

Brett Robbins Academic Consulting

Physics 20 Practice Test

Unit B: Dynamics

25 Questions

Original practice questions written to the Alberta curriculum, in the style of past diploma examinations. Work through each question, then check your answers with the key at the end.

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, contact Brett for clarification.

Question 1

A hockey puck slides across a frictionless ice surface at a constant velocity.

The net force, $\vec{F}_{\text{net}}$, acting on the puck is

- A) in the direction of motion
- B) zero
- C) equal to the weight of the puck
- D) directed toward the ice surface

Question 2

The weight of a 12 kg mass on Earth, where $g = 9.81 \text{ m/s}^2$, is

- A) 118 N
- B) 12 N
- C) 1.22 N
- D) $1.18 \times 10^3 \text{ N}$

Question 3

A book rests motionless on a horizontal table. The gravitational force that Earth exerts on the book forms an action – reaction pair with

- A) the normal force exerted on the book by the table
- B) the gravitational force exerted on Earth by the book
- C) the force exerted on the table by the book
- D) the force exerted on the book by the table due to friction

Question 4

A net force of 36 N acts on a 4.5 kg object.

The acceleration of the object, in m/s^2 to the nearest tenth, is ____

Question 5

A crate slides across a rough horizontal floor. The force of kinetic friction acting on the crate is directed

- A) perpendicular to the floor
- B) in the same direction as the motion
- C) opposite to the direction of motion
- D) in the direction of the applied force

Question 6

A 15 kg box slides across a horizontal surface. The coefficient of kinetic friction between the box and the surface is 0.25. Use $g = 9.81 \text{ m/s}^2$.

The magnitude of the force of kinetic friction acting on the box is

- | | |
|-----------|-----------|
| A) 3.75 N | B) 147 N |
| C) 589 N | D) 36.8 N |

Question 7

A horizontal force of 150 N pushes a 25 kg crate across a floor.

The force of friction opposing the motion is 50 N.

The acceleration of the crate is

- | | |
|------------------------|------------------------|
| A) 4.0 m/s^2 | B) 2.0 m/s^2 |
| C) 6.0 m/s^2 | D) 8.0 m/s^2 |

Question 8

A 30 kg crate rests on a horizontal floor. The coefficient of static friction between the crate and the floor is 0.45. Use $g = 9.81 \text{ m/s}^2$.

The maximum force of static friction, in newtons to the nearest newton, is ____

Question 9

A student pushes against a wall with a horizontal force of 200 N.

The force that the wall exerts back on the student is

- A) 0 N, because the wall does not move
- B) 200 N in the same direction as the push
- C) 200 N in the direction opposite to the push
- D) 400 N in the direction opposite to the push

Question 10

An astronaut has a mass of 80 kg. On a planet where the acceleration due to gravity is 3.7 m/s^2 , the weight of the astronaut is

- | | |
|--------------------------------|--------------------------------|
| A) $7.8 \times 10^2 \text{ N}$ | B) $3.0 \times 10^2 \text{ N}$ |
| C) 80 N | D) 22 N |

Question 11

Two blocks, of mass 3.0 kg and 5.0 kg, are connected by a light rope on a frictionless horizontal surface. A horizontal force of 40 N is applied to the 5.0 kg block, pulling both blocks to the right.

The tension in the rope is

- | | |
|----------|---------|
| A) 40 N | B) 25 N |
| C) 5.0 N | D) 15 N |

Question 12

A 4.0 kg block rests on a frictionless horizontal table. A light rope attached to the block passes over a pulley at the edge of the table, and a 2.0 kg mass hangs from the other end of the rope. Use $g = 9.81 \text{ m/s}^2$.

The acceleration of the system is

- | | |
|-------------------------|-------------------------|
| A) 3.27 m/s^2 | B) 6.54 m/s^2 |
| C) 9.81 m/s^2 | D) 1.64 m/s^2 |

Question 13

A 6.0 kg block rests on a frictionless horizontal table and is connected by a light rope over a pulley at the edge of the table to a hanging mass of 4.0 kg. Use $g = 9.81 \text{ m/s}^2$.

The tension in the rope, in newtons to the nearest tenth, is ____

Question 14

A block slides down a frictionless ramp inclined at 30° to the horizontal.

