Paths and Plants

Redesign a trampled planting strip using evidence

BOT.4.2 "Use an engineering design process to define a problem, design, construct, evaluate, and improve a habitat impacted by human interactions.*"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the evidence that defines the habitat problem, circle the features of the team's design, and number each measurement used to evaluate it. Use your marks to trace how the team tested and improved its solution.

A Better Route Behind the School

1. Every lunch period, students cut across a sunny planting strip behind Larch High. Their footsteps pack the soil, making it harder for water to soak in and for roots to grow. By April, more than half the strip showed bare soil, and few flowering plants remained. A student design team marked four fixed, one-square-meter plots and found that 55 percent of their combined surface was bare. They also counted an average of 24 people crossing the strip during each of three lunch periods. The team set two goals for eight weeks later: less than 20 percent bare soil and at most five crossings per lunch period.

2. To keep students moving without crushing plants, the team proposed a short path of firm, level, permeable pavers beside, not through, the strip. They selected locally native asters and goldenrods suited to the sunny site because their roots could hold soil and their flowers could support insects. The school approved a narrow rail along the planted edge, but required the new route to remain accessible and avoid an existing tree's roots. Volunteers laid the pavers on a prepared base, installed the rail, loosened compacted soil in areas clear of tree roots, and planted 40 young plants. They watered the plants during establishment.

3. Eight weeks later, the team measured the same four plots and counted crossings during three more lunch periods. Bare soil had fallen to 18 percent, 32 of the 40 plants were alive, and an average of three people crossed the strip per lunch period. Both stated goals were met, but one plot near the path entrance still had 30 percent bare soil. Students noticed shoes cutting around the end of the rail there. They proposed extending the firm path to that entrance and moving the rail end to guide feet onto it. After construction, they would repeat the plot measurements and lunch counts to test whether the weak spot improved.

2 ANSWER WITH EVIDENCE

Use the passage

1. What human action damaged the habitat, and which two measurements helped the team define the problem?

2. How did two parts of the design address the habitat problem while still allowing students to pass through the area?

3. Which results show whether the team's two goals were met? Compare each result with its goal.

4. What evidence pointed to a remaining weak spot, and how would the proposed change address it?

3 YOUR TURN

Your own words

A lawn beside a pond sends fertilizer runoff toward the water. Write a plan that defines the plant habitat problem, sets a measurable goal, describes what you would build and plant, and explains how you would test and improve your design.

Paths and Plants

PART 1 · READ AND MARK

Underline the evidence that defines the habitat problem, circle the features of the team's design, and number each measurement used to evaluate it. Use your marks to trace how the team tested and improved its solution. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What human action damaged the habitat, and which two measurements helped the team define the problem?	**Students crossed the strip, compacting its soil. The team measured 55 percent bare soil and an average of 24 crossings per lunch period.**
2	How did two parts of the design address the habitat problem while still allowing students to pass through the area?	**The paver path gave students a route beside the plants, while the rail guided them away from the planting strip.**
3	Which results show whether the team's two goals were met? Compare each result with its goal.	**Bare soil fell to 18 percent, below the 20 percent limit. Crossings averaged three per lunch period, below the limit of five.**
4	What evidence pointed to a remaining weak spot, and how would the proposed change address it?	**The entrance plot still had 30 percent bare soil, and students walked around the rail end. Extending the path and moving the rail end would guide them onto the path.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Fertilizer runoff from the lawn may change the pond-edge habitat for plants. My goal is for water leaving a new planting area to have at least 25 percent less nitrate than water entering it during three rainstorms. I would build a shallow swale between the lawn and pond and plant locally native sedges suited to wet soil. After the plants establish, I would sample water at both ends during storms. If nitrate does not decrease enough, I would enlarge the planted area and test it again.

Accept equivalent explanations that connect a design choice to reduced trampling or plant recovery. For the open task, look for a measurable goal, a buildable plant-focused design, a matching test, and an improvement tied to possible results.