UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

PHYSICS **5054/03**

Paper 3 Practical Test **October/November 2008**

2 hours

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions

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 pencil for any diagrams, graphs or rough work.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
For each of the questions in Section A, you will be allowed to work with the apparatus for a maximum of 20 minutes. For the question in Section B, you will be allowed to work with the apparatus for a maximum of 1 hour.
You are expected to record all your observations as soon as these observations are made.
An account of the method of carrying out the experiments is **not** required.

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 **11** printed pages and **1** blank page.

Section A

Answer **all** questions in this section.

1 *In this experiment you will use a beaker of water as a lens and make measurements to determine an approximate value for the focal length of the lens*.

You have been provided with a 250 cm^3 beaker filled with water, a lamp, a slit, a screen, a set square and a metre rule.

(a) (i) Set up the apparatus as shown in Fig. 1.1.

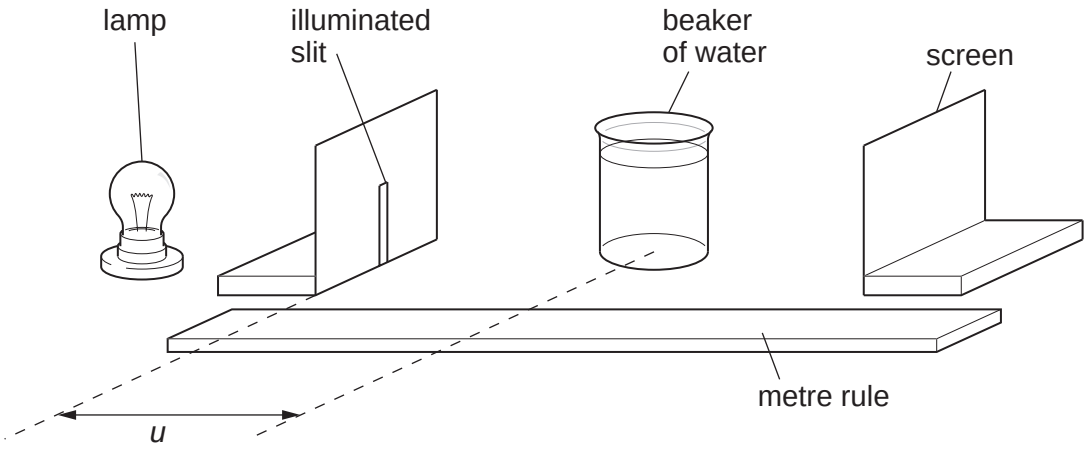


Fig. 1.1

(ii) Place the illuminated slit a distance u = 15.0 cm from the centre of the beaker of water. Adjust the position of the screen until a focussed image of the slit is formed on the screen. Measure the distance v between the centre of the beaker and the screen.

v = ...

(iii) State and explain any special precautions that you took in order to obtain accurate values for u and v.

.....

.....

.....

(b) Calculate the focal length f of the lens using

$$f = \frac{u\,v}{u + v}.$$

f = ... [1]

(c) Repeat **(a)(ii)** and **(b)** with a different value for u. Hence calculate a second value for f.

u = ...

v = ...

f = ...
[2]

[Total: 5]

2 *In this experiment you will determine the acceleration of a connected mass system.*

You have been provided with a 50 g mass labelled A and a 60 g mass labelled B, connected by a length of string that passes over a pulley, a metre rule and a stopwatch.

(a) The apparatus has been set up as shown in Fig. 2.1.

