



Cambridge International AS & A Level

CANDIDATE
NAME
CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

MATHEMATICS**9709/41**

Paper 4 Mechanics

May/June 2025**1 hour 15 minutes**

You must answer on the question paper.

You will need: List of formulae (MF19)

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.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- Where a numerical value for the acceleration due to gravity (g) is needed, use 10 m s^{-2} .

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [].

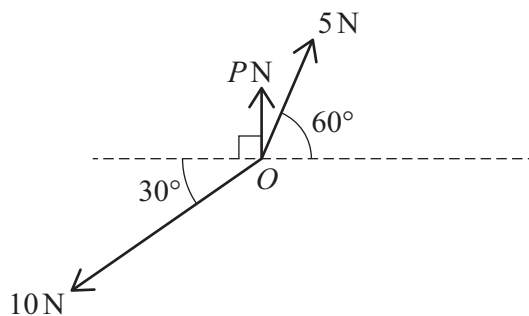
This document has **12** pages.

- Find the tension in the rope.

[illegible]



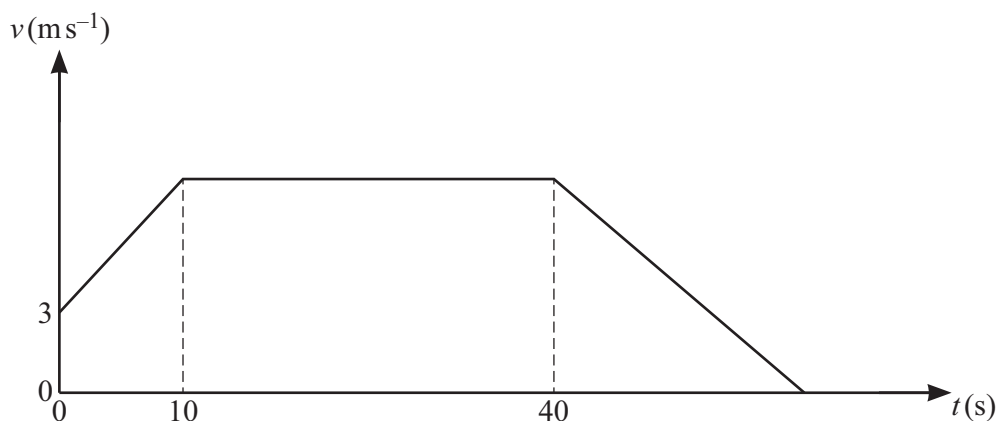
2



Three coplanar forces of magnitudes P N, 5 N and 10 N act at a point O , as shown in the diagram. The resultant of the three forces has magnitude Q N and acts in a direction perpendicular to the force of magnitude P N.

Find the value of P and the value of Q . [4]

[illegible]



