

Overview of Science Units & Major Resources: GRADE 4

Unit 1: Earth and Space Science – Rocks, Minerals and Fossils

- Grade 3 Harcourt Science: (from grade 3)
- Literacy by Design [An Encyclopedia of Rocks](#)

Unit 2: Earth and Space Science – Water Cycle

- Literacy by Design [The Story of Water: A Moving Adventure](#)
- National Geographic [Wonders of Water](#)

Unit 3: Life Science – Preventing Diseases/Disease

- Grade 4 Harcourt “Your Health”

Unit 4: Physical Science – Matter

- Grade 4 Harcourt Science

Unit 5: Physical Science – Electricity/Magnetism

- Grade 4 Harcourt Science

** See Science Curriculum Frameworks for more detailed information.*

** See grade level district shared folder for additional resources.*

GRADE 4: SCIENCE CURRICULUM FRAMEWORKS

UNIT 1: EARTH AND SPACE SCIENCE – ROCKS, MINERALS AND FOSSILS					
Big Questions			Formative/Summative Assessments (To be determined by teachers/teams)		
1. What are minerals and rocks? 2. How do rocks form? 3. What are fossils? 4. What are the positive and negative impacts that the designed world has on the natural world?			Options include, but are not limited to: <ul style="list-style-type: none"> • Grade 3 Harcourt Science Unit C, Chapter 1 Assessment 		
Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency (To be determined by teachers/teams)	Resources	Optional Ideas for Engineering Connections
<u>Substrand:</u> Earth Structure and Processes. <u>Standard:</u> Understand that rocks are Earth materials that may vary in composition.	Describe and classify minerals based on their physical properties. (For example: Streak, luster, hardness, reaction to vinegar.) <i>(Standard ES: 4.3.1.3.2)</i>	<ul style="list-style-type: none"> • Items may require students to describe or classify minerals based on mineral properties provided in a table. • Items will NOT require students to compare minerals based on density, fracture or Mohs scale of hardness. • Items will NOT require students to name specific minerals. 		Grade 3 Harcourt Science <ul style="list-style-type: none"> • Unit C, Chapter 1, Lesson 1, pp. C2-C9 • Workbook, pp. 99-100, p. 103 Literacy by Design, Level P Book: <u>An Encyclopedia of Rocks</u>	
<u>Substrand:</u> Earth Structure and Processes. <u>Standard:</u> Understand that rocks are Earth materials that may vary in composition.	Recognize that rocks may be uniform or made of mixtures of different minerals. <i>(Standard ES: 4.3.1.3.1)</i>	<ul style="list-style-type: none"> • Items will NOT require students to identify specific rocks by their composition. • Items may require students to describe that a rock can be made of one or many minerals. • Items will NOT require students to describe the difference between rocks and minerals. • Items will NOT use the term uniform. 		Grade 3 Harcourt Science <ul style="list-style-type: none"> • Unit C, Chapter 1, Lesson 2, pp. C10-C17 • Workbook, pp. 104-105, p. 108 	

GRADE 4: SCIENCE CURRICULUM FRAMEWORKS

UNIT 1: EARTH AND SPACE SCIENCE – ROCKS, MINERALS AND FOSSILS (continued)					
Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency (To be determined by teachers/teams)	Resources	Optional Ideas for Engineering Connections
<p>Substrand: Earth Structure and Processes. Standard: Understand that rocks are Earth materials that may vary in composition.</p>	<ul style="list-style-type: none"> • Describe how fossils form. • Give examples of the different types of fossils. • Recognize where most fossils are formed. • Describe how fossils show that life has changed. 	Not on MCA.		Grade 3 Harcourt Science <ul style="list-style-type: none"> • Unit C, Chapter 1, Lesson 3, pp. C18-C27 	
<p>Substrand: The Practice of Engineering Standard: Understand that engineers design, create, and develop structures, processes, and systems that are intended to improve society and may make humans more productive.</p>	Describe the positive and negative impacts that the designed world has on the natural world as more and more engineering products and services are created and used. <i>(Standard NSE: 4.1.2.1.1)</i>	<ul style="list-style-type: none"> • Items may require students to classify impacts as positive, negative or both. • Designed products and services are limited to those that are familiar to a grade 4 student, such as an aluminum can, plastic bag, plastic bottle or bicycle or sufficient background information will be supplied for the product or service 		Literacy by Design, Level P Book: <u>An Encyclopedia of Rocks</u> , pp. 12-13. Discuss the positive and negative impact that the use of coal has on the natural world.	

