Voles on the Move

Use population data to investigate causes of change

7.7 "Analyze and interpret data to explain how density-independent and density-dependent limiting factors in an ecosystem can lead to shifts in populations."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the two kinds of limiting factors described in the passage. Then number the table rows from 1 to 4 and circle the changes in vole counts you can connect to a possible limiting factor.

A Year in the Wetland

(1) A population can rise or fall as conditions change. A density-independent factor can affect animals whether the area holds many or few of them. A sudden hailstorm is one example. A density-dependent factor grows stronger as a population becomes crowded. For example, a contagious illness may spread more easily when animals meet often.

(2) Scientists counted voles, small rodents, in a grassy wetland at four times during one year. They also recorded whether edible seeds were plentiful or scarce and noted events between counts. The table shows their observations. Each count is an estimate for the same area, so the changes can be compared.

VOLES IN ONE WETLAND

Census time	Voles counted	Edible seeds	Since the last count
Early spring	40	Plentiful	No major event recorded
After spring flood	18	Plentiful	Flash flood crossed the wetland
Early summer	62	Plentiful	Many young were born
Late summer	43	Scarce	Seeds were heavily eaten

(3) A count shows what changed, but not exactly why every animal lived or died. New young can raise a count, and some voles may move away. Use the timing of events and the food notes to support your explanations. A factor that changes with crowding may become more important after the population grows.

2 ANSWER WITH EVIDENCE

Use the passage

1. How did the vole count change after the flood? Explain why a flood is a density-independent limiting factor.

2. How might the rise from 18 voles to 62 voles make food a stronger limiting factor later?

3. What evidence suggests that food may have limited the vole population by late summer?

4. Can the table prove that every vole missing after the flood died in it? Use the passage to explain your answer.

3 YOUR TURN

Your own words

Starting with the late-summer count, invent two different possible future events that are not named in the passage or table, one density-independent and one density-dependent. Give a possible new vole count after each event and explain why each event fits its type.

ANSWER KEY

Voles on the Move

GRADE 7 · 7.7

PART 1 · READ AND MARK

Underline the two kinds of limiting factors described in the passage. Then number the table rows from 1 to 4 and circle the changes in vole counts you can connect to a possible limiting factor. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How did the vole count change after the flood? Explain why a flood is a density-independent limiting factor.	**The count fell from 40 to 18. A flood can affect voles whether the population is large or small.**
2	How might the rise from 18 voles to 62 voles make food a stronger limiting factor later?	**More voles would seek seeds in the same area, so competition for food could grow stronger.**
3	What evidence suggests that food may have limited the vole population by late summer?	**The count fell from 62 to 43 while edible seeds changed from plentiful to scarce and were heavily eaten.**
4	Can the table prove that every vole missing after the flood died in it? Use the passage to explain your answer.	**No. The flood and the drop happened during the same period, but some voles may have moved away.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

In one possible future, a blizzard covers the wetland and the vole count falls from 43 to 24. This is density-independent because snow can bury nests whether there are many voles or few. In another possible future, voles gather in a small patch of grass and hawks catch more of them, lowering the count from 43 to 34. This is density-dependent because crowding makes the voles easier for hawks to find.

Accept other reasonable explanations that connect a change in the counts to the timing and conditions shown. For Your Turn, accept plausible counts and new events if the explanation correctly distinguishes an effect that does not depend on crowding from one that grows stronger with crowding.