Second Grade Science

Course Overview

Students perform experiments to develop skills of observation and analysis, and learn how scientists understand the world. They demonstrate how pulleys lift heavy objects, make a temporary magnet and test its strength, and analyze the parts of a flower. Students will explore topics such as:

- **Force—**motion and simple machines; physicist Isaac Newton
- **Magnetism—**magnetic poles and fields; how a compass works
- **Sound—**how sounds are made; inventor Alexander Graham Bell
- **Human Body—**cells; the digestive system
- **Geology—**layers of the earth; kinds of rocks; weathering; geologist Florence Bascom
- **Life Cycles—**plants and animals

Course Outline

Metrics and Measurements

- Measure length, mass, weight, temperature, and liquid volume using a metric ruler, a balance, a spring scale, a thermometer, and a graduated cylinder, and then express those measurements in standard metric units of centimeters, grams, newtons, degrees Celsius, and milliliters
- Distinguish the difference between mass and weight
- Recognize some common equivalencies within the metric system such as 1,000 milliliters in 1 liter, 100 centimeters in 1 meter, and 1,000 grams in 1 kilogram
- Identify the boiling and freezing points of water and the average body temperature in degrees Celsius and compare them with points on the Fahrenheit scale
- Use the scientific method to ask questions, make hypotheses, collect data, analyze results, and formulate conclusions

Forces and Motion

- Demonstrate that a *force* is a push or a pull that can make an object move; an object changes position when moved; and the size of the change is related to the *strength*, or the amount of force, of the push or pull
- Determine that moving heavy objects requires more force than moving light objects
- Observe how the force of friction affects the movement of objects, know that friction works in the direction opposite the motion to slow down or stop sliding objects, and know that friction occurs whenever two types of matter move against each other
- Identify gravity as the force that causes all things to fall toward the Earth
- Observe that gravity makes objects fall at the same rate
- Observe that when an object falls, the force of friction pushes the object upward as the force of gravity pulls it downward; all objects experience friction when they fall; and shapes with large surfaces are most affected by friction

Simple Machines

- Explain how machines make work easier
- Explain that wheels help reduce friction by allowing surfaces to roll instead of slide
- Categorize common objects such as a lever, inclined plane, wedge, wheel and axle, pulley, and screw
- Demonstrate how force is transferred between a wheel and an axle
- Use moveable and fixed pulleys to lift loads
- Demonstrate that it takes less force to pull a load up an inclined plane than it does to lift the load to the same height, but the load must travel a longer distance

Magnetism

- Observe that you can use magnets to make some objects move without touching them
- State that magnets have two poles (north and south) and that similar poles repel each other and opposite poles attract each other
- Observe that magnets are strongest at the poles, and compare relative strengths of magnets
- Construct a temporary magnet and observe its magnetic properties
- Recognize that the earth is a large magnet, with magnetic poles and fields
- Observe that the north-seeking pole of a bar magnet points to the north
- Recognize that the true north (the geographic North Pole) and the magnetic north pole are close to, but not exactly at, the same location
- Construct and use a compass to locate directions

Sounds Around Us

- Describe the sounds that a variety of objects make
- Identify the sources of natural and man-made sounds
- Explain how sound vibrations and sound waves travel
- Differentiate between pitch and volume

- Explain how pitch and volume change on a stringed instrument
- Explain the nature of vocal cords
- Tell about the life and accomplishments of Alexander Graham Bell

The Human Body

- Explain that all living things are made of cells
- Identify the three main parts of an animal cell as the cell membrane, cytoplasm, and nucleus
- Identify cells and their functions
- Recognize that the digestive system breaks down the food you eat to provide your body with energy to live and grow
- Describe the process of digestion and the functions of the mouth, esophagus, stomach, small intestine, and large intestine
- Identify the functions of the parts of the excretory system
- Identify proper nutrient requirements using a food pyramid

Rock Hounds

- Name the three layers of the earth (crust, mantle, and core) and describe their characteristics
- Recognize that rocks are made of minerals, and that minerals form in certain shapes called crystals
- Use Moh's Scale of Hardness to test and identify minerals
- Identify *igneous rock* as cooled lava from a volcanic eruption
- Explain that *sedimentary rock* forms over a long period of time from layers of sediment
- State that *metamorphic rock* is sedimentary or igneous rock that has been changed by heat and pressure
- Demonstrate that a *fossil* is a plant, an animal, or an imprint of a plant or animal that has turned to stone
- Recognize that fossils give us information about plants and animals that lived long ago

Weathering, Erosion, and Soil

- State that *soil* is a mixture of minerals, humus, air, and water
- Identify *humus* as part of soil that is composed of things that were once living
- Recognize that clay, silt, and sand are names for different sizes of mineral particles
- Explain that soils vary in texture, color, and ability to hold water
- Describe *weathering* as the process by which rocks break down into smaller pieces
- Describe *erosion* as the carrying away of soil and weathered rock
- Recognize that plant roots help reduce erosion by trapping soil
- Evaluate soils by observing, measuring, and graphing the height of bean plants grown in different soils

Circle of Life, Plants

- Explain that the series of changes through which a living thing passes during its lifetime is called its life cycle
- Put the various stages in the life cycle of a plant into proper order
- Recognize that plants can grow from parts other than seeds, such as bulbs, tubers, and runners
- Identify various parts of a flower, including sepals, petals, stamens, and pistil
- Recognize that the force of gravity causes roots to grow downward
- Demonstrate that plants grow toward light
- Give examples of how seeds are dispersed (for example, hitchhiking, blowing in the wind, gravity, and being eaten by animals)

Circle of Life, Animals

- Put into proper order the stages of life cycles of insects, fish, frogs, reptiles, birds, and mammals (including humans)
- State that the changes insects and frogs go through during their lives is called metamorphosis
- Recognize that as adults, both plants and animals reproduce to make more of their kind
- Tell how plant and animal life cycles differ (for example, plants grow from seeds, while animals hatch from eggs or are born live)

Lesson Time and Scheduling

Total lessons: 72. If you teach Science twice a week, you can comfortably complete the program within a typical school year.

Lesson Time: 60 minutes. You might choose to split the lessons into smaller segments and take a break between investigations. The K[12] online lesson tracking system allows you to pick up wherever you left off in any given lesson.

Standard Curriculum Items

Green bean seeds
Grass seeds
Directional compass
Graduated cylinder
Rock samples

Thermometer
Plastic pipette
Safety goggles
Magnifying glass
Plastic 1 cm cubes
Bucket balance
Iron filings
Bar magnets
Latch magnets
Ring magnets
U-shaped magnets
Spring scale
Aluminum single pulley

Additional Curriculum Items

Some lessons require additional resources, including common household items and books that are readily available online or in your local library:
Fossils Tell of Long Ago by Aliki
Let's Go Rock Collecting by Roma Gans
What Happens to a Hamburger? by Paul Showers
What Makes a Magnet? by Franklyn Branley
Why Frogs Are Wet by Judy Hawes

NOTE: List subject to change.