Instructor(s): *C. Parks*

PHYSICS DEPARTMENT

PHY2053, Summer 2016 EXAM 2 July 5, 2016

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

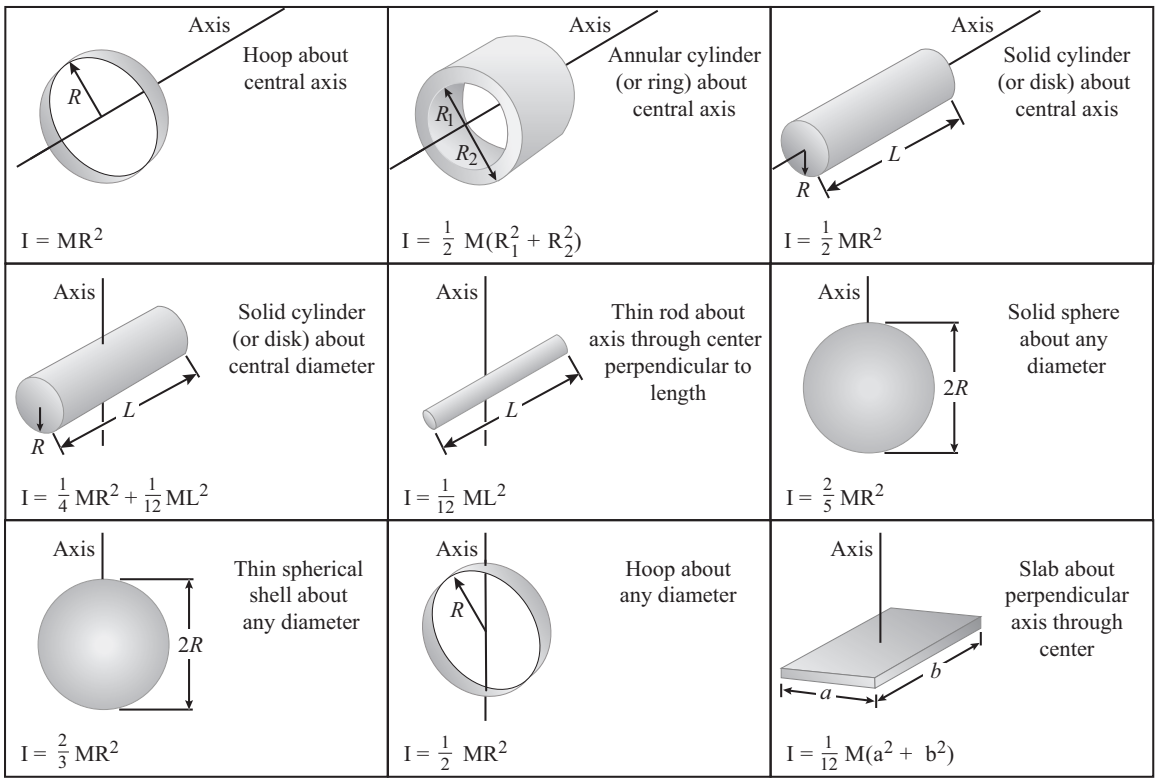
On my honor, I have neither given nor received unauthorized aid on this examination.

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 blue or black ink**. 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:

$g = 9.8$ m/s^2 1 m = 100 cm 1 kg = 1000 g



1. A ball dropped from height h hts the ground with velocity v. A what height is the velocity $v/3$?

   (1) $8h/9$ (2) $2h/3$ (3) $h/3$ (4) $5h/6$ (5) None of these.

2. A 3.0-kg block has an initial speed of 4.0 m/s and slides to a stop on a horizontal table. If the block stops in 3.0 m, what is the average frictional force acting on the block?

   (1) 8.0 N (2) 4.0 N (3) 2.0 N (4) 10.0 N (5) None of these.

3. Initially a spring with $k = 250$ N/m hangs vertically. Then a 4.0-kg object is attached to the spring and the spring is pulled down by 0.20 m <u>below</u> its unstretched position. What is the acceleration of the 4.0-kg object when it is released?

   (1) 2.7 m/s^2 (2) 22 m/s^2 (3) 13 m/s^2 (4) 4.9 m/s^2 (5) None of these.

4. A 60-kg gymnast is jumping on a trampoline. She jumps so that her feet reach a maximum height of 2.0 m above the trampoline and when she lands, her feet stretch the trampline down by 0.70 m. Rounded to two significant figures, how far does the trampoline stretch when she stands on it at rest?

   (1) 0.091 m (2) 0.12 m (3) 0.18 m (4) 0.24 m (5) None of these.

5. A rope pulls a box with a constant speed of 3.0 m/s. The rope makes a 40° angle with the horizontal. If the power supplied by the rope to the box is 300 W, what is the tension in the rope? Round your answer to two significant figures.

