Wagon Force Tests

Investigate how pulls change a wagon's motion

3.1 "Conduct investigations to explain the effects of balanced and unbalanced forces exerted on an object, varying the size, number, and direction of the forces."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the words that tell the size, number, or direction of the pulls in each test, then circle the words that tell what the wagon does.

Which Way Will It Go?

1. At the start of each test, a toy wagon rests on the same smooth floor. Mia ties strings to the wagon. Her classmates pull for the same amount of time and start at the same line each time. First, one child pulls right while another pulls left with equal strength. The wagon stays still. The two pulls balance, so its motion does not change.

2. Next, Mia changes only the direction of one pull. Both children still pull with equal strength, but now they both pull right. The wagon moves right. Their pulls add together instead of balancing. Mia then tries just one rightward pull of the same strength. The wagon also moves right, but it does not go as far in the same amount of time as it did with two rightward pulls.

3. Finally, Mia tests the size of the pulls. One child pulls right with a stronger pull, and another pulls left with a weaker pull. The wagon moves right because the pulls do not balance. Mia tries a stronger left pull and a weaker right pull. Now the wagon moves left. In these tests, she changes the strength of the pulls, not the wagon, floor, or pulling time.

2 ANSWER WITH EVIDENCE

Use the passage

1. In the first test, why does the wagon stay still?

2. When both children pull right, how does changing the direction of one pull affect the wagon's motion?

3. How does the wagon's motion change when Mia uses one rightward pull instead of two rightward pulls of the same strength?

4. In Mia's last two tests, how does changing which side has the stronger pull affect the wagon?

3 YOUR TURN

Your own words

Plan two trials with a foam block on a desk to test how the number of rightward pushes affects its motion. In three sentences, tell what you will keep the same, how the pushes will differ, and what you will measure or predict.

ANSWER KEY

Wagon Force Tests

GRADE 3 · 3.1

PART 1 · READ AND MARK

Underline the words that tell the size, number, or direction of the pulls in each test, then circle the words that tell what the wagon does. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	In the first test, why does the wagon stay still?	**Two equal pulls act in opposite directions, so they balance.**
2	When both children pull right, how does changing the direction of one pull affect the wagon's motion?	**The pulls no longer balance. They add together, and the wagon moves right.**
3	How does the wagon's motion change when Mia uses one rightward pull instead of two rightward pulls of the same strength?	**The wagon still moves right, but it does not go as far in the same amount of time.**
4	In Mia's last two tests, how does changing which side has the stronger pull affect the wagon?	**The wagon moves toward the stronger pull, right in the first test and left in the second.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I will use the same foam block, desk, starting line, and two-second push time in both trials. First, one student will push the block right with a gentle push; next, two students will each push it right with a gentle push of the same strength. I will measure how far the block moves from the line and predict it will go farther with two pushes.

Accept plans that keep the object and testing conditions the same while changing only the number of same-strength, rightward pushes. Students may measure distance or compare the block's motion over the same amount of time.