

Resources Have Histories

Use geoscience evidence to explain where resources are found and why supplies change.

MS-ESS3-1 "Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each past or current geoscience process, circle the resource it affects, and write 1 beside each statement about human removal or limited supply. These marks will help you connect evidence to an explanation.

Why Resources Cluster

- ① Earth's resources are not spread evenly because Earth's history was not the same everywhere. Petroleum formed where huge amounts of tiny marine organisms were buried in sediments, then changed by heat and pressure over millions of years. Later, moving rock layers created traps that held oil and gas. A basin with the right ancient sea, burial conditions, and trap may contain petroleum. A nearby area may lack one of these conditions, so drilling there is less likely to find it.
- ② Many metal ores are also clustered in certain places. At some plate boundaries, one plate sank beneath another long ago. This subduction helped produce volcanoes and hot, mineral-rich fluids. As the fluids cooled in cracks in rock, they left concentrated minerals, including copper, gold, or zinc. Weathering can later expose these deposits near the surface. Mining regions therefore often match areas with a history of volcanic and hydrothermal activity, rather than areas chosen at random. The processes concentrated useful minerals in a few locations.
- ③ Groundwater fills spaces and cracks below ground, but usable supplies differ from place to place. Rain and snow can soak into permeable soil and rock, recharging an aquifer. Dry climates, hard rock, or paved land may allow less water to enter. People pump groundwater for homes, farms, and industry. If pumping removes water faster than recharge replaces it, water levels fall. Petroleum and metal ores usually take far longer to form than humans can wait, so they are nonrenewable. Soil can form or be deposited, yet erosion and poor land use can remove it quickly.

2 ANSWER WITH EVIDENCE Use the passage

- 1 Use evidence from the passage to explain why one basin may contain petroleum while a nearby area does not.

- 2 Construct a claim explaining why copper, gold, or zinc ores are often found in particular regions rather than randomly across Earth.

- 3 Explain how permeable rock, climate, and land surface conditions can cause groundwater supplies to be unevenly distributed.

- 4 How can human removal change resource availability, and why are petroleum and metal ores not quickly replaced?

3 YOUR TURN Your own words

Use this new evidence to write a three-sentence scientific explanation: Valley A has fractured, permeable rock and gets seasonal rain. Valley B has solid granite and little rain. Wells in Valley A are pumped faster than seasonal rain refills the aquifer. Explain why groundwater is unevenly distributed and how human removal changes its availability.

PART 1 • READ AND MARK

Underline each past or current geoscience process, circle the resource it affects, and write 1 beside each statement about human removal or limited supply. These marks will help you connect evidence to an explanation. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Use evidence from the passage to explain why one basin may contain petroleum while a nearby area does not.	A petroleum basin needs an ancient sea with buried marine organisms, heat and pressure, and a geologic trap. A nearby area may be missing one or more of these past conditions.
2	Construct a claim explaining why copper, gold, or zinc ores are often found in particular regions rather than randomly across Earth.	Past subduction produced volcanoes and hot, mineral-rich fluids. When the fluids cooled in rock cracks, they deposited concentrated minerals, so ores cluster in regions with that geologic history.
3	Explain how permeable rock, climate, and land surface conditions can cause groundwater supplies to be unevenly distributed.	Permeable soil and rock allow rain and snow to soak in and recharge an aquifer. Dry climates, hard rock, and paved land allow less water to enter, so groundwater supplies differ by location.
4	How can human removal change resource availability, and why are petroleum and metal ores not quickly replaced?	Pumping groundwater faster than recharge lowers water levels. Petroleum and metal ores take far longer to form than humans can wait, so they are nonrenewable on human time scales.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Groundwater is likely more available in Valley A because its fractured, permeable rock and seasonal rain allow water to enter and recharge an aquifer. Valley B is likely to have less groundwater because solid granite and little rain limit recharge. In Valley A, pumping faster than recharge will lower water levels, so people can change the amount of available groundwater.

Accept explanations that connect a resource pattern to specific geoscience evidence, not just a statement that resources are uneven. For the open task, accept three sentences that compare recharge conditions and explain that pumping faster than recharge lowers groundwater availability.