Grade 3 Chapter 9
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Teacher’s Guide to Using the
Chapter 9 Resource Masters

The Chapter 9 Resource Masters includes the core materials needed for Chapter 9. These materials include worksheets, extensions, and assessment options. The answers for these pages appear at the back of this booklet.

All of the materials found in this booklet are included for viewing and printing on the TeacherWorks Plus™ CD-ROM.

Chapter Resources

**Graphic Organizer** (page 1) This master is a tool designed to assist students with comprehension of grade-level concepts. While the content and layout of these tools vary, their goal is to assist students by providing a visual representation from which they can learn new concepts.

**Student Glossary** (page 2) This master is a study tool that presents the key vocabulary terms from the chapter. You may suggest that students highlight or star the terms they do not understand. Give this list to students before beginning Lesson 3–1. Remind them to add these pages to their mathematics study notebooks.

**Anticipation Guide** (page 6) This master is a survey designed for use before beginning the chapter. You can use this survey to highlight what students may or may not know about the concepts in the chapter. If feasible, interview students in small groups, asking them the interview questions in the guide. There is space for recording how well students answer the questions before they complete the chapter. You may find it helpful to interview students a second time, after completing the chapter, to determine their progress.

**Game** (page 7) A game is provided to reinforce chapter concepts and may be used at appropriate times throughout the chapter.

Resources for Computational Lessons

**Reteach** Each lesson has an associated Reteach worksheet. In general, the Reteach worksheet focuses on the same lesson content but uses a different approach, learning style, or modality than that used in the Student Edition. The Reteach worksheet closes with computational practice of the concept.

**Skills Practice** The Skills Practice worksheet for each lesson focuses on the computational aspect of the lesson. The Skills Practice worksheet may be helpful in providing additional practice of the skill taught in the lesson.

**Homework Practice** The Homework Practice worksheet provides an opportunity for additional computational practice. The Homework Practice worksheet includes word problems that address the skill taught in the lesson.

**Problem-Solving Practice** The Problem-Solving Practice worksheet presents additional reinforcement in solving word problems that apply both the concepts of the lesson and some review concepts.

**Enrich** The Enrich worksheet presents activities that extend the concepts of the lesson. Some Enrich materials are designed to widen students’ perspectives on the mathematics they are learning. These worksheets are written for use with all levels of students.

Resources for Problem-Solving Strategy and Problem-Solving Investigation Lessons

In recognition of the importance of problem-solving strategies, worksheets for problem-solving lessons follow a slightly different format. For problem-solving lessons, a two-page Reteach worksheet offers a complete model for choosing a problem-solving strategy. For each Problem-Solving Strategy lesson, Reteach and Homework Practice worksheets offer reinforcement of
the strategy taught in the Student Edition lesson. In contrast, the Problem-Solving Investigation worksheets include a model strategy on the Reteach worksheets and provide problems requiring several alternate strategies on the Homework Practice and Skills Practice worksheets.

**Assessment Options**  The assessment masters in the Chapter 3 Resource Masters offer a wide variety of assessment tools for monitoring progress as well as final assessment.

**Individual Progress Checklist**  This checklist explains the chapter’s goals or objectives. Teachers can record whether a student’s mastery of each objective is beginning (B), developing (D), or mastered (M). The checklist includes space to record notes to parents as well as other pertinent observations.

**Chapter Diagnostic Assessment**  This one-page test assesses students’ grasp of skills that are needed for success in the chapter.

**Chapter Pretest**  This one-page quick check of the chapter’s concepts is useful for determining pacing. Performance on the pretest can help you determine which concepts can be covered quickly and which specific concepts may need additional time.

**Mid-Chapter Review**  This one-page chapter test provides an option to assess the first half of the chapter. It includes both multiple-choice and free-response questions.

**Quizzes**  Three free-response quizzes offer quick assessment opportunities at appropriate intervals in the chapter.

**Vocabulary Test**  This one-page test focuses on chapter vocabulary. It is suitable for all students. It includes a list of vocabulary words and questions to assess students’ knowledge of the words.

**Oral Assessment**  This two-page test consists of one page for teacher directions and questions and a second page for recording responses. Although this assessment is designed to be used with all students, the interview format focuses on assessing chapter content assimilated by ELL students.

**Chapter Project Rubric**  This one-page rubric is designed for use in assessing the chapter project. You may want to distribute copies of the rubric when you assign the project and use the rubric to record each student’s chapter project score.

