Don't go crazy preparing for high-stakes testing in 8th grade!

STCMS helps prepare students for the 8th grade CAST in three ways.

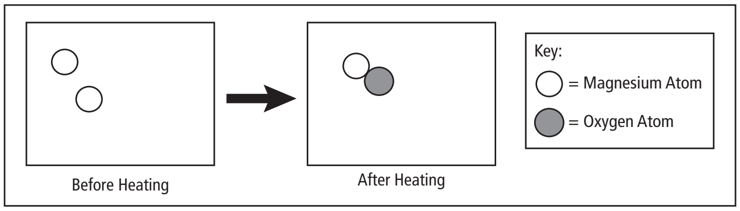
1. High-Quality Summative Assessments

The CAST will include higher-level thinking questions in a variety of formats.

- **STCMS Summative Assessments provide:**
  - ✔ Multiple-choice assessment items that require explanations for the selected answer
  - ✔ Multiple-choice items that require more than one correct answer
  - ✔ Constructed-response questions use the same language as the CA NGSS Science and Engineering Practices

Draw and Explain

6. When magnesium metal burns, it combines with oxygen gas to produce magnesium oxide. Magnesium oxide has the chemical formula MgO. A partial diagram for this process is shown below.



a. Describe what additional atoms and molecules must be added to the diagram to complete it.

b. Copy the partial diagram into the space provided below, then add additional atoms and molecules to complete the diagram.

c. Explain how your diagram illustrates conservation of matter.

Use Evidence and Reasoning

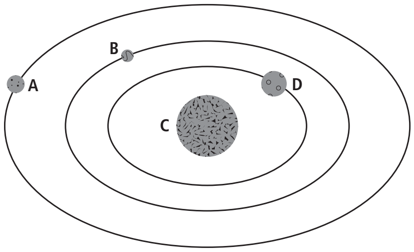
7. The students claim that a chemical reaction occurred when the sample burned. Use evidence and scientific reasoning to support or refute this claim.

Use Evidence and Reasoning

Multiple Choice

Directions: Use Student Sheet 10.WA: *Space Systems Exploration Written Assessment Answer Sheet* to circle the letter of your response to each multiple-choice question, and then clearly explain the evidence and reasoning for choosing it. Make no marks on this sheet.

3. Observe the model of an imaginary solar system. Analyze the data table along with the model to determine which two celestial bodies you would expect to have the greatest gravitational attraction to each other.



Celestial Body	Mass	Distance from the Sun
A	2.71×10^{23} kg	241,000,000 km
B	1.26×10^{23} kg	136,000,000 km
C	4.89×10^{24} kg	N/A
D	$6.12 \text{ x } 10^{23}$ kg	80,000,000 km

a. Celestial bodies A and B

b. Celestial bodies B and C

c. Celestial bodies C and D

d. Celestial bodies A and C

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CAROLINA®

2. Analysis, Interpretation, and Explanation of Data

Interpreting data in tables to build explanations

Investigation 1.1

Krakatau, 1883

Materials

For you
- Science notebook

For your group
- 1 Krakatau Card Set

Procedure

1. Krakatau (Figure 1.1) is sometimes referred to using its English name, Krakatoa. In 1883, people all over Indonesia and around the world observed phenomena related to events happening on Krakatau. The Krakatau Card Set includes some observations and illustrations of the phenomena.
2. The Krakatau Card Set describes several locations near the island. Use Figure 1.3 to locate the following:
   - **a.** Anjer
   - **b.** Bantam (now Banten)
   - **c.** Batavia (now Jakarta)
   - **d.** First Point
   - **e.** Java
   - **f.** Krakatau
   - **g.** Merak
   - **h.** Sunda Strait
   - **i.** Sumatra
   - **j.** Tyringen
3. Read or examine each card in the Krakatau Card Set. Think about how you described the term "phenomena" during Getting Started. Select one card that you think represents a good example of a phenomenon. Record your example in your science notebook and explain why you think it is a good example of a phenomenon. Be prepared to share your example with the class.
4. Continue reading and examining each card in the Krakatau Card Set. In your science notebook, record any questions you have about the phenomena. Discuss these questions with your group.
5. Discuss where you think the island went and why the events that were happening made people record the observations and illustrations they did. Record your group's responses in your science notebook.
6. In your science notebook, explain what you think happened on Krakatau in 1883. Support your explanation using your prior knowledge and evidence from the card set. (**Note:** You may wish to organize your explanations using events that occurred before, during, and after what occurred in 1883.)
7. Between 1880 and 1884, many seismic events occurred in Indonesia near Krakatau. A summary of these events is shown in Table 1.1. Read through the descriptions of each seismic event. In your science notebook, record any questions you have about the phenomena.

