This resource is intended to be a guide for parents and students to improve content knowledge and understanding. The information below is detailed information about the Standards of Learning taught during the 3rd grading period and comes from the Science Standards of Learning Curriculum Framework, Grade 3 issued by the Virginia Department of Education. The Curriculum Framework may be found in its entirety at the following website.


Standard 3.1
The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) observations are made and are repeated to ensure accuracy;

b) predictions are formulated using a variety of sources of information;

c) objects with similar characteristics or properties are classified into at least two sets and two subsets;

d) natural events are sequenced chronologically;

e) length, volume, mass, and temperature are estimated and measured in metric and standard English units using proper tools and techniques;

f) time is measured to the nearest minute using proper tools and techniques;

g) questions are developed to formulate hypotheses;

h) data are gathered, charted, graphed, and analyzed;

i) unexpected or unusual quantitative data are recognized;

j) inferences are made and conclusions are drawn;

k) data are communicated;

l) models are designed and built; and

m) current applications are used to reinforce science concepts.
Overview
The skills defined in standard 3.1 are intended to define the “investigate” component and the understanding of the nature of science for all of the other third-grade standards. The intent of standard 3.1 is that students will continue to develop a range of inquiry skills and achieve proficiency with those skills in the context of the concepts developed at the third grade, and continue to strengthen their understanding of the components of the nature of science.

Science assumes that the natural world is understandable. Scientific inquiry can provide explanations about nature. This expands students’ thinking from just knowledge of facts to understanding how facts are relevant to everyday life.

- Questions frequently arise from observations. **Hypotheses** can be developed from those questions. A **hypothesis** is a statement written in a manner that describes the cause and effect relationship between the independent and dependent variables in an experiment. A method for helping students understand how to develop a hypothesis is to have them build “if/then” statements (e.g., if heat is added to ice, then the ice will melt.).

- Complete observations are made using all of the senses. Simple instruments can help extend the senses (e.g., magnifying glass enhances the vision of an item).

- **Predictions** are statements of what is expected to happen in the future based on past experiences and observations.

- **An inference** is a tentative explanation based on background knowledge and available data.

- **A conclusion** is a summary statement based on the results of an investigation.

- Putting **natural events** in a sequence allows us to notice change over time.

- Scientists use a variety of modes to communicate about their work. Examples of ways they communicate include oral presentations; graphs and charts created to visualize, analyze and present information about their data; and written reports.

- In science, it is important that experiments and the observations recorded are replicable. There are two different types of data – qualitative and quantitative. **Qualitative data** deal with descriptions and data that can be observed, but not measured precisely. **Quantitative data** are data that can be counted or measured and the results can be recorded using numbers. **Quantitative data** can be represented visually in graphs and charts. **Quantitative data** define, whereas **qualitative data** describe. **Quantitative data** are more valuable in science because they allow direct comparisons between observations made by different people or at different times.
Standard 3.7
The student will investigate and understand the major components of soil, its origin, and its importance to plants and animals including humans. Key concepts include

a) soil provides the support and nutrients necessary for plant growth;

b) topsoil is a natural product of subsoil and bedrock;

c) rock, clay, silt, sand, and humus are components of soils; and

d) soil is a natural resource and should be conserved.

Overview
Students should know that most plants grow in soil and that people and many other animals are dependent on plants for food. The nutrients in soil are materials that plants and animals need to live and grow. Soil takes a long time to form; therefore, it should be conserved. Soil is made up of humus, silt, rock, and sand. Humus is decayed (once living) matter in soil.

- **Soil** is important because many plants grow in soil, and it provides support and nutrients for the plants.

- Over many years, weather, water, and living organisms help break down rocks and create soil **(weathering)**

- **Nutrients** are materials that plants and animals need to live and grow.
- **Humus** is decayed matter in soil. It adds nutrients to the soil. It is located in the topsoil.
- **Topsoil** is the upper soil surface and a natural product of subsoil and bedrock. Topsoil is best for plant growth.
- **Subsoil** and **bedrock** are layers of soil under the topsoil that are formed over a long period of time by the action of water.
- **Subsoil** and **bedrock** are **not as good** for growing plants as is topsoil.

