Robot

Physical Science | Lesson Guide

1st Grade

Photo Description

This image shows a bright blue robot toy with a round head, orange eyes, and wheels sitting on a rock in a garden. The robot has a body made of connected round and oval shapes, and it is surrounded by green grass and soil. This is an example of a machine that people design to move and do tasks.

Scientific Phenomena

Anchoring Phenomenon: A robot designed to move and interact with its environment.

Why This Happens: Robots are machines that people design and build using simple machines and materials. They often have wheels or legs to help them move from one place to another. This particular robot uses wheels (the round parts on its base) to roll across the ground. Engineers think about how things move and work together to create robots that can do jobs or explore places. The robot's design shows how humans use science and engineering to create tools that solve problems or help us learn about the world.

Core Science Concepts

* Simple Machines and Movement: Robots use wheels, which are simple machines that help them roll and move. Wheels reduce friction and make movement easier.

* Forces and Motion: The robot can move forward, backward, or turn because forces push or pull it. Without force, the robot would stay still.

* Design and Function: Every part of the robot has a purpose. The wheels help it move, the eyes help it "see," and the body holds everything together.

* Materials and Properties: The robot is made of hard plastic that is smooth and durable. Different materials are chosen because of how they work and what they can do.

Pedagogical Tip:

For First Grade students, use the robot as a concrete example of how machines have parts that work together. Let students physically manipulate toy robots or build simple robots from blocks to understand the relationship between parts and function. Avoid abstract discussions about circuits or programming—focus instead on observable movements and how parts connect.

UDL Suggestions:

Representation: Provide tactile robot models or images with labels in both words and pictures. Use videos showing robots moving so students can see motion from multiple perspectives.

Action & Expression: Allow students to demonstrate movement by rolling like wheels, walking like a robot, or building their own robot designs using recyclables. Accept drawings, models, and physical demonstrations as evidence of learning.

Engagement: Connect robots to students' interests (space exploration, helping people, animals). Use the novelty and excitement of robots to maintain interest in how machines work.

Zoom In / Zoom Out

Zoom In: Inside the Robot's Wheels
When we zoom in very close to the robot's wheels, we can see tiny bumps and patterns on the rubber surface. These bumps help the wheels grip the ground so the robot doesn't slip. Even smaller, the rubber is made of tiny materials all packed together. When the wheel turns, these materials rub against the dirt and rocks, creating a pushing force that makes the robot move forward. The smoother the surface under the wheel, the easier it rolls!

Zoom Out: Robots in the Bigger World
When we zoom out and look at the bigger picture, this robot is just one small tool that people use to help solve problems. In hospitals, robots help doctors. In factories, robots build cars and toys. In homes, robots vacuum floors and mow lawns. All around our cities, towns, and countryside, robots are working alongside people. They are part of a larger system where humans design tools to make life easier, safer, and more interesting. The rock where this robot sits is part of a garden, which is part of a neighborhood, which is part of a community—and robots play different roles in helping communities work well.

Discussion Questions

1. What parts of this robot help it move? (Bloom's: Understand | DOK: 1)

2. Why do you think engineers put wheels on this robot instead of legs? (Bloom's: Analyze | DOK: 2)

3. If you could design a robot to help in your classroom, what would you want it to do? What parts would it need? (Bloom's: Create | DOK: 3)

4. How is this robot similar to and different from a toy car? (Bloom's: Analyze | DOK: 2)

Potential Student Misconceptions

Misconception 1: "Robots can think like people and make their own decisions."
Clarification: Robots cannot think or make decisions on their own. A person has to tell the robot what to do—like pushing a button, using a remote control, or giving it instructions. The robot follows what it's been programmed to do, but it doesn't have feelings, ideas, or a brain like people do. It's a tool that people designed and control.

Misconception 2: "All robots look like humans with arms and legs."
Clarification: Robots come in many different shapes and sizes. Some robots look like the one in the photo—round with wheels. Some robots look like arms in factories, some look like vacuum cleaners, and some look like animals. Engineers design robots to look and move in ways that help them do their specific job. The shape and parts depend on what the robot needs to do.

Misconception 3: "Robots never need help and can do everything by themselves."
Clarification: Robots need people to design them, build them, fix them, and tell them what to do. If a robot breaks, a person has to repair it. If a robot needs a new job, a person has to reprogram it or redesign it. Robots are tools that help people—they work because of human creativity and planning.

