

Photo Description



This picture shows the inside of a car when you lift up the hood. You can see the engine, which is the part that makes the car move. There are many tubes, wires, and metal parts that work together to help the car run.

Scientific Phenomena

The anchoring phenomenon is energy transformation in machines. The car engine converts chemical energy stored in gasoline into mechanical energy that makes the car move. This happens through controlled explosions inside the engine cylinders, which push pistons that turn gears and ultimately move the wheels. The various components visible work together as a system to transform one type of energy into another.

Core Science Concepts

1. Energy Transfer and Transformation - Engines change one type of energy (chemical) into another type (motion energy)
2. Simple and Complex Machines - Car engines contain many simple machines like levers, wheels, and pulleys working together
3. Systems and System Models - All the parts must work together for the car to function properly
4. Matter and Its Properties - Different materials (metal, plastic, rubber) are chosen for different jobs based on their properties

Pedagogical Tip:

Use toy cars and wind-up toys to help students experience energy transformation firsthand. Let them feel the spring tension before and after winding to understand stored energy.

UDL Suggestions:

Provide multiple ways for students to explore this concept: visual diagrams, hands-on models, sound recordings of engines, and kinesthetic activities like pedaling bikes to feel energy transfer.

Zoom In / Zoom Out

1. Zoom In: Inside the engine, tiny explosions happen very fast when gasoline mixes with air and gets a spark. These explosions push parts called pistons up and down, which makes other parts turn.
2. Zoom Out: Cars are part of a transportation system that helps people and goods move around our community, state, and country. This connects to how energy flows through our entire society.

Discussion Questions

1. What do you think would happen if one part of the engine broke? (Bloom's: Analyze | DOK: 2)
2. How is a car engine like your body? How is it different? (Bloom's: Compare | DOK: 3)
3. What other machines do you know that change one type of energy into another? (Bloom's: Apply | DOK: 2)
4. Why do you think engineers made car engines so complicated instead of simple? (Bloom's: Evaluate | DOK: 3)

Potential Student Misconceptions

1. Misconception: "Cars run on electricity from the battery"
Clarification: The battery helps start the car and runs lights, but gasoline provides the energy to make the car move
2. Misconception: "The engine makes the car go by spinning really fast"
Clarification: The engine creates controlled explosions that push pistons, which then turn gears to move the wheels
3. Misconception: "All the parts do the same job"
Clarification: Each part has a specific job, and they must all work together like a team

Cross-Curricular Ideas

1. Math Connection: Counting and Measuring - Have students count the different parts they can see in the engine photo (tubes, wires, bolts). Measure toy cars and compare their sizes. Create a bar graph showing "How many wheels do different vehicles have?"
2. ELA Connection: Descriptive Writing and Vocabulary - Ask students to write or dictate sentences describing what they see in the engine using sensory words (shiny, metal, dark, round). Read books about cars and create a word wall of car-related vocabulary.
3. Social Studies Connection: Community Helpers and Jobs - Discuss how mechanics and car repair workers help our community. Take a virtual field trip to a local mechanic's shop or invite a mechanic to talk to the class about their job and the tools they use.
4. Art Connection: Building and Design - Have students create their own simple machines using building blocks, cardboard tubes, and recycled materials. Draw pictures of what they think is happening inside an engine and color them with different colors for different parts.

STEM Career Connection

1. Automobile Mechanic - A mechanic is someone who fixes cars when they break down. They use special tools to find problems in engines and other car parts, then repair or replace them so cars run safely. Mechanics need to understand how all the different parts work together and solve problems when something isn't working right. Average Annual Salary: \$42,000 USD
2. Automotive Engineer - An automotive engineer designs and builds cars, including the engine and all its parts. They think about how to make cars faster, safer, and better for the environment. Engineers use science and math to test their ideas before cars are made in factories. Average Annual Salary: \$87,000 USD

3. Car Factory Technician - A factory technician works in the place where cars are built and assembled. They operate machines and tools that put all the engine parts together in the correct order to make sure each car works properly. They help check that everything is built correctly before cars leave the factory. Average Annual Salary: \$38,000 USD

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 Ideas:

- K-2-ETS1.A - Asking Questions and Defining Problems
- 2-PS1.B - Chemical Reactions

Crosscutting Concepts:

- Systems and System Models
- Energy and Matter

Science Vocabulary

- * Engine: The part of a car that burns fuel to make the car move
- * Energy: The power needed to make things move or work
- * System: A group of parts that work together to do a job
- * Transform: To change from one thing into another thing
- * Fuel: Something that burns to give energy, like gasoline
- * Machine: A tool that helps people do work more easily

External Resources

Children's Books:

- Cars and Trucks and Things That Go by Richard Scarry
- The Magic School Bus: Revving Up with Magnetism by Joanna Cole
- Machines at Work by Byron Barton