Assignment 5.01: Force

1. A 600 kg car accelerates from 5 m/s to 10 m/s in three seconds.

   (a) What is the acceleration of the car?

   (b) What is the force that the motor exerts on the car?

2. Two children are playing tug-o-war. Juan has a mass of 40 kg and pulls with a force of 20 N. Carlos has a mass of 20 kg and pulls with a force of 50 N.

   (a) Which way do the children go?

   (b) What is the acceleration of the children?

   (c) How far do they end up after 10 seconds?

3. A pitcher throws a curve-ball at 20 m/s toward home plate, perfectly horizontal. The ball leaves his hand 1.5 meters above the ground.

   (a) How far does the ball go?

   (b) With what velocity (magnitude and direction) does the ball hit the ground?

4. A car has a mass of 850 kg. What is the weight of the car?

5. A crane lifts a 1200 kg steel girder. It causes the girder to accelerate at a rate of 0.2 m/s^2 upward.

   (a) What force must the crane exert on the steel girder?

   (b) How long does it take the crane to reach its top speed of 3 m/s?

6. You push a box across the floor with a force of 60 newtons for two seconds. The force of friction on the box is 20 newtons. The box has a mass of 40 kg.

   (a) What is the acceleration of the box?

   (b) What is the speed of the box when you stop pushing it?

   (c) What is the deceleration of the box when you stop pushing it?

   (d) How long does it take the box to come to a complete stop?

   (e) What is the final position of the box?