Extension Activities

1. Build a Simple Robot: Provide students with boxes, paper cups, paper plates, and wheels (bottle caps or paper circles). Have students design and construct their own robot using classroom materials. Encourage them to label the parts and explain what each part does.

2. Robot Movement Exploration: Create a small obstacle course (pillows, books, tape lines). Let students test toy robots or rolling containers around the course and observe which movements are easy or hard. Discuss why certain designs work better.

3. Robot Sorting Game: Collect pictures of different robots (toy robots, factory robots, cleaning robots) and have students sort them by what job they do or how they move. Create a class chart showing robots and their purposes.

Cross-Curricular Ideas

Math: Counting and Measuring Robot Parts
Have students count the number of wheels, eyes, and body parts on the robot in the photo. Create a simple graph showing "How many of each part?" Then, have students measure toy robots using non-standard units (blocks, paper clips, hand-spans) and compare sizes. Students can also sort robots by size (smallest to largest) or count how many wheels different vehicles have (cars, tricycles, wagons).

ELA: Narrative and Descriptive Writing*
Students can write or dictate simple sentences describing the robot: "This robot is blue. It has orange eyes. It has wheels." Create a class book titled "Meet Our Robots" where each student draws a robot and writes 2-3 sentences about what it looks like and what it does. Students can also listen to robot-themed picture books and act out what the robots do, combining comprehension with movement and expression.

Social Studies: Community Helpers and Jobs*
Discuss how robots help different people in the community (doctors, farmers, teachers, construction workers). Create a chart showing "Robots at Work" with pictures of robots doing different jobs. Talk about how engineers are community helpers who design and build things. Students can interview family members about tools and machines they use at work, connecting real-world jobs to the idea of helpful machines.

Art and Design: Building with Recyclables*
Students can create 3D robots using paper cups, containers, paper plates, and craft supplies. Encourage them to design robots for a specific purpose (a robot to help pick up toys, a robot to deliver snacks, a robot to help in the garden). Students can paint, decorate, and label their creations, then share their designs with the class, explaining what each part does.

STEM Career Connection

Robotics Engineer
A robotics engineer is a person who designs and builds robots to do helpful jobs. They think about what problems robots can solve and plan how to make robots that work well. Robotics engineers might create robots for hospitals, factories, homes, or space exploration. They test their designs to make sure they work safely and do what they're supposed to do. Every robot you see was created by engineers who had great ideas and worked hard to build them.
Average Annual Salary: $68,000–$85,000

Mechanical Engineer
A mechanical engineer designs machines and parts that move, like the wheels on the robot in the photo. They figure out how gears, wheels, and other parts fit together to make things work. Mechanical engineers design cars, toys, tools, and many other machines we use every day. They test their designs to make sure everything moves smoothly and lasts a long time.
Average Annual Salary: $70,000–$90,000

Software Engineer / Programmer

A software engineer writes instructions (called "code" or "programs") that tell robots what to do. While a robotics engineer builds the robot's body and wheels, a software engineer makes the "brain" that controls the robot's movements and decisions. They program robots to move in certain directions, respond to sensors, and complete tasks. Without programmers, robots wouldn't know what to do!
Average Annual Salary: $75,000–$110,000

NGSS Connections

Performance Expectation:
K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Disciplinary Core Idea:
K-2-ETS1.A Devices are tools that do work or perform tasks for us. Robots are devices designed by people.

Crosscutting Concepts:
* Systems and System Models
* Structure and Function

Science and Engineering Practices:
* Asking questions about how and why robots move
* Observing how parts of the robot work together
* Designing and building simple moving machines

Science Vocabulary

* Robot: A machine that is designed and built by people to do jobs or move around.
* Wheel: A round part that turns and helps something roll and move.
* Machine: A tool made of parts that work together to do something.
* Force: A push or pull that makes something move or change.
* Design: A plan for how something will be made and how it will work.
* Engineer: A person who designs and builds machines and tools.

External Resources

Children's Books:
Little Blue Truck* by Alice Schertle (wheels and movement theme)
Robots Everywhere* by Shelley Rotner and Sheila Kelly (explores real robots in the world)
Click, Clack, Moo: A Typewriter on the Farm* by Doreen Cronin (simple machines and creative problem-solving)