Overview of Science Units & Major Resources:
GRADE 5

Unit 1: Physical Science – Simple Machines
- "Mysterious Machine" Interact Unit – Teacher Guide and Student Journals
- "Intermediate Simple Machines" DVD (one per building)

Unit 2: Earth and Space Science – Changes to Earth's Surface
- Grade 5 Harcourt Science

Unit 3: Life Science – Living Things Interact/Biomes
- Grade 5 Harcourt Science

Unit 4: Earth and Space Science – Environment
- Grade 5 Harcourt Science

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

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

GRADE 5: SCIENCE CURRICULUM FRAMEWORKS

UNIT 1: PHYSICAL SCIENCE – SIMPLE MACHINES

Big Questions	Formative/Summative Assessments (To be determined by teachers/teams)
1. What are the 6 simple machines and how do they work? 2. What is the force that is affecting the object's movement? 3. How do tools and math make the job of scientists/engineers easier? 4. Why is it important to take notes and make detailed observations while doing experiments? 5. What are the steps of the scientific method?	Options include, but are not limited to: • Assessments found in Mysterious Machine Interact Unit

Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency (To be determined by teachers/teams)	Resources	Optional Ideas for Engineering Connections
Substrand: Motion. Standard: Understand that an object's motion is affected by forces and can be described by the object's speed and the direction it is moving.	Give examples of simple machines and demonstrate how they change the input and output of forces and motion. *(Standard PS: 5.2.2.1.1)*	• Uses of these simple machines are limited to changes in the speed of an object, the distance the object moves and the force on the object. • Simple machines will NOT include pulleys or second or third class levers. • Items will NOT require students to calculate mechanical advantage. • Items will NOT require students to make mathematical calculations. • Items may make comparisons to the human body. • Items will NOT use the terms input and output.		*Simple Machines is not part of the Grade 5 Harcourt Science book.* • "Mysterious Machine" Interact Unit – Teacher Guide and Student Journals • Simple Machines Manipulatives • DVD "Intermediate Simple Machines: Inclined Press, Levers, Pulleys, Wheels and Axles, and Working Together" (60 minutes) (located in each building media center) *Optional to Borrow:* • *Grade 4, Harcourt Science, Unit F, Chapter 3, Lessons 1-3, pp. F68-F89*	
Substrand: Motion. Standard: Understand that an object's motion is affected by forces and can be described by the object's speed and the direction it is moving.	Identify the force that starts something moving or changes its speed or direction of motion. (For example: Friction slows down a moving skateboard.) *(Standard PS: 5.2.2.1.2)*	None.			

GRADE 5: SCIENCE CURRICULUM FRAMEWORKS

UNIT 1: PHYSICAL SCIENCE – SIMPLE MACHINES (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
Substrand: Motion. Standard: Understand that an object's motion is affected by forces and can be described by the object's speed and the direction it is moving.	Demonstrate that a greater force on an object can produce a greater change in motion. *(Standard PS: 5.2.2.1.3)*	• Items may require students to understand the relationship between force and motion, apply this understanding to specific examples, make comparisons or predict the result of interactions. • Items may make comparisons to the human body. • Items will NOT require students to make mathematical calculations. • Items will NOT use the term acceleration. • Items will NOT refer directly to Newton's laws.		*Simple Machines is not part of the Grade 5 Harcourt Science book.* • "Mysterious Machine" Interact Unit – Teacher Guide and Student Journals • Simple Machines Manipulatives • DVD "Intermediate Simple Machines: Inclined Press, Levers, Pulleys, Wheels and Axles, and Working Together" (60 minutes) (located in each building media center) *Optional to Borrow:* • *Grade 4, Harcourt Science, Unit F, Chapter 3, Lessons 1-3, pp. F68-F89*	
Substrand: The Practice of Science Standard: Understand that scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.	**Generate a scientific question and plan an appropriate scientific investigation, such as systematic observations, field studies, open-ended exploration or controlled experiments to answer the question.** *(Standard NSE: 5.1.1.2.1)*	• Items may require students to compare and contrast types of investigations and how they are used to answer questions. • Items may require students to identify the appropriateness of a 2- to 3-step procedure or recognize and follow individual steps in a procedure. • Items will NOT test knowledge of specific terms, such as hypothesis. • Additional vocabulary may include terms such as experimental question, investigable question and testable question.			