GRADE 4: SCIENCE CURRICULUM FRAMEWORKS

UNIT 2: EARTH AND SPACE SCIENCE – WATER CYCLE					
Big Questions			Formative/Summative Assessments (To be determined by teachers/teams)		
1. How does water move from the land, to the ocean and then to the air? 2. How do humans affect the world's water supply? 3. What are the positive and negative results of the products we use in today's world?			Options include, but are not limited to: • Wonders of Water Test (District-wide 4 th grade shared folder)		
Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency (To be determined by teachers/teams)	Resources	Optional Ideas for Engineering Connections
<u>Substrand:</u> Interdependence Within the Earth System. <u>Standard:</u> Understand that water circulates through the Earth's crust, oceans and atmosphere in what is known as the water cycle.	Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system using the processes of evaporation, condensation and precipitation. <i>(Standard ES: 4.3.2.3.1)</i>	<ul style="list-style-type: none"> • Examples of places where water exists on Earth include rivers, lakes, streams, clouds, the atmosphere, glaciers, groundwater and oceans. • Items may include interpreting or labeling a water cycle diagram. • Items will NOT include the process of transpiration. • Items will define the term infiltration if the concept is used. • Additional vocabulary may include terms such as water vapor, water, ice, rain, snow, pond, puddle and collection. 		Literacy by Design, Level R Book: <u>The Story of Water a Moving Adventure</u>	

GRADE 4: SCIENCE CURRICULUM FRAMEWORKS

UNIT 2: EARTH AND SPACE SCIENCE – WATER CYCLE (continued)

Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency (To be determined by teachers/teams)	Resources	Optional Ideas for Engineering Connections
<p><u>Substrand:</u> Humans Interactions with Earth Systems.</p> <p><u>Standard:</u> Understand that in order to improve their existence, humans interact with and influence Earth systems.</p>	<p>Describe how the methods people utilize to obtain and use water in their homes and communities can affect water supply and quality. <i>(Standard ES: 4.3.4.1.1)</i></p>	<ul style="list-style-type: none"> • Items will NOT address chemical testing to determine water quality. 		<p>Literacy by Design, Level R Book: The Story of Water a Moving Adventure</p> <p>National Geographic: The Wonders of Water book and teacher’s guide (See accompanying lesson packet in district 4th grade shared folder.)</p>	<p>Not everyone on this planet has access to clean, safe water to drink. This is a real world challenge for engineers. Fourth graders can design water filters and pumps and learn about the global issue of safe water. This website has good directions to get to started: http://library.thinkquest.org/04apr/00222/filter.htm</p> <p>With your students, you can also visit or learn about municipal water treatment plants, which rely on a wide range of biological engineering. <i>(from “The Works”*)</i></p>
<p><u>Substrand:</u> Practice of Engineering.</p> <p><u>Standard:</u> Understand that engineers design, create and develop structures, processes and systems that are intended to improve society and may make humans more productive.</p>	<p>Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used. <i>(Standard NSE: 4.1.2.1.1)</i></p>	<ul style="list-style-type: none"> • Items may require students to classify impacts as positive, negative or both. • Designed products and services are limited to those that are familiar to a grade 4 student, such as an aluminum can, plastic bag, plastic bottle or bicycle or sufficient background information will be supplied for the product or service. 			<p>For example, a negative impact of plastics and packaging is that they don’t decompose quickly and they sit in landfills. But on the positive side, environmental engineers are developing new ways to recycle these materials. With your students, find out how your school recycles. <i>(from “The Works”*)</i></p>

