

Target Reading Skill

Preview Text Structure Review Section 4 of the chapter. Then, complete the graphic organizer on Mathematics and Science.

Mathematics and Science		
Heading	Question	Answer
Estimation	What is an estimate?	
Accuracy and Reproducibility	How does accuracy differ from reproducibility?	
Significant Figures and Precision		

Reviewing Key Terms

Choose the letter of the best answer.

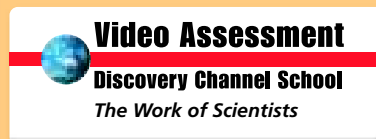
- A logical interpretation based on reasoning from prior experience is called
 - scientific inquiry.
 - a prediction.
 - an inference.
 - an observation.
- In an experiment where you change only the temperature, temperature is the
 - responding variable.
 - manipulated variable.
 - hypothesis.
 - controlled parameter.
- The amount of matter an object contains is its
 - length.
 - mass.
 - weight.
 - volume.
- Repeated measurements that are close to one another demonstrate
 - accuracy.
 - reproducibility.
 - scientific inquiry.
 - significant figures.
- In the event that a glass beaker breaks during a lab, the first thing you should do is
 - wash your hands.
 - clean up the broken glass.
 - alert your teacher.
 - obtain another beaker.

Complete the following sentences so that your answers clearly explain the key terms.

- When a meteorologist **predicts** the weather, she makes a _____.
- A key process in the scientific method is the collection of **data**, which are _____.
- You can predict whether an object will float or sink in water if you know the object's **density**, which is _____.
- The measurement 5.22 centimeters has three **significant figures**, which means that _____.
- One way to analyze a linear graph of data is to calculate the **slope**, which tells _____.

Writing in Science

Interview You are a sports reporter interviewing an Olympic swimmer who lost the silver medal by a few hundredths of a second. Write a one-page interview in which you discuss the meaning of time and the advanced instruments used to measure time.



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Diagnose and Remediate

Standard	Review and Assessment Items	Standards-Targeted Resources	Additional Resources
S 8.9.b	4, 14, 15, 20	RNG-A 19–24, 25–28; RNG-B 18–24, 25–28	TR: Vocabulary Skill
S 8.9.c	2, 13	RNG-A 14–18; RNG-B 14–17	TR: Key Terms
S 8.9.d	10, 16	RNG-A 29–33; RNG-B 29–33	Student Edition in MP3 (English/Spanish)
S 8.9.g	16, 24, 25, 26	RNG-A 29–33; RNG-B 29–33	Student Express with Interactive Textbook CD-ROM

Target Reading Skill

Preview Text Structure Sample answers: An estimate is an approximation of a number based on reasonable assumptions; Accuracy refers to how close a measurement is to the actual value; whereas, reproducibility refers to how close a group of measurements are to each other; How are significant figures and precision related?; Scientists use significant figures to express precision in their measurements and calculations.

Reviewing Key Terms

- c
- b
- b
- b
- c
- forecast of what will happen in the future based on past experience and current information
- facts, figures, and other evidence gathered through observations
- its mass per unit volume
- the 5 and first 2 have been measured exactly, and the second 2 has been estimated
- how much y changes for every change in x

Writing in Science



E-LA: Writing 8.2.0

Writing Mode Descriptive

Scoring Rubric

- Exceeds criteria; may have an engaging story and/or superior descriptions of time and the instruments used to measure time
- Meets all criteria
- Meets some but not all criteria
- Meets few criteria, with only brief and/or inaccurate information

Video Assessment

The Work of Scientists

Show the Video Assessment to review chapter content and as a prompt for the writing assignment. Discussion question: **What's the difference between accuracy and precision?** (Sample answer: Accuracy refers to how close a measurement is to the true or accepted value, while precision refers to how close a group of measurements are to each other.)

Review and Assessment

Checking Concepts

11. Sample: Physical science is the study of matter, energy, and how they change.
12. A scientific hypothesis must be testable so that information can be collected that may or may not support the hypothesis.
13. It is important to change just one variable parameter at a time in a controlled experiment to tell what is causing observable changes.
14. Scientists must use standard units of measurement in their experiments so that they can compare data and communicate with each other about their results.
15. Sample answer: Only when measurements are accurate and precise can you be sure that they are close to the true, or correct, values and were made carefully using high-quality measuring tools.
16. Sample answer: A smooth line is most likely to show the general trend of the data. Connecting the dots may not show the trend and may even make inconsistencies or normal variations in the data appear too important.
17. Sample answer: You should read through the procedure, review safety guidelines, and ask your teacher about anything that is unclear.

