Defense Underwater

Read how two marine animals avoid predators.

ZOO.6.3 "Describe sea urchins' and sea cucumbers' defense structures and behaviors."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline defense structures, circle defensive behaviors, and number two places where the text explains how a defense affects a predator.

Spines, Shelter, and Sticky Threads

1 At low tide, a sea urchin can look like a dark pincushion lodged in a tide-pool crack. Its hard shell, called a test, supports movable spines. If a fish tries to bite, the spines can make the urchin hard to grasp and may prick the fish. Tiny pincerlike structures called pedicellariae sit among the spines. In some species, they pinch an attacker; some also deliver venom. These parts are not identical weapons: long spines block contact, while much smaller pincers act on animals that get close. Neither defense makes an urchin impossible to eat.

2 An urchin also changes where it puts those structures. Tube feet help it cling to rock and move into a crevice, where fewer parts of its body are exposed to a predator. Some urchins hold bits of shell or seaweed over themselves with their tube feet and spines. This covering can hide their outline and may shield them from sunlight as well as predators. A fish with a strong jaw might still pull an urchin out or break its test. The outcome depends on the attacker, the species of urchin, and the shelter available.

3 On the same shore, a sea cucumber has a soft body rather than a spiny test. Many retreat into cracks or bury part of their bodies in sediment when disturbed. Some species have Cuvierian tubules, sticky threads they expel through the anus toward an attacker. The threads can tangle a fish and give the cucumber time to escape. Other species, and sometimes those with tubules, can eject internal organs when severely threatened. This behavior, called evisceration, may distract a predator, but the cucumber must spend energy regrowing the lost organs. Not all sea cucumbers use either emergency defense.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do an urchin's spines and pedicellariae defend it in different ways?

2. Describe two behaviors an urchin can use to reduce its exposure to a predator. How does each help?

3. How can a sea cucumber's hiding behavior and Cuvierian tubules defend it at different points in an encounter?

4. Describe evisceration as a defense. What is its cost to the sea cucumber?

3 YOUR TURN

Your own words

Invent a four- or five-sentence field note about a fish attacking a sea urchin and a sea cucumber in two different places. Describe a structure and a behavior each animal could use, explain how each defense works, and include one limit or cost described in the passage.

ANSWER KEY

Defense Underwater

HIGH SCHOOL · ZOO.6.3

PART 1 · READ AND MARK

Underline defense structures, circle defensive behaviors, and number two places where the text explains how a defense affects a predator. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do an urchin's spines and pedicellariae defend it in different ways?	**Spines make the urchin hard to grasp and can prick a fish. Pedicellariae pinch attackers that get close, and some species' pedicellariae deliver venom.**
2	Describe two behaviors an urchin can use to reduce its exposure to a predator. How does each help?	**It can move into a crevice, exposing less of its body. It can also hold shell or seaweed over itself, hiding its outline.**
3	How can a sea cucumber's hiding behavior and Cuvierian tubules defend it at different points in an encounter?	**Retreating into a crack or burying part of its body can help it avoid a predator. If attacked, a species with Cuvierian tubules can expel the sticky threads to tangle the predator and gain time to escape.**
4	Describe evisceration as a defense. What is its cost to the sea cucumber?	**The cucumber ejects internal organs, which may distract a predator. Regrowing the organs costs energy.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

At a rocky ledge, a fish lunged at an urchin, whose spines made its body difficult to grip. The urchin moved into a narrow crack, leaving less of its body exposed. Later, the fish grabbed a sea cucumber with Cuvierian tubules on a sandy patch. The cucumber expelled its sticky tubules, which tangled the fish and gave the cucumber time to escape. A strong-jawed fish could still break the urchin's test, so its spines do not guarantee safety.

Accept other defenses supported by the passage when students accurately explain how they work. Responses should not suggest that every sea cucumber has Cuvierian tubules or can eviscerate.