

CAROLINA

Carolina™ Curriculum Correlation to



Ohio Academic Content Standards
Science Grades K-8

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The following STC PROGRAM™, GEMS® and Zula® units are recommended based on the Ohio Academic Content Standards. Provided for each grade level, are the units that most strongly align with the content objectives. Carolina publishes additional units that are not included in the document. For more information visit www.carolinacurriculum.com

| GRADE | STC PROGRAM™ | GEMS® and Zula® |
|-------|---|--|
| K-2 | <ul style="list-style-type: none"> • Changes • Comparing and Measuring • Solids and Liquids • Sound • Organisms • The Life Cycle of Butterflies • Weather | <ul style="list-style-type: none"> • Investigating Artifacts • Penguins and Their Young • Launch Pad for Learning |
| 3-5 | <ul style="list-style-type: none"> • Animal Studies • Chemical Tests • Ecosystems • Electric Circuits • Land and Water • Motion and Design • Plant Growth and Development • Rocks and Minerals • Soils | <ul style="list-style-type: none"> • Space Science Sequence |
| 6-8 | <ul style="list-style-type: none"> • Catastrophic Events • Earth in Space • Energy, Machines, and Motion • Light • Organisms–From Macro to Micro • Properties of Matter | |



The STC PROGRAM™ is made up of 2 research-based, inquiry-centered curriculums:

- Science and Technology for Children® (STC®) for grades K–6; and
- Science and Technology Concepts for Middle Schools™ (STC/MS™) for grades 6–8



GEMS Kits® are standards-based PreK-8 math and science supplemental kits. The kits have been tested for specific grade levels but can also be used at lower or higher levels.



Great Explorations in Math and Science® (GEMS®) Space Science is a research-based 3-5 science curriculum that teach fundamental concepts in space science.



Zula®-Launch Pad for Learning is a PreK-2 science curriculum that teacher science and astronomy concepts.

LEGEND - To save paper, the curriculum location information in this document has been abbreviated as follows:

- TG = Teacher’s Guide
- S-Sec3 = Section 3 (containing a section on safety) in the STC® Teacher’s Guide
- L01, L02, etc. = Lesson 1, Lesson 2, etc. or Act01, Act02, etc. = Activity 1, Activity 2, etc.
- p, pp = page, pages
- RB = STC BOOK™ (a science reading book included in some of the grades 3–5 STC® unit kits)
- Exts = Extensions (found at the end of most lessons in the Teacher’s Guide)
- App-A, App-B = Appendix A, Appendix B (found at the end of Section 4 in the Teacher’s Guide)

K-8 Science Benchmarks

By the end of the K-2 program:

| Earth and Space Sciences | Life Sciences |
|--|---|
| <p>A. Observe constant and changing patterns of objects in the day and night sky.</p> <p>B. Explain that living things cause changes on Earth.</p> <ul style="list-style-type: none"> • Changes • TG: L06.Exts (pp67-69) • Solids and Liquids • TG: L14.Exts (p114) <p>C. Observe, describe and measure changes in the weather, both long term and short term.</p> <ul style="list-style-type: none"> • Weather • TG: L02-05 (pp11-54), L15-17 (pp135-150) <p>D. Describe what resources are and recognize some are limited but can be extended through recycling or decreased use.</p> <ul style="list-style-type: none"> • Changes • TG: L06.Exts (pp67-69) • Solids and Liquids • TG: L14.Exts (p114) | <p>A. Discover that there are living things, non-living things and pretend things, and describe the basic needs of living things (organisms).</p> <ul style="list-style-type: none"> • The Life Cycle of Butterflies • TG: L02-03 (pp11-22), L05-08 (pp29-52), L10-12 (pp63-80), L15-16 (pp89-96) • Organisms • TG: L01 (pp3-10), L03-04 (pp21-52), L06-10 (pp65-118), L13 (pp135-148), L15-17 (pp155-182) • Weather • TG: L10.Exts (p95) <p>B. Explain how organisms function and interact with their physical environment.</p> <ul style="list-style-type: none"> • Life Cycle of Butterflies • TG: L01-03 (pp3-22), L12 (pp75-80) • Organisms • TG: L04 (pp36-52), L11-12 (pp119-134) <p>C. Describe similarities and differences that exist among individuals of the same kind of plants and animals.</p> |
| Physical Sciences | Science and Technology |
| <p>A. Discover that many objects are made of parts that have different characteristics. Describe these characteristics and recognize ways an object may change.</p> <p>B. Recognize that light, sound and objects move in different ways.</p> <ul style="list-style-type: none"> • Solids and Liquids • TG: L04 (pp29-40) • Sound • TG: L01-17 (pp7-118) • Weather • TG: L09 (pp83-90) | <p>A. Explain why people, when building or making something, need to determine what it will be made of, how it will affect other people and the environment.</p> <p>B. Explain that to construct something requires planning, communication, problem solving and tools.</p> <ul style="list-style-type: none"> • Comparing and Measuring • TG: L14 (pp93-98) • The Life Cycle of Butterflies • TG: L01.Exts (p7), L02-09 (pp11-62), L11.Exts (pp71-73), L12 (pp75-80), L14 (pp85-88) |

| | |
|--|---|
| <p>C. Recognize sources of energy and their uses.</p> <ul style="list-style-type: none"> • Zula: Launch Pad for Learning | <ul style="list-style-type: none"> • Solids and Liquids • TG: L07.Exts (pp59-60), L11 (pp87-94) • Sound • TG: L04.Exts (pp26-27) • Weather • TG: L05-10 (pp43-100) |
| <p style="text-align: center;">Scientific Inquiry</p> | <p style="text-align: center;">Scientific Ways of Knowing</p> |
| <p>A. Ask a testable question.</p> <ul style="list-style-type: none"> • Changes • TG: L01-17 (pp3-158) • Comparing and Measuring • TG: L01-16 (pp3-116) • The Life Cycle of Butterflies • TG: L01-16 (pp3-96) • Organisms • TG: L01-17 (pp3-182) • Solids and Liquids • TG: L01-16 (pp3-136) • Sound • TG: L01-17 (pp11-118) • Weather • TG: L01-15 (pp3-140) • Investigating Artifacts • TG: Ses01-06 (pp7-63), Exts (pp68-69) • Penguins and Their Young • TG: Act01-04 (pp5-45) <p>B. Design and conduct a simple investigation to explore a question.</p> <ul style="list-style-type: none"> • Changes • TG: L01-17 (pp3-158) • Comparing and Measuring • TG: L01-16 (pp3-116) • The Life Cycle of Butterflies • TG: L01-16 (pp3-96) • Organisms • TG: L02-16 (pp11-178) • Solids and Liquids • TG: L02-16 (pp11-136) • Sound • TG: L01-17 (pp11-118) • Weather • TG: L02-13 (pp11-128) • Investigating Artifacts • TG: Ses01-06 (pp7-63), Exts (pp68-69) • Penguins and Their Young • TG: Act01-04 (pp5-45) <p>C. Gather and communicate information from careful observations and simple investigation through a variety of methods.</p> | <p>A. Recognize that there are different ways to carry out scientific investigations. Realize that investigations can be repeated under the same conditions with similar results and may have different explanations.</p> <ul style="list-style-type: none"> • Changes • TG: L01-17 (pp3-158) • Comparing and Measuring • TG: L01-16 (pp3-116) • The Life Cycle of Butterflies • TG: L01-16 (pp3-96) • Organisms • TG: L02-16 (pp11-178) • Solids and Liquids • TG: L02-16 (pp11-136) • Sound • TG: L01-17 (pp11-118) • Weather • TG: L02-13 (pp11-128) • Investigating Artifacts • TG: Ses01-06 (pp7-63), Exts (pp68-69) • Penguins and Their Young • TG: Act01-04 (pp5-45) <p>B. Recognize the importance of respect for all living things.</p> <p>C. Recognize that diverse groups of people contribute to our understanding of the natural world.</p> <ul style="list-style-type: none"> • Investigating Artifacts |

- **Changes**
- TG: L01-17 (pp3-158)
- **Comparing and Measuring**
- TG: L01-17 (pp3-120)
- **The Life Cycle of Butterflies**
- TG: L01-16 (pp3-96)
- **Organisms**
- TG: L02-16 (pp11-178)
- **Solids and Liquids**
- TG: L01-17 (pp3-140)
- **Sound**
- TG: L01-17 (pp11-118)
- **Weather**
- TG: L01-13 (pp3-128), L15-17 (pp135-150), App-B (pp153-167)
- **Investigating Artifacts**
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- **Penguins and Their Young**
- TG: Act01-04 (pp5-45)

Kindergarten

Earth and Space Sciences

The Universe

1. Observe that the sun can be seen only in the daytime, but the moon can be seen sometimes at night and sometimes during the day.

Processes That Shape Earth

2. Explore that animals and plants cause changes to their surroundings.
 - Organisms
 - TG: L01 (pp3-10), L17 (pp179-182)
3. Explore that sometimes change is too fast to see and sometimes change is too slow to see.
4. Observe and describe day-to-day weather changes (e.g., today is hot, yesterday we had rain).
 - Weather
 - TG: L02-05 (pp11-54), L15-17 (pp135-150)
5. Observe and describe seasonal changes in weather.
 - Weather
 - TG: L02-05 (pp11-54), L15-17 (pp135-150)

Life Sciences

Characteristics and Structure of Life

1. Explore differences between living and non-living things (e.g., plant-rock).
 - Organisms
 - TG: L01 (pp3-10), L01.Exts (p6), L15-17 (pp155-182)
2. Discover that stories (e.g., cartoons, movies, comics) sometimes give plants and animals characteristics they really do not have (e.g., talking flowers).

Heredity

3. Describe how plants and animals usually resemble their parents.
 - Penguins and Their Young
4. Investigate variations that exist among individuals of the same kind of plant or animal.
 - Penguins and Their Young

Diversity and

5. Investigate observable features of plants and animals that help them live

Interdependence of Life

in different kinds of places.

- Weather
- TG: L10.Exts (p95)
- Penguins and Their Young

6. Investigate the habitats of many different kinds of local plants and animals and some of the ways in which animals depend on plants and each other in our community.

- Organisms
- TG: L04 (pp36-52), L11-12 (pp119-134)

Physical Sciences

Nature of Matter

1. Demonstrate that objects are made of parts (e.g., toys, chairs).

2. Examine and describe objects according to the materials that make up the object (e.g., wood, metal, plastic and cloth).

- Solids and Liquids
- TG: L02-17 (pp11-140)

3. Describe and sort objects by one or more properties (e.g., size, color and shape).

- Comparing and Measuring
- TG: L01-05 (pp3-42)
- Organisms
- TG: L01 (pp3-10), L02.Exts (pp15-16), L05.Exts (p59), L13-14 (pp135-154), L17 (pp179-182)
- Solids and Liquids
- TG: L01-17 (pp3-140)
- Weather
- TG: L03 (pp25-32), L14 (pp129-134)
- Investigating Artifacts
- TG: Ses01 (pp7-13)

Forces and Motion

4. Explore that things can be made to move in many different ways such as straight, zigzag, up and down, round and round, back and forth, or fast and slow.

- Solids and Liquids
- TG: L04 (pp29-40)

5. Investigate ways to change how something is moving (e.g., push, pull).

- Solids and Liquids
- TG: L04 (pp29-40)

Science and Technology

Understanding

1. Explore that objects can be sorted as "natural" or "man-made".

Technology

- Comparing and Measuring
- TG: L01-05 (pp3-42)
- Organisms
- TG: L01 (pp3-10), L02.Exts (pp15-16), L05.Exts (p59), L13-14 (pp135-154), L17 (pp179-182)
- Solids and Liquids
- TG: L01-17 (pp3-140)
- Weather
- TG: L03 (pp25-32), L14 (pp129-134)
- Investigating Artifacts
- TG: Ses01 (pp7-13)

2. Explore that some materials can be used over and over again (e.g., plastic or glass containers, cardboard boxes and tubes).

- Solids and Liquids
- TG: L14.Exts (p114)

Abilities To Do Technological Design

3. Explore that each kind of tool has an intended use, which can be helpful or harmful (e.g., scissors can be used to cut paper but they can also hurt you).

- Comparing and Measuring
- TG: S-Sec (pp8-11)
- Organisms
- TG: S-Sec (pp19-24)
- Solids and Liquids
- TG: S-Sec (pp9-18), L11 (pp87-94)
- Weather
- TG: S-Sec (pp9-12), L02.Exts (pp15-16), L05-10 (pp43-100)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

Scientific Inquiry

Doing Scientific Inquiry

1. Ask "what if" questions.

- Comparing and Measuring
- TG: L01-16 (pp3-116)
- Organisms
- TG: L01-17 (pp3-182)
- Solids and Liquids
- TG: L01-16 (pp3-136)
- Weather
- TG: L01-15 (pp3-140)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

2. Explore and pursue student-generated "what if" questions.

- Comparing and Measuring

- TG: L01-16 (pp3-116)
- Organisms
- TG: L01-17 (pp3-182)
- Solids and Liquids
- TG: L01-16 (pp3-136)
- Weather
- TG: L01-15 (pp3-140)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

3. Use appropriate safety procedures when completing scientific investigations.

- Comparing and Measuring
- TG: S-Sec (pp8-11)
- Organisms
- TG: S-Sec (pp19-24)
- Solids and Liquids
- TG: S-Sec (pp9-18)
- Weather
- TG: S-Sec (pp9-12), L02.Exts (pp15-16)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

4. Use the five senses to make observations about the natural world.

- Comparing and Measuring
- TG: L01-17 (pp3-120)
- Organisms
- TG: L01.Exts (p6), L02-16 (pp11-178)
- Solids and Liquids
- TG: L01-16 (pp3-136)
- Weather
- TG: L01-15 (pp3-140)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

5. Draw pictures that correctly portray features of the item being described.

- Comparing and Measuring
- TG: L01 (pp3-10), L04-05 (pp23-42), L07 (pp49-58), L09 (pp65-70)
- Organisms
- TG: L02-16 (pp11-178)
- Solids and Liquids
- TG: L01 (pp3-10), L05.Exts (pp43-45), L06.Exts (pp51-52), L09 (pp69-80), L10.Exts (p85), L11.Exts (p92), L12 (pp95-100), L17 (pp137-140)
- Weather
- TG: L01-17 (pp3-150), App-B (pp153-167)

6. Recognize that numbers can be used to count a collection of things.

- Comparing and Measuring

- TG: L01-17 (pp3-120)
- Organisms
- TG: L02-16 (pp11-136)
- Weather
- TG: L01-13 (pp3-128), L15.Exts (p137), App-B (pp153-167)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

7. Use appropriate tools and simple equipment/instruments to safely gather scientific data (e.g., magnifiers and other appropriate tools).

- Comparing and Measuring
- TG: S-Sec (pp8-11)
- Organisms
- TG: S-Sec (pp19-24)
- Solids and Liquids
- TG: S-Sec (pp9-18), TG: L11 (pp87-94)
- Weather
- TG: S-Sec (pp9-12), L02.Exts (pp15-16), L05-10 (pp43-100)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

8. Measure the lengths of objects using non-standard methods of measurement (e.g., teddy bear counters and pennies).

- Comparing and Measuring
- TG: L01-17 (pp3- -120)
- Solids and Liquids
- TG: L09.Exts (p73)
- Weather
- TG: L05-10 (pp43-100), L12.Exts (pp116-117)

9. Make pictographs and use them to describe observations and draw conclusions.

- Comparing and Measuring
- TG: L01-17 (pp3-120)
- Organisms
- TG: L01.Exts (p6), L02-16 (pp11-178)
- Solids and Liquids
- TG: L01-17 (pp3-140)
- Weather
- TG: L01-17 (pp3-150), App-B (pp153-167)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

10. Make new observations when people give different descriptions for the same thing.

- Comparing and Measuring
- TG: L01-17 (pp3-120)
- Organisms

- TG: L01.Exts (p6), L02-16 (pp11-178)
- Solids and Liquids
- TG: L01-16 (pp3-136)
- Weather
- TG: L01-15 (pp3-140)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

Scientific Ways of Knowing

Nature of Science

1. Recognize that scientific investigations involve asking open-ended questions. (How? What if?)

- Comparing and Measuring
- TG: L01-16 (pp3-116)
- Organisms
- TG: L01-17 (pp3-182)
- Solids and Liquids
- TG: L01-16 (pp3-136)
- Weather
- TG: L01-15 (pp3-140)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

2. Recognize that people are more likely to accept your ideas if you can give good reasons for them.

- Comparing and Measuring
- TG: L01-16 (pp3-116)
- Organisms
- TG: L01-17 (pp3-182)
- Solids and Liquids
- TG: L01-16 (pp3-136)
- Weather
- TL01-15 (pp3-140)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

Ethical Practices

3. Interact with living things and the environment in ways that promote respect.

Science and Society

4. Demonstrate ways science is practiced by people everyday (children and adults).

Grade One

Earth and Space Sciences

Earth Systems

1. Identify that resources are things that we get from the living (e.g., forests) and nonliving (e.g., minerals, water) environment and that resources are necessary to meet the needs and wants of a population.
 - Changes
 - TG: L06.Exts (pp67-69)
 - Solids and Liquids
 - TG: L14.Exts (p114)
2. Explain that the supply of many resources is limited but the supply can be extended through careful use, decreased use, reusing and/or recycling.
 - Changes
 - TG: L06.Exts (pp67-69)
 - Solids and Liquids
 - TG: L14.Exts (p114)

Processes That Shape Earth

3. Explain that all organisms cause changes in the environment where they live; the changes can be very noticeable or slightly noticeable, fast or slow (e.g., spread of grass cover slowing soil erosion, tree roots slowly breaking sidewalks).

Life Sciences

Characteristics and Structure of Life

1. Explore that organisms, including people, have basic needs which include air, water, food, living space and shelter.
 - The Life Cycle of Butterflies
 - TG: L02-03 (pp11-22), L05-08 (pp29-52), L10-12 (pp63-80), L15-16 (pp89-96)
 - Organisms
 - TG: L03-04 (pp21-52), L06-10 (pp65-118), L13 (pp135-148), L15-16 (pp155-173)
 - Weather
 - TG: L10.Exts (p95)
2. Explain that food comes from sources other than grocery stores (e.g., farm crops, farm animals, oceans, lakes and forests).
 - The Life Cycle of Butterflies
 - TG: L02-03 (pp11-22), L05-08 (pp29-52), L10-12 (pp63-80), L15 (pp89-94)
 - Organisms
 - TG: L07-10 (pp75-118), L16 (pp169-178)
3. Explore that humans and other animals have body parts that help to seek, find and take in food when they are hungry (e.g., sharp teeth, flat teeth, good nose and sharp vision).
 - The Life Cycle of Butterflies

- TG: L01-11 (pp3-74), L13-16 (pp81-96), App-B (pp101-110)
- Organisms
- TG: L07-09 (pp75-104), L10 (pp105-118), L14-17 (pp149-182)

*Diversity and
Interdependence of
Life*

4. Investigate that animals eat plants and/or other animals for food and may also use plants or other animals for shelter and nesting.

- The Life Cycle of Butterflies
- TG: L02-03 (pp11-22), L05-08 (pp29-52), L10-12 (pp63-80), L15 (pp89-94)
- Organisms
- TG: L07-10 (pp75-118), L16 (pp169-178)

5. Recognize that seasonal changes can influence the health, survival or activities of organisms.

Physical Sciences

Nature of Matter

1. Classify objects according to the materials they are made of and their physical properties.

- Changes
- TG: L01 (pp3-20), L11 (pp103-110)
- Solids and Liquids
- TG: L01-02 (pp3-18), L07 (pp55-62), L10 (pp81-86)

2. Investigate that water can change from liquid to solid or solid to liquid.

- Changes
- TG: L03 (pp31-42), L06 (pp63-70), L08.Exts (p82), L09 (pp85-94), L13.Exts (p123), L17 (pp155-158)

3. Explore and observe that things can be done to materials to change their properties (e.g., heating, freezing, mixing, cutting, wetting, dissolving, bending and exposing to light).

- Changes
- TG: L01 (pp3-20), L11 (pp103-110)
- Solids and Liquids
- TG: L01-02 (pp3-18), L07 (pp55-62), L10 (pp81-86)

4. Explore changes that greatly change the properties of an object (e.g., burning paper) and changes that leave the properties largely unchanged (e.g., tearing paper).

- Changes
- TG: L01 (pp3-20), L11 (pp103-110)
- Solids and Liquids
- TG: L01-02 (pp3-18), L07 (pp55-62), L10 (pp81-86)

Forces and Motion

5. Explore the effects some objects have on others even when the two objects might not touch (e.g., magnets).

- Solids and Liquids

- TG: L04 (pp29-40)
6. Investigate a variety of ways to make things move and what causes them to change speed, direction and/or stop.
- Solids and Liquids
 - TG: L04 (pp29-40)

Nature of Energy

7. Explore how energy makes things work (e.g., batteries in a toy and electricity turning fan blades).
8. Recognize that the sun is an energy source that warms the land, air and water.
- Zula: Launch Pad for Learning
9. Describe that energy can be obtained from many sources in many ways (e.g., food, gasoline, electricity or batteries).