* “The Works” <http://www.theworks.org/>

GRADE 4: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: LIFE SCIENCE – PREVENTING DISEASES/DISEASE					
Big Question			Formative/Summative Assessments (To be determined by teachers/teams)		
1. What is disease? 2. What causes disease? 3. How can you prevent disease? 4. What are examples of scientific inventions used to eradicate disease?			Options include, but are not limited to: <ul style="list-style-type: none"> • Grade 4 Harcourt “Your Health,” Chapter 5 Assessment 		
Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency (To be determined by teachers/teams)	Resources	Optional Ideas for Engineering Connections
<u>Substrand:</u> Interactions with Earth Systems. <u>Standard:</u> Understand that microorganisms can get inside one’s body and they may keep it from working properly.	Give examples of diseases that can be prevented by vaccination. <i>(Standard LS: 4.4.4.2.2)</i>	<ul style="list-style-type: none"> • Items will NOT refer to specific diseases but will deal in general terms with disease prevention. • Items will NOT require students to understand how a vaccination works or the mechanisms of the body’s response (i.e., dead germs allow the body to prepare a defense against that specific type of germ). • Additional vocabulary may include terms such as contagious. 		Grade 4 Harcourt “Your Health” <ul style="list-style-type: none"> • Chapter 5, Lessons 1, 2, and 3, pp. 142-155 • Workbook, pp. 31-32 	With your students, learn about the engineers and scientists who invented different vaccines. <i>(from “The Works”*)</i>
<u>Substrand:</u> Interactions Among Science, Engineering, Technology and Society <u>Standard:</u> Understand that the needs of any society influence the technologies that are developed and how they are used.	Describe a situation in which one invention led to other inventions. <i>(Standard NSE: 4.1.3.3.1)</i>	<ul style="list-style-type: none"> • Inventions are limited to those familiar to grade 4 students or sufficient background information will be supplied for the invention 			Discuss the invention of vaccinations, how they have impacted the world, and how they have led to other inventions.
<u>Substrand:</u> Interactions with Earth Systems. <u>Standard:</u> Understand that microorganisms can get inside one’s body and they may keep it from working properly.	Recognize that the body has defense systems against germs, including tears, saliva, skin, and blood. <i>(Standard LS: 4.4.4.2.1)</i>	<ul style="list-style-type: none"> • Items will NOT ask students to define the terms virus or bacteria or differentiate between them. • Items will NOT address organ systems. • Items may require students to know how germs enter the body. 			Engineers and scientists create products (antibacterial cleaners, antibacterial salve, etc.) to prevent infection and disease. <i>(from “The Works”*)</i>

