UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

**PHYSICS** **5054/04**

Paper 4 Alternative to Practical **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 | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| Total | |

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.

*For Examiner's Use*

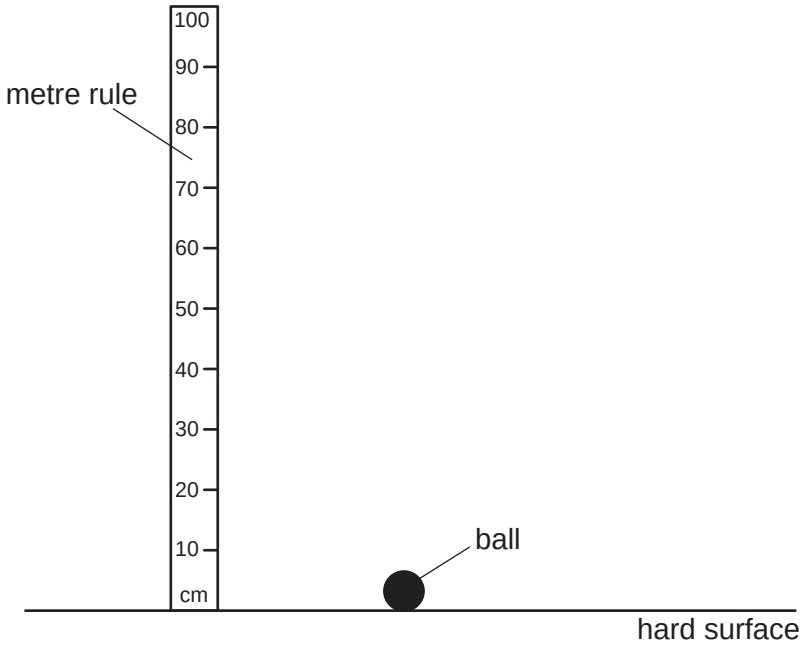



**Fig. 1.1**

**(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.

*For Examiner's Use*

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.

$t$ = ..... s [1]

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

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

Calculate $h$ using this relationship.

$h$ = ..... m [1]

**Question 1 continues on page 4**



**[Turn over**

**(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.

*For Examiner's Use*

| number of bounces $N$ | $h$ / 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]

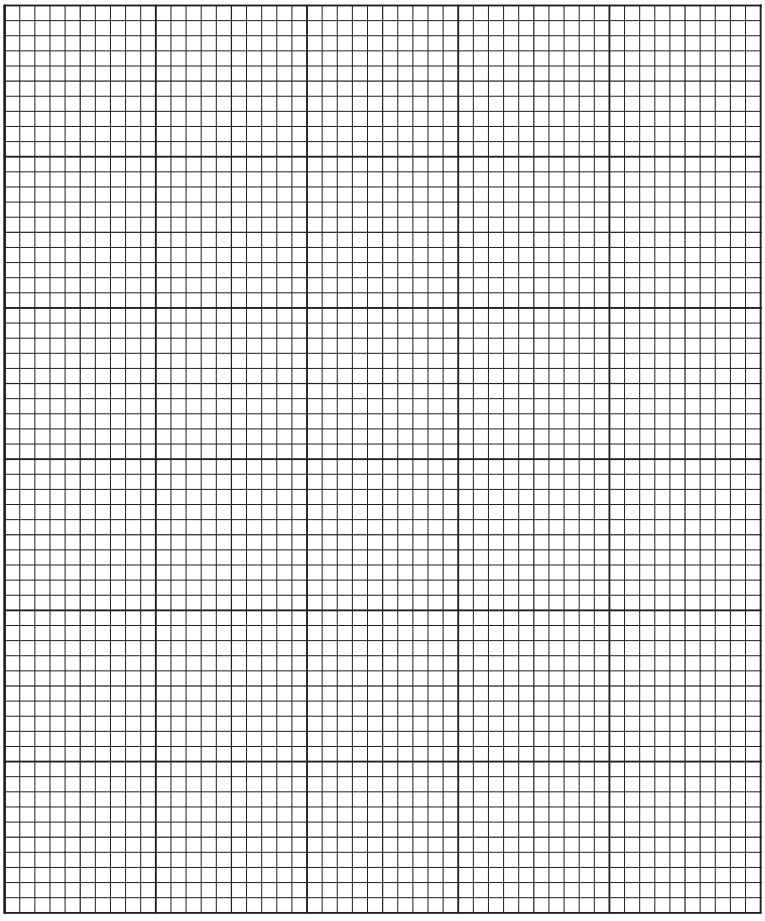


**Fig. 1.3**

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

For Examiner's Use

.....

..... [1]

**(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.

*For Examiner's Use*

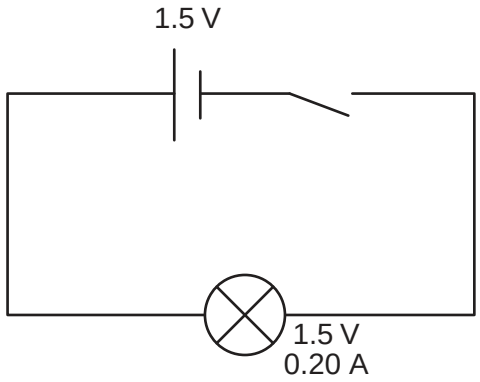



**Fig. 2.1**

**(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. .....

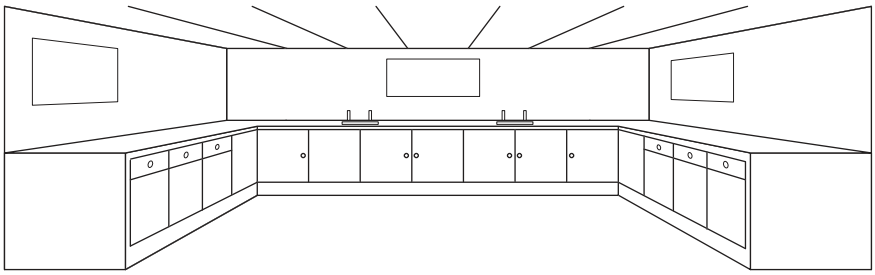
..... [1]

3. .....

