

# Fifth Grade Science Curriculum

## Unit: Earth and Sun

Time: 1<sup>st</sup> Marking Period

### Essential Questions

- How and why does your shadow change during the day?
- How does the shape of the Moon change over 4 weeks?
- How do meteorologists measure and record weather variables?
- What is the water cycle?
- What is the universe, and what is Earth's place in it?

### Enduring Understandings

- I can identify the pattern of how shadows change length and directions over a day and use this information to analyze a graphical display
- I can analyze a graphical display of moon phases, then choose an illustration that continues that pattern.
- I can measure and record weather variables.
- I can model the patterns of interaction involved in the hydrosphere and atmosphere (water cycle).

### Standards:

5-ESS1-1: Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.

5-ESS1-2: Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

5-ESS2-1: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS2-2: Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

5-PS1-1: Develop a model to describe that matter is made of particles too small to be seen.

5-PS2-1: Support an argument that the gravitational force exerted by Earth on objects is directed down.

3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

### Benchmark Assessment(s)

- SWBAT observe and compare shadows during a school day through the Shadow Challenge by tracing their shadows outside with chalk in the morning and afternoon, and compare the tracings. (5-ESS1-2)
- SWBAT relate the position of the Sun in the sky to the size and orientation of an object's shadow by constructing a Sun tracker that will reproduce the movement of the Sun throughout the day. (5-ESS1-1)
- SWBAT use physical models to explain day and night and determine the causes of day and night by positioning themselves around a lamp to observe the movement of Earth that causes day and night. (5-ESS1-2)
- SWBAT record graphically the organization of the solar system and use models to reveal patterns of the Moon Phases by observing the night sky and creating a Moon Calendar in the classroom for 4 weeks. (5-ESS1-1), (5-ESS1-2)
- SWBAT use syringes to explain compress and pressure while investigating the properties of air. (5-PS1-1)
- SWBAT describe Earth's atmosphere by using solar system cards to create visual displays of the atmosphere and solar system. (5-ESS2-1), (5-PS2-1)
- SWBAT conduct experiments by heating earth materials and creating solar water heaters using black and white collectors to see if color affects temperature change in water. They will build explanations and design solutions. (3-5-ETS1-2), (3-5-ETS1-3)
- SWBAT collect, organize, and interpret weather data by reading weather tools to graph the data on a weather chart. (5-ESS2-2)
- SWBAT investigate the conditions that cause condensation as part of the water cycle by creating condensation chambers to observe condensation on cold surfaces. (5-ESS2-2)

### Other Assessments

- ✓ Embedded assessments
- ✓ Journal entries
- ✓ Focus questions
- ✓ Classroom observations and labs
- ✓ I-Checks

### Materials

- Student resource book
- Teacher resource book
- FOSS investigation 1-5 materials
- FOSS Online Videos

# Fifth Grade Science Curriculum

## SUGGESTED ACTIVITIES

- Investigation 1- The Sun: Students trace their shadows outside in the schoolyard with chalk in the morning and afternoon, and compare the tracings. Pairs of students construct Sun trackers to reproduce the movement of the Sun throughout the day. Students position themselves around a lamp to observe day and night.
- Investigation 2- Planetary Systems: Students take a mini-field trip to the schoolyard to look for the Moon. The class starts a Moon calendar and records the Moon phases for 4 weeks. Students work in pairs with a set of solar system cards to organize the objects into a model of the solar system. Students identify imagines in patterns of stars (constellations).
- Investigation 3- Earth's Atmosphere: Students explore the properties of air by working with syringes and tubes to discover that air takes up space and is compressible. They are introduced to the atmosphere as a mixture of gases with properties that change with distance. Students review local weather reports and determine variables that combine to produce weather. They are introduced to weather instruments.
- Investigation 4- Heating Earth: Students monitor temperature changes when solar energy is transferred to water and dry soil. They observe two examples of heat transfer by conduction and convection. Students set up solar water heaters.
- Investigation 5- Water Planet: Students observe condensation and find that more evaporated from the cup that was heated by the lamp. Students consider why Earth is called the water planet and are introduced to climate.

