

# Investigating Earth Systems Correlation to the Science Curriculum Framework for Massachusetts

## Grades 6 - 8 Earth Science Related Standards

<b>Correlation key:</b> "X" Coverage = Coverage in Student Edition and/or Teacher Edition supports the development of the concept. "XX" In-depth Coverage = In-depth coverage of the concept in Student Edition.	Climate and Weather	Dynamic Planet	Energy Resources	Fossils	Materials and Minerals	Oceans	Rocks and Landforms	Soil	Water as a Resource
<b>Skills of Inquiry</b>									
Formulate a testable hypothesis.	XX	XX	XX	XX	XX	XX	XX	XX	XX
Design and conduct an experiment specifying variable to be changed, controlled, and measured.	XX	XX	XX	XX	XX	XX	XX	XX	XX
Select appropriate tools and technology (e.g., calculators, computers, thermometers, meter sticks, balances, graduated cylinders, and microscopes), and make quantitative observations.	XX	XX	XX	XX	XX	XX	XX	XX	XX
Present and explain data and findings using multiple representations, including tables, graphs, mathematical and physical models, and demonstrations.	XX	XX	XX	XX	XX	XX	XX	XX	XX
Draw conclusions based on data or evidence presented in tables or graphs, and make inferences based on patterns or trends in the data.	XX	XX	XX	XX	XX	XX	XX	XX	XX
Communicate procedures and results using appropriate science and technology terminology.	XX	XX	XX	XX	XX	XX	XX	XX	XX
Offer explanations of procedures, and critique and revise them.	XX	XX	XX	XX	XX	XX	XX	XX	XX
<b>STRAND 1: EARTH AND SPACE SCIENCE</b>									
<b>Mapping the Earth</b>									
1. Recognize, interpret, and be able to create models of the Earth's common physical features in various mapping representations, including contour maps.	X	XX	XX		X		XX	XX	XX
<b>Earth's Structure</b>									
2. Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic core.		XX				XX			
<b>Heat Transfer in the Earth's System</b>									
3. Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through the Earth's system.	X	X	XX			X			
4. Explain the relationship among the energy provided by the Sun, the global patterns of atmospheric movement, and the temperature differences among water, land, and atmosphere.	X		XX			X			
<b>Earth's History</b>									
5. Describe how the movement of the Earth's crustal plates causes both slow changes in the Earth's surface (e.g., formation of mountains and ocean basins) and rapid ones (e.g., volcanic eruptions and earthquakes).		XX		X		XX			
6. Describe and give examples of ways in which the Earth's surface is built up and torn down by natural processes, including deposition of sediments, rock formation, erosion, and weathering.	X	XX		X			XX	XX	
7. Explain and give examples of how physical evidence, such as fossils and surface features of glaciation, supports theories that the Earth has evolved over geologic time.		XX	X	XX		X	XX	X	X
<b>The Earth in the Solar System</b>									

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8. Recognize that gravity is a force that pulls all things on and near the Earth toward the center of the Earth. Gravity plays a major role in the formation of the planets, stars, and solar system and in determining their motions.							X	X	X
9. Describe lunar and solar eclipses, the observed moon phases, and tides. Relate them to the relative positions of the Earth, Moon, and Sun.									
10. Compare and contrast properties and conditions of objects in the solar system (i.e., sun, planets, and moons) to those on Earth (i.e., gravitational force, distance from the sun, speed, movement, temperature, and atmospheric conditions).									
11. Explain how the tilt of the Earth and its revolution around the sun result in an uneven heating of the earth, which in turn causes the seasons.									
12. Recognize that the universe contains many billions of galaxies, and that each galaxy contains many billions of stars.									
<b>STRAND 2 : LIFE SCIENCE</b>									
<b>Evolution and Biodiversity</b>									
10. Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.				X		X			
11. Recognize that evidence drawn from geology, fossils, and comparative anatomy provide the basis of the theory of evolution.				XX					
12. Relate the extinction of species to a mismatch of adaptation and the environment.				X					
<b>Living Things and Their Environment</b>									
13. Give examples of ways in which organisms interact and have different functions within an ecosystem that enable the ecosystem to survive.				XX		XX		X	
<b>Changes in Ecosystems Over Time</b>									
17. Identify ways in which ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans. Describe how changes may be catastrophes such as volcanic eruptions or ice storms.	XX	XX	X	X	X	XX	XX	X	X
18. Recognize that biological evolution accounts for the diversity of species developed through gradual processes over many generations.				XX					
<b>STRAND 4 : TECHNOLOGY/ENGINEERING</b>									
<b>1. Materials, Tools, and Machines</b>									
1.1 Given a design task, identify appropriate materials (e.g., wood, paper, plastic, aggregates, ceramics, metals, solvents, adhesives) based on specific properties and characteristics (e.g., weight, strength, hardness, and flexibility).	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.2 Identify and explain appropriate measuring tools, hand tools, and power tools used to hold, lift, carry, fasten, and separate, and explain their safe and proper use.	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.3 Identify and explain the safe and proper use of measuring tools, hand tools, and machines (e.g., band saw, drill press, sanders, hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners) needed to construct a prototype of an engineering design.					X				
<b>2. Engineering Design</b>									