Thinking Critically

18. Object B has a greater volume (64 cm^3) than object A (48 cm^3).
19. Sample answer: When water expands, its volume increases while its mass stays the same. Therefore, its density decreases. Ice cubes float in water because they are less dense than water.
20. Sample answer: Because we hurried, we may have made mistakes in performing some procedures and taken measurements that were imprecise and inaccurate.
21. Sample answer: Food or drink could become health hazards by being contaminated with materials in the lab, and food or drink might contaminate materials to be used in experiments.

Math Practice

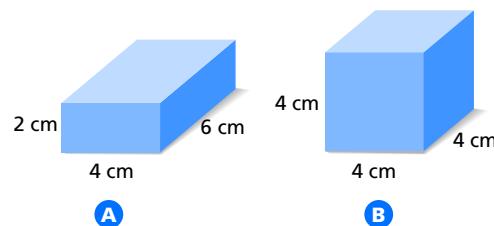
22. 2.5 g/cm^3
23. 204 cm^2

Checking Concepts

11. In your own words, briefly explain what physical science is.
12. Why must a scientific hypothesis be testable?
13. In a controlled experiment, why is it important to change just one variable parameter at a time?
14. Why must scientists use standard units of measure in their experiments?
15. Why is it important to be both accurate and precise when you make measurements?
16. When graphing, why should you draw a smooth line that reflects the general pattern, rather than simply connect the data points?
17. List three things you can do to prepare for a lab experiment.

Thinking Critically

18. **Comparing and Contrasting** Which of the objects below has a greater volume? Explain.



19. **Applying Concepts** When water freezes, it expands. Use this statement and your knowledge of density to explain why ice cubes float in water.
20. **Relating Cause and Effect** In a lab activity that involves many measurements and calculations, you and your lab partner rush through the procedures. In the end, you obtain a percent error of 50 percent. Explain what may have led to such a high percent error.
21. **Making Judgments** Why do you think that, as a general precaution, you should never bring food or drink into a laboratory?

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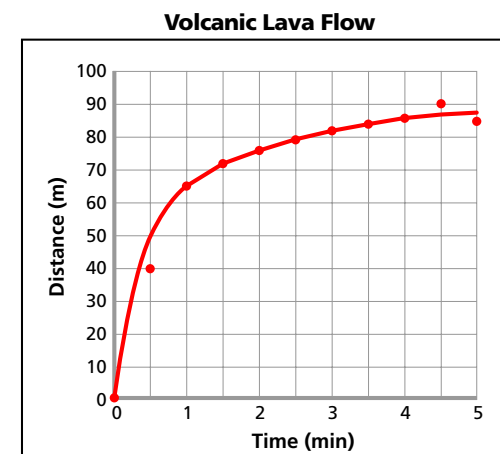
Math Practice

22. **Calculating Density** A 12.5-g marble displaces 5.0 mL of water. What is its density?
23. **Area** Calculate the area of a picture frame that measures $17 \text{ cm} \times 12 \text{ cm}$.

Applying Skills

Use the graph to answer Questions 24–26.

A scientist measured the distance a lava stream flowed over 5 minutes.



24. **Reading Graphs** What is plotted on the horizontal axis? The vertical axis?
25. **Interpreting Data** Did the stream travel the same distance every minute? Explain.
26. **Predicting** Predict the movement of the stream between 5 and 6 minutes.

Standards Investigation

Performance Assessment Present a brief summary of your experience while building your density-calculating system. Describe the most difficult part of construction. What steps were easiest? Defend the accuracy and reliability of your system, and describe its limitations.

