

From Clues to Questions

Use evidence to ask testable questions and define a design problem.

8.1.A “ask questions and define problems based on observations or information from text, phenomena, models, or investigations;”

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline observations that give evidence, circle words or quantities that can be measured, and number the need and limits in the engineering problem so you can see how evidence leads to a focused investigation or design task.

Beans by the Brick Wall

- ① During a school garden check, students noticed that bean plants beside a brick wall were shorter and had paler leaves than bean plants in the center bed. Both groups received water from the same hose twice each week. The wall-side soil felt dry near the surface at noon, while the center-bed soil felt damp. Before deciding what caused the difference, the class recorded where each plant grew, its height, leaf color, watering schedule, and soil condition. These observations gave them evidence, not a conclusion.
- ② A useful scientific question focuses on something that can be observed or measured. The class could ask, “How does distance from the brick wall relate to bean-plant height after four weeks?” This question names a factor, distance, and a measurement, height. “Why are the wall-side plants unhappy?” is less useful because unhappy cannot be measured and many causes are possible. The class would need to compare plants at planned distances, keep other conditions as similar as possible, and collect height data before claiming a relationship.
- ③ After learning that the wall-side bed dries quickly, the school garden club faced an engineering problem. They needed a way to keep the soil in that bed moist enough for beans during hot afternoons. A clear problem statement includes the need, evidence, and limits. For example, the club must use materials already at school, avoid blocking the walkway, and check soil moisture with the same method each day. The club can then ask testable questions about possible designs and decide what data will show whether a design meets the need.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Write one observation from the garden check that is evidence, not a conclusion.

2 In the class's useful scientific question, what factor is being changed or compared, and what measurement will be collected?

3 Why is the question about plants being "unhappy" less useful for an investigation?

4 State the garden club's engineering need and list two limits the club must follow.

3 YOUR TURN _____ Your own words

After rain, puddles remain for hours near the school entrance, and students track water indoors. Write one testable scientific question about this observation. Then write one engineering problem statement that includes the need, the observation, and two limits.

PART 1 • READ AND MARK

Underline observations that give evidence, circle words or quantities that can be measured, and number the need and limits in the engineering problem so you can see how evidence leads to a focused investigation or design task. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Write one observation from the garden check that is evidence, not a conclusion.	Answers may include that wall-side plants were shorter, wall-side leaves were paler, wall-side soil felt dry at noon, center-bed soil felt damp, or both groups were watered from the same hose twice weekly.
2	In the class's useful scientific question, what factor is being changed or compared, and what measurement will be collected?	The factor is distance from the brick wall, and the measurement is bean-plant height after four weeks.
3	Why is the question about plants being "unhappy" less useful for an investigation?	"Unhappy" cannot be measured, and many possible causes could explain it.
4	State the garden club's engineering need and list two limits the club must follow.	Need: keep the wall-side soil moist enough for beans during hot afternoons. Limits include using materials already at school, not blocking the walkway, and checking soil moisture with the same method each day.

PART 3 • YOUR TURN (SAMPLE ANSWER)

How does the amount of water left near the entrance two hours after rain change when different walkway surfaces are tested? Design a way to reduce water tracked indoors because puddles remain near the entrance, using materials the school already has and without making the entrance harder to use.

Accept varied testable questions if they name an observable or measurable factor and outcome. Accept engineering problem statements that state the need, connect it to the puddle observation, and include two realistic limits.