

1. UH football player Samson Satele has a *weight* of 311 pounds.
  - a) What is his weight in Newtons?
  
  - b) What is his *mass* in kilograms?
  
2. Suppose Samson Satele was in outer space, far from the influence of the Earth's (or any other object's) gravity.
  - a) What would his *weight* be there (in Newtons)?
  
  - b) What would his *mass* be (in kilograms)?
  
3. A ball is thrown straight upward with an initial upward speed of 30 m/s.
  - a) What maximum height does it reach?
  
  - b) What is its acceleration at its maximum height?
  
  - c) How long does it take it to come back and hit the ground?
  
  - d) What is its speed when it hits the ground?
  
  - e) If the same ball was thrown up with twice the initial speed, i.e. 60 m/s, how high would its maximum height be?
  
4. A shuttle astronaut orbits the Earth at a constant speed. Is she accelerating? If so, what is the magnitude and direction of her acceleration?

5. A car goes from 0 to 100 km/hr in 6 seconds. How many “g’s” is this acceleration?
6. A two-person outrigger canoe team, whose speed in still water is 6 km/hr, is paddling in a channel where there is a tidal current of 3 km/hr.
- What is their net speed when they are going upstream (against the current)?
  - What is it when they are going downstream (with the current)?
  - How long does it take them to complete a course that goes upstream 6km and then back downstream to where they started?
7. (For this and the next problem you have to use the fact that the influence of gravity at the Earth’s surface causes things to fall a distance of  $d = \frac{1}{2}gt^2$  below where they would be if there were no gravity.)  
In his prime, Michael Jordan, the famous basketball player, could jump a vertical distance of 1.1 m.
- What is his “hang time” (i.e., the total time he is in the air; the time to go up *plus* the time to go down) during a 1.1 meter-high vertical jump.
  - What is his hang time if he moves horizontally 4 meters during this jump?
8. Let’s have a contest to see who in our class has the fastest reflexes. Have a friend help you measure your reflex time by having him/her release a ruler between your fingers and measuring how far the ruler moves before you can clamp your fingers on it. (Do this 5 or 10 times and use the average.)
- How far on average does the ruler move before you can clamp your fingers on it?
  - How much time does this correspond to?
9. A pingpong ball and a bowling ball have very different inertia: it is very easy to change the state of motion of a pingpong ball but pretty hard to do the same to a bowling ball. However, when they are allowed to fall, the Earth’s gravity accelerates both of them at the same rate. What does this say about the force of gravity?