Science and Technology

Understanding Technology

1. Explore that some kinds of materials are better suited than others for making something new (e.g., the building materials used in the *Three Little Pigs*).
2. Explain that when trying to build something or get something to work better, it helps to follow directions and ask someone who has done it before.
- The Life Cycle of Butterflies
 - TG: L01-16 (pp3-96)
 - Organisms
 - TG: L03-16 (pp21-178)
 - Solids and Liquids
 - TG: L01 (pp3-10), L09 (pp69-80), L11.Exts (p92), L17 (pp137-140)
 - Weather
 - TG: L01-13 (pp3-128), L15-17 (pp135-150)
3. Identify some materials that can be saved for community recycling projects (e.g., newspapers, glass and aluminum).
- Changes
 - TG: L06.Exts (pp67-69)
 - Solids and Liquids
 - TG: L14.Exts (p114)
4. Explore ways people use energy to cook their food and warm their homes (e.g., wood, coal, natural gas and electricity).
5. Identify how people can save energy by turning things off when they are not using them (e.g., lights and motors).

Abilities To Do

6. Investigate that tools are used to help make things and some things

Technological Design

cannot be made without tools.

- The Life Cycle of Butterflies
- TG: L01.Exts (p7), L02-09 (pp11-62), L11.Exts (pp71-73), L12 (pp75-80), L14 (pp85-88)
- Solids and Liquids
- TG: L11 (pp87-94)
- Weather
- TG: L05-10 (pp43-100)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

7. Explore that several steps are usually needed to make things (e.g., building with blocks).

8. Investigate that when parts are put together they can do things that they could not do by themselves (e.g., blocks, gears and wheels).

Scientific Inquiry

Doing Scientific Inquiry

1. Ask "what happens when" questions.

- Changes
- TG: L01-02 (pp3-158)
- Comparing and Measuring
- TG: L01-16 (pp3-116)
- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L01-17 (pp3-182)
- Solids and Liquids
- TG: L01-16 (pp3-136)
- Weather
- TG: L01-15 (pp3-140)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

2. Explore and pursue student-generated "what happens when" questions.

- Changes
- TG: L01-17 (pp3-158)
- Comparing and Measuring
- TG: L01-16 (pp3-116)
- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L0-17 (pp3-182)
- Solids and Liquids
- TG: L01-16 (pp3-136)
- Weather
- TG: L01-15 (pp3-140)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young

- TG: Act01-04 (pp5-45)

3. Use appropriate safety procedures when completing scientific investigations.

- Changes
- TG: S-Sec (pp9-29)
- Comparing and Measuring
- TG: S-Sec (pp8-11)
- The Life Cycle of Butterflies
- TG: S-Sec (pp17-22), L02 (pp11-18)
- Organisms
- TG: S-Sec (pp19-24)
- Solids and Liquids
- TG: S-Sec (pp9-18)
- Weather
- TG: S-Sec (pp9-12), L02.Exts (pp15-16)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

4. Work in a small group to complete an investigation and then share findings with others.

- Changes
- TG: L01-17 (pp3-158)
- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L02-08 (pp11-178)
- Solids and Liquids
- TG: L01-17 (pp3-140)
- Weather
- TG: L01-17 (pp3-150)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

5. Create individual conclusions about group findings.

- Changes
- TG: L01-17 (pp3-158)
- Comparing and Measuring
- TG: L01-16 (pp3-116)
- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L01-17 (pp3-182)
- Solids and Liquids
- TG: L01-16 (pp3-136)
- Weather
- TG: L01-15 (pp3-140)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

6. Use appropriate tools and simple equipment/instruments to safely gather scientific data (e.g., magnifiers, timers and simple balances and other appropriate tools).

- Changes
- TG: S-Sec (pp9-29)
- Comparing and Measuring
- TG: S-Sec (pp8-11)
- The Life Cycle of Butterflies
- TG: S-Sec (pp17-22), L01.Exts (p7), L02-09 (pp11-62), L11.Exts (pp71-73), L12 (pp75-80), L14 (pp85-88)
- Organisms
- TG: S-Sec (pp19-24)
- Solids and Liquids
- TG: S-Sec (pp9-18), L11 (pp87-94)
- Weather
- TG: S-Sec (pp9-12), L02.Exts (pp15-16), L05-10 (pp43-100)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63)

7. Make estimates to compare familiar lengths, weights and time intervals.

- Changes
- TG: L09.Exts (pp89-90)
- Comparing and Measuring
- TG: L01-17 (pp3-120)
- The Life Cycle of Butterflies
- TG: L12 (pp75-80)
- Solids and Liquids
- TG: L09.Exts (p73)
- Weather
- TG: L05-10 (pp43-100), L12.Exts (pp116-117)

8. Use oral, written and pictorial representation to communicate work.

- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L03-16 (pp21-178)
- Solids and Liquids
- TG: L01 (pp3-10), L09 (pp69-80), L11.Exts (p92), L17 (pp137-140)
- Weather
- TG: L01-13 (pp3-128), L15-17 (pp135-150)

9. Describe things as accurately as possible and compare with the observations of others.

- Changes
- TG: L01-17 (pp3-158)
- Comparing and Measuring
- TG: L01-17 (pp3-120)
- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L01.Exts (p6), L02-16 (pp11-178)
- Solids and Liquids

- TG: L01-17 (pp3-140)
- Weather
- TG: L01-17 (pp3-150)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

Scientific Ways of Knowing

Nature of Science

1. Discover that when a science investigation is done the same way multiple times, one can expect to get very similar results each time it is performed.

- Changes
- TG: L01-17 (pp3-158)
- Comparing and Measuring
- TG: L01-16 (pp3-116)
- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L02-16 (pp11-178)
- Solids and Liquids
- TG: L02-16 (pp11-136)
- Weather
- TG: L02-13 (pp11-128)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

2. Demonstrate good explanations based on evidence from investigations and observations.

- Changes
- TG: L01-17 (pp3-158)
- Comparing and Measuring
- TG: L01-17 (pp3-120)
- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L01.Exts (p6), L02-16 (pp11-178)
- Solids and Liquids
- TG: L01-17 (pp3-140)
- Weather
- TG: L01-17 (pp3-150)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)
- Penguins and Their Young
- TG: Act01-04 (pp5-45)

Science and Society

3. Explain that everybody can do science, invent things and have scientific ideas no matter where they live.

- Comparing and Measuring

- TG: L14 (pp93-98)
- Solids and Liquids
- TG: L07.Exts (pp59-60)

Grade Two

Earth and Space Sciences

The Universe

1. Recognize that there are more stars in the sky than anyone can easily count.
 - Zula: Launch Pad for Learning
2. Observe and describe how the sun, moon and stars all appear to move slowly across the sky.
 - Zula: Launch Pad for Learning
3. Observe and describe how the moon appears a little different every day but looks nearly the same again about every four weeks.
 - Zula: Launch Pad for Learning

Earth Systems

4. Observe and describe that some weather changes occur throughout the day and some changes occur in a repeating seasonal pattern.
 - Weather
 - TG: L02-05 (pp11-54), L15-17 (pp135-150)
5. Describe weather by measurable quantities such as temperature and precipitation.
 - Weather
 - TG: L02-05 (pp11-54), L15 (pp135-150)

Life Sciences

Characteristics and Structure of Life

1. Explain that animals, including people, need air, water, food, living space and shelter; plants need air, water, nutrients (e.g., minerals), living space and light to survive.
 - The Life Cycle of Butterflies
 - TG: L02-03 (pp11-22), L05-08 (pp29-52), L10-12 (pp63-80), L15-16 (pp89-96)
 - Organisms
 - TG: L03-04 (pp21-52), L06-10 (pp65-118), L13 (pp135-148), L15-16 (pp155-178)
 - Weather
 - TG: L10.Exts (p95)
2. Identify that there are many distinct environments that support different kinds of organisms.
 - The Life Cycle of Butterflies
 - TG: L02.Exts (pp14-15)
 - Organisms
 - TG: L04.Exts (pp43-45), L11.Exts (pp122-123), L12.Exts (p131), L13.Exts (pp139-140)

3. Explain why organisms can survive only in environments that meet their needs (e.g., organisms that once lived on Earth have disappeared for different reasons such as natural forces or human-caused effects).

- The Life Cycle of Butterflies
- TG: L02-03 (pp11-22), L05-08 (pp29-52), L10-12 (pp63-80), L15 (pp89-94)
- Organisms
- TG: L07-10 (pp75-118), L16 (pp169-178)
- Penguins and Their Young

Heredity

4. Compare similarities and differences among individuals of the same kind of plants and animals, including people.

- Penguins and Their Young

*Diversity and
Interdependence of
Life*

5. Explain that food is a basic need of plants and animals (e.g., plants need sunlight to make food and to grow, animals eat plants and/or other animals for food, food chain) and is important because it is a source of energy (e.g., energy used to play, ride bicycles, read, etc.).

- The Life Cycle of Butterflies
- TG: L02-03 (pp11-22), L05-08 (pp29-52), L10-12 (pp63-80), L15 (pp89-94)
- Organisms
- TG: L07-10 (pp75-118), L16 (pp169-178)

6. Investigate the different structures of plants and animals that help them live in different environments (e.g., lungs, gills, leaves and roots).

- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96), App-B (pp101-110)
- Organisms
- TG: L07-10 (pp75-118), L13-15 (pp135-168), L17 (pp179-182)
- Sound
- TG: SL04.Exts (pp26-27), L14.Exts (p98)
- Weather
- TG: L10.Exts (p95)

7. Compare the habitats of many different kinds of Ohio plants and animals and some of the ways animals depend on plants and each other.

- The Life Cycle of Butterflies
- TG: L01-03 (pp3-22), L10 (pp63-68), L12 (pp75-80)
- Organisms
- TG: L04 (pp36-52), L11-12 (pp119-134), L14.Exts (pp152-153)

8. Compare the activities of Ohio's common animals (e.g., squirrels, chipmunks, deer, butterflies, bees, ants, bats and frogs) during the different seasons by describing changes in their behaviors and body covering.

- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L04 (pp36-52), L11 (pp119-126), L12 (pp127-134)
- Weather
- TG: L10.Exts (p95)

9. Compare Ohio plants during the different seasons by describing changes in their appearance.

- The Life Cycle of Butterflies
- TG: L01-03 (pp3-22), L12 (pp75-80)
- Organisms
- TG: L04 (pp36-52), L11-12 (pp119-134), L13.Exts (pp139-140)

Physical Sciences

Forces and Motion

1. Explore how things make sound (e.g., rubber bands, tuning fork and strings).
 - Sound
 - TG: L01-17 (pp11-118)
2. Explore and describe sounds (e.g., high, low, soft and loud) produced by vibrating objects.
 - Sound
 - TG: L01-17 (pp11-118)
3. Explore with flashlights and shadows that light travels in a straight line until it strikes an object.
 - Weather
 - TG: L09 (pp83-90)

Science and Technology

Understanding Technology

1. Explain that developing and using technology involves benefits and risks.
2. Investigate why people make new products or invent new ways to meet their individual wants and needs.
 - Weather
 - TG: L11-12 (pp101-122)
3. Predict how building or trying something new might affect other people and the environment.
 - Changes
 - TG: L02-03 (pp21-42), L09 (pp85-94), L11 (pp103-110), L14 (pp129-136), L16 (pp147-154)
 - Comparing and Measuring
 - TG: L05 (pp31-42), L08 (pp59-64), L12 (pp81-86), L14 (pp93-98), L16 (pp111-116)
 - The Life Cycle of Butterflies
 - TG: L04 (pp23-28), L07.Exts (p43), L08-10 (pp47-68)
 - Organisms
 - TG: L03 (pp21-36)
 - Solids and Liquids
 - TG: L04 (pp29-40), L10.Exts (p85), L11.Exts (p92), L12.Exts (p98), L13-14 (pp101-120), L15.Exts (p124), L16 (pp131-136)
 - Sound
 - TG: L03 (pp23-27), L05.Exts (pp35-36), L06 (pp39-48)
 - Weather
 - TG: L08.Exts (p76), L11.Exts (p104)

Abilities To Do Technological Design

4. Communicate orally, pictorially, or in written form the design process used to make something.
 - The Life Cycle of Butterflies

- TG: L01-16 (pp3-96)
- **Organisms**
- TG: L03-16 (pp21-178)
- **Solids and Liquids**
- TG: L01 (pp3-10), L09 (pp69-80), L11.Exts (p92), L17 (pp137-140)
- **Sound**
- TG: L01-14 (pp11-102), L17 (pp117-118)
- **Weather**
- TG: L01-13 (pp3-128), L15-17 (pp135-150)

Scientific Inquiry

Doing Scientific Inquiry

1. Ask "how can I/we" questions.

- **Changes**
- TG: L01-17 (pp3-158)
- **Comparing and Measuring**
- TG: L01-16 (pp3-116)
- **The Life Cycle of Butterflies**
- TG: L01-16 (pp3-96)
- **Organisms**
- TG: L01-17 (pp3-182)
- **Solids and Liquids**
- TG: L01-16 (pp3-136)
- **Sound**
- TG: L01-17 (pp11-118)
- **Weather**
- TG: L01-15 (pp3-140)
- **Investigating Artifacts**
- TG: Ses01-06 (pp7-63), Exts (pp68-69)

2. Ask "how do you know" questions (not "why" questions) in appropriate situations and attempt to give reasonable answers when others ask questions.

- **Changes**
- TG: L01-17 (pp3-158)
- **Comparing and Measuring**
- TG: L01-16 (pp3-116)
- **The Life Cycle of Butterflies**
- TG: L01-16 (pp3-96)
- **Organisms**
- TG: L01-17 (pp3-182)
- **Solids and Liquids**
- TG: L01-16 (pp3-136)
- **Sound**
- TG: L01-17 (pp11-118)
- **Weather**
- TG: L01-15 (pp3-140)
- **Investigating Artifacts**
- TG: Ses01-06 (pp7-63), Exts (pp68-69)

3. Explore and pursue student-generated "how" questions.

- **Changes**
- TG: L01-17 (pp3-158)

- Comparing and Measuring
- TG: L01-16 (pp3-116)
- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L01-17 (pp3-182)
- Solids and Liquids
- TG: L01-16 (pp3-136)
- Sound
- TG: L01-17 (pp11-118)
- Weather
- TG: L01-15 (pp3-140)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)

4. Use appropriate safety procedures when completing scientific investigations.

- Changes
- TG: S-Sec (pp9-29)
- Comparing and Measuring
- TG: S-Sec (pp8-11)
- The Life Cycle of Butterflies
- TG: S-Sec (pp17-22)
- Organisms
- TG: S-Sec (pp19-24)
- Solids and Liquids
- TG: S-Sec (pp9-18)
- Sound
- TG: S-Sec (pp9-12)
- Weather
- TG: S-Sec (pp9-12)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63)

5. Use evidence to develop explanations of scientific investigations. (What do you think? How do you know?)

- Changes
- TG: L01-17 (pp3-158)
- Comparing and Measuring
- TG: L01-16 (pp3-116)
- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L02-16 (pp11-178)
- Solids and Liquids
- TG: L02-16 (pp11-136)
- Sound
- TG: L01-17 (pp11-118)
- Weather
- TG: L02-13 (pp11-128)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)

6. Recognize that explanations are generated in response to observations, events and phenomena.

- **Changes**
- TG: L01-17 (pp3-158)
- **Comparing and Measuring**
- TG: L01-16 (pp3-116)
- **The Life Cycle of Butterflies**
- TG: L01-16 (pp3-96)
- **Organisms**
- TG: L01-17 (pp3-182)
- **Solids and Liquids**
- TG: L01-16 (pp3-136)
- **Sound**
- TG: L01-17 (pp11-118)
- **Weather**
- TG: L01-15 (pp3-140)
- **Investigating Artifacts**
- TG: Ses01-06 (pp7-63), Exts (pp68-69)

7. Use appropriate tools and simple equipment/instruments to safely gather scientific data (e.g., magnifiers, non-breakable thermometers, timers, rulers, balances and calculators and other appropriate tools).

- **Changes**
- TG: S-Sec (pp9-29)
- **Comparing and Measuring**
- TG: S-Sec (pp8-11)
- **The Life Cycle of Butterflies**
- TG: S-Sec (pp17-22), L01.Exts (p7), L02-09 (pp11-62), L11.Exts (pp71-73), L12 (pp75-80), L14 (pp85-88)
- **Organisms**
- TG: S-Sec (pp19-24)
- **Solids and Liquids**
- TG: S-Sec (pp9-18), L11 (pp87-94)
- **Sound**
- TG: S-Sec (pp9-12), L04.Exts (pp26-27)
- **Weather**
- TG: S-Sec (pp9-12), L02.Exts (pp15-16), L05-10 (pp43-100), App-A (pp151-152), App-B (pp153-167)
- **Investigating Artifacts**
- TG: Ses01-06 (pp7-63), Exts (pp68-69)

8. Measure properties of objects using tools such as rulers, balances and thermometers.

- **Changes**
- TG: L09.Exts (pp89-90)
- **Comparing and Measuring**
- TG: L01-17 (pp3-120)
- **The Life Cycle of Butterflies**
- TG: L01.Exts (p7), L02-09 (pp11-62), L11.Exts (pp71-73), L12 (pp75-80), L14 (pp85-88)
- **Solids and Liquids**
- TG: L09.Exts (p73), L11 (pp87-94)
- **Sound**
- TG: L04.Exts (pp26-27)
- **Weather**
- TG: L05-10 (pp43-100), App-A (pp151-152), App-B (pp153-167)
- **Investigating Artifacts**
- TG: Ses01-06 (pp7-63)

9. Use whole numbers to order, count, identify, measure and describe things and experiences.

- Changes
- TG: L01-17 (pp3-158)
- Comparing and Measuring
- TG: L01-17 (pp3-120)
- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L01.Exts (p6), L02-16 (pp11-178)
- Solids and Liquids
- L01-16 (pp3-136)
- Sound
- TG: L01-14 (pp11-102), L17 (pp117-118)
- Weather
- TG: L01-15 (pp3-140)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)

10. Share explanations with others to provide opportunities to ask questions, examine evidence and suggest alternative explanations.

