In grade 8, instructional time should focus on ten core ideas:

**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

**Science Concepts**

**Earth & Space Science (ESS1, ESS2, ESS3)**
- Using and developing a model of the Earth-sun system to explain seasons
- Explaining gravity’s role in tides and orbital motions in the solar system
- Modeling convection in Earth’s interior which cycles Earth’s crust
- Interpreting patterns in air mass interactions with partners in weather data
- Describing the effects the ocean has on weather and climate
- Using data to describe human activity and global temperature rise
- Analyzing data to explain uneven distribution of Earth’s resources

**Life Science (LS1, LS3, LS4) Continued**
- Using a model to show that sexually reproducing organisms have chromosome pairs
- Using evidence to explain natural selection
- Communicating and synthesizing information about artificial selection

**Physical Science (PS1, PS2)**
- Developing a model to describe molecular-level interactions
- Analyzing properties of substances to identifying chemical reactions
- Develop a model to explain and predict changes in particle motion in phase changes
- Showing substances are rearranged and conserved during reactions
- Modeling Newton’s Third Law
- Providing evidence of net force and mass on motion of an object

**Technology/Engineering (ETS2)**
- Recognizing materials maintain their composition during physical processing
- Describing creation of products using manufacturing processes
- Recognizing that products can be made by humans and computers

**NOTES**

Comments on the Science and Engineering Practices: For a list of specific skills, see the Science and Engineering Practices Progression Matrix [here](http://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.
**What to Look For**

The example below features three Indicators from the [Standards of Effective Practice](https://www.doe.mass.edu/candi/observation). 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 8th grade science classroom.

<table>
<thead>
<tr>
<th>Expectations</th>
<th>Plans and implements lessons that set clear and high expectations and also make knowledge accessible for all students.</th>
</tr>
</thead>
</table>
| **What is the teacher doing?** | • Communicating a lesson’s objectives and their connections to unit essential questions and goals.  
• Asking students to apply scientific knowledge and ideas when engaging with real-world problems  
• Focusing attention on scientific language (e.g., linguistic complexity, conventions, and vocabulary) |
| **What are the students doing?** | • Persisting when engaging with meaningful scientific tasks  
• Using information from observations to construct an evidence based account for natural phenomena  
• Constructing explanations using multiple sources of evidence  
• Revising models to predict abstract phenomena |

<table>
<thead>
<tr>
<th>Instruction</th>
<th>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.</th>
</tr>
</thead>
</table>
| **What is the teacher doing?** | • Providing opportunities for students to communicate ideas, ask questions, and make their thinking visible in writing and speaking  
• Providing opportunities for students to work with large data sets  
• Modeling how to distinguish between causation and correlation in data |
| **What are the students doing?** | • Asking questions that challenge the premise(s) of an argument or the interpretation of data  
• Actively incorporating others into discussions about scientific ideas  
• Analyzing observations to distinguish between correlation and causation |

<table>
<thead>
<tr>
<th>Assessment</th>
<th>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.</th>
</tr>
</thead>
</table>
| **What is the teacher doing?** | • Providing students with feedback aligned to long-term goals  
• Using multiple formative approaches to assess student learning (e.g., mid-unit quiz, completion of investigation)  
• Providing exemplars of work (e.g. historical examples, student work) |
| **What are the students doing?** | • Reflecting on how they are progressing toward goals  
• Demonstrating learning in multiple ways (e.g., mid-unit quiz, completion of investigation)  
• Engaging in challenging learning tasks regardless of learning needs (e.g., linguistic background, disability, academic gifts) |