



Full Option Science System (FOSS™)

Correlation with

MINNESOTA

SCIENCE STANDARDS AND BENCHMARKS

FOR GRADES K-8



State of Minnesota
***State Science Standards
and Benchmarks***
Grades K-8

**Correlated with FOSS™
(Full Option Science System)**

The following is a correlation of the Science Standards and Benchmarks for the State of Minnesota to Full Option Science System. This correlation shows representative examples of investigations and activities from the programs that address the Science Benchmarks. A citation does not include all of the investigations or activities that might address a particular benchmark.

Delta Science Content Readers (DSCR) and Delta Science Readers (DSR) indicate use as a supplement to the FOSS program.

Earth Science Delta Science Content Readers are currently being developed. They are listed by title in grade 3-5 with page numbers if available.

March 2009

Kindergarten

The Nature of Science and Engineering

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
0.1.1.2.1 Use observations to develop an accurate description of a natural phenomenon and compare one's observations and descriptions with those of others.	All FOSS modules provide the opportunity to address this benchmark. Students observe objects and discuss their observations. See examples below: Fabric Investigation 1-2, all parts Wood and Paper Investigation 1-5, all parts Animals Two by Two Investigation 1-5, all parts Trees Investigation 1-3, all parts	
0.1.2.1.1 Sort objects into two groups: those that are found in nature and those that are human made.	Fabric Investigation 1, Parts 1-6, pp. 6-33 Investigation 2, Part 4, pp. 22-25 Science Stories, pp. 3-17 Wood and Paper Investigation 2, Parts 3-4, pp. 16-23 Investigation 5, Parts 1-2, pp. 8-17 Science Stories, pp. 3-8, 13-18 Trees Investigation 1-3, all parts Science Stories, pp. 3-24 Animals Two by Two Investigation 1-5, all parts Science Stories, pp. 3-24	

Physical Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
0.2.1.1.1 Sort objects in terms of color, size and shape, and texture and communicate reasoning for the sorting system. <i>For example:</i> Cars, pencils, trees, rocks.	Trees Investigation 2, Parts 1-5, pp. 6-25 Fabric Investigation 1, Part 1, pp. 6-11 Investigation 2, Part 4, pp. 22-25 Animals Two by Two Investigation 1, Part 4, pp. 26-29 Investigation 2, Part 4, pp. 22-24 Investigation 3, Part 3, pp. 17-20	

	Investigation 4, Part 2, pp. 12-15	
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Earth Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
0.3.2.2.1 Monitor daily and seasonal changes in weather and summarize the changes. <i>For example:</i> Recording cloudiness, rain, snow and temperature.	Trees Tools for Observing Weather Tools 1-6, pp. 6-24	
0.3.2.2.2 Identify the sun as a source of heat and light. <i>For example:</i> Record the time of day when the sun shines into different locations of the school and note patterns.	Trees Science Stories, p. 16	DSR Sunshine and Shadows , p. 2 DSR Investigating Water , pp. 8-11

Life Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
0.4.1.1.1 Observe and compare plants and animals.	Animals Two By Two Investigation 1, Parts 1, 4, pp. 10-16, 26-29 Investigation 2, Parts 1, 3, pp. 9-13, 18-21 Investigation 3, Parts 1, 3, pp. 8-12, 17-20 Investigation 4, Parts 1-2, pp. 9-15 Science Stories, pp. 4-23 Trees Investigation 1, Parts 3-4, pp. 20-24 Investigation 2, Parts 3-4, pp. 16-22 Science Stories, pp. 4-12	
0.4.1.1.2 Identify the external parts of a variety of plants and animals including humans. <i>For example:</i> Heads, legs, eyes and ears on humans and animals; flowers, stems and roots on many plants.	Animals Two By Two Investigation 1, Parts 1, 4, pp. 10-16, 26-29 Investigation 2, Parts 1, 3, pp. 9-13, 18-21 Investigation 3, Parts 1, 3, pp. 8-12, 17-20 Investigation 4, Parts 1-2, pp. 9-15 Science Stories, pp. 4-23 Trees Investigation 1, Parts 5-6, pp. 28-34 Investigation 2, Parts 1-3, pp. 6-19 Investigation 3, Parts 1-2, pp.	

	10-14 Science Stories, pp. 4-24	
<p>0.4.1.1.3 Differentiate between living and nonliving things.</p> <p><i>For example:</i> Sort live organisms (or pictures of organisms) into groups of those that grow and reproduce and need air, food and water, and those that don't.</p>	<p>FOSS provides the opportunity to address this benchmark. See below:</p> <p>Fabric Investigation 1, Parts 1-6, pp. 6-33 Investigation 2, Part 4, pp. 22-25 Science Stories, pp. 3-17</p> <p>Wood and Paper Investigation 2, Parts 3-4, pp. 16-23 Investigation 5, Parts 1-2, pp. 8-17 Science Stories, pp. 3-8, 13-18</p> <p>Trees Investigation 1-3, all parts Science Stories, pp. 3-24</p> <p>Animals Two by Two Investigation 1-5, all parts Science Stories, pp. 3-24</p>	
<p>0.4.2.1.1 Observe a natural system or its model and identify living and nonliving components in that system.</p> <p><i>For example:</i> A wetland, prairie, garden or aquarium.</p>	<p>Animals Two by Two Investigation 1, Part 1-3, pp. 10-25 Investigation 4, Part 4, pp. 20-23 Science Stories, pp. 4-7, 12-13</p> <p>Trees Investigation 1, Part 1, pp. 7-14 Investigation 2, Part 1, pp. 6-9</p>	

Grade One

The Nature of Science and Engineering

BENCHMARK	FOSS	DSR/DSCR
<p>1.1.1.1.1 When asked "How do You Know?" students should support their answer with observations.</p> <p><i>For example:</i> Use observations to tell why a squirrel is a living thing.</p>	<p>FOSS investigations and discussions stress that students use evidence to support their findings. See for example:</p> <p>Balance and Motion Investigation 3, Part 2, pp. 13-18</p> <p>Air and Weather Investigation 1, Part 2, pp. 13-16</p> <p>New Plants Investigation 2, Part 2, pp. 15-19</p> <p>Solids and Liquids Investigation 4, Part 1, pp. 7-16</p>	
<p>1.1.1.1.2 Recognize that describing things as accurately as possible is important in science because it enables people to compare their observations with those of others.</p>	<p>FOSS investigations rely on accurate observations by students and students compare observations in post-investigation discussions. See examples below:</p> <p>Insects Investigation 1, Parts 1-2, pp. 8-21</p> <p>Pebbles, Sand and Silt Investigation 2, Parts 2-3, pp. 18-29</p> <p>Plants and Animals Investigation 4, Parts 1-2, pp. 151-163</p> <p>Air and Weather Investigation 1, Part 5, pp. 27-33</p>	
<p>1.1.3.1.1 Observe that many things are made of parts and that if a part is missing or broken the thing/s may not function properly.</p>	<p>Balance and Motion Investigation 1, Part 4, pp. 24-28 Investigation 2, Part 1, pp. 8-13 Science Stories, pp. 10-13, 17, 23-25</p> <p>Air and Weather Investigation 1, Part 5, pp. 27-33 Investigation 3, Part 5, pp. 28-33 Science Stories, pp. 14-15</p> <p>Insects Investigation 1, Parts 1-2, pp. 8-21 Science Stories, pp. 12-15</p>	
<p>1.1.3.2.1 Recognize that tools</p>	<p>Pebbles, Sand and Silt</p>	

are used by people, including scientists and engineers, to gather information and solve problems. <i>For example:</i> Magnifier, snowplow and calculator.	Investigation 2, Parts 1-4, pp. 8-29 Solids and Liquids Investigation 1, Part 3, pp. 21-24 Investigation 3, Part 4, pp. 24-27 Air and Weather Investigation 2, Parts 2, 4, pp. 14-19, 24-27 Investigation 3, Parts 2, 4, pp. 12-16, 22-27 Insects and Plants Investigation 1, Parts 1-3, pp. 52-75	
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Physical Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
None listed.		

Earth Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
1.3.1.3.1 Group or classify rocks in terms of color, shape and size.	Pebbles, Sand and Silt Investigation 1, Parts 1, 3-4, pp. 8-12, 18-25 Investigation 2, Parts 1-4, pp. 8-29	
1.3.1.3.2 Describe similarities and differences between soil and rocks. <i>For example:</i> Use screens to separate components of soil and observe the samples using a magnifier.	Pebbles, Sand and Silt Investigation 4, Part 1, pp. 8-14 Science Stories, pp. 3-7, 20-23	
1.3.1.3.3 Identify and describe large and small objects made of Earth materials.	Pebbles, Sand and Silt Investigation 3, Interdisciplinary Extensions, pp. 30-32 Investigation 3, Home/School Connection, p. 32 Science Stories, pp. 16-19	

Life Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
1.4.1.1.1 Describe and sort animals into groups in many ways, according to their physical characteristics and behaviors.	Insects Investigation 1-6, all parts Science Stories, pp. 12-33 Insects and Plants Investigation 1, 3-5, all parts Science Resources, pp. 20-23, 30-33, 37-55	
1.4.2.1.1 Recognize that animals need space, water, food, shelter and air.	Insects Investigation 1, Part 1, pp. 8-15 Investigation 2, Part 1, pp. 8-13	

	<p>Investigation 3, Part 2, pp. 12-20 Investigation 4, Part 2, pp. 14-18 Investigation 5, Part 1, pp. 10-15</p> <p>Insects and Plants Investigation 1, Part 1, pp. 52-61 Investigation 3, Part 2, pp. 134-144 Investigation 4, Part 2, pp. 179-186 Investigation 5, Part 1, pp. 206-211</p> <p>Plants and Animals Investigation 3, Part 2, pp. 128-134 Science Resources, pp. 21-24</p>	
<p>1.4.2.1.2 Describe ways in which an animal's habitat provides for its basic needs.</p> <p><i>For example:</i> Compare students' houses with animal habitats.</p>	<p>Insects Investigation 3, Part 2, pp. 12-20 Science Stories, pp. 8-9</p> <p>Insects and Plants Investigation 2, Part 2, pp. 95-104 Investigation 3, Part 2, pp. 134-144 Science Resources, pp. 26-27</p> <p>New Plants Investigation 1, Part 2, pp. 13-22 Science Stories, pp. 3-7, 22-39</p> <p>Plants and Animals Investigation 3, Parts 1-2, pp. 120-134 Science Resources, pp. 3-7, 21-24, 28-46</p>	
<p>1.4.3.1.1 Demonstrate an understanding that animals pass through life cycles that include a beginning, development into adults, reproduction and eventually death.</p> <p><i>For example:</i> Use live organisms or pictures to observe the changes that occur during the life cycle of butterflies, meal worms or frogs.</p>	<p>Insects Investigations 1-5, all parts Science Stories, pp. 16-33</p> <p>Insects and Plants Investigations 1, 3-5, all parts Science Resources, pp. 37-55</p>	
<p>1.4.3.1.2 Recognize that animals pass through the same life cycle stages as their parents.</p>	<p>Insects Investigations 1-5, all parts Science Stories, pp. 16-33</p> <p>Insects and Plants Investigations 1, 3-5, all parts Science Resources, pp. 37-55</p>	

