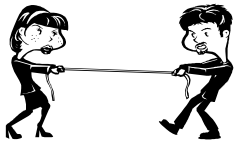


## Newton's 3<sup>rd</sup> Law Problems: *(draw a free-body diagram for all problems)*

1. A **0.40-kg apple** falls to Earth. (*mass of Earth =  $5.98 \times 10^{24}$  kg*)
  - a. with what force does Earth pull on the apple?
  
  
  
  
  
  
  
  
  
  
  - b. with what force does the apple pull on Earth?
  
  
  
  
  
  
  
  
  
  
  - c. what is the apple's acceleration?
  
  
  
  
  
  
  
  
  
  
  - d. what is Earth's acceleration?
  
2. A **60-kg boy** and a **40-kg girl** are engaged in a tug-of-war on an icy, frictionless surface. If the **acceleration** of the girl toward the boy is **3.0 m/s/s**, determine the acceleration of the boy toward the girl.



3. You are competing on the U.S. Olympic Skeet Team and are taking practice shots with a new shotgun (**mass = 5.00 kg**). If the acceleration of the pellets (**mass = 20.0 g**) you shoot is  $7.00 \times 10^2$  m/s<sup>2</sup> while they are in the barrel of your gun, what is the acceleration of the shotgun against your shoulder?



4. You jump off the high dive at the pool. Your mass is **125 kg**.
  - a. How much force is Earth exerting on you?
  
  
  
  
  
  
  
  
  
  
  - b. How much is Earth accelerating due to the force you are exerting on it?