- Changes
- TG: L01-17 (pp3-158)
- Comparing and Measuring
- TG: L01-16 (pp3-116)
- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L01-17 (pp3-182)
- Solids and Liquids
- TG: L01-17 (pp3-140)
- Sound
- TG: L01-17 (pp11-118)
- Weather
- TG: L01-17 (pp3-150)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)

Scientific Ways of Knowing

Nature of Science

1. Describe that scientific investigations generally work the same way under the same conditions.

- Changes
- TG: L01-17 (pp3-158)
- Comparing and Measuring
- TG: L01-16 (pp3-116)
- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L02-16 (pp11-178)
- Solids and Liquids
- TG: L02-16 (pp11-136)
- Sound

- TG: L01-17 (pp11-118)
- Weather
- TG: L02-13 (pp11-128)
- Investigating Artifacts
- TG: Ses01-06 (pp7-63), Exts (pp68-69)

2. Explain why scientists review and ask questions about the results of other scientists' work.

- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L03-16 (pp21-178)
- Solids and Liquids
- TG: L01 (pp3-10), L09 (pp69-80), L11.Exts (p92), L17 (pp137-140)
- Sound
- TG: L01-14 (pp11-102), L17 (pp117-118)
- Weather
- TG: L01-13 (pp3-128), L15-17 (pp135-150)

Ethical Practices

3. Describe ways in which using the solution to a problem might affect other people and the environment.

Science and Society

4. Demonstrate that in science it is helpful to work with a team and share findings with others.

- The Life Cycle of Butterflies
- TG: L01-16 (pp3-96)
- Organisms
- TG: L03-16 (pp21-178)
- Solids and Liquids
- TG: L01 (pp3-10), L09 (pp69-80), L11.Exts (p92), L17 (pp137-140)
- Sound
- TG: L01-14 (pp11-102), L17 (pp117-118)
- Weather
- TG: L01-13 (pp3-128), L15-17 (pp135-150)

K-8 Science Benchmarks

By the end of the 3-5 program:

| Earth and Space Sciences | Life Sciences |
|--|---|
| <p>A. Explain the characteristics, cycles and patterns involving Earth and its place in the solar system.</p> <ul style="list-style-type: none"> • Motion and Design • TG: L07 (pp65-72) • GEMS 3-5 Space Science Sequence • TG: Ses 1 Pre-Assessment (p 1), Ses 1 Post Assessment (pp 1-2), Ses 1.2 (pp 46-55), Ses 1.4-1.9 (pp 70-167), Ses 4.2 (pp 364-373) <p>B. Summarize the processes that shape Earth's surface and describe evidence of those processes.</p> <ul style="list-style-type: none"> • Land and Water • RB: (pp10-14), (pp36-38) • TG: L12 (pp129-142) <p>C. Describe Earth's resources including rocks, soil, water, air, animals and plants and the ways in which they can be conserved.</p> <ul style="list-style-type: none"> • Ecosystems • RB: (pp35-37), (pp45-48), pp57-59) • Land and Water • RB: (pp36-38) • TG: L12 (pp129-142), L14-16 (pp153-182) <p>D. Analyze weather and changes that occur over a period of time.</p> | <p>A. Differentiate between the life cycles of different plants and animals.</p> <ul style="list-style-type: none"> • Animal Studies • TG: L09.Exts (pp101-102) <p>B. Analyze plant and animal structures and functions needed for survival and describe the flow of energy through a system that all organisms use to survive.</p> <ul style="list-style-type: none"> • Animal Studies • RB: (pp09-19), (pp30-32), (pp35-42), (pp50-52) • TG: L01-17 (pp3-172) • Ecosystems • RB: (pp07-23), (pp26-37), (pp45-51) • TG: L01-07 (pp3-82), L12 (pp117-124), L17 (pp169-171) • Plant Growth and Development • TG: L01 (pp3-8) <p>C. Compare changes in an organism's ecosystem/habitat that affect its survival.</p> <ul style="list-style-type: none"> • Animal Studies • RB: (pp09-19), (pp30-32), (pp35-42), (pp50-52) • Animal Studies • TG: L01-17 (pp3-172) • Ecosystems • RB: (pp07-23), (pp26-37), (pp45-51) • TG: L01-07 (pp3-82), L12 (pp117-124), L17 (pp169-171) |
| Physical Sciences | Science and Technology |
| <p>A. Compare the characteristics of simple physical and chemical changes.</p> <ul style="list-style-type: none"> • Chemical Tests • TG: L10.Exts (p97), L11.Exts (pp103-104), L15.Exts (pp140-141), L16.Exts (pp152-153), L17 (pp155-158) • Ecosystems • TG: L13.Exts (p127) | <p>A. Describe how technology affects human life.</p> <ul style="list-style-type: none"> • Electric Circuits • RB: (pp17-21) <p>B. Describe and illustrate the design process.</p> <ul style="list-style-type: none"> • Motion and Design • RB: (pp29-31), (pp54-57), (p62) • TG: L01-02 (pp1-24), L05 (pp47-56), L09 (pp81-90), L15-17 (pp139-156) |

B. Identify and describe the physical properties of matter in its various states.

- Chemical Tests
- TG: L11.Exts (pp103-104), L16.Exts (pp152-153), L17 (pp155-158)
- Rocks and Minerals
- TG: L01-02 (pp3-18)
- Soils
- TG: L01 (pp3-16), L03-08 (pp27-86)

C. Describe the forces that directly affect objects and their motion.

- Motion and Design
- TG: L03-05 (pp25-56), L07.Exts (pp68-69), L08-13 (pp73-124), L15 (pp139-144), L17 (pp153-156)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1 (pp 28-45), Ses 2.1-2.6 (pp 172-281)

D. Summarize the way changes in temperature can be produced and thermal energy transferred.

- Chemical Tests
- TG: L10 (pp93-100)
- Electric Circuits
- RB: (pp13-21), (pp24-28), (pp32-33), (pp36-38)
- Motion and Design
- TG: L06 (pp57-64)

E. Trace how electrical energy flows through a simple electrical circuit and describe how the electrical energy can produce thermal energy, light, sound and magnetic forces.

- Electric Circuits
- RB: (pp13-33), (pp36-44)
- TG: L01-17 (pp3-86)
- Motion and Design
- TG: L06-07 (pp57-72), L12 (pp109-116), L15 (pp139-144)

F. Describe the properties of light and sound energy.

- Chemical Tests
- TG: L10.Exts (p97)
- Electric Circuits
- RB: (pp39-41)

| <p style="text-align: center;">Scientific Inquiry</p> | <p style="text-align: center;">Scientific Ways of Knowing</p> |
|--|---|
| <p>A. Use appropriate instruments safely to observe, measure and collect data when conducting a scientific investigation.</p> <ul style="list-style-type: none"> • Animal Studies • TG: S-Sec (pp16-26), L02-10 (pp11-114), L12-15 (pp123-164), L17 (pp169-172) • Chemical Tests • TG: S-Sec (pp18-46), L01-17 (pp3-158) • Ecosystems • RB: (pp43-44) • TG: S-Sec (pp34-44), L02-17 (pp13-171) • Electric Circuits • RB: (pp13-16), (pp29-33), (pp42-44), pp60-61) • TG: S-Sec (pp16-19), L01-17 (pp3-86) • Land and Water • RB: (pp32-35) • TG: S-Sec (pp13-18), L01-17 (pp3-186) • Motion and Design • RB: (pp23-28) • TG: S-Sec (pp8-11), L01-17 (pp1-156) • Plant Growth and Development • TG: S-Sec (pp10-14), L01-16 (pp3-98) • Rocks and Minerals • TG: S-Sec (pp10-14), L01-16 (pp3-126) • Soils • TG: S-Sec (pp12-17), L01-16 (pp3-168) • GEMS 3-5 Space Science Sequence • TG: Ses 1.1 (pp 28-45), Ses 1.4-1.5 (pp 70-103), Ses 1.7-1.9 (pp 122-167), Ses 2.4-2.5 (pp 226-259), Ses 3.2-3.4 (pp 300-335), Ses 4.1-4.5 (pp 340-423) <p>B. Organize and evaluate observations, measurements and other data to formulate inferences and conclusions.</p> <ul style="list-style-type: none"> • Animal Studies • TG: L01-17 (pp3-172) • Chemical Tests • TG: L01-17 (pp3-158) • Ecosystems • RB: (pp43-44) • TG: L01-17 (pp3-171) • Electric Circuits • RB: (pp13-16), (pp60-61) • TG: L01-17 (pp3-86) • Land and Water • TG: L01-17 (pp3-186) • Motion and Design • RB: (pp23-28) • TG: L01 (pp1-14), L03-13 (pp25-124), L15-17 (pp139-156) • Plant Growth and Development • TG: L01-17 (pp3-100) • Rocks and Minerals • TG: L01-16 (pp3-126) | <p>A. Distinguish between fact and opinion and explain how ideas and conclusions change as new knowledge is gained.</p> <ul style="list-style-type: none"> • Animal Studies • TG: L16 (pp165-168) • Chemical Tests • TG: L01-17 (pp3-158) • Ecosystems • TG: L13 (pp125-132) • Land and Water • TG: L06 (pp63-74), L08 (pp85-98), L10-12 (pp109-142), L15-16 (pp163-182) • Motion and Design • TG: L04-05 (pp35-56), L07 (pp65-72), L10 (pp91-100), L12 (pp109-116), L15-16 (pp139-152) • Plant Growth and Development • TG: L02-17 (pp9-100) • Rocks and Minerals • TG: L01-16 (pp3-126) • GEMS 3-5 Space Science Sequence • TG: Ses 1.9 (pp 152-167) <p>B. Describe different types of investigations and use results and data from investigations to provide the evidence to support explanations and conclusions.</p> <ul style="list-style-type: none"> • Animal Studies • TG: L01-17 (pp3-172) • Chemical Tests • TG: L01-17 (pp3-158) • Ecosystems • RB: (pp43-44) • TG: L01-17 (pp3-171) • Electric Circuits • RB: (pp13-16), (pp60-61) • TG: L01-17 (pp3-86) • Land and Water • TG: L01-17 (pp3-186) • Motion and Design • RB: (pp23-28) • TG: L01 (pp1-14), L03-15 (pp25-144), L17 (pp153-156) • Plant Growth and Development • TG: L01-16 (pp3-98) • Rocks and Minerals • TG: L01-16 (pp3-126) • Soils • TG: L01-16 (pp3-168) • GEMS 3-5 Space Science Sequence • TG: Ses 1.1-1.9 (pp 28-167), Ses 2.1-2.6 (pp 172-281), Ses 3.1-3.4 (pp 286-335), Ses 4.1-4.5 (pp 340-423) |

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|---|---|
| <ul style="list-style-type: none"> • Soils • TG: L01-16 (pp3-168) • GEMS 3-5 Space Science Sequence TG: Ses 1.1-1.9 (pp 28-167), Ses 2.1-2.6 (pp 172-281), Ses 3.1-3.4 (pp 286-335), Ses 4.1-4.5 (pp 340-423) <p>C. Develop, design and safely conduct scientific investigations and communicate the results.</p> <ul style="list-style-type: none"> • Animal Studies • RB: (pp58-61) • TG: L01-17 (pp3-172) • Chemical Tests • TG: L01-17 (pp3-158) • Ecosystems • RB: (pp07-23), (pp26-37), (pp40-51), (pp54-61) • TG: L01-17 (pp3-171) • Electric Circuits • RB: (pp13-16), (pp60-61) • TG: L01-17 (pp3-86) • Land and Water • TG: L01-17 (pp3-186) • Motion and Design • RB: (pp23-28) • TG: L01-17 (pp1-156) • Plant Growth and Development • TG: L01-16 (pp3-98) • Rocks and Minerals • TG: L01-16 (pp3-126) • Soils • TG: L01-17 (pp3-172) • GEMS 3-5 Space Science Sequence • TG: Ses 1 Pre-Assessment (p 1), Ses 1 Post Assessment (pp 1-2), Ses 1 Reading (p 2), Ses 1.1-1.9 (pp 28-167), Ses 2 Pre-Assessment (p 1), Ses 2 Post Assessment (pp 1-2), Ses 2.1-2.3 (pp 172-225), Ses 2.3 Reading (pp 1-2), Ses 2.4 (pp 226-245), Ses 2.4 Reading (pp 1-2), Ses 2.5-2.6 (pp 246-281), Ses 3 Pre-Assessment (pp 1-2), Ses 3 Post Assessment (pp 1-2), Ses 3 Reading (pp 1-2), Ses 3.1-3.4 (pp 286-335), Ses 4 Pre-Assessment (pp 1-2), Ses 4 Post Assessment (pp 1-2), Ses 4 Reading (pp 41-2), Ses 4.1-4.5 (pp 340-423) | <p>C. Explain the importance of keeping records of observations and investigations that are accurate and understandable.</p> <ul style="list-style-type: none"> • Animal Studies • RB: (pp58-61) • TG: L02 (pp11-20), L04-09 (pp37-106), L11-12 (pp115-134), L17 (pp169-172) • Chemical Tests • TG: Sec4.L01-16 (pp3-154), App-A (pp159-160) • Ecosystems • RB: (pp07-23), (pp26-37), (pp40-51), (pp54-61) • TG: L01-17 (pp3-171) • Electric Circuits • TG: L01-17 (pp3-86) • Land and Water • RB: (pp07-18), (pp21-38), (pp41-61) • TG: L01-17 (pp3-186) • Motion and Design • TG: L01-17 (pp1-156) • Plant Growth and Development • TG: L01-16 (pp3-98) • Rocks and Minerals • TG: L01-16 (pp3-126) • GEMS 3-5 Space Science Sequence • TG: Ses 1 Pre-Assessment (p 1), Ses 1 Post Assessment (pp 1-2), Ses 1 Reading (p 2), Ses 1.2-1.5 (pp 46-103), Ses 1.7-1.9 (pp 122-167), Ses 2 Pre-Assessment (p 1), Ses 2 Post Assessment (pp 1-2), Ses 2.1-2.3 (pp 172-225), Ses 2.3 Reading (pp 1-2), Ses 2.4 (pp 226-245), Ses 2.4 Reading (pp 1-2), Ses 2.5-2.6 (pp 246-281), Ses 3 Pre-Assessment (pp 1-2), Ses 3 Post Assessment (pp 1-2), Ses 3 Reading (pp 1-2), Ses 3.1-3.4 (pp 286-335) Ses 4 Pre-Assessment (pp 1-2), Ses 4 Post Assessment (pp 1-2), Ses 4 Reading (pp 41-2), Ses 4.1-4.5 (pp 340-423) <p>D. Explain that men and women of diverse countries and cultures participate in careers in all fields of science.</p> <ul style="list-style-type: none"> • Animal Studies • RB: (pp50-52) • Land and Water • RB: (pp07-09) • Motion and Design • RB: (pp23-28), (pp41-43) |
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Grade Three

Earth and Space Sciences

Earth Systems

1. Compare distinct properties of rocks (e.g., color, layering and texture).
 - Land and Water
 - RB: (pp15-18)
 - Rocks and Minerals
 - TG: L01-04 (pp3-34), L16-17 (pp113-128)
2. Observe and investigate that rocks are often found in layers.
 - Land and Water
 - RB: (pp15-18)
 - Rocks and Minerals
 - TG: L01 (pp3-34), L16-17 (pp113-128)
3. Describe that smaller rocks come from the breakdown of larger rocks through the actions of plants and weather.
 - Land and Water
 - RB: (pp15-18)
 - Rocks and Minerals
 - TG: L01 (pp3-34), L16-17 (pp113-128)
4. Observe and describe the composition of soil (e.g., small pieces of rock and decomposed pieces of plants and animals, and products of plants and animals).
 - Land and Water
 - RB: (pp36-38)
 - TG: L05.Exts (p56)
 - Soils
 - TG: L01-17 (pp3-172)
5. Investigate the properties of soil (e.g., color, texture, capacity to retain water, ability to support plant growth).
 - Land and Water
 - RB: (pp36-38)
 - TG: L05.Exts (p56)
 - Soils
 - TG: L01-17 (pp3-172)
6. Investigate that soils are often found in layers and can be different from place to place.
 - Land and Water
 - RB: (pp36-38)
 - TG: L05.Exts (p56)
 - Soils
 - TG: L01-17 (pp3-172)

Life Sciences

Heredity

1. Compare the life cycles of different animals including birth to adulthood, reproduction and death (e.g., egg-tadpole-frog, egg-caterpillar-chrysalis-butterfly).

- Animal Studies
- RB: (pp06-08), (pp12-15), (pp35-37)
- TG: L04.Exts (pp41-42), L07.Exts (pp79-80)

Diversity and Interdependence of Life

2. Relate animal structures to their specific survival functions (e.g., obtaining food, escaping or hiding from enemies).

- Animal Studies
- RB: (pp06-08), (pp16-19)
- TG: L03-06 (pp21-74), L08 (pp87-96), L13.Exts (p138), L14-15 (pp143-164), L16.Exts (p167)
- Electric Circuits
- RB: (pp11-12), (pp47-49)
- Motion and Design
- RB: (pp07-09), (pp14-17)
- Plant Growth and Development
- TG: L08-09 (pp43-54), L14 (pp79-88)

3. Classify animals according to their characteristics (e.g., body coverings and body structure).

- Animal Studies
- RB: (pp26-29)
- TG: L14.Exts (p145), L16.Exts (p167)
- Plant Growth and Development
- TG: L10 (pp55-60)

4. Use examples to explain that extinct organisms may resemble organisms that are alive today.

5. Observe and explore how fossils provide evidence about animals that lived long ago and the nature of the environment at that time.

- Animal Studies
- RB: (pp45-49)

6. Describe how changes in an organism's habitat are sometimes beneficial and sometimes harmful.

Physical Sciences

Forces and Motion

1. Describe an object's position by locating it relative to another object or the background.

2. Describe an object's motion by tracing and measuring its position over time.

- Motion and Design
- TG: L03-05 (pp25-56), L07.Exts (pp68-69), L08-13 (pp73-124), L15 (pp139-144),

- L17 (pp153-156)
 - GEMS 3-5 Space Science Sequence
 - TG: Ses 1.1 (pp 28-45), Ses 2.1-2.6 (pp 172-281)
3. Identify contact/noncontact forces that affect motion of an object (e.g., gravity, magnetism and collision).
- Motion and Design
 - TG: L03-05 (pp25-56), L07.Exts (pp68-69), L08-13 (pp73-124), L15 (pp139-144), L17 (pp153-156)
 - GEMS 3-5 Space Science Sequence
 - TG: Ses 1.1 (pp 28-45), Ses 2.1-2.6 (pp 172-281)
4. Predict the changes when an object experiences a force (e.g., a push or pull, weight and friction).
- Motion and Design
 - TG: L03-05 (pp25-56), L07.Exts (pp68-69), L08-13 (pp73-124), L15 (pp139-144), L17 (pp153-156)
 - GEMS 3-5 Space Science Sequence
 - TG: Ses 1.1 (pp 28-45), Ses 2.1-2.6 (pp 172-281)

Science and Technology

Understanding Technology

1. Describe how technology can extend human abilities (e.g., to move things and to extend senses).
- Animal Studies
 - TG: L08.Exts (p94)
 - Electric Circuits
 - RB: (pp17-21), (pp53-55)
 - TG: L16 (pp81-84)
 - Land and Water
 - RB: (pp21-29)
 - Motion and Design
 - RB: (pp32-36)
2. Describe ways that using technology can have helpful and/or harmful results.
- Animal Studies
 - TG: L08.Exts (p94)
 - Electric Circuits
 - RB: (pp17-21), (pp53-55)
 - TG: L16 (pp81-84)
 - Land and Water
 - RB: (pp21-29)
 - Motion and Design
 - RB: (pp32-36)
3. Investigate ways that the results of technology may affect the individual, family and community.
- Electric Circuits
 - RB: (pp17-21)

*Abilities To Do
Technological
Design*

4. Use a simple design process to solve a problem (e.g., identify a problem, identify possible solutions and design a solution).

- Electric Circuits
- TG: L02.Exts (p13), L06.Exts (p36), L16.Exts (p83)
- Motion and Design
- RB: (pp29-31), (pp54-57), (p62)
- TG: L01-02 (pp1-24), L05 (pp47-56), L09 (pp81-90), L15-17 (pp139-156)

5. Describe possible solutions to a design problem (e.g., how to hold down paper in the wind).

- Electric Circuits
- TG: L02.Exts (p13), L06.Exts (p36), L16.Exts (p83)
- Motion and Design
- RB: (pp29-31), (pp54-57), (p62)
- TG: L01-02 (pp1-24), L05 (pp47-56), L09 (pp81-90), L15-17 (pp139-156)

Scientific Inquiry

*Doing Scientific
Inquiry*

1. Select the appropriate tools and use relevant safety procedures to measure and record length and weight in metric and English units.

