

Plus, Minus, Zero: Sorting Interactions by Who Gains and Who Loses

Learning target: I can use the terms predation, competition, mutualism, commensalism and parasitism to classify new interactions by their effect on each partner, and explain how the terms relate to one another.

Vocabulary in action

About 35 min

Individual

MS-LS2-2 · practice

independent practice

writing

visual modeling

Name _____

Date _____

Period _____

Directions

Start with the word bank and the symbol table. The rule for every interaction in this lesson is the same: ask what the interaction does to each partner, helped (+), harmed (–) or no effect (0), and the pair of symbols names the interaction. Then apply the rule to new situations in Part B. None of the examples here are from your textbook, so you cannot answer by memory; you have to use the rule.

You will need: This worksheet, Pencil, Colored pencils for the concept map (optional)

predation

A feeding interaction: the predator gets its food by eating all or part of another living thing, the prey. In this lesson, eating plants counts, so a grazing animal is a predator of grass.

carnivore

A predator whose diet is mostly animals.

herbivore

A predator whose diet is mostly plants or plant parts.

omnivore

A predator that regularly eats both plants and animals. The mix does not have to be equal; some omnivores eat mostly plants.

competition

An interaction in which two organisms or species need the same limited resource, so each gets less than it would alone. Both are harmed.

mutualism

An interaction in which each of the two species gains something that helps it survive, grow or reproduce.

commensalism

An interaction in which one species gains and the other is neither helped nor harmed, as far as scientists can tell.

parasitism

An interaction in which one species (the parasite) lives on or in another (the host) and takes resources from it a little at a time, usually weakening the host rather than killing it.

Part A: Crack the symbol code

Effect of each interaction on the two partners

Interaction	Partner 1	Partner 2
Mutualism	+	+
Commensalism	+	?
Predation	+ (predator)	– (prey)
Parasitism	? (parasite)	– (host)
Competition	?	?

Three of the five rows are complete. The question marks are for you to fill in using the word bank.

1. Fill the question marks. Commensalism: partner 2 is _____. Parasitism: the parasite is _____. Competition: partner 1 is _____ and partner 2 is _____.

2. Predation and parasitism have the same symbols (+ and –). Using the word bank, explain two differences that tell them apart.

3. Which interaction is the only one in which **neither** partner gains? Explain why it still counts as an interaction even though nobody benefits.

Part B: Which term fits?

Read each situation. Decide the effect on the first-named species and on the second-named species, then name the interaction. **Situation 1.** A mistletoe plant sinks root-like structures into the branch of an oak and draws off water and minerals; the branch beyond the mistletoe often weakens, but the oak lives for years.

Situation 2. A great blue heron stands in the shallows and swallows a frog. **Situation 3.** Two kinds of

hummingbird visit the same patch of flowers; when both are present, each bird gets less nectar than it would alone. **Situation 4.** Bees collecting nectar carry pollen between squash flowers; the squash plants set fruit and the bees get food. **Situation 5.** A songbird builds its nest in the fork of a maple's branches; the maple is neither helped nor harmed as far as scientists can tell. **Situation 6.** A deer browses the new shoots of a shrub, leaving the shrub alive but smaller. **Situation 7.** A tapeworm lives in a dog's intestine and absorbs food the dog has digested; the dog loses weight. **Situation 8.** Microbes in a cow's stomach break down grass fibers the cow cannot digest on its own; the microbes get food and a warm home, and the cow gets nutrients from the grass. **Situation 9.** Two shrub species on a dry hillside need the same scarce soil water; both grow more slowly when planted together than apart. **Situation 10.** A hermit crab moves into the empty shell of a snail that died months ago.

4. Complete the table for situations 1 to 9.

Effect on first species (+, -, 0)	Effect on second species (+, -, 0)	Name of the interaction
Situation 1		
Situation 2		
Situation 3		
Situation 4		
Situation 5		
Situation 6		
Situation 7		
Situation 8		
Situation 9		

5. Situation 10 is left out of the table on purpose. Explain why it is **not** an interaction between two species in the sense this lesson uses.

6. Situations 2 and 6 get the same name even though the frog dies and the shrub does not. Explain why, and say which one is easier to predict the effect of on the prey population.

7. A classmate says, 'Herbivore is the opposite of predator.' Use the word bank to explain why that is wrong in this lesson, and give the three words that are the real sub-groups of predator.

8. A black bear's diet is mostly berries, nuts and roots, with some fish and insects. Is it a carnivore, herbivore or omnivore? Explain using the word bank definition.

Part C: Build the map

9. Draw a concept map with 'Interactions between species' in the center and five branches, one per interaction. On each branch write the two symbols and one example from Part B. Then draw one extra line connecting the two branches that are most alike and write on it what they share.



10. The word **host** and the word **prey** both name the partner that is harmed. Write one sentence that uses both words correctly and shows the difference between them.

Two questions, every time

For any situation, ask only two questions. Question 1: Does the first species end up better off, worse off, or the same? Question 2: Does the second species end up better off, worse off, or the same? Write the two symbols first, then look them up in the grid. If both are minus, it is competition. If one is plus and the other is zero, it is commensalism. If one is plus and the other is minus, ask whether the gainer eats the other outright (predation) or lives on or in it and takes a little at a time (parasitism).

The partner that changes its mind

Some interactions do not sit still in one box. Oxpecker birds on African buffalo eat ticks from the buffalo's skin, which helps the buffalo, but they also peck at open wounds and drink blood, which harms it. Write a paragraph explaining which two of the five interaction names could describe oxpeckers and buffalo, what evidence a scientist would need to collect to decide which fits better, and why the answer might be different in the dry season than in the wet season.