Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic : 2 (Mechanics)

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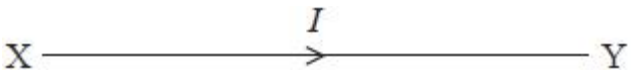
Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Q1.

An electrical conductor XY carries a current *I* as shown.



The current density *j* is defined as $j = \frac{I}{A}$ where *A* is the cross-sectional area of the conductor.

Current density is a vector quantity.

State what is meant by a vector quantity.

(1)

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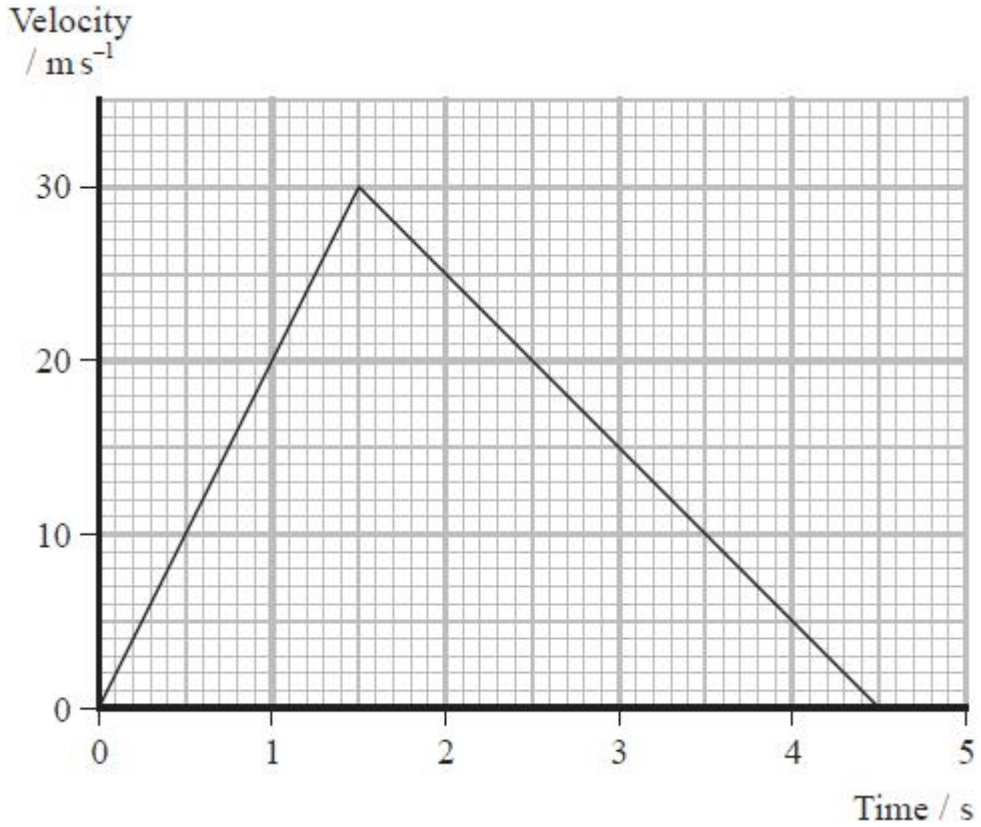
(Total for question = 1 mark)

Q2.

A model rocket accelerates vertically upwards then decelerates due to gravity until it reaches a maximum height.

A velocity-time graph for the rocket until it reaches maximum height is shown.



Show that the rocket reaches a maximum height of about 68 m.

(2)

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(Total for question = 2 marks)

Q3.

A model rocket accelerates vertically upwards then decelerates due to gravity until it reaches a maximum height.

When the rocket reaches the maximum height of 68 m, a parachute opens. Almost instantly, the rocket reaches a terminal velocity of 2.0 m s^{-1}.

Complete the velocity-time graph below for the motion of the rocket until it reaches the ground.

