Momentum

Question Paper

Course	CIE IGCSE Physics
Section	1. Motion, Forces & Energy
Topic	Momentum
Difficulty	Easy

Time Allowed 60

Score /46

Percentage /100

Question 1a

Extended tier only

State the equation for momentum.

[1 mark]

Question 1b

Extended tier only

For the momentum equation in part (a) state the units of each variable.

[3 marks]

Question 1c

Extended tier only

Without calculation, state the momentum of an object at rest and explain your answer.

[2 marks]

Question 1d

Extended tier only

Complete the sentence to state the principle of conservation of momentum.

In a closed system, the total momentum ..... an event is ..... to the total momentum after the event

[2 marks]

Question 2a

Extended tier only

Choose the word from the list which completes the sentence:

Momentum is a property of a moving object making it difficult for it to change .....

direction mass speed weight

[1 mark]

Question 2b

Extended tier only

A ball with mass 5.0 kg is moving with velocity of 10 m/s.

Calculate the momentum of the ball.

[3 marks]

Question 2c

Extended tier only

The ball in part (b) hits a wall and rebounds in the opposite direction. The speed of the ball does not change.

Without further calculation, state the momentum of the ball in part (b) after it rebounds.

[2 marks]

Question 2d

Extended tier only

Explain your answer to part (c).

[3 marks]

Question 3a

Extended tier only

A trolley **X** with mass of 4.0 kg is moving on a track with velocity of 2.0 m/s towards a stationary trolley **Y** with mass of 8.0 kg as shown in Fig. 1.

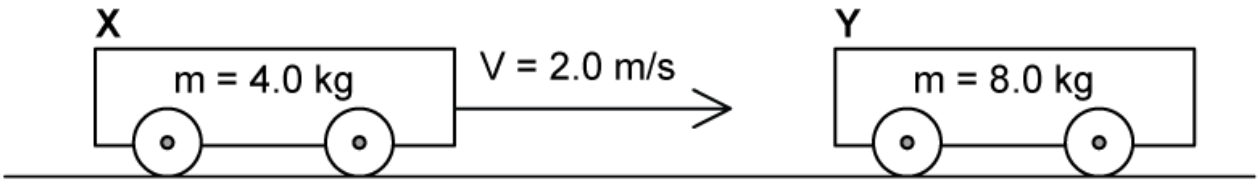

Fig. 1

Calculate the initial momentum of trolley **X**.

[3 marks]

Question 3b

Extended tier only

Trolley **X** collides with trolley **Y**.

If the two trolleys stick together, calculate their combined momentum after the collision.

[1 mark]

Question 3c

Extended tier only

Calculate the velocity of the two trucks after the collision.

[3 marks]

Question 3d

Extended tier only

State the direction the trolleys will move in, and explain your answer.

[2 marks]

Question 4a

Extended tier only

A squash ball is hit towards a wall at a velocity of 44 m/s. The ball has mass 0.025 kg.

The motion of the ball is shown in Fig. 1.

