Phys 100 – 10am Fall 2015

Homework 1

Due Oct 7th, 2015

1. If you are driving 95 km/h along a straight road and you look to the side for 2.0 s, how far do you travel during this inattentive period?
2. What must your car’s average speed be in order to travel 235 km in 2.75 h?
3. A bird can fly 25 km/h. How long does it take to fly 3.5 km?
4. A sports car accelerates from rest to 95 km/h in 4.3 s. What is its average acceleration in m/s2?
5. A sprinter accelerates from rest to 9.00 m/s in 1.38 s. What is her acceleration in (*a*) m/s2; (*b*) km/h2?
6. A sports car moving at constant velocity travels 120 m in 5.0 s. If it then brakes and comes to a stop in 4.0 s, what is it’s acceleration?
7. A car slows down from 28 m/s to rest in a distance of 88 m. What was its acceleration, assumed constant?
8. A light plane must reach a speed of 35 m/s for takeoff. How long a runway is needed if the (constant) acceleration is 3.0 m/s2?
9. A stone is dropped from the top of a cliff. It is seen to hit the ground below after 3.55 s. How high is the cliff?
10. Estimate how long it took King Kong to fall straight down from the top of the Empire State Building (380 m high).
11. What force is needed to accelerate a sled (mass = 55 kg) at 1.4 m/s2 on horizontal frictionless ice?
12. What is the weight of a 68-kg astronaut (*a*) on Earth, (*b*) on the Moon (*g* = 1.7 m/s2), (*c*) on Mars (*g* = 3.7 m/s2
13. According to a simplified model of a mammalian heart, at each pulse approximately 20 g of blood is accelerated from 0.25 m/s to 0.35 m/s during a period of 0.10 s. What is the magnitude of the force exerted by the heart muscle?
14. If the coefficient of kinetic friction between a 22-kg crate and the floor is 0.30, what horizontal force is required to move the crate at a steady speed across the floor? What horizontal force is required if  is zero?
15. You are trying to push your stalled car. Although you apply a horizontal force of 400 N to the car, it doesn’t budge, and neither do you. Which force(s) must also have a magnitude of 400 N?
16. The force exerted by the car on you.
17. The friction force exerted by the car on the road.
18. The normal force exerted by the road on you.
19. The friction force exerted by the road on you.