Grade Two

The Nature of Science and Engineering

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
<p>2.1.1.2.1 Raise questions about the natural world and seek answers by making careful observations, noting what happens when you interact with an object, and sharing the answers with others.</p>	<p>FOSS investigations are driven by questions and provide the opportunity to address this benchmark. See for example:</p> <p>Balance and Motion Investigation 3, Part 2, pp. 13-18</p> <p>Air and Weather Investigation 1, Part 2, pp. 13-16</p> <p>New Plants Investigation 2, Part 2, pp. 15-19</p> <p>Solids and Liquids Investigation 4, Part 1, pp. 7-16</p>	
<p>2.1.2.2.1 Identify a need or problem and construct an object that helps to meet the need or solve the problem.</p> <p><i>For example:</i> Design and build a tool to show wind direction.</p> <p><i>Another example:</i> Design a kite and identify the materials to use.</p>	<p>Balance and Motion Investigation 3, Parts 1-3, pp. 6-25</p> <p>Air and Weather Investigation 3, Part 3, pp. 17-21</p> <p>Pebbles, Sand and Silt Investigation 3, Part 5, pp. 24-29</p>	
<p>2.1.2.2.2 Describe why some materials are better than others for making a particular object and how materials that are better in some ways may be worse in other ways.</p> <p><i>For example:</i> Objects made of plastic or glass.</p>	<p>FOSS provides the opportunity to address this benchmark through student constructions. See for example:</p> <p>Balance and Motion Investigation 2, Parts 1-3, pp. 8-25 Investigation 3, Parts 1-3, pp. 6-25</p> <p>Air and Weather Investigation 1, Part 3, pp. 17-20 Investigation 3, Parts 3, 5, pp. 17-21, 28-33</p> <p>Pebbles, Sand and Silt Investigation 3, Part 5, pp. 24-29</p>	
<p>2.1.2.2.3 Explain how engineered or designed items from everyday life benefit people.</p>	<p>Pebbles, Sand and Silt Investigation 2, Part 2, pp. 12-15 Science Stories, pp. 16-19</p> <p>Air and Weather Investigation 2, Part 2, pp. 14-19 Science Stories, pp. 13-15</p> <p>Balance and Motion</p>	

	Science Stories, pp. 10, 12-17, 24-25, 32-35 New Plants Science Stories, pp. 4-6, 18-21 Plants and Animals Science Resources, pp. 4-6, 11-14	
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Physical Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
2.2.1.1.1 Describe objects in terms of color, size, shape, weight, texture, flexibility, strength and the types of materials in the object.	Solids and Liquids Investigation 1, Parts 1-2, pp. 8-20 Investigation 2, Parts 1-3, pp. 10-27 Pebbles, Sand and Silt Investigation 1, Part 1, pp. 8-12 Investigation 2, Parts 1-2, pp. 8-17	
2.2.1.2.1 Observe, record, and recognize that water can be a solid or a liquid and can change from one state to another and that the amount of water stays the same when it melts and freezes.	Solids and Liquids Investigation 4, Science Extension, p. 29 Science Stories, p. 16 Air and Weather Investigation 2, Science Extension, p. 32	DSR States of Matter pp. 8-10
2.2.2.1.1 Describe an object's position relative to other objects or a background. <i>For example:</i> Forward, backward, going up, going down.	Balance and Motion Investigation 1, Parts 1-3, pp. 8-28 Investigation 3, Part 2, pp. 13-18 Science Stories, pp. 4-21 Solids and Liquids Investigation 1, Part 3, pp. 21-24 Investigation 2, Part 3, pp. 21-27 Air and Weather Investigation 1, Parts 2-6, pp. 13-38 Investigation 2, Parts 2, 4, pp. 14-19, 24-27	
2.2.2.1.2 Demonstrate that objects move in a variety of ways, including a straight line, a curve, a circle, back and forth, and at different speeds. <i>For example:</i> Spinning toy and rocking toy. <i>Another example:</i> Construct objects that will move in a straight line or a curve such as a marble or toy car on a track.	Balance and Motion Investigation 2, Parts 1-3, pp. 8-25 Investigation 3, Parts 1-3, pp. 6-25 Science Stories, pp. 22-31 Air and Weather Investigation 1, Parts 3-6, pp. 17-38 Investigation 3, Parts 1-5, pp. 8-33	

2.2.2.2.1 Describe how push and pull forces can make objects move. <i>For example:</i> Push and pull objects on smooth and rough surfaces.	Balance and Motion Investigation 2, Parts 1-2, pp. 8-19 Science Stories, pp. 10-21 Air and Weather Investigation 1, Parts 4-6, pp. 21-38 Investigation 3, Parts 1, 3, pp. 8-11, 17-21	
2.2.2.2.2 Describe how things near Earth fall to the ground unless something holds them up.	Balance and Motion Investigation 2, Part 3, pp. 20-25 Investigation 3, Parts 1-3, pp. 6-25 Air and Weather Investigation 1, Part 3, pp. 17-20 Investigation 3, Part 5, pp. 28-33	

Earth Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
2.3.2.2.1 Measure, record and describe weather conditions using common tools. <i>For example:</i> Temperature, precipitation, sunrise/sunset, and wind speed/direction.	Air and Weather Investigation 2, Parts 1-4, pp. 8-27 Investigation 3, Parts 2, 4, pp. 12-16, 22-27	

Life Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
2.4.1.1.1 Describe and sort plants into groups in many ways, according to their physical characteristics and behaviors.	New Plants Investigation 2, Parts 1-2, pp. 8-19 Investigation 3, Parts 1-3, pp. 8-25 Investigation 4, Parts 1-2, pp. 7-19 Science Stories, pp. 22, 25, 28, 31, 34, 37 Plants and Animals Investigation 1, Parts 1-2, pp. 47-62 Investigation 2, Parts 1-3, pp. 87-108 Investigation 4, Parts 1-2, pp. 151-163 Science Resources, pp. 16-19, 28, 31, 34, 37, 40, 43	
2.4.2.1.1 Recognize that plants need space, water, food and air and fulfill these needs in different ways.	Insects and Plants Investigation 2, Part 2, pp. 95-104 New Plants Investigation 1, Part 2, pp. 13-	DSR, Classroom Plants, p. 2

	<p>22 Investigation 2, Part 1, pp. 8-14 Science Stories, pp. 3-7 Plants and Animals Investigation 1, Part 1, pp. 47-57 Investigation 3, Part 1, pp. 120-127 Science Resources, pp. 3-7</p>	
<p>2.4.3.1.1 Describe the characteristics of plants at different stages of their life cycles. <i>For example:</i> Use live organisms or pictures to observe the changes that occur during the life cycles of bean plants or marigolds.</p>	<p>New Plants Investigation 1, Parts 2-3, pp. 13-30 Investigation 2, Parts 1-3, pp. 8-28 Investigation 3, Parts 1-3, pp. 8-25 Investigation 4, Parts 1-2, pp.7-19 Science Stories, pp. 8-19, 22, 25, 28, 31, 34, 37 Insects and Plants Investigation 2, Parts 2-3, pp. 95-115 Plants and Animals Investigation 1, Parts 1-3, pp. 47-72 Investigation 2, Parts 1-3, pp. 87-108 Investigation4, Parts 1-2, pp. 151-163 Science Resources, pp. 9-12, 16-19, 28, 31, 34, 37, 40, 43</p>	<p>DSR, Classroom Plants, p. 5</p>

Grade Three

The Nature of Science and Engineering

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
<p>3.1.1.1.1 Provide evidence to support claims, other than saying “Everyone knows that,” or “I just know,” and discount such reasons when given by others.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Sun, Moon and Stars Investigation 1, Parts 1-2, pp. 42-55</p> <p>Ideas and Inventions Investigation 2, Part 2, pp. 16-19</p> <p>Earth Materials Investigation 2, Part 2, pp. 14-21</p> <p>Structures of Life Investigation 1, Part 3, pp. 28-33</p> <p>Magnetism and Electricity Investigation 1, Part 3, pp. 23-30</p>	
<p>3.1.1.2.1 Generate questions that can be answered when scientific knowledge is combined with knowledge gained from one’s own observations or investigations.</p> <p><i>For example:</i> Investigate the sounds produced by striking various objects.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Human Body Investigation 4, Parts 2-3, pp. 17-24</p> <p>Magnetism and Electricity Investigation 4, Parts 2-3, pp. 14-22</p> <p>Physics of Sound Investigation 2, Parts 1-3, pp. 8-24</p> <p>Ideas and Inventions Investigation 3, Parts 2-3, pp. 14-21</p> <p>Measurement Investigation 3, Part 3, pp. 18-21</p> <p>Structures of Life Investigation 2, Part 3, pp. 28-33</p>	
<p>3.1.1.2.2 Recognize that when a science investigation is done the way it was done before, even in a different place, a similar result is expected.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Sun, Moon and Stars Investigation 1, Part 2, pp. 42-55</p> <p>Measurement Investigation 2, Part 3, pp. 18-</p>	

	<p>28</p> <p>Water Investigation 4, Part 1, pp. 8-13</p> <p>Structures of Life Investigation 1, Part 3, pp. 28-33</p> <p>Physics of Sound Investigation 2, Parts 1-3, pp. 8-24</p>	
<p>3.1.1.2.3 Maintain a record of observations, procedures and explanations, being careful to distinguish between actual observations and ideas about what was observed.</p> <p><i>For example:</i> Make a chart comparing observations about the structures of plants and animals.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. In addition, the use of notebooks is encouraged. See for example:</p> <p>Measurement Investigation 4, Part 2, pp. 14-17</p> <p>Magnetism and Electricity Investigation 4, Parts 2-3, pp. 14-22</p> <p>Matter and Energy Investigation 3, Parts 2-3, pp. 139-160</p> <p>Earth Materials Investigation 2, Parts 1-2, pp. 8-21</p> <p>Structures of Life Investigation 1, Parts 2-3, pp. 18-33</p> <p>Sun, Moon and Stars Investigation 2, Parts 1-2, pp. 79-100</p>	
<p>3.1.1.2.4 Construct reasonable explanations based on evidence/data collected from observations or experiments.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Human Body Investigation 4, Parts 2-3, pp. 17-24</p> <p>Magnetism and Electricity Investigation 2, Part 4, pp. 26-29</p> <p>Water Investigation 4, Part 1, pp. 8-13</p> <p>Structures of Life Investigation 1, Part 3, pp. 28-33</p> <p>Physics of Sound Investigation 2, Parts 1-3, pp. 8-24</p>	
<p>3.1.3.2.1 Understand that everybody can use evidence to learn about the natural world, identify patterns in nature, and</p>	<p>This would need to be addressed at the local level. FOSS investigations provide ample opportunity to address this benchmark.</p>	

develop tools. <i>For example:</i> Ojibwe and Dakota knowledge and use of patterns in the stars to predict and plan.		
3.1.3.2.2 Recognize that the practice of science and/or engineering involves many different kinds of work and engages men and women of all ages and backgrounds.	Sun, Moon and Stars Science Resources, pp. 40-46 Magnetism and Electricity Science Stories, pp. 12-23, 34-37 Water Science Stories, pp. 24-26 Structures of Life Science Stories, pp. 6-9 Ideas and Inventions Science Stories, pp. 1-3, 17-22	
3.1.3.4.1 Use tools, including rulers, thermometers, magnifiers and simple balances, to improve observations and keep a record of the observations made.	Matter and Energy Investigation 3, Parts 2-3, pp. 139-160 Investigation 4, Part 1, pp. 174-180 Magnetism and Electricity Investigation 1, Part 3, pp. 23-34 Water Investigation 4, Part 1, pp. 8-13 Structures of Life Investigation 1, Part 3, pp. 28-33 Measurement Investigation 1, Parts 2-3, pp. 16-24 Investigation 2, Parts 2-3, pp. 14-24 Investigation 3, Parts 2-3, pp. 14-21 Investigation 4, Parts 1-3, pp. 8-21	

