Which Way, Sled?

Investigate how opposite pulls affect motion

3.PS2.1 "Plan and conduct investigations on the effects of balanced and unbalanced forces on the motion of an object."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline what Nia keeps the same in every test, circle the meter readings, and draw a box around what the sled does in each test. These marks will help you compare the pulls and the sled's motion.

The Classroom Sled Test

1. A toy sled sits on a smooth classroom floor. Nia ties a string to each end. A force meter on each string shows how hard someone pulls. Nia wants to find out how pulls change the sled's motion. She marks a starting spot with tape. For each test, she uses the same sled and floor, starts with the sled still, and records which way it moves.

2. First, Nia and Eli pull in opposite directions. Each meter reads two units. The sled stays at the starting spot. They repeat the test and see the same result. Next, the left meter reads two units, but the right meter reads four units. The sled moves right. They repeat this test, too. Each time, the sled moves toward the stronger pull.

3. For one more test, Nia changes which side pulls harder. The left meter reads four units, and the right meter reads two units. The sled moves left. Equal pulls in opposite directions balance, so a sled that starts still stays still. Unequal pulls do not balance, so the sled can start moving. Nia writes down each meter reading and the sled's motion to compare the tests.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why does Nia use the same sled and floor and start with the sled still in every test?

2. In the first test, what readings and motion show that the pulls balance?

3. How does Nia change the pulls in the second test, and what happens to the sled?

4. Which two tests show what happens when the stronger pull changes sides? What does Nia observe?

3 YOUR TURN

Your own words

Plan a test with a different object that starts still. In three or four sentences, name what you will keep the same, describe one test with equal opposite pulls and one with unequal opposite pulls, and tell what motion you will look for and record.

ANSWER KEY

Which Way, Sled?

GRADE 3 · 3.PS2.1

PART 1 · READ AND MARK

Underline what Nia keeps the same in every test, circle the meter readings, and draw a box around what the sled does in each test. These marks will help you compare the pulls and the sled's motion. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why does Nia use the same sled and floor and start with the sled still in every test?	**Keeping these things the same helps Nia find out whether changing the pulls changes the sled's motion.**
2	In the first test, what readings and motion show that the pulls balance?	**Both meters read two units, and the sled stays at the starting spot.**
3	How does Nia change the pulls in the second test, and what happens to the sled?	**She makes the right pull four units and the left pull two units. The sled moves right.**
4	Which two tests show what happens when the stronger pull changes sides? What does Nia observe?	**In the second test, the right pull is stronger and the sled moves right. In the third test, the left pull is stronger and the sled moves left.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I will put a small box on the same desk at the same starting spot each time. I will pull its opposite sides with two force meters that have equal readings and record whether it moves. Then I will make the left pull stronger than the right pull and record which way the box moves. I expect the box to stay still with equal pulls and move left with unequal pulls.

Accept plans that keep the object, surface, and starting motion the same while changing the opposite pulls. Equal pulls should leave an object that starts still at rest; an unequal pull can move it toward the stronger side.