

Q1. (2018)

0 3

Figure 5 shows an ice skater, Skater A.

Figure 5



a)

0 3

1 Write down the equation that links mass, momentum and velocity.

[1 mark]

b)

0 3

2 Skater A travels with a velocity of 3.2 m/s and has a momentum of 200 kg m/s

Calculate the mass of Skater A.

[3 marks]

c)

0 3

3 Skater A bumps into another skater, Skater B. Skater B is stationary.

The skaters move off together in a straight line.

Explain what happens to the velocity of each of the skaters.

Use the idea of conservation of momentum.

[3 marks]

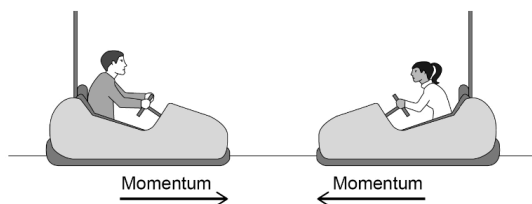
Q2. (2019)

Bumper cars are a fairground ride and are designed to bump into each other.

Figure 5 shows two bumper cars moving towards each other.

The momentum of each bumper car is shown by an arrow.

Figure 5



a)

0 3

3 Give **two** factors that affect the momentum of each bumper car.

[2 marks]

1 _____

2 _____

b)

0 3

4 The bumper cars crash into each other and stop.

Explain why both bumper cars stop after the crash.

[4 marks]

Q3. (2020)

0 4

Figure 8 shows a girl bowling a ball along a ten-pin bowling lane.

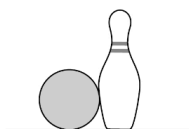
Figure 8



The girl is trying to knock down the ten pins at the end of the bowling lane.

Figure 9 shows the bowling ball hitting one of the pins.

Figure 9



a)

0 4 . 3

Write down the equation that links mass (m), momentum (p) and velocity (v).

[1 mark]

b)

0 4 . 4

The bowling ball has a velocity of 5.0 m/s when it hits the pin.

The momentum of the bowling ball is 26 kg m/s

Calculate the mass of the bowling ball.

[3 marks]

c)

0 4 . 5

Explain why the bowling ball slows down when it hits the pin.

You should use ideas about momentum in your answer.

[3 marks]

Q4. (2022)

0 3

Figure 4 shows a child playing with a toy train.

The train is on a bridge.

Figure 4



When the child lets go of the train, the train rolls down the bridge.

a)

- 0 3 . 1** The momentum of the train at the bottom of the bridge is 0.216 kg m/s
mass of the train = 180 g

Calculate the velocity of the train at the bottom of the bridge.

Use the Physics Equations Sheet.

[4 marks]

b)

- 0 3 . 2** The train collides with a stationary carriage on the track.

Explain why the velocity of the train after the collision is less than it was before the collision.

Use ideas about momentum in your answer.

[4 marks]

Q5. (2024)

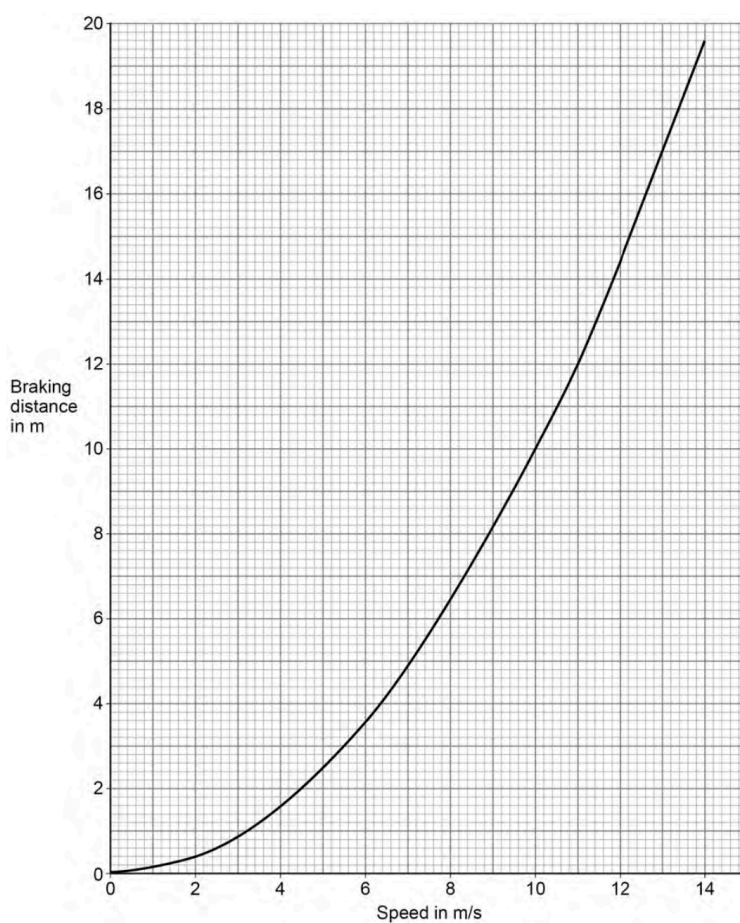
- 0 5** A safety test was carried out to determine how the speed of a car affects the stopping distance of the car.

The car was driven at a constant speed. The driver applied the maximum braking force, and the braking distance was measured.

The test was repeated at different speeds.

Figure 8 shows the results.

Figure 8



0 5 . 4 During one test the brakes were applied with a force of 6250 N.

The deceleration of the car was 5.0 m/s^2 .

The braking distance of the car was 14.4 m.

Determine the momentum of the car before the brakes were applied.

Use the Physics Equations Sheet.

Use **Figure 8**.

[6 marks]