

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
4. Energy and Power Technologies

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

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 in weather data
- Describing the effects the ocean has on weather and climate
- Using data to describe human activity and global temperature rise

Life Science (LS1, LS3, LS4)

- Illustrating how the environment and genetics influence organism growth
- Describing how food molecules are broken down and rearranged
- Developing a model of structural changes to genes and proteins
- Comparing asexual and sexual reproduction
- Illustrating that chromosomes contain genes that define proteins
- Showing that sexually reproducing organisms have chromosome pairs
- Explaining natural selection
- Describing artificial selection

Physical Science (PS1, PS2)

- Developing a model to describe molecular-level interactions
- Analyzing properties of substances to identify chemical reactions
- Develop a model to 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, ETS4)

- 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
- Explaining how machines covert energy to do work

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.



Science and Technology/Engineering What to Look For Guide

The practices below, which are aligned to the MA Model Teacher Rubric, should be evident in planning and instruction. Any particular lesson will demonstrate some of the practices, not all. For each lesson, artifacts or observables might include: lesson plan, tasks and assessments, teacher instruction, student discussion and behavior, or student work.

Standard I: Curriculum, Planning, and Assessment (I-A, I-B)

- The lesson focuses on grade-level standard(s).
- The lesson integrates science and engineering practice(s) with core idea(s) to support development of skills and conceptual understanding.
- The lesson engages students in making sense of relevant phenomena or solving relevant problems (through firsthand experiences or representations).
- The lesson intentionally relates new learning to students' prior skills and knowledge.
- The lesson provides grade-appropriate connection(s) to Literacy and/or Mathematics standards.
- The lesson includes opportunities to monitor learning throughout the lesson (such as through questioning or student performance assessments).

Standard II: Teaching all Students (II-A)

- The teacher actively engages students in authentic scenarios that provide opportunities to make sense of phenomena or design solutions.
- The teacher promotes use of evidence and provides time for students to communicate, clarify, justify, and represent their thinking about the lesson content.
- The teacher uses variation in students' ideas and strategies to strengthen other students' understanding.
- The teacher addresses student variability and diverse needs (including English language learners and students with disabilities) to ensure equitable access to the lesson and achievement of the standard(s).
- The teacher references student work and discussion to summarize the practices and core ideas learned.

NOTES