- Animal Studies
- TG: S-Sec (pp16-26), L02-15 (pp11-164)
- Chemical Tests
- TG: S-Sec (pp18-46), L01-10 (pp3-100), L12-16 (pp107-154)
- Electric Circuits
- RB: (pp29-33), (pp42-44)
- TG: S-Sec (pp16-19), L01-17 (pp3-86)
- Land and Water
- RB: (pp32-35)
- TG: S-Sec (pp13-18), L02-16 (pp11-182)
- Motion and Design
- TG: S-Sec (pp8-11), L02-04 (pp15-46), L06 (pp57-64), L08-09 (pp73-90), L11-17 (pp101-156)
- Plant Growth and Development
- TG: S-Sec (pp10-14), L02-16 (pp9-98)
- Rocks and Minerals
- TG: S-Sec (pp10-14), L01-16 (pp3-126)
- Soils
- TG: S-Sec (pp12-17), L01.Exts (p12), L02-03 (pp17-36), L05-08 (pp45-86), L10-15 (pp97-158)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.3-1.5 (pp 56-103), Ses 1.7-1.9 (pp 122-167), Ses 2.1 (pp 172-181), Ses 2.4 (pp 226-245), Ses 4.1 (pp 340-364)

2. Discuss observations and measurements made by other people.

- Animal Studies
- RB: (pp58-61)
- TG: L16-17 (pp165-172)
- Chemical Tests
- TG: L01-16 (pp3-154)
- Electric Circuits
- TG: L01-17 (pp3-86)
- Land and Water

- TG: L01-05 (pp3-62), L08 (pp85-98), L10-14 (pp109-162), L16-17 (pp173-186)
- **Motion and Design**
- TG: L01-17 (pp1-156)
- **Plant Growth and Development**
- TG: L01 (pp3-8), L13.Exts (p78)
- **Soils**
- TG: L01-17 (pp3-172)
- **GEMS 3-5 Space Science Sequence**
- TG: Ses 1 Pre-Assessment (p 1), Ses 1 Post Assessment (pp 1-2), Ses 1 Reading (p 2), Ses 1.4-1.5 (pp 70-103), Ses 1.7-1.9 (pp 122-167), Ses 2 Pre-Assessment (p 1), Ses 2 Post Assessment (pp 1-2), Ses 2.1-2.3 (pp 172-225), Ses 2.3 Reading (pp 1-2), Ses 2.4 (pp 226-245), Ses 2.4 Reading (pp 1-2), Ses 2.5-2.6 (pp 246-281), Ses 3 Pre-Assessment (pp 1-2), Ses 3 Post Assessment (pp 1-2), Ses 3 Reading (pp 1-2), Ses 3.1-3.4 (pp 286-335), Ses 4 Pre-Assessment (pp 1-2), Ses 4 Post Assessment (pp 1-2), Ses 4 Reading (pp 41-2), Ses 4.1-4.5 (pp 340-423)

3. Read and interpret simple tables and graphs produced by self/others.

- **Animal Studies**
- TG: L02-06 (pp11-74), L08-09 (pp87-106), L15 (pp157-164)
- **Chemical Tests**
- TG: L05 (pp45-56), L08 (pp79-84), L11 (pp101-106)
- **Electric Circuits**
- TG: L02-16 (pp7-84)
- **Land and Water**
- TG: L01-02 (pp3-28), L04-05 (pp37-62), L07-09 (pp75-108), L12-13 (pp129-152)
- **Motion and Design**
- TG: L04 (pp35-46)
- **Plant Growth and Development**
- TG: L01 (pp3-8), L05 (pp29-34), L07 (pp39-42), L12 (pp67-70), L15 (pp89-94), App-A (pp101-103)
- **Rocks and Minerals**
- TG: L03 (pp19-26)
- **GEMS 3-5 Space Science Sequence**
- TG: Ses 1.3 (pp 56-69)

4. Identify and apply science safety procedures.

- **Animal Studies**
- TG: S-Sec (pp16-26), L04 (pp37-48), L06 (pp65-74)
- **Chemical Tests**
- TG: S-Sec (pp18-46), L02 (pp13-22), L04.Exts (p39), L10 (pp93-100), L12.Exts (pp109-110)
- **Electric Circuits**
- RB: (pp29-33), (pp42-44)
- TG: S-Sec (pp16-19), L01-02 (pp3-14), L04 (pp21-24), L08 (pp45-48)
- **Land and Water**
- TG: S-Sec (pp13-18), L02 (pp11-28), L04 (pp37-50), L06 (pp63-74), L15 (pp163-172)
- **Motion and Design**
- TG: S-Sec (pp8-11), L02-13 (pp15-124), L15 (pp139-144), L17 (pp153-156)
- **Plant Growth and Development**
- TG: S-Sec (pp10-14)
- **Rocks and Minerals**
- TG: S-Sec (pp10-14)
- **Soils**
- TG: S-Sec (pp12-17)

5. Record and organize observations (e.g., journals, charts and tables).

- **Animal Studies**
- TG: L02-06 (pp11-74), L08-09 (pp87-106), L15 (pp157-164)
- **Chemical Tests**
- TG: L01-16 (pp3-154)
- **Electric Circuits**
- TG: L02-16 (pp7-84)
- **Land and Water**
- TG: L01-02 (pp3-28), L04-05 (pp37-62), L07-09 (pp75-108), L12 (pp129-142), L13 (pp143-152)
- **Motion and Design**
- TG: L04 (pp35-46)
- **Plant Growth and Development**
- TG: L01 (pp3-8), L05 (pp29-34), L07 (pp39-42), L12 (pp67-70), L15 (pp89-94), App-A (pp101-103)
- **Rocks and Minerals**
- TG: L01-16 (pp3-126)
- **GEMS 3-5 Space Science Sequence**
- TG: Ses 1.3 (pp 56-69)

6. Communicate scientific findings to others through a variety of methods (e.g., pictures, written, oral and recorded observations).

- **Animal Studies**
- RB: (pp58-61)
- TG: L17 (pp169-172)
- **Chemical Tests**
- TG: L01-16 (pp3-154)
- **Electric Circuits**
- TG: L01-17 (pp3-86)
- **Land and Water**
- TG: Sec4.L01-05 (pp3-62), L08 (pp85-98), L10-14 (pp109-162), L16-17 (pp173-186)
- **Motion and Design**
- TG: L01-04 (pp1-46), L06-17 (pp57-156)
- **Plant Growth and Development**
- TG: L01 (pp3-8)
- **Soils**
- TG: L01-17 (pp3-172)
- **GEMS 3-5 Space Science Sequence** TG: Ses 1 Pre-Assessment (p 1), Ses 1 Post Assessment (pp 1-2), Ses 1 Reading (p 2), Ses 1.4-1.5 (pp 70-103), Ses 1.7-1.9 (pp 122-167), Ses 2 Pre-Assessment (p 1), Ses 2 Post Assessment (pp 1-2), Ses 2.1-2.3 (pp 172-225), Ses 2.3 Reading (pp 1-2), Ses 2.4 (pp 226-245), Ses 2.4 Reading (pp 1-2), Ses 2.5-2.6 (pp 246-281), Ses 3 Pre-Assessment (pp 1-2), Ses 3 Post Assessment (pp 1-2), Ses 3 Reading (pp 1-2), Ses 3.1-3.4 (pp 286-335), Ses 4 Pre-Assessment (pp 1-2), Ses 4 Post Assessment (pp 1-2), Ses 4 Reading (pp 41-2), Ses 4.1-4.5 (pp 340-423)

Scientific Ways of Knowing

Nature of Science

1. Describe different kinds of investigations that scientists use depending on the questions they are trying to answer.

- **Animal Studies**
- TG: L12 (pp123-134), L16-17 (pp165-172)
- **Chemical Tests**
- TG: L01-17 (pp3-158)
- **Electric Circuits**
- RB: (pp13-16), (pp60-61)
- TG: L01-17 (pp3-86)

- Land and Water
- TG: L01-17 (pp3-186)
- Motion and Design
- RB: (pp23-28)
- TG: L01 (pp1-14), L03-15 (pp25-144), L17 (pp153-156)
- Plant Growth and Development
- TG: L01-16 (pp3-98)
- Rocks and Minerals
- TG: L01-16 (pp3-126)
- Soils
- TG: L01-16 (pp3-168)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1 (pp 28-45), Ses 1.4-1.5 (pp 70-103), Ses 1.7-1.9 (pp 122-167), Ses 2.4-2.5 (pp 226-259), Ses 3.2-3.4 (pp 300-335), Ses 4.1-4.5 (pp 340-423)

Ethical Practices

2. Keep records of investigations and observations and do not change the records that are different from someone else's work.

- Chemical Tests
- TG: L12 (pp107-114)
- Electric Circuits
- TG: L17 (pp85-86)
- Land and Water
- RB: (pp07-09)
- TG: L02-03 (pp11-36), L09 (pp99-108), L13 (pp143-152), L17 (pp182-186)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1-1.9 (pp 28-167), Ses 2.1-2.6 (pp 172-281), Ses 3.1-3.4 (pp 286-335), Ses 4.1-4.5 (pp 340-423)

Science and Society

3. Explore through stories how men and women have contributed to the development of science.

- Electric Circuits
- RB: (pp07-12), (pp17-21)
- Land and Water
- RB: (pp07-09), (pp36-38), (pp41-44), (pp57-58)

4. Identify various careers in science.

- Animal Studies
- TG: L08.Exts (p94)
- Electric Circuits
- RB: (pp42-44)

5. Discuss how both men and women find science rewarding as a career and in their everyday lives.

- Animal Studies
- TG: L08.Exts (p94)
- Electric Circuits
- RB: (pp07-12), (pp17-21), (pp29-38), (pp42-44)
- TG: L01.Exts (p5)
- Land and Water
- RB: (pp07-09), (pp36-38), (pp41-44), (pp57-58)

Grade Four

Earth and Space Sciences

Earth Systems

1. Explain that air surrounds us, takes up space, moves around us as wind, and may be measured using barometric pressure.
 - GEMS 3-5 Space Science Sequence
 - TG: Ses 1.1-1.9 (pp 28-167), Ses 2.1-2.6 (pp 172-281)
2. Identify how water exists in the air in different forms (e.g., in clouds, fog, rain, snow and hail).
 - Chemical Tests
 - TG: L05.Exts (p50)
 - Land and Water
 - TG: L01-03 (pp3-36), L06 (pp63-74)
 - GEMS 3-5 Space Science Sequence
 - TG: Ses 1.1-1.9 (pp 28-167), Ses 2.1-2.6 (pp 172-281)
3. Investigate how water changes from one state to another (e.g., freezing, melting, condensation and evaporation).
 - Chemical Tests
 - TG: L08.Exts (p82)
 - Land and Water
 - RB: (pp21-25)
 - TG: L01-02 (pp3-28)
4. Describe weather by measurable quantities such as temperature, wind direction, wind speed, precipitation and barometric pressure.
5. Record local weather information on a calendar or map and describe changes over a period of time (e.g., barometric pressure, temperature, precipitation symbols and cloud conditions).
6. Trace how weather patterns generally move from west to east in the United States.
7. Describe the weather which accompanies cumulus, cumulonimbus, cirrus and stratus clouds.

Processes That Shape Earth

8. Describe how wind, water and ice shape and reshape Earth's land surface by eroding rock and soil in some areas and depositing them in other areas producing characteristic landforms (e.g., dunes, deltas and glacial moraines).
 - Land and Water
 - RB: (pp36-38)
 - TG: L03-07 (pp29-84), L09.Exts (p103), L10-15 (pp109-172)
9. Identify and describe how freezing, thawing and plant growth reshape the land surface by causing the weathering of rock.

- Land and Water
- RB: (pp10-14), (pp36-38)
- TG: L03 (pp29-36), L05 (pp51-62), L07 (pp75-84), L12 (pp129-142)

10. Describe evidence of changes on Earth's surface in terms of slow processes (e.g., erosion, weathering, mountain building and deposition) and rapid processes (e.g. volcanic eruptions, earthquakes and landslides).

- Land and Water
- RB: (pp10-14), (pp36-38)
- TG: L12 (pp129-142)

Life Sciences

Heredity

1. Compare the life cycles of different plants including germination, maturity, reproduction and death.

- Animal Studies
- TG: L03.Exts (p32), L09.Exts (pp101-102)
- Ecosystems
- TG: L03.Exts (p29), L13.Exts (p127)

Diversity and Interdependence of Life

2. Relate plant structures to their specific functions (e.g., growth, survival and reproduction).

- Land and Water
- TG: L14.Exts (p156)
- Plant Growth and Development
- TG: L02 (pp9-12), L04-05 (pp25-34), L10 (pp55-60), L13 (pp71-78)

3. Classify common plants according to their characteristics (e.g., tree leaves, flowers, seeds, roots and stems).

- Plant Growth and Development
- TG: L02.Exts (p11), L06.Exts (p36), L10 (pp55-60), L12.Exts (pp68-69), L13 (pp71-78)
- Rocks and Minerals
- TG: L16.Exts (p117)

4. Observe and explore that fossils provide evidence about plants that lived long ago and the nature of the environment at that time.

- Animal Studies
- TG: L03.Exts (p32)
- Ecosystems
- TG: L03.Exts (p29), L13.Exts (p127)

5. Describe how organisms interact with one another in various ways (e.g., many plants depend on animals for carrying pollen or dispersing seeds).

- Ecosystems
- RB: (pp11-23), (pp49-51)
- TG: L01-07 (pp3-82), L12 (pp117-124), L17 (pp169-171)
- Plant Growth and Development
- TG: L11 (pp61-66), L14.Exts (pp86-87)

Physical Sciences

Nature of Matter

1. Identify characteristics of a simple physical change (e.g., heating or cooling can change water from one state to another and the change is reversible).
 - Chemical Tests
 - TG: 11.Exts (pp103-104) L16.Exts (pp152-153), L17 (pp155-158)
 - Ecosystems
 - TG: L13.Exts (p127)
2. Identify characteristics of a simple chemical change. When a new material is made by combining two or more materials, it has chemical properties that are different from the original materials (e.g., burning paper, vinegar and baking soda).
 - Chemical Tests
 - TG: L10.Exts (p97), L11.Exts (pp103-104), L15.Exts (pp140-141), L16.Exts (pp152-153), L17 (pp155-158)
3. Describe objects by the properties of the materials from which they are made and that these properties can be used to separate or sort a group of objects (e.g., paper, glass, plastic and metal).
 - Chemical Tests
 - TG: L01-09 (pp3-92), L11-17 (pp101-158)
 - Electric Circuits
 - TG: L04 (pp21-24), L07 (pp39-44)
 - Rocks and Minerals
 - TG: L01-02 (pp3-18)
4. Explain that matter has different states (e.g., solid, liquid and gas) and that each state has distinct physical properties.
 - Chemical Tests
 - TG: L11.Exts (pp103-104), L16.Exts (pp152-153), L17 (pp155-158)
 - Rocks and Minerals
 - TG: L01-02 (pp3-18)

Nature of Energy

5. Compare ways the temperature of an object can be changed (e.g., rubbing, heating and bending of metal).
 - Chemical Tests
 - TG: L10 (pp93-100)

Science and Technology

Understanding Technology

1. Explain how technology from different areas (e.g., transportation, communication, nutrition, healthcare, agriculture, entertainment and manufacturing) has improved human lives.
 - Electric Circuits
 - RB: (pp17-21)

2. Investigate how technology and inventions change to meet peoples' needs and wants.

- Animal Studies
- TG: L03.Exts (p32)
- Ecosystems
- RB: (pp35-37)
- Electric Circuits
- RB: (pp07-10), (pp17-21), (pp36-38), (pp56-59)
- TG: L04.Exts (p24), L08.Exts (p47)
- Motion and Design
- RB: (pp20-22), (pp29-40), (pp54-57)

*Abilities To Do
Technological
Design*

3. Describe, illustrate and evaluate the design process used to solve a problem.

- Electric Circuits
- TG: L02.Exts (p13), L06.Exts (p36), L16.Exts (p83)
- Motion and Design
- RB: (pp29-31), (pp54-57), (p62)
- TG: L01-02 (pp1-24), L05 (pp47-56), L09 (pp81-90), L15-17 (pp139-156)

Scientific Inquiry

*Doing Scientific
Inquiry*

1. Select the appropriate tools and use relevant safety procedures to measure and record length, weight, volume, temperature and area in metric and English units.

- Animal Studies
- TG: S-Sec (pp16-26), L02-10 (pp11-114), L12-15 (pp123-164)
- Chemical Tests
- TG: S-Sec (pp18-46), L01-10 (pp3-100), L12-16 (pp107-154)
- Ecosystems
- RB: (pp43-44)
- TG: S-Sec (pp34-44), L06 (pp61-74)
- Electric Circuits
- RB: (pp29-33), (pp42-44)
- TG: S-Sec (pp16-19), L01-17 (pp3-86)
- Land and Water
- RB: (pp32-35)
- TG: S-Sec (pp13-18), L02-16 (pp11-182)
- Motion and Design
- TG: S-Sec (pp8-11), L02-04 (pp15-46), L06 (pp57-64), L08-09 (pp73-90), L11-17 (pp101-156)
- Plant Growth and Development
- TG: S-Sec (pp10-14), L02-16 (pp9-98)
- Rocks and Minerals
- TG: S-Sec (pp10-14), L01-16 (pp3-126)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.3-1. (pp 56-103), Ses 1.7-1.9 (pp 122-167), Ses 2.1 (pp 172-181), Ses 2.4 (pp 226-245), Ses 4.1 (pp 340-364)

2. Analyze a series of events and/or simple daily or seasonal cycles, describe the patterns and infer the next likely occurrence.

- Chemical Tests
- TG: L04.Exts (p39), L05-07 (pp45-78), L09 (pp85-106)
- Ecosystems
- TG: L02-15 (pp13-164)
- Electric Circuits
- TG: L03 (pp15-20), L05 (pp25-32), L09 (pp49-52), L11 (pp59-64)
- Land and Water
- TG: L03.Exts (p35), L04 (pp37-50), L10 (pp109-118), L13-16 (pp143-182)
- Motion and Design
- TG: L07 (pp65-72)
- Plant Growth and Development
- TG: L01 (pp3-8), L07 (pp39-42), L11.Exts (p63), L16.Exts (pp96-97)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1-1.9 (pp 28-167), Ses 2.1-2.6 (pp 172-281), Ses 3.1-3.4 (pp 286-335), Ses 4.1-4.5 (pp 340-423)

3. Develop, design and conduct safe, simple investigations or experiments to answer questions.

- Animal Studies
- TG: L01.Exts (p6), L05 (pp49-64), L08 (pp87-96), L10 (pp107-114), L12 (pp123-134), L17 (pp169-172)
- Chemical Tests
- TG: L01-17 (pp3-158)
- Ecosystems
- RB: (pp43-44)
- TG: L02-17 (pp13-171)
- Electric Circuits
- RB: (pp13-16), (pp60-61)
- TG: L01-17 (pp3-86)
- Land and Water
- TG: L01-17 (pp3-186)
- Motion and Design
- RB: (pp23-28)
- TG: L01-17 (pp1-156)
- Plant Growth and Development
- TG: L01-16 (pp3-98)
- Rocks and Minerals
- TG: L01-16 (pp3-126)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1 (pp 28-45), Ses 1.4-1.5 (pp 70-103), Ses 1.7-1.9 (pp 122-167), 2.4-2.5 (pp 226-259), Ses 3.2-3.4 (pp 300-335), Ses 4.1-4.5 (pp 340-423)

4. Explain the importance of keeping conditions the same in an experiment.

- Animal Studies
- TG: L10 (pp107-114)
- Chemical Tests
- TG: L01-10 (pp3-100), L12-16 (pp107-154)
- Ecosystems
- RB: (pp43-44)
- TG: L10-14 (pp99-144), L16.Exts (p167)
- Electric Circuits
- TG: L02-03 (pp7-20), L05-08 (pp25-48), L11.Exts (p63), L14 (pp73-76), L17 (pp85-86)
- Land and Water
- RB: (pp07-09)
- TG: L02-03 (pp11-36), L09 (pp99-108), L13 (pp143-152), L16-17 (pp173-186)
- Motion and Design
- TG: L15 (pp139-144)

Scientific Ways of Knowing

Nature of Science

1. Differentiate fact from opinion and explain that scientists do not rely on claims or conclusions unless they are backed by observations that can be confirmed.

- Chemical Tests
- TG: L12 (pp107-114)
- Electric Circuits
- TG: L17 (pp85-86)
- Land and Water
- RB: (pp07-09)
- TG: L02-03 (pp11-36), L09 (pp99-108), L13 (pp143-152), L17 (pp182-186)
- GEMS 3-5 Space Science Sequence TG: Ses 1.1-1.9 (pp 28-167), Ses 2.1-2.6 (pp 172-281), Ses 3.1-3.4 (pp 286-335), Ses 4.1-4.5 (pp 340-423)

2. Record the results and data from an investigation and make a reasonable explanation.

- Animal Studies
- TG: L04-09 (pp37-106), L11-12 (pp115-134), L17 (pp169-172)
- Chemical Tests
- TG: L01-17 (pp3-158)
- Ecosystems
- RB: (pp43-44)
- TG: L02-17 (pp13-171)
- Electric Circuits
- RB: (pp13-16), (pp60-61)
- TG: L01-17 (pp3-86)
- Land and Water
- TG: L01-17 (pp3-186)
- Motion and Design
- RB: (pp23-28)
- TG: L01 (pp1-14), L03-15 (pp25-144), L17 (pp153-156)
- Plant Growth and Development
- TG: L01-16 (pp3-98)
- Rocks and Minerals
- TG: L01-16 (pp3-126)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1 (pp 28-45), Ses 1.3-1.5 (pp 56-103), Ses 1.7-1.9 (pp 122-167), Ses 2.3-2.5 (pp 202-259), Ses 3.2-3.4 (pp 300-335), Ses 4.1-4.5 (pp 340-423)

3. Explain discrepancies in an investigation using evidence to support findings.

- Animal Studies
- TG: L12 (pp123-134), L17 (pp169-172)
- Chemical Tests
- TG: L01-17 (pp3-158)
- Ecosystems
- RB: (pp43-44)
- TG: L02-17 (pp13-171)
- Electric Circuits
- RB: (pp13-16), (pp60-61)
- TG: L01-17 (pp3-86)
- Land and Water
- RB: (pp07-09)

- TG: L01-17 (pp3-186)
- Motion and Design
- RB: (pp23-28)
- TG: L01 (pp1-14), L03-15 (pp25-144), L17 (pp153-156)
- Plant Growth and Development
- TG: L01-16 (pp3-98)
- Rocks and Minerals
- TG: L01-16 (pp3-126)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1-1.9 (pp 28-167), Ses 2.1-2.6 (pp 172-281), Ses 3.1-3.4 (pp 286-335), Ses 4.1-4.5 (pp 340-423)

Ethical Practices

4. Explain why keeping records of observations and investigations is important.

- Chemical Tests
- TG: L12 (pp107-114)
- Electric Circuits
- TG: L17 (pp85-86)
- Land and Water
- RB: (pp07-09)
- TG: L02-03 (pp11-36), L09 (pp99-108), L13 (pp143-152), L17 (pp182-186)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1-1.9 (pp 28-167), Ses 2.1-2.6 (pp 172-281), Ses 3.1-3.4 (pp 286-335), Ses 4.1-4.5 (pp 340-423)

Grade Five

Earth and Space Sciences

The Universe

1. Describe how night and day are caused by Earth's rotation.
 - GEMS 3-5 Space Science Sequence
 - TG: Ses 3.1-3.4 (pp 286-335), Ses 4.1-4.5 (pp 340-423)
2. Explain that Earth is one of several planets to orbit the sun, and that the moon orbits Earth.
 - GEMS 3-5 Space Science Sequence
 - TG: Ses 1 Pre-Assessment (p 1), Ses 1 Post Assessment (pp 1-2), Ses 1.2 (pp 46-55), Ses 1.4-1.9 (pp 70-167, Ses 2.6 (pp 260-281), Ses 3.1-3.3 (pp 286-323), Ses 4 Pre-Assessment (pp 1-2), Ses 4 Post Assessment (pp 1-2), Ses 4.1-4.5 (pp 340-423)
3. Describe the characteristics of Earth and its orbit about the sun (e.g., three-fourths of Earth's surface is covered by a layer of water [some of it frozen], the entire planet surrounded by a thin blanket of air, elliptical orbit, tilted axis and spherical planet).
 - GEMS 3-5 Space Science Sequence
 - TG: Ses 1.4-1.9 (pp 70-167), Ses 3.1-3.4 (pp 286-335), Ses 4.1-4.5 (pp 340-423)
4. Explain that stars are like the sun, some being smaller and some larger, but so far away that they look like points of light.