Physical Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
3.2.3.1.1 Explain the relationship between the pitch of a sound, the rate of vibration of the source and factors that affect pitch. <i>For example:</i> Changing the length of a string that is plucked changes the pitch. <i>Another example:</i> Compare materials according to their ability to conduct or produce sound.	Physics of Sound Investigation 2, Parts 1-3, pp. 8-24 Science Stories, pp. 11-14, 17-18	DSCR Sound Energy, pp. 10-13 DSR, Sound, pp. 6-7, 12-13
3.2.3.1.2 Explain how shadows can form in various ways.	Sun, Moon and Stars Investigation 1, Part 2, pp. 56-	DSCR Heat and Light, p. 14

	64 Science Resources, pp.4-11 Ideas and Inventions Science Stories, pp. 26-27, 33	
3.2.3.1.3 Describe how light travels in a straight line until it is absorbed, redirected, reflected or allowed to pass through an object. <i>For example:</i> Use a flashlight, mirrors and water to demonstrate reflection and bending of light.	Ideas and Inventions Investigation 4, Parts 1-3, pp. 8-21 Science Stories, pp. 28-29 Matter and Energy Investigation 2, Part 1, pp. 93-102 Science Resources, pp. 24-27, 33-36	DSCR Heat and Light, pp. 12-13

Earth Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
3.3.3.1.1 Observe and describe the daily and seasonal changes in the position of the sun and compare observations.	Sun, Moon and Stars Investigation 1, Parts 1-2, pp. 42-64 Science Resources, pp. 1-11	DSCR Earth, Moon and Sun Systems, pp. 13-17
3.3.3.1.2 Recognize the pattern of apparent changes in the moon's shape and position.	Sun, Moon and Stars Investigation 2, Parts 1-2, pp. 79-100 Science Resources, pp. 19-32 Ideas and Inventions Science Stories, pp. 34-36	DSCR Earth, Moon and Sun Systems, pp. 20-21
3.3.3.2.1 Demonstrate how a large light source at a great distance looks like a small light that is much closer. <i>For example:</i> Car headlights at a distance look small compared to when they are close.	Sun, Moon and Stars Investigation 3, Part 2, pp. 126-130 Science Resources, pp. 35-36, 47	DSCR Our Solar System and Beyond, pp. 18-19
3.3.3.2.2 Recognize that the Earth is one of several planets that orbit the sun, and that the moon orbits the Earth.	Sun, Moon and Stars Science Resources, pp. 17-18	DSCR Our Solar System and Beyond, pp. 4-12 DSR Solar System, pp. 2-12

Life Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
3.4.1.1.1 Compare how the different structures of plants and animals serve various functions of growth, survival and reproduction. <i>For example:</i> Skeletons in animals and stems in plants provide strength and stability.	Structures of Life Investigation 1, Part 1, pp. 8-17 Investigation 2, Parts 1, 3, pp. 8-13, 18-22 Investigation 3, Part 1, pp. 8-15 Investigation 4, Part 1, pp. 8-13 Investigation 5, Part 1, pp. 8-12 Science Stories, pp. 1-3, 17-19, 22-26, 38-42 Human Body Investigation 1, Parts 1-2, pp. 8-20 Investigation 2, Parts 1-4, pp. 8-25	DSCR Plant Needs, pp. 7-19 DSCR Animal Needs and Life Cycles, pp. 12-17 DSR, Butterflies and Moths, pp. 4-7 DSR, Classroom Plants, pp. 6-12

	Investigation 3, Parts 1-3, pp. 8-21 Science Stories, pp. 1-3, 10-15	
3.4.1.1.2 Identify common groups of plants and animals using observable physical characteristics, structures and behaviors. <i>For example:</i> Sort animals into groups such as mammals and amphibians based on physical characteristics. <i>Another example:</i> Sort and identify common Minnesota trees based on leaf/needle characteristics.	Structures of Life Investigation 3, Part 1, pp. 8-15 Investigation 4, Part 1, pp. 8-13 Science Stories, pp. 17-18, 23-35, 39-40 FOSS Web: Pictures Human Body Science Stories, p. 11	DSCR Plant Needs, pp. 12-13, 15, 22 DSCR Animal Needs and Life Cycles, pp. 5-7 DSCR Cells and Classification, pp. 13-20
3.4.3.2.1 Give examples of likenesses between adults and offspring in plants and animals that can be inherited or acquired. <i>For example:</i> Collect samples or pictures that show similarities between adults and their young offspring.	Structures of Life Investigation 2, Parts 1-3, pp. 8-22 Science Stories, pp. 20-21 FOSS Web, Activity: Life Cycles	DSCR Heredity, pp. 4-19 DSR, Plant and Animal Life Cycles, pp. 7-12
3.4.3.2.2 Give examples of differences among individuals that can sometimes give an individual an advantage in survival and reproduction.	FOSS provides the opportunity to address this benchmark. See below: Structures of Life Investigation 3, Part 1, pp. 8-15 Investigation 4, Part 1, pp. 8-13 Investigation 5, Part 1, pp. 8-12	DSCR Heredity, pp. 21-23 DSCR Heredity, pp. 4-19 DSR, Food Chains and Webs, pp. 4-5 DSR, Plant and Animal Populations, pp. 5-7

Grade Four

The Nature of Science and Engineering

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
<p>4.1.2.1.1 Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used.</p>	<p>Matter and Energy Science Resources, pp. 2-3, 6-7, 9-11</p> <p>Magnetism and Electricity Science Stories, pp. 18-19, 32-33</p> <p>Water Investigation 4, Language Extension, p. 29 Science Stories, pp. 18-21, 23</p> <p>Ideas and Inventions Science Stories, pp. 21, 38</p> <p>Sun, Moon and Stars Science Resources, pp. 40-43</p> <p>Physics of Sound Science Stories, pp. 32-35</p>	
<p>4.1.2.2.1 Identify and investigate a design solution and describe how it was used to solve an everyday problem.</p> <p><i>For example:</i> Investigate different varieties of construction tools.</p>	<p>Water Investigation 4, Part 2, pp. 14-18</p>	
<p>4.1.2.2.2 Generate ideas and possible constraints for solving a problem through engineering design.</p> <p><i>For example:</i> Design and build an electromagnet to sort steel and aluminum materials for recycling.</p>	<p>Water Investigation 4, Part 2, pp. 14-18</p>	
<p>4.1.2.2.3 Test and evaluate solutions, including benefits and drawbacks for the engineering solution, and communicate the results effectively.</p>	<p>Water Investigation 4, Part 2, pp. 14-18</p>	
<p>4.1.3.3.1 Describe a situation in which one invention led to other inventions.</p>	<p>Magnetism and Electricity Science Stories, pp. 15, 17-18, 23, 28-31, 34-37</p> <p>Water Science Stories, pp. 18-20</p> <p>Ideas and Inventions Science Stories, pp. 1-2, 17-18, 22</p>	

Physical Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
4.2.1.1.1 Measure temperature, volume, weight and length using appropriate tools and units.	<p>Matter and Energy Investigation 3, Parts 2-3, pp. 139-160 Investigation 4, Part 1, pp. 174-180</p> <p>Magnetism and Electricity Investigation 1, Part 3, pp. 23-34</p> <p>Water Investigation 4, Part 1, pp. 8-13</p> <p>Structures of Life Investigation 1, Part 3, pp. 28-33</p> <p>Measurement Investigation 1, Parts 2-3, pp. 16-24 Investigation 2, Parts 2-3, pp. 14-24 Investigation 3, Parts 2-3, pp. 14-21 Investigation 4, Parts 1-3, pp. 8-21</p>	
4.2.1.2.1 Distinguish between solids, liquids and gases in terms of shape and volume. <i>For example:</i> Water changes shape depending on the shape of its container.	<p>Water Investigation 2, Part 3, pp. 19-24 Investigation 3, Parts 1-4, pp. 8-26 Science Stories, pp. 1-2, 8-9, 13-16</p> <p>Matter and Energy Investigation 3, Part 1, pp. 129-139 Science Resources, pp. 39-42</p>	DSCR Properties of Matter, pp. 9-11
4.2.1.2.2 Describe how the states of matter change as a result of heating and cooling.	<p>Water Investigation 2, Part 3, pp. 19-24 Investigation 3, Parts 1-4, pp. 8-26 Science Stories, pp. 8-9, 13-16 FOSS Web, Activity: Evaporation</p> <p>Matter and Energy Investigation 4, Part 2, pp. 181-192 Science Resources, pp. 54-56</p> <p>Measurement Science Stories, pp. 32-33</p>	DSCR Changes in Matter, pp. 10-13 DSR, Water Cycle, pp. 8-9
4.2.3.1.1 Describe the transfer of heat energy when a warm and a cool object are touching or placed near each other.	<p>Water Investigation 2, Parts 2-3, pp. 14-24</p> <p>Matter and Energy Investigation 4, Part 2, pp. 181-192</p>	DSCR Heat and Light Energy, pp. 7-9