GRADE 5: SCIENCE CURRICULUM FRAMEWORKS

UNIT 1: PHYSICAL SCIENCE – SIMPLE MACHINES (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**
Substrand: The Practice of Science Standard: Understand that scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.	**Conduct or critique an experiment, noting when the experiment might not be fair because some of the things that might change the outcome are not kept the same, or that the experiment isn't repeated enough times to provide valid results.** *(Standard NSE: 5.1.1.2.3)*	• Items may require students to recognize the variables of an investigation. • Items may require students to recognize when variables are NOT kept the same.		*Simple Machines is not part of the Grade 5 Harcourt Science book.* • "Mysterious Machine" Interact Unit – Teacher Guide and Student Journals • Simple Machines Manipulatives • DVD "Intermediate Simple Machines: Inclined Press, Levers, Pulleys, Wheels and Axles, and Working Together" (60 minutes) (located in each building media center) *Optional to Borrow:* • *Grade 4, Harcourt Science, Unit F, Chapter 3, Lessons 1-3, pp. F68-F89*	
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society. Standard: Understand that tools and mathematics help scientists and engineers see more, measure more accurately and do things that they could not otherwise accomplish.	**Use appropriate tools and techniques in gathering, analyzing and interpreting data. (For example: Spring scale, metric measurements, tables, mean/median/range, spreadsheets, and appropriate graphs).** *(Standard NSE: 5.1.3.4.1)*	• Measurement tools are limited to metric units. • Metric prefixes are limited to kilo-, centi- and milli-. • Items may require students to choose a tool that is most appropriate to analyze and interpret data, including selecting of a tool that has the appropriate units of measure. • Examples of organizing include placing data in a table. • Examples of analysis include simple graphing (bar graph and line graph) and using data to make comparisons. • Items will NOT require students to make statistical calculations.			

GRADE 5: SCIENCE CURRICULUM FRAMEWORKS

UNIT 1: PHYSICAL SCIENCE – SIMPLE MACHINES (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**
Substrand: The Practice of Science. Standard: Understand that science is a way of knowing about the natural world, is done by individuals and groups, and is characterized by empirical criteria, logical argument and skeptical review.	**Explain why evidence, clear communication, accurate record keeping, replication by others, and openness to scrutiny are essential parts of doing science.** *(Standard NSE: 5.1.1.1.1)*	• Items may require students to recognize whether communication is clear and/or accurate or how clear communication helps others repeat work or conduct further investigations.		*Simple Machines is not part of the Grade 5 Harcourt Science book.* • "Mysterious Machine" Interact Unit – Teacher Guide and Student Journals • Simple Machines Manipulatives • DVD "Intermediate Simple Machines: Inclined Press, Levers, Pulleys, Wheels and Axles, and Working Together" (60 minutes) (located in each building media center) *Optional to Borrow:* • *Grade 4, Harcourt Science, Unit F, Chapter 3, Lessons 1-3, pp. F68-F89*	All these are important in engineering as well. People's lives depend on many engineered products – from airplanes to heart valves to bridges – so engineers must test products accurately and rigorously. *(from "The Works"*)*
Substrand: The Practice of Science. Standard: Understand that science is a way of knowing about the natural world, is done by individuals and groups, and is characterized by empirical criteria, logical argument and skeptical review.	**Recognize that when scientific investigations are replicated they generally produce the same results, and when results differ significantly, it is important to investigate what may have caused such differences. (For example: Measurement errors, equipment failures, or uncontrolled variables.)** *(Standard NSE: 5.1.1.1.2)*	• Items may use the terms investigation or experiment. • Items will NOT include the terms uncontrolled variables. • Uncontrolled variables will be referred to as variables that are not kept the same.			

