

Springfield Public Schools
SCIENCE

FOURTH GRADE

COURSE DESCRIPTION

Science in fourth grade is taught on a daily basis for 30 – 45 minutes each day within a regular self-contained classroom. The fourth grade student will be introduced to different objectives within the areas of earth structures and processes, space science, light, electricity, sound and heat. The program emphasizes a hands-on approach to learning and scientific inquiry.

MAJOR INSTRUCTIONAL GOALS

The intent of the Springfield R-12 Science Program is:

1. The student will use data collected from hands-on scientific investigations to construct a reasonable explanation for observable phenomenon.
 - a. Use simple metric tools to accurately measure objects (length, mass, capacity, and temperature) and record the data. (SC7; 1.4; 1.8; **2.1**)
 - Make qualitative observations using the five senses (7.1.B.4.a.) (7.1.B.5.a.)
 - Make observations using simple tools and equipment (e.g., hand lenses, magnets, thermometers, metric rulers, balances, graduated cylinders, spring scale) (7.1.B.4.b.)
 - Measure length to the nearest centimeter, mass using grams, temperature using degrees Celsius, volume to the nearest milliliter, weight to the nearest Newton (7.1.B.4.c.)
 - Compare amounts/measurements (7.1.B.4.d.)
 - Judge whether measurements and computation of quantities are reasonable (7.1.B.4.e.) (7.1.B.5.e.)
 - b. Analyze and interpret data resulting from simple investigations to support or reject predictions. (SC7; 1.5; **1.8**; 3.3; 3.5; 3.7)
 - Use quantitative and qualitative data as support for reasonable explanations (7.1.C.4.a.)
 - Use data as support for observed patterns and relationships, and to make predictions to be tested (7.1.C.4.b.)
 - Evaluate the reasonableness of an explanation (7.1.d.3.a.) (7.1.D.4.a.)
 - Analyze whether evidence supports proposed explanations (7.1.D.3.b.) (7.1.D.4.b.)
 - Formulate testable questions and explanations (hypotheses) (7.1.A.4.a.)
 - Conduct a fair test to answer a question (7.1.A.3.b.) (7.1.A.4.c.) (7.1.A.5.c.)
 - Recognize the characteristics of a fair and unbiased test (7.1.A.4.b.) (7.1.A.5.b.)
 - c. Summarize data collected from investigations into tables, graphs and charts. (SC7; 1.4; 1.8; 2.1; 2.2; 2.7; 4.1)
 - Communicate the procedures and results of investigations and explanations through: oral presentations, drawings and maps, data tables, graphs (bar, single line, pictograph), writings (7.1.E.4.a.)
2. The student will understand that women and men of various backgrounds work in teams and alone, but all communicate extensively with others.
 - a. Discuss current scientific knowledge and how recent findings guide future scientific investigations. (SC8; **1.1**; 1.2; **1.6**; **3.5**)
 - b. Demonstrate an understanding that safety is an important part of science investigations and that following safety rules prevent injuries in school and the workplace. (SC8; **3.5**)

3. The student will demonstrate knowledge of the effects science and technology has on occupations, careers and the culture.
 - a. Recognize the various ways in which science and technology impact on all careers and occupational areas. (SC8; 4.3; 4.8)
 - b. Identify reasons and/or causes for recent increases in technological advances. (SC8; 1.2; **4.1**)

4. The students will investigate the composition of the earth, the forces that act upon it and its natural processes.
 - a. Compare differing soil types according to soil composition of weathered rocks and decomposing organic material. (SC5; **1.3**; 1.4; **1.5**; **1.6**; 1.9; **1.10**; **2.1**; 2.2; 2.4; **3.3**; **3.5**; 4.6)
 - Identify and describe the components of soil (e.g., plant roots and debris, bacteria, fungi, worms, types of rock) and its properties (e.g., odor, color, resistance to erosion, texture, fertility, relative grain size, absorption rate) (5.1.A.4.a.)
 - Compare the physical properties (i.e., size, shape, color, texture, layering, presence of fossils) of rocks (mixtures of different Earth materials, each with observable physical properties) (5.1.A.4.b.)
 - Describe how weathering agents (e.g., water, chemicals, temperature, wind, plants) cause surface changes that create and/or change Earth's surface materials and/or landforms (5.2.A.4.c.)
 - Describe how erosional processes (i.e., action of gravity, waves, wind, rivers, glaciers) cause surface changes that create and/or change Earth's surface materials and/or landforms (5.2.A.4.d.)
 - Identify the ways humans affect the erosion and deposition of Earth's materials (e.g., clearing of land, planting vegetation, paving land, construction of new buildings) (5.3.A.4.a.)