(2)

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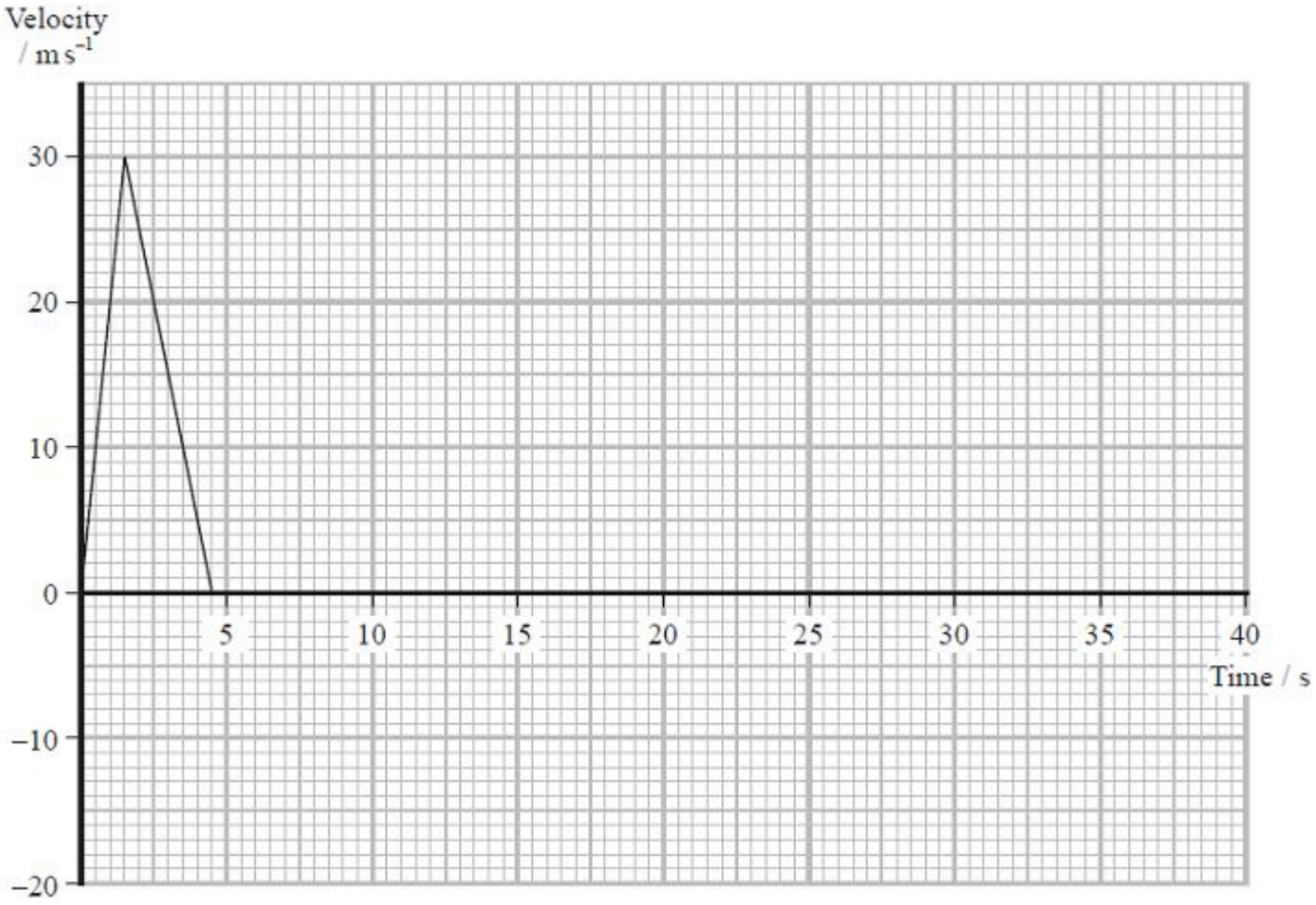
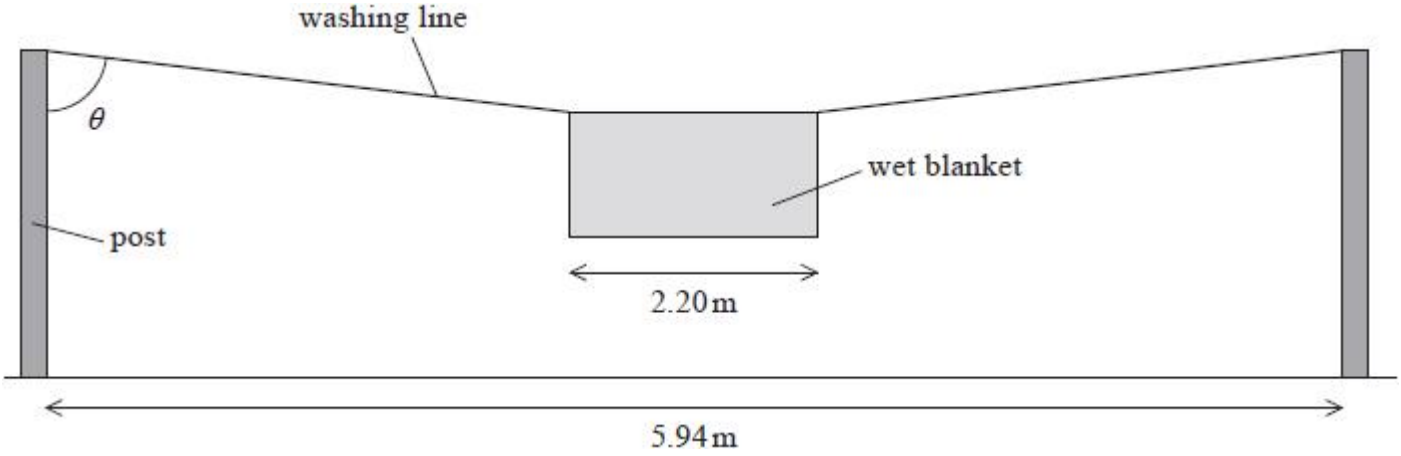


