Predict the Roll

Build a testable hypothesis from a physical science question.

PS.1.a.ii "asking questions and defining problems develop hypotheses indicating relationships between independent and dependent variables"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline Mateo's testable question. Circle the independent variable and box the dependent variable in Mateo's hypothesis so you can see the relationship he predicts.

A Ramp Investigation

1. During an after-school design challenge, Mateo noticed that a toy car rolled farther on some ramps than on others. He wanted to investigate rather than guess. First, he asked, "How does the height of a ramp affect the distance a toy car travels after leaving the ramp?" This question names a possible cause, ramp height, and an outcome, travel distance. A testable question focuses on one relationship that can be measured. Mateo decided to use the same car, release point, and floor surface each time.

2. The factor Mateo changed on purpose was the independent variable. He set the ramp at several heights and measured each height in centimeters. The distance traveled was the dependent variable because it could change in response to ramp height. He measured that distance in centimeters from the ramp's end to the car's stopping point. Keeping other conditions the same helps make the comparison fair. If the car, starting location, and surface changed too, Mateo could not tell which factor caused a difference.

3. Before testing, Mateo wrote a hypothesis: "If ramp height increases, then the distance the toy car travels after leaving the ramp will increase." This statement predicts a relationship between the independent and dependent variables. It is not a claim that every ramp test must give the same result. It gives Mateo a prediction he can test by collecting measurements. His results might support the hypothesis or not support it. Either outcome can lead to a better question, such as whether surface type changes the car's travel distance.

2 ANSWER WITH EVIDENCE

Use the passage

1. What possible cause and outcome does Mateo's question compare?

2. What is the independent variable in Mateo's investigation? Why is it independent?

3. What is the dependent variable, and how does Mateo measure it?

4. State Mateo's hypothesis in an If... then... form.

3 YOUR TURN

Your own words

Choose a physical science investigation that is different from a toy car on a ramp. Write three sentences: a testable question, a sentence naming the independent and dependent variables, and an If... then... hypothesis that predicts their relationship.

ANSWER KEY

Predict the Roll

GRADES 7-8 · PS.1.a.ii

PART 1 · READ AND MARK

Underline Mateo's testable question. Circle the independent variable and box the dependent variable in Mateo's hypothesis so you can see the relationship he predicts. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What possible cause and outcome does Mateo's question compare?	**The possible cause is ramp height, and the outcome is the distance the toy car travels.**
2	What is the independent variable in Mateo's investigation? Why is it independent?	**Ramp height is the independent variable because Mateo changes it on purpose.**
3	What is the dependent variable, and how does Mateo measure it?	**The dependent variable is the distance traveled. Mateo measures it in centimeters from the end of the ramp to where the car stops.**
4	State Mateo's hypothesis in an If... then... form.	**If ramp height increases, then the distance the toy car travels after leaving the ramp will increase.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

How does the length of a pendulum string affect the time needed for 10 swings? The independent variable is string length, and the dependent variable is the time needed for 10 swings. If string length increases, then the time needed for 10 swings will increase.

Accept any measurable physical science question with a clearly identified independent variable and dependent variable. The hypothesis should predict how the dependent variable will change when the independent variable changes.