Name of the Student:_____

Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

A student investigates how the average speed of the trolley varies with starting height.

Figure 9 shows the trolley and runway.

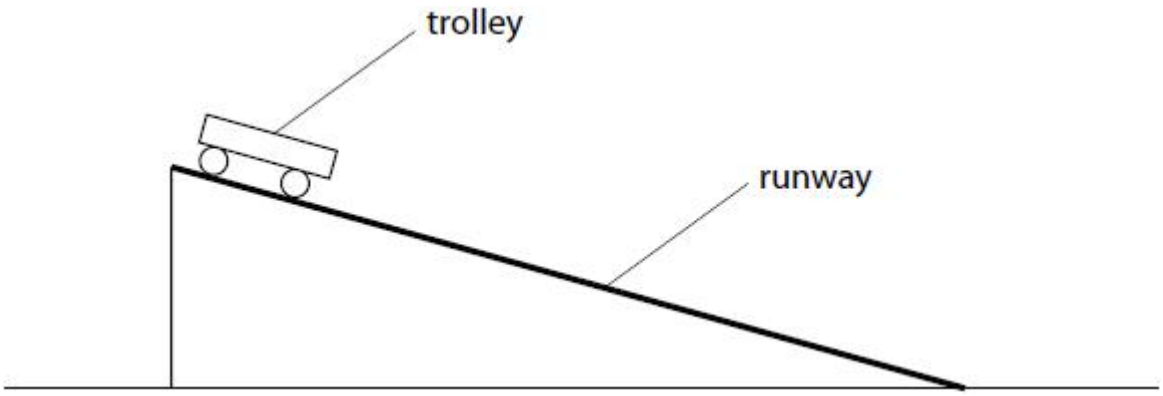


Figure 9

(a) Describe how the student can determine the average speed of the trolley.

(4)

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(b) Figure 10 shows his results.

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starting height / m	v / ms^{-1}
0.01	0.22
0.02	0.31
0.04	0.44
0.09	0.66
0.12	0.77
0.14	0.83
0.18	0.94

Figure 10

Figure 11 shows the student's graph.

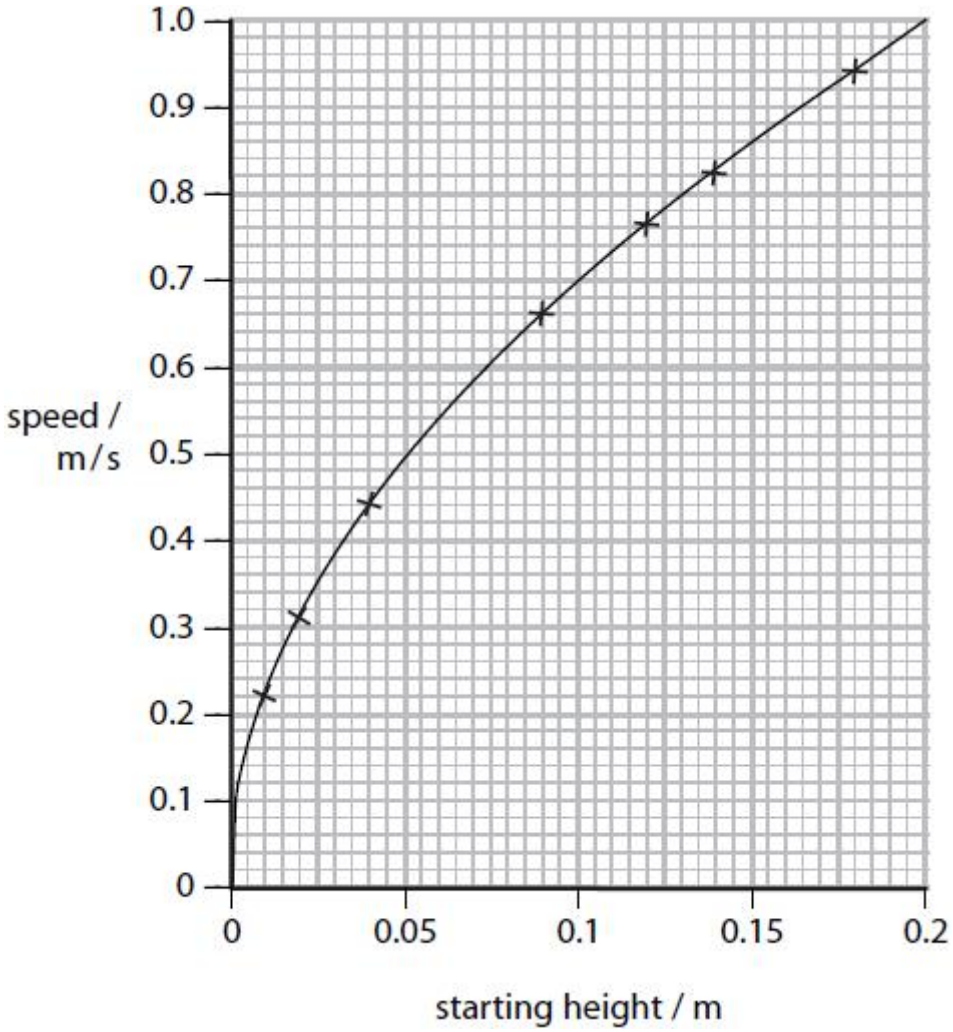


Figure 11

(i) The trolley has a mass of 650 g.
Calculate the average kinetic energy of the trolley which had a starting height of 0.075 m.

(2)

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average kinetic energy = ... J

(ii) Determine the gradient of the graph when the height is 0.1 m.

(2)

gradient = ...

(iii) Describe how the speed of the trolley varies with the changes in height made by the student between 0.04 m and 0.12 m.

(2)

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(c) The student wants to change his experiment to investigate how different surfaces of the runway affect the speed of the trolley down the slope.

Devise an experiment that would allow him to investigate the effect of different surfaces on the average speed of the trolley.

(3)

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(Total for question = 13 marks)

Q2.

A pilot begins to land an aircraft.
The aircraft lands with its wheels on the runway as shown.



The aircraft is moving forwards.

(i) Draw an arrow on the diagram to show the direction of the momentum of the aircraft.

(1)

(ii) The velocity of the aircraft when it lands is 75 m/s.

The mass of the aircraft is 130 000 kg.

Calculate the momentum of the aircraft.

(2)

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(iii) The aircraft comes to a stop.

State the momentum change of the aircraft from when it lands to when it stops.

(1)

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