Branches Beneath the Surface

Use animal traits to build a cladogram.

MAQ.7.2 "Identify characteristics that are shared and derived using graphical representations of animal evolution and develop cladograms/phylogenetic trees."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the rule for placing a trait on a branch, then circle the Yes entries in the table to trace which animals share each trait.

From Shore to Family Tree

1 At a rocky shoreline, a lancelet buries most of its body in sand while a shark swims offshore. A tuna crosses the open water, and a salamander moves through a nearby freshwater pool. These animals are not steps in a ladder of progress. Their bodies offer clues about branches in a family tree, called a cladogram.

2 A Yes in the table means an animal has that trait; a No means it does not. A trait shared by several animals may have been inherited from a common ancestor. When building a cladogram, look for groups nested inside larger groups. Place each trait on the branch leading to all the animals that share it.

TRAITS OF FOUR ANIMALS

Animal	Backbone	Jaws	Bony skeleton	Four limbs
Lancelet	No	No	No	No
Shark	Yes	Yes	No	No
Tuna	Yes	Yes	Yes	No
Salamander	Yes	Yes	Yes	Yes

3 A cladogram shows a hypothesis about common ancestry, not a march from simple to advanced animals. Its branch points mark where lineages split. A trait that appears on one branch can be passed to every branch beyond that point. Animals living today belong at the tips, not at branch points. No species in this set is the direct ancestor of another.

2 ANSWER WITH EVIDENCE

Use the passage

1. Which two animals share a bony skeleton? Name two other traits they share with the shark.

2. Which animal should branch off before the backbone trait appears? Use the table to explain.

3. Which trait should appear between the backbone and bony skeleton on the main branch? Use two animals as evidence.

4. Why should the four-limb trait appear after the branch leading to tuna?

3 YOUR TURN

Your own words

Draw a cladogram for all four animals in the table. Label where each of the four traits first appears, then write one sentence explaining a trait placement using evidence from the table.

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PART 1 · READ AND MARK

Underline the rule for placing a trait on a branch, then circle the Yes entries in the table to trace which animals share each trait. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Which two animals share a bony skeleton? Name two other traits they share with the shark.	**Tuna and salamander share a bony skeleton. Both also share a backbone and jaws with the shark.**
2	Which animal should branch off before the backbone trait appears? Use the table to explain.	**The lancelet should branch off first because it is the only animal listed without a backbone.**
3	Which trait should appear between the backbone and bony skeleton on the main branch? Use two animals as evidence.	**Jaws should appear there. Sharks have jaws but no bony skeleton, while tuna have both.**
4	Why should the four-limb trait appear after the branch leading to tuna?	**The salamander has four limbs, but the tuna does not, so four limbs belong only on the branch leading to the salamander.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The lancelet splits first. Backbone and jaws appear before the shark splits off. Bony skeleton appears before the tuna splits off, and four limbs appear on the salamander branch. I placed bony skeleton before the tuna split because both tuna and salamander have it.

Accept any clearly rooted cladogram with lancelet branching first, shark second, and tuna and salamander sharing the bony-skeleton branch. Backbone and jaws may be placed in either order because this table does not show an animal with a backbone but no jaws.