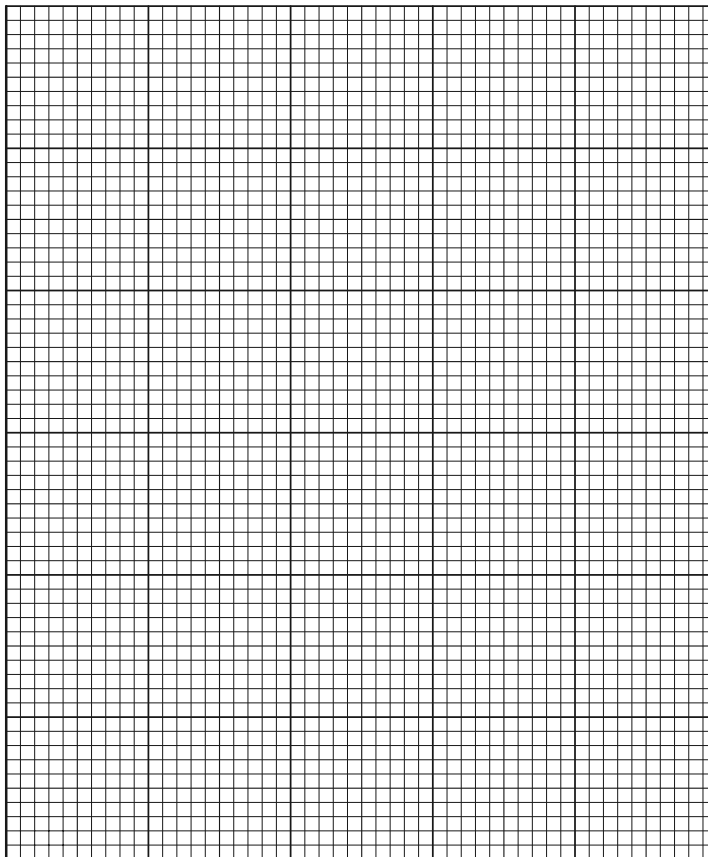
- (e) The ball is allowed to bounce several times. The maximum height  $h$  after each bounce is measured and recorded in the table of Fig. 1.2.

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number of bounces $N$	$h / \text{m}$
0	1.00
1	0.66
2	0.45
3	0.32
4	0.21

**Fig. 1.2**

On Fig. 1.3, plot the graph of  $h$  on the  $y$ -axis against the number of bounces  $N$  on the  $x$ -axis. Start your axes from the origin. Draw the curve of best fit. [4]



**Fig. 1.3**

(f) Describe the relationship between  $N$  and  $h$ .

.....  
..... [1]

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(g) Use your graph to estimate the total number of bounces  $N_T$  before  $h$  becomes zero.

$N_T =$  ..... [1]

2 Fig. 2.1 is a circuit containing a 1.5 V cell, a switch and a lamp labelled 1.5 V, 0.20 A.

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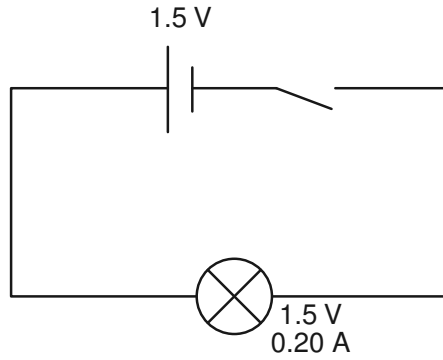


Fig. 2.1

(a) When the switch is closed the lamp does not light up.

Explain, with the aid of a diagram, how to use a voltmeter to find out whether the cell has run down.

.....  
..... [2]

(b) Suggest three other possible faults in the circuit that might prevent the lamp from lighting.

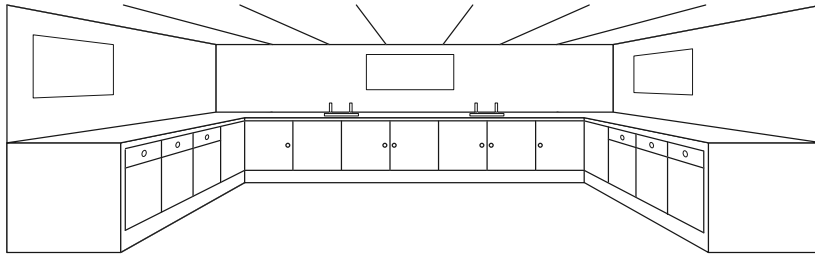
1. ....  
..... [1]

2. ....  
..... [1]

3. ....  
..... [1]

- 3 A group of students determine the approximate volume of air in their empty school laboratory.

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(a) State

(i) the measuring instrument used .....

..... [1]

(ii) the measurements taken .....

..... [1]

(iii) how the volume of the air is calculated .....

..... [1]

(b) State two possible sources of error in their answer.

1. ....

.....

2. ....

..... [2]

4 Fig. 4.1 on page 9 shows four thermometers used in a science laboratory.

(a) State the temperature reading on thermometer A. .... [1]

(b) 250 cm<sup>3</sup> of boiling water is poured into a beaker as shown in Fig. 4.2. The temperature is measured every 30s for 10 minutes.