GRADE 5: SCIENCE CURRICULUM FRAMEWORKS

UNIT 2: EARTH AND SPACE SCIENCE – CHANGES TO EARTH'S SURFACE

Big Question	Formative/Summative Assessments (To be determined by teachers/teams)
1. What processes change landforms? 2. What causes mountains, volcanoes, and earthquakes? 3. How has Earth's surface changed?	Options include, but are not limited to: • Grade 5 Harcourt Science Unit C, Chapter 1 "Changes to Earth's Surface" Assessment)(adapted version in district 5th 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
Substrand: Earth Structure and Processes. Standard: Understand that the surface of the Earth changes. Some changes are due to slow processes and some changes are due to rapid processes.	Explain how slow processes, such as water erosion, and rapid processes, such as landslides and volcanic eruptions, form features of the Earth's surface. *(Standard ES: 5.3.1.2.2)*	• Changes to the earth's surface are limited to observable examples, such as runoff from fields or construction sites, flooding, volcanic eruptions, landslides, earthquakes, wind or wave erosion and freezing and thawing.		Grade 5 Harcourt Science: • Unit C, Chapter 1, Lessons 1-3, pp. C4-C25 – Investigation: How Water Changes Earth's Surface, pp. C4-C5 – Investigation: Movement of the Continents, pp. C20-C21	With your students, learn how engineers work to predict extreme weather and natural disasters like tornados and earthquakes. *(from "The Works"*)*
Substrand: Earth Structure and Processes. Standard: Understand that the surface of the Earth changes. Some changes are due to slow processes and some changes are due to rapid processes.	Explain how, over time, rocks and weather combine with organic matter to form soil. *(Standard ES: 5.3.1.2.1)*	• Items will NOT include the terms chemical and physical weathering or require students to know the differences between these processes. • Items will NOT require students to know the differences between soil types. • Soil composition is limited to rocks, organic matter, water and air. • Items will NOT require students to identify the four components of soil. • Soil properties are limited to color and particle size. • Soil formation is limited to making soil through weathering and erosion. • Items will NOT assess soil horizons. • Additional vocabulary may include terms such as compost.		United Streaming Video: "Getting to Know Soil" (23 minutes) (in district 5th grade shared folder)	

GRADE 5: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: LIFE SCIENCE – LIVING THINGS INTERACT/BIOMES

Big Questions	Formative/Summative Assessments (To be determined by teachers/teams)
1. What are ecosystems? 2. How does energy flow through an ecosystem? 3. How do organisms compete and survive in an ecosystem? 4. What are land biomes? 5. What are water ecosystems? 6. How do ecosystems change naturally? 7. How do people change ecosystems? 8. How do maps make the job of scientists/engineers easier? 9. What are the steps of the scientific method?	Options include, but are not limited to: • Grade 5 Harcourt Science Unit B, Chapter 2 "Living Things Interact" Assessment (adapted version in district 5th grade shared folder) • Grade 5 Harcourt Science Unit B, Chapter 3 "Biomes" Assessment (adapted version in district 5th 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
Substrand: Interdependence Among Living Systems. Standard: Understand that natural systems have many components that interact to maintain the living system.	Describe a natural system in Minnesota, such as a wetland, prairie, or garden, in terms of the relationships among its living and nonliving parts, as well as inputs and outputs. (For example: Design and construct a habitat for a living organism that meets its need for food, air and water.) *(Standard LS: 5.4.2.1.1)*	• Items may ask students to understand the relationships between producers, consumers and decomposers. • Examples of ways organisms interact include providing food, survival, safety (e.g., herding and schooling behaviors), reproduction, competition for resources and grooming. • Examples of ways organisms interact will NOT include the terms symbiosis, commensalisms, mutualism and parasitism, but these concepts may be addressed. • Nonliving parts of natural systems are limited to water, soil, light, air and temperature. • Items will focus on relationship between living and nonliving parts of system and NOT only identify the sun as a source of energy. • Items may require students to follow the flow of energy between trophic levels but will NOT use the term trophic level. • Items will NOT include the terms primary consumer, secondary consumer or tertiary consumer. • Additional vocabulary may include terms such as protection, shelter, decay, waste, environment, population, predator, prey, food chain and food web.		Grade 5 Harcourt Science: • Unit B, Chapter 2, Lessons 1 and 2, pp. B28-B31, B34-B39 – Play "Predator, The Food Chain Game" instead of Investigation: What Eats What In Ecosystems, pp. B32-B33 • Unit B, Chapter 3, Lessons 1 and 2, P. B62-B73, B76-B81 – Investigation: Biomes and Climates, pp. B62-B63 – Biome Project – Investigation: Life in a Pond, pp. B74-B75	Use the engineering design process to design and make a habitat for a plant or animal. *(from "The Works"*)*