 - b. Investigate reasons for conservation of natural resources and consequences associated with exploiting those resources. (SC8; **1.1**; 1.2; **1.3**; **3.5**)
 - Propose ways to solve simple environmental problems (e.g., recycling, composting, ways to decrease soil erosion) that result from human activity (5.3.A.4.b.)
 - Explain how major bodies of water are important natural resources for human activity (e.g., food, recreation, habitat, irrigation, solvent, transportation) (5.3.A.5.a.)
 - Describe how human needs and activities (e.g., irrigation, damming of rivers, waste treatment, sources of drinking water) have affected the quantity and quality of major bodies of fresh water (5.3.A.5.b.)
 - Propose solutions to problems related to water quality and availability that result from human activity (5.3.A.5.c.)

 - c. Demonstrate an understanding of the basic components of the water cycle, atmosphere and how they relate to the weather. (SC5; **1.3**; 1.4; **1.7**; 2.3; 2.4; **3.2**; **3.3**)
 - Recognize how changes in state (i.e., freezing/melting, condensation/evaporation) provide evidence that matter is made of particles too small to be seen (1.1.C.5.a.)
 - Recognize the mass of water remains constant as it changes state (as evidenced in a closed container) (1.1.1.5.a.)
 - Recognize liquid water can change into a gas (vapor) in the air (5.1.C.3.a.)
 - Recognize clouds and fog are made of tiny droplets of water (5.1.C.3.b.)
 - Recognize air is a substance that surrounds us, takes up space, and moves around us as wind (5.1.C.3.c.)
 - Recognize the atmosphere is composed of a mixture of gases, water, and minute particles (5.1.C.5.a.)
 - Describe and trace the path of water as it cycles through the hydrosphere, geosphere, and atmosphere (i.e., the water cycle: evaporation, condensation, precipitation, surface run-off/groundwater flow) (5.2.E.5.a.)
 - Identify the different forms water can take (e.g., snow, rain, sleet, fog, clouds, dew) as it moves through the water cycle (5.2.E.5.b.)
 - Identify and use appropriate tools (i.e., thermometer, anemometer, wind vane, hygrometer, barometer, rain gauge, satellite images, weather maps) to collect weather data (i.e., temperature, wind speed and direction, relative humidity, air pressure, precipitation, cloud type and cover) (5.2.F.5.a.)
 - Recognize and summarize relationships between weather data (e.g., temperature and time of day, cloud cover and temperature, wind direction and temperature) collected over a period of time (5.2.F.5.b.)

Identify the major landforms on Earth (i.e., mountains, plains, oceans, river valleys, coastlines, canyons) (5.2.A.4.b.)
Recognize water evaporates (liquid water changes into a gas as it moves into the air) (1.1.D.3.c.)
Describe the changes in the physical properties of water (i.e., shape, volume) when frozen or melted (1.1.D.3.f.)

5. The student will investigate properties, patterns, and movement of the earth, the solar system, and the universe; and will investigate space exploration.
 - a. Identify and describe celestial objects, such as: galaxies, solar system, stars, planets, moons, comets, asteroids, and meteorites. (SC6; **1.6**; 1.8; 2.3; **3.5**) (may be too general)
 - Describe our Sun as a star because it provides light energy to the solar system (6.1.A.3.a.)
 - Recognize the moon is a reflector of light (6.1.A.3.b.)
 - Recognize the Earth is one of several planets within a solar system that orbits the Sun (6.1.A.5.a.)
 - Recognize the moon orbits the Earth (6.1.A.5.b.)
 - Recognize planets look like stars and appear to move across the sky among the stars (6.1.A.5.c.)
 - Describe physical features of the planet Earth that allows life to exist (e.g., air, water, temperature) and compare these to the physical features of the Sun, the moon, and other planets (6.1.B.5.a.)
 - Illustrate and describe how the Sun appears to move slowly across the sky from east to west during the day (6.2.A.3.a.)
 - Illustrate and describe how the moon appears to move slowly across the sky from east to west during the day and/or night (6.2.B.3.a.)
 - Recognize there is a day/night cycle every 24 hours (6.2.C.3.a.)
 - b. Evaluate and explain how revolution, rotation, and the tilt of the earth influence seasons, weather and climate. (SC6; **1.7**; 1.8; **3.5**)
 - c. Create a model of the solar system depicting accurate distances between objects in space. (SC6; SC7; **1.6**; 2.1)
 - d. Compare and contrast the physical properties of the planets and their moons. (SC6; 1.2; 1.7; 2.7; **3.5**; **4.1**)
 - e. Explain the effect the force of gravity has on celestial objects and their orbits. (SC2; SC6; **1.3**; **1.6**; **3.6**)
 - f. Research and explain how information received from telescopes and space probes has either confirmed or modified scientific theories concerning the physical properties and conditions of the solar system. (SC8; 1.7; 2.4; 2.7; **3.1**; **3.5**; **4.1**)
6. The student will investigate changes in the properties of matter and the transfer of energy (heat, light, sound and electricity.)
 - a. Explain differences between elements, mixtures and compounds and their ability to react with other substances. (SC1; 1.2; **1.3**; 1.4; **1.6**; **1.7**; **2.1**; 2.3; 2.4; **3.1**; **3.2**; **3.3**; **3.5**)
 - Identify water as a solvent that dissolves materials (Do NOT assess the term solvent) (1.1.B.4.a.)
 - Observe and describe how mixtures are made by combining solids or liquids, or a combination of these (1.1.B.4.b.)
 - Distinguish between the components in a mixture (e.g., trail mix, conglomerate rock, salad) (1.1.B.4.c.)
 - Classify types of materials (e.g., water, salt, sugar, iron filings, salt water) into substances (materials that have specific physical properties) or mixtures of substances by using their characteristic properties (1.1.A.4.d.)