Below is a soil profile. Students should practice labeling and describing each layer.

![Soil Profile Diagram]

- **Topsoil** is the upper soil surface and a natural product of subsoil and bedrock. Topsoil is best for plant growth. It contains the most humus.
- **Subsoil** is very low in organic matter or humus compared to the topsoil. This is the layer where most of the soil's nutrients are found. Deep plant roots come here looking for water. Clays and minerals released up above often stick here as water drains down.
- **Bedrock** is where solid rock can be found. It is called **bedrock**. It awaits here until erosion or an earthquake or something else exposes it to the surface.
- **Humus** is a thick cover of plants can keep the soil cool and keep it from drying out. Decomposers recycle dead plants and animals into **humus**.

Then some of it will be weathered and the soil making process will start all over again.
• Rock, clay, silt, sand, and humus are components of soil.
• **Clay** contains tiny particles of soil that hold water well and provides nutrients.
• **Sand** is made up of small grains of worn-down rock, has few nutrients, and does not hold water well.
• **Silt** is made up of very small broken pieces of rock. Its particles are larger than clay and smaller than sand.

Since soil takes a long time to form, it should be conserved, not wasted.

Soil conservation is the best way to make sure that we will continue to have the land we need to live on. Soil saving is going on right now. People use grass and other plants to hold the soil down. Farmers employ ways to keep their soil on the land so they can continue to grow food. One way is with windbreaks — rows of trees that are planted beside fields to keep the soil from blowing away.

**What are some ways to help keep or save our soil?**

Have the students draw and label a map of the schoolyard, giving a detailed description of the area(s) needing conservation help. For example, they might draw and label
• areas needing retaining walls to hold loose rocks and soil
• areas needing drainage pipes to direct flowing water to appropriate areas
• areas needing grass and/or other plants to hold loose soil in place
• areas needing fences, walls, and/or windbreaks to help prevent movement of soil
1. This experiment shows that –
   A  clay and humus do not hold water
   B  humus holds water better than clay
   C  clay holds water better than humus
   D  clay and humus hold the same amount of water

2. Humus, silt, clay, and sand are all parts of –
   A  soil
   B  fungi
   C  rocks
   D  plants
Standard 3.10

The student will investigate and understand that natural events and human influences can affect the survival of species.

Key concepts include:
   a) the interdependency of plants and animals;
   b) the effects of human activity on the quality of air, water, and habitat;
   c) the effects of fire, flood, disease, and erosion on organisms; and
   d) conservation and resource renewal.

Overview

This standard reinforces the concept that plants and animals are dependent upon each other for survival. Living things depend on other living thing to survive. Human and natural events can change habitats. Natural disasters such as fire, flood, disease, and erosion can kill organisms and destroy their habitats. Methods of ensuring the survival of plant and animal species include specific conservation measures. These are resource renewal, habitat management procedures, and species monitoring practices. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Every living thing depends on other organisms to survive. This is called *interdependency*.

All living things belong to a community of other animals or plants. A *community* is all of the populations that live together in the same place. Plant and animal populations in a community depend on each other for survival. This is called *interdependency*.

Human actions, such as polluting can affect the survival of plants and animals.

For example:
   - Clearing land to build homes, cities, and roads hurts the natural communities around us. When an environment is destroyed by people, its community of plants and animals is also destroyed. As more and more people move into a natural environment they pollute the water, air and land with trash, carbon monoxide and chemicals such as oil and pesticides.

Natural events, such as *fires, floods, diseases*, and *erosion* can also affect the survival of plant and animal species.

*Fire* can significantly change a natural environment. Lightening is the cause of many forest fires. Fire destroys natural habitats, and animals in these habitats are killed or forced to move to nearby areas.
**Floods** change the natural environment by destroying property and forcing animals to move from their natural habitats.

