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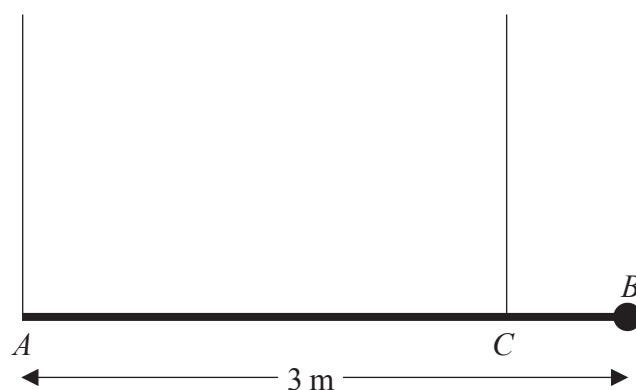
Question 1 continued

[illegible]

Q1

(Total 7 marks)

Figure 1



A plank AB has mass 40 kg and length 3 m . A load of mass 20 kg is attached to the plank at B . The loaded plank is held in equilibrium, with AB horizontal, by two vertical ropes attached at A and C , as shown in Figure 1. The plank is modelled as a uniform rod and the load as a particle. Given that the tension in the rope at C is three times the tension in the rope at A , calculate

- (a) the tension in the rope at C , (2)
- (b) the distance CB . (5)

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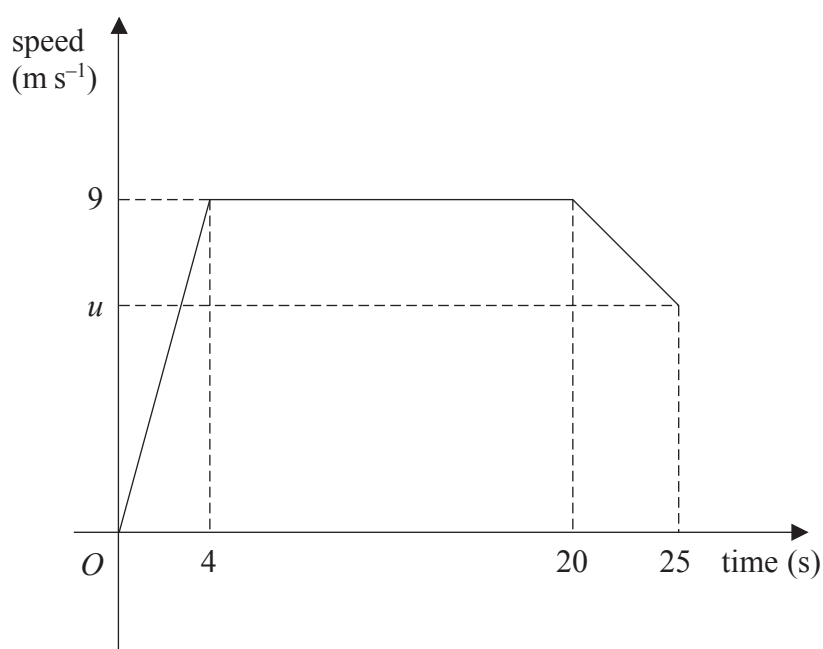
Question 2 continued

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Q2

(Total 7 marks)

Figure 2

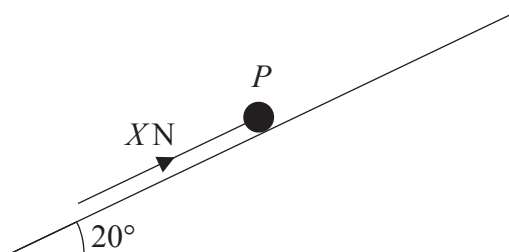


A sprinter runs a race of 200 m. Her total time for running the race is 25 s. Figure 2 is a sketch of the speed-time graph for the motion of the sprinter. She starts from rest and accelerates uniformly to a speed of 9 m s^{-1} in 4 s. The speed of 9 m s^{-1} is maintained for 16 s and she then decelerates uniformly to a speed of $u \text{ m s}^{-1}$ at the end of the race. Calculate

- (a) the distance covered by the sprinter in the first 20 s of the race, (2)
- (b) the value of u , (4)
- (c) the deceleration of the sprinter in the last 5 s of the race. (3)

(Total 9 marks)

Figure 3



A particle P of mass 2.5 kg rests in equilibrium on a rough plane under the action of a force of magnitude X newtons acting up a line of greatest slope of the plane, as shown in Figure 3. The plane is inclined at 20° to the horizontal. The coefficient of friction between P and the plane is 0.4 . The particle is in limiting equilibrium and is on the point of moving up the plane. Calculate

- (a) the normal reaction of the plane on P ,

- (b) the value of X . (4)

The force of magnitude X newtons is now removed.

- (c) Show that P remains in equilibrium on the plane. (4)

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Question 4 continued

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Q4

(Total 10 marks)

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Question 5 continued

(Total 13 marks)

Q5

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Question 6 continued

(Total 13 marks)

Q6

- (b) expressions for \mathbf{p} and \mathbf{q} , in terms of t , \mathbf{i} and \mathbf{j} . (4)

(c) By finding an expression for \overrightarrow{PQ} , show that

$$d^2 = 25t^2 - 92t + 292. \quad (5)$$

(d) find the time, to the nearest minute, at which the lights on Q move out of sight of the observer.

(5)

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This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Question 7 continued

This image shows a full page of blank, lined paper. It features approximately 28 horizontal grey lines spaced evenly across the page, typical of notebook paper. The lines are thin and light grey, set against a plain white background. There are no margins, text, or other markings on the page.

(Total 16 marks)

Q7

TOTAL FOR PAPER: 75 MARKS

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