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Bio GT—Metric Practice

This will be graded for accuracy. You may use a calculator, but show your work.

1. How long, in seconds, does it take a beam of light to travel around a standard 400 m track? The speed of light is 3.0 x 108 meters per second.  
     
   **Solution: Divide 400 m by the speed of light:  
   400/3.0 x 108 = 0.0000013 seconds**
2. A human red blood cell has, on average, a diameter of 7 µm (micrometers). Adults have roughly 2.5 x 1013 red blood cells in their bodies. If you lined up all of the red blood cells in the body, how long would that line be? Give your answer in kilometers.  
     
   **Solution:   
   7μm x (2.5 x 1013) = 175,000,000,000,000 μm  
   175,000,000,000,000 μm = 175,000, 000 m  
   175, 000, 000 m = 175, 000 km**
3. Every one of your cells has 300 centimeters of DNA. Assume that there are 1.0 x 1014 cells in your body. The moon is 384, 403 km from Earth. If you stretched out all of the DNA in your body and put it in a line, would it reach the moon?  
     
   **Solution:  
   300 cm x (1.0 x 1014 cells) = 3.0 x 1016 cm of DNA  
   3.0 x 1016 cm = 3.0 x 1014 m**  
   **3.0 x 1014 m = 3.0 x 1011 km**  
   **3.0 x 1011 km > 384, 403 km, so yes, your DNA would reach the moon (several times over!)**
4. A heartbeat takes 0.8 seconds. How many times does your heart beat in a year?  
     
   **Solution: 60 s x 60 min = 3600 s in 1 hr  
   3600 s x 24 hrs = 86, 400 s in 1 day  
   86,400 s x 365 = 31,536,000 s in 1 yr  
   31,536,000 s divided by 0.8 = 39,420,000 heartbeats in 1 yr**
5. The average human brain has a mass of 390,000 mg. A standard paper clip has a mass of 0.0005 kg. Your brain is equal to how many paperclips?  
     
   **Solution:  
   390,000 mg = 390 g  
   0.0005 kg = 0.5 g**

**390 g divided by 0.5 g = 780 paperclips**