In grade 7, instructional time should focus on eight core ideas:

**ESS**
- 2. Earth’s Systems
- 3. Earth and Human Activity

**LS**
- 1. From Molecules to Organisms: Structures and Processes
- 2. Ecosystems: Interactions, Energy, and Dynamics

**PS**
- 2. Motion and Stability: Forces and Interactions
- 3. Energy

**ETS**
- 1. Engineering Design
- 3. Technological Systems

### Science Concepts

**Earth & Space Science (ESS2, ESS3)**
- Explaining how Earth’s surface has changed over different scales
- Developing a model of the sun and Earth’s gravity in the water cycle
- Using data to explain that Earth’s resources are unevenly distributed
- Communicating how past geologic events are used to make predictions
- Constructing an argument about human activities and technologies on consumption of resources

**Life Science (LS1, LS2)**
- Developing an argument that body systems interact for life functions
- Explaining how animal behaviors and plant structures lead to reproduction
- Interpreting data about available resources and organism populations
- Describing the relationship between organisms across ecosystems
- Developing a model to describe the cycling of matter in an ecosystem
- Analyzing data about disruptions to an ecosystem and population shifts
- Evaluating designs to protect an ecosystem
- Explaining biodiversity and resource availability within an ecosystem
- Constructing a model of a food web

**Physical Science (PS2, PS3)**
- Describing the effects of electric charges on electric forces
- Presenting evidence of fields
- Interpreting data on the relationship of kinetic energy, mass, and speed
- Developing a model of the relative position and energy of objects
- Creating a device to control thermal energy transfer
- Investigating relationships involved in energy transfer
- Providing evidence linking changes in motion to energy transfer
- Modeling energy transfer mechanisms
- Relating kinetic and potential energy

**Technology/Engineering (ETS1, ETS3)**
- Evaluating competing solutions to a problem and modeling the solutions
- Testing to optimize a solution
- Constructing a prototype
- Explaining a communication system
- Comparing benefits and drawbacks of various communication systems
- Researching transportation systems
- Explaining how components of a structural system work together
- Using systems engineering to model components of technology systems

### Science and Engineering Practices

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

### Comments on the Science and Engineering Practices
For a list of specific skills, see the Science and Engineering Practices Progression Matrix (www.doe.mass.edu/stem/review.html). Practices are skills students are expected to learn and do; standards focus on some but not all skills associated with a practice.
STE What to Look For The example below features three Indicators from the Standards of Effective Practice. These Indicators are just a sampling from the full set of Standards and were chosen because they create a sequence: the educator plans a lesson that sets clear and high expectations, the educator then delivers high quality instruction, and finally the educator uses a variety of assessments to see if students understand the material or if re-teaching is necessary. This example highlights teacher and student behaviors aligned to the three Indicators that you can expect to see in a rigorous 7th grade science classroom.

<table>
<thead>
<tr>
<th>Expectations (Standard II, Indicator D)</th>
<th>What is the teacher doing?</th>
<th>What are the students doing?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plans and implements lessons that set clear and high expectations and also make knowledge accessible for all students.</td>
<td>• Creating culturally responsive lessons that engage and sustain student attention</td>
<td>• Identifying a lesson’s standards or objectives and how they connect to unit goals</td>
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<td>• Asking students to apply scientific knowledge and ideas when engaging with real-world problems</td>
<td>• Using information from observations to construct an evidence based account for natural phenomena</td>
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<td>• Showing students how to revise models to predict and explain science phenomena</td>
<td>• Constructing explanations using multiple sources of evidence</td>
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<thead>
<tr>
<th>Instruction (Standard II, Indicator A)</th>
<th>What is the teacher doing?</th>
<th>What are the students doing?</th>
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<tbody>
<tr>
<td>Uses instructional practices that reflect high expectations regarding content and quality of effort and work; engage all students; and are personalized to accommodate diverse learning styles, needs, interests, and levels of readiness.</td>
<td>• Providing opportunities for students to communicate ideas, ask questions, and make their thinking visible in writing and speaking</td>
<td>• Asking questions that challenge the premise(s) of an argument or the interpretation of data</td>
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<td>• Sharing conflict resolution strategies for working together with students</td>
<td>• Drawing explicitly upon content they have learned in class in conversations with peers</td>
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<td>• Modeling ways of using computation and analysis to find patterns in observations</td>
<td>• Analyzing observations to distinguish between correlation and causation</td>
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<thead>
<tr>
<th>Assessment (Standard I, Indicator B)</th>
<th>What is the teacher doing?</th>
<th>What are the students doing?</th>
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<tr>
<td>Uses a variety of informal and formal methods of assessments to measure student learning, growth, and understanding to develop differentiated and enhanced learning experiences and improve future instruction.</td>
<td>• Providing students with feedback aligned to long-term goals</td>
<td>• Engaging in challenging learning tasks regardless of learning needs (e.g., linguistic background, disability, academic gifts)</td>
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<td>• Conducting frequent checks for student understanding and adjusting instruction accordingly</td>
<td>• Conducting investigations with multiple controlled variables and considering the accuracy of the data or the methods</td>
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<td>• Providing exemplars of work (e.g. historical examples, student work)</td>
<td>• Using exemplars to inform their work</td>
</tr>
</tbody>
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