Earth Systems

5. Explain how the supply of many non-renewable resources is limited and can be extended through reducing, reusing and recycling but cannot be extended indefinitely.
 - Ecosystems
 - RB: (pp35-37), (pp45-48), (pp57-59)
 - Land and Water
 - RB: (pp36-38), (pp47-49)
 - TG: L12 (pp129-142), L14-16 (pp153-182)
6. Investigate ways Earth's renewable resources (e.g., fresh water, air, wildlife and trees) can be maintained.
 - Ecosystems
 - RB: (pp35-37), (pp45-48), (pp57-59)
 - Land and Water
 - RB: (pp36-38)
 - TG: L12 (pp129-142), L14-16 (pp153-182)

Life Sciences

Diversity and Interdependence of Life

1. Describe the role of producers in the transfer of energy entering ecosystems as sunlight to chemical energy through photosynthesis.
 - Ecosystems

- TG: L01 (pp3-12)
2. Explain how almost all kinds of animals' food can be traced back to plants.
- Ecosystems
 - RB: (pp14-16)
 - TG: L01 (pp3-12), L07 (pp75-82), L12.Exts (p120)
3. Trace the organization of simple food chains and food webs (e.g., producers, herbivores, carnivores, omnivores and decomposers).
- Ecosystems
 - RB: (pp14-16)
 - TG: L07 (pp75-82), L12.Exts (p120)
4. Summarize that organisms can survive only in ecosystems in which their needs can be met (e.g., food, water, shelter, air, carrying capacity and waste disposal). The world has different ecosystems and distinct ecosystems support the lives of different types of organisms.
- Animal Studies
 - RB: (pp06-08)
 - TG: L01-17 (pp3-172)
 - Ecosystems
 - RB: (pp07-10), RB: (pp11-23), (pp26-37), (pp40-51), (pp54-61)
 - TG: L01-02 (pp3-24), L04-15 (pp39-164), L17 (pp169-171)
5. Support how an organism's patterns of behavior are related to the nature of that organism's ecosystem, including the kinds and numbers of other organisms present, the availability of food and resources, and the changing physical characteristics of the ecosystem.
- Animal Studies
 - RB: (pp06-11), (pp16-19), (pp30-32), (pp35-37), (pp40-42), (pp45-49)
 - TG: L01-17 (pp3-172)
 - Ecosystems
 - RB: (pp07-23), (pp26-37), (pp40-51), (pp54-61)
 - TG: L01-02 (pp3-24), L04-15 (pp39-164), L17 (pp169-171)
6. Analyze how all organisms, including humans, cause changes in their ecosystems and how these changes can be beneficial, neutral or detrimental (e.g., beaver ponds, earthworm burrows, grasshoppers eating plants, people planting and cutting trees and people introducing a new species).
- Animal Studies
 - RB: (pp09-11)
 - Ecosystems
 - RB: (pp20-23), (pp26-27), (pp31-37), (pp40-42), (pp60-61)
 - TG: L01-12 (pp3-124), L17 (pp169-171)
 - Land and Water
 - TG: L14 (pp153-162)

Physical Sciences

Nature of Energy

1. Define temperature as the measure of thermal energy and describe the way it is measured.
2. Trace how thermal energy can transfer from one object to another by conduction.
3. Describe that electrical current in a circuit can produce thermal energy, light, sound and/or magnetic forces.
 - Electric Circuits
 - RB: (pp07-21), (pp24-44), pp47-61)
 - TG: L01-17 (pp3-86)
4. Trace how electrical current travels by creating a simple electric circuit that will light a bulb.
 - Electric Circuits
 - RB: (pp13-16), (pp29-33), (pp39-44)
 - TG: L01-17 (pp3-86)
5. Explore and summarize observations of the transmission, bending (refraction) and reflection of light.
 - Electric Circuits
 - RB: (pp39-41)
6. Describe and summarize observations of the transmission, reflection, and absorption of sound.
7. Describe that changing the rate of vibration can vary the pitch of a sound.

Science and Technology

Understanding Technology

1. Investigate positive and negative impacts of human activity and technology on the environment.
 - Animal Studies
 - TG: L14.Exts (p145)
 - Ecosystems
 - RB: (pp07-10)
 - Electric Circuits
 - RB: (pp17-21)
 - Motion and Design
 - RB: (pp29-36)

Abilities To Do Technological Design

2. Revise an existing design used to solve a problem based on peer review.
 - Animal Studies
 - RB: (pp58-61)
 - TG: L17 (pp169-172)
 - Ecosystems
 - RB: (pp07-23), (pp26-37), (pp40-51), (pp54-61)
 - TG: L02-10 (pp13-110), L12-17 (pp117-171)

- Electric Circuits
- TG: L01-17 (pp3-86)
- Land and Water
- TG: L01-05 (pp3-62), L08 (pp85-98), L10-14 (pp109-162), L16-17 (pp173-186)
- Motion and Design
- RB: (pp29-31), (pp54-57), (p62)
- TG: L01-17 (pp1-156)
- GEMS 3-5 Space Science Sequence
- TG: TG: Ses 1 Pre-Assessment (p 1), Ses 1 Post Assessment (pp 1-2), Ses 1 Reading (p 2), Ses 1.4-1.5 (pp 70-103), Ses 1.7-1.9 (pp 122-167), Ses 2 Pre Assessment (p 1), Ses 2 Post Assessment (pp 1-2), Ses 2.1-2.3 (pp 172-225), Ses 2.3 Reading (pp 1-2), Ses 2.4 (pp 226-245), Ses 2.4 Reading (pp 1-2), Ses 2.5-2.6 (pp 246-281), Ses 3 Pre-Assessment (pp 1-2), Ses 3 Post Assessment (pp 1-2), Ses 3 Reading (pp 1-2), Ses 3.1-3.4 (pp 286-335), Ses 4 Pre-Assessment (pp 1-2), Ses 4 Post Assessment (pp 1-2), Ses 4 Reading (pp 41-2), Ses 4.1-4.5 (pp 340-423)

3. Explain how the solution to one problem may create other problems.

- Electric Circuits
- TG: L02.Exts (p13), L06.Exts (p36), L16.Exts (p83)
- Motion and Design
- RB: (pp29-31), (pp54-57), (p62)
- TG: L01-02 (pp1-24), L05 (pp47-56), L09 (pp81-90), L15-17 (pp139-156)

Scientific Inquiry

Doing Scientific Inquiry

1. Select and safely use the appropriate tools to collect data when conducting investigations and communicating findings to others (e.g., thermometers, timers, balances, spring scales, magnifiers, microscopes and other appropriate tools).

- Animal Studies
- TG: S-Sec (pp16-26), L02-10 (pp11-114), L12-15 (pp123-164), L17 (pp169-172)
- Ecosystems
- RB: (pp43-44)
- TG: S-Sec (pp34-44), L02-17 (pp13-171)
- Electric Circuits
- RB: (pp13-16), (pp29-33), (pp42-44), (pp60-61)
- TG: S-Sec (pp16-19), L01-17 (pp3-86)
- Land and Water
- RB: (pp32-35)
- TG: S-Sec (pp13-18), L01-17 (pp3-186)
- Motion and Design
- RB: (pp23-28)
- TG: S-Sec (pp8-11), L01-17 (pp1-156)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1 (pp 28-45), Ses 1.4-1.5 (pp 70-103), Ses 1.7-1.9 (pp 122-167), Ses 2.4-2.5 (pp 226-259), Ses 3.2-3.4 (pp 300-335), Ses 4.1-4.5 (pp 340-423)

2. Evaluate observations and measurements made by other people and identify reasons for any discrepancies.

- Animal Studies
- RB: (pp58-61)
- TG: L16-17 (pp165-172)
- Ecosystems
- RB: (pp07-23), (pp26-37), (pp40-51), (pp54-61)
- TG: L02-10 (pp13-110), L12-17 (pp117-171)

- **Electric Circuits**
- TG: L01-17 (pp3-86)
- **Land and Water**
- RB: (pp07-09)
- TG: L01-05 (pp3-62), L08 (pp85-98), L10-14 (pp109-162), L16-17 (pp173-186)
- **Motion and Design**
- TG: L01-04 (pp1-46), L06-17 (pp57-156)
- **GEMS 3-5 Space Science Sequence**
- TG: TG: Ses 1 Pre-Assessment (p 1), Ses 1 Post Assessment (pp 1-2), Ses 1 Reading (p 2), Ses 1.4-1.5 (pp 70-103), Ses 1.7-1.9 (pp 122-167), Ses 2 Pre Assessment (p 1), Ses 2 Post Assessment (pp 1-2), Ses 2.1-2.3 (pp 172-225), Ses 2.3 Reading (pp 1-2), Ses 2.4 (pp 226-245), Ses 2.4 Reading (pp 1-2), Ses 2.5-2.6 (pp 246-281), Ses 3 Pre-Assessment (pp 1-2), Ses 3 Post Assessment (pp 1-2), Ses 3 Reading (pp 1-2), Ses 3.1-3.4 (pp 286-335), Ses 4 Pre-Assessment (pp 1-2), Ses 4 Post Assessment (pp 1-2), Ses 4 Reading (pp 41-2), Ses 4.1-4.5 (pp 340-423)

3. Use evidence and observations to explain and communicate the results of investigations.

- **Animal Studies**
- RB: (pp58-61)
- TG: L12 (pp123-134), L17 (pp169-172)
- **Ecosystems**
- RB: (pp07-23), (pp26-37), (pp40-51), (pp54-61)
- TG: L02-17 (pp13-24), L17 (pp169-171)
- **Electric Circuits**
- RB: (pp13-16), (pp60-61)
- TG: L01-17 (pp3-86)
- **Land and Water**
- RB: (pp07-09)
- TG: L01-17 (pp3-186)
- **Motion and Design**
- RB: (pp23-28)
- TG: L01-17 (pp1-156)
- **GEMS 3-5 Space Science Sequence**
- TG: Ses 1 Pre-Assessment (p 1), Ses 1 Post Assessment (pp 1-2), Ses 1 Reading (p 2), Ses 1.1-1.9 (pp 28-167), Ses 2 Pre Assessment (p 1), Ses 2 Post Assessment (pp 1-2), Ses 2.1-2.3 (pp 172-225), Ses 2.3 Reading (pp 1-2), Ses 2.4 (pp 226-245), Ses 2.4 Reading (pp 1-2), Ses 2.5-2.6 (pp 246-281), Ses 3 Pre-Assessment (pp 1-2), Ses 3 Post Assessment (pp 1-2), Ses 3 Reading (pp 1-2), Ses 3.1-3.4 (pp 286-335), Ses 4 Pre-Assessment (pp 1-2), Ses 4 Post Assessment (pp 1-2), Ses 4 Reading (pp 41-2), Ses 4.1-4.5 (pp 340-423)

4. Identify one or two variables in a simple experiment.

- **Animal Studies**
- TG: L12 (pp123-134), L17 (pp169-172)
- **Ecosystems**
- RB: (pp43-44)
- TG: L02-17 (pp13-171)
- **Electric Circuits**
- RB: (pp13-16), (pp60-61)
- TG: L01-17 (pp3-86)
- **Land and Water**
- RB: (pp07-09)
- TG: L01-17 (pp3-186)
- **Motion and Design**
- RB: (pp23-28)
- TG: L01 (pp1-14) L03-15 (pp25-144), L17 (pp153-156)

- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1-1.9 (pp 28-167), Ses 2.1-2.6 (pp 172-281), Ses 3.1-3.4 (pp 286-335), Ses 4.1-4.5 (pp 340-423)

5. Identify potential hazards and/or precautions involved in an investigation.

- Animal Studies
- TG: S-Sec (pp16-26), L12 (pp123-134), L17 (pp169-172)
- Ecosystems
- RB: (pp43-44)
- TG: L02-17 (pp13-171)
- Electric Circuits
- RB: (pp13-16), (pp29-33), (pp42-44), (pp60-61)
- TG: S-Sec (pp16-19), L01-17 (pp3-86)
- Land and Water
- TG: S-Sec (pp13-18), L01-17 (pp3-186)
- Motion and Design
- RB: (pp23-28)
- TG: L01 (pp1-14), L03-15 (pp25-144), L17 (pp153-156)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1 (pp 28-45), Ses 1.4-1.5 (pp 70-103), Ses 1.7-1.9 (pp 122-167), Ses 2.4-2.5 (pp 226-259), Ses 3.2-3.4 (pp 300-335), Ses 4.1-4.5 (pp 340-423)

6. Explain why results of an experiment are sometimes different (e.g., because of unexpected differences in what is being investigated, unrealized differences in the methods used or in the circumstances in which the investigation was carried out, and because of errors in observations).

- Animal Studies
- TG: L01-17 (pp3-172)
- Ecosystems
- RB: (pp43-44)
- TG: L01-17 (pp3-171)
- Electric Circuits
- TG: L01-17 (pp3-86)
- Land and Water
- RB: (pp07-09)
- TG: L01-17 (pp3-186)
- Motion and Design
- TG: L01-15 (pp1-144), L17 (pp153-156)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1-1.9 (pp 28-167), Ses 2.1-2.6 (pp 172-281), Ses 3.1-3.4 (pp 286-335), Ses 4.1-4.5 (pp 340-423)

Scientific Ways of Knowing

Nature of Science

1. Summarize how conclusions and ideas change as new knowledge is gained.

- Animal Studies
- TG: L16 (pp165-168)
- Electric Circuits
- RB: (pp17-21)
- Motion and Design
- RB: (pp29-36)

2. Develop descriptions, explanations and models using evidence to defend/support findings.

- Animal Studies
- TG: L16 (pp165-168)
- Electric Circuits
- RB: (pp17-21)
- Motion and Design
- RB: (pp29-36)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1 Pre-Assessment (p 1), Ses 1 Post Assessment (pp 1-2), Ses 1 Reading (p 2), Ses 1.1-1.9 (pp 28-167), Ses 2 Pre-Assessment (p 1), Ses 2 Post Assessment (pp 1-2), Ses 2.1-2.4 (pp 172-245), Ses 2.4 Reading (pp 1-2), Ses 2.5-2.6 (pp 246-281), Ses 3 Pre Assessment (pp 1-2), Ses 3 Post Assessment (pp 1-2), Ses 3 Reading (pp 1-2), Ses 3.1-3.4 (pp 286-335), Ses 4 Pre Assessment (pp 1-2), Ses 4 Post Assessment (pp 1-2), Ses 4 Reading (pp 41-2), Ses 4.1-4.5 (pp 340-423)

3. Explain why an experiment must be repeated by different people or at different times or places and yield consistent results before the results are accepted.

- Animal Studies
- RB: (pp58-61)
- TG: L1-17 (pp165-172)
- Ecosystems
- RB: (pp07-23), (pp26-37), (pp40-51), (pp54-61)
- TG: L02-10 (pp13-110), L12-17 (pp117-171)
- Electric Circuits
- TG: L01-17 (pp3-86)
- Land and Water
- RB: (pp07-09)
- TG: L01-05 (pp3-62), L08-14 (pp85-162), L16-17 (pp173-186)
- Motion and Design
- TG: L01-04 (pp1-46), L06-17 (pp57-156)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1 Pre-Assessment (p 1), Ses 1 Post Assessment (pp 1-2), Ses 1 Reading (p 2), Ses 1.1-1.9 (pp 28-167), Ses 2 Pre-Assessment (p 1), Ses 2 Post Assessment (pp 1-2), Ses 2.1-2.4 (pp 172-245), Ses 2.4 Reading (pp 1-2), Ses 2.5-2.6 (pp 246-281), Ses 3 Pre Assessment (pp 1-2), Ses 3 Post Assessment (pp 1-2), Ses 3 Reading (pp 1-2), Ses 3.1-3.4 (pp 286-335), Ses 4 Pre Assessment (pp 1-2), Ses 4 Post Assessment (pp 1-2), Ses 4 Reading (pp 41-2), Ses 4.1-4.5 (pp 340-423)

4. Identify how scientists use different kinds of ongoing investigations depending on the questions they are trying to answer (e.g., observations of things or events in nature, data collection and controlled experiments).

- Animal Studies
- TG: L12 (pp123-134), L16-17 (pp165-172)
- Ecosystems
- RB: (pp43-44)
- TG: L02-17 (pp13-171)
- Electric Circuits
- RB: (pp13-16), (pp60-61)
- TG: L01-17 (pp3-86)
- Land and Water
- RB: (pp07-09)
- TG: L01-17 (pp3-186)

- Motion and Design
- RB: (pp23-28)
- TG: L01 (pp1-14), L03-15 (pp25-144), L17 (pp153-156)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.1-1.9 (pp 28-167), Ses 2.1-2.6 (pp 172-281), Ses 3.1-3.4 (pp 286-335), Ses 4.1-4.5 (pp 340-423)

Ethical Practices

5. Keep records of investigations and observations that are understandable weeks or months later.

- Animal Studies
- TG: L16 (pp165-168)
- GEMS 3-5 Space Science Sequence
- TG: Ses 1.3 (pp 56-69), Ses 1.5 (pp 86-103), Ses 1.7-1.8 (pp 122-151), Ses 2.3 (pp 202-225), Ses 4.2 (pp 364-373)

Science and Society

6. Identify a variety of scientific and technological work that people of all ages, backgrounds and groups perform.

- Animal Studies
- TG: L08.Exts (p94)
- Electric Circuits
- RB: (pp17-21), (pp29-38), (pp42-44), (pp53-55)
- TG: L01.Exts (p5), L16 (pp81-84)
- Land and Water
- RB: (pp21-29)
- Motion and Design
- RB: (pp32-36)

