Two Pond Stories

Use population data and field notes to investigate limiting factors.

ENV.1.6 "Use mathematics, graphics, and informational text to determine how population density-dependent and density-independent limiting factors affect populations and diversity within ecosystems..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two field observations that might explain changes in the pond populations. Circle the table counts you need to compare the ponds from year 2 to year 3.

What Changed at the Ponds?

1. Population counts show how many organisms live in an area, but counts alone cannot reveal why a population changes. When organisms become crowded, competition for food or space can slow growth; its effect depends on population density. A storm can reduce numbers even when a population is sparse. Comparing counts across time with field notes helps separate these causes.

2. Researchers counted frogs at two nearby ponds each spring. Both ponds had similar starting counts. At Pond A, insects available per frog fell as frog numbers rose. Just before the final count, a long dry spell shrank Pond B, while Pond A stayed wet. The table records frog counts, not the number of species.

SPRING FROG COUNTS

Year	Pond A frogs	Pond B frogs
0	20	20
1	40	40
2	55	55
3	58	11

3. Before the dry spell, each pond contained four frog species. At the final count, Pond A still contained four, but Pond B contained two. A spreadsheet can make a line graph with year on the horizontal axis and frogs on the vertical axis, using a separate line for each pond. Field notes help explain patterns that the lines alone cannot prove.

2 ANSWER WITH EVIDENCE

Use the passage

1. From year 0 to year 3, how much did each pond's frog count change?

2. Compare Pond A's increase from year 0 to year 1 with its increase from year 2 to year 3. Which field observation could help explain the difference?

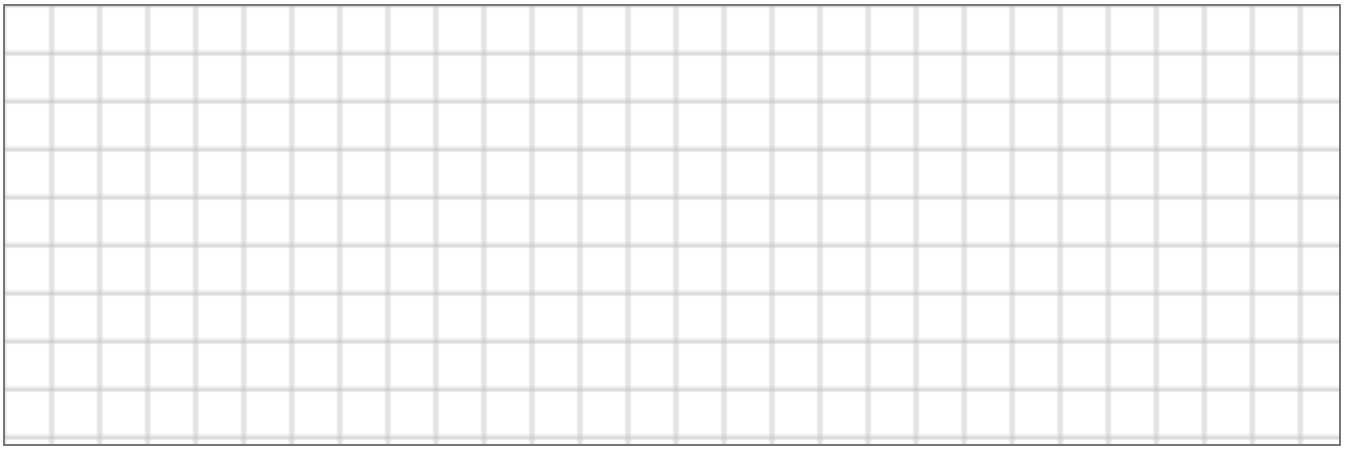
3. What percent of Pond B's frogs were lost from year 2 to year 3? Explain why the dry spell is a density-independent limiting factor.

4. Compare the change in frog species diversity at the two ponds. Use the species counts in your answer.

3 YOUR TURN

Your own words

Plot both ponds' counts on the grid as two labeled lines, as you could in a spreadsheet. Use years 0 to 3 on the horizontal axis and 0 to 60 frogs on the vertical axis. Then write two sentences explaining how a spreadsheet graph would help you compare the curves and why frog counts alone cannot show the change in diversity.



Two Pond Stories

PART 1 · READ AND MARK

Underline two field observations that might explain changes in the pond populations. Circle the table counts you need to compare the ponds from year 2 to year 3. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	From year 0 to year 3, how much did each pond's frog count change?	**Pond A increased by 38 frogs, from 20 to 58. Pond B decreased by 9 frogs, from 20 to 11.**
2	Compare Pond A's increase from year 0 to year 1 with its increase from year 2 to year 3. Which field observation could help explain the difference?	**Pond A gained 20 frogs from year 0 to 1 but only 3 from year 2 to 3. Insects available per frog fell as the population grew, which could have slowed growth through competition for food.**
3	What percent of Pond B's frogs were lost from year 2 to year 3? Explain why the dry spell is a density-independent limiting factor.	**Pond B lost 44 of 55 frogs, or 80%. A dry spell can affect a pond regardless of how crowded its frog population is.**
4	Compare the change in frog species diversity at the two ponds. Use the species counts in your answer.	**Pond A remained at four frog species. Pond B fell from four species to two, losing half of its recorded frog species.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Graph: Pond A (0, 20), (1, 40), (2, 55), (3, 58); Pond B (0, 20), (1, 40), (2, 55), (3, 11).
A spreadsheet line graph would show Pond A leveling off while Pond B drops after the dry spell. The frog counts alone cannot show that Pond B fell from four frog species to two.

Accept correctly scaled graphs with two labeled series and plotted points connected in year order. Students may describe food competition and the dry spell as possible explanations, but the curves alone do not prove either cause.