

AP Physics 1 – Algebra-Based: Unit 5 Momentum Practice Test

Question 1:

The Law of Conservation of Momentum states:

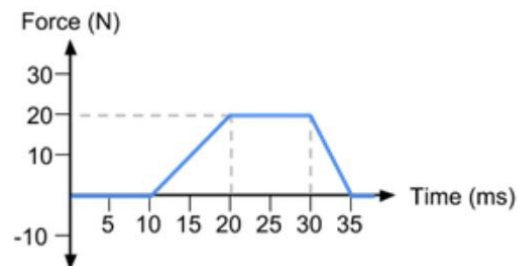
- A. The total momentum before a collision is equal to the total momentum after a collision.
- B. The total momentum before a collision is less than the total momentum after a collision.
- C. The total momentum before a collision is greater than the total momentum after a collision.
- D. The total momentum before a collision is not related to the total momentum after a collision.

Question 2:

The impulse is _____ the change in momentum.

- A. greater than
- B. less than
- C. equal to
- D. always double

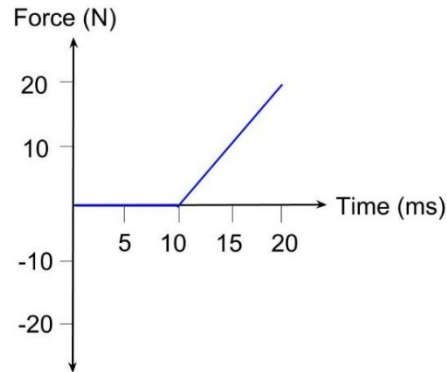
Question 3:



A hammer drops to the floor and comes to rest. The net force on the hammer over time is shown above. How does the hammer's momentum change between 0 ms and 35 ms ?

- A. Momentum is constant.
- B. Momentum increases
- C. Momentum decreases

Question 4:



A clown hits a balloon that is initially at rest. The net force on the balloon over time is shown above. How does the balloon's velocity change between 0 ms and 10 ms ?

- A. velocity increases
- B. the velocity does not change
- C. velocity increases, then decreases
- D. velocity decreases

Question 5:

A steel ball bearing is released from a height H and rebounds after hitting a steel plate to a height H . What is true about the collision with the steel plate?

- A. It is elastic since kinetic energy was conserved.
- B. It is inelastic since kinetic energy was not conserved.
- C. It is inelastic since kinetic energy was conserved.
- D. It is elastic since kinetic energy was not conserved.

Question 6:

Cart 1 of mass m is traveling with speed v_0 in the $+x$ -direction when it has an elastic collision with cart 2 of mass $3m$ that is at rest. What are the velocities of the carts after the collision?

- A. $v_1 = \frac{v_0}{2} \wedge v_2 = \frac{v_0}{2}$
- B. $v_1 = 0 \wedge v_2 = \frac{v_0}{3}$
- C. $v_1 = \frac{-v_0}{2} \wedge v_2 = \frac{v_0}{2}$

D. $v_1 = \frac{-v_0}{3} \wedge v_2 = \frac{v_0}{3}$

Question 7:

A cart of mass m moves to the right on a frictionless track at speed v_1 . The cart collides and sticks to another cart to the left at speed v_2 with mass $2m$. Which of the following quantities are conserved during the collision?

- A. Both momentum and kinetic energy are conserved.
- B. Kinetic energy is conserved.
- C. Momentum is conserved.

Question 8:



A runner has a momentum of $670 \text{ kg} \frac{\text{m}}{\text{s}}$ and is traveling at a velocity of $9 \frac{\text{m}}{\text{s}}$.

What is his mass?

- A. 74.4 kg
- B. 0.0134 kg
- C. 6,030 kg
- D. 679 kg

Question 9:

Momentum is conserved in this type of collision...

- A. elastic
- B. both types of collision
- C. inelastic

Question 10:

Which object listed below has the greatest momentum?

- A. A 0.05 kg object rolling at $0.2\frac{\text{m}}{\text{s}}$
- B. A 0.15 kg object rolling at $2\frac{\text{m}}{\text{s}}$
- C. A 0.15 kg object rolling at $1\frac{\text{m}}{\text{s}}$
- D. A 0.4 kg object rolling at $2\frac{\text{m}}{\text{s}}$

Question 11:

When the speed of an object is doubled, its momentum _____.

- A. remains unchanged
- B. doubles
- C. quadruples
- D. decreases

Question 12:

How can a tennis ball and a bowling ball have the same momentum?

- A. have the same speed
- B. have different speeds
- C. one is moving backwards
- D. they can't

Question 13:

A Russian cosmonaut (87 kg) and USA astronaut (94 kg) are outside the ISS and decide to run a momentum experiment. They are motionless facing each other palm to palm, then push apart from each other. What happens to their momentum?

- A. their total momentum doubles
- B. their total momentum decreases
- C. the guy with the smaller mass has less momentum
- D. their momenta are opposite but equal

Question 14:

What is the formula for calculating momentum?

A. $m = mv$

B. $p = \frac{v}{m}$

C. $p = \frac{m}{v}$

D. $p = vm$

Question 15:

A biker with a mass of 75 kg moves along the path with a constant velocity of $5\frac{\text{m}}{\text{s}}$. What is the biker's momentum?

A. $25\frac{\text{m}}{\text{s}}$

B. $375\text{ kg}\frac{\text{m}}{\text{s}}$

C. $375\frac{\text{m}}{\text{s}}$

D. $25\text{ kg}\frac{\text{m}}{\text{s}}$

Question 16:

When a bat collides with a baseball, the momentum of the bat...

A. transfers to the momentum of the ball

B. does not transfer from the bat to the ball

C. transfers from the momentum of the ball

D. does not transfer from the ball to the bat

Question 17:

If two objects collide and stick together, what will happen to their overall momentum?

A. momentum will decrease

B. momentum will stay the same

C. momentum will increase

D. none of the above

Question 18:

The momentum of a truck traveling in a straight line at $25 \frac{m}{s}$ is $37,500 \text{ kg} \frac{m}{s}$.

What is the truck's mass?

- A. $937,500 \text{ kg}$
- B. $1,500 \text{ N}$
- C. $937,500 \text{ N}$
- D. $1,500 \text{ kg}$

Question 19:

A 10 kg toy truck moves at $5 \frac{m}{s}$ East. It collides head-on with a 5 kg toy car moving $10 \frac{m}{s}$ moving West. What is the total momentum of the system?

- A. $10 \text{ kg} \frac{m}{s}$
- B. $50 \text{ kg} \frac{m}{s}$
- C. $30 \text{ kg} \frac{m}{s}$
- D. $0 \text{ kg} \frac{m}{s}$

Answer Key:

1. A
2. C
3. B
4. B
5. A
6. C
7. C
8. A
9. B
10. D
11. B
12. B
13. D
14. D
15. B
16. A
17. B
18. D
19. D