Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Q1.

* Figure 13 is a velocity/time graph for a toy train on a straight track for 7 seconds.

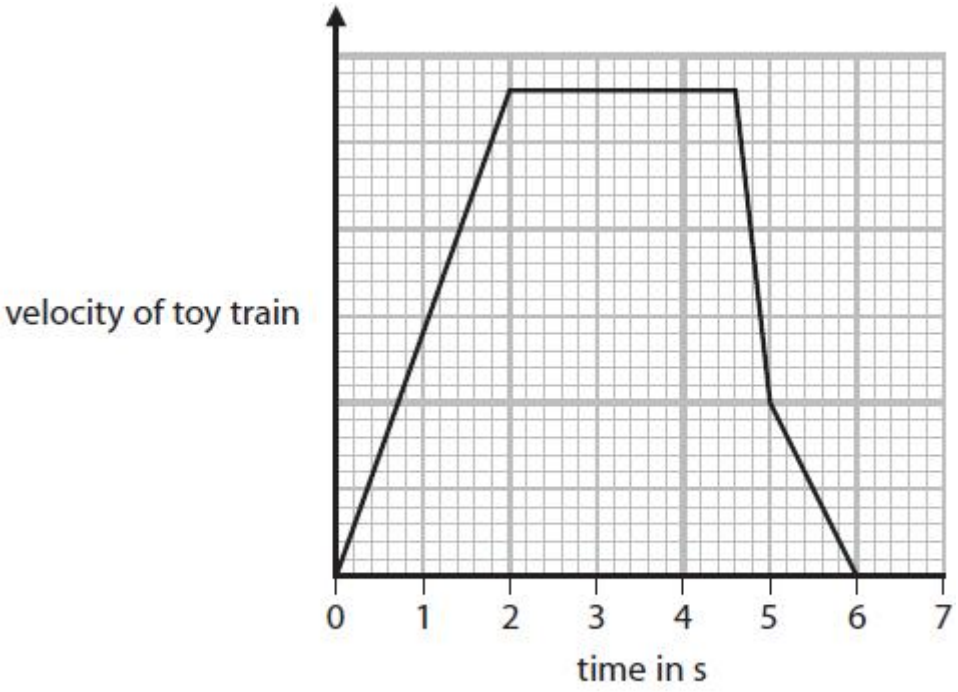

Figure 13

Using information from the graph, describe when and how the velocity and acceleration of the toy train change at different times during the 7 seconds shown on the graph.

(6)

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(Total for question = 6 marks)

Q2.

Figure 7 shows a skier going down a hill.

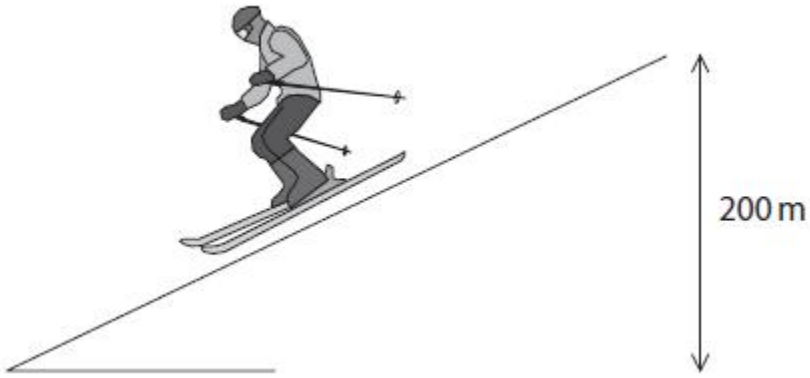

Figure 7

Describe how her speed at the bottom of the slope could be determined.

(3)

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(Total for question = 3 marks)

Q3.

Figure 7 shows a ball bearing as it falls slowly through a clear, dense liquid.

