Massachusetts Curriculum Framework | SCIENCE | 8

WHAT TO LOOK FOR

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 **8th 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); 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 8th grade science classroom.

Expectations (Standard II, Indicator E)	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)