	Science Resources, pp. 54-55 Measurement Science Stories, p. 33	
4.2.3.1.2 Describe how magnets can repel or attract each other and how they attract certain metal objects	Magnetism and Electricity Investigation 1, Parts 1-3, pp. 8-29 Science Stories, pp. 1-9 FOSS Web, Activity: Kitchen	DSCR Electricity and Magnetism, p. 12 DSR, Magnets, pp. 2-3
4.2.3.1.3 Compare materials that are conductors and insulators of heat and/or electricity. <i>For example:</i> Glass conducts heat well, but is a poor conductor of electricity.	Magnetism and Electricity Investigation 2, Part 3, pp. 20-25	DSR, Electric Circuits, p. 3
4.2.3.2.1 Identify several ways to generate heat energy. <i>For example:</i> Burning a substance, rubbing hands together, or electricity flowing through wires.	Physics of Sound Science Stories, pp. 23-23 Measurement Science Stories, p. 33 Matter and Energy Science Resources, pp. 2-3, 19 Magnetism and Electricity Investigation 2, Part 1, p. 8-13 Investigation 2, Part 1: Safety Warnings pp. 9, 11 Science Stories, pp. 17, 23	DSCR Heat and Light Energy, pp. 7-9 DSCR, Energy, p. 12
4.2.3.2.2 Construct a simple electrical circuit using wires, batteries and light bulbs.	Magnetism and Electricity Investigation 2, Parts 1-4, pp. 8-29 Investigation 3, Parts 1-3, pp. 10-26 Investigation 4, Parts 1-3, pp. 8-22 Matter and Energy Investigation 1, Parts 1, 3, pp. 50-62, 71-82	DSCR Electricity and Magnetism, pp. 8-9 DSR, Electric Circuits, pp. 4-7
4.2.3.2.3 Demonstrate how an electric current can produce a magnetic force. <i>For example:</i> Construct an electromagnet to pick up paperclips.	Magnetism and Electricity Investigation 4, Parts 1-3, pp. 8-22 Investigation 5, Parts 1-2, pp. 8-20 Science Stories, pp. 21-23, 28-32 FOSS Web, Activity: Electromagnets	DSCR Electricity and Magnetism, pp. 13, 16, 23 DSR, Magnets, pp. 10-11 DSR, Electric Circuits, pp. 10-11

Earth Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
4.3.1.3.1 Recognize that rocks may be uniform or made of mixtures of different minerals.	Earth Materials Investigation 1, Parts 1-3, pp. 8-29 Investigation 4, Part 1, pp. 8-13 Science Stories, pp. 34-37	DSCR Minerals and Rocks, and Fossils, pp. 10-13
4.3.1.3.2 Describe and classify minerals based on their physical	Earth Materials Investigation 2, Parts 1-2, pp. 8-	DSCR Minerals and Rocks, and Fossils, pp.

properties. <i>For example:</i> Streak, luster, hardness, reaction to vinegar.	21 Investigation 4, Part 1, pp. 8-13 Science Stories, pp. 30-33	3-7
4.3.2.3.1 Identify where water collects on Earth, including atmosphere, ground and surface water, and describe how water moves through the Earth system using the processes of evaporation, condensation and precipitation.	Water Investigation 2, Social Studies Extension, p. 26 Investigation 3, Parts 1-4, pp. 8-26 Investigation 4, Language Extension, p. 29 Science Stories, pp. 1-2, 4, 8-9, 12-16 FOSS Web, Activity: Evaporation FOSS Web, Pictures: Water Cycle	DSCR Air and Water DSR, Water Cycle, pp. 2-11
4.3.4.1.1 Describe how the methods people utilize to obtain and use water in their homes and communities can affect water supply and quality.	Water Investigation 4, Language Extension, p. 29 Science Stories, pp. 17-21	DSR, Water Cycle, pp. 14-15

Life Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
4.4.4.2.1 Recognize that the body has defense systems against germs, including tears, saliva, skin and blood.		DSCR, Human Body Systems, p. 4
4.4.4.2.2 Give examples of diseases that can be prevented by vaccination.		

Grade Five

The Nature of Science and Engineering

BENCHMARK	FOSS	DSR/DSCR
<p>5.1.1.1.1 Explain why evidence, clear communication, accurate record keeping, replication by others, and openness to scrutiny are an essential part of doing science.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Landforms Investigation 3, Parts 1-3, pp. 8-24</p> <p>Solar Energy Investigation 3, Parts 1-2, pp. 8-23</p> <p>Levers and Pulleys Investigation 1, Parts 2-3, pp. 18-28</p> <p>Environments Investigation 3, Parts 1-3, pp. 8-22</p> <p>Mixtures and Solutions Investigation 1, Part 2, pp. 16-20</p> <p>Water Planet Investigation 3, Part 1, pp. 125-135</p>	
<p>5.1.1.1.2 Recognize that when scientific investigations are replicated they generally produce the same results, and when results differ significantly, it is important to investigate what may have caused such differences.</p> <p><i>For example:</i> Measurement Errors, equipment failures, or uncontrolled variables</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Variables Investigation 3, Parts 2-3, pp. 14-23</p> <p>Models and Designs Investigation 4, Parts 1-2, pp. 6-15</p> <p>Food and Nutrition Investigation 2, Parts 2-3, pp. 18-25</p> <p>Landforms Investigation 2, Parts 1-2, pp. 8-22</p> <p>Solar Energy Investigation 2, Parts 1-2, pp. 8-24</p> <p>Living Systems Investigation 3, Part 3, pp. 136-142</p>	
<p>5.1.1.1.3 Understand that different explanations for the same observations usually lead to making more observations and trying to resolve the differences.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Variables Investigation 4, Part 3, pp. 18-</p>	

	<p>23</p> <p>Living Systems Investigation 2, Part 1, pp. 85-98</p> <p>Solar Energy Investigation 3, Parts 1-2, pp. 8-23</p> <p>Mixtures and Solutions Investigation 1, Part 2, pp. 16-20</p> <p>Water Planet Investigation 2, Parts 2-3, pp. 86-100</p>	
<p>5.1.1.1.4 Understand that different models can be used to represent natural phenomena and these models have limitations about what they can explain.</p> <p><i>For example:</i> Different kinds of maps of a region provide different information about the land surface.</p>	<p>Landforms Investigation 2, Parts 1-2, pp. 8-22</p> <p>Investigation 3, Parts 1-3, pp. 8-24</p> <p>Solar Energy Investigation 4, Parts 1-2, pp. 8-23</p> <p>Environments Investigation 6, Parts 1-2, pp. 8-17</p> <p>Water Planet Investigation 3, Part 2, pp. 136-144</p>	
<p>5.1.1.2.1 Generate a scientific question and plan an appropriate scientific investigation, such as systematic observations, field studies, open-ended exploration or controlled experiments to answer the question.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Variables Investigation 2, Parts 1-3, pp. 8-23</p> <p>Solar Energy Investigation 1, Part 2, pp. 14-21</p> <p>Living Systems Investigation 2, Part 1, pp. 85-98</p> <p>Environments Investigation 2, Parts 2-4, pp. 16-30</p> <p>Mixtures and Solutions Investigation 4, Parts 1-3, pp. 8-24</p>	
<p>5.1.1.2.2 Identify and collect relevant evidence, make systematic observations and accurate measurements, and identify variables in a scientific investigation.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Variables Investigation 3, Parts 2-3, pp. 14-23</p> <p>Investigation 4, Part 3, pp. 18-23</p> <p>Solar Energy</p>	

	<p>Investigation 3, Parts 1-2, pp. 8-23</p> <p>Environments Investigation 5, Part 1, pp. 8-13</p> <p>Living Systems Investigation 3, Part 3, pp. 136-141</p> <p>Water Planet Investigation 2, Parts 2-3, pp. 85-100</p>	
<p>5.1.1.2.3 Conduct or critique an experiment, noting when the experiment might not be fair because some of the things that might change the outcome are not kept the same, or that the experiment is not repeated enough times to provide valid results.</p>	<p>FOSS provides the opportunity to address this benchmark. See for example:</p> <p>Variables Investigation 3, Parts 2-3, pp. 14-23 Investigation 4, Part 3, pp. 18-23</p> <p>Solar Energy Investigation 3, Parts 1-2, pp. 8-23</p> <p>Environments Investigation 5, Part 1, pp. 8-13</p> <p>Living Systems Investigation 3, Part 3, pp. 136-141</p> <p>Water Planet Investigation 2, Parts 2-3, pp. 85-100</p>	
<p>5.1.3.2.1 Describe how science and engineering influence and are influenced by local traditions and beliefs.</p> <p><i>For example:</i> Sustainable agriculture practices used by many cultures.</p>	<p>Models and Designs Science Stories, pp. 5-8</p> <p>Solar Energy Science Stories, pp. 16-17</p>	
<p>5.1.3.4.1 Use appropriate tools and techniques in gathering, analyzing and interpreting data.</p> <p><i>For example:</i> Spring scale, metric measurements, tables, mean/median/range, spreadsheets, and appropriate graphs.</p>	<p>Variables Investigation 1, Parts 1-3, pp. 8-27</p> <p>Solar Energy Investigation 2, Parts 1-2, pp. 8-24</p> <p>Levers and Pulleys Investigation 1, Parts 2-3, pp. 18-28</p> <p>Environments Investigation 5, Parts 1-2, pp. 8-18</p> <p>Mixtures and Solutions Investigation 1, Part 2, pp. 16-20</p> <p>Water Planet Investigation 3, Part 1, pp. 125-135</p> <p>Living Systems</p>	

	Investigation 2, Part 1, pp. 85-98	
5.1.3.4.2 Create and analyze different kinds of maps of the student's community and of Minnesota. <i>For example:</i> Weather maps, city maps, aerial photos, regional maps or online map resources.	This would need to be addressed at the local level. See: Landforms Investigation 1, Parts 1-3, pp. 8-24 Investigation 4, Parts 1-3, pp. 8-24 Investigation 5, Parts 1-3, pp. 8-26 Science Stories, pp. 1-6	

Physical Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
5.2.2.1.1 Give examples of simple machines and describe how they change the input and output of forces and motion.	Levers and Pulleys Investigation 1, Parts 1-3, pp. 8-28 Investigation 2, Parts 1-4, pp. 8-25 Investigation 3, Parts 1-3, pp. 8-24 Investigation 4, Parts 1-2, pp. 8-20 Investigation 4, Language Extension, p. 28 Science Stories, pp. 1-17, 21-27	DSR Simple Machines, pp. 2-9 DSCR Work and Machines, pp. 12-19
5.2.2.1.2 Identify the force that starts something moving or changes its speed or direction of motion. <i>For example:</i> Friction slows down a moving skateboard.	Levers and Pulleys Investigation 1, Parts 2-3, pp. 18-28 Investigation 2, Parts 1-4, pp. 8-25 Investigation 3, Parts 1-2, pp. 8-20 Investigation 4, Parts 1-2, pp. 8-20 Science Stories, pp. 1-17, 21-28 Models and Designs Investigation 3, Parts 1-3, pp. 8-23 Investigation 4, Parts 1-2, pp. 6-15 Science Stories, pp. 17-43, 48-53	DSCR Forces and Motion, pp. 3-9 DSR, Flight and Rocketry, pp. 4-5, 7
5.2.2.1.3 Demonstrate that a greater force on an object can produce a greater change in motion.	Levers and Pulleys Investigation 1, Parts 2-3, pp. 18-28 Investigation 4, Parts 1-2, pp. 8-20 Models and Designs Investigation 3, Parts 1-3, pp. 8-23 Investigation 4, Parts 1-2, pp. 6-	DSCR Forces and Motion, pp. 14-23