Figure 1.3
Map of Java and Sumatra
CREDIT: Margaret Baxter/© Carolina Biological Supply Company

Table 1.1. Seismic Events Occurring Near Krakatau		
Date	**Time**	**Remarks** (with distance and direction of cities from Krakatau noted)
Sept. 1, 1880	4:35 p.m.	Several earthquakes, largest with epicenter in Bantam (155 km E) felt as far as northern Australia; the lighthouse on Java's First Point (74 km SSE) is damaged.
Mar. 10, 1882	4:57 p.m.	Earthquake with epicenter in Pekalongen (485 km E); felt in Bantam (155 km E).
May 9–10, 1883		Earthquakes felt at Java's First Point lighthouse (74 km SSE).
May 15–20, 1883		Earthquakes felt at Ketimbang (40 km NNE).
May 17, 1883	10:25 a.m.	Light tremor felt at Anjer (55 km E).
May 27, 1883	2:00 a.m. 3:55 a.m.	Two shocks felt at Tyringen; last also felt in Pandeglang (74 km E × N).
May 27, 1883	3:30 a.m. 4:20 a.m.	Earthquake ("horizontal shock") felt at Teluk Betong (80 km NNW) lasts 15 sec. Three "heavy jolts" are felt at 3:30 and 4:20 a.m. at lighthouse on Java's First Point (74 km SSE).
May 27, 1883	4:00 a.m. 4:30 a.m.	Two shocks are felt at Valakke Hoek lighthouse (75 km SSW).
May 31, 1883		During night of May 31–June 1, hopper *Bintaing* is "suddenly rocked" in water while anchored at Blinjoe (500 km NE).
July, 1883		Earthquakes felt in Java.
Aug. 26, 1883	7:30 p.m.	Six earthquake shocks felt during the night.
Aug. 26, 1883	7:50 p.m.	Severe earthquakes reported at Java's First Point lighthouse (74 km SSE).
Aug. 26, 1883	8:30 p.m.	Violent eruptions occur on Krakatau; strong ground shaking felt in Anjer (55 km E).
Aug. 27, 1883	2:00 a.m. 3:00 a.m.	Two earthquakes reported at Anjer (55 km E), believed to be air wave effects from eruption.
Aug. 27, 1883	1:30 a.m. 3:00 a.m.	Three earthquakes reported at Java's First Point lighthouse (74 km SSE), believed to be air wave effects from eruption.
		enes (56 km SSE).
		nanoek (72 km SSE), 2 tremors.
		in Padang (800 km NW) during the night.
		t Ranjkas Betong (Bantam), second recorded at 1:00 p.m. at and Java's First Point lighthouse (74 km SSE).
		akatau] were distinctly heard, and tremors of the ground were
		over a large part of Bantam (155 km E).
		t the Vlakke Hock lighthouse (75 km SSW).
		E), ground tremors, rattling of doors and windows, and a red rved in the evening.
		most of Bantam (155 km E).

effects.

