Physics 2205   23 September, 1999
Practice for Exam 1

Suggestion: Take this practice exam like it's the real thing, but only after you feel you are reasonably well-prepared. That will give you an indication of how well you'll do on the actual exam. Use your incorrect answers to steer you to material you need to review.

Questions 1-10 are each worth **8** points. Questions 11 and 12 are each worth 10 points.

1.   It's the final seconds of a basketball game, and Josh shoots a basket with 1.25 seconds remaining in the game. If he sinks it right at the buzzer from a distance of 5.0 m, how fast was the basketball going when he released it? You may assume that Josh released the ball at the same height as the basket (jump-shot!).

    A)   4.0 m/s
    B)   7.3 m/s
    C)   13 m/s
    D)   54 m/s
    E)   none of the above   Answer: _____

2.   A large crate of mass 68 kg rests on a loading ramp, and it is held in place by a cable tied to the door at the top of the ramp. Both the ramp and the cable make an angle of 25° with respect to the horizontal. The cable will break if the tension is greater than 1000 N. What is the tension in the cable? Assume no friction on the ramp and no mass in the cable.

    A)   280 N
    B)   310 N
    C)   600 N
    D)   The cable will break.
    E)   none of the above   Answer: _____

3.   Three polls have reported the percentage of citizens who favor a proposed new law. Which of the following percentages has the smallest uncertainty?

    A)   52
    B)   53.7
    C)   54.0 ± 0.4
    D)   The errors in these measurements are indistinguishable.
                                                                   Answer: _____

4.   The moon has a surface gravity very close to 1/6 the surface gravity of the Earth (g). Given that the Moon's radius is 1740 km, find its mass.

   A) 7.4×10^{16} kg
   B) 2.6×10^{17} kg
   C) 7.4×10^{22} kg
   D) 4.4×10^{23} kg
   E)   none of the above   Answer: _____

5.   Bonnie places a cup of coffee on her dashboard at a stoplight and then accelerates when the light turns green. What's the shortest time she cross the intersection (a distance of 15 m) and still keep the coffee cup from sliding? The coefficient of static friction between the coffee cup and her dashboard is 0.40.

   A)   1.9 s
   B)   2.8 s
   C)   7.7 s
   D)   You must know the mass of the coffee cup.
   E)   none of the above   Answer: _____

6.   A distant star is very bright, and it has a faint companion whose mass by comparison is negligible. If the companion orbits in a circle of radius 75 AU (2.24×10^{13} m) with a period of 125 years (3.94×10^{9} s), what is the mass of the brighter star?   One solar mass ($M_\odot$) is 2×10^{30} kg.

   A) $0.003\ M_\odot$
   B) $0.4\ M_\odot$
   C) $9.0\ M_\odot$
   D) $27.0\ M_\odot$
   E)   More information is needed.   Answer: _____

7. A helicopter and its cargo have a mass of 7.5×10^{4} kg, and it is descending at a constant velocity of 5 m/s. What is the lift force on the helicopter blades?

   A) 2.9×10^{5} N
   B) 7.4×10^{5} N
   C) 1.1×10^{6} N
   D)   You must know if the cargo is in the helicopter
           or if it suspended from a cable.
   E)   none of the above   Answer: _____

8. Estimate the number of babies born in the United States each year.

    A)   70,000
    B)   300,000
    C)   4 million
    D)   50 million   Answer: _____

9.   Tarzan grabs a vine which can withstand a force of 1100 N before breaking. Tarzan's mass is 72 kg and the vine is 8.0 m long. How fast can Tarzan go at the bottom of the swing without breaking the vine?

    A)   The vine wouldn't support Tarzan even at 0 m/s.
    B)   6.6 m/s
    C)   14 m/s
    D)   44 m/s
    E)   none of the above   Answer: _____

10. A car rounds a curve in the road at a speed of 90 km/h (25 m/s). If the radius of curvature is 115 m and the road is not banked, what is the minimum coefficient of static friction the driver needs to avoid skidding?

    A)   0.55
    B)   0.72
    C)   0.95
    D)   It would have to be greater than one.   Answer: _____
    E)   none of the above

11. A force of 165,000 N accelerates a 11.0 kg projectile through a distance of 1.70 m, and launches the projectile at an initial angle of 40.0°. (Show your work *legibly* for partial credit.)

a) How long is the projectile in the air? (6 points)

b) How far down-range does it land? (4 points)

12. If a car travelling at 90.0 km/h can stop in 62.5 m on a level surface once the brakes are applied, what would its stopping distance be if it were travelling downhill on a 15° incline? (Show your work *legibly* for partial credit.)

Answers: 1. B; 2. A; 3. B; 4. C; 5. B; 6. D; 7. B; 8. C; 9. B; 10. A
            11. a. 30 s; b. 5.1 km; 12. 130 m