	15 Science Stories, pp. 37-43, 48-53	
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Earth Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
5.3.1.2.1 Explain how, over time, rocks weather and combine with organic matter to form soil.		DSCR Soils, pp. 4-14
5.3.1.2.2 Explain how slow processes, such as water erosion, and rapid processes, such as landslides and volcanic eruptions, form features of the Earth's surface.	Landforms Investigation 2, Parts 1-2, pp. 8-22 Investigation 3, Parts 1-3, pp. 8-24 Science Stories, pp. 15-29 FOSS Web, Movie: Volcanic Eruption	DSCR Weathering and Erosion, pp. 4-19 DSCR Inside Earth, pp. 10-21 DSR Erosion, pp. 2-13
5.3.4.1.1 Identify renewable and non-renewable energy and material resources that are found in Minnesota and describe how they are used. <i>For example:</i> Water, iron ore, granite, sand and gravel, wind and forests.	This would need to be addressed at the local level.	DSCR Minerals, Rocks and Fossils, pp. 16-17
5.3.4.1.2 Give examples of how mineral and energy resources are obtained and processed and how that processing modifies their properties to make them more useful. <i>For example:</i> Iron ore, biofuels, or coal.	Solar Energy Science Stories, pp. 29-31, 38-39	DSCR Energy, p. 2 DSCR Minerals, Rocks and Fossils, pp. 16-17
5.3.4.1.3 Compare the impact of individual decisions on natural systems. <i>For example:</i> Choosing paper or plastic bags impacts landfills as well as ocean life cycles.	Water Planet Investigation 4, Part 4, pp. 212-216 Science Resources, pp. 65-66 Landforms Science Stories, pp. 13-14, 43-44 Environments Investigation 5, Language Extension, p. 23 Science Stories, pp. 36-37, 43-44	

Life Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
5.4.1.1.1 Describe how plant and animal structures and their functions provide an advantage for survival in a given natural	Environments Science Stories, pp. 3-7, 11-17, 20, 22	DSCR Plant Needs, pp. 7-19 DSCR Animal Needs and Life Cycles, pp. 12-17

<p>system.</p> <p><i>For example:</i> Compare the physical characteristics of plants or animals from widely different environments, such as desert versus tropical, and explore how each has adapted to its environment.</p>		
<p>5.4.2.1.1 Describe a natural system in Minnesota, such as a wetland, prairie or garden, in terms of the relationships among its living and nonliving parts, as well as inputs and outputs.</p> <p><i>For example:</i> Design and construct a habitat for a living organism that meets its need for food, air and water.</p>	<p>This would need to be addressed at the local level.</p> <p>See: Environments Science Stories, pp. 11-12, 27-29</p>	<p>DSCR Ecosystems, pp. 4-13, 18-23</p>
<p>5.4.2.1.2 Explain what would happen to a system such as a wetland, prairie or garden if one of its parts were changed.</p> <p><i>For example:</i> Investigate how road salt runoff affects plants, insects and other parts of an ecosystem.</p> <p><i>Another example:</i> Investigate how an invasive species changes an ecosystem.</p>	<p>Environments Science Stories, pp. 43-44 Landforms Science Stories, pp. 13-14</p>	<p>DSCR, Changes in Ecosystems, pp. 10-13</p>
<p>5.4.4.1.1 Give examples of beneficial and harmful human interaction with natural systems.</p> <p><i>For example:</i> Recreation, pollution, or wildlife management.</p>	<p>Environments Science Stories, pp. 3-37, 43-44 Landforms Science Stories, pp. 13-14 Mixtures and Solutions Science Stories, pp. 20-23</p>	<p>DSCR, Changes in Ecosystems, pp. 13-15, 22-23 DSR, Pollution, pp. 2-14</p>

Grade Six

The Nature of Science and Engineering

BENCHMARK	FOSS	DSR/DSCR
<p>6.1.2.1.1 Identify a common engineered system and evaluate its impact on the daily life of humans.</p> <p><i>For example:</i> Refrigeration, cell phone or automobile.</p>	<p>FOSS provides the opportunity for teachers to address this benchmark. See for example:</p> <p>Variables Science Stories, pp. 18-20</p> <p>Models and Designs Science Stories, pp. 25-36</p> <p>Solar Energy Science Stories, pp. 29-32, 35-39</p> <p>Levers and Pulleys Science Stories, pp. 23-25</p> <p>Electronics Resources, pp. 18-21</p>	<p>DSR, Electromagnetism, pp. 11-13, 15</p> <p>DSR, Flight and Rocketry, pp. 10-12</p> <p>DSR, Electrical Connections, pp. 10, 16, 22</p>
<p>6.1.2.1.2 Recognize that there is no perfect design and that new technologies have consequences that may increase some risks and decrease others.</p> <p><i>For example:</i> Seat belts and airbags.</p>	<p>FOSS provides the opportunity for teachers to address this benchmark. See for example:</p> <p>Variables Science Stories, pp. 18-20</p> <p>Models and Designs Science Stories, pp. 25-28, 52-55</p> <p>Food and Nutrition Investigation 2, Parts 2-3, pp. 18-25</p> <p>Solar Energy Science Stories, pp. 35-37</p>	<p>DSR, Flight and Rocketry, pp. 10-12</p> <p>DSR, Electrical Connections, pp. 16, 22</p>
<p>6.1.2.1.3 Describe the trade-offs in using manufactured products in terms of features, performance, durability and cost.</p>	<p>FOSS provides the opportunity for teachers to address this benchmark. See for example:</p> <p>Solar Energy Science Stories, pp. 35-37</p> <p>Electronics Resources, pp. 18-21</p>	<p>DSR, Electromagnetism, p. 15</p> <p>DSR, Electrical Connections, pp. 16, 22</p>
<p>6.1.2.1.4 Explain the importance of learning from past failures, in order to inform future designs of similar products or systems.</p> <p><i>For example:</i> Space shuttle or bridge design.</p>	<p>FOSS provides the opportunity for teachers to address this benchmark. See for example:</p> <p>Models and Designs Science Stories, pp. 2-28, 33-36</p> <p>Variables Science Stories, pp. 18-20</p> <p>Electronics Investigation 4, Part 2, pp. 149-151</p>	<p>DSR, Flight and Rocketry, pp. 6-12, 14</p>
<p>6.1.2.2.1 Apply and document an engineering design process that includes identifying criteria and constraints, making representations, testing and evaluation, and refining the</p>	<p>FOSS provides the opportunity for teachers to address this benchmark. See for example:</p> <p>Variables Investigation 3, Part 3, pp. 20-23</p>	

<p>design as needed to construct a product or system that solves a problem.</p> <p><i>For example:</i> Investigate how energy changes from one form to another by designing and constructing a simple roller coaster for a marble.</p>	<p>Solar Energy Investigation 4, Part 3, pp. 24-28</p> <p>Models and Designs Investigation 3, Parts 1-3, pp. 8-23 Investigation 4, Parts 1-2, pp. 6-15</p> <p>Force and Motion Investigation 8, Part 2, pp. 294-301</p> <p>Electronics Investigation 9, Part 2, pp. 290-297</p>	
<p>6.1.3.1.1. Describe a system in terms of its subsystems and parts, as well as its inputs, processes and outputs.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Variables Investigation 3, Parts 1-2, pp. 8-19 Science Stories, pp. 15-19</p> <p>Solar Energy Science Stories, pp. 29-31</p> <p>Models and Designs Investigation 2, Parts 1-3, pp. 8-24 Investigation 3, Parts 1-3, pp. 8-23 Science Stories, pp. 37-43</p> <p>Electronics Investigation 1, Parts 1-3, pp. 55-70</p> <p>Force and Motion Investigation 1, Part 1, pp. 55-70</p>	<p>DSR, Electromagnetism, pp. 4-6, 8-9, 11-13 DSR, Flight and Rocketry, pp. 7-11 DSR, Simple Machines, pp. 10-12 DSR, Electrical Connections, pp. 7-15 DSR, Newton’s Toy Box, pp. 19-22</p>
<p>6.1.3.1.2 Distinguish between open and closed systems.</p> <p><i>For example:</i> Kinetic and potential energy are conserved in a closed system, but are not conserved when frictional heating is considered...</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Environments Investigation 4, Parts 1-3, pp. 8-22</p> <p>Solar Energy Investigation 4, Parts 1-2, pp. 8-23 Science Stories, pp. 35-37</p> <p>Models and Designs Investigation 2, Parts 1-3, pp. 8-24</p> <p>Electronics Investigation 1, Parts 1-3, pp. 55-70</p> <p>Force and Motion Investigation 1, Part 1, pp. 55-70</p>	<p>DSR, Electromagnetism, pp. 9, 11, 13 DSR, You and Your Body, pp. 6-9 DSR, Electrical Connections, pp. 7-10</p>

<p>6.1.3.4.1 Determine and use appropriate safe procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in a physical science context.</p>	<p>Variables Investigation 2, Parts 1-4, pp. 8-27</p> <p>Solar Energy Investigation 2, Parts 1-2, pp. 8-24</p> <p>Models and Designs Investigation 3, Parts 1-3, pp. 8-23</p> <p>Levers and Pulleys Investigation 1, Parts 2-3, pp. 18-28</p> <p>Electronics Investigation 6, Part 3, pp. 195-200</p> <p>Force and Motion Investigation 5, Parts 1-2, pp. 169-186</p>	
<p>6.1.3.4.2 Demonstrate the conversion of units within the Systeme Internationale (SI, or metric) and estimate the magnitude of common objects and quantities using metric units.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Variables Investigation 3, Parts 2-3, pp. 13-23</p> <p>Models and Designs Investigation 3, Parts 2-3, pp. 13-23</p> <p>Levers and Pulleys Investigation 1, Parts 2-3, pp. 18-28</p> <p>Environments Investigation 1, Parts 2, pp. 16-19</p> <p>Mixtures and Solutions Investigation 1, Part 2, pp. 16-20</p> <p>Force and Motion Investigation 1, Part 1, pp. 47-56</p> <p>Planetary Science Investigation 8, Parts 3-4, pp. 260-270</p>	

Physical Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
<p>6.2.1.1.1 Explain density, dissolving, compression, diffusion and thermal expansion using the particle model of matter.</p>	<p>Water Planet Science Resources, pp. 28-30, 46-57</p> <p>Weather and Water Resources, pp. 22-28</p> <p>Chemical Interactions Investigation 5, Part 2, pp. 159-164</p> <p>Investigation 7, Part 2, pp. 210-</p>	<p>DSR, Matter and Change, pp. 12, 15</p>

