# McRoberts Secondary

**Momentum Retest 2025-12-04**

Personal Data

Family Name:

Given Name:

Signature:

checked

Registration Number

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| 0 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | 0 |
| 1 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | 1 |
| 2 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | 2 |
| 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | 3 |
| 4 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | 4 |
| 5 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | 5 |
| 6 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | 6 |
| 7 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | 7 |
| 8 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | 8 |
| 9 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | 9 |

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

**Scrambling** 0 0

Type: 020

Exam ID(Physics 12): 25120400001

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 | ☐ | ☐ | | |
| 4 | ☐ | ☐ | | |
| 5 | ☐ | ☐ | ☐ | ☐ |
| 6 | ☐ | ☐ | ☐ | ☐ |
| 7 | ☐ | ☐ | ☐ | ☐ |
| 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 in a completely inelastic collision.
    a. True
    b. False
2. True or false? Momentum is conserved when two objects collide and stick together.
    a. True
    b. False
3. True or false? Kinetic energy is conserved in all collisions.
    a. True
    b. False
4. True or false? Kinetic energy is conserved when two objects collide and stick together.
    a. True
    b. False
5. Impulse is the area under a graph of
    a. momentum vs. time
    b. velocity vs. time
    c. force vs. displacement
    d. force vs. time
6. A ball moving due east at 14 m/s collides with a wall. As a result, the ball moves due west at 14 m/s. Which of the following best describes the collision?
    a. Elastic.
    b. Inelastic.
    c. Completely inelastic.
    d. Any of the above, depending on the mass of the ball.
7. A rubber ball and a lump of putty have equal mass. They are both thrown with equal speed at a wall. The rubber ball bounces back with nearly the same speed with which it hit the wall. The putty sticks to the wall. Which object experiences the greater momentum change?
    a. The ball.
    b. The putty.
    c. Both experience the same momentum change.
    d. Cannot be determined from the information given.
8. A light rubber ball moving at high speed strikes a heavy stationary cart. As a result of the collision, the rubber ball rebounds and the cart rolls forward. Which object experienced the greater magnitude of impulse?
    a. The rubber ball.
    b. The cart.
    c. Both experienced the same magnitude of impulse.
    d. It depends on whether the collision was elastic or inelastic.
9. Two objects collide and bounce apart. Kinetic energy is
    a. conserved only if the collision is elastic.
    b. definitely conserved.
    c. definitely not conserved.
    d. conserved only if there is no friction.

10. A very heavy ball rolling with speed $v$ collides with a very light ball at rest. If the collision is elastic, then the light ball's speed after the collision is approximately

    a. $v/2$
    b. $v$
    c. $2v$
    d. $3v$

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

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

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 425 g, moving horizontally with speed 10 m/s strikes a wall and rebounds at 9.0 m/s. What is the magnitude of the change in momentum of the ball?

    a. 8.1 kg m/s
    b. 4700 kg m/s
    c. 2200 kg m/s
    d. 8100 kg m/s

14. A 131 g baseball is thrown towards a batter at 34.0 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 1.40 ms, the average force exerted by the bat was

    a. $6.36 \times 10^6$ N
    b. $2.16 \times 10^6$ N
    c. 6360 N
    d. 6.36 N

15. The momentum of a male Olympic sprinter in the middle of a 100 m dash is about

    a. $10^1$ kg m/s
    b. $10^2$ kg m/s
    c. $10^3$ kg m/s
    d. $10^4$ kg m/s

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

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

17. A car of mass 1401 kg, traveling with a velocity 67 km/h, strikes a parked truck of mass 14010 kg head-on. The bumpers lock together in this completely inelastic collision. What fraction of the initial kinetic energy is lost in the collision?

    a. $1/100$
    b. $1/11$
    c. $10/11$
    d. $1/10$

18. A skater of mass 66 kg skates at speed 9.0 m/s towards another skater of mass 83 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. 4.9 m/s
    b. 4.5 m/s
    c. 4 m/s
    d. 5.4 m/s

19. A 8.4 kg object moving due north at 29 m/s collides with a barrier for 0.32 s, resulting in a final velocity of 20 m/s due east. What is the magnitude of impulse on the object?

    a. 440 N s
    b. 300 N s
    c. 240 N s
    d. 350 N s

20. A bullet (78 g) is fired into the wooden block (6.00 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 40 cm. What was the initial speed of the bullet?

    a. 256 m/s
    b. 218 m/s
    c. 167 m/s
    d. 329 m/s