(Total for question = 2 marks)

Q4.

A washing line is attached to two posts which are a distance 5.94 m apart. A wet blanket of width 2.20 m is hung from the centre of the washing line. The washing line stretches to a length of 6.06 m and hangs at an angle θ, as shown.



Calculate the tension in the washing line.

mass of wet blanket = 9.36 kg

(4)

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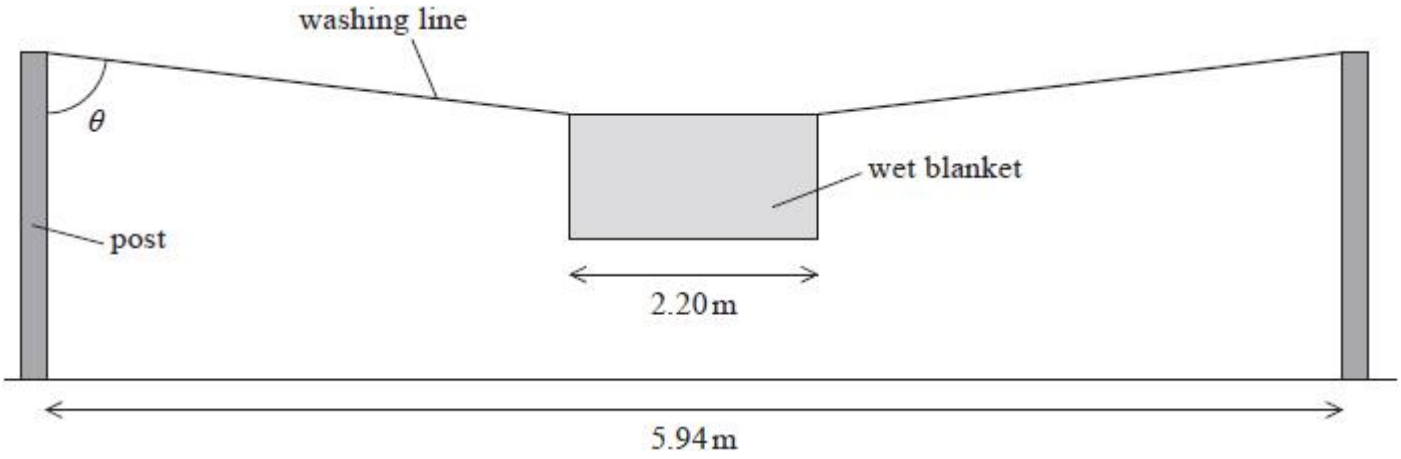
Tension = ...

