Pond Futures

Use a simulation to weigh shoreline choices.

HS-LS4-6 "Create and/or use a simulation to evaluate the impacts of human activity on biodiversity."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two model rules that link paving to changes in biodiversity. Circle the two 60% paving scenarios in the table, then box the four species counts you need to test whether the planted strip helps.

What Happens at Willow Pond?

1. At Willow Pond, a town plans a lakeside parking area. Ecologists build a computer simulation to test how paving the shore might affect biodiversity. Each run begins with the same 12 native plant species and 18 insect species. The program tracks how many species remain after ten years, not how many individual organisms survive.

2. The model assumes paving removes plant habitat and sends more stormwater into the pond. Fewer native plants also leave less food and shelter for insects. Researchers run four scenarios with identical starting conditions. One adds a planted strip on the unpaved shore; in the model, the strip absorbs some runoff and provides insect habitat.

SIMULATED SPECIES REMAINING AFTER TEN YEARS

Scenario	Shore paved	Native plant species	Insect species
No new paving	0%	12	18
Paving	30%	9	13
Paving	60%	5	7
Paving with planted strip	60%	8	12

3. Each output is a prediction, not a count taken at the pond. The ecologists hold starting conditions constant so differences between runs can be linked to the changed scenario within the model. They would need field surveys to check the predictions. Drought, invasive species, or construction outside the shoreline might change actual results.

2 ANSWER WITH EVIDENCE

Use the passage

1. Compared with no new paving, what impact does 30% paving have on each group of species in the simulation?

2. How does increasing paving from 30% to 60%, without a planted strip, change the predicted species counts?

3. At 60% paving, how much does the planted strip change each predicted species count? Does either count reach the no-paving result?

4. The town is choosing between 30% paving without a strip and 60% paving with a strip. Which choice preserves more species in the model? Use both counts.

3 YOUR TURN

Your own words

Start with the 60% paved scenario and design one new human action not shown in the table. State a rule your simulation would use, predict both species counts after ten years, compare them with 60% paving alone, and name one reason your prediction might be uncertain.

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PART 1 · READ AND MARK

Underline two model rules that link paving to changes in biodiversity. Circle the two 60% paving scenarios in the table, then box the four species counts you need to test whether the planted strip helps. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Compared with no new paving, what impact does 30% paving have on each group of species in the simulation?	**Native plant species fall from 12 to 9, a loss of 3. Insect species fall from 18 to 13, a loss of 5.**
2	How does increasing paving from 30% to 60%, without a planted strip, change the predicted species counts?	**The plant count falls from 9 to 5, and the insect count falls from 13 to 7.**
3	At 60% paving, how much does the planted strip change each predicted species count? Does either count reach the no-paving result?	**The strip adds 3 plant species and 5 insect species compared with 60% paving alone. Neither count reaches the no-paving result.**
4	The town is choosing between 30% paving without a strip and 60% paving with a strip. Which choice preserves more species in the model? Use both counts.	**The 30% paving scenario preserves more of both groups: 9 plant and 13 insect species, compared with 8 plant and 12 insect species.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would install permeable pavement in the parking area. My simulation rule is that it reduces stormwater entering the pond but does not restore the plant habitat removed by paving. I predict 6 native plant species and 9 insect species after ten years. That is one more plant species and two more insect species than with 60% paving alone. Drought could change how many species actually remain.

Accept other new actions and plausible counts if the stated rule supports the predicted change. Students should compare both counts with 5 plant and 7 insect species and identify a source of uncertainty.