Instructor(s): *C. Parks*

PHYSICS DEPARTMENT

PHY2053, Summer 2013   Final Exam   August 8, 2013

Name (print, last first): _____   Signature: _____

On my honor, I have neither given nor received unauthorized aid on this examination.

YOUR TEST NUMBER IS THE 5-DIGIT NUMBER AT THE TOP OF EACH PAGE.

(1) **Code your test number on your answer sheet (use lines 76–80 on the answer sheet for the 5-digit number)**. Code your name on your answer sheet. **DARKEN CIRCLES COMPLETELY**. Code your UFID number on your answer sheet.

(2) Print your name on this sheet and sign it also.

(3) Do all scratch work anywhere on this exam that you like. **Circle your answers on the test form.** At the end of the test, this exam printout is to be turned in. No credit will be given without both answer sheet and printout.

(4) **Blacken the circle of your intended answer completely, using a #2 pencil or <u>blue</u> or <u>black ink</u>**. Do not make any stray marks or some answers may be counted as incorrect.

(5) **The answers are rounded off. Choose the closest to exact. There is no penalty for guessing. If you believe that no listed answer is correct, leave the form blank.**

(6) Hand in the answer sheet separately.

Given Information:

$g = 9.80$ m/s^2 cylinder $I = MR^2/2$ density of water $= 1000$ kg/m^3

speed of sound $= 340$ m/s $A = \pi r^2$ 1 m $= 100$ cm   1 minute $= 60$ s

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1. When $\vec{A}$ (magnitude 50 m, directed at 40° N of E) is added to $\vec{B}$, the resultant is a vector pointing due N with a magnitude of 50 m. What is the magnitude of $\vec{A} + 2\vec{B}$?

   (1) 78 m   (2) 100 m   (3) 135 m   (4) 65 m   (5) None of these.

2. The first car travels at a constant speed of 25 m/s for one minute. A second car starts from rest and accelerates at a constant 3 m/s^2. How long will it take for the second car to travel the same distance as the first car?

   (1) 32 s   (2) 22 s   (3) 1000 s   (4) 47 s   (5) None of these.

3. A 5-kg block slides without friction down a ramp inclined at 36.9°. What is the acceleration of the block?

   (1) None of these.   (2) 7.8 m/s^2 (3) 9.8 m/s^2 (4) 7.4 m/s^2 (5) 4.9 m/s^2

4. A ball is tied to a rope with a 3-m long cord. The ball swings around the pole so that it makes a 30° angle with the pole. What is the angular speed of the ball?

   (1) 1.9 rad/s
   (2) 2.6 rad/s
   (3) 1.4 rad/s
   (4) 3.8 rad/s
   (5) None of these.
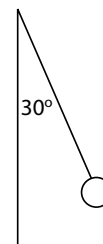
5. A 0.5-kg rock kicked across a level parking lot travels 16 m before it stops. If the coefficient of friction between the rock and the parking lot is 0.26, what is the initial speed of the rock?

   (1) 9.0 m/s   (2) 13 m/s   (3) 6.4 m/s   (4) 18 m/s   (5) None of these.

6. A 1000-kg railroad car moving to the right at 5 m/s is struck by another railroad (1500 kg) moving at 6 m/s. After the collision, the cars stick together. What is the speed of the combination immediately after the collision?
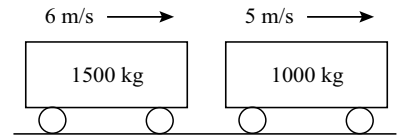
(1) 5.6 m/s
(2) 5.5 m/s
(3) 6.0 m/s
(4) 5.7 m/s
(5) 5.8 m/s

7. A 25-kg, 3-m ladder is leaning against the wall as shown. Because of damage to the ladder, its center of mass is not at the center. The center of mass is now 2/3 of the way from the foot of the ladder. What is the force of the wall pushing against the ladder?
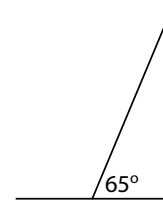

(1) 76 N   (2) 57 N   (3) 38 N   (4) 245 N   (5) None of these.

8. A rope is wrapped around a 30-kg cylinder. Attached to the end of the rope is a 2 kg mass. The radius of the cylinder is 0.20 m. The 2 kg mass is released from rest and the cylinder, starting also from rest, begins to rotate. What is the angular velocity of the cylinder 10 s after the mass is released? Assume the cylinder rides on frictionless bearings.

(1) None of these.   (2) 33 rad/s   (3) 13 rad/s   (4) 21 rad/s   (5) 65 rad/s

9. Water flows through a bent tube with constant area. The water's velocity at 1 is 2.5 m/s. What is the pressure difference $P_2 - P_1$ if the height difference is 10 m?
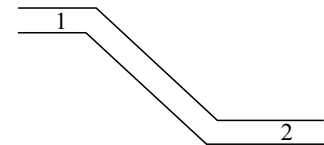
(1) 9.8×10^4 Pa   (2) 4.9×10^4 Pa   (3) 9.8×10^3 Pa   (4) 4.9×10^3 Pa   (5) None of these.

10. The period of a simple harmonic oscillator is 5 s. If the spring if unchanged, what has to happen if the period becomes 10 s?

(1) Quadruple the mass.   (2) Double the mass.   (3) Halve the mass.   (4) Quarter the mass.   (5) None of these.

11. Which traveling wave has the greatest speed?

(1) $y = A\cos((40 \text{ rad/s})t - (20 \text{ rad/m})x)$
(2) $y = A\cos((30 \text{ rad/s})t - (20 \text{ rad/m})x)$
(3) $y = A\cos((20 \text{ rad/s})t - (20 \text{ rad/m})x)$
(4) $y = A\cos((40 \text{ rad/s})t - (30 \text{ rad/m})x)$
(5) $y = A\cos((20 \text{ rad/s})t - (30 \text{ rad/m})x)$

12. A one meter tube open at both ends resonates at its fundamental frequency. The E string on a guitar has a mass per unit length of 4.5×10^{-4} kg/m and it resonates at the same frequency. What is the tension in the string if it is also 1.0 m long?

(1) 52 N   (2) 74 N   (3) 37 N   (4) 104 N   (5) None of these.