..... [1]

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

*For Examiner's Use*



**(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]

For Examiner's Use

**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 $cm^3$ of boiling water is poured into a beaker as shown in Fig. 4.2. The temperature is measured every 30 s for 10 minutes.

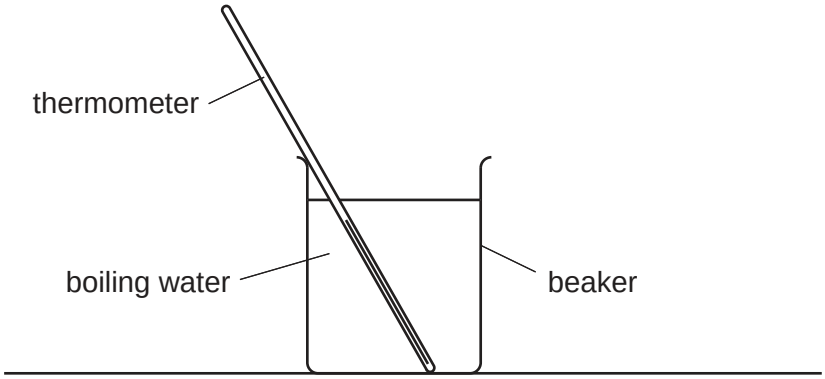



**Fig. 4.2**

**(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]

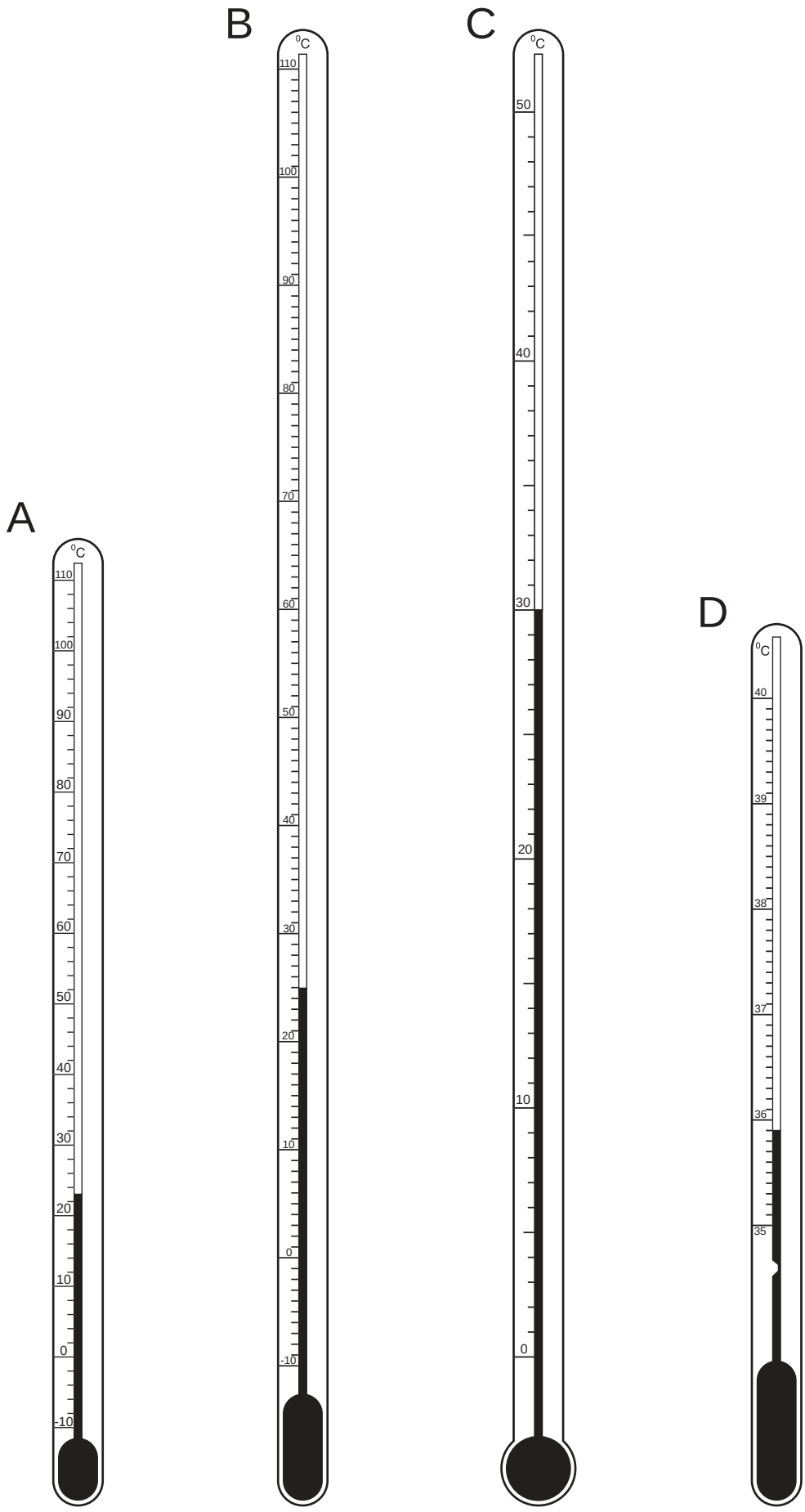



**Fig. 4.1**

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