

University of Maryland Science Olympiad

2025 Invitational



Fossils (Answer Key)

DO NOT SHARE

Section 1: Stations: (10 pts. per station; 50 pts. total)

Station 1:

1. Favosites
2. Hexagonaria
3. Heliophyllum
4. Fossil 1
5. B

Station 2:

1. Triticites
2. Rotaliida
3. D
4. Protozoa
5. Foraminifera (Forams)

Station 3:

1. Cryptolithus
2. Peronopsis
3. Ordovician
4. Middle Cambrian
5. True

Station 4:

1. Rafinesquina
2. Mucrospirifer
3. Atrypa
4. Paleozoic Era, especially in the Cambrian to Permian periods
5. Articulate brachiopods have hinged shells with teeth and sockets that allow them to open and close their shells, while inarticulate brachiopods lack such a hinge mechanism and rely on muscle contraction to open and close their shells. The evolution of articulate brachiopods is thought to reflect adaptations to more dynamic environments, whereas inarticulate brachiopods are typically found in

Team Number: _____ Team Name: _____

more stable environments. These differences help scientists trace the evolutionary shifts in brachiopod adaptations.

Station 5:

1. C, B, N, G, K, H, J, M, O, D = I, A, E, P (minus 1 point per error until -10 has been reached)

Section 2: Multiple Choice: (2 pts. each; 20 pts. total)

1. C
2. D
3. A
4. A
5. D
6. D
7. C
8. B
9. B
10. A

Section 3: Free Response: (10 pts. per station; 50 pts. total)

1. A mold fossil occurs when an organism, such as a plant or animal, is buried in sediment and then decays or dissolves over time, leaving behind an imprint or hollow space in the surrounding rock. This imprint is the negative impression of the organism. On the other hand, a cast fossil forms when the mold is filled with other materials, such as minerals or sediments, which harden to create a 3D replica of the original organism. Essentially, the cast is a positive copy of the mold. Thus, a mold is the negative imprint, while a cast is the positive replica created in that space.
2. Permineralization is a process of fossilization where minerals fill the pores and cavities within an organism's remains, preserving its structure in great detail. This process typically begins when an organism, such as a plant or animal, dies and is buried by sediment. Over time, groundwater, which is rich in dissolved

minerals, seeps into the remains. As the water moves through the organism, minerals like silica, calcium carbonate, or iron are deposited into the empty spaces within the bones, wood, or other tissues. These minerals gradually crystallize, hardening and preserving the original structure of the organism in a fossilized form.

3. Index fossils are significant in dating rock layers because they help establish the relative ages of the rocks in which they are found. These fossils come from species that lived for a relatively short period but were widely distributed geographically.
4. Trilobites are considered crucial for understanding the Paleozoic era because they were among the earliest and most abundant forms of complex life, and they serve as key index fossils for dating and correlating rock layers from that time.
5. The difference between body fossils and trace fossils lies in what they represent and how they form. Body fossils are the preserved remains of the actual organism, such as bones, shells, teeth, or leaves, and directly represent the physical structure of the organism that lived in the past. These fossils can preserve both hard parts, like bones and shells, and sometimes soft tissues, although soft tissue preservation is rarer. For example, a dinosaur bone is a body fossil because it is the direct physical remnant of the dinosaur itself. In contrast, trace fossils are indirect evidence of an organism's activity rather than its physical remains. They include things like footprints, burrows, nests, or coprolites (fossilized feces), offering insights into the behavior, movement, and interactions of ancient organisms. For instance, a set of dinosaur footprints found in mud that later hardened into rock is a trace fossil, as it represents the movement or activity of the dinosaur rather than its actual body.