* "The Works" http://www.theworks.org/

GRADE 5: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: LIFE SCIENCE – LIVING THINGS INTERACT/BIOMES (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
Substrand: Structure and Function in Living Systems. Standard: Understand that living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system. (For example: Compare the physical characteristics of plants or animals from widely different environments, such as desert versus tropical, and explore how each has adapted to its environment.) *(Standard LS:5.4.1.1.1)*	• Physical characteristics of animals are limited to those that are observable, such as coloration, body covering, size and strength. • Physical characteristics of plants are limited to roots, stems, leaves/needles/scales, flowers, fruits and seeds. • Items assessing this benchmark may also assess benchmark 3.4.3.2.2. • Additional vocabulary may include terms such as feature and trait.		Grade 5 Harcourt Science: • Unit B, Chapter 2, Lesson 3, pp. B42-B47 – Investigation: Body Color, pp. B40-B41	
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society. Standard: Understand that tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.	**Create and analyze different kinds of maps of the student's community and of Minnesota. (For example: Weather maps, city maps, aerial photos, regional maps, or online map resources.)** *(Standard NSE: 5.1.3.4.2)*	None.		Options: • Look at weather map/precipitation map of Minnesota. Compare to one of biome.	5th graders can learn about zoning and can design cities. *(from "The Works"*)*
Substrand: Interdependence Among Living Systems. Standard: Understand that natural systems have many parts that interact to maintain the living system.	Explain what would happen to a system such as a wetland, prairie, or garden if one of its parts were changed. (For example: Investigate how road salt runoff affects plants, insects and other parts of an ecosystem; Another example: Investigate how an invasive species changes an ecosystem.) *(Standard LS: 5.4.2.1.2)*	• Examples of changes in a habitat may include changes in rainfall, pollution, catastrophic events, fire and introduced species. • Items may require knowledge that changes in a habitat can be either helpful or harmful to an organism, depending on the organism's niche. • Items will NOT use the terms catastrophic or niche.		Grade 5 Harcourt Science: • Unit B, Chapter 4, Lesson 1, pp. B92-B95 (natural) • Unit B, Chapter 4, Lesson 2, pp. B98-B101 (man-made)	Explore Acid and Base Chemistry and the effect of "acid rain" on ecosystems. *(from "The Works"*)*

* "The Works" http://www.theworks.org/

GRADE 5: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: LIFE SCIENCE – LIVING THINGS INTERACT/BIOMES (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**
Substrand: The Practice of Science. Standard: Understand that scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.	**Identify and collect relevant evidence, make systematic observations and accurate measurements, and identify variables in a scientific investigation.** *(Standard NSE: 5.1.1.2.2)*	• Examples of collecting relevant evidence may include placing data in a table. • Examples of tools for collecting data include thermometers, microscopes, hand lenses, balances, rulers and rain gauges; tools also include common items that may indicate wind speed or direction, such as a flag or weather vane. • Items may require students to identify which variables were changed, kept the same and measured in a given experiment. • Items will NOT use the terms independent variable, dependent variable, manipulated variable or responding variable. • Measurement tools are limited to metric units, except thermometers. • Temperature will be presented in Celsius but may be presented in Fahrenheit in situations where Fahrenheit is commonly used such as weather. • Items assessing this benchmark may also assess benchmark 3.1.3.4.1.		Grade 5 Harcourt Science: • Unit B, Chapter 4, Lesson 1, pp. B90-B91 – Investigation: How a Pond Changes • Unit B, Chapter 4, Lesson 2, pp. B96-B97 – Investigation: How Chemical Fertilizer Affects a Pond	

