

A quick guide for observing classroom content and practice

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

### ESS

1. Earth's Place in the Universe
2. Earth's Systems
3. Earth and Human Activity

### LS

1. From Molecules to Organisms: Structures and Processes
3. Heredity: Inheritance and Variation of Traits
4. Biological Evolution: Unity and Diversity

### PS

1. Matter and Its Interactions
2. Motion and Stability: Forces and Interactions

### ETS

2. Materials, Tools, and Manufacturing

In an **8<sup>th</sup> grade science** class you should observe students engaged with at least one science concept and practice:

## 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)

- Constructing an argument for how the environment and genetics influence organism growth
- Describing how food molecules are broken down and rearranged
- Developing a model to explain structural changes to genes and how that result changes proteins
- Comparing asexual and sexual reproduction
- Illustrating that chromosomes contain genes that define proteins

### 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* ([www.doe.mass.edu/stem/review.html](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.

**ELA 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 8<sup>th</sup> grade science classroom.

**Expectations**  
(Standard II, Indicator D) Plans and implements lessons that set clear and high expectations and also make knowledge accessible for all students.

**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

**Instruction**  
(Standard II, Indicator A) 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.

**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

**Assessment**  
(Standard I, Indicator B) 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.

**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)