Name: Date: Period:

Weight Questions

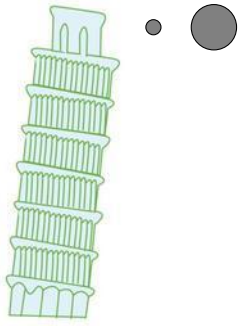
1. Consider a 12-kg bowling ball.
   (a) What is the bowling ball's weight on earth?

   (b) What is the bowling ball's weight on Mars where $g = 3.71\,\text{m/s}^2$?

2. In the famous Leaning Tower of Pisa experiment, Galileo dropped two balls from the top of the tower. Let's say that one was 5 kg and the other was 500 kg
   (a) Calculate the weight of the 5-kg ball.

   (b) Calculate the weight of the 500-kg ball.

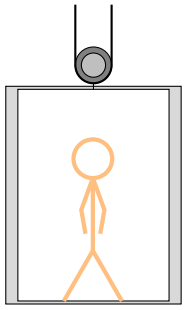
   (c) Newton's Second Law says that the ball with more force (*i.e.* more weight) should have a greater acceleration. How can both balls have the same acceleration?



3. When you are riding in an elevator, there are some times that you feel heavier and some times that you feel lighter.

   (a) Let's say your mass is 95 kg. Calculate the weight (that is, force of gravity) acting on you.

   (b) When you stand in a stationary elevator, are you in mechanical equilibrium? Draw the Free-Body diagram.

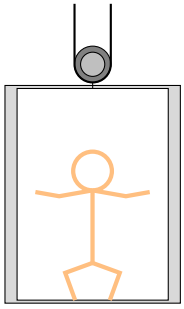


stationary elevator

   (c) What is the normal force acting on you?

   (d) Now, let's say the elevator is accelerating upward at 2.1 m/s^2. What is the net force acting on you?

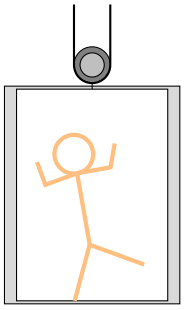
   (e) Are you in mechanical equilibrium now? Draw the free-body diagram.



accelerating upward

   (f) What is the normal force acting on you?

   (g) Calculate what the net force would be if you are accelerating downward.



accelerating downward