Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

7512156889

PHYSICS **5054/32**

Paper 3 Practical Test **October/November 2020**

2 hours

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- 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 should record all your observations in the spaces provided in the question paper as soon as these observations are made.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 30.
- The number of marks for each question or part question is shown in brackets [ ].

For Examiner's Use	
1	
2	
3	
4	
Total	

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[Turn over

Section A

Answer **all** the questions in this section.

1 *In this experiment, you will investigate the effect on forces of using pulleys.*

You are provided with:

- three identical springs
- two 100 g mass hangers and three 100 g masses
- a system of pulleys
- a 30 cm ruler
- a stand, three bosses and two clamps
- a heavy weight
- thread.

The supervisor has set up the apparatus as shown in Fig. 1.1.

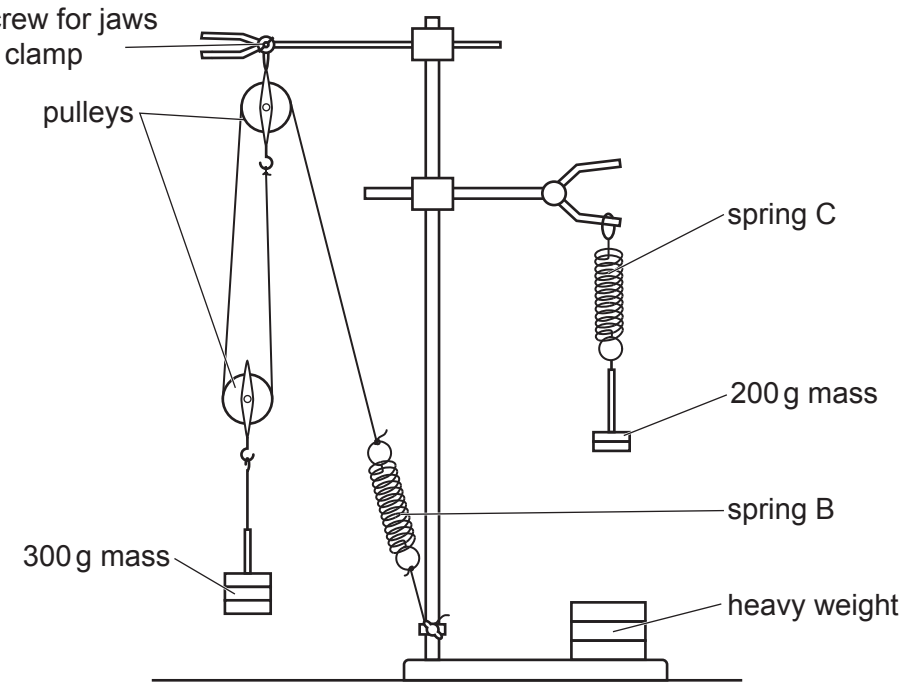


Fig. 1.1

(a) (i) Spring A is placed on the card labelled 'Spring A'.

Measure the unstretched length A_u of spring A as shown in Fig. 1.2.

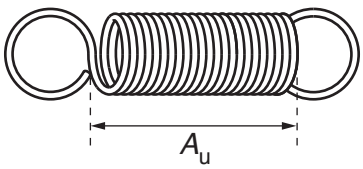


Fig. 1.2

A_u = ... mm [1]

(ii) Measure:

- the length B_s of the stretched spring B

B_s = ... mm

- the length C_s of the stretched spring C

C_s = ... mm
[1]

(iii) Calculate:

- the extension B_x of spring B where

$B_x = B_s - A_u$

B_x = ... mm

- the extension C_x of spring C where

$C_x = C_s - A_u$

C_x = ... mm
[1]

(b) State how the force exerted on spring B compares with the weight of the 300 g mass.

Explain your reasoning by referring to the extensions of the springs.

.....

.....

.....[1]

(c) Suggest one change to the arrangement of the apparatus in Fig. 1.1 that would eliminate the need to use a heavy weight on the stand.

Explain your answer.

change .....

.....

explanation .....

.....
[1]

[Total: 5]

2 *In this experiment, you will describe techniques to investigate the magnetic field around an electromagnet.*

You are provided with:

- a power supply
- a resistor
- an ammeter
- an electromagnet
- connecting leads, crocodile clips and a switch
- stand and boss.

The supervisor has set up the circuit as shown in Fig. 2.1.

