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

Q1.

Figure 5 is a velocity/time graph for a lift moving upwards in a tall building.

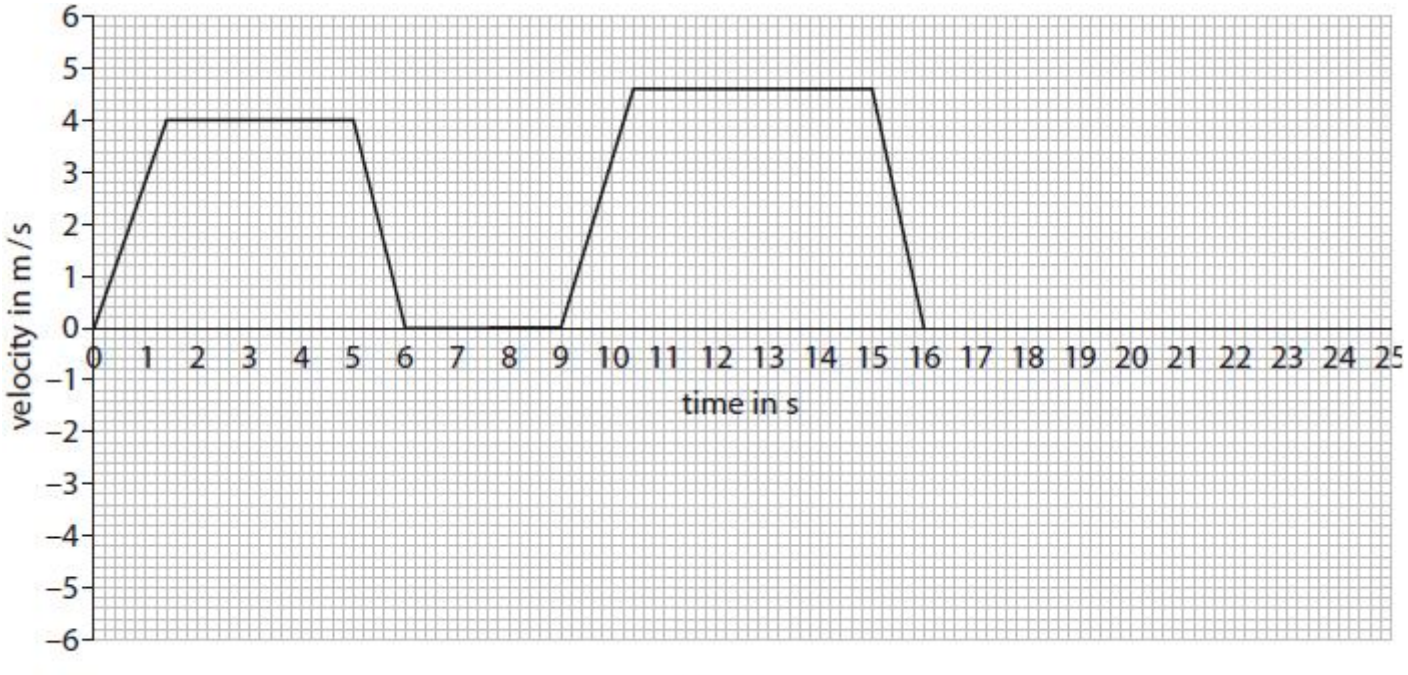

Figure 5

At 18 s, the lift starts to move downwards.

Sketch a line on the graph in Figure 5 to show the lift moving downwards after 18 s.

(1)

(Total for question = 1 mark)

Q6.

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)

.....

(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)

.....

(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)

.....

.....

*(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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.....

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.....

(Total for Question = 12 marks)

Q7.

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.

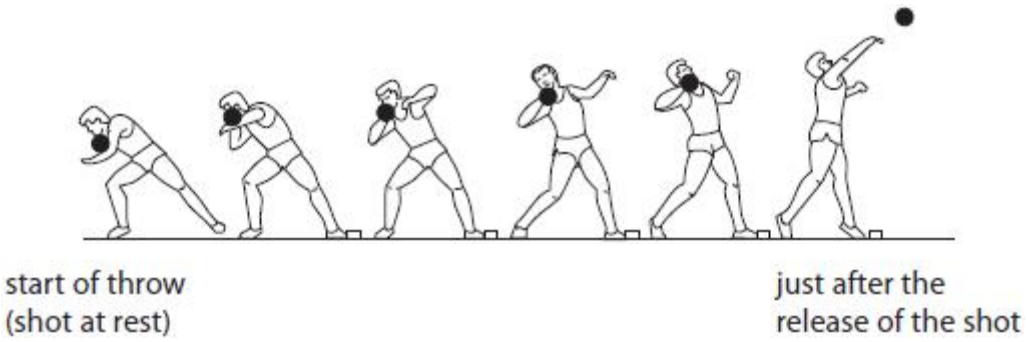

Figure 3

(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)

.....

.....

.....

.....

.....

(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)