## REINFORCEMENT

- Provide printed notes, organizers, charts, etc. for student notebooks.
- Have students use post-it notes/highlighters to mark key points in notebooks/materials.
- Provide note cards for vocabulary terms.
- Show tutorial: Animal Basic Needs – Foss Teacher Page/Digital Only Resources/Tutorials

## ENRICHMENT

- Solar Heater – Enrichment Activity
- Define a solar heater as a system that uses solar energy to heat water. The heating is accomplished by using a heating collector. Watch the teacher preparation video 4.4. Students set up solar water heaters using black and white collectors to see if color affects temperature change in water. They also set up open and covered solar water heaters to find out if exposure to air affects temperature change in water. What is the best design for a solar water heater?
- Extension: Have students create a solar over. They will need a box, aluminum foil, tape, and an item to melt for example chocolate. Have students work with different color heating collectors like in the investigation above and compare the time to melt the chocolate. Does it accelerate the rate of melt?
- Extension: Teacher Masters 31, 32

## Suggested Websites

- [www.fossweb.com](http://www.fossweb.com)
- [www.brainpop.com](http://www.brainpop.com)
- [www.discoveryeducation.com](http://www.discoveryeducation.com)
- <http://solarsystem.nasa.gov>
- <http://nightsky.jpl.nasa.gov/planner.cfm>
- <http://hubblesite.org>
- <http://www.nasa.gov/audience/forkids/kidsclub>
- [http://thewaterproject.org/resources/the\\_water\\_cycle](http://thewaterproject.org/resources/the_water_cycle)

## Suggested Materials

- *Time for Kids*
- *Variety of informational text about earth and sun.*

# Fifth Grade Science Curriculum

## **Cross-Curricular Connections**

### **21<sup>st</sup> Century Skills:**

*CRP4: Communicate clearly and effectively and with reason.*

*CRP7: Employ valid and reliable research strategies.*

*CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.*

### **Technology:**

*8.1.5.F.1: Apply digital tools to collect, organize, and analyze data that support a scientific finding.*

*8.2.5.C.4: Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.*

### **SEL:**

*Understand and practice strategies for managing one's own emotions, thoughts, and behaviors.*

*Develop, implement, and model effective problem solving and critical thinking skills.*

*Utilize positive communication and social skills to interact effectively with others.*

### **Language Arts or Math:**

*RI.5.7: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.*

*MP.4: Model with mathematics.*

# Fifth Grade Science Curriculum

Unit: Mixtures and Solutions

Time: 2<sup>nd</sup> Marking Period

## Essential Questions

- How can mixtures be separated?
- What is the process to develop a model?
- What is the difference between dissolving and melting?
- How can you determine which salt solution is more concentrated?
- Does it always take the same amount of solid materials to saturate 50 mL of water?
- What is the effect of mixing two substances with water?

## Enduring Understandings

- I can separate mixtures by using a screen, filter, magnets, and evaporation.
- I can determine the process to develop a model of the black box and come to a consensus with another group to determine what is inside the box.
- I can explain the difference between dissolving and melting.
- I can use a balance to determine which salt solution is more concentrated.
- I can determine there is a limit to the amount of salt that will dissolve in 50 mL of water.
- I can explain the effect of mixing two substances with water.

## Standards:

5-PS1-1: Develop a model to describe that matter is made of particles too small to be seen.  
5-PS1-2: Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.  
5-PS1-3: Make observations and measurements to identify materials based on their properties.  
5-PS1-4: Conduct an investigation to determine whether the mixing of two or more substances results in new substances.  
3-5-ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost  
3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.  
3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

## Benchmark Assessment(s)

- SWBAT separate materials using magnets, screens, filters, and evaporation dishes to explain what tools separate specific materials. (5-PS1-1), (5-PS1-3)
- SWBAT develop black box models and explain the process by observing the black box and drawing the model on paper. With the consensus of their group, they will build a model of it and test the model to see if it worked. (3-5-ETS1-1), (3-5-ETS1-2), (3-5-ETS1-3)
- SWBAT explain the difference between melting and dissolving by conducting an experiment and heating wax, butter, and chocolate to see the physical property changes in the materials. (5-PS1-3)
- SWBAT use a balance to determine relative concentration between salt and Epsom salt. They will determine which has a higher concentration level. (5-PS1-2)
- SWBAT explain what chemical and physical changes are by mixing two substances with water. (5-PS1-4)

## Other Assessments

- ✓ Embedded assessments
- ✓ Journal entries
- ✓ Focus questions
- ✓ Classroom observations and labs
- ✓ I-Checks

