Beyond the Shell

How an egg helped reptiles develop on land

ZOO.8.9 "Identify the amniotic egg as the major derived characteristic of reptiles."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the name of the major derived characteristic of reptiles. Circle two details that show how it supports an embryo, then number two reasons a shell alone does not identify the trait.

An Egg Away From Water

1 After a rainstorm, a tree frog lays a cluster of jelly-coated eggs in a pool. Nearby, a fence lizard buries its eggs in warm, loose soil. The settings offer a clue about reproduction on land. Frog embryos usually develop in water because their eggs lack the specialized membranes found in lizard eggs. A lizard embryo develops inside an amniotic egg, an egg with membranes that support development away from a pond. For the reptile lineage, the amniotic egg was a major derived characteristic, a trait that evolved in its ancestors and helped distinguish them from earlier vertebrates such as amphibians.

2 Inside the lizard's egg, the amnion surrounds the embryo with fluid, buffering it from drying and physical shocks. The yolk sac supplies nutrients, while other membranes help move gases and collect wastes. A flexible shell offers another layer of protection, but oxygen can still pass through it. These structures work together so the embryo can develop on land rather than in open water. The egg still needs suitable conditions: the buried nest must not become too dry or too hot. The key innovation is the complete amniotic egg, not merely a shell or a spot on dry ground.

3 A museum label claims that reptiles are defined by hard eggshells. That claim misses the important trait. Many reptile eggs have leathery shells, and some reptiles give birth to live young; their embryos still develop with amniotic membranes. Birds also have amniotic eggs, and mammals belong to the amniote group even though most mammal embryos develop inside the mother. These groups share the trait because of common ancestry. To identify the major derived characteristic of reptiles, look for the amniotic egg and its supporting membranes, not a particular shell texture or a nest location.

2 ANSWER WITH EVIDENCE

Use the passage

1. Which major derived characteristic distinguishes the lizard lineage from the frog in the passage? How does it change where embryos can develop?

2. Why would a hard eggshell be a poor substitute for the amniotic egg when identifying this characteristic of reptiles?

3. A reptile gives birth to live young. What evidence in the passage shows that its lineage still has the major derived characteristic?

4. Birds and mammals also have the trait described in the passage. Why can it still be identified as a major derived characteristic of reptiles?

3 YOUR TURN

Your own words

Invent a reptile species that nests in a surprising place and give it a name. Write three sentences describing its nesting site, identifying the major derived characteristic of its lineage, and explaining how that trait supports embryonic development there.

Beyond the Shell

PART 1 · READ AND MARK

Underline the name of the major derived characteristic of reptiles. Circle two details that show how it supports an embryo, then number two reasons a shell alone does not identify the trait. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Which major derived characteristic distinguishes the lizard lineage from the frog in the passage? How does it change where embryos can develop?	**The amniotic egg supports embryonic development on land, away from open water.**
2	Why would a hard eggshell be a poor substitute for the amniotic egg when identifying this characteristic of reptiles?	**Many reptile eggs have leathery shells, and some reptiles give birth to live young. The characteristic is the amniotic egg with its supporting membranes, not a hard shell.**
3	A reptile gives birth to live young. What evidence in the passage shows that its lineage still has the major derived characteristic?	**The passage states that embryos of live-bearing reptiles still develop with amniotic membranes.**
4	Birds and mammals also have the trait described in the passage. Why can it still be identified as a major derived characteristic of reptiles?	**The groups share the trait through common ancestry. It evolved in ancestors of the reptile lineage, distinguishing them from earlier vertebrates such as amphibians.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The ridge skink buries its eggs beneath damp leaves on a rocky ledge. Its lineage has the amniotic egg, the major derived characteristic of reptiles. Fluid around each embryo and other supporting membranes help it develop away from open water.

Accept responses that identify the amniotic egg, rather than shell texture or nest location, as the major derived characteristic. For the open task, the invented nesting site should offer conditions in which eggs could develop, including enough moisture.