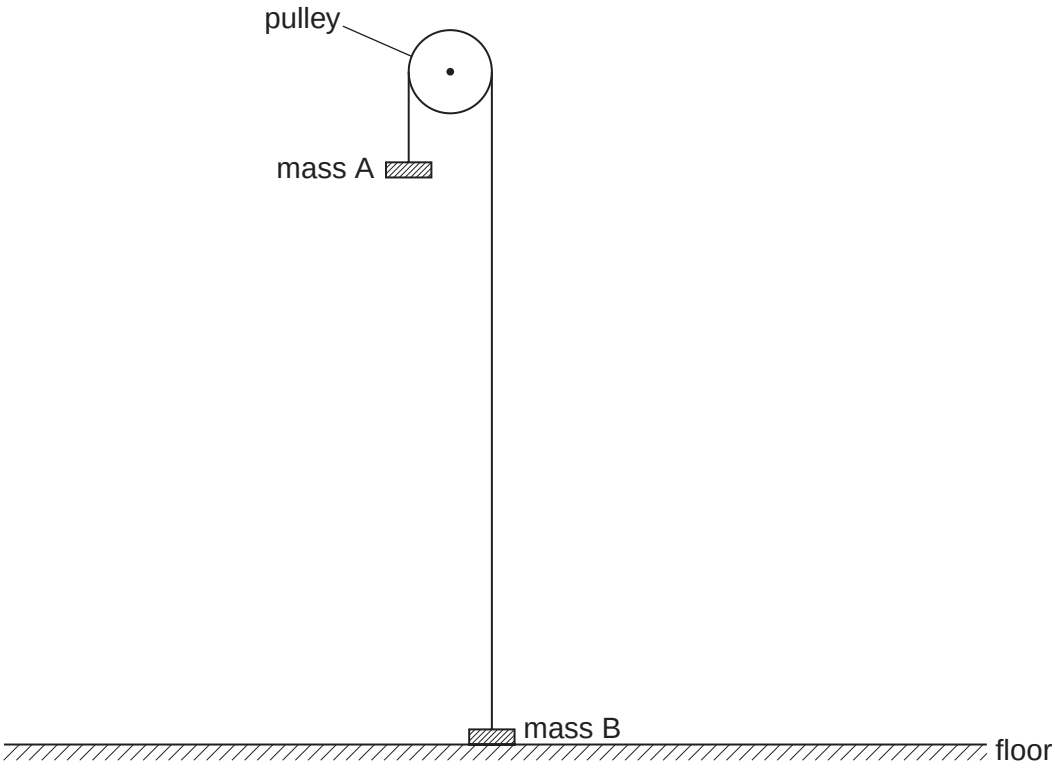


Fig. 2.1

Raise mass B so that it is a distance y = 1.00 m from the floor. Release mass B. Determine the average time t taken for mass B to fall to the floor.

t = ... [2]

(b) Calculate the acceleration a of the mass B using

$$a = \frac{2y}{t^2}.$$

a = ... [1]

(c) Assuming that there is no friction in the pulley, the theoretical acceleration a_T [illegible] masses is given by

$$a_T = \frac{(m_2 - m_1)g}{(m_2 + m_1)}$$

where $m_2 = 0.060\,\text{kg}$,
$m_1 = 0.050\,\text{kg}$,
and $g = 9.81\ \text{m/s}^2$.

(i) Calculate a_T.

a_T = ...

(ii) Suggest, with a reason, whether friction in the pulley has affected your results.

.....

.....

.....

[2]

[Total: 5]

3 *In this experiment you will investigate a light dependent resistor in a potential divider c*

You have been provided with an electrical circuit consisting of a power supply, a resistor, a light dependent resistor (LDR), a switch and an ammeter connected in series. You have also been provided with a voltmeter and a disc with which to cover the LDR.

(a) Draw a circuit diagram of the arrangement that has been set up by the Supervisor.

[1]

(b) Close the switch and measure the current in the circuit.

current = ... [1]

(c) Use the voltmeter to measure the potential difference across the LDR.

potential difference = ... [1]

(d) Place the disc on top of the LDR.

(i) State the effect that this has on both of the meter readings.

.....

.....

.....

(ii) Explain your observations.

.....

.....

.....

[2]

(e) Open the switch.

[Total: 5]

Section B

4 *In this experiment, you will investigate the equilibrium of a balanced metre rule.*

You have been provided with the apparatus shown in Fig. 4.1 together with an identical unstretched spring, a metre rule and a set square.

