

Momentum Worksheet Questions and Answers PDF

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Part 1: Building a Foundation

What is the formula for momentum?

Hint: Consider the relationship between mass and velocity.

- A) $p = m + v$
- B) $p = m \times v$ ✓
- C) $p = m / v$
- D) $p = v / m$

■ The formula for momentum is the product of mass and velocity.

Which of the following statements about momentum are true?

Hint: Think about the properties of momentum.

- A) Momentum is a scalar quantity.
- B) Momentum is the product of mass and velocity. ✓
- C) Momentum has both magnitude and direction. ✓
- D) Momentum is measured in kg·m/s. ✓

■ Momentum is a vector quantity that is the product of mass and velocity, and it is measured in kg·m/s.

Explain in your own words what is meant by the conservation of momentum.

Hint: Consider how momentum behaves in isolated systems.

The conservation of momentum states that in a closed system, the total momentum before and after an event remains constant.

List the two main types of collisions and describe one key characteristic of each.

Hint: Think about how energy is conserved in each type.

1. Elastic Collision

Conserves both momentum and kinetic energy.

2. Inelastic Collision

Conserves momentum but not kinetic energy.

The two main types of collisions are elastic and inelastic. Elastic collisions conserve both momentum and kinetic energy, while inelastic collisions conserve momentum but not kinetic energy.

Part 2: comprehension and Application

In an elastic collision, which of the following is conserved?

Hint: Consider the properties of elastic collisions.

- A) Only momentum
- B) Only kinetic energy
- C) Both momentum and kinetic energy ✓
- D) Neither momentum nor kinetic energy

In an elastic collision, both momentum and kinetic energy are conserved.

Which factors affect the momentum of an object?

Hint: Consider the variables that define momentum.

- A) Mass ✓
- B) Velocity ✓
- C) Time
- D) Force

The momentum of an object is affected by its mass and velocity.

Describe how impulse relates to momentum change and provide an example.

Hint: Think about the relationship between force, time, and momentum.

Impulse is the change in momentum resulting from a force applied over time. For example, hitting a baseball with a bat applies an impulse that changes the ball's momentum.

A car with a mass of 1000 kg is moving at 20 m/s. What is its momentum?

Hint: Use the momentum formula $p = m \times v$.

- A) 20,000 kg·m/s ✓
- B) 2,000 kg·m/s
- C) 200 kg·m/s
- D) 10,000 kg·m/s

The momentum of the car is calculated by multiplying its mass by its velocity, resulting in 20,000 kg·m/s.

Calculate the change in momentum for a 5 kg object that accelerates from 2 m/s to 10 m/s.

Hint: Use the formula for momentum change: $\Delta P = m(v_{\text{final}} - v_{\text{initial}})$.

The change in momentum is calculated by finding the difference in momentum before and after acceleration, resulting in 40 kg·m/s.

Part 3: Analysis, Evaluation, and Creation

If two objects collide and stick together, what type of collision is this?

Hint: Consider the characteristics of collisions.

- A) Elastic
- B) Inelastic ✓
- C) Perfectly elastic
- D) Superelastic

This is an inelastic collision, where the objects stick together after colliding.

Analyze the following scenarios and identify which involve an impulse:

Hint: Think about actions that change momentum quickly.

- A) A bat hitting a baseball ✓
- B) A car parked on a hill
- C) A swimmer pushing off the pool wall ✓
- D) A book resting on a table

The scenarios involving impulse are A) A bat hitting a baseball and C) A swimmer pushing off the pool wall.

Compare and contrast elastic and inelastic collisions in terms of energy conservation.

Hint: Think about how energy is transferred in each type of collision.

Elastic collisions conserve both momentum and kinetic energy, while inelastic collisions conserve momentum but not kinetic energy.

Which of the following best explains why airbags are used in cars?

Hint: Consider the relationship between force, time, and impulse.

- A) They increase the time over which the force acts, reducing the impulse. ✓**
- B) They decrease the time over which the force acts, increasing the impulse.
- C) They increase the force, increasing the momentum.
- D) They decrease the force, decreasing the momentum.

Airbags increase the time over which the force acts, reducing the impulse experienced by passengers.

Design a simple experiment to demonstrate the conservation of momentum using everyday materials. Describe the setup and expected outcomes.

Hint: Think about how you can use common items to illustrate momentum.

An example experiment could involve colliding two carts on a track and measuring their velocities before and after the collision to show momentum conservation.