	214 Resources, pp. 18-50	
6.2.1.2.1 Identify evidence of physical changes, including changing phase or shape, and dissolving in other materials.	<p>Landforms Investigation 2, Parts 1-2, pp. 8-22</p> <p>Mixtures and Solutions Investigation 1, Parts 1-3, pp. 8-24 Investigation 2, Parts 1-4, pp. 8-28 Science Stories, pp. 1-3</p> <p>Food and Nutrition Investigation 1, Parts 1-2, pp. 8-20</p> <p>Water Planet Investigation 2, Parts 1-4, pp. 80-110 Science Resources, pp. 26-30, 33-40</p> <p>Chemical Interactions Investigation 7, Parts 1-5, pp. 204-234 Investigation 8, Part 1, pp. 248-255</p>	DSR, Matter and Change, pp. 13-15
6.2.1.2.2 Describe how mass is conserved during a physical change in a closed system. <i>For example:</i> The mass of an ice cube does not change when it melts.	<p>Mixtures and Solutions Investigation 2, Part 2, pp. 16-20</p> <p>Chemical Interactions Resources , pp. 63-71</p>	
6.2.1.2.3 Use the relationship between heat and the motion and arrangement of particles in solids, liquids and gases to explain melting, freezing, boiling and evaporation.	<p>Weather and Water CD, Particles in Solids, Liquids, and Gases</p> <p>Chemical Interactions Investigation 7, Parts 1-5, pp. 204-234 Resources , pp. 23-27, 32-37, 42-48 CD, Particles in Solid, Liquid and Gas</p>	DSR, Matter and Change, pp. 11-12
6.2.2.1.1 Measure and calculate the speed of an object that is traveling in a straight line.	<p>Force and Motion Investigation 2, Part 3, pp. 89-99</p>	DSR, Newton’s Toy Box, p. 3
6.2.2.1.2 Graph an object’s position as a function of time and an object’s speed as a function of time for an object traveling in a straight line and use the graphs to describe the object’s motion.	<p>Force and Motion Investigation 2, Part 3, pp. 89-99 Investigation 3, Part 2, pp. 119-123 Investigation 4, Parts 1-3, pp. 138-155</p>	
6.2.2.2.1 Recognize that when the forces acting on an object are balanced, the object remains at rest or continues to move at a	<p>FOSS provides the opportunity to address this benchmark. See below: Levers and Pulleys</p>	DSR, Flight and Rocketry, pp. 4-12 DSR, Simple Machines, pp. 10-12, 15

<p>constant speed in a straight line, and that unbalanced forces cause a change in the speed or direction of the motion of an object.</p>	<p>Investigation 1, Parts 2-3, pp. 18-28 Investigation 3, Parts 1-2, pp. 8-20 Investigation 4, Parts 1-2, pp. 8-20 Variables Investigation 1-4, all parts Models and Designs Investigation 3, Parts 1-3, pp. 8-23 Investigation 4, Parts 1-2, pp. 6-15 Science Stories, pp. 48-55 Force and Motion Investigation 5, Parts 1-4, pp. 169-201 Investigation 8, Part 1, pp. 284-293 Resources, pp. 70-74</p>	<p>DSR, Newton’s Toy Box, pp. 4-7, 10-12</p>
<p>6.2.2.2 Identify the forces acting on an object and describe how the sum of the forces affects the motion of the object. <i>For example:</i> Forces acting on a book on a table or a car on the road.</p>	<p>FOSS provides the opportunity to address this benchmark. See below: Levers and Pulleys Investigation 1, Parts 2-3, pp. 18-28 Investigation 2, Parts 1-4, pp. 8-25 Investigation 3, Parts 1-2, pp. 8-20 Investigation 4, Parts 1-2, pp. 8-20 Science Stories, pp. 5-17 Variables Investigation 1-4, all parts Models and Designs Investigation 3, Parts 1-3, pp. 8-23 Investigation 4, Parts 1-2, pp. 6-15 Science Stories, pp. 48-55 Force and Motion Investigation 6, Parts 1-4, pp. 218-245 Investigation 8, Part 1, pp. 284-293 Resources, pp. 32-34, 70-74 CD: Force Bench</p>	<p>DSR, Flight and Rocketry, pp. 4-9 DSR, Simple Machines, pp. 6-12 DSR, Newton’s Toy Box, pp. 4-7</p>
<p>6.2.2.3 Recognize that some forces between objects act when the objects are in direct contact and others, such as magnetic, electrical and gravitational forces can act from a distance</p>	<p>Levers and Pulleys Investigation 1, Parts 2-3, pp. 18-28 Investigation 2, Parts 1-4, pp. 8-25 Science Stories, pp. 5-17 Variables Investigation 1-4, all parts</p>	<p>DSR, Flight and Rocketry, pp. 4-13 DSR, Electromagnetism, pp. 8-13 DSR, Newton’s Toy Box, p. 8 DSR, Electrical Connections, pp. 11-13</p>

	<p>Science Stories, pp. 8-9, 15-17, 32-33</p> <p>Models and Designs</p> <p>Investigation 2, Parts 1-3, pp. 8-24</p> <p>Investigation 3, Parts 1-3, pp. 8-23</p> <p>Science Stories, pp. 37-43</p> <p>Force and Motion</p> <p>Investigation 1, Part 1, pp. 47-56</p> <p>Investigation 2, Part 3, pp. 89-99</p> <p>Investigation 7, Parts 2-3, pp. 262-272</p> <p>Resources, pp. 62-69</p>	
6.2.2.2.4 Distinguish between mass and weight.	<p>FOSS provides the opportunity to address this benchmark. See below:</p> <p>Force and Motion</p> <p>Investigation 7, Part 1, pp. 256-261</p> <p>Resources, p. 62</p>	DSR, Newton’s Toy Box, p. 8
6.2.3.1.1 Describe properties of waves, including speed, wavelength, frequency and amplitude.		
6.2.3.1.2 Explain how the vibration of particles in air and other materials results in the transfer of energy through sound waves.	<p>Human Brain and Senses</p> <p>Resources, p. 69</p>	
6.2.3.1.3 Use wave properties of light to explain reflection, refraction and the color spectrum.	<p>Human Brain and Senses</p> <p>Investigation 3, Part 1, pp. 92-100</p> <p>Resources, pp. 31-33</p> <p>CD, Optics Bench</p>	DSR, Color and Light, pp. 2-9
6.2.3.2.1 Differentiate between kinetic and potential energy and analyze situations where kinetic energy is converted to potential energy and vice versa.	<p>FOSS provides the opportunity to address this benchmark. See below:</p> <p>Variables</p> <p>Investigation 3, Parts 1-3, pp. 8-23</p> <p>Investigation 4, Parts 1-3, pp. 8-23</p> <p>Models and Designs</p> <p>Investigation 2, Parts 1-3, pp. 8-24</p> <p>Investigation 3, Parts 1-3, pp. 8-23</p> <p>Science Stories, pp. 37-45</p> <p>Electronics</p> <p>Investigation 1, Part 1, pp. 55-60</p> <p>Force and Motion</p>	<p>DSR, Flight and Rocketry, pp. 10-13</p> <p>DSR, Simple Machines, pp. 3-12</p> <p>DSR, Newton’s Toy Box, p. 14</p>

	Investigation 1, Part 1, pp. 47-56 Investigation 2, Part 3, pp. 89-99	
6.2.3.2.2 Trace the changes of energy forms, including thermal, electrical, chemical, mechanical or others as energy is used in devices. <i>For example:</i> A bicycle, light bulb or automobile.	Variables Investigation 3, Parts 1-3, pp. 8-23 Investigation 4, Parts 1-3, pp. 8-23 Models and Designs Investigation 2, Parts 1-3, pp. 8-24 Investigation 3, Parts 2-3, pp. 13-23 Science Stories, pp. 37-43 Solar Energy Science Stories, pp. 30-31, 35-39 Electronics Investigation 1, Part 1-3, pp. 55-70 Investigation 4, Part 2, pp. 149-151 Resources, pp. 1-2 Force and Motion Investigation 1, Part 1, pp. 47-56	DSR, Flight and Rocketry, pp. 10-12 DSR, Electromagnetism, pp. 4-5, 8-9, 11-12 DSR, Electrical Connections, pp. 7-16
6.2.3.2.3 Describe how energy is transferred in conduction, convection and radiation.	Water Planet Investigation 3, Parts 1-2, pp. 125-144 Science Resources, pp. 42-49 Solar Energy Investigation 2, Parts 1-2, pp. 8-24 Investigation 3, Parts 1-2, pp. 8-23 Science Stories, pp. 16-17, 22 Weather and Water Investigation 4, Parts 1-2, pp. 121-139 Investigation 5, Parts 2-3, pp. 163-174 Video: Conduction through Metals CD, Convection Chamber Chemical Interactions Resources, pp. 34-37	

Grade Seven

The Nature of Science and Engineering

BENCHMARK	FOSS	DSR/DSCR
<p>7.1.1.1.1 Understand that prior expectations create bias when conducting scientific investigations. <i>For example:</i> Students continue to think that air is not matter, even though they have evidence from investigations.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example: Chemical Interactions Investigation 5, Part 1, pp. 153-158 Weather and Water Investigation 6, Part 1, pp. 190-193 Human Brain and Senses Investigation 6, Parts 1-2, pp. 186-196 Planetary Science Investigation 5, Parts 2-3, pp. 158-167 Earth History Investigation 4, Part 3, pp. 138-146</p>	
<p>7.1.1.1.2 Understand that when similar investigations give different results, the challenge is to judge whether the differences are significant, and if further studies are required. <i>For example:</i> Use mean and range to analyze the reliability of experimental results.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example: Chemical Interactions Investigation 7, Part 4, pp. 222-228 Human Brain and Senses Investigation 7, Part 2, pp. 219-225 Force and Motion Investigation 2, Part 3, pp. 89-99 Electronics Investigation 2, Part 3, pp. 99-103</p>	
<p>7.1.1.2.1 Generate and refine a variety of scientific questions and match them with appropriate methods of investigation, such as field studies, controlled experiments, reviews of existing work and development of models.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example: Diversity of Life Investigation 9, Part 2, pp. 278-285 Weather and Water Investigation 1, Part 2, pp. 48-53 Populations and Ecosystems Investigation 5, Part 1, pp. 142-150 Planetary Science Investigation 6, Parts 1-2, pp.</p>	

	192-200 Earth History Investigation 4, Part 3, pp. 138-146	
7.1.1.2.2 Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables, ensuring that one variable is systematically manipulated, the other is measured and recorded, and any other variables are kept the same (controlled). <i>For example:</i> The effect of various factors on the production of carbon dioxide by plants.	FOSS investigations provide the opportunity for teachers to address this benchmark. See for example: Diversity of Life Investigation 8, Part 2, pp. 244-252 Weather and Water Investigation 4, Part 1, pp. 121-130 Force and Motion Investigation 2, Part 3, pp. 89-99 Planetary Science Investigation 5, Parts 2-3, pp. 158-167	
7.1.1.2.3 Generate a scientific conclusion from an investigation, clearly distinguishing between results (evidence) and conclusions (explanation).	FOSS investigations provide the opportunity for teachers to address this benchmark. See for example: Chemical Interactions Investigation 5, Part 3, pp. 165-171 Weather and Water Investigation 5, Part 2, pp. 152-162 Diversity of Life Investigation 9, Part 2, pp. 278-285 Populations and Ecosystems Investigation 5, Part 1, pp. 142-150 Electronics Investigation 3, Part 4, pp. 133-135	
7.1.1.2.4 Evaluate explanations proposed by others by examining and comparing evidence, identifying faulty reasoning, and suggesting alternative explanations.	FOSS investigations provide the opportunity for teachers to address this benchmark. See for example: Chemical Interactions Investigation 5, Part 2, pp. 159-164 Weather and Water Investigation 4, Part 1, pp. 121-130 Human Brain and Senses Investigation 7, Parts 1-2, pp. 219-225 Planetary Science Investigation 5, Parts 2-3, pp. 158-167 Force and Motion	

