

Push, Pull, Observe

Use test evidence to explain how forces affect motion.

3-PS2-1 "Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline sentences that tell what balanced forces do. Circle sentences that tell what unbalanced forces do, then number the three things Maya kept the same in her first test.

Maya Tests a Toy Car

- ① Scientists use tests to learn how forces change motion. A force is a push or a pull. When forces on an object are balanced, they match in opposite directions. The object does not start moving or change its motion because of those forces. When forces are unbalanced, one direction has a stronger effect. The object can start moving, stop, speed up, slow down, or turn.
- ② To investigate the number of forces, Maya placed a toy car at the same starting line on a smooth floor. In one trial, one student gave the car a gentle push forward. In another trial, two students gave gentle pushes forward at the same time. Maya kept the car, floor, and push size the same. She recorded how the car moved in each trial.
- ③ Later, Maya tested direction. Two students pushed the same car with gentle pushes of the same size. In one trial, both pushed forward. In the next trial, one pushed forward while the other pushed backward. She changed only the direction of one push. The second trial had balanced forces, so the car did not start moving. Gravity also pulls objects down, such as a book falling from a table.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Which three things did Maya keep the same in her first investigation? Why was keeping them the same important?

2 A lunchbox is still. Two students push it equally hard from opposite sides at the same time. Will it start moving? Explain.

3 A rolling scooter has a stronger push backward than forward. Are the forces balanced or unbalanced? Name one change that could happen to the scooter.

4 A ball rolls off a table. What force pulls the ball downward?

3 YOUR TURN _____ Your own words

Plan and conduct a fair test with a small object to show balanced or unbalanced forces. Write 3 to 4 sentences that name one thing you changed, two things you kept the same, what you observed, and how your observation is evidence.

PART 1 • READ AND MARK

Underline sentences that tell what balanced forces do. Circle sentences that tell what unbalanced forces do, then number the three things Maya kept the same in her first test. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Which three things did Maya keep the same in her first investigation? Why was keeping them the same important?	She kept the car, the floor, and the push size the same. This helped her test the number of forces fairly.
2	A lunchbox is still. Two students push it equally hard from opposite sides at the same time. Will it start moving? Explain.	No. The equal pushes in opposite directions are balanced forces, so the lunchbox will not start moving.
3	A rolling scooter has a stronger push backward than forward. Are the forces balanced or unbalanced? Name one change that could happen to the scooter.	The forces are unbalanced. The scooter could slow down or stop.
4	A ball rolls off a table. What force pulls the ball downward?	Gravity pulls the ball downward.

PART 3 • YOUR TURN (SAMPLE ANSWER)

I tested the direction of two gentle pushes on a plastic cup. I kept the cup, the floor, and the push size the same. When both pushes pointed right, the cup moved right, but when equal pushes pointed in opposite directions, it did not start moving. This is evidence that unbalanced forces changed its motion and balanced forces did not.

Accept equivalent explanations that balanced forces do not change an object's motion and unbalanced forces can change motion. For the open task, accept a safe, workable test that changes only one variable and includes an observation used as evidence.