Your Science Online

Cambridge IGCSE Physics 0625 style

FORCES

Topic practice paper (exam style)

CANDIDATE NAME	
CLASS	
DATE	

50 minutes

You will need: a pen, a pencil, a ruler and a calculator.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- 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 or in the margins.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 45.
- The number of marks for each question or part question is shown in brackets [ ].
- Questions or parts marked **[Extended]** are for Extended-tier candidates. Core candidates may leave them out (Core total: 29 marks).
- Topics: Hooke's law, resultant force, F = ma, moments, centre of gravity, momentum and circular motion.

For teacher's use	
Question	**Mark**
1	
2	
3	
4	
5	
6	
Total	

[Turn over

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1 A student investigates how the length of a spring changes when loads are added to it. Fig. 1.1 shows the apparatus.

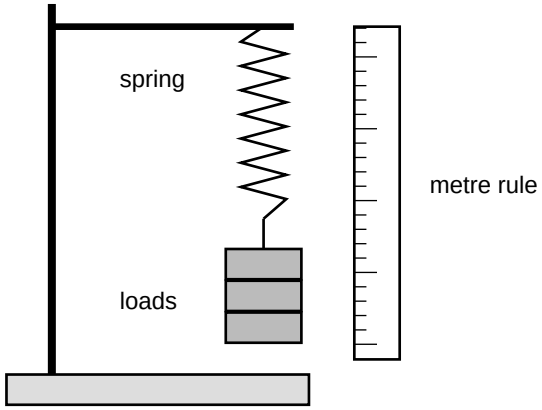

Fig. 1.1

(a) State why the student should read the metre rule with her eye level with the bottom of the spring.

.....

..... [1]

Table 1.1 shows her results.

load / N	0	1.0	2.0	3.0	4.0	5.0	6.0
length / cm	12.0	14.0	16.0	18.0	20.0	22.4	25.6
extension / cm	0	2.0	4.0		8.0	10.4	13.6

Table 1.1

(b) Calculate the extension of the spring when the load is 3.0 N. Write your answer in Table 1.1.

[1]

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(c) On the grid in Fig. 1.2, plot a graph of extension (y-axis) against load (x-axis). Draw the best-fit line.

