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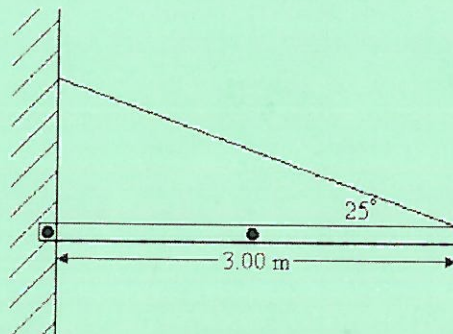
PHYS 1301
Exam III
Chapters 10-11 and 13-15
Fall 2010

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- C* 1) A solid disk is released from rest and rolls without slipping down an inclined plane that makes an angle of 25.0° with the horizontal. What is the speed of the disk after it has rolled 3.00 m, measured along the plane?
A) 3.53 m/s B) 6.29 m/s C) 4.07 m/s D) 2.04 m/s E) 5.71 m/s

- A* 2) One of the harmonics of a string fixed at both ends has a frequency of 52.2 Hz and the next higher harmonic has a frequency of 60.9 Hz. What is the fundamental frequency of the string?
A) 8.7 Hz B) 4.35 Hz C) 26.1 Hz D) 30.4 Hz E) 17.4 Hz

FIGURE 11-6



- D* 3) A store's sign, with a mass of 20.0 kg and 3.00 m long, has its center of gravity at the center of the sign. It is supported by a loose bolt attached to the wall at one end and by a wire at the other end, as shown in **Figure 11-6**. The wire makes an angle of 25.0° with the horizontal. What is the tension in the wire?
A) 116 N B) 196 N C) 297 N D) 232 N E) 464 N

- A* 4) A wheel rotates through an angle of 320° as it slows down from 78.0 rpm to 22.8 rpm. What is the magnitude of the average angular acceleration of the wheel?
A) 5.48 rad/s^2 B) 6.50 rad/s^2 C) 2.34 rad/s^2 D) 10.9 rad/s^2 E) 8.35 rad/s^2

- C* 5) A 5.0-m radius playground merry-go-round with a moment of inertia of $2000 \text{ kg}\cdot\text{m}^2$ is rotating freely with an angular speed of 1.0 rad/s. Two people, each having a mass of 60 kg are standing right outside the edge of the merry-go-round and step on it with negligible speed. What is the angular speed of the merry-go-round right after the two people have stepped on?
A) 0.60 rad/s B) 0.20 rad/s C) 0.40 rad/s D) 0.67 rad/s E) 0.80 rad/s

- E* 6) A mass of 500 g is resting on a vertical spring with a force constant of 55.0 N/m. A mass of 250 g is dropped from a height of 12.0 cm onto the larger mass and sticks to it. What is the amplitude of the resulting oscillations?
A) 6.34 cm B) 9.90 cm C) 4.71 cm D) 11.4 cm E) 5.97 cm

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7) A car approaches you at a constant speed, sounding its horn, and you hear a frequency of 76 Hz. After the car goes by, you hear a frequency of 65 Hz. What is the frequency of the sound emitted by the horn? The speed of sound in air is 343 m/s.

- A) 72 Hz B) 69 Hz C) 70 Hz D) 71 Hz E) 68 Hz

B

8) A mass is oscillating on a spring with a period of 4.60 s. At $t = 0$ s the mass has zero speed and is at $x = 8.30$ cm. What is its acceleration at $t = 2.50$ s?

- A) 0.784 cm/s^2 B) 14.9 cm/s^2 C) 1.33 cm/s^2 D) 0 cm/s^2 E) 11.5 cm/s^2

E

9) An incompressible fluid flows steadily through a pipe that has a change in diameter. The fluid speed at a location where the pipe diameter is 8.0 cm is 1.28 m/s. What is the fluid speed at a location where the diameter has narrowed to 4.0 cm?

- A) 1.28 m/s B) 0.32 m/s C) 2.56 m/s D) 0.64 m/s E) 5.12 m/s

D

10) A child is riding a merry-go-round, which has an instantaneous angular speed of 1.25 rad/s and an angular acceleration of 0.745 rad/s^2 . The child is standing 4.65 m from the center of the merry-go-round. What is the magnitude of the acceleration of the child?

- A) 4.10 m/s^2 B) 7.27 m/s^2 C) 2.58 m/s^2 D) 8.05 m/s^2 E) 3.46 m/s^2

B

11) The torque required to turn the crank on an ice cream maker is 4.50 Nm. How much work does it take to turn the crank through 300 full turns?

- A) 2120 J B) 8480 J C) 1350 J D) 4240 J E) 2700 J

E

12) A 15.0-kg child is sitting on a playground teeter-totter, 1.50 m from the pivot. What is the minimum distance, on the other side of the pivot, such that a 220-N force will make the child lift off the ground?

- A) 0.102 m B) 2.35 m C) 1.50 m D) 9.78 m E) 1.00 m