Use $g = 9.81 \text{ m/s}^2$. The acceleration of the block down the ramp is

- | | |
|------------------------|-------------------------|
| A) 8.5 m/s^2 | B) 9.81 m/s^2 |
| C) 4.9 m/s^2 | D) 2.5 m/s^2 |

Question 15

A 10 kg crate slides down a ramp inclined at 25° to the horizontal.

The coefficient of kinetic friction between the crate and the ramp is 0.20.

Use $g = 9.81 \text{ m/s}^2$. The acceleration of the crate down the ramp is

- | | |
|------------------------|------------------------|
| A) 4.1 m/s^2 | B) 2.4 m/s^2 |
| C) 5.9 m/s^2 | D) 1.8 m/s^2 |

Question 16

A 8.0 kg block rests on a ramp inclined at 20° to the horizontal.

Use $g = 9.81 \text{ m/s}^2$. The magnitude of the normal force exerted on the block by the ramp is

- | | |
|---------|---------|
| A) 78 N | B) 27 N |
| C) 69 N | D) 74 N |

Question 17

A box sliding across a horizontal floor comes to rest under the force of kinetic friction alone. The coefficient of kinetic friction is 0.30.

Use $g = 9.81 \text{ m/s}^2$. The magnitude of the acceleration of the box, in m/s^2 to the nearest hundredth, is _____

Question 18

A force of 50 N is applied to a 10 kg box at an angle of 30° above the horizontal. The box is on a frictionless horizontal surface.

The acceleration of the box is

- | | |
|------------------------|------------------------|
| A) 4.3 m/s^2 | B) 5.0 m/s^2 |
| C) 2.5 m/s^2 | D) 8.7 m/s^2 |

Question 19

On a frictionless horizontal surface, a horizontal force of 48 N is applied to the back of a 6.0 kg block, which pushes against a 2.0 kg block in front of it. Both blocks move together. The force that the 6.0 kg block exerts on the 2.0 kg block is

- | | |
|---------|----------|
| A) 48 N | B) 36 N |
| C) 12 N | D) 6.0 N |

Question 20

A 8.0 kg crate on a horizontal floor is pulled by a horizontal force of 50 N. The coefficient of kinetic friction between the crate and the floor is 0.25. Use $g = 9.81 \text{ m/s}^2$. The acceleration of the crate, in m/s^2 to the nearest tenth, is ____

Question 21

A person with a mass of 70 kg stands on a scale in an elevator. The elevator accelerates upward at 2.0 m/s^2 . Use $g = 9.81 \text{ m/s}^2$. The reading on the scale, expressed as a force, is

- | | |
|--------------------------------|--------------------------------|
| A) $6.9 \times 10^2 \text{ N}$ | B) $8.3 \times 10^2 \text{ N}$ |
| C) $5.5 \times 10^2 \text{ N}$ | D) $9.7 \times 10^2 \text{ N}$ |

Question 22

A box is pushed across a rough horizontal floor at a constant velocity by a horizontal applied force of 85 N. The magnitude of the force of kinetic friction acting on the box is

- | | |
|----------------------|-------------------|
| A) 0 N | B) less than 85 N |
| C) greater than 85 N | D) 85 N |

Question 23

A 5.0 kg block is held at rest on a ramp inclined at 35° to the horizontal by the force of static friction. Use $g = 9.81 \text{ m/s}^2$. The magnitude of the force of static friction, in newtons to the nearest newton, is ____

Question 24

Two forces act on a 5.0 kg object at rest on a frictionless surface :

a force of 30 N directed east and a force of 40 N directed north.

The magnitude of the acceleration of the object is

A) 10 m/s^2

B) 14 m/s^2

C) 2.0 m/s^2

D) 70 m/s^2

Question 25

A 4.0 kg block rests on a frictionless ramp inclined at 30° to the

horizontal. A light rope attached to the block runs up the ramp and over a pulley at the top, and a 6.0 kg mass hangs from the other end.

Use $g = 9.81 \text{ m/s}^2$. The magnitude of the acceleration of the system, in m/s^2 to the nearest hundredth, is ____

Answer Key

- | | | |
|--------|----------|----------|
| 1. B | 10. B | 19. C |
| 2. A | 11. D | 20. 3.8 |
| 3. B | 12. A | 21. B |
| 4. 8.0 | 13. 23.5 | 22. D |
| 5. C | 14. C | 23. 28 |
| 6. D | 15. B | 24. A |
| 7. A | 16. D | 25. 3.92 |
| 8. 132 | 17. 2.94 | |
| 9. C | 18. A | |

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