K-8 Science Benchmarks

By the end of the 6-8 program:

| Earth and Space Sciences | Life Sciences |
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| <p>A. Describe how the positions and motions of the objects in the universe cause predictable and cyclic events.</p> <ul style="list-style-type: none"> • Earth in Space • SG: L02 (pp12-21), L04-06 (pp42-87), L08-10 (pp102-145) L12-17 (pp160-289), L22 (pp340-343) • TG: L02 (pp11-20), L04-06 (pp37-82), L08 (pp97-120), L12 (pp181-196), L14-15 (pp209-244), L16.Exts (p256), L17 (pp269-276), L22 (pp311-326) <p>B. Explain that the universe is composed of vast amounts of matter, most of which is at incomprehensible distances and held together by gravitational force. Describe how the universe is studied by the use of equipment such as telescopes, probes, satellites and spacecraft.</p> <ul style="list-style-type: none"> • Catastrophic Events • SG: L02 (pp12-25) • TG: L02 (pp17-26) • Earth in Space • SG: L02 (pp12-21), L04-05 (pp42-73), L07-17 (pp88-289), L22 (pp340-343) • TG: L02 (pp11-20), L04-05 (pp37-72), L07-17 (pp83-276), L22 (pp311-326) • Light • SG: L03 (pp32-39), L09 (pp92-107), L16 (pp166-185), L22 (pp244-251) • TG: L22.Exts (pp310-311) <p>C. Describe interactions of matter and energy throughout the lithosphere, hydrosphere and atmosphere (e.g., water cycle, weather and pollution).</p> <ul style="list-style-type: none"> • Catastrophic Events • SG: L06 (pp68-79), L10 (pp114-119), L14-16 (pp164-193), L18 (pp200-209), L24 (pp264-273) • TG: L06 (pp69-82), L10 (pp143-148), L14-16 (pp187-232), L18 (pp257-264), L24 (pp329-346) • Energy, Machines, and Motion • SG: L09 (pp82-91) • Properties of Matter • SG: L01 (pp2-13) • TG: L05.Exts (p56) | <p>A. Explain that the basic functions of organisms are carried out in cells and groups of specialized cells form tissues and organs; the combination of these cells make up multicellular organisms that have a variety of body plans and internal structures.</p> <ul style="list-style-type: none"> • Organisms - From Macro to Micro • SG: L01 (pp2-11), L03 (pp28-37), L07-08 (pp82-105), L11 (pp132-145), L14 (pp172-179) • TG: L01 (pp3-14), L02.Exts (p25), L03 (pp33-48), L07-08 (pp105-150), L11 (pp185-200), L14 (pp237-252) <p>B. Describe the characteristics of an organism in terms of a combination of inherited traits and recognize reproduction as a characteristic of living organisms essential to the continuation of the species.</p> <ul style="list-style-type: none"> • Organisms - From Macro to Micro • SG: L01 (pp2-11), L09 (pp106-119), L14 (pp172-179), L18-19 (pp204-235) • TG: L01 (pp3-14), L02.Exts (p25), L09 (pp151-166), L14 (pp237-252), L18-19 (pp293-330) <p>C. Explain how energy entering the ecosystems as sunlight supports the life of organisms through photosynthesis and the transfer of energy through the interactions of organisms and the environment.</p> <ul style="list-style-type: none"> • Earth in Space • SG: L07 (pp88-101) • TG: L07 (pp83-96) • Light • SG: L01 (pp2-19), SG: L11 (pp116-131) • TG: L11.Exts (p131) • Organisms - From Macro to Micro • SG: L07 (pp82-93), L10 (pp120-131) • TG: L07 (pp105-130), L10 (pp167-184), L18.Exts (pp299-300) <p>D. Explain how extinction of a species occurs when the environment changes and its adaptive characteristics are insufficient to allow survival</p> |

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| <p>D. Identify that the lithosphere contains rocks and minerals and that minerals make up rocks. Describe how rocks and minerals are formed and/or classified.</p> <ul style="list-style-type: none"> • Catastrophic Events • SG: L10 (pp114-119), L14-15 (pp164-189), L21-22 (pp232-251) • TG: L10 (pp143-148), L14-15 (pp187-218), L21-22 (pp293-316), L23.Exts (pp325-326) • Earth in Space • TG: L12.Exts (pp192-193), L18.Exts (pp285-286) • Properties of Matter • TG: L05.Exts (p56) <p>E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements).</p> <ul style="list-style-type: none"> • Catastrophic Events • SG: L01-03 (pp2-41), L05-25 (pp54-282) • TG: L01-25 (pp3-372) • Earth in Space • SG: L13 (pp174-199) • TG: L13 (pp197-208) • Properties of Matter • SG: L05 (pp38-55) • TG: L11.Exts (p132) | <p>(as seen in evidence of the fossil record).</p> <ul style="list-style-type: none"> • Catastrophic Events • SG: L24 (pp264-273) • TG: L24 (pp329-346) • Organisms - From Macro to Micro • SG: L06 (pp64-81), L12-13 (pp146-171) • TG: L06 (pp73-104), L10.Exts (pp175-176) L12-13 (pp201-236), L18.Exts (pp299-300) |
| <p>Physical Sciences</p> | <p>Science and Technology</p> |
| <p>A. Relate uses, properties and chemical processes to the behavior and/or arrangement of the small particles that compose matter.</p> <ul style="list-style-type: none"> • Energy, Machines, and Motion • SG: L02-03 (pp12-25) • TG: L02-03 (pp23-36) • Properties of Matter • SG: L06-07 (pp56-73), L10-11 (pp86-105), L13 (pp112-115), L15 (pp122-129), L18 (pp150-161), L21-23 (pp186-217), L25 (pp224-229) • TG: L06-07 (pp65-90), L10-11 (pp113-134), L13 (pp143-152), L15 (pp161-168), L18 (pp193-208), L21-23 (pp241-294), L25 (pp303-312) <p>B. In simple cases, describe the motion of objects and conceptually describe the effects of forces on an object.</p> <ul style="list-style-type: none"> • Catastrophic Events | <p>A. Give examples of how technological advances, influenced by scientific knowledge, affect the quality of life.</p> <ul style="list-style-type: none"> • Energy, Machines, and Motion • SG: L16 (pp148-161) • TG: L16 (pp185-202) • Earth in Space • SG: L20-21 (pp324-339) • TG: L20-21 (pp293-) • Properties of Matter • TG: L21.Exts (p251) <p>B. Design a solution or product taking into account needs and constraints (e.g., cost, time, trade-offs, properties of materials, safety and aesthetics).</p> <ul style="list-style-type: none"> • Catastrophic Events • SG: L11 (pp120-133), L17 (pp194-197), L24-25 |

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| <ul style="list-style-type: none"> • SG: L11-12 (pp120-153), L15 (pp170-189) • TG: L11-12 (pp149-176), L15 (pp197-218) • Energy, Machines, and Motion • SG: L01 (pp2-11), L05-13 (pp36-129), L15-22 (pp140-236) • TG: L01 (pp3-22), L05-13 (pp47-166), L15-22 (pp177-254) • Earth in Space • SG: L15 (pp216-243) • TG: L15 (pp221-244) <p>C. Describe renewable and nonrenewable sources of energy (e.g., solar, wind, fossil fuels, biomass, hydroelectricity, geothermal and nuclear energy) and the management of these sources.</p> <ul style="list-style-type: none"> • Catastrophic Events • SG: L03-04 (pp26-53), L06-07 (pp68-95) • TG: L03-04 (pp27-56), L06-07 (pp69-102) • Energy, Machines, and Motion • SG: L04 (pp26-35), L08 (pp72-81) • TG: L04.Exts (pp41-42) • Earth in Space • SG: L07-09 (pp88-127) • TG: L07-09 (pp83-146) • Light • SG: L02 (pp20-31) <p>D. Describe that energy takes many forms, some forms represent kinetic energy and some forms represent potential energy; and during energy transformations the total amount of energy remains constant.</p> <ul style="list-style-type: none"> • Energy, Machines, and Motion • SG: L01-04 (pp2-35), L10 (pp92-97), L17 (pp164-173), L19-20 (pp188-213), L22 (pp226-236) • TG: L01-04 (pp3-46), L09-10 (pp99-130), L17 (pp203-216), L19-22 (pp229-254) • Light • SG: L02 (pp20-31), L07 (pp68-81), L26 (pp294-297) • TG: L02 (pp21-36), L26 (pp349-367) | <ul style="list-style-type: none"> • (pp264-282) • TG: L02.Exts (p23), L03.Exts (pp35-36), L06.Exts (pp77-78), L11 (pp149-162), L14.Exts (pp193-194), L17-18 (pp233-263), L23.Exts (pp325-326), L24-25 (pp329-372) • Energy, Machines, and Motion • SG: L16-18 (pp148-187), L21-22 (pp214-236) • TG: L06.Exts (pp68-69), L07 (pp75-84), L08.Exts (pp92-93), L09.Exts (p105), L12 (pp147-156), L16-17 (pp185-216), L20.Exts (p238), L21.Exts (p245), L22 (pp247-254) • Earth in Space • SG: L20-22 (pp324-343) • TG: L10.Exts (p152), L20-22 (pp293-326) • Light • SG: L03 (pp32-39), L07 (pp68-81), L15 (pp154-165), L19 (pp214-223), L21-22 (pp230-251) • TG: L03 (pp37-48), L07 (pp83-98), L15 (pp181-194), L19 (pp247-274), L21-22 (pp295-312) • Organisms - From Macro to Micro • SG: L15 (pp180-187), L20 (pp236-243) • TG: L15 (pp253-266), L20 (pp331-350) • Properties of Matter • SG: L10 (pp86-97) • TG: L04.Exts (p45), L07.Exts (p86), L10 (pp113-124), L13.Exts (p148) |
| <p>Scientific Inquiry</p> | <p>Scientific Ways of Knowing</p> |
| <p>A. Explain that there are differing sets of procedures for guiding scientific investigations and procedures are determined by the nature of the investigation, safety considerations and appropriate tools.</p> <ul style="list-style-type: none"> • Properties of Matter • SG: L17 (pp140-149) | <p>A. Use skills of scientific inquiry processes (e.g., hypothesis, record keeping, description and explanation).</p> <ul style="list-style-type: none"> • Catastrophic Events • SG: L01-25 (pp2-282) • TG: L01-25 (pp3-372) • Energy, Machines, and Motion |

- TG: L17 (pp179-192)

B. Analyze and interpret data from scientific investigations using appropriate mathematical skills in order to draw valid conclusions.

- Catastrophic Events
- SG: L12-13 (pp134-163), L15 (pp170-189), L17 (pp194-197), L22-25 (pp240-282)
- TG: L06.Exts (pp77-78), L12-13 (pp163-186), L14.Exts (pp193-194), L15 (pp197-218), L17 (pp233-256), L19.Exts (pp274-275), L22-25 (pp303-372)
- Energy, Machines, and Motion
- SG: L07 (pp62-71), L09-13 (pp82-129), L15 (pp140-147), L18 (pp174-187)
- TG: L04 (pp37-46), L07-13 (pp75-166), L15-16 (pp177-202), L18-19 (pp217-234)
- Earth in Space
- SG: L02-04 (pp12-61), L22 (pp340-343)
- TG: L02-04 (pp11-52), L11.Exts (p170), L22 (pp311-326)
- Light
- SG: L04 (pp40-47), L12-13 (pp132-141), L20 (pp224-227), L25 (pp284-293)
- TG: L03.Exts (p43), L12-13 (pp137-168), L25 (pp335-348)
- Properties of Matter
- SG: L02-04 (pp14-37), L08-09 (pp74-83), L13-14 (pp112-121), L16-17 (pp130-149), L19 (pp162-167), L23-24 (pp208-223), L26 (pp230-235)
- TG: L02-04 (pp15-48), L08-09 (pp91-112), L13-14 (pp143-160), L16-17 (pp169-192), L19 (pp209-226), L23-24 (pp275-302), L25.Exts (pp307-308), L26 (pp313-332)

- SG: L07 (pp62-71), L10 (pp92-97), L13 (pp120-129), L15 (pp140-147)
- TG: L04 (pp37-46), L05.Exts (pp53-54), L07 (pp75-84), L10 (pp107-130), L13 (pp157-166), L15-16 (pp177-202), L20.Exts (p238)
- Earth in Space
- SG: L01 (pp2-11), L03 (pp22-41), L05 (pp62-73), L09 (pp122-127), L11 (pp146-159), L13-14 (pp174-215), L18 (pp290-311), L22 (pp340-343)
- TG: L01 (pp3-10), L03 (pp21-36), L05 (pp53-72), L09 (pp121-146), L11 (pp159-180), L13-14 (pp197-220), L18-20 (pp277-308), L22 (pp311-326)
- Light
- SG: L01-26 (pp2-297)
- TG: L01-26 (pp3-367)
- Organisms - From Macro to Micro
- SG: L01-20 (pp2-243)
- TG: L01-20 (pp3-350)
- Properties of Matter
- SG: L01-26 (pp2-235)
- TG: L01-26 (pp3-332)

B. Explain the importance of reproducibility and reduction of bias in scientific methods.

- Energy, Machines, and Motion
- SG: L07 (pp62-71)
- TG: L07 (pp75-84)
- Light
- SG: L26 (pp294-297)
- TG: L26 (pp349-367)
- Organisms - From Macro to Micro
- SG: L15 (pp180-187)
- TG: L15 (pp253-266)
- Properties of Matter
- SG: L03 (pp24-29)
- TG: L03 (pp27-38)

C. Give examples of how thinking scientifically is helpful in daily life.

- Catastrophic Events
- SG: L01-25 (pp2-282)
- TG: L01-25 (pp3-372)
- Energy, Machines, and Motion
- TG: L05.Exts (pp53-54)
- Earth in Space
- SG: L05 (pp62-73), L09 (pp122-127), L13-14 (pp174-215), L18 (pp290-311), L22 (pp340-343)
- TG: L01 (pp3-10), L05 (pp53-72), L09 (pp121-146), L13-14 (pp197-220), L19-20 (pp287-308), L22 (pp311-326)
- Light
- SG: L01-26 (pp2-297)
- TG: L01-26 (pp3-367)
- Organisms - From Macro to Micro
- SG: L01-20 (pp2-243)

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| | <ul style="list-style-type: none">• TG: L01-20 (pp3-350)• Properties of Matter• SG: L01-26 (pp2-235)• TG: L01-26 (pp3-332) |
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Grade Six

Earth and Space Sciences

Earth Systems

1. Describe the rock cycle and explain that there are sedimentary, igneous and metamorphic rocks that have distinct properties (e.g., color, texture) and are formed in different ways.
 - Catastrophic Events
 - SG: L21-23 (pp232-263), L25 (pp274-282)
 - TG: L21-23 (pp293-328), L25 (pp347-372)
 - Earth in Space
 - SG: L18 (pp290-311)
 - TG: L12.Exts (pp192-193), L18 (pp277-286)
2. Explain that rocks are made of one or more minerals.
 - Catastrophic Events
 - SG: L21-22 (pp232-251)
 - TG: L21-22 (pp293-316), TG: L23.Exts (pp325-326)
 - Earth in Space
 - TG: L12.Exts (pp192-193), L18.Exts (pp285-286)
3. Identify minerals by their characteristic properties.
 - Catastrophic Events
 - SG: L21-22 (pp232-251)
 - TG: L21-22 (pp293-316)

Life Sciences

Characteristics and Structure of Life

1. Explain that many of the basic functions of organisms are carried out by or within cells and are similar in all organisms.
 - Organisms - From Macro to Micro
 - SG: L07-08 (pp82-105)
 - TG: L07-08 (pp105-150)
2. Explain that multicellular organisms have a variety of specialized cells, tissues, organs and organ systems that perform specialized functions.
 - Organisms - From Macro to Micro
 - SG: L07-08 (pp82-105)
 - TG: L07-08 (pp105-150)
3. Identify how plant cells differ from animal cells (e.g., cell wall and chloroplasts).
 - Organisms - From Macro to Micro
 - SG: L07-08 (pp82-105)
 - TG: L07-08 (pp105-150)

Heredity

4. Recognize that an individual organism does not live forever; therefore reproduction is necessary for the continuation of every species and traits

are passed on to the next generation through reproduction.

- Earth in Space
- SG: L16 (pp244-265)
- TG: L16 (pp245-268)
- Organisms - From Macro to Micro
- SG: L01 (pp2-11), L09 (pp106-119), L14 (pp172-179), L18-19 (pp204-235)
- TG: L01 (pp3-14), L06 (pp73-104), L09 (pp151-166), L14 (pp237-252), L18-19 (pp293-330)

5. Describe that in asexual reproduction all the inherited traits come from a single parent.

- Organisms - From Macro to Micro
- SG: L03 (pp28-37), L09 (pp106-119), L12 (pp146-155), L14 (pp172-179), L17-18 (pp194-215)
- TG: L03 (pp33-48), L09 (pp151-166), L12 (pp201-218), L14 (pp237-252), L17 (pp281-292)

6. Describe that in sexual reproduction an egg and sperm unite and some traits come from each parent, so the offspring is never identical to either of its parents.

- Organisms - From Macro to Micro
- SG: L03 (pp28-37), L09 (pp106-119), L12 (pp146-155), L14 (pp172-179), L17-18 (pp194-215)
- TG: L03 (pp33-48), L09 (pp151-166), L12 (pp201-218), L14 (pp237-252), L17 (pp281-292)

7. Recognize that likenesses between parents and offspring (e.g., eye color, flower color) are inherited. Other likenesses, such as table manners are learned.

- Organisms - From Macro to Micro
- SG: L01 (pp2-11), L19 (pp216-235)
- TG: L01 (pp3-14), L19 (pp303-330)

Diversity and Interdependence of Life

8. Describe how organisms may interact with one another.

- Organisms - From Macro to Micro
- SG: L04 (pp38-45), L09 (pp106-119), L12 (pp146-155)
- TG: L04 (pp49-56) L09 (pp151-166), L12 (pp201-218), L18.Exts (pp299-300)

Physical Sciences

Nature of Matter

1. Explain that equal volumes of different substances usually have different masses.

- Catastrophic Events
- SG: L04 (pp42-53)
- TG: L04 (pp45-56)
- Properties of Matter
- SG: L01-03 (pp2-29), L05 (pp38-55), L09 (pp78-83), L19 (pp162-167), L26 (pp230-235)

- TG: L01-03 (pp3-38, L04.Exts (p45), L05 (pp49-64), L09 (pp101-112), L19 (pp209-226), L26 (pp313-332)

2. Describe that in a chemical change new substances are formed with different properties than the original substance (e.g., rusting, burning).

- Catastrophic Events
- SG: L23 (pp252-263)
- TG: L23 (pp217-328)
- Properties of Matter
- SG: L06 (pp56-63), L18 (pp150-161), L20 (pp170-185), L24 (pp218-223)
- TG: L06 (pp65-78), L18 (pp193-208), L20 (pp227-240), L22.Exts (p270), L24 (pp295-302)

3. Describe that in a physical change (e.g., state, shape and size) the chemical properties of a substance remain unchanged.

- Energy, Machines, and Motion
- SG: L02-03 (pp12-25)
- TG: L02-03 (pp23-36)
- Properties of Matter
- SG: L18 (pp150-161)
- TG: L17.Exts (p185), L18 (pp193-208)

4. Describe that chemical and physical changes occur all around us (e.g., in the human body, cooking and industry).

- Properties of Matter
- SG: L06 (pp56-63), L18 (pp150-161), L20 (pp170-185), L24 (pp218-223)
- TG: L06 (pp65-78), L17.Exts (p185), L18 (pp193-208), L20 (pp227-240), L22.Exts (p270), L24 (pp295-302)

Nature of Energy

5. Explain that the energy found in nonrenewable resources such as fossil fuels (e.g., oil, coal and natural gas) originally came from the sun and may renew slowly over millions of years.

- Energy, Machines, and Motion
- SG: L01-02 (pp2-19), L09-10 (pp82-97), L20 (pp200-213), L22 (pp226-236)
- TG: L01-02 (pp3-30), L10 (pp107-130), L20 (pp235-238), L22 (pp247-254)

6. Explain that energy derived from renewable resources such as wind and water is assumed to be available indefinitely.

- Energy, Machines, and Motion
- SG: L01-02 (pp2-19), L04 (pp26-35), L09-10 (pp82-97), L20 (pp200-213), L22 (pp226-236)
- TG: L01-02 (pp3-30), L10 (pp107-130), L20 (pp235-238), L22 (pp247-254)

7. Describe how electric energy can be produced from a variety of sources (e.g., sun, wind and coal).

- Energy, Machines, and Motion
- SG: L02-04 (pp12-35), L09 (pp82-91)
- TG: L02-04 (pp23-46)
- Properties of Matter

- SG: L20 (pp170-185)
- TG: L20 (pp227-240)

8. Describe how renewable and nonrenewable energy resources can be managed (e.g., fossil fuels, trees and water).

- Energy, Machines, and Motion
- SG: L04 (pp26-35), SG: L09 (pp82-91)

Science and Technology

Understanding Technology

1. Explain how technology influences the quality of life.

- Earth in Space
- SG: L20-21 (pp324-339)
- TG: L20-21 (pp293-310)
- Properties of Matter
- TG: L21.Exts (p251)

2. Explain how decisions about the use of products and systems can result in desirable or undesirable consequences (e.g., social and environmental).

- Energy, Machines, and Motion
- SG: L16 (pp148-161, L20-21 (pp324-339)
- Earth in Space
- TG: L20-21 (pp293-310)

3. Describe how automation (e.g., robots) has changed manufacturing including manual labor being replaced by highly-skilled jobs.

- Earth in Space
- SG: L20-21 (pp324-339)
- TG: L20-21 (pp293-310)
- Properties of Matter
- SG: L10 (pp86-97)
- TG: L10 (pp113-124), L21.Exts (p251)

4. Explain how the usefulness of manufactured parts of an object depend on how well their properties allow them to fit and interact with other materials.

- Energy, Machines, and Motion
- TG: L17.Exts (p208), L18.Exts (p224), L19.Exts (p234), L21.Exts (p245)
- Earth in Space
- SG: L21 (pp334-339)
- TG: L20.Exts (p297), L21 (pp309-310)
- Organisms - From Macro to Micro
- TG: L05.Exts (pp69-70)
- Properties of Matter
- SG: L10 (pp86-97)
- TG: L10 (pp113-124), TG: L21.Exts (p251)

Abilities To Do Technological Design

5. Design and build a product or create a solution to a problem given one constraint (e.g., limits of cost and time for design and production, supply of materials and environmental effects).

