# Net Force Worksheet Solutions

10 points total

1. **Question**:

   Select all of the following which a force can do.

   - Make an object change direction
   - Make an object speed up
   - Make an object stop moving
   - Make an object slow down
   - Make an object start moving

   **Solution**:

   All of the choices are correct.

2. **Question**:

   What is the net force acting on Nina as she runs at a constant velocity northward to the school bus? Place the number in the first blank and the direction (if necessary) in the second blank. If no direction is necessary, type "None" in the second blank.

_____ Newtons _____

**Solution**:

Because Nina is moving at a **constant velocity**, we know the net force acting on her must be **ZERO**. In addition, any time a vector quantity is equal to zero, we do not need to include a direction. Thus the net force acting on Nina is ZERO Newtons.

3. **Question**:

A woman exerts 100 N of force to lift a laundry basket weighing 75 N. What is the net force acting on the laundry basket? Place the number in the first blank and a direction (if necessary) in the second blank. If no direction is necessary, type "None" in the second blank.

Hint: An object's weight is just the force due to gravity acting on that object, and it always points down toward the center of the earth.

_____ Newtons _____

**Solution**:

The net force acting on the laundry basket is equal to the **TOTAL** force acting on the basket. The woman exerts a force of 100 Newtons upward on the basket, and gravity exerts a force of 75 Newtons downward on the basket. Because the two forces are pointed in **opposite directions**, we must **subtract** them. Thus the magnitude of the net force acting on the laundry basket is 100 N – 75 Newtons = 25 Newtons. Finally, because force is a vector quantity, we must include a **direction** for the net force acting on the basket. The direction of the net force is the same as the direction of the larger force: upward. Thus, the net force acting on the basket is equal to 25 Newtons upward.

4. **Question**:

   Two teams were having a tug of war. Team A had four people, and each of them pulled with 25 N of force. Team B had three people, and each of them pulled with 35 N of force. Which team won?

   **Solution**:

   First, we need to find the magnitude of the total force exerted by each team. Team A had four people, and each person pulled with 25 Newtons of force. So, **the magnitude of the total force exerted by Team A is (25 Newtons) x (4) = 100 Newtons**. Team B had three people, and each person pulled with 35 Newtons of force. Thus, **the magnitude of the total force exerted by Team B is (35 Newtons) x (3) = 105 Newtons**. The total force exerted by Team B is greater than the total force exerted by Team A. Team B won.

5. **Question**:

   Two people are pushing a disabled car. One person exerts a force of 200 N east, and the other exerts a force of 150 N east. What is the net force exerted on the car? Place the number in the first blank and a direction (if necessary) in the second blank. If no direction is necessary, type "None" in the second blank.

   _____ Newtons _____

   **Solution**:

   The net force acting on the car is just the total force on the car. The two people are both pushing the car in the same direction. So, to find the total force on the car, we will add the two forces. One person pushes with a force of 200 Newtons east, and the other

pushes with a force of 150 Newtons east. Thus, the magnitude of the net force acting on the car is 200 Newtons + 150 Newtons = 350 Newtons. Because force is a vector quantity, we must include a direction for the net force, and because both forces point east, the net force will also point east. Therefore, the net force acting on the car is 350 Newtons east.

6. **Question**:

   A child accelerates downward as he jumps to the ground. In which direction is the net force acting on the child?

   **Solution**:

   The net force acting on an object always points in the same direction as the acceleration of the object. Thus, if the child is accelerating downward, the net force acting on the child must also point downward.