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2.1 Identify and explain the steps of the engineering design process, i.e., identify the need or problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.					X				
2.2 Demonstrate methods of representing solutions to a design problem, e.g., sketches, orthographic projections, multiview drawings.					X				
2.3 Describe and explain the purpose of a given prototype.					X				
2.4 Identify appropriate materials, tools, and machines needed to construct a prototype of a given engineering design.					X				
2.5 Explain how such design features as size, shape, weight, function, and cost limitations would affect the construction of a given prototype.					X				
2.6 Identify the five elements of a universal systems model: goal, inputs, processes, outputs, and feedback.					X				
<b>3. Communication Technologies</b>									
3.1 Identify and explain the components of a communication system, i.e., source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.					X				
3.2 Identify and explain the appropriate tools, machines, and electronic devices (e.g., drawing tools, computer-aided design, and cameras) used to produce and/or reproduce design solutions (e.g., engineering drawings, prototypes, and reports)	X	X	X	X	X	X	X	X	X
3.3 Identify and compare communication technologies and systems, i.e., audio, visual, printed, and mass communication.	X	X	X	X	X	X	X	X	X
3.4 Identify and explain how symbols and icons (e.g., international symbols and graphics) are used to communicate a message.	X	X	X	X	X	X	X	X	X
<b>4. Manufacturing Technologies</b>									
4.1 Describe and explain the manufacturing systems of custom and mass production.					X				
4.2 Explain and give examples of the impacts of interchangeable parts, components of mass-produced products, and the use of automation, e.g., robotics.					X				
4.3 Describe a manufacturing organization, e.g., corporate structure, research and development, production, marketing, quality control, distribution.					X				
4.4 Explain basic processes in manufacturing systems, e.g., cutting, shaping, assembling, joining, finishing, quality control, and safety.					X				
<b>5. Construction Technologies</b>									
5.1 Describe and explain parts of a structure, e.g., foundation, flooring, decking, wall, roofing systems.					X				
5.2 Identify and describe three major types of bridges (e.g., arch, beam, and suspension) and their appropriate uses (e.g., site, span, resources, and load).					X				
5.3 Explain how the forces of tension, compression, torsion, bending, and shear affect the performance of bridges.					X				
5.4 Describe and explain the effects of loads and structural shapes on bridges.					X				
<b>6. Transportation Technologies</b>									
6.1 Identify and compare examples of transportation systems and devices that operate on each of the following: land, air, water, and space.					X				

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6.2 Given a transportation problem, explain a possible solution using the universal systems model.					X				
6.3 Identify and describe three subsystems of a transportation vehicle or device, i.e., structural, propulsion, guidance, suspension, control, and support.					X				
6.4 Identify and explain lift, drag, friction, thrust, and gravity in a vehicle or device, e.g., cars, boats, airplanes, rockets.									
<b>7. Bioengineering Technologies</b>									
7.1 Explain examples of adaptive or assistive devices, e.g., prosthetic devices, wheelchairs, eyeglasses, grab bars, hearing aids, lifts, braces.					X				
7.2 Describe and explain adaptive and assistive bioengineered products, e.g., food, bio-fuels, irradiation, integrated pest management.					X				