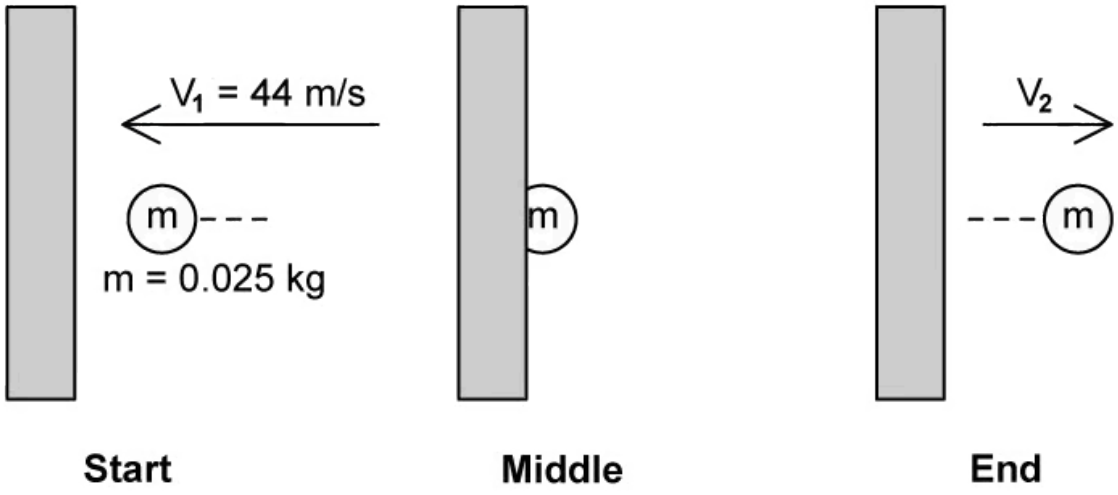

Fig. 1.

Calculate the momentum of the ball at the start, before it hits the wall.

[3 marks]

Question 4b

Extended tier only

The ball is in contact with the wall for 0.1 s and then rebounds with velocity 42 m/s

Calculate the momentum of the ball at the end of the motion, after the impact with the wall.

Consider the direction of motion in your answer.

[1 mark]

Question 4c

Extended tier only

For the initial and final motion of the ball

(i) Calculate the change in momentum.

[3]

(ii) State the impulse on the ball.

[1]

[4 marks]

Question 4d

Extended tier only

Calculate the force exerted on the ball by the wall.

[1 mark]

Question 5a

Extended tier only

A golf ball with mass 0.05 kg is at rest on the grass as shown in Fig. 1.

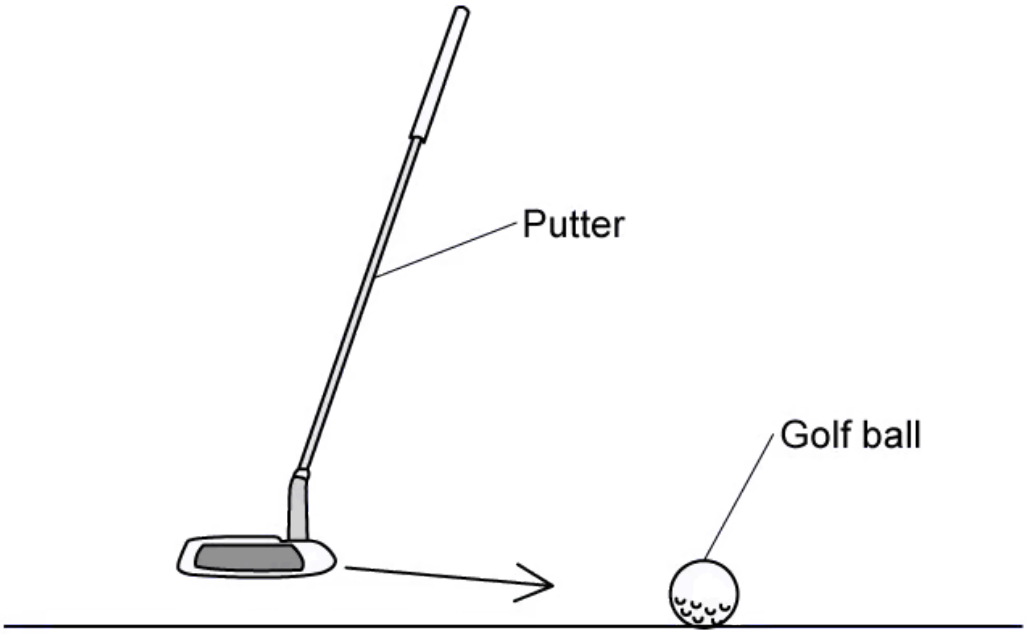

Fig. 1

The ball is hit with a putter so that the ball moves off with velocity of 2.0 m/s

Calculate the momentum of the ball after being hit with the putter.

[3 marks]

Question 5b

Extended tier only

After hitting the golf ball the putter immediately stops moving. The mass of the putter is 0.5 kg.

Calculate the velocity of the putter at the moment it hit the ball.

[3 marks]

Question 5c

Extended tier only

For the golf ball in part (a) state the impulse exerted on the ball by the putter.

[2 marks]

Question 5d

Extended tier only

The putter is in contact with the ball for 0.6 seconds.

Calculate the force exerted on the ball by the putter.

[3 marks]