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!)

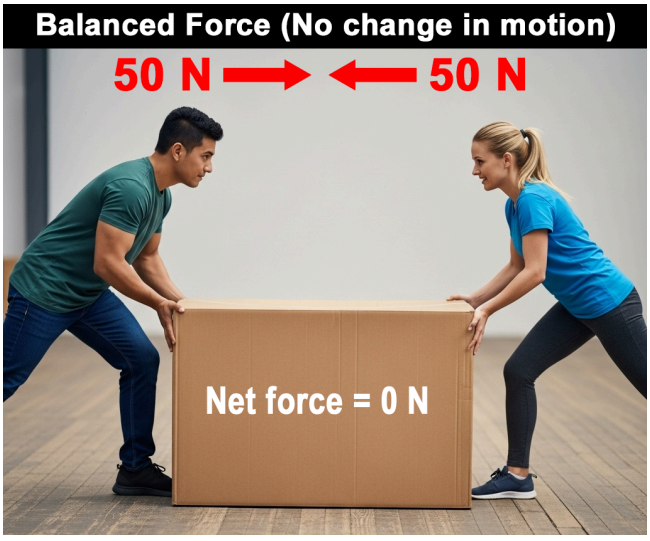
Have you ever pushed a friend on a swing or helped move a heavy box? Whether you knew it or not, you were using **force**! A **force** is a **push or a pull** on an object, and it's measured in **newtons (N)**. Forces can make things **move, stop moving, or change direction**.

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 N (left) – 50 N (right) = 0 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**.

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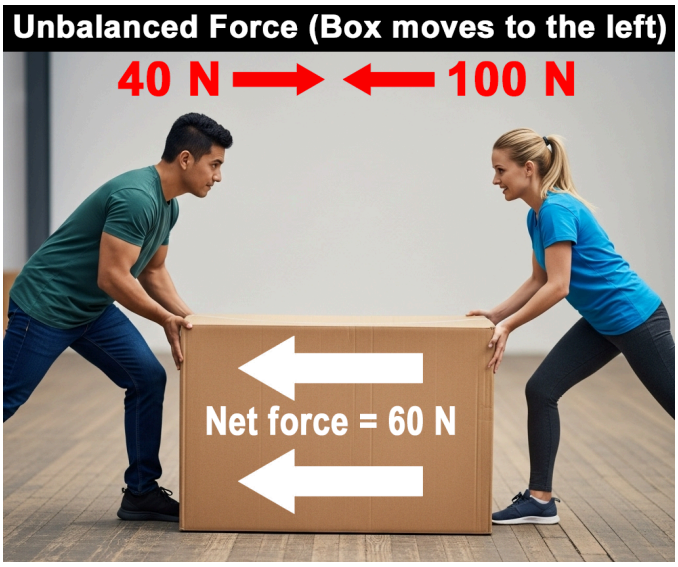
Unbalanced Forces

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 N – 40 N = 60 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**

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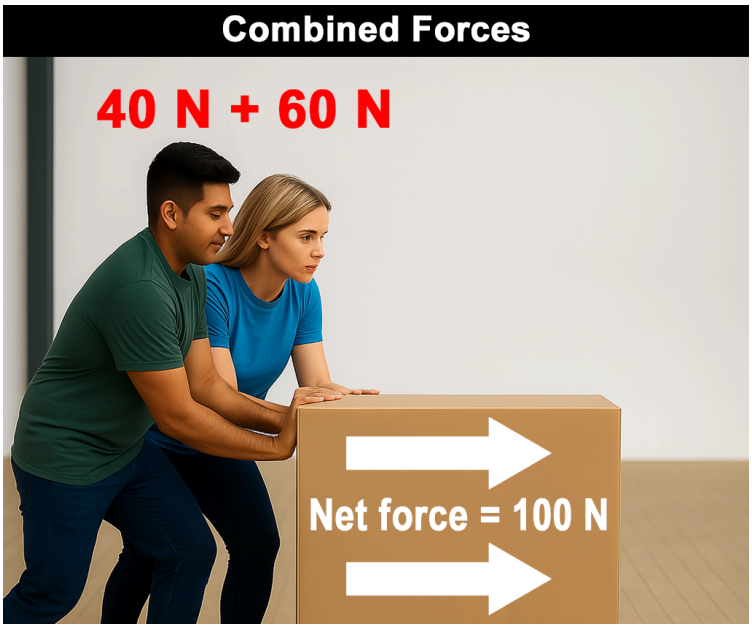
Combined Forces

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 ≠ 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 ≠ 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

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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

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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**.

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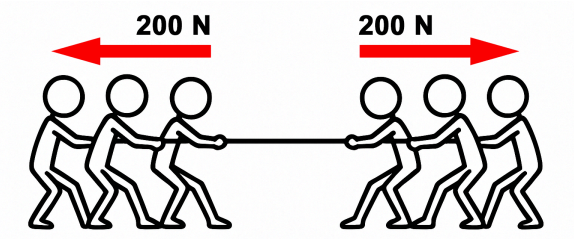
Directions: Examine the figures playing tug-of-war and write down your answers.

11.

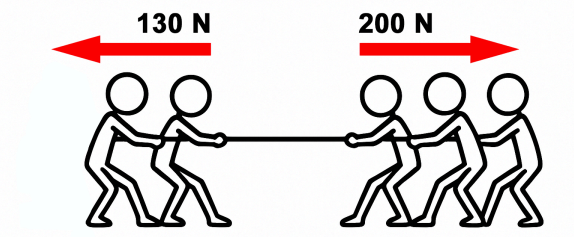


Is this a balanced or unbalanced force? _____
What's the net force? _____
Is there a change in motion or direction? (Explain your answer)

_____

_____

12.



Is this a balanced or unbalanced force? _____
What's the net force? _____
Is there a change in motion or direction? (Explain your answer)

_____

_____

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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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