## Materials

- Student resource book
- Teacher resource book
- FOSS investigation 1-5 materials
- FOSS Online Videos

# Fifth Grade Science Curriculum

## SUGGESTED ACTIVITIES

- Investigation 1- Separating Mixtures: Students will observe mixtures of solid materials and they will separate them with screens and filters. They discover that salt and water create a solution that can only be separated through evaporation. Students observe the salt crystals after evaporation.
- Investigation 2- Developing Models: Students develop black box models and try to reach consensus with other students who investigated the same boxes to determine what is inside. Students heat four common solid materials and observe phase changes and melting.
- Investigation 3- Concentration: Students observe and compare soft-drink solutions that differ in the amount of powder and the amount of water to develop the concept of concentration. Students make salt solutions and compare their concentrations.
- Investigation 4- Students make a saturated solution by adding salt to water until no more salt will dissolve. They use a balance to determine the mass of the salts in order to compare the solubility of salt and Epsom salt.
- Investigation 5- Fizz Quiz: Students add water to substances to observe chemical and physical reactions.
- Grow Borax Crystal Snowflakes: <http://chemistry.about.com/cs/howtos/ht/boraxsnowflake.htm>
- Create Oobleck: A Non-Newtonian Fluid

## REINFORCEMENT

- Provide printed notes, organizers, charts, students, etc. for student notebooks.
- Have students pair-up with partner to share answers to focus questions
- Show video: Change in Properties of Matter – Foss Teacher Page/Digital Only Resources/Streaming Video
- Multi-media Interactive Activities – Foss Teacher Page/Digital Only Resources/Multi-media – Separating Materials.
- Have students use post-it notes/highlighters to mark key points in notebooks/materials.

## ENRICHMENT

- Drought Stopper – Enrichment Activity
- Prepare materials as shown in teacher preparation video 2.2. The model will need to be prepared before presenting investigation to students. Students observe a device that delivers 600–700 mL of water when only 100 mL of water is put in. The inner works of the device will be covered so students don't see the actual design. Students are then asked to develop a conceptual model to explain how they think the device works.
- Read *Beachcombing Science*, located in the science resources section.
- Extension: Teacher Masters 5, 6, 7

## Suggested Websites

- [www.fossweb.com](http://www.fossweb.com)
- [www.brainpop.com](http://www.brainpop.com)
- [www.discoveryeducation.com](http://www.discoveryeducation.com)
- [www.chem.purdue.edu](http://www.chem.purdue.edu)
- [www.chemicalelements.com](http://www.chemicalelements.com)

## Suggested Materials

- *Time for Kids*
- *Variety of informational text about mixtures and solutions*

# Fifth Grade Science Curriculum

## **Cross-Curricular Connections**

### **21<sup>st</sup> Century Skills**

*CRP4: Communicate clearly and effectively and with reason.*

*CRP7: Employ valid and reliable research strategies.*

*CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.*

### **Technology**

*8.1.5.F.1: Apply digital tools to collect, organize, and analyze data that support a scientific finding.*

*8.2.5.C.4: Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.*

### **SEL**

*Understand and practice strategies for managing one's own emotions, thoughts, and behaviors.*

*Develop, implement, and model effective problem solving and critical thinking skills.*

*Utilize positive communication and social skills to interact effectively with others.*

### **Language Arts or Math**

*MP.4: Model with mathematics*

*RI.5.7: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.*

# Fifth Grade Science Curriculum

## Unit: Living Systems

Time: 3<sup>rd</sup> and 4<sup>th</sup> Marking Period

## Standards:

5-LS1-1: Support an argument that plants get the materials they need for growth chiefly from air and water.

5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

5-PS3-1: Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

5-ESS2-1: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

## Essential Questions

- How can you identify a system?
- What organisms are predators and prey?
- How do plants and animals get the nutrients they need?
- What behaviors are instinctive and what behaviors are learned?

## Enduring Understandings

- I can identify the function of a system and subsystems.
- I can analyze a model that describes movement of matter and energy in a food web.
- I can explain plant systems and animal systems that are necessary for survival.
- I can identify the differences among instinct, learned behaviors, and reflexes.