Plants and animals can be affected by **diseases** which will cause a change in their food chain. Plants and animals can be infected by germs and die.

**Erosion** is another natural event that impacts our environment. Erosion is often caused by wind, ice and water. It can destroy an environment by removing all of the soil in an area. Soil is needed for most plants to survive.

**Conservation** is the careful use and preservation of our natural resources.

<table>
<thead>
<tr>
<th>Resource Renewal</th>
<th>Habitat Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource renewal is a conservation practice in which species are protected.</td>
<td>Habitat management is the protection of plant and animal habitats.</td>
</tr>
<tr>
<td>An example would be protecting endangered plants by saving their seeds, growing the seeds indoors, and later putting the new plants back in their natural habitats.</td>
<td>An example would be setting up national parks or areas where no one is allowed to build houses, hunt, or collect plants or animals.</td>
</tr>
</tbody>
</table>
1. One reason people build tall buildings in cities is that there is too little –
   A. land
   B. air
   C. minerals
   D. water

2. Which of these probably causes the most air pollution?
   A. Trees
   B. Cars
   C. Wind
   D. Paper

3. Which natural event most likely caused the damage to this forest habitat?
   A. A flood
   B. A fire
   C. A hurricane
   D. An Earthquake
Standard 3.11

The student will investigate and understand different sources of energy. Key concepts include

a) energy from the sun;
b) sources of renewable energy; and

c) sources of nonrenewable energy.

Overview

This standard focuses on Earth’s major types of energy sources. The sun produces light and thermal energy. Natural forms of energy include sunlight, water, and wind. Important fossil fuels are coal, oil, and natural gas, which were formed over millions of years by decaying plants and animals buried in layers of rock. Sources of energy are classified either as renewable or nonrenewable. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

- The sun is the source of almost all energy on Earth. The sun is the direct source of light and thermal energy.
- Sunlight, water, and wind are sources of energy. The force of flowing water and moving air (wind) can also be used to generate electricity.
- Wood comes from trees. It has many important uses, including its use as a fuel.
- Some energy sources, like sunlight, water, and wind are renewable resources. That means that they can be replaced.
- Some energy sources are nonrenewable. That means that once they are used up, they are gone and cannot be replaced. Coal, oil, and natural gas are nonrenewable resources.
- Fossil fuels, such as coal, oil, and natural gas, are formed from decayed plants and animals. The formation of fossil fuels takes millions of years.
Natural Energy Resources

<table>
<thead>
<tr>
<th>Renewable</th>
<th>Nonrenewable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some energy sources are renewable. That means that they <strong>can be replaced</strong>.</td>
<td>Some energy sources are nonrenewable. That means that once they are used up, they are gone and <strong>cannot be replaced</strong>.</td>
</tr>
<tr>
<td>Some examples of renewable energy resources are sunlight, water, and wind.</td>
<td>Coal, oil, and natural gas are nonrenewable resources. Coal, oil and natural gas are also known as <strong>fossil fuels</strong>. <strong>Fossil fuels</strong>, such as coal, oil, and natural gas, are formed from decayed plants and animals. The formation of fossil fuels takes millions of years.</td>
</tr>
</tbody>
</table>

There are three major sources of energy on Earth. They are sunlight, water and wind. The sun is the main source of Earth’s energy. It provides both light and thermal energy.

