

Chapter 8 Momentum, Impulse and Collisions

Example 1:

If a 1600 kg car has the same momentum as 4800 kg truck traveling at 10 m/s, what is the speed of the car?

Example 2:

A 3.2 lb ball with a speed of 30 ft/s collides head on and rebounds from a wall at 15 ft/s. Find the change in momentum of the ball and the force of the wall on the ball if the collision lasts 0.01 sec.

Example 3:

A 10 gram bullet hits and becomes embedded in a 2 kg block of wood which is initially at rest. What was the bullet's speed before the collision if the combination has a speed of 3 m/s after the collision?

Example 4:

When a 200 lb halfback collides with a 240 lb linebacker, both are stopped. If the collision occurs when both are moving at full speed and the halfback's speed is 30 ft/s. What was the speed of the linebacker?

Example 5:

Two billiard balls have a head on collision. If one of them was at rest initially, what are their speeds after the collision?

Example 6:

A 16 lb bowling ball is at rest when it is struck by a 200 mph, 2 oz, golf ball. What is the velocity of each after the collision? (in mph)

Example 7:

A 1000 kg car moving North at 30 m/s collides with a 2000 kg car which was traveling East at 20 m/s. If they stick together, what is the velocity of the pile after the collision?

Example 8:

When a stationary bomb explodes, a 2 kg piece flies West at 50 m/s and a 5 kg piece travels North at 70 m/s. In what direction does the final piece move if it has a mass of 3 kg?

Example 9:

Two billiard balls collide. Initially one is at rest; after the collision, the initially moving ball has changed its direction by 30°. Find the velocity of both balls after the collision if the speed of the initially moving ball was 3 m/s.

Example 10:

Calculate the center of mass of the following system: a 1 kg mass is 2 m to the left of the origin; a 3 kg mass 4 m to the right and a 5 kg mass 1 m to the right.

Example 11:

How far from the center of the Earth is the center of mass of the Earth-Moon system. (Mass of Moon = 7.36×10^{22} kg and distance from the center of the Earth to the center of the moon is 3.84×10^8 m)

Example 12:

A 20 ft long 75 lb plank is lying on a frozen pond (There is no friction between the ice and the wood.). The Plank's left end rests against the pier and a 200 lb man is standing on its right end 20 ft from the pier. How far from the pier is the left end of the plank after the man has walked from the right end to the left end of the plank?