   (1) 130 N (2) 100 N (3) 160 N (4) 120 N (5) None of these.

6. An automobile traveling at a speed of 30.0 m/s applies its brakes and comes to a stop in 5.0 s. If the automobile has a mass of 1000 kg, what is the average horizontal force exerted on it during braking? Assume the road is level.

   (1) 6000 N (2) 7000 N (3) 8000 N (4) 9000 N (5) None of these.

7. An 8.0-kg object sliding at 6.0 m/s collides head on with a stationary 4.0-kg object. The collision is one dimensional and inelastic. After the collision the 8.0-kg object retains 1/3 of its initial linear momentum. What is the speed of the 4.0-kg object after the collision? Assume the objects slide on a frictionless surface.

   (1) 8.0 m/s (2) 4.0 m/s (3) 2.0 m/s (4) 6.0 m/s (5) None of these.

8. A 1.0-kg cart collides elastically with a 4.0-kg cart. Before the one dimensional collision, the 1.0-kg cart travels to the right at 3.0 m/s and the 4.0-kg cart travels to the right at 2.0 m/s. What is the velocity of the 1.0-kg cart after the collision?

   (1) 1.4 m/s (2) 2.4 m/s (3) 2.0 m/s (4) 3.5 m/s (5) None of these.

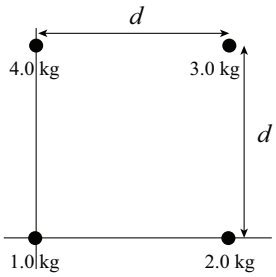
9. A 900-kg car is driving to the east along Newberry Road. It collides into the rear of a 1100-kg car traveling at 16 m/s eastward along Newberry. After the collision, the cars are stuck together and their velocity is 19.6 m/s to the east. What was the speed of the 900-kg car before the collision? Round your answer to two significant figures.

   (1) 24 m/s (2) 63 m/s (3) 43 m/s (4) 21 m/s (5) None of these.

10. A 900-kg car is traveling east along Newberry Road at 20 m/s. A 1100-kg car is traveling north along University Avenue at 20 m/s. The cars collide and stick together. What is (a) the magnitude of the total linear momentum of the combination and (b) their speed after the collision? The answers were rounded to two significant figures.

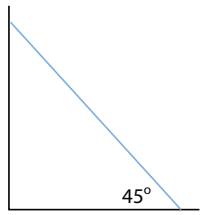
(1) (a) 28,000 kg-m/s (b) 14 m/s
(2) (a) 40,000 kg-m/s (b) 20 m/s
(3) (a) 28,000 kg-m/s (b) 20 m/s
(4) (a) 40,000 kg-m/s (b) 14 m/s
(5) None of these.

11. Find the coordinates of the center of mass for the given figure. Use $d = 1.5$ m.



(1) (0.75 m, 1.05 m)
(2) (1.05 m, 0.75 m)
(3) (0.90 m, 0.60 m)
(4) (0.60 m, 0.90 m)
(5) None of these.

12. A 10-foot ladder weighing 40 pounds is leaning against a wall as shown. Since The ladder is uniform its center of mass is at its center. The ladder is in equilibrium. Find the force of the wall pushing against the top of the ladder.



(1) 20 pounds
(2) 10 pounds
(3) 30 pounds
(4) 40 pounds
(5) None of these.

13. A grinding wheel is used to sharpen knifes. The grinding wheel is a uniform disk spinning about its central axis. To start the wheel a 72 N-m torque acts for 10 seconds and the wheel's angular speed becomes 20 rad/s. If the mass of the wheel is 50 kg, what is the wheel's radius?

(1) 1.20 m (2) 0.85 m (3) 1.34 m (4) 1.47 m (5) None of these.

14. A thin hoop is spinning about its central axis. The mass of the hoop is 5.0 kg, its radius is 0.50 m, and its rotational kinetic energy is 500 J. The hoop falls from its support and lands on the floor, a very short distance below the hoop. Because the distance is short, you can ignore the change in gravitational potential energy. The hoop rolls without slipping but loses half of its kinetic energy after hitting the ground. What is the speed of the hoop as it rolls on the ground? The answers are rounded to two significant figures.

(1) 7.1 m/s (2) 10 m/s (3) 8.2 m/s (4) 12 m/s (5) None of these.

15. Initially, an object's angular speed is 5.0 rad/s when its rotational inertia is 100 kg-m^2. The object's rotational inertia changes and it now rotates at 10 rad/s. What is the new rotational inertia of the object?

(1) 50 kg-m^2 (2) 200 kg-m^2 (3) 150 kg-m^2 (4) 75 kg-m^2 (5) None of these.