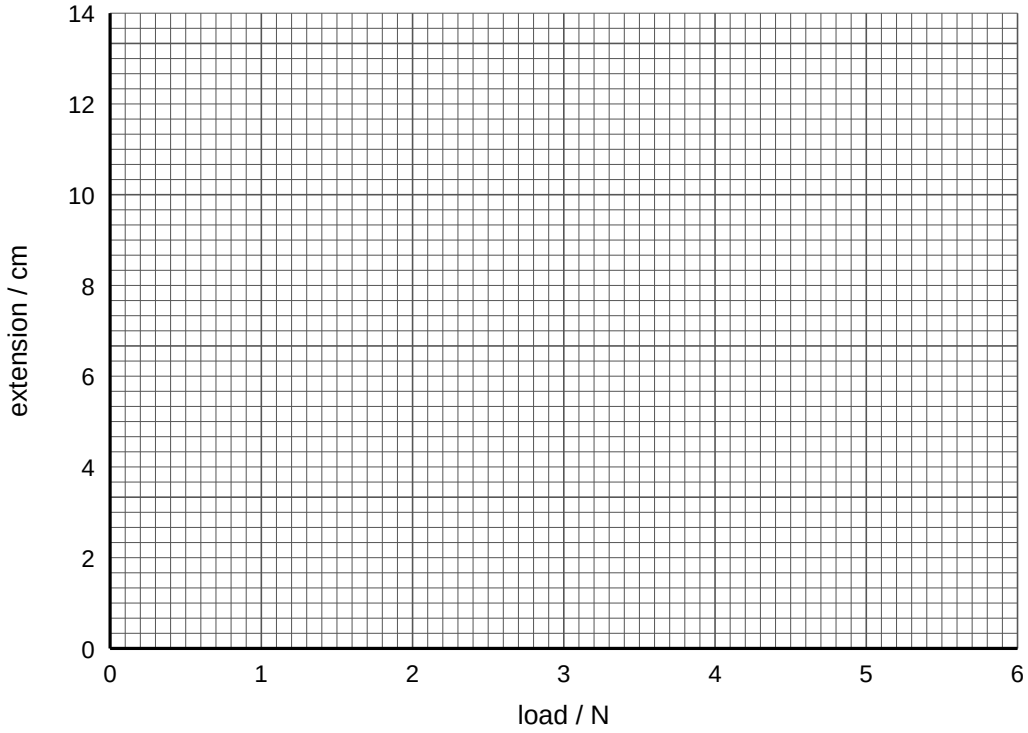

Fig. 1.2

[3]

(d) Use your graph to state the load at the limit of proportionality.

load = ... N [1]

(e) ***[Extended]*** Calculate the spring constant *k* of the spring in N/m. Use the straight-line part of your graph.

.....

.....

.....

k = ... N/m [2]

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2 A worker pushes a box along a horizontal floor. Fig. 2.1 shows the forces acting on the box. The mass of the box is 20 kg.

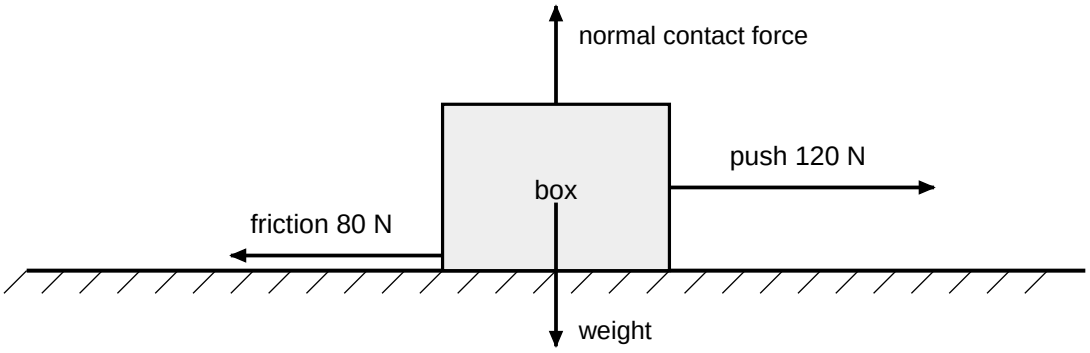

Fig. 2.1

(a) Calculate the size of the resultant force on the box and state its direction.

.....

resultant force = ... N

direction: ..... [2]

(b) Calculate the acceleration of the box.

.....

.....

.....

acceleration = ... m/s² [2]

(c) The worker reduces the push to 80 N. Friction stays at 80 N. Describe the motion of the box now. Give a reason for your answer.

.....

.....

..... [2]

(d) The worker stops pushing. Explain why the box slows down and stops.

.....

.....

..... [2]

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3 Fig. 3.1 shows a uniform see-saw balanced on a pivot at its centre. A girl of weight 400 N sits 1.5 m from the pivot. A boy of weight 300 N sits a distance *x* from the pivot.

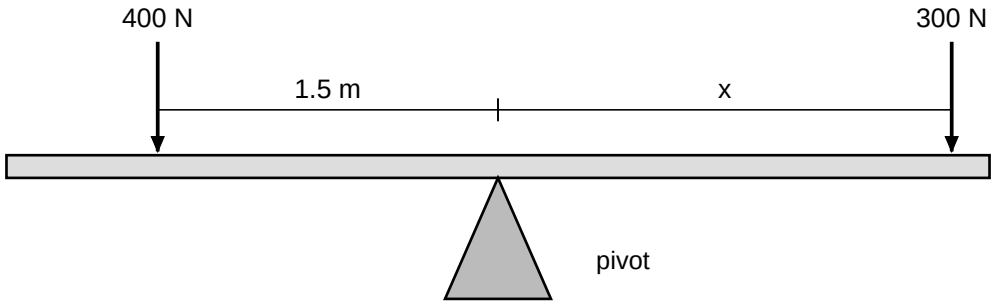

Fig. 3.1

(a) State what is meant by the *moment* of a force.

