ALBERTA PHYSICS 30 · UNIT A · 25 QUESTIONS

Momentum & Impulse — Practice Test

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

1 **A hockey puck with a mass of 0.16 kg is sliding across the ice at 25 m/s. The magnitude of the momentum of the puck is**



A 0.16 kg · m/s

B 25 kg · m/s

C 4.0 kg · m/s

D 1.6×10^2 kg · m/s

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2 **A 0.40 kg ball moving at 12 m/s is caught and brought to rest by a player. The magnitude of the impulse delivered to the ball is**

- **A** 4.8 N · s
- **B** 3.0 N · s
- **C** 0.40 N · s
- **D** 30 N · s

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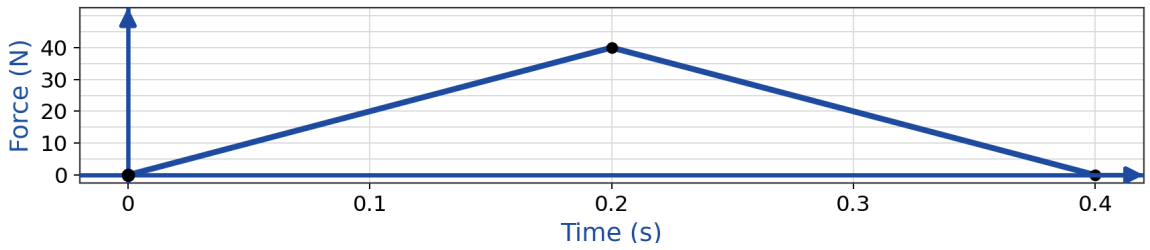
3 **The graph shows the net force acting on an object against time. The average net force acting on the object, in newtons, is ____**



ANSWER _____

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4 **A constant net force of 250 N acts on a crate for 0.80 s. The magnitude of the impulse delivered to the crate is**

- **A** 31 N · s
- **B** 3.1×10^2 N · s
- **C** 20 N · s
- **D** 2.0×10^2 N · s

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5

A 1.2 kg ball moving east at 5.0 m/s strikes a wall and rebounds directly west at 3.0 m/s. The magnitude of the change in momentum of the ball is



A 2.4 kg · m/s

B 9.6 kg · m/s

C 6.0 kg · m/s

D 3.6 kg · m/s

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6 **A 0.50 kg ball moving at 12 m/s toward a wall rebounds directly away from the wall at 8.0 m/s. If the ball is in contact with the wall for 0.010 s, the magnitude of the average force exerted on the ball by the wall is**

- **A** 2.0×10^2 N
- **B** 4.0×10^2 N
- **C** 1.0×10^3 N
- **D** 1.0×10^4 N

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7 **A 1 200 kg car travelling at 8.0 m/s rear-ends a stationary 900 kg car. The two cars lock together. Their common speed immediately after the collision is**

- **A** 4.6 m/s
- **B** 3.4 m/s
- **C** 6.2 m/s
- **D** 8.0 m/s

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8 **Two carts rest on a frictionless track with a compressed spring between them. When the spring is released, the 1.2 kg cart moves away at 2.0 m/s. The speed of the 0.80 kg cart, in metres per second, to the nearest tenth, is ____**

ANSWER _____

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9 **A 1.0 kg ball moving at 6.0 m/s undergoes an elastic collision with a stationary 3.0 kg ball. The speed of the 3.0 kg ball immediately after the collision is**