- b. Demonstrate that substances have characteristic properties. (SC1; **1.1; 2.1; 3.3; 3.5**)
- Describe ways to separate the components of a mixture by their properties (i.e., sorting, filtration, magnets, screening) (1.1.B.4.d.)
 - Recognize that the total mass of a material remains constant whether it is together, in parts, or in a different state (1.1.I.4.a.)
 - Classify matter as a solid, a liquid, or a gas, as it exists at room temperature, using physical properties (i.e., volume, shape, ability to flow) (1.1.D.5.a.)
 - Recognize no two objects can occupy the same space at the same time (e.g., water level rises when an object or substance, such as a rock, is placed in a quantity of water) (1.1.A.4.c.)
 - Compare the observable physical properties of solids, liquids, or gases (air) (i.e., visible vs. invisible, changes in shape, changes in the amount of space occupied) (1.1.D.3.a.)
- c. Demonstrate an understanding of the basic types and properties of heat energy (e.g. conduction, convection and radiation). (SC1; **1.2; 1.3; 1.4; 1.6; 1.7; 1.10; 2.1; 2.3; 2.7; 3.1; 3.5; 3.8; 4.1**)
- Predict the effect of heat energy on the physical properties of water as it changes to and from a solid, liquid, or gas (i.e., freezing/melting, evaporation/condensation) (1.1.D.5.b.)
 - Predict and investigate the effect of heat energy (i.e., change in temperature, melting, evaporation) on objects and materials (1.1.D.3.g.)
- d. Demonstrate the transference of electrical energy by investigating electrical current and circuits. (SC5; **1.1; 2.1; 3.3; 3.5**)
- Construct and diagram a complete electric circuit by using a source (e.g., battery), means of transfer (e.g., wires), and receiver (e.g., resistance bulbs, motors, fans) (1.2.A.4.a.)
 - Observe and describe the evidence of energy transfer in a closed series circuit (e.g., lit bulb, moving motor, fan) (1.2.A.4.b.)
 - Classify materials as conductors or insulators of electricity when placed within a circuit (e.g., wood, pencil lead, plastic, glass, aluminum foil, lemon juice, air, water) (1.2.A.4.c.)
 - Identify the evidence of energy transformations (temperature change, light, sound, motion, and magnetic effects) that occur in electrical circuits (1.2.F.4.a.)
- e. Use a graph to represent the motion of an object from a description of its position, direction of motion, and speed. (SC2; **1.8**).
- Classify different types of motion (straight line, curved, back and forth) (2.1.A.4.a.)
 - Describe an object's motion in terms of distance and time (2.1.A.4.b.)
 - Identify the forces acting on the motion of objects traveling in a straight line (2.2.A.4.a.)
 - Recognize friction as a force that slows down or stops a moving object that is touching another object or surface (2.2.A.4.b.)
 - Compare the forces (measured by a spring scale in Newtons) required to overcome friction when an object moves over different surfaces (i.e., rough/smooth) (2.2.A.4.c.)
 - Identify the forces acting on a load and use a spring scale to measure the weight (resistance force) of the load (2.2.A.5.a.)
- f. Identify spectral properties of light (electromagnetic radiation). (SC1; **1.2**).
- Identify sources of light energy (e.g., Sun, bulbs, flames) (1.2.A.3.b.)
- g. Explore changes in the pitch of sound by changing the rate of vibration. (SC1; **1.2**)
- h. Interpret and show the relationship between kinetic and potential energy. (SC1; SC2; SC8; 1.2; **1.5; 1.6; 3.5**)

*Processing skills in **bold print** are assessed by the Missouri Assessment Program at this grade level.