* “The Works” <http://www.theworks.org/>

GRADE 4: SCIENCE CURRICULUM FRAMEWORKS

UNIT 4: PHYSICAL SCIENCE – MATTER					
Big Questions			Formative/Summative Assessments (To be determined by teachers/teams)		
1. What are the three states of matter? 2. How can matter be measured and compared? 3. What are some useful properties of matter? 4. What are chemical and physical changes? 5. How does one invention lead to other inventions? 6. What is the engineering design process?			Options include, but are not limited to: <ul style="list-style-type: none"> • Grade 4 Harcourt Science Unit E, Chapter 1, Assessment 		
Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency (To be determined by teachers/teams)	Resources	Optional Ideas for Engineering Connections
<u>Substrand:</u> Matter <u>Standard:</u> Understand that solids, liquids and gases are states of matter that have unique properties.	Distinguish between solids, liquids and gases in terms of shape and volume. (For example: Water changes shape depending on the shape of its containers.) <i>(Standard PS: 4.2.1.2.1)</i>	<ul style="list-style-type: none"> • Items will NOT require students to understand density or changes to the volume of water during phase changes. • Examples of materials used to illustrate concepts include water, a piece of wood, air in a balloon and other common materials. 		Grade 4 Harcourt Science <ul style="list-style-type: none"> • Unit E, Chapter 1, Lesson 1, pp. E2-E9 • Workbook, pp. 220-222, p. 224 	
<u>Substrand:</u> Matter <u>Standard:</u> Objects have observable properties that can be measured.	Measure temperature, volume, weight and length using appropriate tools and units. <i>(Standard PS: 4.2.1.1.1)</i>	<ul style="list-style-type: none"> • Temperature should be measured in Celsius. • Measurements should be in metric units. • Items will use the more familiar term “weight” to represent both weight and mass and will use grams as the base unit for this measurement type. • Items may require students to use a tool by measuring size of an object or reading a volume and temperature from the appropriate tool. 		Grade 4 Harcourt Science <ul style="list-style-type: none"> • Unit E, Chapter 1, Lesson 2, pp. E10-E15 • Workbook, pp. 225-229 	

GRADE 4: SCIENCE CURRICULUM FRAMEWORKS

UNIT 4: PHYSICAL SCIENCE – MATTER (continued)					
Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency (To be determined by teachers/teams)	Resources	Optional Ideas for Engineering Connections
<p><u>Substrand:</u> Matter <u>Standard:</u> Understand that solids, liquids and gases are states of matter that have unique properties.</p>	<p>Describe how the states of matter change as a result of heating and cooling. <i>(Standard PS: 4.2.1.2.2)</i></p>	<ul style="list-style-type: none"> • Changes of state include changes between solid, liquid and gas. • Examples of materials used to illustrate concepts include water, a piece of wood, air in a balloon and other common materials. • Processes of changing phases are limited to evaporation, condensation, boiling, freezing and melting. • Additional vocabulary may include terms such as water vapor, steam and phase change. 		<p>Grade 4 Harcourt Science</p> <ul style="list-style-type: none"> • Unit E, Chapter 1, Lesson 4, pp. E24-E35 • Workbook, pp. 235-236, pp. 239-240 	
<p><u>Substrand:</u> Interactions Among Science, Technology, Engineering, Mathematics, and Society. <u>Standard:</u> Understand that the needs of any society influence the technologies that are developed and how they are used.</p>	<p>Describe a situation in which one invention led to other inventions. <i>(Standard NSE: 4.1.3.3.1)</i></p>	<ul style="list-style-type: none"> • Inventions are limited to those familiar to grade 4 students or sufficient background information will be supplied for the invention. 		<p>Grade 4 Harcourt Science</p> <ul style="list-style-type: none"> • Unit E, Chapter 1, Lesson 3, pp. E16-E23 • Workbook, pp. 230-231, p. 234 	<p>With your students, learn about the history of recorded sound. You can follow the progression from wax cylinders to vinyl records to cassette tapes to CDs to mp3 players. This is a good place to integrate history and STEM. Alternatively, you could study the invention of the battery. How many things were invented after electricity became portable? <i>(from “The Works”*)</i></p>
<p><u>Substrand:</u> Practice of Engineering <u>Standard:</u> Understand that engineering design is the process of identifying problems, developing multiple solutions, selecting the best possible solution, and building the product.</p>	<p>Test and evaluate solutions, considering advantages and disadvantages for the engineering solution, and communicate the results effectively. <i>(Standard NSE: 4.1.2.2.3)</i></p>	None.		<p>Grade 4 Harcourt Science</p> <ul style="list-style-type: none"> • Unit E, Chapter 1, Lesson 3, pp. E16-E23 • Workbook, pp. 230-231, p. 234 	<p>For example, ask your students to design and build a device to rescue a small stuffed animal from a box while standing three feet away. <i>(from “The Works”*)</i></p>