A 1.5 m/s

B 6.0 m/s

C 4.5 m/s

D 3.0 m/s

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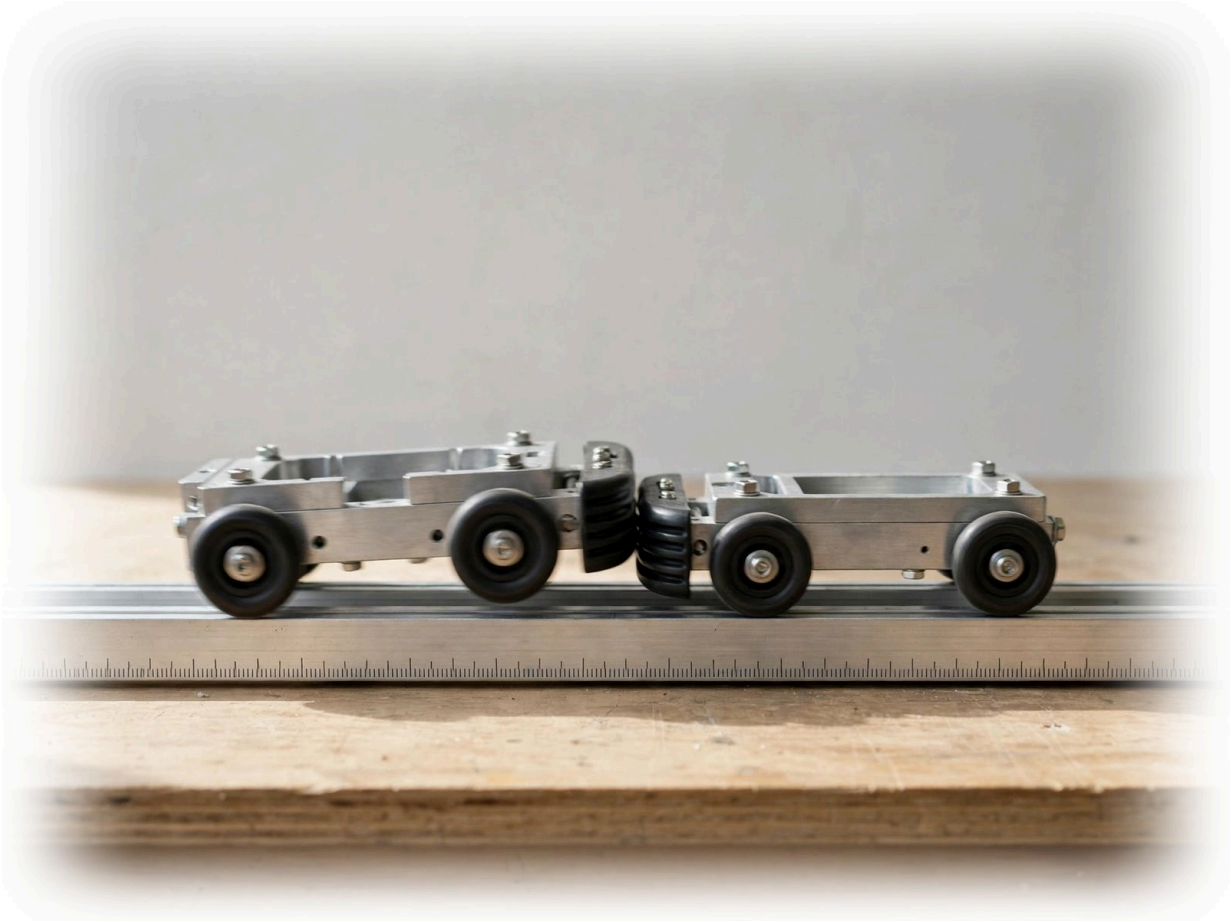
10 A 5.0 kg cart moving at 6.0 m/s collides with a stationary 5.0 kg cart and sticks to it. The kinetic energy lost in the collision is



A 0 J

B 45 J

C 90 J

D 22 J

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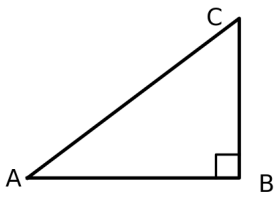
11 **The diagram shows the momentum triangle for the combined lump. A 3.0 kg lump of clay moving north at 5.0 m/s collides with a 4.0 kg lump of clay moving east at 5.0 m/s. The two lumps stick together. The speed of the combined lump immediately after the collision is**



- **A** 2.9 m/s
- **B** 5.0 m/s
- **C** 7.1 m/s
- **D** 3.6 m/s

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12 **The total momentum of a system has an eastward component of 30 kg · m/s and a northward component of 40 kg · m/s. The magnitude and direction of the total momentum are**

- **A** 50 kg · m/s, 53° north of east
- **B** 50 kg · m/s, 37° north of east
- **C** 70 kg · m/s, 53° north of east
- **D** 35 kg · m/s, 37° north of east

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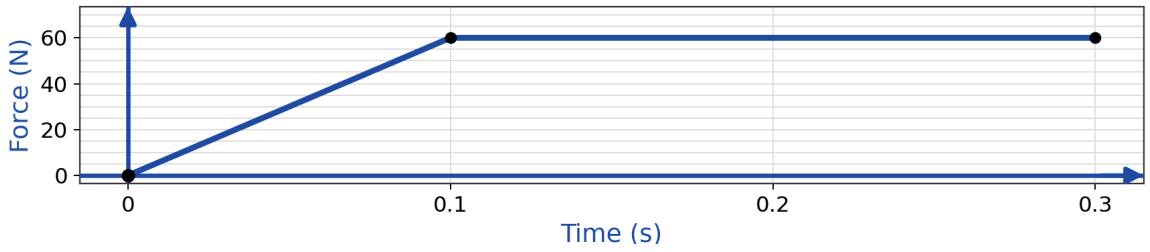
13 **The graph shows the net force acting on an object against time. The impulse delivered to the object, in newton seconds, is _____**



