Reading Public Schools

Instilling a joy of learning and inspiring the innovative leaders of tomorrow

Science Curriculum Guide **Grade 7**

Course Description

Students in grade 7 focus on systems and cycles using their understanding of structures and functions, connections and relationships in systems, and flow of matter and energy developed in earlier grades. A focus on systems requires students to apply concepts and skills across disciplines, since most natural and designed systems and cycles are complex and interactive. They gain experience with plate tectonics, interactions of humans and Earth processes, organism systems to support and propagate life, ecosystem dynamics, motion and energy systems, and key technological systems used by society. Through grade 7, students begin a process of moving from a more concrete to an abstract perspective, since many of the systems and cycles studied are not directly observable or experienced. This also creates a foundation for exploring cause and effect relationships in more depth in grade 8.

Seventh Grade Content Standards

Earth and Space Sciences

⇒ ESS2. Earth's Systems

⇒ ESS3. Earth and Human Activity

Life Science

⇒ LS1. From Molecules to Organisms: Structures and Processes

⇒ LS2. Ecosystems: Interactions, Energy, and Dynamics

Physical Science

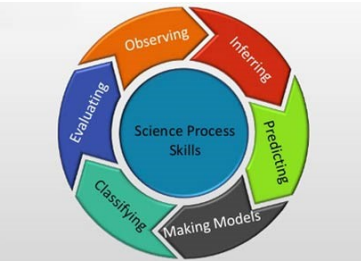
⇒ PS2. Motion and Stability: Forces and Interactions

⇒ PS3. Energy

Engineering/Technology

⇒ ETS1. Engineering Design

⇒ ETS3. Technological Systems



Expectations: *What are the students doing?*

•Identifying a lesson's standards or objectives and how they connect to unit goals •Using information from observations to construct an evidence based account for natural phenomena •Constructing explanations using multiple sources of evidence

Instruction: *What are the students doing?*

•Asking questions that challenge the premise(s) of an argument or the interpretation of data •Drawing explicitly upon content they have learned in class in conversations with peers •Analyzing observations to distinguish between correlation and causation

Assessment: *What are the students doing?*

•Engaging in challenging learning tasks regardless of learning needs •Conducting investigations with multiple controlled variables and considering the accuracy of the data or the methods •Using exemplars to inform their work

Concepts	Essential Questions	Key Activities MAY Include:
Life Science: Growth and Development of Organisms	• What characteristics do plants and animals have to increase reproduction? (Nest Building, Vocalization, Asexual Vs Sexual Reproduction)	StemScopes Unit(s): Various physical and behavioral adaptation activities
Life Science: Interdependent Relationships and Ecosystems	• What factors can influence an organism's survival in an ecosystem? • What are some limited resources that can affect an organism's growth or population increase? • How can competitive, predatory, and mutually beneficial relationships affect organisms? • What do food webs demonstrate? • How can changes in biodiversity influence humans?	StemScopes Unit(s): Food web, trophic pyramid modeling, ecosystem relationship , invasive species, and endangered species projects/activities.
Earth and Space Science: Earth's Systems and Natural Hazards	• Do Earth's processes occur quickly or slowly? • How does water change the land? • How can scientists predict the likelihood of natural hazards? • What is the difference between large scale and small scale processes?	StemScopes Unit(s): Subduction and mountain building modeling, weathering and erosion, stream table activities.
Earth and Space Science: The Water Cycle	• How is water moved around Earth? • How does the Sun affect the water cycle? • How does gravity affect the water cycle?	StemScopes Unit(s): Activities to demonstrate/ model how water moves through Earth's spheres
Earth and Space Science: Human Impacts on Earth Systems	• What are some positive and negative ways that humans alter the environment? • What are some solutions to the negative impact of humans on the environment?	StemScopes Unit(s): Air pollution, over population, consumption of natural and artificial resources and environmental protection activities.
Physical Science: Forces at a Distance	• How do forces change an object's motion? • What types of forces exist in our world? • How can forces impact objects without directly touching them?	StemScopes Unit(s): Building electromagnetics, examining magnetic fields, and visualizing forces between object that cannot be seen.

Concepts	Essential Questions	Key Activities MAY Include:
Physical Science: Potential and Kinetic Energy	• What is the difference between kinetic and potential energy? • What does kinetic energy depend upon? • What does potential energy depend upon?	StemScopes Unit(s): Speed and motion, system design utilizing kinetic and potential energy
Physical Science: Energy Transfer in Temperature	• What is the relationship between temperature and thermal energy? • Does energy transfer from hot to cold or cold to hot? • What is the difference between conduction, convection, and radiation? • What factors affect the amount of energy transfer needed to change the temperature of matter?	StemScopes Unit(s): Materials Matter Amounts Matter Environments Matter Solar oven design/build/test
Engineering/ Technology: System Design	• What are the components of a structural, transportation, or communication system? • How do these components interact to make up the system as a whole? • What are the inputs, processes, outputs, and feedback of the system? • How can you model the system to better understand how the system functions?	StemScopes Unit(s): Manufacturing processes, Encoding/decoding exploration, Understanding Engineering Design Process challenges

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Curriculum Guide Overview

Curriculum Guide	Curriculum guides are public documents that are aligned with the Massachusetts Department of Education Curriculum Frameworks. They focus on the set of standards that students will learn within certain disciplines at appropriate grade levels. Curriculum Guides are intended for teachers, parents, and the wider school community as an overview document of the course of study for the year.
Curriculum Map	Curriculum maps are internal documents utilized as planning tools for teachers. Curriculum maps keep a focus on the end-of-year standards and chart a course for the teaching and learning over the year. They are typically organized in a grade-level overview organized by month or marking period. Curriculum maps typically include; standards and expectations for the grade/content, essential skills/ concepts, methods of assessment, and major content resources. Maps are never "done" as ongoing work of educators include revisions, additions, and revisits to the maps. They provide an overview for the year while also allowing educators to see a vertical picture of how the content develops as students progress through each grade.
Standards	The standards used as the foundation of our curriculum come directly from the Massachusetts Department of Education Curriculum Frameworks. State standards may be viewed here: http://www.doe.mass.edu/frameworks/
Science and Engineering Practices	While presented as distinct skill sets, the eight practices intentionally overlap and interconnect. Skills such as those outlined above should be reflected in curricula and instruction that engage students in an integrated use of the practices.
Content Standards	The Content Standards describe what students should know and be able to do within each grade-level.
Essential Questions	Essential questions are questions that are not answerable with an easy answer or a simple instruction. The purpose of essential questions is to provide opportunities for inquiry into the learning and act as an umbrella to anchor the unit/lesson.
Resources	Resources identified in Curriculum Guides are not intended to be exhaustive, nor are they intended to be prescriptive. The resources identified may function as a menu of curriculum resources from which educators identify the most appropriate tools to utilized in their classrooms. More specifics about identified resources are identified within the curriculum map documents.