	Investigation 6, Part 2, pp. 222-235	
7.1.3.4.1 Use maps, satellite images and other data sets to describe patterns and make predictions about natural systems in a life science context. <i>For example:</i> Use online data sets to compare wildlife populations or water quality in regions of Minnesota.		
7.1.3.4.2 Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in a life science context.	Diversity of Life Investigation 3, Part 3, pp. 116-122 Populations and Ecosystems Investigation 5, Part 1, pp. 142-150 Human Brain and Senses Investigation 6, Part 1, pp. 186-192 Investigation 7, Part 2, pp. 219-225	

Physical Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
7.2.1.1.1 Recognize that all substances are composed of one or more of approximately one hundred elements and that the periodic table organizes the elements into groups with similar properties.	Chemical Interactions Investigation 2, Parts 1-2, pp. 70-80 Resources, pp. 3-13, 90-95 CD, Periodic Table	DSR Matter and Change, pp. 4-5
7.2.1.1.2 Describe the differences between elements and compounds in terms of atoms and molecules.	Chemical Interactions Investigation 9, Parts 1-4, pp. 280-312 Resources, pp. 14-15, 63-65, 96	DSR Matter and Change, pp. 4-8
7.2.1.1.3 Recognize that a chemical equation describes a reaction where pure substances change to produce one or more different substances whose properties are different from the original substance(s).	Chemical Interactions Investigation 9, Part 2, pp. 288-297 Resources, pp. 63-65, 73-74	DSR Matter and Change, p. 18

Life Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
7.4.1.1.1 Recognize that all cells do not look alike and that specialized cells in multicellular organisms are organized into tissues and organs that perform specialized functions.	Diversity of Life Investigation 3, Parts 1-3, pp.102-122 Investigation 4, Parts 1-2, pp. 133-141 Investigation 5, Part 3, pp. 165-	DSR, DNA-From Genes to Proteins, pp. 2-3, 5-7 DSR, Plants in Our World, pp. 14-15

<p><i>For example:</i> Nerve cells and skin cells do not look the same because they are part of different organs and have different functions.</p>	<p>170 Resources, pp. 27-30, 32, 37-38 Human Brain and Senses Resources, pp. 60, 65</p>	
<p>7.4.1.1.2 Describe how the organs in the respiratory, circulatory, digestive, nervous, skin and urinary systems interact to serve the needs of vertebrate organisms.</p>	<p>Human Brain and Senses Resources, pp. 63-74</p>	
<p>7.4.1.2.1 Recognize that cells carry out life functions, and that these functions are carried out in a similar way in all organisms, including animals, plants, fungi, bacteria and protists.</p>	<p>Diversity of Life Resources, pp. 24-30</p>	<p>DSR, DNA-From Genes to Proteins, pp. 8-14</p>
<p>7.4.1.1.2 Recognize that cells repeatedly divide to make more cells for growth and repair.</p>		<p>DSR, DNA-From Genes to Proteins, pp. 12-14</p>
<p>7.4.1.1.3 Use the presence of the cell wall and chloroplasts to distinguish between plant and animal cells. <i>For example:</i> Compare microscopic views of plant cells and animal cells.</p>	<p>Diversity of Life Investigation 4, Parts 1-2, pp. 133-141 Resources, pp. 27-30 Database: Collection</p>	<p>DSR, DNA-From Genes to Proteins, pp. 6-7 DSR, Plants in Our World, p. 2</p>
<p>7.4.2.1.1 Identify a variety of populations and communities in an ecosystem and describe the relationships among the populations and communities in a stable ecosystem.</p>	<p>FOSS provides the opportunity to address this benchmark. See below. Populations and Ecosystems Investigation 2, Part 2, pp.76-79 Investigation 4, Part 2, pp. 122-129 Investigation 7, pp. 210-215 Resources, pp. 27-28, 31-41</p>	
<p>7.4.2.1.2 Compare and contrast predator/prey, parasite/host and producer/consumer/decomposer relationships.</p>	<p>FOSS provides the opportunity to address this benchmark. See below. Populations and Ecosystems Investigation 4, Part 2, pp. 122-129 Investigation 5, Parts 2-4, pp. 151-169 Resources, pp. 17-21, 27-28 CD, Mono Lake Food Web</p>	
<p>7.4.2.1.3 Explain how the number of populations an ecosystem can support depends on the biotic resources available as well as abiotic factors such as amount of light and water, temperature range and soil composition.</p>	<p>Populations and Ecosystems Investigation 6, Parts 1-3, pp. 179-197 Resources, pp. 22-24</p>	
<p>7.4.2.2.1 Recognize that</p>	<p>Populations and Ecosystems</p>	

producers use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms.	Investigation 5, Parts 2-3, pp. 151-169 Resources, pp. 14-21 Diversity of Life Resource, pp. 36-37	
7.4.2.2.2 Describe the roles and relationships among producers, consumers and decomposers in changing energy from one form to another in a food web within an ecosystem.	Populations and Ecosystems Investigation 4, Part 2, pp. 122-129 Investigation 5, Parts 2-4, pp. 151-169 Resources, pp. 17-21 CD: Mono Lake Food Web	
7.4.2.2.3 Explain that the total amount of matter in an ecosystem remains the same as it is transferred between organisms and their physical environment, even though its form and location change. <i>For example:</i> Construct a food web to trace the flow of matter in an ecosystem.	Populations and Ecosystems Investigation 4, Part 2, pp. 122-129 Investigation 5, Part 4, pp. 161-169 Resources, pp. 17-21, 27-28	
7.4.3.1.1 Recognize that cells contain genes and that each gene carries a single unit of information that either alone, or with other genes, determines the inherited traits of an organism.	Populations and Ecosystems Investigation 9, Parts 2-4, pp. 267-291 Resources, pp. 46-55	DSR, DNA-From Genes to Proteins, pp. 15-18
7.4.3.1.2 Recognize that in asexually reproducing organisms all the genes come from a single parent, and that in sexually reproducing organisms half of the genes come from each parent.	Populations and Ecosystems Investigation 9, Parts 2-4, pp. 267-291 Resources, pp. 46-55	DSR, DNA-From Genes to Proteins, pp. 14, 18
7.4.3.1.3 Distinguish between characteristics of organisms that are inherited and those acquired through environmental influences.	FOSS provides the opportunity to address this benchmark. See below. Populations and Ecosystems Investigation 9, Part 1, pp. 262-266 Resources, pp. 46-55	DSR, DNA-From Genes to Proteins, pp. 15-20
7.4.3.2.1 Explain how the fossil record documents the appearance, diversification and extinction of many life forms.	Earth History Investigation 6, Part 3, pp. 215-219 Investigation 7, Part 1, pp. 234-242 Resources, pp. 83-86	
7.4.3.2.2 Use internal and external anatomical structures to compare and infer relationships between living organisms as well as those in the fossil record.		

7.4.3.2.3 Recognize that variation exists in every population and describe how a variation can help or hinder an organism's ability to survive.	Populations and Ecosystems Investigation 10, Parts 1-3, pp. 302-317 Resources, pp. 58-61 Video: Voyage to the Galapagos	
7.4.3.2.4 Recognize that extinction is a common event and it can occur when the environment changes and an organism's ability to adapt is insufficient to allow its survival.	Populations and Ecosystems Resources, p. 35	
7.4.4.1.1 Describe examples where selective breeding has resulted in new varieties of cultivated plants and particular traits in domesticated animals.	Populations and Ecosystems Resources, pp. 58-59	DSR, DNA-From Genes to Proteins, p. 20
7.4.4.1.2 Describe ways that human activities can change the populations and communities in an ecosystem.	Populations and Ecosystems Investigation 7, pp. 210-215 Resources, pp. 31-41	
7.4.4.2.1 Explain how viruses, bacteria, fungi and parasites may infect the human body and interfere with normal body functions.	Diversity of Life Resources, pp. 67-68	
7.4.4.2.2 Recognize that a microorganism can cause specific diseases and that there are a variety of medicines available that can be used to combat a given microorganism.		
7.4.4.2.3 Recognize that vaccines induce the body to build immunity to a disease without actually causing the disease itself.		
7.4.4.2.4 Recognize that the human immune system protects against microscopic organisms and foreign substances that enter from outside the body and against some cancer cells that arise from within.		

Grade Eight

The Nature of Science and Engineering

BENCHMARK	FOSS	DSR/DSCR
<p>8.1.1.1.1 Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given.</p> <p><i>For example:</i> Evaluate the use of pH in advertising products related to body care or gardening.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Chemical Interactions Investigation 7, Part 4, pp. 222-228</p> <p>Human Brain and Senses Investigation 7, Part 2, pp. 219-225</p> <p>Force and Motion Investigation 2, Part 3, pp. 89-99</p> <p>Electronics Investigation 2, Part 3, pp. 99-103</p>	
<p>8.1.1.2.1 Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Chemical Interactions Investigation 5, Part 3, pp. 165-171</p> <p>Weather and Water Investigation 5, Part 2, pp. 152-162</p> <p>Diversity of Life Investigation 9, Part 2, pp. 278-285</p> <p>Populations and Ecosystems Investigation 5, Part 1, pp. 142-150</p> <p>Electronics Investigation 3, Part 4, pp. 133-135</p>	
<p>8.1.3.2.1 Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history.</p>	<p>Chemical Interactions Resources, pp. 5, 7-8, 69-72</p> <p>Earth History Resources, pp. 83-84</p> <p>Force and Motion Resources, pp. 50-52</p> <p>Planetary Science Resources, pp. 52-53</p> <p>Populations and Ecosystems Resources, pp. 46-55, 59-61</p>	
<p>8.1.3.3.1 Explain how constraints like scientific laws and engineering principles, as well as economic, political, social, and ethical expectations, must be</p>	<p>FOSS investigations provide ample opportunity for teachers to address this benchmark during investigation discussions.</p>	

