Zoe's Robot Ecosystem Mission

Grade 6 science robots

Students will be able to analyze the roles of organisms in an ecosystem, including producers, consumers, and decomposers, and explain how organisms depend on each other for survival.

Name: _____ Date: _____

1. Zoe arrives at Robot Island to study its ecosystem. She finds three groups of organisms: solar-panel plants, gear beetles, and rust fungi. Which group is the PRODUCER in this ecosystem? Circle one: solar-panel plants / gear beetles / rust fungi. Explain your answer in one sentence.

2. Zoe observes that gear beetles eat solar-panel plants. Rust fungi break down dead beetles. True or False: Rust fungi are decomposers in Robot Island's ecosystem. Circle your answer and write one reason why.

3. Zoe discovers a food chain on Robot Island: solar-panel plants → gear beetles → circuit-board hawks. She notices the energy cell inside each organism gets smaller at each level. Fill in the blank: As energy moves up the food chain, the amount of energy _____ at each level. Use the word 'decreases' or 'increases' and explain why in two sentences.

4. Zoe finds two populations living near the same power core vents: gear beetles and copper crabs. Both species eat the same solar-panel plants. Zoe writes a hypothesis. Complete her hypothesis: 'If gear beetles and copper crabs both eat solar-panel plants, then they will _____ with each other because _____.' Use the science term 'competition' in your answer.

5. Zoe uses her robot arm to collect data. She records that the solar-panel plant population dropped by half after a storm blocked the sun. Predict what will happen NEXT to the gear beetle population. Write two to three sentences. Use the words 'food supply' and 'population' in your answer.

6. Zoe discovers a recycling bay where broken energy cells are piled up. Rust fungi live here and break down the cells, releasing minerals back into the soil for solar-panel plants to absorb. Zoe asks: 'What would happen to the ecosystem if ALL rust fungi disappeared?' Write a detailed explanation. Identify at least TWO effects on other organisms and use the term 'nutrient cycling' in your answer.

7. Zoe notices something strange near the circuit board forest. Copper crabs have almost vanished. Gear beetles have multiplied. Solar-panel plants are being eaten faster than they can regrow. Zoe forms an explanation. Using evidence from this scene, explain how the REMOVAL of copper crabs disrupted the ecosystem's balance. Your answer must: name a predator-prey relationship, explain a population change, and use the term 'trophic level' correctly.

8. Zoe has saved Robot Island! She writes her final report. In the real world, wolves were removed from Yellowstone National Park in the 1900s. Elk populations exploded and ate riverbank plants down to bare soil. When wolves were reintroduced in 1995, plant life recovered and even rivers changed course — this is called a 'trophic cascade.' Connect Zoe's Robot Island mission to Yellowstone. Explain how both ecosystems show the

same principle. Use the terms 'keystone species,' 'trophic cascade,' and 'biodiversity' in your answer. Write four to five sentences.

Answer Key: Zoe's Robot Ecosystem Mission

GRADE 6 | TEACHER & PARENT USE ONLY

Before Q6, pause and ask students: 'Which robot zone from our worksheet acts like a real forest floor?' This anchors decomposer roles to Zoe's circuit board recycling bay and sparks peer discussion.

1. Zoe arrives at Robot Island to study its ecosystem. She finds three groups of organisms: solar-panel plants, gear beetles, and rust fungi. Which group is the PRODUCER in this ecosystem? Circle one: solar-panel plants / gear beetles / rust fungi. Explain your answer in one sentence.

Answer: Q1: Producers make their own food using energy from the sun. Solar-panel plants capture sunlight to make food — just like real plants use photosynthesis. Answer: solar-panel plants are the producers because they capture sunlight to make their own food.

2. Zoe observes that gear beetles eat solar-panel plants. Rust fungi break down dead beetles. True or False: Rust fungi are decomposers in Robot Island's ecosystem. Circle your answer and write one reason why.

Answer: Q2: Decomposers break down dead or decaying organisms and return nutrients to the soil or ground. Rust fungi break down dead gear beetles, which matches the decomposer role exactly. Answer: TRUE — rust fungi are decomposers because they break down dead organisms and recycle nutrients back into the ecosystem.

3. Zoe discovers a food chain on Robot Island: solar-panel plants → gear beetles → circuit-board hawks. She notices the energy cell inside each organism gets smaller at each level. Fill in the blank: As energy moves up the food chain, the amount of energy _____ at each level. Use the word 'decreases' or 'increases' and explain why in two sentences.

Answer: Q3: In any food chain, energy is lost as heat at each level — only about 10% passes to the next consumer. This is why food chains rarely have more than four or five levels. Answer: As energy moves up the food chain, the amount of energy DECREASES at each level. This happens because each organism uses most of its energy for life processes like movement and growth, so less energy is passed on to the next level.