ANSWER _____

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14 **A 60 kg astronaut floating at rest in space throws a 3.0 kg tool at 8.0 m/s. The speed of the astronaut after throwing the tool, in metres per second, to the nearest hundredth, is ____**

ANSWER _____

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15 **A 0.20 kg ball moving at 5.0 m/s strikes a stationary ball of the same mass. After the collision, the first ball moves at 1.0 m/s and the second ball moves at 4.0 m/s, both in the original direction. This collision is best classified as**



A elastic, because both momentum and kinetic energy are conserved

B inelastic, because momentum is conserved but kinetic energy is not

C perfectly inelastic, because the two balls stick together

D impossible, because momentum is not conserved

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16 **A bullet with a mass of 0.020 kg travelling at 400 m/s embeds itself in a stationary 4.0 kg wooden block. The speed of the block and bullet immediately after the impact is**

- **A** 1.0 m/s
- **B** 4.0 m/s
- **C** 2.0 m/s
- **D** 8.0 m/s

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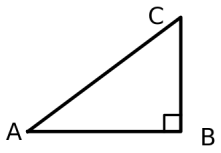
17 **The diagram shows the momentum triangle for the combined mass. Two 0.50 kg balls collide and stick together. One ball moves east at 4.0 m/s and the other moves north at 3.0 m/s. The direction of the combined mass immediately after the collision, in degrees north of east, to the nearest degree, is ____**



ANSWER _____

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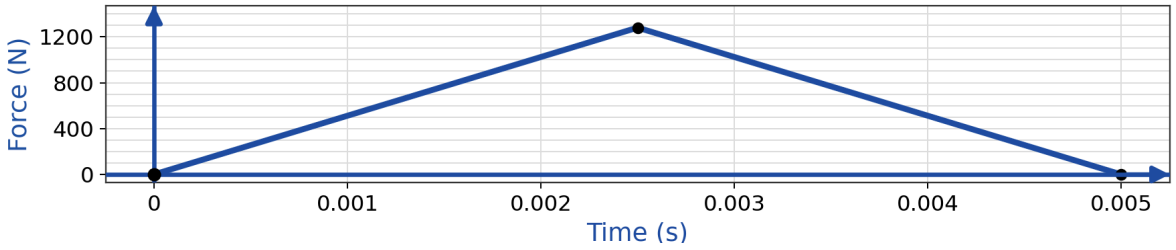
18 **A 0.058 kg tennis ball approaches a racket at 30 m/s and leaves the racket at 25 m/s in the opposite direction. The graph shows the force exerted on the ball against time. The magnitude of the average force exerted on the ball is**



A 58 N

B 2.9×10^2 N

C 3.5×10^2 N

D 6.4×10^2 N

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19 **A 5.0 kg object at rest explodes into two pieces. A 2.0 kg piece flies off at 6.0 m/s. The speed of the remaining 3.0 kg piece, in metres per second, to the nearest tenth, is _____**

ANSWER _____

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20 **A 1 500 kg car travelling east at 20 m/s collides head-on with a 1 000 kg car travelling west at 15 m/s. The cars lock together. The velocity of the combined cars immediately after the collision is**



A 6.0 m/s east

B 6.0 m/s west

C 18 m/s east

D 2.0 m/s east

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21 **A 65 kg driver is brought to rest from a speed of 14 m/s in 0.25 s by an airbag and seatbelt. The magnitude of the average net force exerted on the driver, in newtons, is ____**

ANSWER _____

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22 **A 0.30 kg puck sliding east at 6.0 m/s collides with an identical stationary puck. After the collision, the first puck moves at 3.0 m/s in a direction 60° north of east. The speed of the second puck after the collision is**

A 5.2 m/s

B 4.5 m/s

C 3.0 m/s

D 6.0 m/s

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23 **Crumple zones in a car reduce the force exerted on the passengers during a collision primarily by**

- **A** increasing the impulse delivered to the passengers
- **B** decreasing the change in momentum of the passengers
- **C** increasing the time over which the momentum of the passengers changes
- **D** decreasing the mass of the car

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24 **A 2.0 kg object moving at 8.0 m/s collides with and sticks to a stationary 6.0 kg object. The kinetic energy lost in the collision, in joules, is _____**

ANSWER _____

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25 **A firecracker at rest explodes into three pieces of equal mass. Two of the pieces fly off at 20 m/s, one toward the north and one toward the east. The speed of the third piece is**



A 20 m/s

B 28 m/s

C 35 m/s

D 40 m/s

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ANSWER KEY

1. C
2. A
3. 20
4. D
5. B
6. C
7. A
8. 3
9. D
10. B
11. D
12. A
13. 15
14. 0.4
15. B
16. C
17. 37
18. D
19. 4
20. A
21. 3640
22. A
23. C
24. 48
25. B

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