Branches Beneath the Waves

Use body features to trace animal relationships

MAQ.6.2 "Identify characteristics that are shared and derived using graphical representations of animal evolution (i.e., cladograms and phylogenetic trees) and develop cladograms and phylogenetic trees."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the sentence that tells you where to place a new feature on a cladogram. Then circle two features in the table that support a shared branch.

A Family Tree for Sea Animals

1. A tide-pool survey brings four animals into focus: a sponge, a jellyfish, a clam, and an octopus. The table records body features, not how advanced an animal is. For each feature, "yes" means the animal has it. Compare the pattern of shared features before you propose branches on a cladogram.

BODY FEATURES OF FOUR SEA ANIMALS

Animal	True tissues	Bilateral symmetry	Mantle	Eight arms
Sponge	No	No	No	No
Jellyfish	Yes	No	No	No
Clam	Yes	Yes	Yes	No
Octopus	Yes	Yes	Yes	Yes

2. A cladogram is a branching hypothesis about ancestry. A branch point stands for a common ancestor. Place a new feature on the branch where it first appears in the group shown, then carry it forward unless later evidence shows a loss. Animals that share a more recent branch point are more closely related.

3. A cladogram of these four animals would have living animals at its tips, but cladograms can also include extinct organisms. A tip does not mean that one living animal turned into another living animal. The diagram compares lines of descent. One body feature alone may mislead, so scientists test proposed branches against additional evidence, including DNA.

2 ANSWER WITH EVIDENCE

Use the passage

1. Which feature groups the jellyfish, clam, and octopus together but separates them from the sponge?

2. Which two features group the clam and octopus together but separate them from the jellyfish?

3. Which animal has eight arms, and on which branch would you place that feature?

4. Which animal would branch off first in a cladogram of these four animals? Use the table to explain.

3 YOUR TURN

Your own words

Draw a cladogram for the four animals in the table. Label all four tips, place each of the four features on the earliest branch that fits the table, and write one sentence explaining your branching.

ANSWER KEY

Branches Beneath the Waves

PART 1 · READ AND MARK

Underline the sentence that tells you where to place a new feature on a cladogram. Then circle two features in the table that support a shared branch. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Which feature groups the jellyfish, clam, and octopus together but separates them from the sponge?	**True tissues.**
2	Which two features group the clam and octopus together but separate them from the jellyfish?	**Bilateral symmetry and a mantle.**
3	Which animal has eight arms, and on which branch would you place that feature?	**The octopus. Place eight arms on the branch leading only to the octopus.**
4	Which animal would branch off first in a cladogram of these four animals? Use the table to explain.	**The sponge branches off first because it lacks true tissues, which the other three animals share.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Cladogram: (sponge, (jellyfish, (clam, octopus))). Place true tissues after the sponge branch; bilateral symmetry and mantle after the jellyfish branch; and eight arms on the octopus branch. The clam and octopus share the most recent branch point because both have bilateral symmetry and a mantle.

Accept any equivalent branching layout with all four features correctly placed. The order of the clam and octopus tips may be reversed.