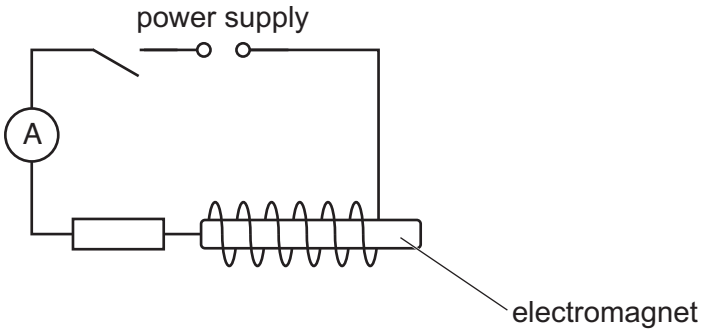


Fig. 2.1

You are also provided with a plotting compass attached to a wooden rod as shown in Fig. 2.2.

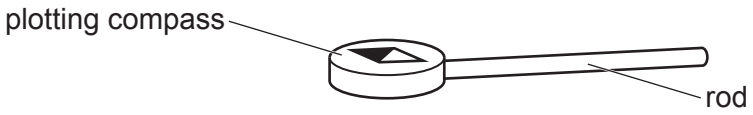


Fig. 2.2

Close the switch.

Use the plotting compass to check that there is a magnetic field around the electromagnet.

Open the switch.

Describe, in detail, how you can use the plotting compass to investigate the shape and direction of the magnetic field around the electromagnet as well as the strength of the magnetic forces involved.

shape .....

.....

direction .....

.....

strength of magnetic forces .....

.....

[5]

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3 *In this experiment you will investigate the magnification produced by a lens.*

You are provided with:

- a lens
- an object labelled A marked with five vertical parallel lines
- a half-metre rule
- small pieces of Blu Tack.

The supervisor has set up the apparatus as shown in Fig. 3.1.

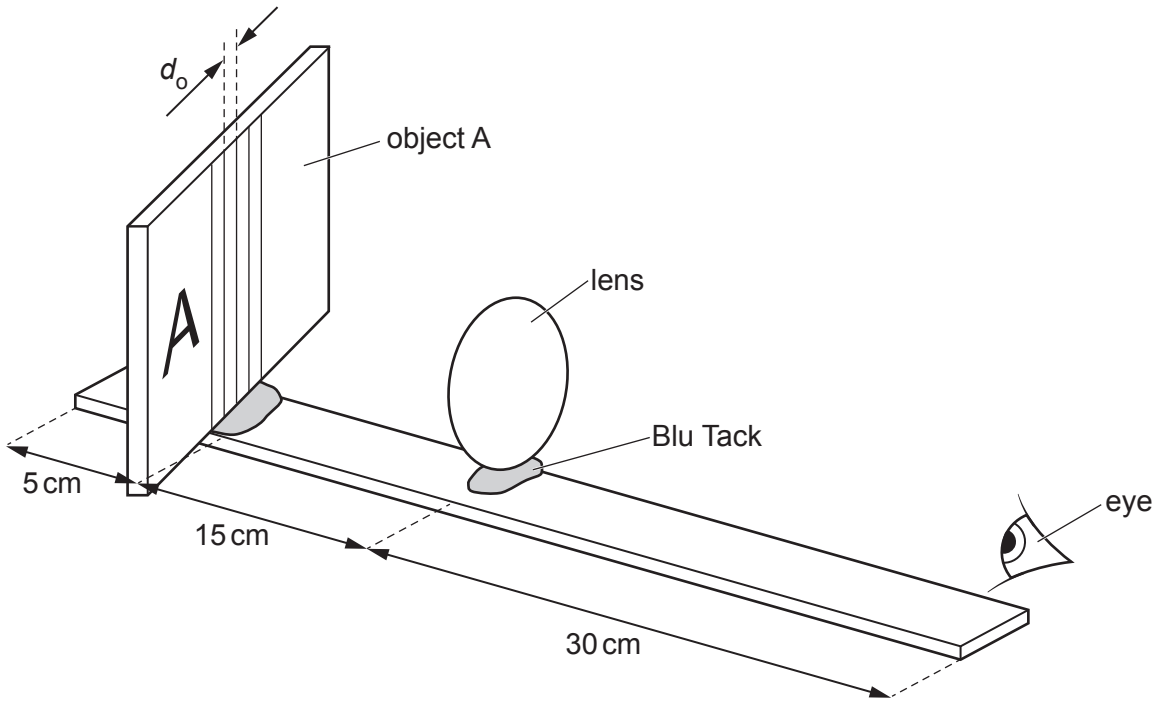


Fig. 3.1

Object A is attached to the half-metre rule at the 5 cm mark using a small piece of Blu Tack.
The lens is attached 15 cm away from object A at the 20 cm mark, also using a small piece of Blu Tack.