.....

..... [1]

(b) Calculate the moment of the girl's weight about the pivot.

.....

.....

moment = ... N m [2]

(c) The see-saw is in equilibrium. Use the principle of moments to calculate the distance *x*.

.....

.....

.....

x = ... m [3]

(d) State the **two** conditions needed for an object to be in equilibrium.

1

.....

2

..... [2]

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4 Fig. 4.1 shows two vases, A and B, standing on a table. They have the same mass.

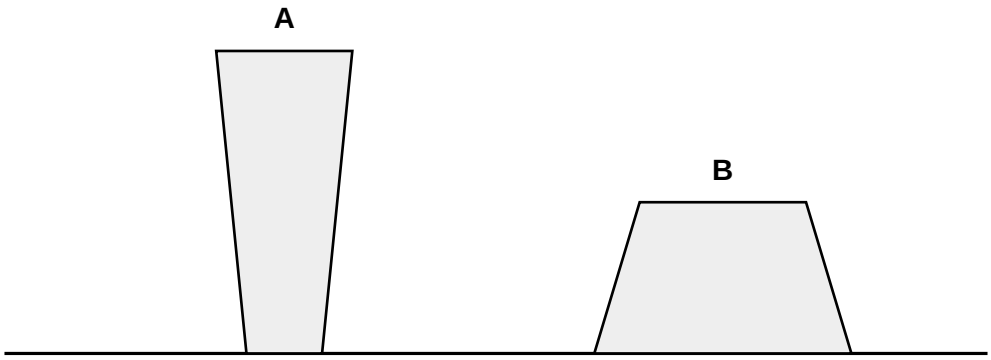

Fig. 4.1

(a) State what is meant by the *centre of gravity* of an object.

.....

..... [1]

(b) Explain which vase, A or B, is more stable.

.....

.....

..... [2]

(c) Describe an experiment to find the centre of gravity of a flat, irregularly shaped piece of card. You may draw a diagram.

.....

.....

.....

.....

..... [4]

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5 ***[Extended]*** Fig. 5.1 shows trolley A moving towards trolley B on a smooth track. Trolley B is at rest. The trolleys collide and stick together.



Fig. 5.1

(a) Calculate the momentum of trolley A before the collision.

.....

.....

momentum = ... kg m/s [2]

(b) Calculate the velocity of the two trolleys just after the collision.

.....

.....

.....

velocity = ... m/s [3]

(c) The collision lasts 0.15 s. Calculate the impulse on trolley B and the average force on trolley B during the collision.

.....

.....

impulse = ... N s

force = ... N [3]

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6 ***[Extended]*** A ball on a string moves in a horizontal circle at a constant speed. Fig. 6.1 shows the ball at one moment, seen from above.

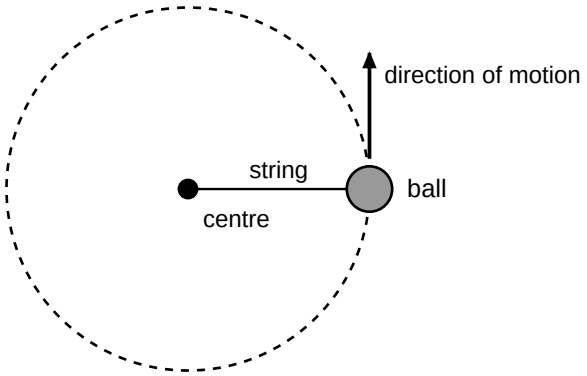

Fig. 6.1

(a) On Fig. 6.1, draw an arrow to show the direction of the resultant force on the ball.

[1]

(b) The speed of the ball is constant. Explain why the ball is accelerating.

.....

..... [2]

(c) State what happens to the size of the force needed to keep the ball moving in the circle when:

(i) the speed of the ball increases

..... [1]

(ii) the radius of the circle increases (same speed)

..... [1]

(iii) a ball with a larger mass is used (same speed and radius).

..... [1]

END OF PAPER

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