* “The Works” <http://www.theworks.org/>

GRADE 4: SCIENCE CURRICULUM FRAMEWORKS

UNIT 5: PHYSICAL SCIENCE – ELECTRICITY/MAGNETISM					
Big Questions			Formative/Summative Assessments (To be determined by teachers/teams)		
1. What is static electricity? 2. What is an electric current? 3. What is a magnet? 4. What is an electromagnet? 5. What is the engineering design process? 6. How can the engineering design process be used to solve everyday problems?			Options include, but are not limited to: <ul style="list-style-type: none"> • Grade 4 Harcourt Science Unit F, Chapter 1, Assessment 		
Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency (To be determined by teachers/teams)	Resources	Optional Ideas for Engineering Connections
<u>Substrand:</u> Energy. <u>Standard:</u> Understand that energy can be transformed within a system or transferred to other systems or the environment.	Identify several ways to generate heat energy. (For example: Burning a substance, rubbing hands together, or electricity flowing through wires.) <i>(Standard PS: 4.2.3.2.1)</i>	None.		Grade 4 Harcourt Science <ul style="list-style-type: none"> • Unit F, Chapter 1, Lesson 1, pp. F2-F9 • Workbook, pp. 292-293, p. 296 	Electrical engineers invent new sources of light and heat energy. Compare different kinds of light bulbs, such as incandescent and fluorescent. Which is more energy efficient? Which generates more heat? <i>(from “The Works”*)</i>
<u>Substrand:</u> Energy. <u>Standard:</u> Understand that energy can be transformed within a system or transferred to other systems or the environment.	Students will be able to: <ul style="list-style-type: none"> • Construct a simple electrical circuit using wires, batteries, and light bulbs. <i>(Standard PS: 4.2.3.2.2)</i>	<ul style="list-style-type: none"> • Simple electrical circuits will include both open (light bulb not on) and closed (light bulb on) circuits with or without switches. • Electrical circuits are limited to series circuits. • Items may require students to understand the organization and identify the parts of a circuit. • Items will NOT require students to understand the mechanics and parts of a light bulb (e.g., tip, threads, globe, filament). • Additional vocabulary may include terms such as light socket and power source. 		Grade 4 Harcourt Science <ul style="list-style-type: none"> • Unit F, Chapter 1, Lesson 2, pp. F10-F15 • Workbook, pp. 297-298, p. 301 	

* “The Works” <http://www.theworks.org/>

GRADE 4: SCIENCE CURRICULUM FRAMEWORKS

UNIT 5: PHYSICAL SCIENCE – ELECTRICITY/MAGNETISM (continued)

Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency (To be determined by teachers/teams)	Resources	Optional Ideas for Engineering Connections
<p><u>Substrand:</u> Energy. <u>Standard:</u> Understand that energy appears in different forms, including heat and electromagnetism.</p>	<p>Compare materials that are conductors and insulators of heat and/or electricity. (For example: Glass conducts heat well, but is a poor conductor of electricity.) <i>(Standard PS: 4.2.3.1.3)</i></p>	<ul style="list-style-type: none"> • Examples of appropriate objects and materials include those commonly found in the classroom, such as wood, rubber, plastic, craft sticks, metal paper clips and aluminum foil. • Items will NOT use objects that could be both an insulator and a conductor, such as glass, unless its properties are identified either in a label or in data. • Items may require students to set up tests or use the results of the tests to identify objects and materials that are conductors and insulators. 		<p>Grade 4 Harcourt Science</p> <ul style="list-style-type: none"> • Unit F, Chapter 1, Lesson 2, pp. F10-F15 • Workbook, pp. 297-298, p. 301 	
<p><u>Substrand:</u> Energy. <u>Standard:</u> Understand that energy appears in different forms, including heat and electromagnetism.</p>	<p>Describe the transfer of heat energy when a warm and a cool object are touching or placed near each other. <i>(Standard PS: 4.2.3.1.1)</i></p>	<ul style="list-style-type: none"> • Items will NOT require mathematical calculations. 		<p>Grade 4 Harcourt Science</p> <ul style="list-style-type: none"> • Unit F, Chapter 1, Lesson 2, pp. F10-F15 • Workbook, pp. 297-298, p. 301 	
<p><u>Substrand:</u> Energy. <u>Standard:</u> Understand that energy appears in different forms, including heat and electromagnetism.</p>	<p>Describe how magnets can repel or attract each other and how they attract certain metal objects. <i>(Standard PS: 4.2.3.1.2)</i></p>	None.		<p>Grade 4 Harcourt Science</p> <ul style="list-style-type: none"> • Unit F, Chapter 1, Lesson 3, pp. F16-F21 • Workbook, pp. 302-303, p. 306 	<p>What exactly do magnets attract? How can you use this to sort recycled metals? <i>(from “The Works”*)</i></p>
<p><u>Substrand:</u> Energy. <u>Standard:</u> Understand that energy can be transformed within a system or transferred to other systems or the environment.</p>	<p>Demonstrate how an electric current can produce a magnetic force. (For example: Construct an electromagnet to pick up paperclips.) <i>(Standard PS: 4.2.3.2.3)</i></p>	<ul style="list-style-type: none"> • Examples include current in a coil or wire wrapped around a nail and electromagnets used to operate devices such as a doorbell. • Items may require students to understand the relationships between the number of turns of wire, the amount of current in the wire and the strength of the magnetic force. • Items may include understanding the magnetic force’s effect on a compass. 		<p>Grade 4 Harcourt Science</p> <ul style="list-style-type: none"> • Unit F, Chapter 1, Lesson 4, pp. F22-F33 • Workbook, pp. 307-308, pp. 311-312 	

* “The Works” <http://www.theworks.org/>

GRADE 4: SCIENCE CURRICULUM FRAMEWORKS

UNIT 5: PHYSICAL SCIENCE – ELECTRICITY/MAGNETISM (continued)

Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency (To be determined by teachers/teams)	Resources	Optional Ideas for Engineering Connections
<p><u>Substrand:</u> Practice of Engineering</p> <p><u>Standard:</u> Understand that engineering design is the process of identifying problems, developing multiple solutions, selecting the best possible solution, and building the product.</p>	<p>Generate ideas and possible constraints for solving a problem through engineering design. (For example: Design and build an electromagnet to sort steel and aluminum materials for recycling.) (Standard NSE: 4.1.2.2.2)</p>	<ul style="list-style-type: none"> • Not assessed on the MCA-III. 		<p>Grade 4 Harcourt Science</p> <ul style="list-style-type: none"> • Unit F, Chapter 1, Lesson 4, pp. F22-F31 <p>Ideas for discussion:</p> <ul style="list-style-type: none"> • Light bulb • Alarm • Compass • Electromagnet or crane • Electric beater 	<p>For example, ask your students to design and build a device to rescue a small stuffed animal from a box while standing three feet away. (from “The Works”*)</p>
<p><u>Substrand:</u> Practice of Engineering</p> <p><u>Standard:</u> Understand that engineering design is the process of identifying problems, developing multiple solutions, selecting the best possible solution, and building the product.</p>	<p>Identify and investigate a design solution and describe how it was used to solve an everyday problem. (For example: Investigate different varieties of construction tools.) (Standard NSE: 4.1.2.2.1)</p>	None.			<p>One design solution you could focus on is Velcro. With your students, learn about the history of fasteners (buttons, snaps, etc.) and explore the unique need that Velcro fills. Why was it invented? Why do we still use it? (from “The Works”*)</p> <p>Have a 4th grade Invention Fair.</p>

* “The Works” <http://www.theworks.org/>