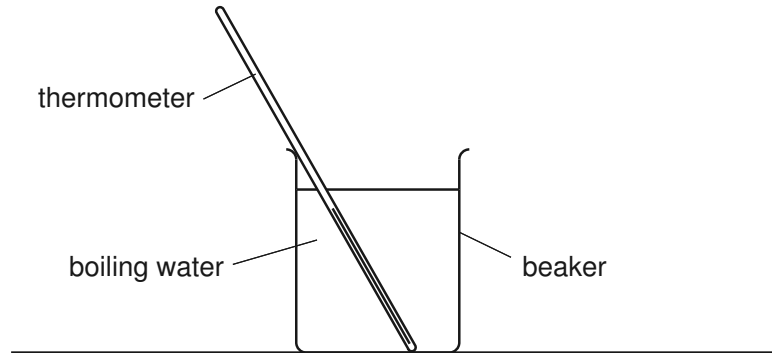


Fig. 4.2

(i) State and explain which thermometer from Fig. 4.1 is the most suitable for this experiment.

.....  
 .....  
 .....  
 ..... [3]

(ii) Describe how the thermometer is used in this experiment to obtain accurate readings.

.....  
 .....  
 ..... [2]

(c) Thermometer D in Fig. 4.1 is used to measure the temperature of a person.

Fig. 4.3 shows a modern forehead thermometer. It is a thin flexible plastic strip that is placed on the forehead. The colour of the numbers changes to show the temperature.



Fig. 4.3

State one advantage of this thermometer when taking the temperature of a young child.

.....  
 ..... [1]



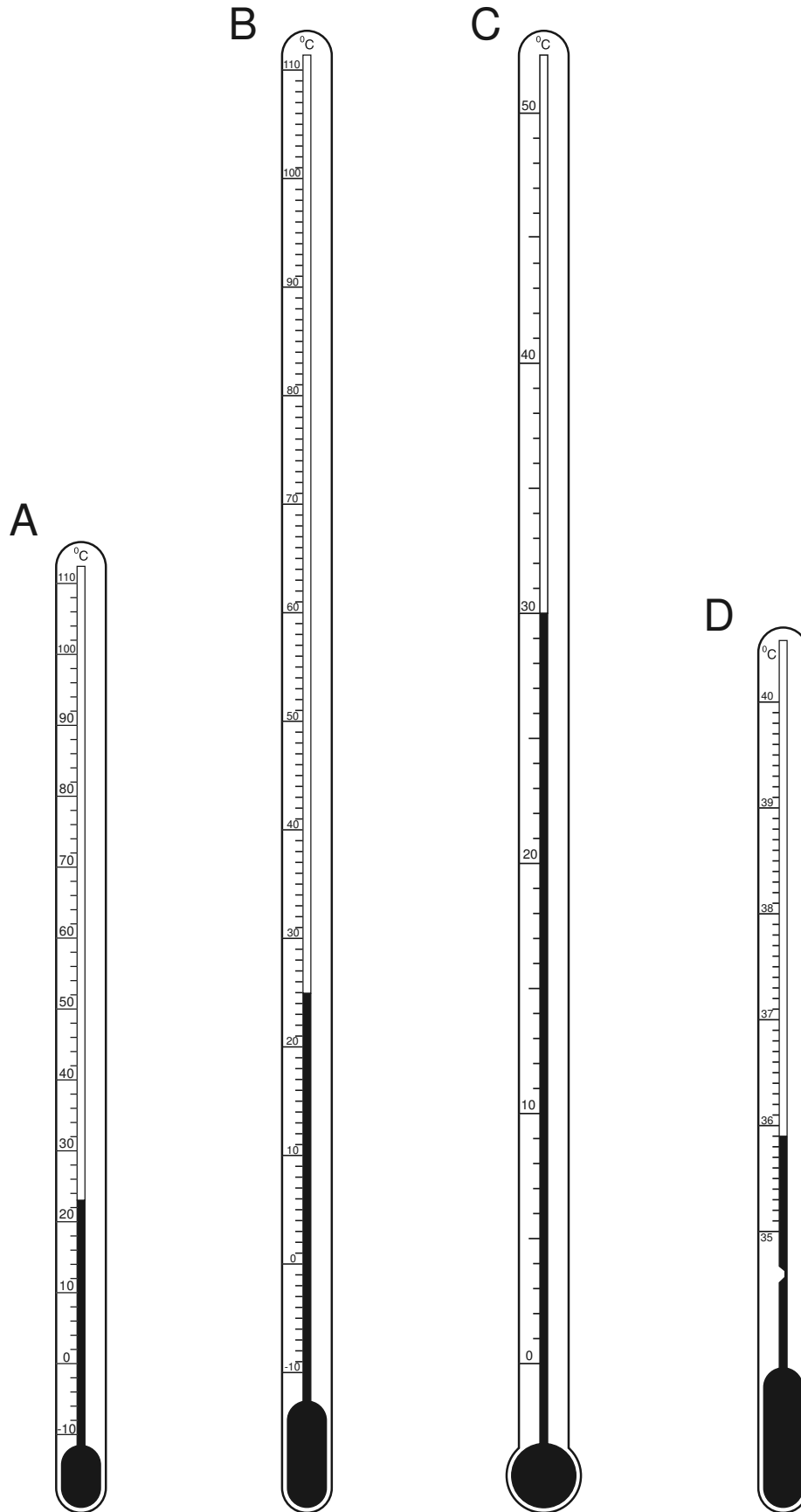


Fig. 4.1





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