continued

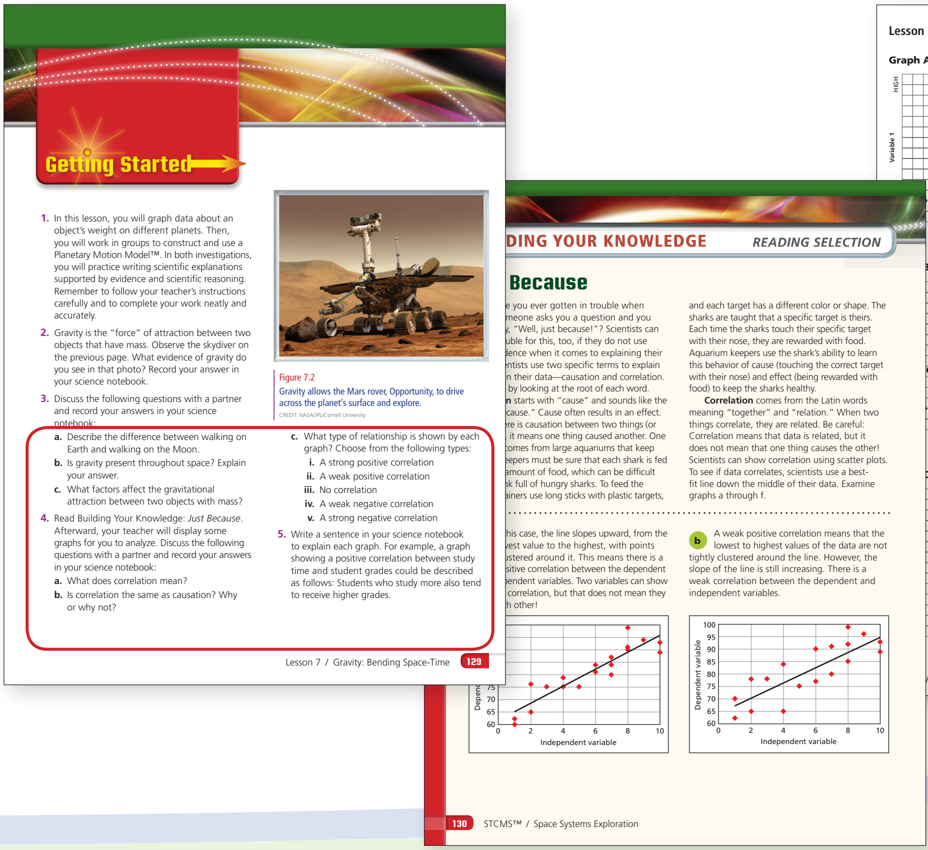
Investigation 1.1 continued

8. Discuss your questions with your group. Then, discuss what a seismic event is and what the data set in Table 1.1 represents. Record your group's responses in your science notebook.
9. How do you think scientists collected the data in Table 1.1? What challenges do you think you would encounter collecting seismic data from the 1800s? Record your ideas in your science notebook and be prepared to discuss them with the class.
10. In your science notebook, explain why you think seismic events occur in Indonesia. Support your explanation using your prior knowledge.
11. New Zealand is an island about 12,070 kilometers (7,500 miles) southeast of Indonesia. In New Zealand, the Maori people have stories that describe the geologic processes and phenomena they observe on their island. Read Building Your Knowledge: *Why Do Volcanoes Have Stories?* and then discuss the questions that follow the reading passage with your group. Record your group's responses in your science notebook.

Figure 1.4
Map of New Zealand
CREDIT: Margaret Baxter/© Carolina Biological Supply Company

Figure 1.5
Volcanic and seismic events are observed all over the world. Do you think these events are related? Why or why not?
CREDIT: Fotos593/Shutterstock.com

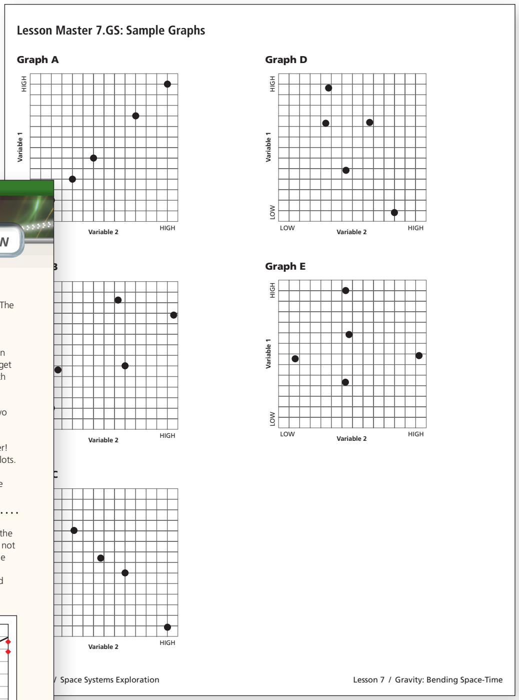
Analyzing and interpreting graphical data


