Built for Survival

Connect plant traits to the challenges of extreme habitats.

BOT.5.1 "Research plants found in various habitats. Analyze how plants use adaptations for survival in these habitats including extreme habitats."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Circle one habitat challenge for each plant. Underline one trait that helps with each challenge, then label each matching challenge and trait with the same number.

Three Habitats, Three Plants

1. At noon in the Sonoran Desert, a saguaro cactus may stand under intense sun while the soil is dry. A brief storm changes its chances. Its wide, shallow roots absorb water near the surface before much of it evaporates. Folds in its thick stem expand as it stores that water. Spines discourage animals from eating the stem, and they cast small patches of shade. The cactus also opens its pores mainly at night, when cooler air reduces water loss. These features work together: collecting rain quickly matters only if the plant can keep enough water through long dry spells.

2. Black mangroves live along warm coasts where tides soak the mud with salty water. The mud holds little air, even though the plant's cells need oxygen to release energy. Some roots grow upward from the mud as short spikes called pneumatophores. Their exposed surfaces let air enter the root system. Salt creates another problem: it can draw water out of plant cells. Black mangrove roots block much of the salt in seawater, while glands on the leaves release some salt that gets inside. A root that only absorbed water would not solve both the oxygen shortage and the salt problem.

3. On Arctic tundra, dwarf willows face cold winds and a short growing season. Unlike tall trees, these willows grow close to the ground, where winds are weaker and temperatures can be slightly warmer. Their small, often hairy leaves can limit water loss when cold soil makes water hard to take up. Snow can cover the low branches in winter, shielding them from harsh winds. The three plants do not share one universal solution. A useful trait depends on the habitat: storing rain helps in a dry desert, while getting air into submerged roots matters in tidal mud. Identify the challenge before deciding why a trait helps.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do the saguaro's shallow roots and folded stem work together to help it survive long dry spells?

2. Why does a black mangrove need both pneumatophores and ways to limit salt?

3. How do two dwarf willow traits help it survive conditions on the Arctic tundra?

4. Why is a water-storing stem more useful to a saguaro in its habitat than air-collecting roots would be?

3 YOUR TURN

Your own words

Invent a plant for a rocky island with salty spray, scarce fresh water, and strong winds. In one paragraph, describe two traits, explain how each solves a different problem, and compare one trait with a plant in the passage.

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PART 1 · READ AND MARK

Circle one habitat challenge for each plant. Underline one trait that helps with each challenge, then label each matching challenge and trait with the same number. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do the saguaro's shallow roots and folded stem work together to help it survive long dry spells?	**Shallow roots quickly absorb rainwater near the surface, and the folded stem expands to store it for dry periods.**
2	Why does a black mangrove need both pneumatophores and ways to limit salt?	**Pneumatophores let air reach roots in oxygen-poor mud. Roots block much of the seawater's salt, and leaf glands release some salt that enters.**
3	How do two dwarf willow traits help it survive conditions on the Arctic tundra?	**Growing close to the ground reduces exposure to cold winds. Small, often hairy leaves limit water loss when cold soil makes water difficult to absorb.**
4	Why is a water-storing stem more useful to a saguaro in its habitat than air-collecting roots would be?	**Desert rain is brief and dry spells are long, so stored water helps the saguaro survive. Air-collecting roots address the oxygen shortage in waterlogged mud, not the desert's main challenge.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

My island plant would have a low, flexible stem so strong winds would bend it instead of snapping it. It would also have thick leaves with a waxy coating to slow water loss when fresh water is scarce. Its low shape resembles the dwarf willow's growth close to the ground, but the island plant also needs leaves that conserve water. Neither trait alone solves every challenge: the low stem addresses wind, while the thick, coated leaves address limited fresh water.

Accept other accurate trait-and-challenge connections supported by the passage. For Your Turn, look for two plausible traits with distinct survival benefits and a valid comparison to one passage plant.