(a) Measure the distance d_o between two adjacent parallel lines on object A.

d_o = ... mm [1]

(b) Position your eye at the end of the half-metre rule, 30 cm from the lens.

Estimate the distance d_i between the images of two adjacent parallel lines as they appear when viewed through the lens.

You may use the spacing of the lines on the card as a reference.

d_i = ... mm [1]

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(c) Calculate the magnification m of the image using the formula

$$m = \frac{d_i}{d_o}$$

m = ... [1]

(d) Keeping your eye at the end of the half-metre rule, move the lens away from object A and towards your eye.

Stop when the lens is 35 cm away from object A.

Describe what happens to the image of the two lines as you move the lens.

.....

.....[2]

[Total: 5]

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TURN OVER FOR SECTION B

Section B

4 *In this experiment, you will investigate the oscillation of a mass on a wire.*

You are provided with:

- a stop-watch
- a length of wire
- a 100 g mass hanger with a pointer attached
- seven 100 g slotted masses
- safety glasses
- a stand, boss and clamp to hold the wire and mass set.

The supervisor has set up the apparatus as shown in Fig. 4.1. **You must wear the safety glasses throughout this experiment.**

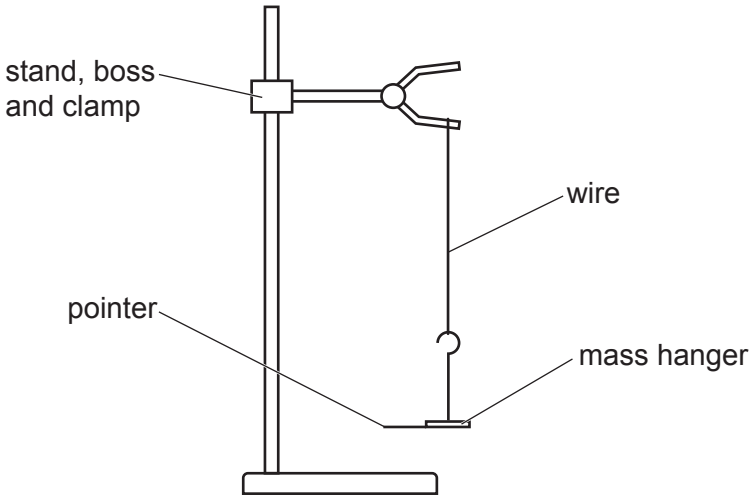


Fig. 4.1 (viewed from the side)

Observe the position of the pointer when the mass hanger is at rest.

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(a) By pushing against the end of the pointer, rotate the mass hanger to the left through a quarter of a turn in a clockwise direction as shown in Fig. 4.2.

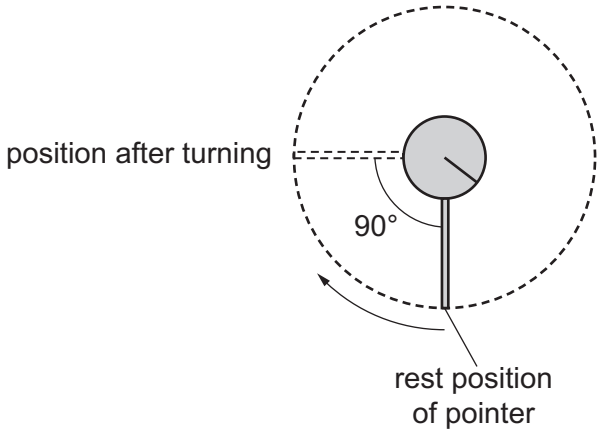


Fig. 4.2 (viewed from above)

The mass hanger has a mass of 100 g.

Release the mass and observe it rotate in an anti-clockwise direction, come to a rest and then return in a clockwise direction to its point of release. This is one oscillation.

(i) Determine the time t_{10} for ten oscillations of the mass.

t_{10} = ... s [1]

(ii) Calculate:

- the time T for one oscillation ..... s
- T^2 ..... s^2

[2]

(iii) In Table 4.1 on page 10, record the mass, your measurement from **(a)(i)** and your calculations from **(a)(ii)**.

Add appropriate headings with units. [1]

(b) Place one 100 g mass on the mass hanger. Repeat the procedure in **(a)**.

Record the mass and all your readings and calculations in Table 4.1.

