Massachusetts Curriculum Framework | SCIENCE | 4

WHAT TO LOOK FOR

A quick guide for observing classroom content and practice

In **grade 4**, instructional time should focus on eight 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

PS
3. Energy
4. Waves and their Applications in Technologies for Information Transfer

ETS
1. Engineering Design
3. Technological Systems

In a **4th 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)

- Explaining that erosion and deposition over time result in rock and landscape formations
- Collecting data showing that Earth's matter is broken down and moved
- Interpreting maps to describe patterns of land formations, volcanoes, and earthquakes
- Obtaining information about human use of renewable and nonrenewable energy resources
- Evaluating a design solution to reduce impact of natural disasters

Life Science (LS1)

- Constructing an argument that plants and animals have structures that support key life functions

Physical Science (PS3, PS4)

- Explaining the relationship of an object's speed to its energy
- Observing energy transfer
- Predicting changes in energy when objects collide
- Refining a device that converts motion into electrical, light, or sound energy
- Using a model to show wave patterns
- Describing how reflection of light allows objects to be seen
- Comparing ways to send information through a coded pattern

Technology/Engineering (ETS1, ETS3)

- Testing and redesigning a prototype
- Evaluating design features when developing a model for a problem
- Recognizing that technology is any modification to fulfill a need or want
- Describe that technological devices are made of interrelated parts

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 4th 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?
•Communicating both the language and content objectives for students and why they are important	•Understanding what they will learn in a lesson and how it connects to prior learning
•Creating culturally responsive lessons that engage and sustain student attention	•Applying scientific knowledge when explaining natural phenomena or real world problems
•Asking students to apply scientific knowledge and ideas when engaging with real-world problems	•Comparing and refining arguments based on an evaluation of evidence
	•Identifying limitations of a model

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	•Asking scientific (testable) questions that can be answered by investigation
•Modeling ways of using computation and analysis to find patterns in observations	•Drawing explicitly upon content they have learned in class in conversations with peers
•Providing resources that support the comparison of students' results	•Comparing data collected by different groups to discuss similarities and differences in their findings

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?
•Using multiple formative approaches to assess student learning (e.g., classroom conversation, completion of investigation)	•Demonstrating learning in multiple ways (e.g., classroom conversation, completion of investigation)
•Providing opportunities for students to conduct investigations with a controlled variable	•Engaging in challenging learning tasks regardless of learning needs (e.g., linguistic background, disability, academic gifts)
•Providing exemplars of work (e.g. historical examples, student work)	•Conducting investigations with a controlled variable