Roots for Repair

Choose plants and test whether a cleanup plan works

BOT.4.1 "Identify plants used in the bioremediation of an area due to natural processes (e.g., fire), industrial pollution, or wars, and develop and communicate a plan to remediate a habitat impacted by human interactions (e.g., carbon sinks…"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each plant named in the passage and circle the metal connected to it. Number the steps the team uses to check whether its plan is working.

A Plan for the Plating Shop Lot

1. Behind a closed metal-plating shop, rain cuts narrow channels through bare soil toward a creek. Old waste left lead and cadmium in parts of the lot. Both metals can harm living things, and neither breaks down like spilled food or oil. Before planting, a restoration team samples soil in a grid and tests creek sediment. The results show the highest lead levels near the building and lower, but still concerning, cadmium levels in a damp strip farther downhill. The team fences the lot and posts signs so people do not track contaminated dust home.

2. The team chooses switchgrass for the lead-rich ground. Its dense roots hold soil in place and reduce the movement of contaminated dust and sediment. This is phytostabilization, not a claim that the grass removes all the lead. In the damp strip, the team tests a small planting of willows, which can take up cadmium from some soils. This is possible phytoextraction, but soil conditions affect how much cadmium enters the plants. Workers keep the test area fenced so animals cannot browse the leaves. They do not plant edible crops anywhere on the lot.

3. Each season, workers test soil and creek sediment to see whether metal levels change. They also test willow leaves and stems before deciding whether harvesting will remove useful amounts of cadmium. Any contaminated cuttings go to an approved disposal facility, not a compost pile or fire. If the willow trial removes too little cadmium, the team will stop using it as a cleanup method and focus on containing the soil. If testing finds a highly contaminated patch, trained specialists may remove that soil for safe disposal. The creek is safer only when measurements show less metal moving into it.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why does the team plant switchgrass on the lead-rich ground instead of relying on it to remove the lead?

2. Why does the team test a small planting of willows before using them widely in the cadmium-rich strip?

3. What does the plan call for if a patch of soil is highly contaminated, and why might planting alone not be enough there?

4. How will the team check whether the willow trial is helping the creek, and what must happen to contaminated cuttings?

3 YOUR TURN

Your own words

An abandoned mine has a dry, lead-contaminated slope above a wetland and a moist, cadmium-contaminated flat beside a public footpath. In four or five sentences, propose where to use switchgrass and where to test willows, how to protect people or wildlife, what to measure, and what to do if the willow trial fails.

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PART 1 · READ AND MARK

Underline each plant named in the passage and circle the metal connected to it. Number the steps the team uses to check whether its plan is working. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why does the team plant switchgrass on the lead-rich ground instead of relying on it to remove the lead?	**Switchgrass roots hold the soil in place, reducing the movement of lead-contaminated dust and sediment. The team does not expect the grass to remove all the lead.**
2	Why does the team test a small planting of willows before using them widely in the cadmium-rich strip?	**Willows can take up cadmium from some soils, but soil conditions affect how much enters the plants. The team must test whether they take up useful amounts at this site.**
3	What does the plan call for if a patch of soil is highly contaminated, and why might planting alone not be enough there?	**Trained specialists may remove the patch for safe disposal. Planting may not adequately address such a high concentration of metal.**
4	How will the team check whether the willow trial is helping the creek, and what must happen to contaminated cuttings?	**Workers test soil, creek sediment, and willow tissue to check metal levels and uptake. Contaminated cuttings go to an approved disposal facility.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would plant switchgrass on the lead-contaminated slope to hold soil back from the wetland. I would test willows on a small part of the moist flat to see whether they take up useful amounts of cadmium. A fence would keep people and wildlife away from the test area. Workers would measure metals in the soil, wetland sediment, and willow tissue, then send contaminated cuttings to an approved disposal facility. If the willows remove too little cadmium, the team would stop using them for extraction and focus on containing the contaminated soil.

Accept plans that distinguish holding contaminated soil in place from testing whether plants remove a metal. Students should include a safety measure, measurements, and a response if the willow trial is ineffective.