By adding one 100 g mass each time, repeat the procedure and continue to record in the table until all of the 100 g slotted masses are on the mass hanger. [3]

Table 4.1

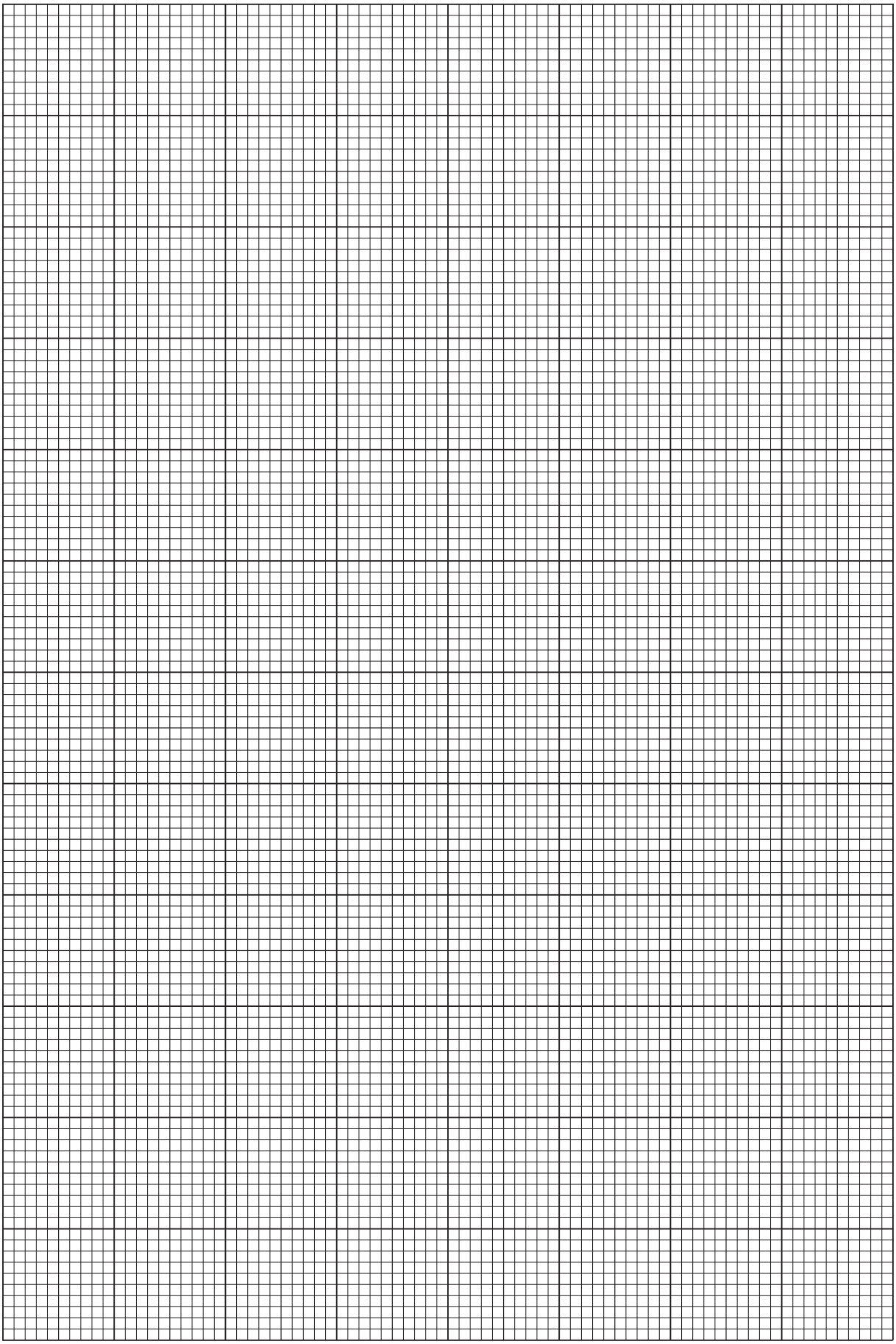
(c) Using the grid opposite, plot a graph of T^2 on the *y*-axis against mass on the *x*-axis. Start your axes at the origin. Draw a straight line of best fit. [4]

(d) Determine the gradient *G* of the line of best fit.

Indicate on the graph how this was done and show your working.

G = ... [2]

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(e) (i) State one difficulty in obtaining an accurate value for t_{10} in this investigation.

.....

.....

..... [1]

(ii) Describe one way of improving this measurement.

.....

..... [1]

[Total: 15]

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