GRADE 5: SCIENCE CURRICULUM FRAMEWORKS

UNIT 4: EARTH AND SPACE SCIENCE – ENVIRONMENT

Big Questions	Formative/Summative Assessments (To be determined by teachers/teams)
1. How do people use fossil fuels? 2. How can moving water generate electricity? 3. How can people treat ecosystems more wisely? 4. How can people help restore damaged ecosystems? 5. How have people used science and engineering in the past and today?	Options include, but are not limited to: • Grade 5 Harcourt Science Unit F, Chapter 4 "Environment" Assessment (Adapted version in district 5th grade shared folder. Note: Unit F and Unit B from this unit are combined into one 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
Substrand: Human Interaction with Earth Systems. Standard: Understand that in order to maintain and improve their existence, humans interact with and influence earth systems.	• Identify renewable and non-renewable energy and material resources that are found in Minnesota and describe how they are used. (For example: Water, iron ore, granite, sand and gravel, wind, and forests.) *(Standard ES: 5.3.4.1.1)*	None.		Grade 5 Harcourt Science: • Unit F, Chapter 4, Lesson 1, pp. F98-F103 – Investigation: Water Power, pp. F102-F103 • Unit F, Chapter 4, Lesson 2, pp. F104-F107; pp. F110-F113 – Investigation: A Steam-Powered Turbine, pp. F108-F109 (teacher demonstration) Optional: • (Spanish only) Harcourt Science, Unit C, Chapter 2, Lesson 3, pp. C50-C53	
	• Give examples of how mineral and energy resources are obtained and processed and how that processing modifies their properties to make them more useful. (For example: Iron ore, biofuels, or coal.) *(Standard ES: 5.3.4.1.2)*	• Items will NOT require understanding of the process of raw material refinement. • Items will require students to understand that raw materials must be processed in order to become usable products. • Materials are limited to iron ore, sand and gravel, granite, coal and oil.			

GRADE 5: SCIENCE CURRICULUM FRAMEWORKS

UNIT 4: EARTH AND SPACE SCIENCE – ENVIRONMENT (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**
Substrand: Human Interaction with Earth Systems. Standard: Understand that in order to maintain and improve their existence, humans interact with and influence earth systems.	Compare the impact of individual decisions on natural systems. (For example: Choosing paper or plastic bags impacts landfills as well as ocean life cycles.) *(Standard ES: 5.3.4.1.3)*	• Items assessing this benchmark may also assess benchmarks 4.1.2.1.1 and 5.4.4.1.1. • Additional vocabulary may include terms such as recycle.		Grade 5 Harcourt Science: • Unit B, Chapter 4, Lessons 3 and 4, pp. B102-B107, pp. B110-B115 – Investigation: What Happens in a Landfill, pp. B102-B103 – Investigation: How Waste Water Can Be Cleaned, pp. B108-B109 – Optional At Home Activities: pp. B117, pp. F117	Egg Drop Challenge**:** What *recyclable* materials would you use to package an egg to protect it from a fall of a few feet or a few stories? Offer your students materials like paper, recyclable packing materials and cardboard, and see what they come up with. (Tip: put the eggs in plastic bags before distributing them to students!) *(from "The Works"*)*
Substrand: Human Interactions with Living Systems. Standard: Understand that humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	Give examples of beneficial and harmful human interaction with natural systems. (For example: Recreation, pollution, wildlife management.) *(Standard LS: 5.4.4.1.1)*	• Examples of changes in a habitat may include pollution, erosion control, catastrophic events, fire and introduced species. • Items may require students to know that changes in a habitat can be either helpful or harmful to an organism depending on the organism's niche. • Items will NOT use the terms catastrophic or niche.			
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society. Standard: Understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	**Describe how science and engineering influence and are influenced by local traditions and beliefs. (For example: Substainable agricultural practices used by many cultures.** *(Standard NSE: 5.1.3.2.1)*	• Not assessed on the MCA-III.		Option: • Parent/community member guest speakers (Example – a farmer shares which technology he uses now as compared to what was available 100 years ago.)	Integrate STEM with history: explore the building of the pyramids or large cathedrals. What motivated the architects to design these structures? What new discoveries did they make in engineering? *(from "The Works"*)*