O Level · Cambridge (CIE) · Physics

13 mins 13 questions

Multiple Choice Questions

1.6 Momentum

Momentum & Impulse / Impulse

Easy (5 questions)	/5
Medium (5 questions)	/5
Hard (3 questions)	/3
Total Marks	**/13**

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Easy Questions

1 Which of these is the correct definition for momentum and its unit?

	Definition	Unit
A	$p = m \div v$	N/m
B	$v = p \times m$	kgm/s
C	$v = p \div m$	kgm/s
D	$p = m \times v$	N/kg

(1 mark)

2 Which of the following terms and equations are equivalent to the change in an object's momentum?

	Term	Equation
A	Force	$F = \frac{I}{t}$
B	Impulse	$I = Ft$
C	Force	$F = ma$
D	Impulse	$I = \frac{\Delta p}{t}$

(1 mark)

3 A ball with mass of 5.0 kg is moving with a velocity of 3.0 m/s.

What is the momentum of the ball?

A. 0.6 kg m/s

B. 1.70 kg m/s

C. 15 kg m/s

D. 15 000 kg m/s

(1 mark)

4 A ball which has momentum = 30 kg m/s hits a stationary ball with momentum = 0 kg m/s so that they both move off.

What is the total momentum of the two balls following the collision?

A. 0 kg m/s

B. 3 kg m/s

C. − 30 kg m/s

D. 30 kg m/s

(1 mark)

5 A footballer kicks a ball with a force of 1500 N. Her foot is in contact with the ball for 1.4 seconds.

What is the impulse on the ball?

A. 1070 Ns

B. 2100 Ns

C. 3000 Ns

D. 4200 Ns

(1 mark)

Medium Questions

1 A rollercoaster moving along a track has a large momentum.

A second rollercoaster has half the mass of the first rollercoaster and travels at four times the speed.

What is the momentum of the second rollercoaster compared to the first?

A. The second rollercoaster has a momentum of zero

B. The second rollercoaster's momentum is half that of the first rollercoaster's momentum

C. The second rollercoaster's momentum is twice that of the first rollercoaster's momentum

D. The second rollercoaster's momentum is four times that of the first rollercoaster's momentum

(1 mark)

2 A bullet is shot from a gun. The bullet moves forward and the gun moves in the opposite direction. Which of the following statements is true?

A. They move with the same velocity in opposite directions.

B. The bullet moves with a slower velocity due to its mass.

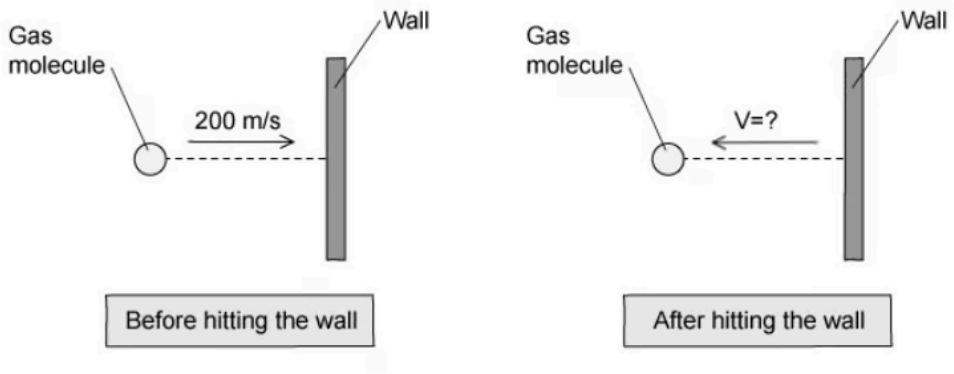
C. The total momentum of the system is zero.

D. The total momentum of the system does not stay constant before and after the collision.

(1 mark)

3 A gas molecule strikes the wall of a container with a speed of 200m/s. It rebounds with

the same kinetic energy as it had before striking the wall.



What is its final velocity?

A. 100 m/s

B. - 100 m/s

C. 200 m/s

D. - 200 m/s

(1 mark)

4 Padded dashboards in cars are safer in an accident than non-padded ones because a passenger hitting the dashboard would experience

A. Lengthened time of contact

B. Shorter time of contact

C. Decreased impulse

D. Increased momentum

(1 mark)

5 After a car crash the car driver's airbag inflates. The airbag then deflates when it is hit by the driver's head.

How does an airbag reduce the risk of injury?

A. Collision time increases, which increases the rate of change of momentum.

B. Collision time increases, which reduces the rate of change of momentum.

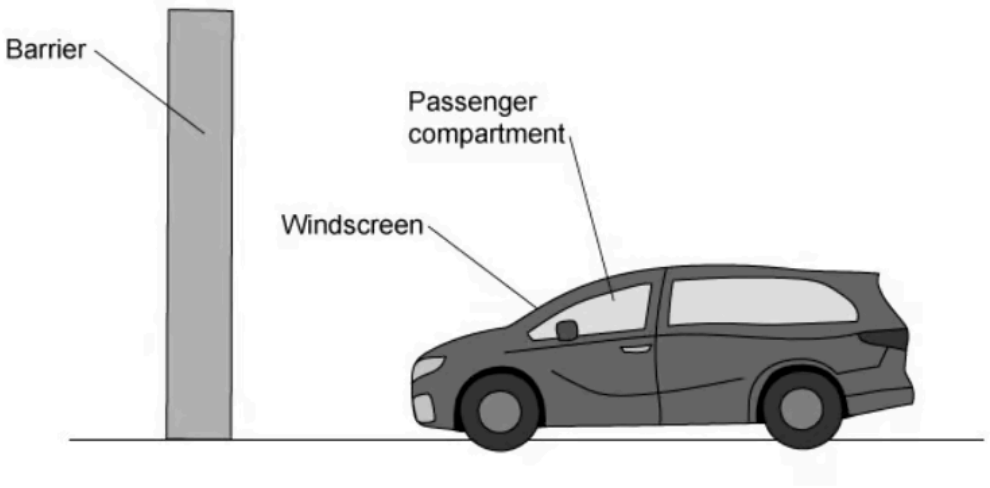
C. Collision time decreases, which increases the rate of change of momentum.

D. Collision time decreases, which reduces the rate of change of momentum .

(1 mark)

Hard Questions

1 A passenger of mass 90 kg is involved in a minor car crash.



The car approaches a solid barrier at 32 m/s. It crashes into the barrer and stops in 0.2s.

Determine the impulse that must be applied to the car to bring it to rest.

A. 2.8 Ns

B. 14 Ns

C. 580 Ns

D. 2900 Ns

(1 mark)

2 An object of mass 150 kg accelerates from a velocity of 5 m/s to a velocity of 10 m/s in the same direction.

What is the impulse provided to cause this acceleration?

A. 750 Ns

B. 1500 Ns

C. 2250 Ns

D. 7500 Ns

(1 mark)

3 During a paintball fight, a paint pellet of mass 150g hits a stationary target with a speed of 220m/s. It takes 0.025s from the moment the pellet comes into contact with the wall until it flattens onto the wall.

What is the force exerted as a result of the paintball "splat"?

A. 1.3×10^3 N

B. 33 N

C. 1.3×10^6 N

D. 33×10^3 N

(1 mark)