- Catastrophic Events
- SG: L09 (pp102-112), L11 (pp120-133)
- TG: L06.Exts (pp77-78), L09 (pp127-142), L11 (pp149-162)
- **Energy, Machines, and Motion**
- SG: L16-18 (pp148-187), L21-22 (pp214-236)
- TG: L06.Exts (pp68-69), L08.Exts (pp92-93), L09.Exts (p105), L16-17 (pp185-216), L20.Exts (p238), L21.Exts (p245), L22 (pp247-254)
- **Earth in Space**
- SG: L20-21 (pp324-339)
- TG: L20-21 (pp293-310)
- **Properties of Matter**
- SG: L10 (pp86-97)
- TG: L10 (pp113-124)

Scientific Inquiry

Doing Scientific Inquiry

1. Explain that there are not fixed procedures for guiding scientific investigations; however, the nature of an investigation determines the procedures needed.

- Catastrophic Events
- SG: L01-25 (pp2-282)
- TG: L01-25 (pp3-372)
- **Energy, Machines, and Motion**
- SG: L01-22 (pp2-236)
- TG: L01-22 (pp3-254)
- **Earth in Space**
- SG: L01 (pp2-11), L04-06 (pp42-87), L09 (pp122-127), L11 (pp146-159), L13-14 (pp174-215), L18 (pp290-311), L20 (pp324-333), L22 (pp340-343)
- TG: L01 (pp3-10), L04 -06 (pp37-82), L09-11 (pp121-180), L13-14 (pp197-220), L18-20 (pp277-308), L22 (pp311-326)
- **Light**
- SG: L01-26 (pp2-297)
- TG: L01-26 (pp3-367)
- **Organisms - From Macro to Micro**
- SG: L01-20 (pp2-243)
- TG: L01-20 (pp3-350)
- **Properties of Matter**
- SG: L01-26 (pp2-235)
- TG: L01-26 (pp3-332)

2. Choose the appropriate tools or instruments and use relevant safety procedures to complete scientific investigations.

- Catastrophic Events
- SG: L12 (pp134-153), L14 (pp164-169), L16 (pp190-193), L19 (pp210-223), L22-23 (pp240-263)
- TG: (pp xxxiii - xxxv), L12 (pp163-176), L14 (pp187-196), L16 (pp219-232), L19 (pp265-278), L22 (pp303-328)
- **Energy, Machines, and Motion**
- SG: L01-13 (pp2-129), L16 (pp148-161), L18-21 (pp174-225)
- TG: (pp xxxiii - xxxv), L01-13 (pp3-166), L16 (pp185-202), L18-21 (pp217-246)
- **Earth in Space**
- SG: L01-22 (pp2-343)
- TG: (pp xxxiv - xxxvi), L01-22 (pp3-326)

- **Light**
- SG: L01-26 (pp2-297)
- TG: (pp xxxiv - xxxv), L01-12 (pp3-152), L14-15 (pp169-194), L16.Exts (p203), L17-26 (pp205-367)
- **Organisms - From Macro to Micro**
- SG: L02-20 (pp12-243)
- TG: (pp xxxiv-xxxv), L02-20 (pp15-350)
- **Properties of Matter**
- SG: L01-26 (pp2-235)
- TG: (pp xxxi - xxxiii), L01 (pp3-332)

3. Distinguish between observation and inference.

- **Catastrophic Events**
- SG: L01-25 (pp2-282)
- TG: L01-25 (pp3-372)
- **Energy, Machines, and Motion**
- SG: L01-22 (pp2-236)
- TG: L01 (pp3-254)
- **Earth in Space**
- SG: L01 (pp2-11), L04-05 (pp42-73), L09-11 (pp122-159), L13-14 (pp174-215), L18-20 (pp290-333), L22 (pp340-343)
- **Earth in Space**
- TG: L01 (pp3-10), L04-05 (pp37-72), L09-11 (pp121-180), L13-14 (pp197-220), L18-20 (pp277-308), L22 (pp311-326)
- **Light**
- SG: L01-26 (pp2-297)
- TG: L01-26 (pp3-367)
- **Organisms - From Macro to Micro**
- SG: L01-20 (pp2-243)
- TG: L01-20 (pp3-350)
- **Properties of Matter**
- SG: L01-26 (pp2-235)
- TG: L01-26 (pp3-332)

4. Explain that a single example can never prove that something is always correct, but sometimes a single example can disprove something.

- **Catastrophic Events**
- SG: L01-25 (pp2-282)
- TG: L01-25 (pp3-372)
- **Energy, Machines, and Motion**
- SG: L01-22 (pp2-236)
- TG: L01-22 (pp3-254)
- **Earth in Space**
- SG: L01 (pp2-11), L04-06 (pp42-87), L09 (pp122-127), L11 (pp146-159), L13-14 (pp174-215), L18 (pp290-311), L20 (pp324-333), L22 (pp340-343)
- TG: L01 (pp3-10), L04-06 (pp37-82), L09-11 (pp121-180), L13-14 (pp197-220), L18-20 (pp277-308), L22 (pp311-326)
- **Light**
- SG: L01-26 (pp2-297)
- TG: L01- (pp3-367)
- **Organisms - From Macro to Micro**
- SG: L01-20 (pp2-243)
- TG: L01-20 (pp3-350)
- **Properties of Matter**
- SG: L01-26 (pp2-235)
- TG: L01-26 (pp3-332)

Scientific Ways of Knowing

Nature of Science

1. Identify that hypotheses are valuable even when they are not supported.

- Catastrophic Events
- SG: L13-14 (pp154-169), L20 (pp224-231), L22-23 (pp240-263)
- TG: L13-14 (pp177-196), L20 (pp279-292), L22-23 (pp303-328)

Ethical Practices

2. Describe why it is important to keep clear, thorough and accurate records.

- Light
- SG: L26 (pp294-297)
- TG: L26 (pp349-367)

Science and Society

3. Identify ways scientific thinking is helpful in a variety of everyday settings.

- Earth in Space
- TG: L20.Exts (p297)

4. Describe how the pursuit of scientific knowledge is beneficial for any career and for daily life.

- Energy, Machines, and Motion
- SG: L17 (pp164-173)
- Earth in Space
- SG: L20-21 (pp324-339)
- TG: L20-21 (pp293-310)
- Properties of Matter
- TG: L21.Exts (p251)

5. Research how men and women of all countries and cultures have contributed to the development of science.

- Catastrophic Events
- SG: L15 (pp170-189)
- TG: L15 (pp197-218)
- Energy, Machines, and Motion
- SG: L15-17 (pp140-173)
- Earth in Space
- SG: L03 (pp22-41), L10 (pp130-145), L21 (pp334-339)
- TG: L01 (pp3-10), L02.Exts (pp18-19), L03 (pp21-36), L08 (pp97-120), L10 (pp147-158), L17.Exts (pp275-276), L21 (pp309-310)
- Light
- SG: L01 (pp2-19), L03 (pp32-39), L05 (pp48-57), L08-09 (pp82-107), L11 (pp116-131), L15 (pp154-165), L22-25 (pp244-293)
- TG: L03.Exts (p43), L08 (pp99-106), L15.Exts (p187), L16.Exts (p203), L19.Exts (p257), L25.Exts (p342)
- Properties of Matter
- SG: L02 (pp14-23), L07 (pp64-73), L10-11 (pp86-105), L25 (pp224-229)

Grade Seven

Earth and Space Sciences

Earth Systems

1. Explain the biogeochemical cycles which move materials between the lithosphere (land), hydrosphere (water) and atmosphere (air).
2. Explain that Earth's capacity to absorb and recycle materials naturally (e.g., smoke, smog and sewage) can change the environmental quality depending on the length of time involved (e.g. global warming).
 - Catastrophic Events
 - SG: L24 (pp264-273)
 - TG: L24 (pp329-346)
 - Earth in Space
 - SG: L19 (pp312-323)
 - Organisms - From Macro to Micro
 - SG: L12 (pp146-155)
 - TG: L12 (pp201-218), L17.Exts (pp287-288)
3. Describe the water cycle and explain the transfer of energy between the atmosphere and hydrosphere.
 - Catastrophic Events
 - SG: L06 (pp68-79)
 - TG: L06 (pp69-82)
 - Energy, Machines, and Motion
 - SG: L09 (pp82-91)
 - Properties of Matter
 - SG: L01 (pp2-13)
4. Analyze data on the availability of fresh water that is essential for life and for most industrial and agricultural processes. Describe how rivers, lakes and groundwater can be depleted or polluted becoming less hospitable to life and even becoming unavailable or unsuitable for life.
5. Make simple weather predictions based on the changing cloud types associated with frontal systems.
 - Catastrophic Events
 - SG: L01-04 (pp2-53), L06-07 (pp68-95)
 - TG: L01-04 (pp3-56), L06-07 (pp69-102)
 - Light
 - TG: L03.Exts (p43)
6. Determine how weather observations and measurements are combined to produce weather maps and that data for a specific location at one point in time can be displayed in a station model.
7. Read a weather map to interpret local, regional and national weather.
8. Describe how temperature and precipitation determine climatic zones (biomes) (e.g., desert, grasslands, forests, tundra and alpine).
9. Describe the connection between the water cycle and weather-related

phenomenon (e.g., tornadoes, floods, droughts and hurricanes).

- Catastrophic Events
- SG: L02 (pp12-53), L06-07 (pp68-95)
- TG: L02-03 (pp17-44), L04.Exts (p54), L06-07 (pp69-102)
- Light
- TG: L03.Exts (p43)
- Properties of Matter
- SG: L01 (pp2-13)

Life Sciences

Characteristics and Structure of Life

1. Investigate the great variety of body plans and internal structures found in multicellular organisms.

- Organisms - From Macro to Micro
- SG: L01 (pp2-11), L03 (pp28-37), L11 (pp132-145), L14 (pp172-179)
- TG: L01 (pp3-14), L02.Exts (p25), L03 (pp33-48), L11 (pp185-200), L14 (pp237-252)

Diversity and Interdependence of Life

2. Investigate how organisms or populations may interact with one another through symbiotic relationships and how some species have become so adapted to each other that neither could survive without the other (e.g., predator-prey, parasitism, mutualism and commensalism).

- Organisms - From Macro to Micro
- SG: L02 (pp12-27), L09 (pp106-119), L14 (pp172-179)
- TG: L02 (pp15-32) L09 (pp151-166), L18.Exts (pp299-300)

3. Explain how the number of organisms an ecosystem can support depends on adequate biotic (living) resources (e.g., plants, animals) and abiotic (non-living) resources (e.g., light, water and soil).

- Organisms - From Macro to Micro
- SG: L04 (pp38-45), L12-13 (pp146-171)
- TG: L04 (pp49-56), L12-13 (pp201-236)

4. Investigate how overpopulation impacts an ecosystem.

- Organisms - From Macro to Micro
- SG: L04 (pp38-45), L12 (pp146-155)
- TG: L04 (pp49-56), L12 (pp201-218)

5. Explain that some environmental changes occur slowly while others occur rapidly (e.g., forest and pond succession, fires and decomposition).

- Catastrophic Events
- SG: L24 (pp264-273)
- TG: L24 (pp329-346)
- Organisms - From Macro to Micro
- SG: L12 (pp146-155)
- TG: L12 (pp201-218)

6. Summarize the ways that natural occurrences and human activity affect the transfer of energy in Earth's ecosystems (e.g., fire, hurricanes, roads and oil spills).

- Light

- SG: L11 (pp116-131)
- Organisms - From Macro to Micro
- SG: L04 (pp38-45), L06 (pp64-81), L12-13 (pp146-171)
- TG: L04 (pp49-56), L12 (pp201-218)
- Properties of Matter
- SG: L12 (pp106-111)

7. Explain that photosynthetic cells convert solar energy into chemical energy that is used to carry on life functions or is transferred to consumers and used to carry on their life functions.

- Light
- SG: L11 (pp116-131)
- TG: L11.Exts (p131)
- Organisms - From Macro to Micro
- SG: L07 (pp82-93), L10 (pp120-131)
- TG: L07 (pp105-130), L10 (pp167-184)

Evolutionary Theory

8. Investigate the great diversity among organisms.

- Organisms - From Macro to Micro
- SG: L02 (pp12-27), L04 (pp38-45), L13 (pp158-171)
- TG: L13 (pp219-236), L19.Exts (pp317-318)

Physical Sciences

Nature of Matter

1. Investigate how matter can change forms but the total amount of matter remains constant.

- Catastrophic Events
- SG: L04 (pp42-53)
- TG: L04 (pp45-56)
- Properties of Matter
- SG: L06-08 (pp56-77), L24-25 (pp218-229)
- TG: L06-08 (pp65-100)
- Properties of Matter
- TG: L24-25 (pp295-312)

Nature of Energy

2. Describe how an object can have potential energy due to its position or chemical composition and can have kinetic energy due to its motion.

- Energy, Machines, and Motion
- SG: L02-04 (pp12-35), L09-10 (pp82-97), L20 (pp200-213)
- TG: L01-04 (pp3-46), L09 (pp99-106), L20-21 (pp235-246)
- Light
- TG: L02 (pp21-36)

3. Identify different forms of energy (e.g., electrical, mechanical, chemical, thermal, nuclear, radiant and acoustic).

- Energy, Machines, and Motion
- SG: L01-02 (pp2-19), L10 (pp92-97), L20 (pp200-213), L22 (pp226-236)
- TG: L01-02 (pp3-30), L10 (pp107-130), L20 (pp235-238), L22 (pp247-254)

4. Explain how energy can change forms but the total amount of energy

remains constant.

- Energy, Machines, and Motion
- SG: L02-04 (pp12-35), L10 (pp92-97), L17 (pp164-173), L19-20 (pp188-213), L22 (pp226-236)
- TG: L02-04 (pp23-46), L09-10 (pp99-130), L17 (pp203-216), L19-22 (pp229-254)
- Light
- SG: L02 (pp20-31), L07 (pp68-81), L26 (pp294-297)
- TG: L02 (pp21-36), L26 (pp349-367)

5. Trace energy transformation in a simple closed system (e.g., a flashlight).

- Energy, Machines, and Motion
- SG: L02-04 (pp12-35), L10 (pp92-97), L17 (pp164-173), L19-20 (pp188-213), L22 (pp226-236)
- TG: L02-04 (pp23-46), L09-10 (pp99-130), L17 (pp203-216), L19-22 (pp229-254)
- Light
- SG: L02 (pp20-31), L07 (pp68-81), L26 (pp294-297)
- TG: L02 (pp21-36), L26 (pp349-367)

Science and Technology

Understanding Technology

1. Explain how needs, attitudes and values influence the direction of technological development in various cultures.

- Catastrophic Events
- SG: L09 (pp102-112)
- TG: L09 (pp127-142)
- Earth in Space
- SG: L20-21 (pp324-339)
- TG: L20-21 (pp293-310)
- Properties of Matter
- SG: L18 (pp150-161)
- TG: L21.Exts (p251)

2. Describe how decisions to develop and use technologies often put environmental and economic concerns in direct competition with each other.

- Earth in Space
- SG: L20-21 (pp324-339)
- TG: L20-21 (pp293-310)
- Properties of Matter
- TG: L21.Exts (p251)

3. Recognize that science can only answer some questions and technology can only solve some human problems.

- Catastrophic Events
- SG: L18 (pp200-209)
- TG: L18 (pp257-264)
- Properties of Matter
- SG: L07 (pp64-73), L10-11 (pp86-105), L16 (pp130-139)
- TG: L10 (pp113-124)

Abilities To Do

4. Design and build a product or create a solution to a problem given two

Technological Design

constraints (e.g., limits of cost and time for design and production or supply of materials and environmental effects).

- Catastrophic Events
- SG: L11 (pp120-133)
- TG: L06.Exts (pp77-78), TG: L11 (pp149-162)
- Energy, Machines, and Motion
- SG: L16-18 (pp148-187), L21-22 (pp214-236)
- TG: L06.Exts (pp68-69), L08.Exts (pp92-93), L09.Exts (p105), L16-17 (pp185-216), L20.Exts (p238), L21.Exts (p245), L22 (pp247-254)
- Earth in Space
- SG: L20-21 (pp324-339)
- TG: L20-21 (pp293-310)
- Properties of Matter
- SG: L10 (pp86-97)
- TG: L10 (pp113-124)

Scientific Inquiry

Doing Scientific Inquiry

1. Explain that variables and controls can affect the results of an investigation and that ideally one variable should be tested at a time; however it is not always possible to control all variables.

- Catastrophic Events
- SG: L25 (pp274-282)
- TG: L25 (pp347-372)

2. Identify simple independent and dependent variables.

- Catastrophic Events
- SG: L25 (pp274-282)
- TG: L25 (pp347-372)

3. Formulate and identify questions to guide scientific investigations that connect to science concepts and can be answered through scientific investigations.

- Earth in Space
- SG: L01 (pp2-11), L21 (pp334-339)
- TG: L01 (pp3-10), L21 (pp309-310)

4. Choose the appropriate tools and instruments and use relevant safety procedures to complete scientific investigations.

- Catastrophic Events
- SG: L12 (pp134-153), L14 (pp164-169), L16 (pp190-193), L19 (pp210-223), L22-23 (pp240-263)
- TG: (pp xxxiii - xxxv), L12 (pp163-176), L14 (pp187-196), L16 (pp219-232), L19 (pp265-278), L22-23 (pp303-328)
- Energy, Machines, and Motion
- SG: L01-13 (pp2-129), L16 (pp148-161), L18-21 (pp174-225)
- TG: (pp xxxiii - xxxv), L01-13 (pp3-166), L16 (pp185-202), L18-21 (pp217-246)
- Earth in Space
- SG: L01-22 (pp2-343)
- TG: (pp xxxiv - xxxvi), L01-22 (pp3-326)
- Light
- SG: L01-26 (pp2-297)

- TG: (pp xxxiv - xxxv), L01-12 (pp3-152), L14-26 (pp169-367)
- **Organisms - From Macro to Micro**
- SG: L02-20 (pp12-243)
- TG: (pp xxxiv-xxxv), L02 (pp15-350)
- **Properties of Matter**
- SG: L01-26 (pp2-235)
- TG: (pp xxxi - xxxiii), L01-26 (pp3-332)

5. Analyze alternative scientific explanations and predictions and recognize that there may be more than one good way to interpret a given set of data.

- **Catastrophic Events**
- SG: L01-25 (pp2-282)
- TG: L01-25 (pp3-372)
- **Energy, Machines, and Motion**
- SG: L03 (pp62-71), L10 (pp92-97), L13 (pp120-129), L15 (pp140-147)
- TG: L04 (pp37-46), L05.Exts (pp53-54), L07 (pp75-84), L10 (pp107-130), L13 (pp157-166), L15-16 (pp177-202)
- **Earth in Space**
- SG: L03 (pp22-41), L05 (pp62-73), L09 (pp122-127), L13-14 (pp174-215), L18 (pp290-311), L22 (pp340-343)
- TG: L01 (pp3-10), L03 (pp21-36), L05 (pp53-72), L09 (pp121-146), L13-14 (pp197-220), L19-20 (pp287-308), L22 (pp311-326)
- **Light**
- SG: L01-26 (pp2-297)
- TG: L01-26 (pp3-367)
- **Organisms - From Macro to Micro**
- SG: L01-20 (pp2-243)
- TG: L01 (pp3-350)
- **Properties of Matter**
- SG: L01-26 (pp2-235)
- TG: L01-26 (pp3-332)

6. Identify faulty reasoning and statements that go beyond the evidence or misinterpret the evidence.

- **Light**
- SG: L26 (pp294-297)
- TG: L26 (pp349-367)

7. Use graphs, tables and charts to study physical phenomena and infer mathematical relationships between variables (e.g., speed and density).

- **Catastrophic Events**
- SG: L13 (pp154-163), L19-21 (pp210-239), L23-25 (pp252-282)
- TG: L04.Exts (p54), L06.Exts (pp77-78), L13 (pp177-186), L16.Exts (p225), L19-25 (pp265-372)
- **Energy, Machines, and Motion**
- SG: L04-05 (pp26-47), L08-13 (pp72-129), L15 (pp140-147), L18 (pp174-187)
- TG: L04-06 (pp37-74), L08-13 (pp85-166), L15-16 (pp177-202), L18-19 (pp217-234)
- **Earth in Space**
- SG: L03-04 (pp22-61), L22 (pp340-343)
- TG: L03-04 (pp21-52), L22 (pp311-326)
- **Light**
- SG: L01 (pp2-19), L04-05 (pp40-57), L07 (pp68-81), L09-13 (pp92-141), L17-21 (pp186-243), L24-26 (pp266-297)
- TG: L01 (pp3-20), L04-05 (pp49-72), L07 (pp83-98), L09.Exts (p115), L10-13 (pp119-168), L18-21 (pp225-304), L24-26 (pp319-367)

- Properties of Matter
- SG: L06-08 (pp56-77), L10 (pp86-97), L13 (pp112-115), L19 (pp162-167), L21 (pp186-197), L24 (pp218-223), L26 (pp230-235)
- TG: L02.Exts (p21), L06-08 (pp65-100), L10 (pp113-124), L13 (pp143-152), L19 (pp209-226), L21 (pp241-260), L22.Exts (p270), L24 (pp295-302), L26 (pp313-332)

Scientific Ways of Knowing

Ethical Practices

1. Show that the reproducibility of results is essential to reduce bias in scientific investigations.

- Light
- SG: L26 (pp294-297)
- TG: L26 (pp349-367)

2. Describe how repetition of an experiment may reduce bias.

- Light
- SG: L26 (pp294-297)
- TG: L26 (pp349-367)

Science and Society

3. Describe how the work of science requires a variety of human abilities and qualities that are helpful in daily life (e.g., reasoning, creativity, skepticism and openness).

