Sample Placement Test

1. Two carts collide elastically on a frictionless track. Cart A (1.0 kg) moves at 3.0 m/s in the positive x direction, and Cart B (2.0 kg) is at rest. What is Cart A's velocity after collision?

A) 1.0 m/s **î**
B) +1.0 m/s **î**
C) +2.0 m/s **î**
D) +0.0 m/s **î**
Correct answer: A

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2. A force of 10 N is applied tangentially to a 2 kg solid cylinder (radius = 0.5 m) causing it to rotate. What is the cylinder's angular acceleration?
A) 10 rad/s²
B) 5 rad/s²
C) 20 rad/s²
D) 8 rad/s²
Correct answer: C

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3. A ball of mass 0.5 kg is swung in a horizontal circle on a 1.2 m long string. If the tension in the string is 18 N, what is the speed of the ball?
A) 6.6 m/s
B) 4.9 m/s
C) 3.8 m/s
D) 5.2 m/s

Correct answer: A

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4. A rotating platform (I = 2.5 kg·m²) slows from 8 rad/s to 4 rad/s in 5 seconds due to friction. What is the torque applied?
A) -2.0 Nm
B) -1.5 Nm
C) -3.0 Nm
D) -1.0 Nm
Correct answer: A

Sample Placement Test

5. A 0.2-kg object moving at 10 m/s strikes a wall perpendicularly and bounces back with a speed of 8 m/s. What is the magnitude of the impulse delivered by the wall?
A) 1.6 N·s
B) 3.6 N·s
C) 2.0 N·s
D) 0.4 N·s
Correct answer: B

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6. A disk with moment of inertia 0.4 kg·m² is spun up from rest by a constant torque of 1.2 Nm. How long does it take to reach 6 rad/s?
A) 1.5 s
B) 2.0 s
C) 2.5 s
D) 3.0 s
Correct answer: B

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7. A spinning figure skater pulls in her arms, reducing her moment of inertia to half. What happens to her angular velocity?
A) Doubles
B) Halves
C) Quadruples
D) Stays the same
Correct answer: A

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8. A car honks its horn while moving toward a stationary observer. Which of the following best describes the sound heard by the observer?
*A) Higher frequency than emitted
B) Lower frequency than emitted
C) Same frequency as emitted
D) Zero frequency
Correct answer: A

Sample Placement Test

9. What is the time required to charge a capacitor to 95.0% of maximum in an RC circuit with a 2.0 kΩ resistor and a 10 μF capacitor?
A) 0.01 s
B) 0.02 s
*C) 0.06 s
D) 2.0 s
Correct answer: C

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10. A proton moving at 2.0×10^6 m/s enters a zone of uniform magnetic field (0.10 T) perpendicular to its velocity. What is the radius of its circular path? (mass = 1.67×10^{-27} kg, charge = 1.6×10^{-19} C)
*A) 0.21 m
B) 0.33 m
C) 0.42 m
D) 0.52 m
Correct answer: A

END OF SAMPLE TEST