

Name:

Date:

Directions: Read the passage on pages 1, 2, and 3. Then, answer the questions that follow.

Understanding Forces: Balanced, Unbalanced, and Combined (with Newtons!)

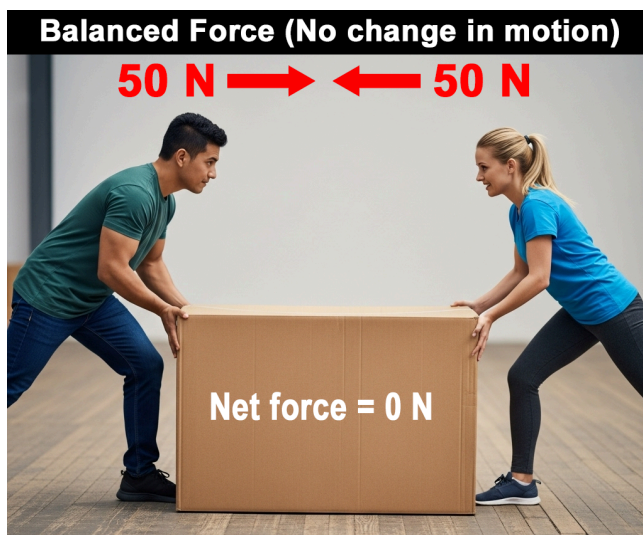
Have you ever pushed a friend on a swing or helped move a heavy box? Whether you knew it or not, you were using **force**! A **force** is a **push or a pull** on an object, and it's measured in **newtons (N)**. Forces can make things **move, stop moving, or change direction**.

Let's learn more about **balanced, unbalanced, and combined forces**, and how they affect the motion of objects—using **newtons** to help us describe them!

Balanced Forces

Balanced forces happen when **two equal forces** act on an object in **opposite directions**. These forces **cancel each other out**, and the object **does not move** or keeps moving at the same speed and direction.

Think of it this way: If one person pushes a box to the left with **50 N**, and another person pushes it to the right with **50 N**, the total or **net force is 0 N**. The forces are **balanced**. There is no change in motion.



To find the **net force**, you subtract the smaller force from the larger one, or you can think of it like this:

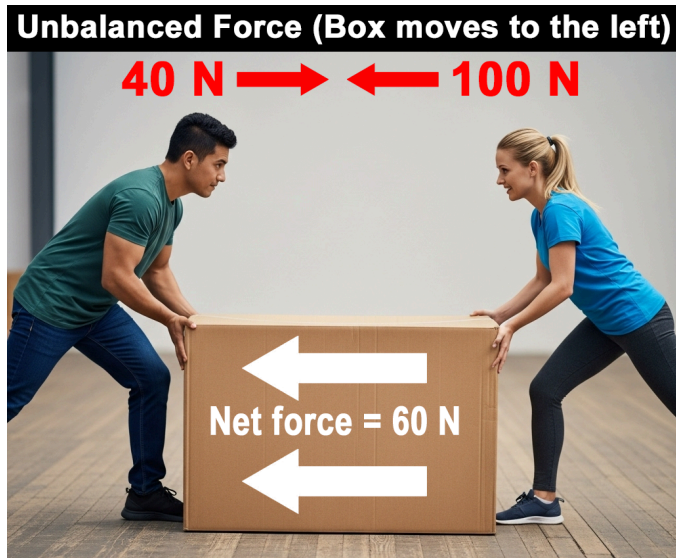
$$50 \text{ N (left)} - 50 \text{ N (right)} = 0 \text{ N}$$

Because the net force is **0 newtons**, the forces are **balanced**. This means the box **does not move** or it **continues moving at the same speed and direction** if it was already in motion. There is **no change in motion**.

Unbalanced Forces

Unbalanced forces happen when the forces acting on an object are **not equal**. The **stronger force** takes over and causes the object to move in that direction. Unbalanced forces can also change an object's **speed or direction**.

Example: If one person pushes a box to the left with **100 N** and the other person pushes back with only **40 N**, the **net force is 60 N to the left**. The box will move left. That's an **unbalanced force**!



When two forces act in opposite directions, you subtract the smaller force from the larger one to find the **net force**. You do the math like this:

$$100 \text{ N} - 40 \text{ N} = 60 \text{ N}$$

Since the stronger force is pushing to the **left**, the **net force is 60 N to the left**. This means the box will move in that direction.

A good rule to remember:

- **Add** forces when they go in the **same direction**
- **Subtract** forces when they go in **opposite directions**
- The object moves in the direction of the **stronger force**

Combined Forces

When forces act in the **same direction**, they **combine** to make a **stronger total force**. This is called the **net force**, which is the **total of all forces** acting on an object.

Example: If two people both push a box forward—one with **40 N** and the other with **60 N**—the forces add together. The **net force is 100 N forward**.



