Overview of Science Units & Major Resources:
GRADE 3

Unit 1: Physical Science – Energy ~ Sound and Light

- Battle Creek Area Math and Science Center "Light and Sound Unit"
- Engineering is Elementary Kwame's Sound
- National Geographic "The Magic of Light and Sound"

Unit 2: Earth and Space Science – The Universe/Solar System

- Grade 3 Harcourt Science

Unit 3: Life Science – Plants and Animals

- Grade 3 Harcourt Science

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

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

GRADE 3: SCIENCE CURRICULUM FRAMEWORKS

UNIT 1: PHYSICAL SCIENCE – ENERGY ~ LIGHT AND SOUND

Big Questions	Formative/Summative Assessments (To be determined by teachers/teams)
1. What is sound? 2. Why do sounds differ? 3. How do sound waves travel? 4. How does light behave? 5. How is scientific inquiry used? 6. How do we provide evidence to support our claims?	Options include, but are not limited to: • Assessments included in "Light and Sound" 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: Energy. Standard: Understand that energy appears in different forms, including sound and light.	Explain the relationship between the pitch of a sound, the rate of vibration of the source, and factors that affect pitch. (For example: Changing the length of a string that is plucked changes the pitch.) *(Standard PS: 3.2.3.1.1)*	• Examples of factors that affect pitch are the size of the object, tension, the type of material, and how fast or slow the object vibrates. • Items will NOT require mathematical calculations.		• "Light and Sound Unit" by Battle Creek Area Mathematics and Science Center • National Geographic "The Magic of Light and Sound"	• See Activities 12, 13 from Battle Creek Area Mathematics and Science Center Curriculum – "Washtub" instrument or drum. • Following the reading of The Remarkable Farkle McBride, students could create their own instruments that produce sound and form an orchestra/band.
Substrand: Energy. Standard: Understand that energy appears in different forms, including sound and light.	Explain how shadows form and can change in various ways. *(Standard PS: 3.2.3.1.2)*	• Items will use only a single light source. • Items are limited to length and direction of shadow as affected by location or light source. • Items assessing this benchmark may also assess benchmark 3.3.3.1.1.		• "Light and Sound Unit" by Battle Creek Area Mathematics and Science Center • National Geographic "The Magic of Light and Sound"	

GRADE 3: SCIENCE CURRICULUM FRAMEWORKS

UNIT 1: PHYSICAL SCIENCE – ENERGY ~ LIGHT AND SOUND (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: Energy. Standard: Understand that energy appears in different forms, including sound and light.	Describe how light travels in a straight line until it is absorbed, redirected, reflected or allowed to pass through an object. (For example: Use a flashlight, mirrors and water to demonstrate reflection and bending of light.) *(Standard PS: 3.2.3.1.3)*	• Items may require students to recognize examples of these concepts, including reflection of light using solid objects and mirrors, rainbows and the absorption of some light when it passes through dark glasses. • Items will NOT use the terms refract or refraction. • Items may include the words transparent or opaque. • Items that describe interactions of light will include an explicit light source. • Additional vocabulary may include terms such as light rays.		• "Light and Sound Unit" by Battle Creek Area Mathematics and Science Center • National Geographic "The Magic of Light and Sound" • "Opaque/Transparent/ Translucent" Lesson (in district 3rd grade shared folder))	
Substrand: The Practice of Science. Standard: Understand that scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.	**Generate questions that can be answered when scientific knowledge is combined with knowledge gained from one's own observations or investigations. (For example: Investigate the sounds produced by striking various objects.)** *(Standard NSE: 3.1.1.2.1)*	• Scientific or investigable questions have measurable qualities and are testable by students. • Scientific questions are questions that begin with "How can," "How does," "What if," and "I wonder if/how," but typically NOT "Why." • Items may require students to identify a testable question. • Items may be placed in a context that addresses an experiment and require students to identify an appropriate question. • Additional vocabulary may include terms such as experimental question, investigable question and testable question.		• "Light and Sound Unit" by Battle Creek Area Mathematics and Science Center • National Geographic "The Magic of Light and Sound" • Kwame's Sound – An Acoustical Engineering Story (Following the reading of Kwame's Sound, students could represent a pattern of sounds by creating an illustration and have another student repeat the sound from the illustration.)	
Substrand: The Practice of Science Standard: Understand that scientists work as individuals and in groups emphasizing evidence, open communication and skepticism.	**Provide evidence to support claims, other than saying "Everyone knows that," or "I just know," and question such reasons when given by others.** *(Standard NSE: 3.1.1.1.1)*	• Evidence is limited to measurable data from an investigation, an observation or historical evidence.		• "Light and Sound Unit" by Battle Creek Area Mathematics and Science Center • National Geographic "The Magic of Light and Sound"	