Getting Started

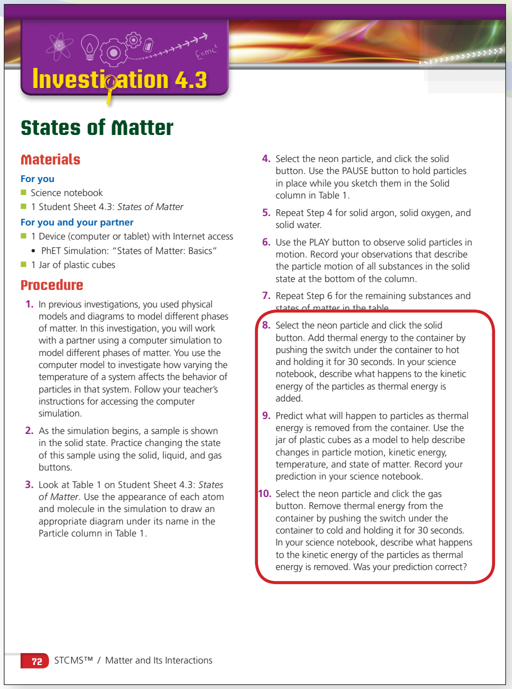
1. In this lesson, you will graph data about an object's weight on different planets. Then, you will work in groups to construct and use a Planetary Motion Model™. In both investigations, you will practice writing scientific explanations supported by evidence and scientific reasoning. Remember to follow your teacher's instructions carefully and to complete your work neatly and accurately.
2. Gravity is the "force" of attraction between two objects that have mass. Observe the skydiver on the previous page. What evidence of gravity do you see in that photo? Record your answer in your science notebook.
3. Discuss the following questions with a partner and record your answers in your science notebook:
   a. Describe the difference between walking on Earth and walking on the Moon.
   b. Is gravity present throughout space? Explain your answer.
   c. What factors affect the gravitational attraction between two objects with mass?
4. Read Building Your Knowledge: *Just Because*. Afterward, your teacher will display some graphs for you to analyze. Discuss the following questions with a partner and record your answers in your science notebook:
   a. What does correlation mean?
   b. Is correlation the same as causation? Why or why not?
   c. What type of relationship is shown by each graph? Choose from the following types:
      i. A strong positive correlation
      ii. A weak positive correlation
      iii. No correlation
      iv. A weak negative correlation
      v. A strong negative correlation
5. Write a sentence in your science notebook to explain each graph. For example, a graph showing a positive correlation between study time and student grades could be described as follows: Students who study more also tend to receive higher grades.

Figure 7.2
Gravity allows the Mars rover, Opportunity, to drive across the planet's surface and explore.
CREDIT: NASA/JPL/Cornell University

Lesson 7 / Gravity: Bending Space-Time 129



Simulated models to analyze, predict, and explain


Investigation 4.3

States of Matter

Materials

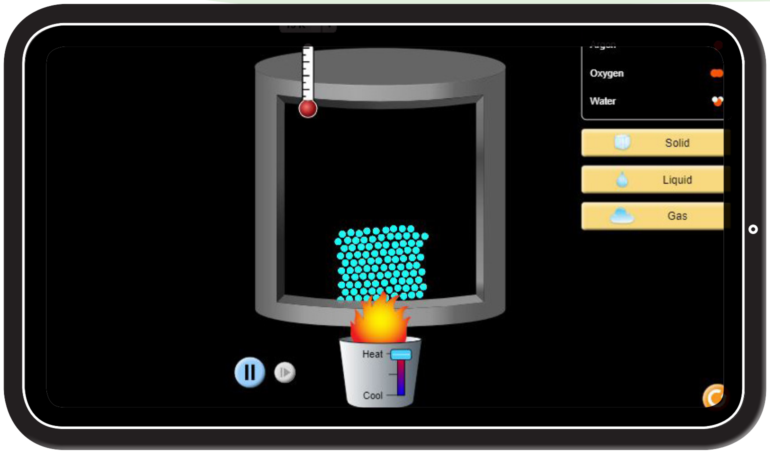
For you
- Science notebook
- 1 Student Sheet 4.3: *States of Matter*

For you and your partner
- 1 Device (computer or tablet) with Internet access
  - PhET Simulation: "States of Matter: Basics"
- 1 Jar of plastic cubes

