Momentum and Impulse Equations Worksheet

Level: A-Level / AP Physics 1 | Difficulty: Intermediate | Topic: Mechanics

Practice momentum and impulse problems including conservation of momentum in elastic and inelastic collisions. 10 problems with full worked solutions.

Equations you will need

p = mv	Momentum
J = FDt = Dp	Impulse = force x time = change in momentum
m_1u_1 + m_2u_2 = m_1v_1 -	Conservation of momentum

Symbol key

Symbol	Quantity	Unit
p	momentum	kg*m/s
m	mass	kg
v	velocity	m/s
J	impulse	N*s
F	force	N
Dt	time interval	s

Practice problems

1. A 2 kg ball moves at 5 m/s. Find its momentum.

2. A 0.15 kg baseball changes velocity from -30 m/s to +40 m/s. Find the impulse.

3. A 1500 kg car decelerates from 20 m/s to 0 in 4 s. Find the average braking force.

4. A 5 kg trolley at 4 m/s collides with a stationary 3 kg trolley and they stick. Find the final speed.

5. A 2 kg ball at 6 m/s hits a 4 kg ball at rest elastically. Find both final speeds.

6. A bullet of 0.02 kg fired at 400 m/s into a 4 kg block at rest. Find the final common velocity.

7. A 70 kg skater pushes off a 50 kg skater, who moves at 2 m/s. Find the first skater's recoil speed.

8. Find the impulse from a 50 N force applied for 0.4 s.

9. A 0.05 kg ball hits a wall at 20 m/s and bounces back at 18 m/s. Find the impulse on the ball.

10. A 1000 kg rocket fires ejecting 50 kg of gas at 200 m/s. Find rocket recoil speed.