<p>taken into account in designing engineering solutions or conducting scientific investigations.</p>		
<p>8.1.3.3.2 Understand that scientific knowledge is always changing as new technologies and information enhance observations and analysis of data.</p> <p><i>For example:</i> Analyze how new telescopes have provided new information about the universe.</p>	<p>Chemical Interactions Resources, pp. 80-83</p> <p>Force and Motion Resources, pp. 50-52</p> <p>Planetary Science Resources, pp. 74-79, 90-95</p>	<p>DSR, DNA-From Genes to Protein, p. 21</p> <p>DSR, Matter and Change, p. 22</p> <p>DSR, Astronomy, pp. 16-23</p>
<p>8.1.3.3.3 Provide examples of how advances in technology have impacted the ways in which people live, work and interact.</p>	<p>Chemical Interactions Resources, pp. 84-85</p> <p>Human Brain and Senses Resources, p. 49</p> <p>Electronics Resources, pp. 34-36</p>	<p>DSR, Electrical Connections, p. 22</p>
<p>8.1.3.4.1 Use maps, satellite images and other data sets to describe patterns and make predictions about local and global systems in Earth science contexts.</p> <p><i>For example:</i> Use data or satellite images to identify locations of earthquakes and volcanoes, ages of sea floor, ocean surface temperatures and ozone concentration in the stratosphere.</p>	<p>FOSS investigations provide the opportunity for teachers to address this benchmark. See for example:</p> <p>Earth History Investigation 2, Part 2, pp. 64-67</p> <p>Investigation 3, Part 3, pp.102-107</p> <p>Weather and Water Investigation 6, Part 5, pp. 214-220</p> <p>Investigation 8, Part 4, pp. 276-279</p> <p>Planetary Science Investigation 6, Part 1, pp. 192-196</p> <p>Investigation 7, Part 3, pp. 228-231</p>	
<p>8.1.3.4.2 Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts.</p>	<p>Chemical Interactions Investigation 7, Part 4, pp. 222-228</p> <p>Weather and Water Investigation 4, Part 1, pp. 121-130</p> <p>Investigation 5, Part 1, pp. 152-162</p> <p>Force and Motion Investigation 2, Part 3, pp. 89-99</p> <p>Electronics Investigation 6, Part 3, pp. 195-200</p> <p>Planetary Science Investigation 5, Parts 2-3, pp. 158-167</p>	

Physical Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
8.2.1.1.1 Distinguish between a mixture and a pure substance and use physical properties including color, solubility, density, melting point and boiling point to separate mixtures and identify pure substances.	Chemical Interactions Investigation 1, Parts 1-2, pp. 41-58 Investigation 8, Part 1, pp. 248-255 Resources, pp. 49-53, 97-101	DSR Matter and Change, pp. 14-15
8.2.1.1.2 Use physical properties to distinguish between metals and non-metals.		DSR Matter and Change, p. 5
8.2.1.2.1 Identify evidence of chemical changes, including color change, generation of a gas, solid formation and temperature change.	Chemical Interactions Investigation 1, Part 2, pp. 46-58 Investigation 9, Parts 2-4, pp. 288-312 Investigation 10, Parts 1-2, pp. 323-336 Resources, pp. 63-68	DSR Matter and Change, p. 17
8.2.1.2.2 Distinguish between chemical and physical changes in matter.	Chemical Interactions Investigation 1, Part 2, pp. 46-58 Investigation 6, pp. 178-187 Investigation 7, Parts 1-5, pp. 204-234 Investigation 8, Part 2, pp. 248-255 Investigation 9, Parts 2-4, pp. 288-312 Investigation 10, Parts 1-2, pp. 323-336 Resources, pp. 42-43, 63-68	DSR, Matter and Change, pp. 13-19
8.2.1.2.3 Use the particle model of matter to explain how mass is conserved during physical and chemical changes in a closed system.	FOSS provides the opportunity to address this benchmark. See below: Chemical Interactions Investigation 9, Part 2, pp. 288-297 Resources, pp. 63-71, 74	DSR, Matter and Change, p. 17
8.2.1.2.4 Recognize that acids are compounds whose properties include a sour taste, characteristic color changes with litmus and other acid/base indicators, and the tendency to react with bases to produce a salt and water.		DSR, Matter and Change, p. 20
8.2.3.1.1 Explain how seismic waves transfer energy through the Earth and across its surfaces.		DSR, Earth Processes, p. 9

Earth Science

<i>BENCHMARK</i>	<i>FOSS</i>	<i>DSR/DSCR</i>
8.3.1.1.1 Recognize that the Earth is composed of layers, and describe the properties of the layers, including the lithosphere, mantle and core.	Earth History Resources, pp. 100-103	DSR, Earth Processes, pp. 2-3
8.3.1.1.2 Correlate the distribution of ocean trenches, mid-ocean ridges and mountain ranges to volcanic and seismic activity.	Earth History Resources, pp. 100-103	DSR, Earth Processes, pp. 5-10
8.3.1.1.3 Recognize that major geological events, such as earthquakes, volcanic eruptions and mountain building, result from the slow movement of tectonic plates.	Earth History Resources, pp. 100-103	DSR, Earth Processes, pp. 25-10
8.3.1.2.1 Explain how landforms result from the processes of crustal deformation, volcanic eruptions, weathering, erosion and deposition of sediment.	Earth History Investigation 4, Parts 2-3, pp. 138-149 Resources, pp. 100-103 Video, Weather and Erosion CD, Geology Lab	DSR, Earth Processes, pp. 8-15
8.3.1.2.2 Explain the role of weathering, erosion and glacial activity in shaping Minnesota's current landscape.	This would need to be addressed at the local level. See also: Earth History Investigation 4, Parts 2-3, pp. 138-149 Resources, pp. 100-103 Video, Weather and Erosion CD, Geology Lab	DSR, Earth Processes, pp. 11-15
8.3.1.3.1 Interpret successive layers of sedimentary rocks and their fossils to infer relative ages of rock sequences, past geologic events, changes in environmental conditions, and the appearance and extinction of life forms.	Earth History Investigation 5, Part 4, pp. 188-193 Investigation 6, Parts 3-4, pp. 215-224 Investigation 7, Parts 1-2, pp. 234-243 Resources, pp. 83-88 CD, Time Room, Time Machine	
8.3.1.3.2 Classify and identify rocks and minerals using characteristics including, but not limited to, density, hardness and streak for minerals; and texture and composition for rocks.	Earth History Investigation 4, Parts 5-6, pp. 150-162 Investigation 5, Part 3, pp. 183-187 Investigation 8, Parts 1-3, pp. 254-265 Resources, pp. 93-97 CD, Geology Lab, Rock Database	DSR, Earth Processes, pp. 16-19
8.3.1.3.3 Relate rock composition and texture to physical conditions at the time of	Earth History Investigation 4, Parts 5-6, pp. 150-162	DSR, Earth Processes, pp. 16-19

formation of igneous, sedimentary and metamorphic rock.	Investigation 8, Parts 1-2, pp. 254-265 Resources, pp. 93-97 CD, Geology Lab, Rock Database	
8.3.2.1.1 Explain how the combination of the Earth's tilted axis and revolution around the sun causes the progression of seasons.	Weather and Water Investigation 3, Parts 1-2, pp. 93-102 Resources, pp. 17-19 CD, Cycles: Seasons	DSR, Earth, Moon and Sun, pp. 11-12
8.3.2.1.2 Recognize that oceans have a major effect on global climate because water in the oceans holds a large amount of heat.	Weather and Water Investigation 8, Part 2, pp. 265-270 Resources, pp. 32-33, 53-55	
8.3.2.1.3 Explain how heating of the Earth's surface and atmosphere by the sun drives convection within the atmosphere and hydrosphere producing winds, ocean currents and the water cycle, as well as influencing global climate.	Weather and Water Investigation 5, Part 2, pp. 163-168 Investigation 7, Parts 1-2, pp. 232-243 Investigation 8, Part 2, pp. 265-275 Investigation 9, Part 3, pp. 311-314 Resources, pp. 32-33, 53-55 CD, Climate Factors	
8.3.2.2.1 Describe how the composition and structure of the Earth's atmosphere affects energy absorption, climate and distribution of particulates and gases. <i>For example:</i> Certain gases contribute to the greenhouse effect.	Weather and Water Investigation 2, Part 2, pp. 76-80 Investigation 9, Part 4, pp. 315-318 Resources, pp. 8-11, 22-24, 31, 63-66	
8.3.2.2.2 Analyze changes in wind direction, temperature, humidity and air pressure and relate them to fronts and pressure systems.	Weather and Water Investigation 8, Part 4, pp. 276-279 Investigation 9, Parts 1-2, pp.296-310 Resources, pp. 85-86	
8.3.2.2.3 Relate global weather patterns to patterns in regional and local weather.	FOSS provides the opportunity to address this benchmark. See below: Weather and Water Investigation 8, Part 2, pp. 265-270 Investigation 9, Parts 1-2, pp.296-310 Resources, pp. 53-62	
8.3.2.3.1 Describe the location, composition and use of major water reservoirs on the Earth, and the transfer of water among them.	Weather and Water Investigation 7, Part 1, pp. 232-239 Resources, pp. 45-47	

<p>8.3.2.3.2 Describe how the water cycle distributes materials and purifies water.</p> <p><i>For example:</i> Dissolved gases in rain can change the chemical composition of substances on Earth.</p> <p><i>Another example:</i> Waterborne disease.</p>	<p>Weather and Water Investigation 7, Parts 1-2, pp. 232-243 CD, Cycles: Water Cycle</p>	
<p>8.3.3.1.1 Recognize that the sun is a medium-sized star, one of billions of stars in the Milky Way galaxy, and the closest star to Earth.</p>	<p>Planetary Science Resources, pp. 84-85</p>	<p>DSR, Astronomy, pp. 8-9 DSR, Earth, Moon and Sun, p. 4</p>
<p>8.3.3.1.2 Describe how gravity and inertia keep most objects in the solar system in regular and predictable motion.</p>	<p>Planetary Science Resources, p. 70 Force and Motion Resources, pp. 67-69</p>	<p>DSR, Earth, Moon and Sun, p. 5</p>
<p>8.3.3.1.3 Recognize that gravity exists between any two objects and describe how the mass and distance between objects affects the force of gravity.</p>	<p>Force and Motion Investigation 7, Part 1, pp. 256-261 Resources, pp. 62, 68</p>	<p>DSR, Newton's Toy Box, p. 8</p>
<p>8.3.3.1.4 Compare and contrast the planets and the moons of our solar system in terms of their size, location and composition.</p>	<p>Planetary Science Investigation 10, Parts 2-3, pp. 318-324 Resources, pp. 80-89</p>	<p>DSR, Astronomy, pp. 2-7 DSR, Earth, Moon and Sun, pp.21-23</p>
<p>8.3.3.1.5 Use the predictability of the motions of the Earth, sun and moon to explain day length, the phases of the moon, and eclipses.</p>	<p>Planetary Science Investigation 3, Parts 1-2, pp. 89-98 Investigation 9, Parts 1-4, pp. 283-301 CD, Day/Night Simulation CD, Phases of the Moon</p>	<p>DSR, Earth, Moon and Sun, pp. 8-10, 14-15, 18-19</p>
<p>8.3.4.1.1 Describe how mineral and fossil fuel resources have formed over millions of years, and explain why these resources are finite and non-renewable over human time frames.</p>		
<p>8.3.4.1.2 Recognize that land and water use practices in specific areas affect natural processes and that natural processes interfere and interact with human systems.</p> <p><i>For example:</i> Levees change the natural flooding process of a river.</p> <p><i>Another example:</i> Agricultural runoff joins the water cycle and influences natural systems far from the source.</p>		