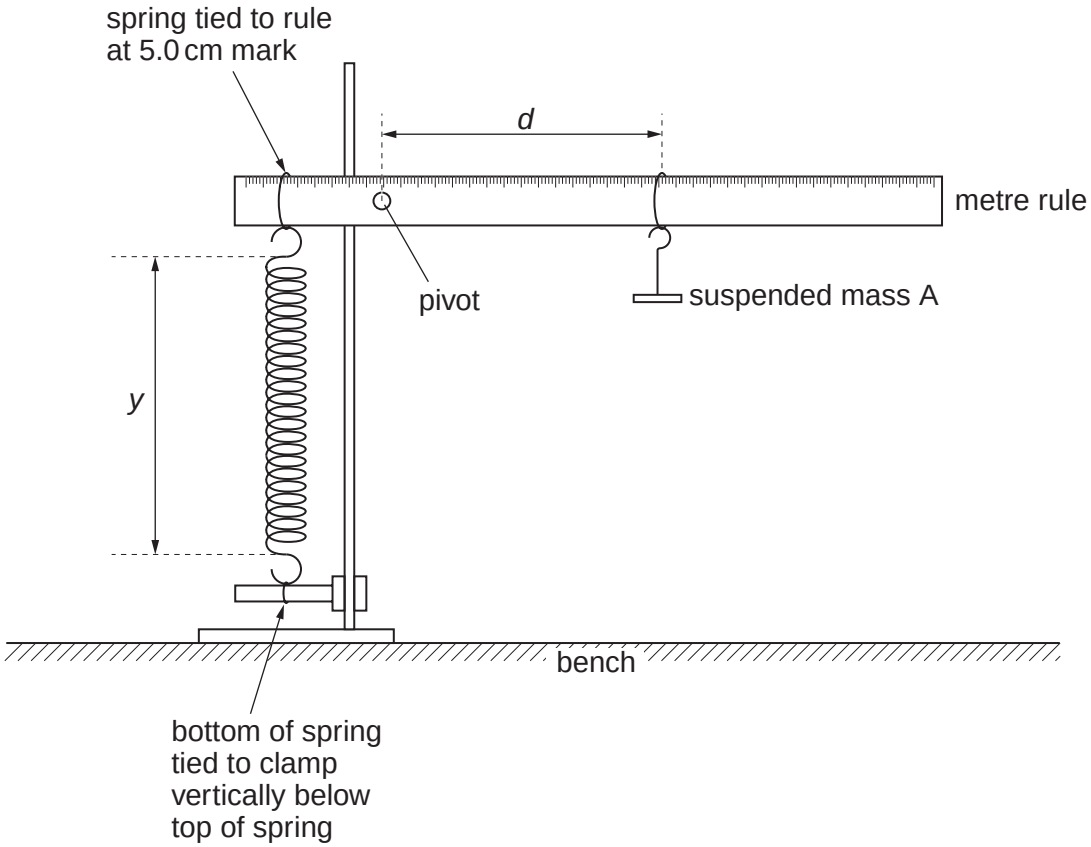


Fig. 4.1

(a) Measure the length *l* of the coiled part of the **unstretched** spring, as shown in Fig. 4.2.

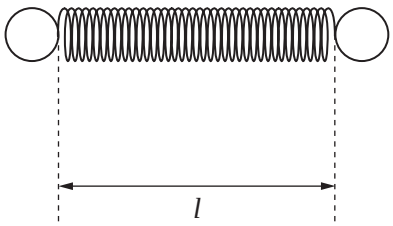


Fig. 4.2

l = ... [1]

(b) The mass A is suspended from a point close to the 60 cm mark on the rule.

(i) Adjust the position of the mass until the metre rule is horizontal.

(ii) Determine the distance *d* of the suspended mass from the pivot.

d = ... [1]

(iii) Determine the length *y* of the stretched spring as shown in Fig. 4.1.

y = ...

(iv) Explain how you determined the value of *y*.

.....

.....

..... [1]

(v) The extension *x* of the stretched spring is given by

$$x = y - l.$$

Calculate *x*.

x = ... [1]

(c) **(i)** Move mass A 5.0 cm towards the pivot.

(ii) Reduce the value of *y* until the rule is **approximately** horizontal by raising the clamp and boss that hold the bottom of the spring.

(iii) Adjust the position of mass A until the metre rule is horizontal.

(iv) Determine the new values of *d* and *x*.

d = ...

x = ...
[2]

(d) Obtain three further of values of d and corresponding values of x. The values of d ... be less than the value used in **(b)**. Tabulate all your results in the space below, inclu... those from parts **(b)** and **(c)**.

