Roll and Test

Plan a fair test of friction and motion

P.3.6.2 "Plan an experiment to investigate the relationship between a force applied to an object (e.g., friction, gravity) and resulting motion of the object."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the one thing Mina changes, circle two things she keeps the same, and number the two steps she uses to measure distance.

Where Will the Marble Stop?

1. Mina wants to find out how a surface changes the motion of a rolling marble. She places a short ramp on the classroom floor. One path in front of the ramp is covered with smooth paper. Another path has a piece of felt. A rolling marble touches each surface. Friction is a force that slows objects when their surfaces rub. Felt is rougher than smooth paper, so it usually makes more friction.

2. Mina can test one path at a time. She sets the same ramp at the start of each path and uses the same marble. She lets go from the same mark on the ramp without giving the marble a push. Changing only the path helps her tell whether the surface makes a difference. A new push would add another force and make the test less fair.

3. Mina marks where the marble leaves the ramp and where it stops. She measures the distance between those marks with a ruler. She tries each path three times because one run can be unusual. If the marble travels a shorter distance on felt, that would support the idea that more friction slows it sooner. She plans to record each distance before making a claim.

2 ANSWER WITH EVIDENCE

Use the passage

1. A toy car rolls onto smooth cardboard in one run and rough sandpaper in another. What is the one thing you should change to test how the surface affects its motion?

2. If the toy car starts on a ramp, name two things you should keep the same in both runs.

3. How could you measure whether the toy car travels farther on cardboard or sandpaper?

4. Which surface would you predict will stop the toy car sooner? Why?

3 YOUR TURN

Your own words

Choose an object that is not a marble or toy car. In four sentences, plan a test of how a gentle push and a stronger push affect its motion: tell what you will change, what you will keep the same, how you will measure motion, and what you predict.

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PART 1 · READ AND MARK

Underline the one thing Mina changes, circle two things she keeps the same, and number the two steps she uses to measure distance. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	A toy car rolls onto smooth cardboard in one run and rough sandpaper in another. What is the one thing you should change to test how the surface affects its motion?	**Change only the surface the car rolls on.**
2	If the toy car starts on a ramp, name two things you should keep the same in both runs.	**Accept two: the car, the ramp, the starting mark on the ramp, or letting go without a push.**
3	How could you measure whether the toy car travels farther on cardboard or sandpaper?	**Mark where the car leaves the ramp and where it stops on each surface. Measure between the marks with a ruler.**
4	Which surface would you predict will stop the toy car sooner? Why?	**Rough sandpaper, because it usually makes more friction, which slows the car sooner.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I will push an upside-down plastic cup across a desk, once gently and once harder. I will use the same cup and desk, start at the same line, and push for the same short time. I will measure from the start line to where the cup stops after each push. I predict the stronger push will move the cup farther.

For Part 3, accept any safe object and a plan that changes push strength while keeping other conditions the same. The student should describe a way to measure motion and make a prediction.