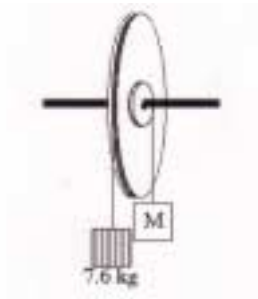


**PHYSICS 218, Spring 2003****Test #2****ORANGE-GOLD TEST DATE**

Fill in your name and I.D. number in both letters and filled circles in the area indicated on the scantron sheet. Use only a #2 pencil. Sign the scantron sheet where indicated. For section, use your lab number. Mark the correct answers on your copy of the test and fill in the answers in the circles on the scantron sheet. Hand in the scantron sheet and keep your test to check answers against the key to be posted outside. **BE SURE TO HAND IN YOUR SCANTRON SHEET IN THE CORRECT COLOR PILE.** Pick the answer closest to yours as some roundoff occurs. There are 10 questions, do them all. This is a one-hour exam.

1. A car with kinetic energy  $8 \times 10^6$  J travels along a horizontal road. How much power is required to stop the car in 10 s?
  - a. zero
  - b.  $8 \times 10^4$  W
  - c.  $8 \times 10^5$  W
  - d.  $8 \times 10^6$  W
  - e.  $8 \times 10^7$  W
  
2. In the drawing below, the large wheel has a radius of 8.5 m. A rope is wrapped around the edge of the wheel and a 7.6-kg box hangs from the rope. A smaller disk of radius 1.9 m is attached to the wheel. A rope is also wrapped around the edge of the disk. An axis of rotation passes through the center of the wheel-disk system.

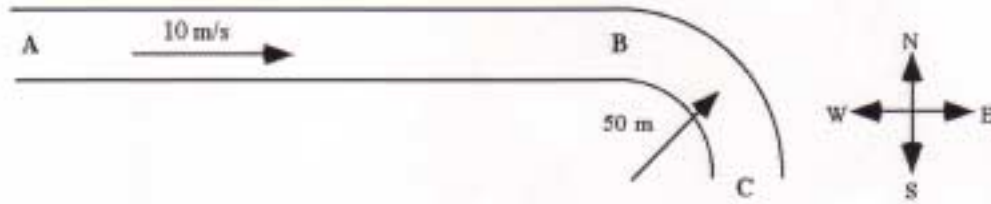


What is the value of the mass M which will prevent the wheel from rotating?

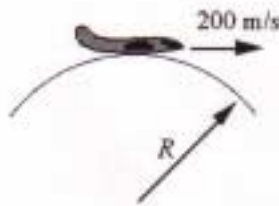
- a. 12 kg
- b. 34 kg
- c. 1.7 kg
- d. 3.8 kg
- e. 46 kg

3. Two cars of equal mass collide on a horizontal frictionless surface. Before the collision, car **A** is at rest while car **B** has a constant velocity of 12 m/s. After the collision, the two bodies are stuck together. What is the speed of the composite body (**A + B**) after the collision?
- a. 3 m/s
  - b. 6 m/s
  - c. 12 m/s
  - d. 24 m/s
  - e. 30 m/s
4. An airplane engine starts from rest and 2 seconds later it is rotating with an angular speed of 300 rev/min. If the angular acceleration is constant, how many revolutions does the propeller undergo during this time?
- a. 5
  - b. 10
  - c. 50
  - d. 300
  - e. 600

A 1000 kg car travels along a straight portion of highway (from **A** to **B**) at a constant speed of 10 m/s. At **B**, the car encounters a curve of radius 50 m. The car follows the road from **B** to **C** traveling at a constant speed of 10 m/s while the direction of the car changes from east to south



5. Refer to the information above. What is the magnitude of the acceleration of the car as it travels from **B** to **C**?
- 2.0 m/s<sup>2</sup>
  - 5.0 m/s<sup>2</sup>
  - 10 m/s<sup>2</sup>
  - 15 m/s<sup>2</sup>
  - zero
6. Refer to the information above. Determine the force of friction between the tires and the road as the car negotiated the curve from **B** to **C**.
- 1000 N
  - 2000 N
  - 5000 N
  - 10,000 N
  - 20,000 N
7. A plane is traveling at 200 m/s following the arc of a verticle circle of radius R. At the top of its path, the passengers experience weightlessness . To one significant figure, what is the value of R?



- 200 m
- 1000 m
- 2000 m
- 4000 m
- 40,000 m

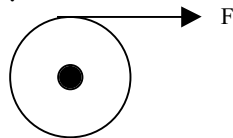
A space vehicle of mass  $m$  has speed  $v$ . At some instant, it separates into two pieces, each of mass  $m/2$ . One of the pieces is at rest just after the separation.

8. Refer to the information above. Which statement is true concerning this situation?
- a. The moving piece has speed  $2v$ .
  - b. This process conserves kinetic energy.
  - c. The piece at rest possesses kinetic energy.
  - d. The process does not conserve total energy.
  - e. This process does not conserve momentum.

9. A roller coaster car travels at  $20 \text{ m/s}$  along a straight horizontal track. What would its speed be after climbing the  $15 \text{ m}$  hill shown in the figure if friction is ignored?



- a.  $3.0 \text{ m/s}$
  - b.  $5.0 \text{ m/s}$
  - c.  $10 \text{ m/s}$
  - d.  $14 \text{ m/s}$
  - e.  $17 \text{ m/s}$
10. A string is wrapped around a pulley of radius  $0.05 \text{ m}$  and moment of inertia  $0.2 \text{ kg m}^2$ . If the string is pulled with a force  $F$ , the resulting angular acceleration of a pulley is  $2 \text{ rad/s}^2$ .



Determine the magnitude of the force  $F$ .

- a.  $0.4 \text{ N}$
- b.  $2 \text{ N}$
- c.  $8 \text{ N}$
- d.  $16 \text{ N}$
- e.  $40 \text{ N}$

**Answer Key**

**PHYSICS 218, Spring 2003**

**Test #1**

**GREEN TEST**

**DATE**

1. C

2. B

3. B

4. A

5. A

6. B

7. D

8. A

9. C

10. C