[3]

(e) Using the grid on the next page, plot a graph of x / cm on the y-axis against d / cm on the x-axis.

[4]

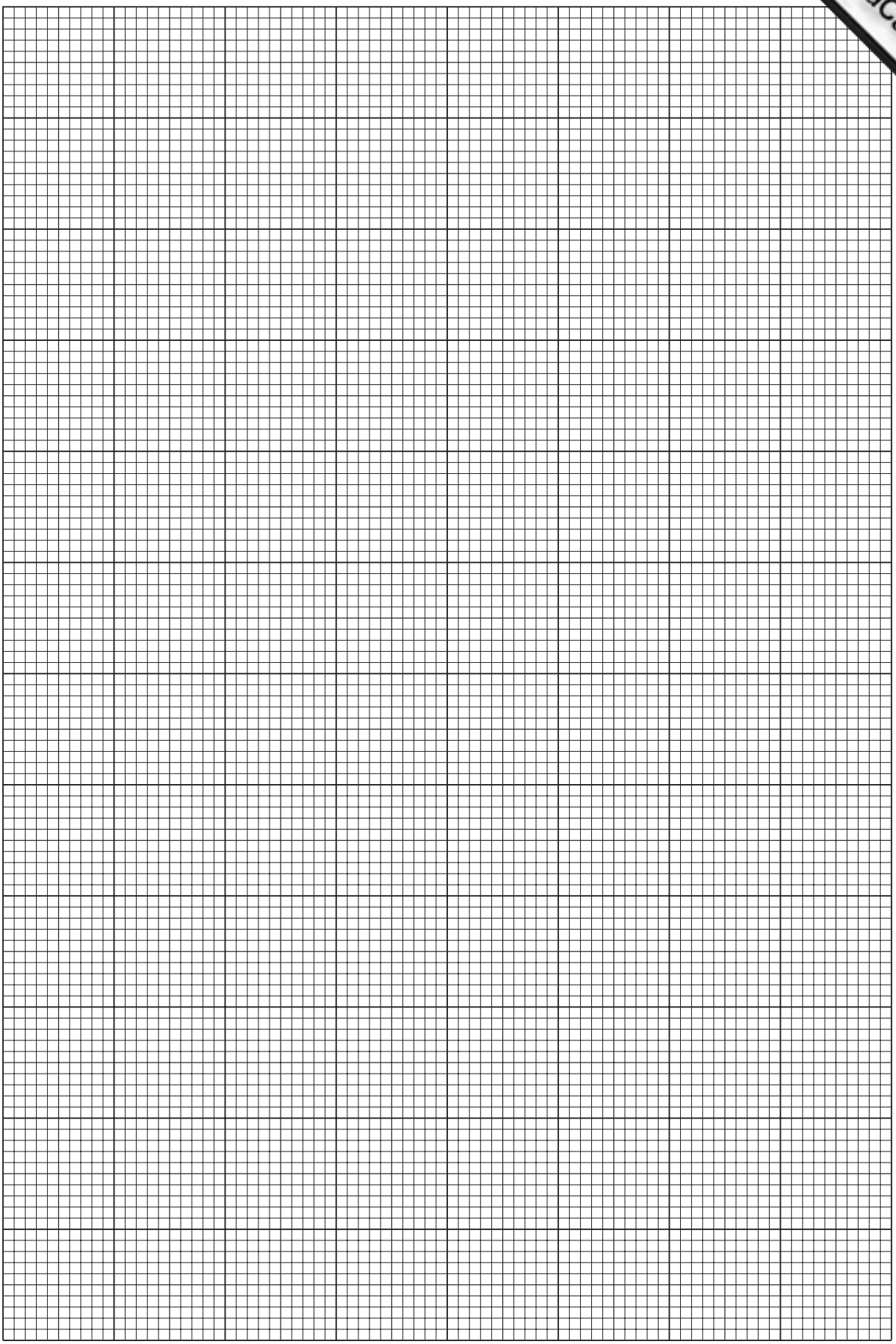
(f) Draw the line of best fit through the points on the graph. Determine the gradient of the line.

.....

.....

.....

gradient = ... [2]



[Total: 15]

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