Changes to Science and Technology/Engineering (STE)

- MCAS and MCAS-Alt will be based on the new 2016 STE standards beginning in:
  - 2018–2019: Grades 5 and 8
  - 2019–2020: Grades 5, 8, and 9/10

- Fall 2018 STE Resource Guides available on MCAS-Alt website
  - One resource guide for Grades PreK–8, and
  - One resource guide for High School

- STE Resource Guide for High School based on new standards will be available in summer of 2019.

Features of the Massachusetts 2016 STE Standards

- STE disciplines (strands) remain the same:
  - Life Science, Physical Science, Earth and Space Science, and Technology/Engineering

- Topics in each discipline are now called core ideas.

- In addition to science content, the STE Framework emphasizes the use of 8 science practices that promote engagement in scientific inquiry and engineering design skills.

- Fall 2018 STE Resource Guide for preK–8 includes:
  - entry points and access skills listed in three grade clusters: PreK–grade 2, grades 3–5, and grades 6–8 (same as before).
  - each entry point and access skill embedded within a science practice.
These are the desired outcomes of the NGSS standards:

- Gain an appreciation for the beauty and wonder of science
- Gain knowledge to engage in public discussion
- Become analytical consumers of scientific technology and information
- Develop skills to be prepared for citizenship and careers in science, technology, or engineering

The new STE Framework includes Science Practices

1. Asking (Scientific) Questions and Defining Problems
   (to gather data and perform experiments to answer a scientific question)

   **What it looks like...**
   Students observe a time-lapse video of a beach in a hurricane and record questions they have.
   **Entry Point**
   Generate scientific questions about land forms and how they were created (p24)

2. Planning and Carrying Out Investigations
   (to gather data and perform experiments to answer a scientific question)

   **What it looks like...**
   Students decide to put one pea plant in a dark room and one pea plant in a window with sunlight to see which one grows the tallest
   **Entry Point**
   Plan and/or follow the steps of an investigation to determine the effect of sunlight on the growth of plants (p59)
The new STE Framework includes Science Practices

3. **Using Mathematical and Computational Thinking**
   (to answer scientific questions)
   **Entry Point**
   Students pick a place to live and record the data for precipitation and temperature and then compare their place to another student’s place.

4. **Analyzing and Interpreting Data**
   (to recognize patterns and analyze/organize data)
   **Entry Point**
   Students select different sized toy cars to collide, and make predictions about their collisions (such as which car will change its direction in the collision).

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Science Practices (cont’d)

5. **Developing and Using Models**
   (to think about and make predictions, using tangible tools, displays, and illustrations)
   **Entry Point**
   Students play large tuning fork and a small tuning fork to answer a questions “how can you make the pitch higher and lower?” and “how can you make the sound louder and softer?” and label their findings on a diagram of the forks.

6. **Constructing Explanations and Designing Solutions**
   (to explain phenomena and use evidence to support explanations)
   **Entry Point**
   After testing a few prototypes of bridges, students explain how testing the prototypes helped them improve their design.

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Science Practices (cont’d)

7. **Engaging in Argument from Evidence**
   (to support a claim and critique competing arguments)
   **Entry Point**
   Students use data from an experiment to argue what properties are best for keeping a drink hot (or cold) (e.g. thickness).

8. **Obtaining, Evaluating, and Communicating Information**
   (to research, record, evaluate, and present information from scientific texts and digital sources)
   **Entry Point**
   Students research the digestive and circulatory systems and identify how those systems work together to get food energy to the body.

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Turn & Talk

- How will teaching science look different with the new standards?
- How will you engage your students in DOING the science?

PLEASE: Write down any lingering questions you have!
Entry Points are listed for grade-spans Pre-K-2, 3-5 and 6-8.

**STEP-BY-STEP:**

**Grades 5 and 8 STE Portfolio Requirements**

- **Step 1:** Educators select a discipline in which to assess a student:
  - Earth and Space
  - Life Science
  - Physical Science
  - Technology/Engineering

- **Step 2:** Select one core idea (formerly “topic”) in the chosen discipline.

- **Step 3:** Select at least six (6) entry points within one core idea.
  - That are relevant, engaging, and challenging
  - All activities relate to the core idea (i.e., a thematic unit of study).
  - Six entry points must include at least three (3) different science practices.

- **Step 4:** Complete and submit one STE Summary Sheet for each activity (total of at least six) with:
  - Student’s Name and Date of activity
  - Core Idea
  - Entry Point (or Access Skill) addressed in the activity
  - Science Practice number (1-8) for the selected entry point
  - % Accuracy and Independence for each task or response, plus overall percent
  - Description of each activity

- **Step 5:** Select three representative pieces of primary evidence, each addressing a different Science Practice.
  - Attach to corresponding Summary Sheet and include in portfolio.
  - Work samples, photos, and/or video may be submitted.
STE Summary Sheet
(Complete one sheet for each activity based on a selected entry point)

Name, date, grade, and what will be assessed

Selected entry point or access skill

Description of activity (i.e., materials, instruction, how conducted)

Document each question or task, and the accuracy and independence of student’s responses.

Evidence Attached

Complete a total of six (6) SUMMARY SHEETS based on one Core Idea, One SUMMARY SHEET for each entry point.

SAMPLE STRAND
Core Idea: Motion and Stability (Summary Sheet and Work Sample)

Work Sample reflects Practice #1 (Ask questions)

Supporting documentation: Article on magnetism read by student
Can STE evidence still be collected over two consecutive school years?

- **YES**, evidence may be collected over **two school years** (i.e., current and one prior school year) and included in STE portfolios.
- For spring 2019:
  - STE portfolio strands begun, but not completed, during 2017–2018 school year may continue to use the previous (2001/2006) version of the STE standards. Contact mcas@measuredprogress.org to gain access to 2001/2006 STE standards and entry points in online Forms and Graphs.
  - STE portfolio strands completed in the 2017–2018 may be submitted as is.
  - STE portfolio strands begun in the 2018–2019 school year must include evidence based only on the new 2016 STE standards.

Benefits of the new STE portfolio structure

- **No data charts are required.**
- Requirements allow teachers to assess a **unit of science instruction**, rather than assessing a single skill.
- Requires the assessment of **multiple entry points (or access skills) in a strand**.
- STE entry points and science practices promote engagement in a **range of instructional approaches** to teach a core idea.
Resources

• DESE Model Curriculum Units – http://www.doe.mass.edu/candi/model/download_form.aspx
• NGSS/NSTA – http://ngss.nsta.org/Classroom-Resources.aspx
• NGSS – Review of Lessons
  https://www.nextgenscience.org/resources/examples-quality-ngss-design
• Instructional Leadership for Science Practices (ILSP) – www.sciencepracticesleadership.com
• PHET Simulations – https://phet.colorado.edu/en/simulations/category/new
• American Museum of Natural History – https://www.amnh.org/explore/curriculum-collections
• Museum of Science – Educator Resource Center https://www.mos.org/educators