

Name of the Student: _____

Max. Marks : 22 Marks

Time : 22 Minutes

Q1.

The photograph shows a man dropping an egg inside a padded box from a height.



He is investigating to see if the padding stops the egg from breaking.

(a) State the type of energy which the egg gains as it falls.

(1)

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(b) The weight of the egg is 0.6 N.

Calculate the work done on the egg to lift it up by 20 m. State the unit.

(3)

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(c) The velocity of the container was 18 m/s as it hit the floor.

The mass of the container was 0.5 kg.

Calculate the momentum of the container.

(2)

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* (d) A student stands on the ground with an egg in his hand.

He throws the egg vertically upwards.

The egg rises to a height of 10 m.

Then the egg falls and lands on the ground.

Describe the energy changes of the egg during this sequence of events.

(6)

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(Total for Question = 12 marks)

Q2.

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.

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

Figure 3 shows the pictures of one throw.

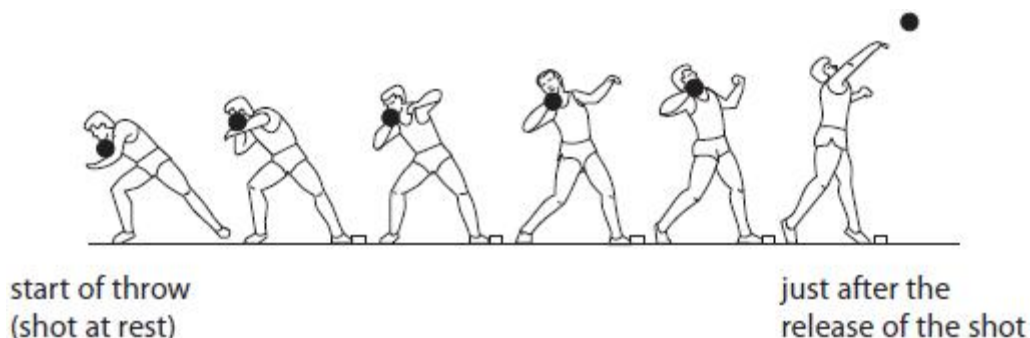


Figure 3

(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

(b) In one throw, the shot continues to rise by another 1.3 m after it leaves the athlete's hand.

The mass of the shot is 7.26 kg .

Calculate the amount of gravitational potential energy gained by the shot.

(2)

gravitational potential energy gained = J

(Total for question = 10 marks)