## Benchmark Assessment(s)

- SWBAT create a redworm habitat system to study decomposers. They will record what organic materials go into the habitat with redworms and observe changes in the worm jar over 1-2 months. (5-PS3-1), (5-LS2-1), (5-ESS2-1)
- SWBAT explain how animals acquire nutrients for their cells by eating and digesting food. They will observe how the painted lady butterfly goes through its life cycle from larva to adulthood. (5-LS1-1)
- SWBAT use models to explain the circulatory and respiratory systems of humans and animals. They will study the structures and functions of the interacting parts. (5-PS3-1), (5-LS1-1), (5-LS2-1)
- SWBAT construct an explanation about how decomposers in an ecosystem can break down organic material by dismantling their worm habitats. (5-PS3-1), (5-LS2-1), (5-ESS2-1), (5-ESS3-1)

## Other Assessments

- ✓ Embedded assessments
- ✓ Journal entries
- ✓ Focus questions
- ✓ Classroom observations and labs
- ✓ I-Checks

## Materials

- Student resource book
- Teacher resource book
- FOSS investigation 1-4 materials
- FOSS Online Videos

# Fifth Grade Science Curriculum

## SUGGESTED ACTIVITIES

- Investigation 1- Systems: Students are introduced to a system as a collection of interacting parts that work together to make a whole or produce an action. They explore Earth as a system and are introduced to subsystems. Students work with organism cards to create food webs and create a redworm habitat.
- Investigation 2- Nutrient Systems: Students determine the necessary conditions for activating dry yeast. Yeast is introduced as a single-celled fungus. Students think about how to break the dormancy of a wheat plant. They plant wheat seeds in containers of soil and place half of the planters in a lighted environment and the other half in a dark environment then observe their plants to determine which plants have chlorophyll. Students investigate how animals acquire nutrients for their cells by eating and digesting food (painted lady butterflies).
- Investigation 3-Transport Systems: Students go outdoors to observe veins in leaves and investigate their functions. They watch a video showing how blood is delivered to every human cell by a system of vessels connected to a pump, the heart. Students assemble a model of a circulatory system that can pump blood to the lungs. They measure their lung volume and read about the circulatory and respiratory systems of animals.
- Investigation 4- Sensory Systems: Students learn about the role of sensory and motor neurons in brain messages. They compare foot-response time to hand-response time. Students learn about instinctive and learned behaviors. They study marine ecosystems and are introduced to the importance of the ocean in the carbon cycle.

## REINFORCEMENT

- Multi-media Interactive Activities – Foss Teacher Page/Digital Only Resources/Multi-media – Food Webs
- Multi-media Interactive Activities – Foss Teacher Page/Digital Only Resources/Multi-media – Plant Vascular Systems
- Multi-media Interactive Activities – Foss Teacher Page/Digital Only Resources/Multi-media – Mammalian Circulating Systems
- Provide printed notes, organizers, charts, students, etc. for student notebooks.
- Have students pair-up with partner to share answers to focus questions.

## ENRICHMENT

- Lung Design – Enrichment Activity
- Prepare materials as shown in teacher preparation video 3.3. Students study the structures and functions of the interacting parts of the phenomenon called respiratory system, learning about the acquisition and distribution of oxygen, and the process of waste removal. They measure their lung volume (vital capacity) and read about the circulatory and respiratory systems of other animals.
- Extension: Teacher Masters 11, 12

## Suggested Websites

- [www.fossweb.com](http://www.fossweb.com)
- [www.brainpop.com](http://www.brainpop.com)
- [www.discoveryeducation.com](http://www.discoveryeducation.com)
- [www.njseagrant.org](http://www.njseagrant.org)
- [www.biology4kids.com](http://www.biology4kids.com)
- [www.kidshealth.org](http://www.kidshealth.org)

## Suggested Materials

- *Time for Kids*
- *Variety of informational text about living systems*

## Cross-Curricular Connections

### 21<sup>st</sup> Century Skills

CRP4: Communicate clearly and effectively and with reason.

CRP7: Employ valid and reliable research strategies.

CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

### Technology

8.1.5.F.1: Apply digital tools to collect, organize, and analyze data that support a scientific finding.

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## SEL

Understand and practice strategies for managing one's own emotions, thoughts, and behaviors.

Develop, implement, and model effective problem solving and critical thinking skills.

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## Language Arts or Math

MP.4: Model with mathematics

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