

Force Detective

Use evidence to decide whether forces are balanced or unbalanced.

S4P3 "Obtain, evaluate, and communicate information about the relationship between balanced and unbalanced forces."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline every sentence that includes at least one force measurement, a direction in which a force acts, or a directly observed change in motion. Write 1 beside evidence for balanced forces and 2 beside evidence for unbalanced forces.

A Wagon Force Test

- ① During a playground test, Mina and Leo pull a wagon in opposite directions. A spring scale shows Mina pulls with 20 newtons to the east. Leo pulls with 20 newtons to the west. The wagon is still at first. The forces are balanced because they are equal in size and act in opposite directions. The wagon has no net force.
- ② Next, Leo changes his pull to 12 newtons west while Mina keeps pulling 20 newtons east. Now the forces do not cancel. The net force is 8 newtons east, so the forces are unbalanced. The wagon, which started still, begins moving east. This observed change in motion supports the claim that an unbalanced force causes acceleration.
- ③ Balanced forces do not always mean an object is still. If a rolling skateboard has balanced forces, it can keep moving at a steady speed in a straight line. A change in speed or direction is evidence of unbalanced forces. Scientists use force measurements, directions, and motion observations to decide whether forces are balanced or unbalanced.

2 ANSWER WITH EVIDENCE Use the passage

1 What evidence shows that the wagon's forces are balanced at the start of the test?

2 Why is the wagon's net force 8 newtons east after Leo changes his pull?

3 What observed change in motion supports the claim that the forces become unbalanced?

4 How can a rolling skateboard have balanced forces even though it is moving?

3 YOUR TURN Your own words

Create two force cases for the same kind of object. In Panel 1, draw and label balanced forces, then write what the object does. In Panel 2, draw and label unbalanced forces, then write the change in motion.

PART 1 • READ AND MARK

Underline every sentence that includes at least one force measurement, a direction in which a force acts, or a directly observed change in motion. Write 1 beside evidence for balanced forces and 2 beside evidence for unbalanced forces. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What evidence shows that the wagon's forces are balanced at the start of the test?	Mina pulls with 20 newtons east, and Leo pulls with 20 newtons west. The forces are equal in size and opposite in direction.
2	Why is the wagon's net force 8 newtons east after Leo changes his pull?	Mina pulls with 20 newtons east and Leo pulls with 12 newtons west. The forces do not cancel, leaving 8 newtons east.
3	What observed change in motion supports the claim that the forces become unbalanced?	The wagon starts still and then begins moving east.
4	How can a rolling skateboard have balanced forces even though it is moving?	With balanced forces, it can keep moving at a steady speed in a straight line.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Panel 1: A toy car rests on a table. Label 10 newtons up and 10 newtons down. The forces are balanced, so the car stays still. Panel 2: The toy car starts still. Label 15 newtons east and 5 newtons west. The forces are unbalanced, so the car begins moving east.

Accept equivalent evidence-based answers that use the stated measurements, directions, and observed motion. In the open task, accept any accurate labeled balanced and unbalanced force cases, with a motion description that matches each case.