Zoe Builds a Robot: Cells Inside

Grade 6 science robots

Students will be able to identify cell structures and explain how cells carry out basic life functions as the smallest unit of living organisms.

Name: _____ Date: _____

1. Zoe powers up her robot in the lab. She sees the robot move, grow, and repair itself. Her teacher says living things share these same traits. What is the smallest unit that carries out all life functions? Circle the correct answer. A) An organ B) A cell C) A tissue D) A robot arm

2. Zoe looks at a slide under her microscope. She sees a cell with a cell wall, a large central vacuole, and chloroplasts. True or false: Zoe is looking at an animal cell.

3. Zoe compares her robot's power core to a cell organelle. The power core produces energy to run the whole robot. Which organelle does the power core best represent? Name it and explain why using one sentence.

4. Zoe finds a circuit board inside her robot. It holds all the instructions that tell each robot part what to do. She says this is just like one organelle inside a cell. Name that organelle. Then fill in the blank: The _____ controls cell activities and holds genetic information.

5. Zoe notices her robot arm stops working when the energy cell runs low. She hypothesizes that cells behave the same way. Write a hypothesis: What might happen to a cell if its mitochondria stopped working? Use the word 'energy' in your answer.

6. Zoe examines two robot models. Robot A has a rigid outer shell that gives it shape and protects it. Robot B has only a flexible membrane with no hard shell. Zoe says Robot A is like a plant cell and Robot B is like an animal cell. Explain whether Zoe is correct. Use two cell structures in your answer.

7. Zoe upgrades her robot with a new part: a sorting chamber that decides which materials enter and which are kept out. She claims every living cell already has this feature built in. Identify the cell structure that does this job. Then explain how it maintains balance inside the cell. Use the term 'selective permeability' in your answer.

8. Zoe has finished building her robot. She presents it to her class and says: 'My robot is a model of a living cell. Every part has a match.' Her teacher asks: 'Can your robot actually be alive?' Zoe thinks hard. Using what you know about cell theory, explain why a robot cannot be a living cell. Include at least two criteria from cell theory in your answer. Then describe one way studying robot design still helps scientists understand real cells.

Answer Key: Zoe Builds a Robot: Cells Inside

GRADE 6 | TEACHER & PARENT USE ONLY

Before Q6, pause and ask students to sketch Zoe's robot body alongside a plant or animal cell. Have them label which robot part matches each cell organelle from the worksheet. This anchors the analogy and prepares students for the comparison in Q7.

1. Zoe powers up her robot in the lab. She sees the robot move, grow, and repair itself. Her teacher says living things share these same traits. What is the smallest unit that carries out all life functions? Circle the correct answer. A) An organ B) A cell C) A tissue D) A robot arm

Answer: Q1: The question asks for the smallest unit of life. By definition in cell theory, the cell is the smallest unit that carries out all life functions. Answer: B) A cell.

2. Zoe looks at a slide under her microscope. She sees a cell with a cell wall, a large central vacuole, and chloroplasts. True or false: Zoe is looking at an animal cell.

Answer: Q2: Cell walls, large central vacuoles, and chloroplasts are features of plant cells, not animal cells. Animal cells lack cell walls and chloroplasts. Answer: False — Zoe is looking at a plant cell.

3. Zoe compares her robot's power core to a cell organelle. The power core produces energy to run the whole robot. Which organelle does the power core best represent? Name it and explain why using one sentence.

Answer: Q3: The power core produces energy for the robot, just as the mitochondrion produces ATP energy for the cell through cellular respiration. Answer: The power core represents the mitochondrion, because both produce energy needed to power their system.

4. Zoe finds a circuit board inside her robot. It holds all the instructions that tell each robot part what to do. She says this is just like one organelle inside a cell. Name that organelle. Then fill in the blank: The _____ controls cell activities and holds genetic information.

Answer: Q4: The circuit board stores all instructions for the robot, matching the role of the nucleus in a cell. The nucleus controls cell activities and contains DNA, which is the cell's genetic information. Answer: The nucleus controls cell activities and holds genetic information.

5. Zoe notices her robot arm stops working when the energy cell runs low. She hypothesizes that cells behave the same way. Write a hypothesis: What might happen to a cell if its mitochondria stopped working? Use the word 'energy' in your answer.

Answer: Q5: This is a hypothesis question. Mitochondria produce energy for the cell. Without working mitochondria, the cell loses its energy supply and cannot carry out life functions. A strong hypothesis: If a cell's mitochondria stopped working, then the cell would run out of energy and would no longer be able to grow, divide, or repair itself.

6. Zoe examines two robot models. Robot A has a rigid outer shell that gives it shape and protects it. Robot B has only a flexible membrane with no hard shell. Zoe says Robot A is like a plant cell and Robot B is like an animal cell. Explain whether Zoe is correct. Use two cell structures in your answer.

Answer: Q6: Plant cells have a rigid cell wall outside the cell membrane, giving them a fixed shape and protection. Animal cells have only a flexible cell membrane and no cell wall. Robot A matches a plant cell because of its rigid outer shell (cell wall). Robot B matches an animal cell because it has only a flexible membrane. Answer: Zoe is correct. Plant cells have a cell wall and a cell membrane, giving them a rigid shape. Animal cells have only a cell membrane, making them more flexible like Robot B.

7. Zoe upgrades her robot with a new part: a sorting chamber that decides which materials enter and which are kept out. She claims every living cell already has this feature built in. Identify the cell structure that does this job. Then explain how it maintains balance inside the cell. Use the term 'selective permeability' in your answer.

Answer: Q7: The sorting chamber controls what enters and exits the robot, matching the function of the cell membrane. The cell membrane is selectively permeable, meaning it allows some substances through while blocking others. This maintains homeostasis by keeping the internal environment of the cell balanced. Answer: The cell membrane performs this job. It uses selective permeability to control which molecules enter and leave the cell, keeping conditions inside the cell stable.

8. Zoe has finished building her robot. She presents it to her class and says: 'My robot is a model of a living cell. Every part has a match.' Her teacher asks: 'Can your robot actually be alive?' Zoe thinks hard. Using what you know about cell theory, explain why a robot cannot be a living cell. Include at least two criteria from cell theory in your answer. Then describe one way studying robot design still helps scientists understand real cells.

Answer: Q8: Cell theory states three things: (1) all living things are made of cells, (2) the cell is the basic unit of life, and (3) all cells come from pre-existing cells. A robot fails all three criteria. It is not made of cells — it is made of metal and circuits. It cannot reproduce by dividing from a pre-existing cell. It does not carry out metabolism using organic molecules. Therefore a robot cannot be alive no matter how well it copies cell functions. However, studying robot design helps scientists understand cells because engineers model robot parts after real organelles. For example, designing an energy cell that mimics mitochondria helps scientists test ideas about how cells produce and use ATP. Zoe's robot mission ends with a powerful discovery: understanding cells means understanding the blueprint that all life — and our best machines — are built from. Answer: A robot cannot be a living cell because it is not made of cells and cannot reproduce from a pre-existing cell, violating two core principles of cell theory. Studying robot design still helps scientists by letting them model and test how organelle functions work in a controlled system.