Procedure

1. In previous investigations, you used physical models and diagrams to model different phases of matter. In this investigation, you will work with a partner using a computer simulation to model different phases of matter. You use the computer model to investigate how varying the temperature of a system affects the behavior of particles in that system. Follow your teacher's instructions for accessing the computer simulation.
2. As the simulation begins, a sample is shown in the solid state. Practice changing the state of this sample using the solid, liquid, and gas buttons.
3. Look at Table 1 on Student Sheet 4.3: *States of Matter*. Use the appearance of each atom and molecule in the simulation to draw an appropriate diagram under its name in the Particle column in Table 1.
4. Select the neon particle, and click the solid button. Use the PAUSE button to hold particles in place while you sketch them in the Solid column in Table 1.
5. Repeat Step 4 for solid argon, solid oxygen, and solid water.
6. Use the PLAY button to observe solid particles in motion. Record your observations that describe the particle motion of all substances in the solid state at the bottom of the column.
7. Repeat Step 6 for the remaining substances and states of matter in the table.
8. Select the neon particle and click the solid button. Add thermal energy to the container by pushing the switch under the container to hot and holding it for 30 seconds. In your science notebook, describe what happens to the kinetic energy of the particles as thermal energy is added.
9. Predict what will happen to particles as thermal energy is removed from the container. Use the jar of plastic cubes as a model to help describe changes in particle motion, kinetic energy, temperature, and state of matter. Record your prediction in your science notebook.
10. Select the neon particle and click the gas button. Remove thermal energy from the container by pushing the switch under the container to cold and holding it for 30 seconds. In your science notebook, describe what happens to the kinetic energy of the particles as thermal energy is removed. Was your prediction correct?

72 STCMS™ / Matter and Its Interactions



3. Rigorous Performance-Task Assessments

The CAST performance tasks require students to answer sets of questions that are centered on a common theme or problem.

STCMS Performance-Task Assessments ask students to:

- ✔ Apply concepts and practices previously investigated to plan and carry out a new investigation
- ✔ Analyze, interpret, and explain gathered data
- ✔ Obtain and communicate information

Lesson 11

Assessment: Matter and Its Interactions

FOCUS QUESTION How can we use our knowledge of matter and its interactions to solve problems?

Introduction

In this unit, you explored the physical and chemical properties of matter and how these properties are related to how atoms and molecules interact. Some of the key topics included atomic and molecular structures, physical and chemical interactions, the role energy plays in chemical processes, conservation of matter, and the synthesis of new substances.

In Lesson 8, you dissolved a chemical compound to make a design a solution for heat on demand. In this lesson, you will draw on your skills and knowledge to design a cold pack. You will also answer written questions about matter and its interactions to further demonstrate what you have learned throughout this unit.

Figure 11.1
Low temperatures can reduce blood flow to an injury. When a cold pack is applied, it can reduce pain and swelling at the site of the injury.
CREDIT: Andrey_Popov/Shutterstock.com

Objectives for This Lesson

- Review concepts from the Matter and Its Interactions unit.
- Complete a performance assessment by constructing explanations and designing a solution.
- Make predictions about chemical compounds and use evidence to support your predictions.
- Apply your knowledge and skills to answer questions in a written assessment about concepts related to matter and its interactions.
- Update your concept map with your new knowledge and apply what you have learned to your daily life.

220 STCMS™ / Matter and Its Interactions

Performance Assessment

Geodynamic Event Preparedness

Materials

For you
- Science notebook

For your group
- 1 Lesson Master 12.PAa: *Geodynamic Event Research Scoring Rubric*
- Materials to make a visual aid

For your class
- Access to resources

Procedure

1. You have learned a lot about Earth's dynamic systems. In this investigation, you will work with your group to analyze and interpret data on geodynamic events and use the data you collect to prepare a proposal for geodynamic event preparedness. Your teacher will assign your group a particular geographic region, and your proposal will be specific to the needs of that area. Record the region you are assigned in your science notebook.
2. You will need to collect data about significant geodynamic events that have occurred in your region. Using the data you collect, you will determine:
   a. Areas that are susceptible to geodynamic events
   b. Areas of highest and lowest risk for severe events
   c. Areas of the highest and lowest event frequency
   d. Types of damage typically caused by geodynamic events
   e. Any phenomena typically observed before or after a geodynamic event

Figure 12.2
A wide variety of instruments are available for monitoring geodynamic events. Their use is driven by individual and societal needs, desires, and values. What technologies would you use and where would you use them?
CREDIT: U.S. Geological Survey

3. You will use at least four appropriate sources for your research. At the end of the Performance Assessment, your group will turn in a bibliography of all the sources your group used.
4. Your work will be evaluated using Lesson Master 12.PAa: *Geodynamic Event Research Scoring Rubric*. Discuss the rubric as a class, and ask any questions you may have during the discussion.

322 STCMS™ / Earth's Dynamic Systems

Geodynamic Event Preparedness Plan:

- Part A: Conducting the Research
- Part B: Proposals and Geodynamic Event Preparedness
- Part C: Presenting Research and Proposals to the Class