McRoberts Secondary

Momentum Test 2025-10-27

Personal Data

Family Name:

Given Name:

Signature:

checked

Registration Number

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1	☐	☐	☐	☐	☐	☐	☐	1
2	☐	☐	☐	☐	☐	☐	☐	2
3	☐	☐	☐	☐	☐	☐	☐	3
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5	☐	☐	☐	☐	☐	☐	☐	5
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8	☐	☐	☐	☐	☐	☐	☐	8
9	☐	☐	☐	☐	☐	☐	☐	9

In this section **no** changes or modifications must be made!

Scrambling 0 0

Type: 020

Exam ID(Physics 12): 25102700004

Please mark the boxes carefully: ☒ Not marked: ☐ or ■

This document is scanned automatically. Please keep clean and do not bend or fold. For filling in the document please use a **blue or black pen**.

Only clearly marked and positionally accurate crosses will be processed!

Answers 1 - 15

	a	b	c	d
1	☐	☐		
2	☐	☐		
3	☐	☐		
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5	☐	☐	☐	☐
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8	☐	☐	☐	☐
9	☐	☐	☐	☐
10	☐	☐	☐	☐
11	☐	☐	☐	☐
12	☐	☐	☐	☐
13	☐	☐	☐	☐
14	☐	☐	☐	☐
15	☐	☐	☐	☐
	a	b	c	d

Answers 16 - 20

	a	b	c	d
16	☐	☐	☐	☐
17	☐	☐	☐	☐
18	☐	☐	☐	☐
19	☐	☐	☐	☐
20	☐	☐	☐	☐
	a	b	c	d

1. True or false? Momentum is conserved when two objects collide and stick together.
    a. True
    b. False
2. True or false? Kinetic energy is conserved in all collisions.
    a. True
    b. False
3. True or false? Kinetic energy is conserved when two objects collide and stick together.
    a. True
    b. False
4. True or false? Momentum is conserved in both elastic and inelastic collisions.
    a. True
    b. False
5. An object of mass m is moving with momentum p. Which of the following represents its kinetic energy?
    a. $\mathrm{p}^2/(2\mathrm{m})$
    b. $\mathrm{mp}^2/2$
    c. mp
    d. $\mathrm{mp}/2$
6. The area under a force-time graph represents
    a. work
    b. momentum
    c. kinetic energy
    d. impulse
7. In a game of pool, the white cue ball hits the #2 ball and stops, while the #2 ball moves away with the same velocity as the cue ball had originally. Both balls have the same mass. The type of collision is
    a. elastic
    b. inelastic
    c. completely inelastic
    d. any of the above, depending on the mass of the balls
8. A very light object moving to the right collides with a very heavy object at rest. After the collision, the heavy object moves to the right with a small speed, and the light object moves to the left. Which object experienced the greater magnitude of impulse during the collision?
    a. The heavy object.
    b. The light object.
    c. Both objects experienced the same magnitude of impulse.
    d. Cannot be determined from the information given.
9. Two objects collide and stick together. Kinetic energy is
    a. conserved only if there is no friction.
    b. definitely not conserved.
    c. conserved only if the collision is elastic.
    d. definitely conserved.

10. Two objects collide and bounce apart. Linear momentum is

    a. conserved only if the collision is elastic.
    b. conserved only if there is no friction.
    c. definitely conserved.
    d. definitely not conserved.

11. Two objects collide and bounce apart. Kinetic energy is

    a. definitely not conserved.
    b. conserved only if there is no friction.
    c. definitely conserved.
    d. conserved only if the collision is elastic.

12. A very heavy ball rolling with speed v collides with a very light ball at rest. If the collision is completely inelastic, then the speed of the combined mass after the collision is approximately

    a. 0
    b. $v/2$
    c. v
    d. $2v$

13. A ball of mass m rolls with speed v towards another ball of mass $(2/3)\mathrm{m}$ at rest. If the collision is completely inelastic, what is the speed of the combined mass after the collision?

    a. $(3/5)v$
    b. $(2/5)v$
    c. $(2/3)v$
    d. $(3/2)v$

14. A ball of mass 626 g, moving horizontally with speed 30 m/s strikes a wall and rebounds at 29 m/s. What is the magnitude of the change in momentum of the ball?

    a. 36.9 kg m/s
    b. 5.7 kg m/s
    c. 36 900 kg m/s
    d. 0.63 kg m/s

15. A fire hose is turned on the door of a burning building in order to knock it down. This requires a force of 960 N. If the hose delivers 22 kg / s, what is the velocity of water needed, assuming that the water doesn't bounce back?

    a. 44 m/s
    b. 31 m/s
    c. 58 m/s
    d. 25 m/s

16. A 116 g baseball is thrown towards a batter at 10 m/s. The batter hits the ball back along the same path, and at the same speed. If the bat was in contact with the ball for 1.5 ms, the average force exerted by the bat was

    a. 1550 N
    b. 1.55 N
    c. 773 N
    d. 1.16×10^6 N

17. Object 1 and Object 2 have the same momentum. The ratio of Object 1's mass to Object 2's mass is $m_1/m_2 = 2/3$. What is the ratio of Object 1's kinetic energy to Object 2's kinetic energy, KE_1/KE_2?

    a. $2/3$
    b. $4/9$
    c. $3/2$
    d. $9/4$

18. A proton at rest is struck head-on by an alpha particle (which consists of 2 protons and 2 neutrons) moving at speed v. If the collision is completely elastic, what speed will the alpha particle have after the collision? Assume that the neutron's mass is equal to the proton's mass.

    a. $(5/3)v$
    b. $(3/5)v$
    c. $(1/4)v$
    d. $(1/5)v$

19. A skater of mass 93 kg skates at speed 2 m/s towards another skater of mass 44 kg who is standing still with open arms. If the skaters hold on to each other after they collide, with what speed do they both move off together?

    a. 0.77 m/s
    b. 1.36 m/s
    c. 1.85 m/s
    d. 0.99 m/s

20. A bullet (14 g) is fired into the wooden block (1.00 kg) of a ballistic pendulum. As a result, the bullet is lodged into the block, and the centre of mass of the pendulum-projectile system swings up to a maximum height of 72 cm. What was the initial speed of the bullet?

    a. 456 m/s
    b. 239 m/s
    c. 140 m/s
    d. 272 m/s