Which Way Wind?

Design, test, and improve a wind vane

E.4.9B.3 "Design weather instruments utilized to measure weather conditions (e.g., barometer, hygrometer, rain gauge, anemometer, or wind vane). Use an engineering design process to define the problem, design, construct, evaluate..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the class's problem and circle two materials Maya uses. Write B beside one sentence about building the vane, T beside one sentence about testing it, and I beside one sentence about improving it.

Maya's Wind Vane

1. Maya's class wants to know which way the wind blows across the playground. A wind vane can show the direction the wind comes from, but it must turn freely. Maya plans a vane made from a drinking straw, a paper arrowhead, a small cardboard tail, a pin, a pencil with an eraser, and clay. The tail catches moving air and helps the arrow point into the wind.

2. Maya tapes the arrowhead to one end of the straw and the tail to the other. She pushes a pin through the straw near its middle and into the pencil eraser. The pencil stands upright in clay. With a compass, she marks north, south, east, and west on paper under the vane. She keeps the vane away from walls that could block or change the wind.

3. To test her design, Maya places a small fan first on one side of the vane, then on another. The arrow should point toward the fan each time, since the fan is where the air comes from. At first, the arrow hardly turns because its tail is too small. Maya adds a wider tail, tests again, and finds that the arrow points toward the fan from both sides.

2 ANSWER WITH EVIDENCE

Use the passage

1. What part of Maya's design catches moving air, and which way should the arrow point?

2. How does Maya set up the vane so she can name a wind direction without a wall changing the wind?

3. How does Maya test whether the vane shows the direction the air comes from?

4. What problem does Maya notice during the first test, and how does she improve the vane?

3 YOUR TURN

Your own words

Design a rain gauge to measure rain at your school. Sketch and label its parts, then write how you would build it, test its readings, and improve it if a test shows a problem.

ANSWER KEY

Which Way Wind?

GRADE 4 · E.4.9B.3

PART 1 · READ AND MARK

Underline the class's problem and circle two materials Maya uses. Write B beside one sentence about building the vane, T beside one sentence about testing it, and I beside one sentence about improving it. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What part of Maya's design catches moving air, and which way should the arrow point?	**The tail catches moving air. The arrow should point into the wind, toward where the air comes from.**
2	How does Maya set up the vane so she can name a wind direction without a wall changing the wind?	**She uses a compass to mark north, south, east, and west under the vane, then places it away from walls.**
3	How does Maya test whether the vane shows the direction the air comes from?	**She puts a fan on two different sides of the vane and checks whether the arrow points toward the fan each time.**
4	What problem does Maya notice during the first test, and how does she improve the vane?	**The arrow hardly turns because the tail is too small, so she adds a wider tail.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Sketch labels: clear, straight-sided jar; open top; flat bottom; ruler taped outside with zero lined up with the inside bottom. I will tape the ruler to the jar and set it on level ground away from a roof. To test it, I will add water until a second ruler shows a depth of 2 cm, then compare the reading on the taped ruler. If the readings do not match, I will move the taped ruler and test again.

Accept other workable rain gauge designs. Look for labeled parts, a way to measure water depth, a test that checks a reading, and an improvement tied to a possible test result.