GRADE 3: SCIENCE CURRICULUM FRAMEWORKS

UNIT 2: EARTH AND SPACE SCIENCE – THE UNIVERSE/SOLAR SYSTEM

Big Questions	Formative/Summative Assessments (To be determined by teachers/teams)
1. What is the Solar System? 2. What causes Earth's seasons? 3. How do the moon and Earth interact? 4. How is scientific inquiry used? 5. How do we use evidence to learn about nature and develop tools?	Options include, but are not limited to: • Grade 3 Harcourt Science Unit D, Chapter 3 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: The Universe. Standard: Understand that the sun and moon have locations and movements that can be observed and described.	Observe and describe the daily and seasonal changes in the position of the sun and compare observations. *(Standard ESS: 3.3.3.1.1)*	• All references to the position of the Sun will be from a position on Earth in the Northern Hemisphere. • Items will NOT use the terms rotation, revolution, tilt, axis, equator, angle, spin and circle. • Additional vocabulary may include terms such as spring, summer, fall, winter, day, night.		Grade 3 Harcourt Science • Unit D, Chapter 3, Lesson 2	
Substrand: The Universe. Standard: Understand that the sun and moon have locations and movements that can be observed and described.	Recognize the pattern of apparent changes in the moon's shape and position. *(Standard ESS: 3.3.3.1.2)*	• Items will NOT require students to name the phases of the moon. • Items will NOT address the causes for changes in the moon's shape or position.		Grade 3 Harcourt Science • Unit D, Chapter 3, Lesson 3	With your students, learn about aerospace engineers and the Apollo missions to the moon during the 1960s. NASA hopes to establish a permanent colony on the moon in the next couple decades. What would you need to design for a lunar colony? *(from "The Works"*)*
Substrand: The Universe. Standard: Understand that objects in the solar system as seen from Earth have various sizes and distinctive patterns of motion.	Demonstrate how the planets rotate and revolve. *(Standard ESS: 3.3.3.2.1)*	None.		Grade 3 Harcourt Science • Unit D, Chapter 3, Lesson 1	Engineers design many tools for exploring the solar system, from telescopes to rocket ships. *(from "The Works"*)*

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

GRADE 3: SCIENCE CURRICULUM FRAMEWORKS

UNIT 2: EARTH AND SPACE SCIENCE – THE UNIVERSE/SOLAR SYSTEM (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 Universe. Standard: Understand that objects in the solar system as seen from Earth have various sizes and distinctive patterns of motion.	Recognize that the Earth is one of several planets that orbit the sun, and that the moon orbits the Earth. *(Standard ESS: 3.3.3.2.2)*	• Items will NOT require students to know why the inner and outer planets are different. • Items will NOT require students to name specific planets. • Items will NOT require students to identify planets by their characteristics.		Grade 3 Harcourt Science • Unit D, Chapter 3, Lesson 3	Learn about the technology of space exploration, like telescopes, rocket ships and the Mars rovers. NASA has some excellent curriculum resources at: www.nasa.gov/education/materials *(from "The Works"*)* Students may create a new solar system, designing planets that rotate/revolve around a star/sun.
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.	**Understand that everybody can use evidence to learn about the natural world, identify patterns in nature, and develop tools. (For example: Ojibwa and Dakota knowledge and use of patterns in the stars to predict and plan.)** *(Standard NSE: 3.1.3.2.1)*	• Items will NOT require students to identify actions of specific individuals or groups.		Grade 3 Harcourt Science • "People in Science" (page D84) (Example)	With your students, explore how different Native American cultures built dwellings, grew food, and made clothing, tools, medicines and boats. The people who invented all these things were early engineers. *(from "The Works"*)*

GRADE 3: SCIENCE CURRICULUM FRAMEWORKS

UNIT 2: EARTH AND SPACE SCIENCE – THE UNIVERSE/SOLAR SYSTEM (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 is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.	**Construct reasonable explanations based on evidence collected from observations or experiments.** *(Standard NSE: 3.1.1.2.4)*	• Items may require students to recognize or generate a reasonable conclusion based on evidence.		Grade 3 Harcourt Science • Unit D, Chapter 3, Lesson 3 • Collect data on moon phases	
Substrand: The Practice of Science. Standard: Understand that scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.	**Recognize that when a science investigation is done the way it was done before, even in a different place, a similar result is expected.** *(Standard NSE: 3.1.1.2.2)*	None.		Grade 3 Harcourt Science • Unit D, Chapter 3, Lesson 3 • Compare data from actual data on moon's phases	