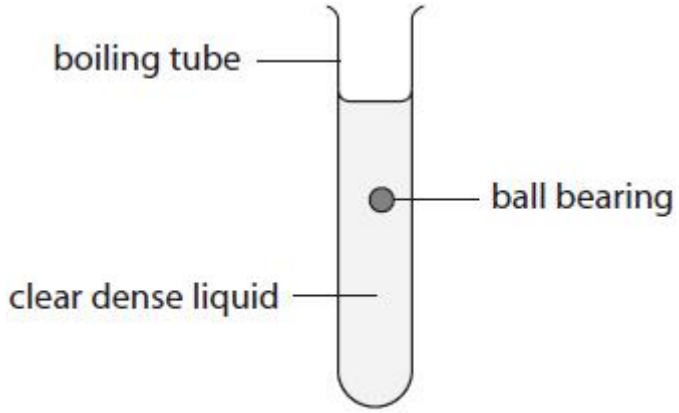

Figure 7

The apparatus in Figure 7 is used to find the average speed of the ball bearing as it falls.

(i) Devise an experiment to determine the average speed of the ball bearing as it falls through the liquid.

(4)

You should include:

- any extra apparatus you would use to take measurements
- the measurements you would take
- how you would calculate the speed.

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(ii) A student thinks that the ball bearing falls through the liquid at a constant speed.

Explain how you could develop this experiment to determine if the ball bearing falls through the liquid at constant speed.
You may draw a diagram to help your answer.

(2)

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(Total for question = 6 marks)

Q4.

The students use a telescope to view the Moon.

Light from the Moon takes 1.3 s to reach the students.

The speed of light is 300 000 km/s.

Calculate the distance to the Moon.

(2)

distance = speed × time

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Q5.

Shot-put is an Olympic event.
The shot is a heavy ball.
An athlete throws the shot as far as possible.

A sports scientist analyses an athlete's throw to help improve performance.

The scientist takes pictures of the athlete every 0.1 s during one throw.

Figure 7 shows the pictures of one throw.

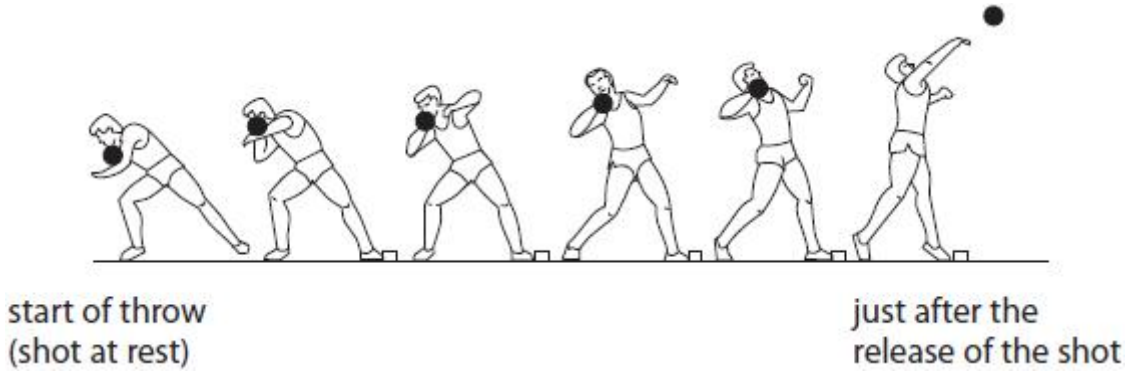

Figure 7

(i) Estimate the amount of time during the throw when the shot is in the athlete's hand.

(1)

time = ... s

(ii) Explain how the scientist could improve this method of analysing the throw.

(2)

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(iii) The average acceleration of the shot while in the athlete's hand is 20.6 m/s^2.

The mass of the shot is 7.26 kg.
Calculate the average force that the athlete applies to the shot during the throw.

(2)

force = ... N

(iv) In another throw, the shot is in the athlete's hand for 0.48 s.

The average acceleration during this time is 23 m/s^2.
Calculate the velocity of the shot as it leaves the athlete's hand.

(3)

velocity = ... m/s

(Total for question = 8 marks)