

Name: _____

Period: _____

1. p_{1+2} D	A. Velocity of the second object after a collision.	1. $p_B + I = p_A$ B	A. Two moving objects collide and stop.
2. m_1 E	B. Velocity of two combined objects.	2. $p_{1B} + p_{2B} = p_{1A} + p_{2A}$ F	B. An object is pushed and speeds up.
3. v_{2A} A	C. Mass of two objects that are stuck together.	3. $p_{1B} + p_{2B} = p_{1+2A}$ D	C. Two objects at rest push off.
4. m_{1+2} C	D. Momentum of two combined objects.	4. $p_{1+2B} = p_{1A} + p_{2A}$ E	D. Two objects collide and stick.
5. v_{1+2} B	E. Mass of the first object.	5. $p_{1B} + p_{2B} = 0$ A	E. A moving object breaks apart.
		6. $0 = p_{1A} + p_{2A}$ C	F. Two objects collide and don't connect.

A. An object going 3 m/s is pushed by a force for 2 seconds.

Conservation of p Equation: $p_B + I = p_A$

B. A cannon shoots a cannonball. cannon ball

Conservation of p Equation: $0 = p_1 + p_2$

C. Two pool balls collide and bounce off of each other.

Conservation of p Equation: $p_{1B} + p_{2B} = p_{1A} + p_{2A}$

D. An object at rest is pushed by a force.

Conservation of p Equation: $0 + I = p_A$

E. A moving object is stopped by a force.

Conservation of p Equation: $p_B - I = 0$

F. A person jumps into a boat that is at rest to begin with.

Conservation of p Equation: $p_B + 0 = p_{1+2A}$

G. Two ice skaters push off from each other.

Conservation of p Equation: $0 = p_{1A} + p_{2A}$

H. A moving object explodes into two pieces.

Conservation of p Equation: $p_{1+2B} = p_{1A} + p_{2A}$

A 6 kg object going 3 m/s hits a 4 kg object at rest. If the 6 kg object is going 1 m/s afterwards, what is the 4 kg object's final velocity?

$$p_{1B} + 0 = p_{1A} + p_{2A}$$

$$6(3) = 6(1) + 4(v)$$

$$18 = 6 + 4v \quad v = 3 \text{ m/s}$$

$$12 = 4v$$

A 10 kg object going 3 m/s is pushed by a 12 N force for 4 seconds. Find its final velocity.

$$p_1 + I = p_A$$

$$10(3) + 12(4) = 10v$$

$$v = 7.8 \text{ m/s}$$

A 1,000 kg cannon shoots a 2 kg cannonball 500 m/s to the right. How fast does the cannon move?

$$0 = p_{\text{ball}} + p_{\text{cannon}}$$

$$0 = 2(500) + 1,000v$$

$$v = -1 \text{ m/s}$$

A 60 kg person running 1.5 m/s jumps into a 12 kg boat that is at rest. How fast is the boat and person moving afterwards?

$$p_1 + 0 = p_{1+2A}$$

$$60(1.5) = 72v$$

$$v = 1.25 \text{ m/s}$$

When is momentum not conserved?

When there is an impulse (a force).

A person shoots a bullet from a gun.

A) What happens to the gun and shoulder holding the gun?
Goes backwards (recoil)

B) How much does the shooter move? *very little motion.*

C) If the bullet hits a person-size target, how much will the target move? *very little (as much as shooter)*

D) In the movies a bullet causes a person to "fly backwards" violently. Explain why this is impossible.
Not enough momentum in the bullet.

How does a rocket move?

Gas backwards: rocket forward. Rocket has more mass, so moves slower than the gas.

As a person jumps up, what happens to the earth?

Must go down.

A 6 kg object moving 10 m/s to the right splits into two equal pieces. If afterwards, one of the pieces is moving 4 m/s to the right, how fast is the other piece moving?

$$6(10) = 3(4) + 3(v)$$

$$60 = 12 + 3v$$

$$48 = 3v$$

$$v = 16 \text{ m/s}$$