GRADE 3: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: LIFE SCIENCE – PLANTS AND ANIMALS

Big Questions	Formative/Summative Assessments (To be determined by teachers/teams)
Plants: 1. What is a plant? 2. What is a simple plant? 3. What kinds of plants have seeds? 4. How do plants make food? Animals: 1. What is an animal? 2. What are mammals and birds? 3. What are amphibians, fish, and reptiles? 4. How do animals behave? 5. What is extinction? Plants/Animals: 1. How have people throughout history used scientific inquiry to investigate the natural world? 2. How do we use tools when we make observations? 3. How and why do we record our observations?	Options include, but are not limited to: • Grade 3 Harcourt Science Unit A, Chapter 1 Assessment • Grade 3 Harcourt Science Unit A, Chapter 2 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: 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.	Compare how the different structures of plants and animals serve various functions of growth, survival and reproduction. (For example: Skeletons in animals and stems in plants provide strength and stability.) *(Standard LS: 3.4.1.1.1)*	• Structures of plants are limited to roots, stems, leaves/needles/scales, flowers, fruits and seeds. • The function of the entire flower is limited to reproduction; the functions of individual parts of the flower are NOT assessed. • Structures of animals are limited to observable physical characteristics such as coverings (skin, fur, hair, scales and feathers), appendages (wings, fins, arms and legs), eyes ears, mouths and beak, tails, teeth. • Items will NOT require students to compare the structures of animals and the structures of plants to each other. • Items assessing this benchmark may also assess benchmark 3.4.3.2.2. • Additional vocabulary may include terms such as features and traits.		Grade 3 Harcourt Science • Unit A, Chapter 1, Lessons 1-2 (pages A2-A15) • Unit A, Chapter 2, Lessons 2-4 (pages A50-A73)	Engineers are often inspired by nature. Encourage your students to compare the structures of plants and animals to the structures of buildings and machines. How are truss bridges similar to bird bones? How are bird wings different from airplane wings? Compare the shape of boat hulls and shark bodies. *(from "The Works"*)*

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

GRADE 3: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: LIFE SCIENCE – PLANTS AND ANIMALS (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.	Identify common groups of plants and animals using observable physical characteristics, structures and behaviors. (For example: Sort animals into groups such as mammals and amphibians based on physical characteristics; Another example: Sort and identify common Minnesota trees based on leaf/needle characteristics. *(Standard LS: 3.4.1.1.2)*	• Characteristics of animals include sex, color, size, shape, coverings (skin, fur, hair, scales, feathers), appendages (wings, fins, arms, legs, number of each), eyes, ears, mouths and beaks, tails, teeth. • Characteristics of plants are limited to roots, stems, leaves/needles/scales, flowers, fruits, seeds and functions of the plant (e.g., carrots as a type of taproot). • The function of the entire flower is limited to reproduction; the functions of individual parts of the flower are NOT assessed. • Items will NOT require recall of specific characteristics of organisms. • Items will NOT require students to identify the name of common organisms based on characteristics. • Additional vocabulary may include terms such as feature and trait.		Grade 3 Harcourt Science • Unit A, Chapter 1, Lessons 1-2 (pages A2-A15) • Unit A, Chapter 2, Lessons 2-3 (pages A50-A65)	With your students, explore all the different products made from trees – paper, wood, cloth, cardboard, oils, spices, foods, etc. – and find out how they are made. You can do this for other agricultural products, too. *(from "The Works"*)* Students may combine characteristics of animals to create a new creature. Students could name and classify their new animal and create a shoebox diorama of the animal in its habitat.

