Massachusetts Curriculum Framework | SCIENCE | 7

WHAT TO LOOK FOR

A quick guide for observing classroom content and practice

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

In an **7th 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 (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

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 7th 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?	What are the students doing?
•Creating culturally responsive lessons that engage and sustain student attention •Asking students to apply scientific knowledge and ideas when engaging with real-world problems •Showing students how to revise models to predict and explain science phenomena	•Identifying a lesson's standards or objectives and how they connect to unit goals •Using information from observations to construct an evidence based account for natural phenomena •Constructing explanations using multiple sources of evidence

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?	What are the students doing?
•Providing opportunities for students to communicate ideas, ask questions, and make their thinking visible in writing and speaking •Sharing conflict resolution strategies for working together with students •Modeling ways of using computation and analysis to find patterns in observations	•Asking questions that challenge the premise(s) of an argument or the interpretation of data •Drawing explicitly upon content they have learned in class in conversations with peers •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?	What are the students doing?
•Providing students with feedback aligned to long-term goals •Conducting frequent checks for student understanding and adjusting instruction accordingly •Providing exemplars of work (e.g. historical examples, student work)	•Engaging in challenging learning tasks regardless of learning needs (e.g., linguistic background, disability, academic gifts) •Conducting investigations with multiple controlled variables and considering the accuracy of the data or the methods •Using exemplars to inform their work