

Ants, Lizards and the Edge of Town: An Invasive Species CER

Learning target: I can write a claim-evidence-reasoning argument, using data, that an invasive species changed native ant diversity and a native predator population, and I can test the argument against another explanation.

Claim, evidence, reasoning

About 45 min

Individual

MS-LS2-4 · practice

MS-LS2-5 · supports

writing

data analysis

Name _____

Date _____

Period _____

Directions

Read the scenario and the background facts, then study both datasets. The numbers are a teaching dataset based on the kind of results scientists have reported; they are not real measurements from one place. Answer the warm-up questions first, because they organize your evidence. Then write your argument in the claim, evidence and reasoning boxes, using numbers from the tables. Finish with the two questions that test your argument.

You will need: This worksheet, Pencil, Calculator

The scenario

Sage Hill Preserve is a patch of coastal sage scrub in Southern California with a neighborhood of houses and watered yards along one side. A biology class helped a park scientist survey the preserve. They set out lines of sampling stations at six distances from the edge of the houses. At each distance they placed 20 small baits (cookie crumbs on cards) to see which ants came, collected ants to count how many native ant species lived there, measured soil moisture, and searched for coast horned lizards for 10 hours.

Background facts — Argentine ants come from South America and were carried around the world by people. In California they need moist ground, so they do best near watered lawns and gardens, where their huge colonies spread outward. They attack native ant colonies and take over their food. Coast horned lizards are native California lizards that eat mostly native ants, especially large harvester ants. The lizards rarely eat Argentine ants, which are tiny.

Survey of Sage Hill Preserve by distance from the edge of the houses (teaching dataset)

Simulated teaching dataset: the numbers are invented to be realistic, not measured.

Distance from houses (m)	Baits visited by Argentine ants (out of 20)	Native ant species found	Soil moisture (percent)	Horned lizards seen per 10 hours
25	19	2	14	0.0
75	16	3	11	0.2
150	11	5	8	0.5
300	4	8	5	1.2
500	1	10	4	1.8
800	0	11	4	2.0

Simulated data for teaching. The pattern, with Argentine ants crowded near watered edges and native ants and horned lizards farther away, matches what researchers have reported in Southern California scrub.

Feeding trial: change in body mass of young horned lizards over 6 weeks (teaching dataset)

Simulated teaching dataset: the numbers are invented to be realistic, not measured.

Diet	Number of young lizards	Average change in mass (g)
Native ants only	8	1.2
Argentine ants only	8	-0.1

Simulated data for teaching, modeled on the direction of a published feeding experiment: young lizards grew on native ants but barely grew, or lost mass, on Argentine ants.

Warm-up: organize the evidence

1. What percent of the baits did Argentine ants visit at 25 m and at 800 m? How many more native ant species were found at 800 m than at 25 m? Show your calculations.

2. Between which two distances do Argentine ants drop from visiting more than half the baits to fewer than half? What happens to native ant species and to horned lizards over the same distances?

3. Draw a chain with arrows that links four things in the tables: soil moisture, Argentine ants, native ants and horned lizards. Write 'more' or 'fewer' on each arrow.

Your argument

CLAIM

Claim: State how the Argentine ant invasion changed native ant diversity and the horned lizard population at Sage Hill Preserve. Your claim must name the cause and both effects.

EVIDENCE

Evidence: Give at least three specific pieces of evidence with numbers. At least one must come from the survey's near-edge and far-from-edge stations, and at least one must come from the feeding trial.

REASONING

Reasoning: Explain why the evidence supports your claim. Explain how Argentine ants can harm horned lizards without ever attacking them (direct or indirect effect?), why the lizards cannot simply switch to eating Argentine ants, and why the ants are crowded near the houses.

Test your argument

4. A neighbor says, 'The lizards near the houses are gone because pet cats hunt them.' Explain why the survey alone cannot rule this out. Then describe one more piece of evidence or one study that could tell whether cats or ants matter more.

5. Propose one change the neighborhood could make along the edge that might shrink the invaded zone. Use the soil moisture data to explain why it could work, and describe what the class should measure next year to find out whether it maintained or improved biodiversity.

Building the reasoning

Reasoning connects your evidence to your claim with a science idea. Try these frames. 'Argentine ants affect horned lizards indirectly, because ____.' 'The feeding trial shows that even if lizards ate Argentine ants, ____.' 'The soil moisture column explains where the ants are, because ____.' Use the words *invasive species*, *native*, *population*, *indirect effect* and *species richness* at least once each.

Dry buffer strip or dry yards?

The preserve manager could build a strip of dry, native plants 100 m wide between the yards and the scrub, or stop all watering of the three yards closest to the preserve. Use the dataset to predict how far into the preserve each choice would move the edge of the Argentine ant zone. Then explain which choice you would test first, what you would measure, and how long you would need to wait before deciding whether it worked.