<table>
<thead>
<tr>
<th>Major Sources of Energy on Earth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sunlight</strong></td>
</tr>
<tr>
<td>The sun’s energy can change into electrical energy called electricity. Solar energy can be used as light and heat also.</td>
</tr>
</tbody>
</table>
1. Turning off lights when you leave a room is a way to-
   A. recycle materials
   B. conserve energy
   C. reuse natural resources
   D. reduce trash

2. In which two groups would water be placed?
   A. Groups 1 and 2
   B. Groups 1 and 3
   C. Groups 2 and 3
   D. Groups 2 and 4

3. Which of these models might help show how a windmill works?
   A. [Windmill model A]
   B. [Windmill model B]
   C. [Windmill model C]
   D. [Windmill model D]
<p>| <strong>3.1</strong> | <strong>hypothesis</strong> | A hypothesis is a statement written in a manner that describes the cause and effect relationship between the independent and dependent variables in an experiment. |
| <strong>3.1</strong> | <strong>inference</strong> | An inference is a tentative explanation based on background knowledge and available data. |
| <strong>3.1</strong> | <strong>predictions</strong> | Predictions are statements of what is expected to happen in the future based on past experiences and observations. |
| <strong>3.1</strong> | <strong>conclusion</strong> | A conclusion is a summary statement based on the results of an investigation. |
| <strong>3.1</strong> | <strong>qualitative data</strong> | Qualitative data is data that deals with descriptions and data that can be observed. |
| <strong>3.1</strong> | <strong>quantitative data</strong> | Quantitative data is data that can be counted or measured and the results can be recorded using numbers. |
| <strong>3.1</strong> | <strong>volume</strong> | Volume is the amount a container can hold; the amount of space occupied by an object. |</p>
<table>
<thead>
<tr>
<th><strong>length</strong></th>
<th>Length is the distance between two points.</th>
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<tr>
<td><strong>mass</strong></td>
<td>Mass is a body of matter with no specific shape.</td>
</tr>
<tr>
<td><strong>gram</strong></td>
<td>A gram is a metric unit of mass equal to 1 thousandth of a kilogram.</td>
</tr>
<tr>
<td><strong>temperature</strong></td>
<td>Temperature is how hot or cold something is.</td>
</tr>
<tr>
<td><strong>Celsius</strong></td>
<td>Celsius is a metric unit for measuring temperature; on this scale water freezes at 0 ° and boils at 100°.</td>
</tr>
<tr>
<td><strong>time</strong></td>
<td>Time is a number representing a specific point in hours, minutes, and seconds.</td>
</tr>
<tr>
<td><strong>minute</strong></td>
<td>A minute is a unit of time equal to 1 sixtieth of an hour; 60 seconds.</td>
</tr>
<tr>
<td><strong>natural events sequenced chronologically</strong></td>
<td>This is when we put natural events in a sequence that allows us to notice change over time. (life cycles, moon phases, tidal changes.)</td>
</tr>
<tr>
<td></td>
<td><strong>sand</strong></td>
</tr>
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<td>------</td>
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<tr>
<td><strong>3.7</strong></td>
<td><strong>clay</strong></td>
</tr>
<tr>
<td><strong>3.7</strong></td>
<td><strong>silt</strong></td>
</tr>
<tr>
<td><strong>3.7</strong></td>
<td><strong>humus</strong></td>
</tr>
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<td><strong>topsoil</strong></td>
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<td><strong>3.7</strong></td>
<td><strong>subsoil and bedrock</strong></td>
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<tr>
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<td><strong>nutrients</strong></td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<td>----------------------</td>
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<td>conservation</td>
<td>Conservation is the careful use and preservation of our natural resources.</td>
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<td>pollution</td>
<td>Pollution occurs when human actions negatively affect the survival of plants and animals.</td>
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<tr>
<td>natural events</td>
<td>Natural events are events such as, fires, floods, diseases, and erosion that affect the survival of plants and animals.</td>
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<td>resource renewal</td>
<td>Resource renewal is a conservation practice in which species are protected.</td>
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<tr>
<td>erosion</td>
<td>Erosion is the process by which natural forces move weathered rock and soil from one place to another.</td>
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<td>interdependency</td>
<td>Interdependency is how every living thing depends on other living things to survive.</td>
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<td><strong>fossil fuels</strong></td>
<td>Fossil fuels are coal, oil, and natural gas which are all formed from decayed plants and animals.</td>
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<td>----------------</td>
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