- Catastrophic Events
- SG: L09 (pp102-112)
- TG: L09 (pp127-142)

Grade Eight

Earth and Space Sciences

The Universe

1. Describe how objects in the solar system are in regular and predictable motions that explain such phenomena as days, years, seasons, eclipses, tides and moon cycles.
 - Earth in Space
 - SG: L01-08 (pp2-121), L10-13 (pp130-199), L15 (pp216-243), L17-22 (pp268-343)
 - TG: L01-22 (pp3-326)
 - Light SG:
 - L02 (pp20-31)
2. Explain that gravitational force is the dominant force determining motions in the solar system and in particular keeps the planets in orbit around the sun.
 - Earth in Space
 - SG: L0-081 (pp2-121), L10-13 (pp130-199), L15 (pp216-243), L17-22 (pp268-343)
 - TG: L01-22 (pp3-326)
3. Compare the orbits and composition of comets and asteroids with that of Earth.
 - Earth in Space
 - SG: L01-08 (pp2-121), L10-13 (pp130-199), L15 (pp216-243), L17-22 (pp268-343)
 - TG: L01-22 (pp3-326)
4. Describe the effect that asteroids or meteoroids have when moving through space and sometimes entering planetary atmospheres (e.g., meteor-"shooting star" and meteorite).
 - Earth in Space
 - SG: L01-08 (pp2-121), L10-13 (pp130-199), L15 (pp216-243), L17-22 (pp268-343)
 - TG: L01-22 (pp3-326)
5. Explain that the universe consists of billions of galaxies that are classified by shape.
6. Explain interstellar distances are measured in light years (e.g., the nearest star beyond the sun is 4.3 light years away).
7. Examine the life cycle of a star and predict the next likely stage of a star.
 - Earth in Space
 - TG: L04 (pp37-52)
8. Name and describe tools used to study the universe (e.g., telescopes, probes, satellites and spacecraft).
 - Earth in Space
 - SG: L08-10 (pp102-145), L13-17 (pp174-289)
 - TG: L08-10 (pp97-158), L13-17 (pp197-276)
 - Light
 - SG: L16 (pp166-185), L22 (pp244-251)

- TG: L22.Exts (pp310-311)

Earth Systems

9. Describe the interior structure of Earth and Earth's crust as divided into tectonic plates riding on top of the slow moving currents of magma in the mantle.

- Catastrophic Events
- SG: L10 (pp114-119), L13-18 (pp154-209)
- TG: L10 (pp143-148), L13- (pp177-264)
- Earth in Space
- SG: L13 (pp174-199)
- TG: L13 (pp197-208)
- Properties of Matter
- SG: L05 (pp38-55)

10. Explain that most major geological events (e.g., earthquakes, volcanic eruptions, hot spots and mountain building) result from plate motion.

- Catastrophic Events
- SG: L01-03 (pp2-41), L05-25 (pp54-282)
- TG: L01-25 (pp3-372)
- Earth in Space
- SG: L13 (pp174-199)
- TG: L13 (pp197-208)
- Properties of Matter
- SG: L05 (pp38-55)

11. Use models to analyze the size and shape of Earth, its surface and its interior (e.g., globes, topographic maps, satellite images).

- Catastrophic Events
- SG: L10 (pp114-119), L12 (pp134-153), L14-15 (pp164-189), L17-20 (pp194-231), L24-25 (pp264-282)
- TG: L10 (pp143-148), L12 (pp163-176), L14 -15(pp187-218), L17-20 (pp233-292), L23.Exts (pp325-326), L24-25 (pp329-372)
- Energy, Machines, and Motion
- SG: L12-13 (pp108-129)
- TG: L04 (pp37-46), L12-13 (pp147-166)
- Earth in Space
- SG: L03-04 (pp22-61), L18 (pp290-311)
- TG: L03-04 (pp21-52), L18 (pp277-286), L20.Exts (p297)
- Light
- SG: L07 (pp68-81), L09 (pp92-107), L19 (pp214-223)
- TG: L19.Exts (p257)
- Organisms - From Macro to Micro
- SG: L10 (pp120-131)
- TG: L10 (pp167-184)
- Properties of Matter
- TG: L07.Exts (p86), L08.Exts (p96), L12.Exts (p140), L14.Exts (p157), L15.Exts (p166)

12. Explain that some processes involved in the rock cycle are directly related to thermal energy and forces in the mantle that drive plate motions.

- Catastrophic Events
- SG: L10 (pp114-119), L13-17 (pp154-197), L21-22 (pp232-239)

- TG: L10 (pp143-148), L13-17 (pp177-256), L21-22 (pp293-316)
- Earth in Space
- SG: L13 (pp174-199)
- TG: L13 (pp197-208)
- Properties of Matter
- SG: L05 (pp38-55)

13. Describe how landforms are created through a combination of destructive (e.g., weathering and erosion) and constructive processes (e.g., crustal deformation, volcanic eruptions and deposition of sediment).

- Catastrophic Events
- SG: L01-25 (pp2-282)
- TG: L01-25 (pp3-372)

14. Explain that folding, faulting and uplifting can rearrange the rock layers so the youngest is not always found on top.

15. Illustrate how the three primary types of plate boundaries (transform, divergent and convergent) cause different landforms (e.g., mountains, volcanoes and ocean trenches).

- Catastrophic Events
- SG: L10 (pp114-119), L13-18 (pp154-209)
- TG: L10 (pp143-148), L13-18 (pp177-264), L19.Exts (pp274-275)

Life Sciences

Heredity

1. Describe that asexual reproduction limits the spread of detrimental characteristics through a species and allows for genetic continuity.

- Organisms - From Macro to Micro
- SG: L03 (pp28-37), L09 (pp106-119), L12 (pp146-155), L14 (pp172-179), L17-19 (pp194-235)
- TG: L02.Exts (p25), L03 (pp33-48), L09 (pp151-166), L12 (pp201-218), L14 (pp237-252), L17-19 (pp281-330)

2. Recognize that in sexual reproduction new combinations of traits are produced which may increase or decrease an organism's chances for survival.

- Organisms - From Macro to Micro
- SG: L03 (pp28-37), L09 (pp106-119), L12 (pp146-155), L14 (pp172-179), L17-19 (pp194-235)
- TG: L02.Exts (p25), L03 (pp33-48), L09 (pp151-166), L12 (pp201-218), L14 (pp237-252), L17-19 (pp281-330)

Evolutionary Theory

3. Explain how variations in structure, behavior or physiology allow some organisms to enhance their reproductive success and survival in a particular environment.

- Organisms - From Macro to Micro
- SG: L06 (pp64-81), L13 (pp158-171)

- TG: L06 (pp73-104), L10.Exts (pp175-176), L13 (pp219-236), L18.Exts (pp299-300)
4. Explain that diversity of species is developed through gradual processes over many generations (e.g., fossil record).
 - Organisms - From Macro to Micro
 - SG: L13 (pp158-171)
 - TG: L13 (pp219-236), L19.Exts (pp317-318)
 5. Investigate how an organism adapted to a particular environment may become extinct if the environment, as shown by the fossil record, changes.
 - Catastrophic Events
 - SG: L24 (pp264-273)
 - TG: L24 (pp329-346)
 - Organisms - From Macro to Micro
 - SG: L12-13 (pp146-171)
 - TG: L12-13 (pp201-236), TG: L19.Exts (pp317-318)

Physical Sciences

Forces and Motion

1. Describe how the change in the position (motion) of an object is always judged and described in comparison to a reference point.
2. Explain that motion describes the change in the position of an object (characterized by a speed and direction) as time changes.
 - Catastrophic Events
 - SG: L11-12 (pp120-153), L15 (pp170-189)
 - TG: L11-12 (pp149-176), L15 (pp197-218)
 - Energy, Machines, and Motion
 - SG: L01 (pp2-11), L05-13 (pp36-129), L15-22 (pp140-236)
 - TG: L01 (pp3-22), L05-13 (pp47-166), L15-22 (pp177-254)
 - Earth in Space
 - SG: L15 (pp216-243)
 - TG: L15 (pp221-244)
3. Explain that an unbalanced force acting on an object changes that object's speed and/or direction.
 - Energy, Machines, and Motion
 - SG: L01 (pp2-11), L05-08 (pp36-81), L11-13 (pp100-129), L18-19 (pp174-199), L21 (pp214-225)
 - TG: L01 (pp3-22), L05-08 (pp47-98), L11-13 (pp131-166), L18-19 (pp217-234), L21 (pp239-246)
 - Earth in Space
 - SG: L15 (pp216-243)
 - TG: L15-16 (pp221-268)

Nature of Energy

4. Demonstrate that waves transfer energy.
 - Catastrophic Events
 - SG: L11-12 (pp120-153), L14 (pp164-169), L17 (pp194-197)

- TG: L11-12 (pp149-176), L14 (pp187-196), L17 (pp233-256)
- **Energy, Machines, and Motion**
- SG: L18 (pp174-187)
- **Light**
- SG: L07 (pp68-81), L09 (pp92-107), L12 (pp132-137)
- TG: L07.Exts (p92), L09 (pp107-118), L19.Exts (p257)

5. Demonstrate that vibrations in materials may produce waves that spread away from the source in all directions (e.g., earthquake waves and sound waves).

- **Catastrophic Events**
- SG: L12 (pp134-153), L14 (pp164-169)
- TG: L11.Exts (p157), L12 (pp163-176), L14 (pp187-196)
- **Energy, Machines, and Motion**
- SG: L15 (pp140-147)
- TG: L15 (pp177-184)
- **Light**
- SG: L07 (pp68-81), L09 (pp92-107)
- TG: L07.Exts (p92), L09 (pp107-118), L19.Exts (p257)

Science and Technology

Understanding Technology

1. Examine how science and technology have advanced through the contributions of many different people, cultures and times in history.

- **Catastrophic Events**
- SG: L15 (pp170-189)
- TG: L15 (pp197-218)
- **Energy, Machines, and Motion**
- SG: L16-17 (pp148-173)
- **Earth in Space**
- SG: L03 (pp22-41), L10 (pp130-145), L21 (pp334-339)
- TG: L01 (pp3-10), L02.Exts (pp18-19), L03 (pp21-36), L08 (pp97-120), L10 (pp147-158), L17.Exts (pp275-276), L21 (pp309-310)
- **Light**
- SG: L05 (pp48-57), L08 (pp82-91), L11 (pp116-131), L15 (pp154-165), L23-25 (pp252-293)
- TG: L08 (pp99-106), L15.Exts (p187), L16.Exts (p203), L19.Exts (p257), L25.Exts (p342)
- **Properties of Matter**
- SG: L02 (pp14-23), L07 (pp64-73), L10-11 (pp86-105), L25 (pp224-229)

2. Examine how choices regarding the use of technology are influenced by constraints caused by various unavoidable factors (e.g., geographic location, limited resources, social, political and economic considerations).

- **Catastrophic Events**
- SG: L10 (pp114-119), L14 (pp164-169)
- TG: L03.Exts (pp35-36), L10 (pp143-148), L14 (pp187-196)
- **Energy, Machines, and Motion**
- SG: L20 (pp200-213)
- TG: L20 (pp235-238)
- **Earth in Space**
- SG: L10 (pp130-145), L20-21 (pp324-339)

- TG: L10 (pp147-158), L20 (pp293-310)
- Light
- SG: L23 (pp252-265)
- TG: L01.Exts (p12)
- Properties of Matter
- TG: L04.Exts (p45), TG: L21.Exts (p251)

Abilities To Do Technological Design

3. Design and build a product or create a solution to a problem given more than two constraints (e.g., limits of cost and time for design and production, supply of materials and environmental effects).

- Catastrophic Events
- SG: L09 (pp102-112), SG: L11 (pp120-133)
- TG: L06.Exts (pp77-78), L09 (pp127-142), L11 (pp149-162)
- Energy, Machines, and Motion
- SG: L16-18 (pp148-187), L21-22 (pp214-236)
- TG: L06.Exts (pp68-69), L08.Exts (pp92-93), L09.Exts (p105), L16-22 (pp185-254)
- Earth in Space
- SG: L20-21 (pp324-339)
- Earth in Space
- TG: L20-21 (pp293-310)
- Organisms - From Macro to Micro
- TG: L05.Exts (pp69-70)
- Properties of Matter
- SG: L10 (pp86-97)
- TG: L10 (pp113-124)

4. Evaluate the overall effectiveness of a product design or solution.

- Catastrophic Events
- SG: L09 (pp102-112), L11 (pp120-133)
- TG: L06.Exts (pp77-78), L09 (pp127-142), L11 (pp149-162), L23.Exts (pp325-326)
- Energy, Machines, and Motion
- SG: L03 (pp20-25), L16-18 (pp148-187), L21-22 (pp214-236)
- TG: L03 (pp31-36), L06.Exts (pp68-69), L08.Exts (pp92-93), L09.Exts (p105), L16-17 (pp185-216), L20.Exts (p238), L21.Exts (p245), L22 (pp247-254)
- Earth in Space
- SG: L20-21 (pp324-339)
- TG: L20-21 (pp293-310)
- Properties of Matter
- SG: L10 (pp86-97)
- TG: L10 (pp113-124)

Scientific Inquiry

Doing Scientific Inquiry

1. Choose the appropriate tools or instruments and use relevant safety procedures to complete scientific investigations.

- Catastrophic Events
- SG: L12 (pp134-153), L14 (pp164-169), L16 (pp190-193), L19 (pp210-223), L22-23 (pp240-263)
- TG: (pp xxxiii - xxxv), L12 (pp163-176), L14 (pp187-196), L16 (pp219-232), L19 (pp265-278), L22-23 (pp303-328)
- Energy, Machines, and Motion
- SG: L01-13 (pp2-129), L16 (pp148-161), L18-21 (pp174-225)

- TG: (pp xxxiii - xxxv), L01-13 (pp3-166), L16 (pp185-202), L18-21 (pp217-246)
- **Earth in Space**
- SG: L01-22 (pp2-343)
- TG: (pp xxxiv - xxxvi), L01-22 (pp3-326)
- **Light**
- SG: L01-26 (pp2-297)
- TG: (pp xxxiv - xxxv), L01-12 (pp3-152), L14-15 (pp169-194), L16.Exts (p203), L17-26 (pp205-367)
- **Organisms - From Macro to Micro**
- SG: L02-20 (pp12-243)
- TG: (pp xxxiv-xxxv), L02-20 (pp15-350)
- **Properties of Matter**
- SG: L01-09 (pp2-83), L11-26 (pp98-235)
- TG: (pp xxxi - xxxiii), L01-09 (pp3-112), L11-26 (pp125-332)

2. Describe the concepts of sample size and control and explain how these affect scientific investigations.

- **Catastrophic Events**
- SG: L25 (pp274-282)
- TG: L25 (pp347-372)

3. Read, construct and interpret data in various forms produced by self and others in both written and oral form (e.g., tables, charts, maps, graphs, diagrams and symbols).

- **Catastrophic Events**
- SG: L01-25 (pp2-282)
- TG: L01-25 (pp3-372)
- **Energy, Machines, and Motion**
- SG: L07 (pp62-71), L10 (pp92-97), L13 (pp120-129), L15 (pp140-147)
- TG: L04 (pp37-46), L07 (pp75-84), L10 (pp107-130), L13 (pp157-166), L15-16 (pp177-202)
- **Earth in Space**
- SG: L01 (pp2-11), L03 (pp22-41), L05 (pp62-73), L09-1 (pp122-159), L14 (pp200-215), L18-19 (pp290-323), L22 (pp340-343)
- TG: L01 (pp3-10), L03 (pp21-36), L05 (pp53-72), L09-11 (pp121-180), L13-14 (pp197-220), L18-19 (pp277-292), L20.Exts (p297), L21.Exts (p310), L22 (pp311-326)
- **Light**
- SG: L12-13 (pp132-141), L20 (pp224-227), L25 (pp284-293)
- TG: L12-13 (pp137-168), L25 (pp335-348)
- **Organisms - From Macro to Micro**
- TG: L02 (pp15-32)
- **Properties of Matter**
- SG: L03-04 (pp24-37), L08-09 (pp74-83), L11 (pp98-105), L13-14 (pp112-121), L17 (pp140-149), L19 (pp162-167), L23-24 (pp208-223), L26 (pp230-235)
- TG: L03-04 (pp27-48), L08-09 (pp91-112), L11 (pp125-134), L13-14 (pp143-160), L17 (pp179-192), L19 (pp209-226), L23-24 (pp275-302), L26 (pp313-332)

4. Apply appropriate math skills to interpret quantitative data (e.g., mean, median and mode).

- **Catastrophic Events**
- SG: L12 (pp134-153)
- TG: L12 (pp163-176), L14.Exts (pp193-194), L19.Exts (pp274-275), L24.Exts (pp337-338)
- **Energy, Machines, and Motion**
- SG: L09-12 (pp82-119), L15 (pp140-147), L18 (pp174-187)

- TG: L08-12 (pp85-156), L15 (pp177-184), L18-19 (pp217-234)
- **Earth in Space**
- SG: L02 (pp12-21)
- TG: L02 (pp11-20), L11.Exts (p170)
- **Light**
- SG: L04 (pp40-47), L13 (pp138-141)
- TG: L03.Exts (p43), L13 (pp153-168)
- **Properties of Matter**
- SG: L02 (pp14-23), L04 (pp30-37), L09 (pp78-83), L26 (pp230-235)
- TG: L02 (pp15-26), L04 (pp39-48), L09 (pp101-112), L25.Exts (pp307-308), L26 (pp313-332)

Scientific Ways of Knowing

Nature of Science

1. Identify the difference between description (e.g., observation and summary) and explanation (e.g., inference, prediction, significance and importance).

- **Catastrophic Events**
- SG: L01-25 (pp2-282)
- TG: L01-25 (pp3-372)
- **Energy, Machines, and Motion**
- SG: L01-22 (pp2-236)
- TG: L01-22 (pp3-254)
- **Earth in Space**
- SG: L01 (pp2-11), L04-05 (pp42-73), L09-11 (pp122-159), L13-14 (pp174-215), L18-20 (pp290-333), L22 (pp340-343)
- TG: L01 (pp3-10), L04-05 (pp37-72), L09-11 (pp121-180), L13-14 (pp197-220), L18-20 (pp277-308), L21.Exts (p310), L22 (pp311-326)
- **Light**
- SG: L01-26 (pp2-297)
- TG: L01-26 (pp3-367)
- **Organisms - From Macro to Micro**
- SG: L01-20 (pp2-243)
- TG: L01-20 (pp3-350)
- **Properties of Matter**
- SG: L01-26 (pp2-235)
- TG: L01-26 (pp3-332)

Ethical Practices

2. Explain why it is important to examine data objectively and not let bias affect observations.

- **Catastrophic Events**
- SG: L12-13 (pp134-163), L15 (pp170-189), L17-18 (pp194-209), L25 (pp274-282)
- TG: L06.Exts (pp77-78), L12-13 (pp163-186), L15 (pp197-218), L17-18 (pp233-264), L25 (pp347-372)
- **Energy, Machines, and Motion**
- SG: L07 (pp62-71), L10 (pp92-97), L13 (pp120-129), L15 (pp140-147)
- TG: L04 (pp37-46), L07 (pp75-84), L10 (pp107-130), L13 (pp157-166), L15-16 (pp177-202)
- **Earth in Space**
- SG: L03 (pp22-41), L22 (pp340-343)
- TG: L03 (pp21-36), L22 (pp311-326)
- **Light**
- SG: L12-13 (pp132-141), L20 (pp224-227), L25-26 (pp284-297)

- TG: L12 (pp137-152), L13 (pp153-168), L25-26 (pp335-367)
- **Properties of Matter**
- SG: L03-04 (pp24-37), L08-09 (pp74-83), L13-14 (pp112-121), L17 (pp140-149), L19 (pp162-167), L23-24 (pp208-223), L26 (pp230-235)
- TG: L03-04 (pp27-48), L08-09 (pp91-112), L13-14 (pp143-160), L17 (pp179-192), L19 (pp209-226), L23-24 (pp275-302), L26 (pp313-332)

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