4. Zoe finds two populations living near the same power core vents: gear beetles and copper crabs. Both species eat the same solar-panel plants. Zoe writes a hypothesis. Complete her hypothesis: 'If gear beetles and copper crabs both eat solar-panel plants, then they will _____ with each other because _____.' Use the science term 'competition' in your answer.

Answer: Q4: When two species need the same limited resource — such as food, water, or space — they compete. This relationship is called competition and it can reduce the size of both populations if resources are scarce. Answer: 'If gear beetles and copper crabs both eat solar-panel plants, then they will COMPETE with each other because they share the same food resource and competition occurs when organisms need the same limited resource to survive.'

5. Zoe uses her robot arm to collect data. She records that the solar-panel plant population dropped by half after a storm blocked the sun. Predict what will happen NEXT to the gear beetle population. Write two to three sentences. Use the words 'food supply' and 'population' in your answer.

Answer: Q5: Solar-panel plants are the producers at the base of the food chain. Gear beetles depend on those plants as their food supply. When the plant population drops, less food is available, so the gear beetle population will also decrease. Answer: The gear beetle population will likely decrease because their food supply has been cut in half. With fewer solar-panel plants available, gear beetles cannot get enough energy to survive and reproduce. This shows how a change at the producer level affects consumers higher up in the food chain.

6. Zoe discovers a recycling bay where broken energy cells are piled up. Rust fungi live here and break down the cells, releasing minerals back into the soil for solar-panel plants to absorb. Zoe asks: 'What would happen to the ecosystem if ALL rust fungi disappeared?' Write a detailed explanation. Identify at least TWO effects on other organisms and use the term 'nutrient cycling' in your answer.

Answer: Q6: Decomposers like rust fungi carry out nutrient cycling — they break down dead matter and return nutrients to the soil. Without decomposers, dead material would pile up and nutrients would be locked away. Effect 1: Solar-panel plants would lose their supply of recycled minerals and their population would shrink because they could not get enough nutrients from the soil. Effect 2: With fewer solar-panel plants, gear beetles and circuit-board hawks would have less food, causing consumer populations to decline too. Answer: If all rust fungi disappeared, nutrient cycling would stop. Dead organisms would pile up and minerals would not return to the soil. Solar-panel plants would struggle to grow without those nutrients, which would reduce food for gear beetles and circuit-board hawks — harming the entire food chain.

7. Zoe notices something strange near the circuit board forest. Copper crabs have almost vanished. Gear beetles have multiplied. Solar-panel plants are being eaten faster than they can regrow. Zoe forms an explanation. Using evidence from this scene, explain how the REMOVAL of copper crabs disrupted the ecosystem's balance. Your answer must: name a predator-prey relationship, explain a population change, and use the term 'trophic level' correctly.

Answer: Q7: A trophic level is a feeding level in a food chain. If copper crabs were predators of gear beetles, removing copper crabs breaks that predator-prey relationship. Without crabs to control them, gear beetle numbers increase rapidly. More beetles eat more solar-panel plants, which causes plant populations to crash. This chain reaction shows how removing one species from a trophic level can destabilize an entire ecosystem. Answer: When copper crabs were removed, the predator-prey relationship between crabs and gear beetles broke down. Gear beetles occupy a lower trophic level than their crab predators, and without predators to limit them, beetle numbers exploded. The huge beetle population consumed solar-panel plants faster than plants could reproduce, threatening the whole food chain. This demonstrates that every trophic level depends on the others for ecosystem balance.

8. Zoe has saved Robot Island! She writes her final report. In the real world, wolves were removed from Yellowstone National Park in the 1900s. Elk populations exploded and ate riverbank plants down to bare soil. When wolves were reintroduced in 1995, plant life recovered and even rivers changed course — this is called a 'trophic cascade.' Connect Zoe's Robot Island mission to Yellowstone. Explain how both ecosystems show the same principle. Use the terms 'keystone species,' 'trophic cascade,' and 'biodiversity' in your answer. Write four to five sentences.

Answer: Q8: A keystone species is one whose removal causes huge changes across an entire ecosystem — far larger than its population size alone would suggest. A trophic cascade is the chain reaction through food web levels caused by adding or removing a key species. Biodiversity refers to the variety of living organisms in an ecosystem, and it tends to drop when a keystone species disappears. On Robot Island, copper crabs acted as a keystone species. When they vanished, gear beetles over-consumed solar-panel plants, triggering a trophic cascade that reduced the plant population and threatened biodiversity across the island. In Yellowstone, wolves were the keystone species. Their removal let elk overgraze riverbank plants, changing the landscape until wolves were reintroduced and the cascade reversed. Both cases prove that protecting keystone species is essential for maintaining biodiversity and a balanced ecosystem. Zoe's mission showed that even one species — whether a crab or a wolf — can hold an entire ecosystem together.