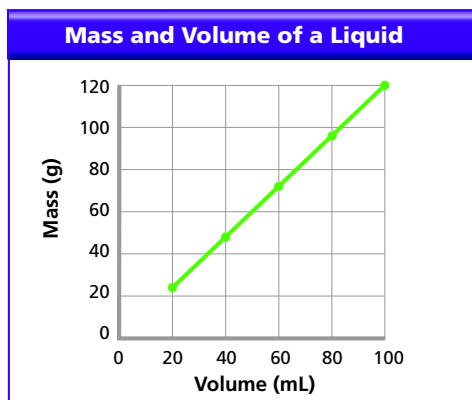
Applying Skills

24. Time (min) on the horizontal axis; Distance (m) on the vertical axis
25. No. For the first minute, the stream traveled about 65 m. For the second minute, the stream traveled only about 10 m. The stream traveled fewer meters for each additional minute.
26. Sample answer: The stream will barely travel any distance.

Choose the letter of the best answer.

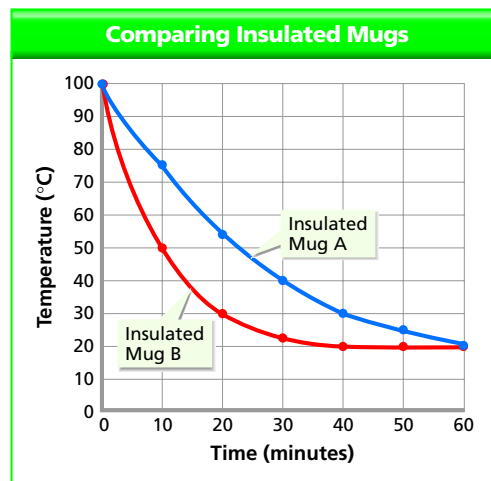
- Ranida measured the length of a string several times as 21.5 cm, 21.3 cm, 21.7 cm, and 21.6 cm. The actual length is 25.5 cm. Which statement best describes Ranida's measurements?
 - The measurements were accurate.
 - The measurements were not accurate, but they were reproducible.
 - The measurements were both accurate and reproducible.
 - The measurements were neither accurate nor reproducible. **S 8.9.b**
- A sample of sulfur has a mass of 12 g and a volume of 6.0 cm³. What is the density of sulfur?
 - 0.5 g/cm³
 - 2.0 g/cm³
 - 2.0 cm³/g
 - 72 g/cm³ **S 8.8.b**

The graph below shows the masses of five different volumes of liquid. Use the graph and your knowledge of science to answer Question 3.



- What is the slope of the graph line?
 - 1.0 g/mL
 - 1.0 g/mL
 - 1.2 mL/g
 - 1.2 g/mL **S 8.9.d**

The graph below compares how well two different brands of insulated mugs retain heat. Each mug was filled with the same volume of boiling water. Use the graph and your knowledge of science to answer Questions 4–5.



- Which parameter in this experiment was the responding variable?
 - the temperature of the water **S 8.9.c**
 - the location of the insulated mug
 - the brand of insulated mug
 - the length of time the water was allowed to cool
- What conclusion can you draw from this experiment?
 - There is no difference between Brand A and Brand B.
 - Brand A keeps water warmer than Brand B.
 - Brand B keeps water warmer than Brand A.
 - Brand B seems to add heat to the water. **S 8.9.a**

Apply the BIG Idea

- Suppose you are given a sample of a liquid. How can you predict the mass of a much larger sample of the same liquid? Describe the measurements and calculations required to make your prediction. **S 8.8.a, S 8.9.a**

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Teachers can monitor student progress and supply remediation when necessary.

Standards Practice

- B; **S 8.9.b**
- B; **S 8.8.b**
- D; **S 8.9.d**
- A; **S 8.9.c**
- B; **S 8.9.a**

Apply the BIG Idea

- You can use the density of the sample to predict the mass of a much larger sample. If you know the volume of the sample, multiply that by the density to get the mass of the sample. **S 8.8.a, 8.9.a**

Lab zone Standards Investigation

S 8.8.a

Performance Assessment Provide class time for student presentations. In their presentations, students should summarize their design and construction process and describe the most difficult part and the

easiest part of the construction. Make sure students also describe the accuracy and reliability of their systems and highlight the limitations.

Teaching Resources

Laboratory Manual TE

- Standards Investigation Scoring Rubric

The Standards Investigation Scoring Rubric will help you evaluate students' work. If you share the rubric in advance, students will know what is expected of them.