

CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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MATHEMATICS

9709/42

Paper 4 Mechanics 1 (M1)

February/March 2019

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: List of Formulae (MF9)

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions in the space provided. If additional space is required, you should use the lined page at the end of this booklet. The question number(s) must be clearly shown.

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.

Where a numerical value for the acceleration due to gravity is needed, use 10 m s^{-2} .

The use of an electronic calculator is expected, where appropriate.

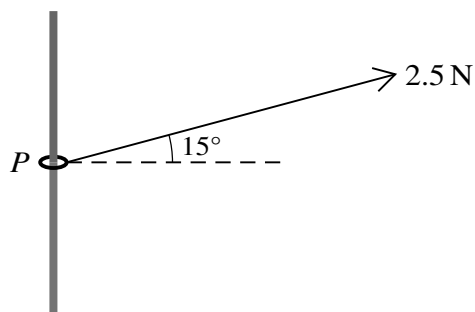
You are reminded of the need for clear presentation in your answers.

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.

The total number of marks for this paper is 50.

This document consists of **14** printed pages and **2** blank pages.



[4]

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- 2 A particle is projected vertically upwards with speed 30 m s^{-1} from a point on horizontal ground.

(i) Show that the maximum height above the ground reached by the particle is 45 m. [2]

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(ii) Find the time that it takes for the particle to reach a height of 33.75 m above the ground for the first time. Find also the speed of the particle at this time. [4]

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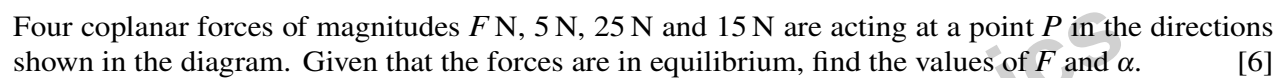
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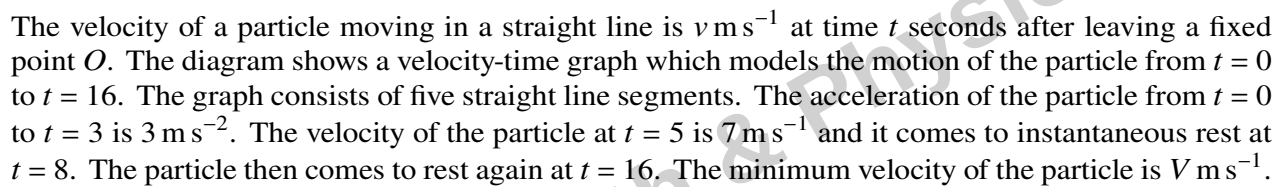
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[2]

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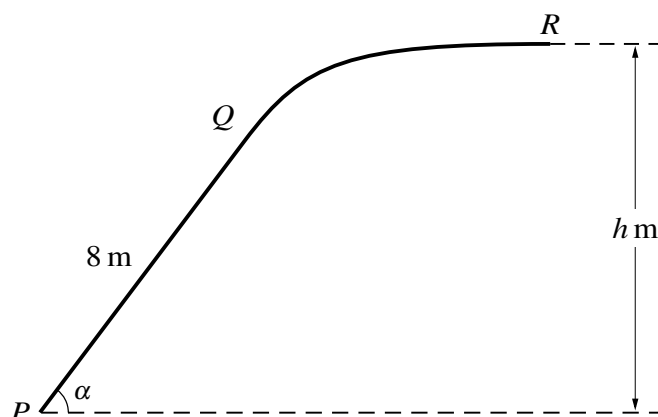
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The diagram shows the vertical cross-section PQR of a slide. The part PQ is a straight line of length 8 m inclined at angle α to the horizontal, where $\sin \alpha = 0.8$. The straight part PQ is tangential to the curved part QR , and R is h m above the level of P . The straight part PQ of the slide is rough and the curved part QR is smooth. A particle of mass 0.25 kg is projected with speed 15 m s^{-1} from P towards Q and comes to rest at R . The coefficient of friction between the particle and PQ is 0.5.

- (i) Find the work done by the friction force during the motion of the particle from P to Q . [4]

Cambridge Math 6

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(ii) Hence find the speed of the particle at Q .

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(iii) Find the value of h .

[3]

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