

Force Balance Lab

Add and subtract forces to predict motion.

GRADE 6 • TEKS 6.7

6.7 "Force, motion, and energy. The student knows the nature of forces and their role in systems that experience stability or change. The student is expected to: identify and explain how forces act on objects, including gravity, friction..."

NAME _____

DATE _____

FINDING NET FORCE

Forces in the same direction add. Forces in opposite directions subtract, and a net force of 0 N means the forces are balanced. When two objects interact, each force has an equal force in the opposite direction on the other object.

WORKED EXAMPLE

A toy car has a 12 N push to the right and a 7 N friction force to the left. Find the net force.



1. Choose right as positive.
2. $12\text{ N} - 7\text{ N} = 5\text{ N}$.
3. A positive force points right.

Answer: 5 N right, unbalanced

PRACTICE 4 problems

- 1** A box on a floor has a 40 N normal force upward and a 40 N gravity force downward. What is the net vertical force? Are the forces balanced?

ANSWER _____

- 2** A cart is pushed with 17 N to the right. Friction pushes with 6 N to the left. Find the net horizontal force. Are the forces balanced?

ANSWER _____

- 3** A magnet pulls a metal clip with 9 N to the right. A hand pulls the clip with 9 N to the left. Find the net horizontal force. Are the forces balanced?

ANSWER _____

- 4** A book pushes down on a table with 30 N. What force does the table exert on the book?

ANSWER _____

APPLY IT Show your work

- 1** At a skate park, use the force data for a scooter. Find the net horizontal force and net vertical force. Is the scooter balanced vertically?

FORCES ON THE SCOOTER

Force	Direction	Size
Rider's push	right	19 N
Friction	left	6 N
Normal force	up	350 N
Gravity	down	350 N

ANSWER _____

- 2** In a robotics contest, a robot moves right with a 21 N applied force. A magnet pulls it left with 10 N, and friction pushes left with 2 N. What is the net force? Is it balanced?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A student pulls a wagon with 24 N to the right. Friction pushes with 10 N to the left. In two sentences, state the wagon's net force and name the Newton's Third Law force pair made by the student and wagon. Explain why that pair does not cancel on the wagon.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A box on a floor has a 40 N normal force upward and a 40 N gravity force downward. What is the net vertical force? Are the forces balanced?	0 N, balanced
2	A cart is pushed with 17 N to the right. Friction pushes with 6 N to the left. Find the net horizontal force. Are the forces balanced?	11 N right, unbalanced
3	A magnet pulls a metal clip with 9 N to the right. A hand pulls the clip with 9 N to the left. Find the net horizontal force. Are the forces balanced?	0 N, balanced
4	A book pushes down on a table with 30 N. What force does the table exert on the book?	A 30 N normal force upward

PART 2 • APPLY IT

1. **Net horizontal force: 13 N right. Net vertical force: 0 N. The scooter is balanced vertically.** Subtract the leftward friction force from the rightward push. The upward normal force and downward gravity force are equal.
2. **9 N right, unbalanced** Add the forces to the left, then subtract that total from the rightward applied force.

CHALLENGE

The wagon's net force is 14 N right, so its forces are unbalanced. The student pulls the wagon right with 24 N, and the wagon pulls the student left with 24 N, so these forces act on different objects and do not cancel on the wagon.

Accept equivalent direction wording, such as "to the right" or "rightward." For Third Law pairs, require equal forces in opposite directions that act on two different objects.