Net Force and Motion

The **net force** tells us how much force is really acting on an object and **in which direction**:

- If the **net force = 0 N**, the forces are **balanced**.
- If the **net force $\neq$ 0 N**, the forces are **unbalanced**, and the object will **move or change its motion**.

Summary

- **Balanced forces** = No change in motion (**net force = 0 N**)
- **Unbalanced forces** = Change in motion (**net force $\neq$ 0 N**)
- **Combined forces** = Add up when in the same direction
- **Forces in opposite directions** = Subtract the smaller from the larger to find the net force
- The **net force (in newtons)** helps us predict how an object will move

Multiple Choice Questions (*Circle the correct answer*)

1. What happens when forces are balanced?
 - A) The object speeds up quickly
 - B) The object does not change its motion
 - C) The object stops and floats
 - D) The object moves in circles

2. Which is an example of an unbalanced force?
 - A) Two people pushing equally on a door from opposite sides
 - B) A book sitting on a table
 - C) One person pushing harder than the other on a box
 - D) A car parked in a garage

3. What is a net force?
 - A) A force that breaks nets
 - B) A weak force inside objects
 - C) A force that disappears
 - D) The total of all forces acting on an object

4. If two people push a wagon in the same direction, what kind of force is this?
 - A) Balanced force
 - B) Opposite force
 - C) Combined force
 - D) Canceling force

5. Which statement is true about unbalanced forces?
 - A) They cause motion to start, stop, or change direction
 - B) They always stop objects
 - C) They do not affect motion
 - D) They only happen in space

Open-Ended Questions (*Answer in complete sentences*)

6. In your own words, explain what a **balanced force** is. Use **newtons** in your answer.

7. Describe a real-life example of **unbalanced forces** you've seen or experienced. What might the **net force** be in **newtons (N)**?

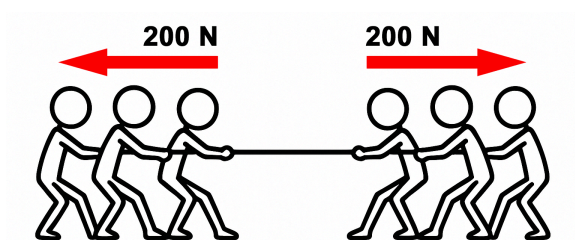
8. What happens to the motion of an object when **combined forces** are acting in the same direction?

9. Why does a box not move when two people push it with equal strength from opposite sides? Use **numbers and newtons (N)** in your answer.

10. How can you find the **net force** when two forces act in opposite directions? Give an example using **N**.

Directions: Examine the figures playing tug-of-war and write down your answers.

11.

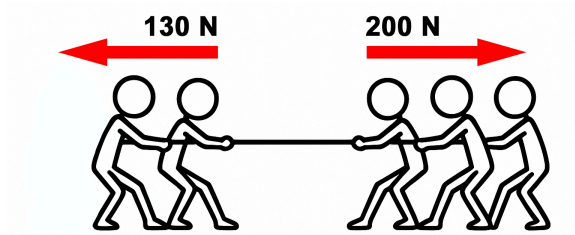


Is this a balanced or unbalanced force? _____

What's the net force? _____

Is there a change in motion or direction? (Explain your answer)

12.



Is this a balanced or unbalanced force? _____

What's the net force? _____

Is there a change in motion or direction? (Explain your answer)

Answer Key: Balanced & Unbalanced Forces Worksheet

Multiple Choice (Page 4)

1. **B)** The object does not change its motion
2. **C)** One person pushing harder than the other on a box
3. **D)** The total of all forces acting on an object
4. **C)** Combined force
5. **A)** They cause motion to start, stop, or change direction

Open-Ended Questions - Sample Answers (Page 5)

6. **In your own words, explain what a balanced force is. Use newtons in your answer.**
A balanced force is when two equal forces act in opposite directions. The object doesn't move or keeps moving the same way. For example, if two people push a box with 50 N from opposite sides, the net force is 0 N.
7. **Describe a real-life example of unbalanced forces you've seen or experienced. What might the net force be in newtons (N)?**
When I pushed a chair across the floor and nobody pushed back, I used about 30 N of force. Since nothing opposed me, the net force was 30 N forward, and the chair moved.
8. **What happens to the motion of an object when combined forces are acting in the same direction?**
The object will move in that direction, and the forces add together to make a stronger net force.
9. **Why does a box not move when two people push it with equal strength from opposite sides? Use numbers and newtons (N) in your answer.**
If one person pushes left with 60 N and the other pushes right with 60 N, the forces cancel out. The net force is 0 N, so the box doesn't move.
10. **How can you find the net force when two forces act in opposite directions? Give an example using N.**
You subtract the smaller force from the larger one. For example, if one person pushes with 100 N and the other with 40 N in the opposite direction, the net force is 60 N.

Tug-of-War Scenarios (Page 6)

11. *Balanced / 0 N / No, because the forces are equal and opposite, the object does not move.*
12. *Unbalanced / 70 N to the right / Yes, because one side is stronger, the object moves in the direction of the greater force.*



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