Merit Minds
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Exam Preparation and Free Resources

Name of the Student:_____

Max. **Marks : 23 Marks**

Time : 23 Minutes
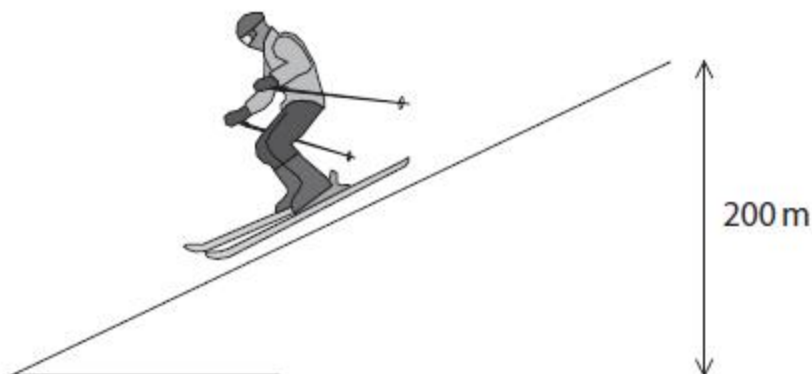
Q1.

Figure 7 shows a skier going down a hill.

200 m

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)

Q2.

Quantities can be either scalar or vector.

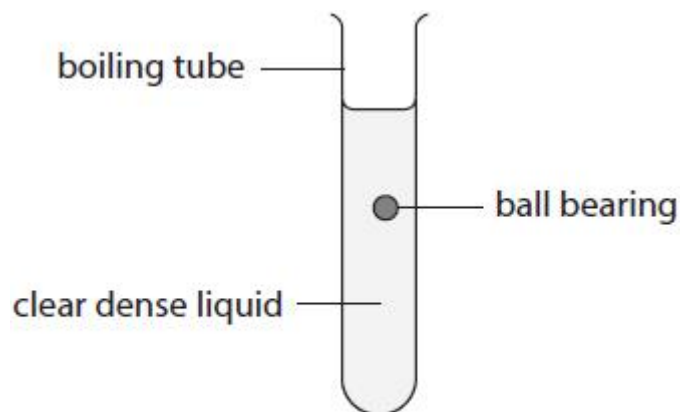Figure 7 shows a ball bearing as it falls slowly through a clear, dense liquid.

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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Q3.

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.

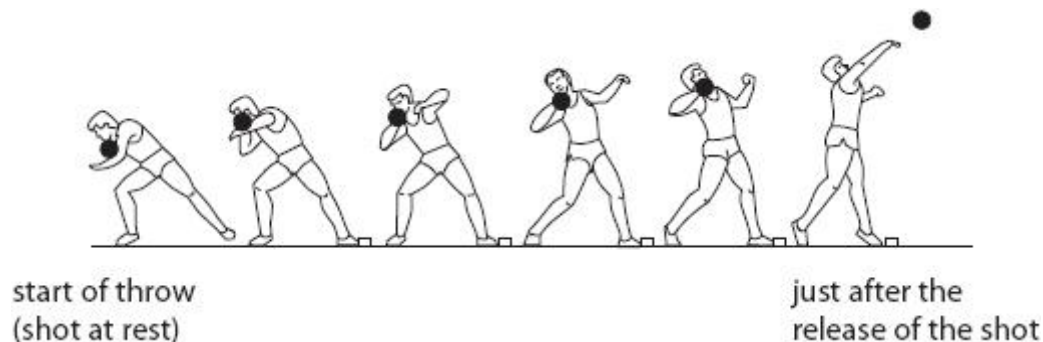Figure 13 shows the pictures of one throw.

start of throw
(shot at rest)

just after the
release of the shot

Figure 13

(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)

Q4.

*Many factors can affect the stopping distance of a car.

Some of these factors involve the driver and some of these factors involve the car or the road.

Explain how the stopping distance of a car is affected by

- factors involving the driver
- factors involving the car or the road.You should include examples in your explanations.

(6)

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(Total for question = 6 marks)