Seeds Beyond Water

How two seed plant groups survive and reproduce on land

BOT.2.3 "Summarize and justify the characteristics of angiosperms and gymnosperms that lead to their success as terrestrial plants."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two traits that help both groups live on land, circle one reproductive trait unique to each group, and number two places where the text explains how a trait helps a plant succeed.

Life on Land

1. On a hillside after a dry week, pines and wildflowers still move water from the soil to their leaves. Both belong to seed plant groups: pines are gymnosperms, while wildflowers are angiosperms. Their roots take in water, and vascular tissues carry water and dissolved minerals upward and sugars to other parts. A waxy cuticle slows water loss from leaves; adjustable pores called stomata allow gas exchange while limiting water loss when closed. These traits help both groups live on land, where water is not always available. Yet surviving between rains is only part of the story: plants must also reproduce without standing water.

2. Consider a cone-bearing spruce on a mountain slope. In many gymnosperms, wind carries pollen from male cones to female cones. Pollen transports sperm to the egg without a film of water, a major advantage on land. After fertilization, seeds develop exposed on the scales of female cones rather than enclosed inside fruit. Each seed contains an embryo, a food supply, and a protective coat, which support survival and early growth after dispersal. Spruce also has narrow needles with a thick cuticle, reducing exposed surface and water loss. Such features can help it persist where winters are cold and the growing season is short.

3. Now picture a flowering shrub beside a stream. Angiosperms make flowers, where pollen can be moved by wind or animals. Animal visitors may carry pollen between flowers even when little wind reaches the shrub. After fertilization, seeds develop inside an ovary that matures into a fruit. A fruit protects developing seeds and can help spread them when an animal eats it and later deposits the seeds elsewhere. Like gymnosperm seeds, angiosperm seeds shelter an embryo and supply food for early growth. Flower and fruit structures vary widely, helping angiosperms reproduce and disperse across many land habitats, but these structures do not replace roots, vascular tissues, or water-saving surfaces.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why can both groups continue living when the soil dries between rains? Connect two shared traits to what each does.

2. A cone-bearing plant grows where water does not collect after rain. Explain how its pollen and seeds help it produce offspring there.

3. In a sheltered area with little wind and many animal visitors, what reproductive advantage might an angiosperm have over a wind-pollinated gymnosperm? Explain why.

4. Compare where seeds develop in the two groups. How can this difference help an angiosperm reach a new site?

3 YOUR TURN

Your own words

Invent a land habitat with two challenges, then choose which group is likely to succeed there. In 4 to 5 sentences, justify your choice using one trait shared by both groups and two reproductive traits of your chosen group; include one advantage the other group could have.

Seeds Beyond Water

PART 1 · READ AND MARK

Underline two traits that help both groups live on land, circle one reproductive trait unique to each group, and number two places where the text explains how a trait helps a plant succeed. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why can both groups continue living when the soil dries between rains? Connect two shared traits to what each does.	**Roots take up water and vascular tissues move it through the plant. A waxy cuticle slows water loss, while stomata can close to limit it.**
2	A cone-bearing plant grows where water does not collect after rain. Explain how its pollen and seeds help it produce offspring there.	**Pollen delivers sperm to an egg without a film of water. Seeds protect and feed embryos during early growth after dispersal.**
3	In a sheltered area with little wind and many animal visitors, what reproductive advantage might an angiosperm have over a wind-pollinated gymnosperm? Explain why.	**Animals can carry pollen between angiosperm flowers when little wind is available to move a gymnosperm's pollen.**
4	Compare where seeds develop in the two groups. How can this difference help an angiosperm reach a new site?	**Gymnosperm seeds develop exposed on cone scales, while angiosperm seeds develop inside an ovary that becomes a fruit. An animal can eat the fruit and deposit its seeds elsewhere.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

On an island with little rain, patches of soil are separated by bare rock, and fruit-eating birds visit. An angiosperm's waxy cuticle would slow water loss between rains. Its flowers could receive pollen carried by animal visitors without standing water. Its fruits could protect seeds and help birds carry them to other patches of soil. A gymnosperm could also succeed because its seeds protect and feed young plants after dispersal.

Accept different supported trait-and-benefit connections. For Part 3, look for two habitat challenges, one shared trait, two reproductive traits of the chosen group, and a valid advantage of the other group.