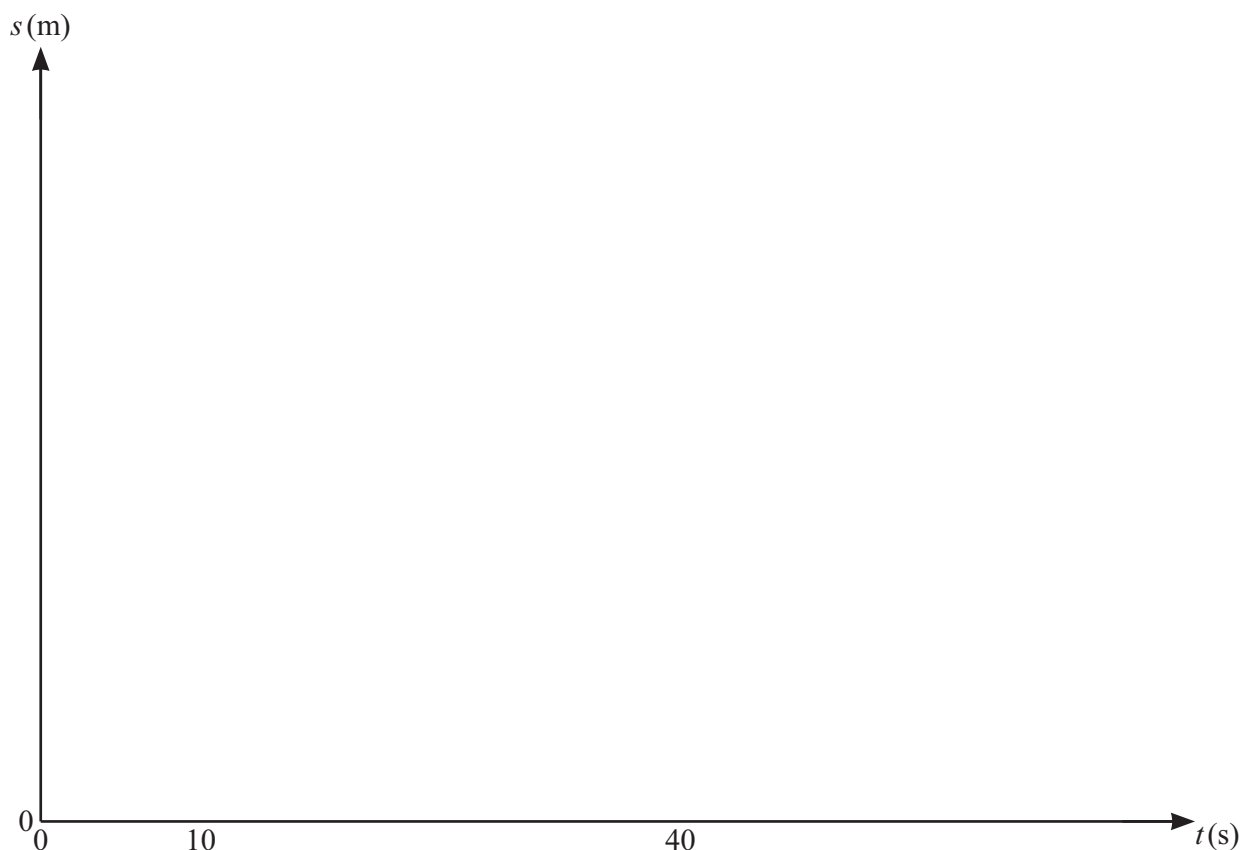
DO NOT WRITE IN THIS MARGIN

- DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN



- (b) On the given axes, sketch a displacement-time graph for the cyclist's journey from O to P , showing on your graph the distances travelled after 10 s and 40 s. [4]



.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....





4 A lorry of mass 18 000 kg is travelling along a straight road.

(a) On a horizontal section of the road, the power of the lorry's engine is constant. There is a constant resistance to motion of 1600 N.

(i) The steady speed which the lorry can maintain with the engine working at power PW is 30 m s^{-1} .

Find the value of P . [1]

.....

.....

.....

.....

.....

.....

(ii) At an instant when the speed of the lorry is 16 m s^{-1} , its engine is working at a power of 40 kW.

Find the acceleration of the lorry at this instant. [2]

.....

.....

.....

.....

.....

.....

(b) When the lorry has reached a speed of 20 m s^{-1} , it begins to ascend a section of road inclined at an angle α° to the horizontal. The engine now works at a power of 120 kW. There is no change in the lorry's speed as it ascends the hill. The constant resistance to motion remains 1600 N.

Find the value of α . [3]

.....

.....

.....

.....

.....

.....

.....



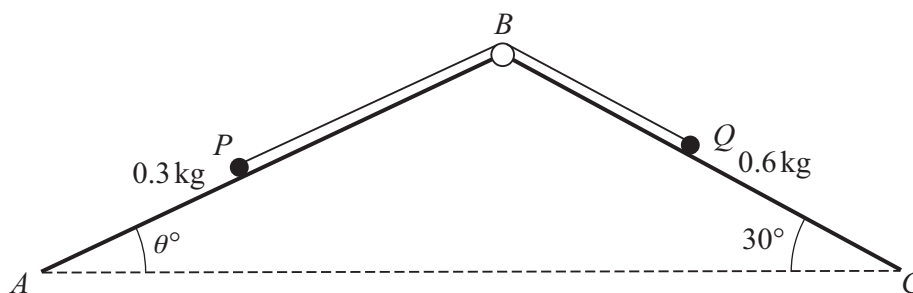


- (a) Find the value of m and the value of u . [3]

[illegible]

(b) Find the value of v and the value of w . [4]

[illegible]



DO NOT WRITE IN THIS MARGIN

- DO NOT WRITE IN THIS MARGIN

[5]

[illegible]

- Use an energy method to find the speed of Q when it has moved 2 m down the plane. [4]

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

- [illegible]



(b) When the velocity of Y is -9.6 ms^{-1} , show that the displacement of X from O is equal to the displacement of Y from P . [7]

This image shows a full page of a document template designed for handwriting practice or general writing. It consists of approximately 20 evenly spaced, horizontal dotted lines running across the width of the page. The background is plain white, and there are no margins, headers, footers, or other markings present.

[illegible]

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.