GRADE 3: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: LIFE SCIENCE – PLANTS AND ANIMALS (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: Evolution in Living Systems. Standard: Understand that offspring are generally similar to their parents, but may have variations that can be advantageous or disadvantageous in a particular environment.	Give examples of likenesses between adults and offspring in plants and animals that can be inherited or acquired. (For example: Collect samples or pictures that show similarities between adults and their young offspring.) *(Standard LS: 3.4.3.2.1)*	• Items will be limited to physical characteristics and will NOT include behavioral characteristics. • Items may require students to identify similarities and differences based on the inherited and acquired characteristics. • Examples of inherited characteristics in humans may include eye, skin and hair color. • Examples of inherited characteristics in other organisms may include coloration, appendages and body coverings. • Examples of inherited characteristics in plants may include leaf and flower shape and seed and stem type. • Examples of acquired characteristics in humans may include pierced ears, hairstyle, clothing and tattoos. • Examples of acquired characteristics in other organisms may include weight and docked tails. • Examples of acquired characteristics in plants may include leaf damage and total number of leaves. • Items will NOT require recall of specific characteristics of organisms. • Items will NOT use examples of organisms that undergo metamorphosis. • Additional vocabulary may include terms such as feature and trait.		Grade 3 Harcourt Science • Unit A, Chapter 1, Lesson 3 (page A20) • Unit A, Chapter 2, Lesson 1 (page A48)	

GRADE 3: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: LIFE SCIENCE – PLANTS AND ANIMALS (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: Evolution in Living Systems. Standard: Understand that offspring are generally similar to their parents, but may have variations that can be advantageous or disadvantageous in a particular environment.	Give examples of differences among individuals that can sometimes give an individual an advantage in survival and reproduction. *(Standard LS: 3.4.3.2.2)*	• Items will refer to differences among individuals within a species. • Differences among individual animals include observable characteristics such as coloration, body covering, size and strength and feeding behaviors, nesting and migration. • Differences among individual plants include observable characteristics such as roots, stems, leaves/needles/scales/flowers, fruits and seeds, and responses to stimuli. • Items assessing this benchmark may also assess benchmarks 5.4.1.1.1 and 3.4.1.1.1. • Additional vocabulary may include terms such as adapt, feature and trait.		"Caterpillar Hunt" Lesson (in district 3rd grade shared folder)	Agricultural engineers and biologists save seeds from plants that best meet human needs. This is how new and better foods are developed. For instance, Native American cultures selected the best corn plants to grow over many generations. *(from "The Works"*)*
Substrand: The Practice of Science. Standard: Understand that scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.	**Maintain a record of observations, procedures and explanations, being careful to distinguish between actual observations and ideas about what was observed. (For example: Make a chart comparing observations about the structures of plants and animals.)** *(Standard NSE: 3.1.1.2.3)*	• Examples of organizing include placing data in a table. • Examples of analysis may include simple graphing (bar graph and line graph) and using data to make comparisons. • Additional vocabulary may include terms such as notebook and journal.		Grade 3 Harcourt Science • Unit A, Chapter 1, Lesson 3, Investigation "What Kinds of Plants Have Seeds?" (page A16) • Unit A, Chapter 2, Lesson 2, Investigation "What Are Mammals and Birds" (page A50)	Engineers also need to make careful records of observations and ideas. *(from "The Works"*)*

GRADE 3: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: LIFE SCIENCE – PLANTS AND ANIMALS (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: 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 tools, including rulers, thermometers, magnifiers and simple balance, to improve observations and keep a record of the observations made.** *(Standard NSE: 3.1.3.4.1)*	• Appropriate measurement tools are limited to rulers, thermometers, magnifiers, simple balances, rain gauges, timers and common items that may indicate wind speed or direction, such as a flag or weather vane. • 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 for a particular task in a scientific investigation. • Items assessing this benchmark may also assess benchmark 5.1.1.2.2.		Grade 3 Harcourt Science • Unit A, Chapter 1, Lesson 2, Investigation "What is a Simple Plant?" (page A12) • Unit A, Chapter 2, Lesson 2, Investigation "What are Mammals and Birds" (page A50)	Students could make their own rulers or balances. *(from "The Works"*)*
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.	**Recognize that the practice of science and/or engineering involves many different kinds of work and engages men and women of all ages and backgrounds.** *(Standard NSE: 3.1.3.2.2)*	• Items will NOT require students to identify specific jobs or careers or to make general descriptions that encompass a job or career.		Grade 3 Harcourt Science • Unit A, Chapter 1, "People In Science," George Washington Carver (page A34) • Unit A, Chapter 2, "People In Science," Redolfo Dirzo (A84)	This is a great place to integrate language and social science by reading biographies of scientists, inventors and engineers. Children can also develop oral communication skills by enacting someone they have read about. Third graders are also ready to explore the different kinds of scientists (biologist, chemist, astronomer, physicist, geologist) and different kinds of engineers and what each does: electrical, chemical, mechanical, civil, aerospace, software, environmental, agricultural, industrial, etc. *(from "The Works"*)*