(Total for question = 4 marks)

Q5.

A washing line is attached to two posts which are a distance 5.94 m apart. A wet blanket of width 2.20 m is hung from the centre of the washing line. The washing line stretches to a length of 6.06 m and hangs at an angle θ, as shown.



Explain what happens to the height of the blanket from the ground as the blanket dries. Your answer should make reference to the Young modulus of the material of the line.

(5)

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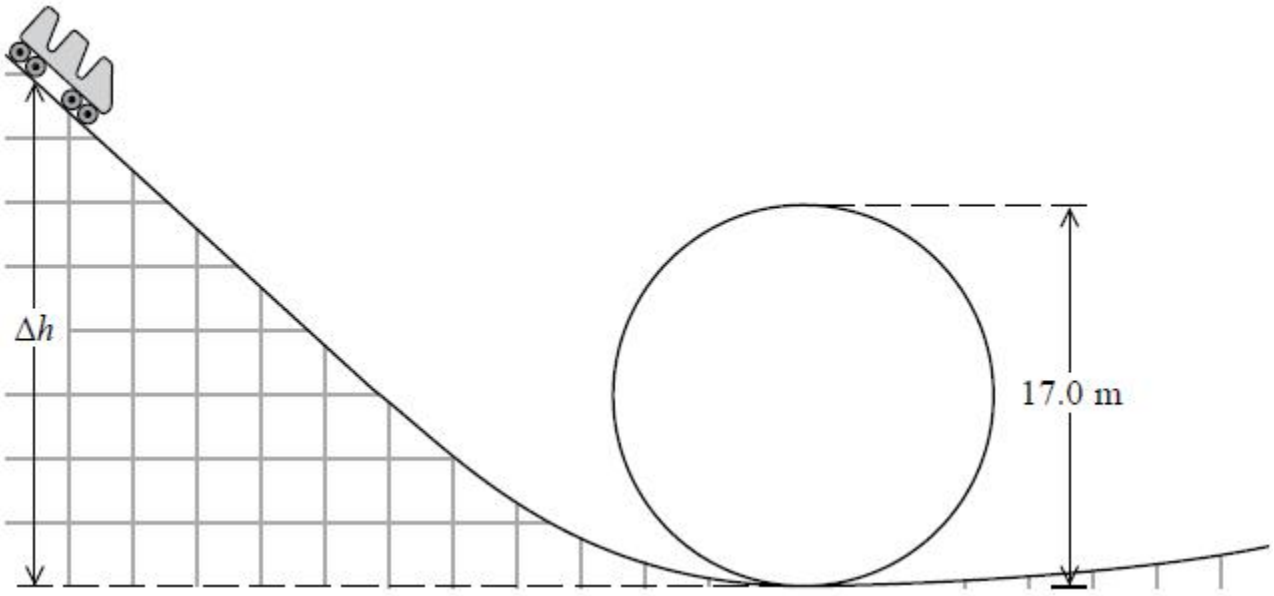
(Total for question = 5 marks)

Q6.

The diagram shows the carriage of a rollercoaster about to enter a vertical loop of diameter 17.0 m. The carriage is initially at rest at a height Δ*h* above the bottom of the loop.



(i) So that a passenger remains in contact with their seat at the top of the ride, show that the minimum speed of the car at the top of the loop is 9.1 m s^{-1}.

(3)

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(ii) Calculate the minimum value of Δ*h* that will enable the passenger to remain in contact with their seat at the top of the loop.

(3)

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Δ*h* = ...

(Total for question = 4 marks)