**Foldables Rubric**  This one-page rubric is designed to assess the Foldables graphic organizer. The rubric is written to the students, telling them what you will be looking for as you evaluate their completed Foldables graphic organizer.

**Leveled Chapter Tests**

- **Form 1** assesses basic chapter concepts through multiple-choice questions and is designed for use with on-level students.
- **Form 2A** is designed for on-level students and is primarily for those who may have missed the Form 1 test. It may be used as a retest for students who received additional instruction following the Form 1 test.
- **Form 2B** is designed for students with a below-level command of the English language.
- **Form 2C** is a free-response test designed for on-level students.
- **Form 2D** is written for students with a below-level command of the English language.
- **Form 3** is a free-response test written for above-level students.
- **Extended-Response Test** is an extended response test for on-level students.

**Student Recording Sheet**  This one-page recording sheet is for the standardized test in the Student Edition.

**Cumulative Standardized Test Practice**  This three-page test, aimed at on-level students, offers multiple-choice questions and free-response questions.

**Answers**

The answers for the Anticipation Guide and Lesson Resources are provided as reduced pages with answers appearing in black. Full size line-up answer keys are provided for the Assessment Masters.
Use this graphic organizer to take notes on **Chapter 9: Measurement: Metric System**. Fill in the missing information.

### Centimeter (cm) vs. Meter (m)

<table>
<thead>
<tr>
<th>Centimeter (cm)</th>
<th>Meter (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>5</td>
</tr>
<tr>
<td>1,000</td>
<td>15</td>
</tr>
<tr>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

### Liter (L) vs. Milliliter (mL)

<table>
<thead>
<tr>
<th>Liter (L)</th>
<th>Milliliter (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3,000</td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8,000</td>
</tr>
<tr>
<td></td>
<td>10,000</td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>
This is an alphabetical list of new vocabulary terms you will learn in Chapter 9: Measurement: Metric System. As you study the chapter, complete each term’s definition or description. Remember to add the page number where you found the term. Add this page to your math study notebook to review vocabulary at the end of the chapter.

<table>
<thead>
<tr>
<th>Vocabulary Term</th>
<th>Found on Page</th>
<th>Definition/Description/Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>centimeter (cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gram</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kilometer (km)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>liter (L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>meter (m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>milliliter (mL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>millimeter (mm)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dear Family,

Today my class started Chapter 9: Measurement: Metric System. I will be learning to estimate and measure length, capacity, and weight/mass. I will also be learning to convert metric measurements. Here are my vocabulary words and an activity that we can do together.

Love, ______________

Key Vocabulary

**meter (m)** A metric unit for measuring length or height. 1 meter = 100 centimeters

**liter (L)** A metric unit for measuring volume or capacity. 1 liter = 1000 milliliters

**mass** The amount of matter in an object.

**gram (g)** A metric unit for measuring mass.

**millimeter (mm)** A metric unit used for measuring length. 1000 millimeters = 1 meter

**centimeter (cm)** A metric unit for measuring length and height. 100 centimeters = 1 meter

**kilometer (km)** A metric unit for measuring length.

**milliliter (mL)** A metric unit used for measuring capacity. 1000 milliliters = 1 liter

Activity

Use a metric ruler to measure the length of various items around the house. Compare the length of all of the items. Which is the longest? Which is the shortest?

Books to Read:

*How Tall, How Short, How Far Away*
by David Adler

*Mr. Archimedes’ Bath*
by Pamela Allen

*Counting on Frank*
by Rod Clement
Estimada familia:

Hoy mi clase comenzó el **Capítulo 9: Medición: El sistema métrico.** Aprenderé a estimar y a medir la longitud, la capacidad y el peso o la masa y también a convertir unidades métricas. A continuación, están mis palabras de vocabulario y una actividad que podemos hacer juntos.

_Cariños,_ ________________

**Vocabulario clave**

**metro (m)** Unidad métrica para medir longitud o altura. 1 metro = 100 centímetros

**litro (L)** Unidad métrica de volumen o capacidad. 1 litro = 1000 mililitros

**masa** Cantidad de materia de un cuerpo

**gramo (g)** Unidad métrica de masa

**milímetro (mm)** Unidad métrica de longitud. 1000 milímetros = 1 metro

**centímetro (cm)** Unidad métrica para medir longitud y altura. 100 centímetros = 1 metro

**kilómetro** Unidad métrica de longitud. 1 kilómetro = 1000 metros

**mililitro** Unidad métrica de capacidad. 1 mililitro = 0.001 litro

**Actividad**

Usen una regla métrica para medir la longitud de varios objetos en la casa. Compren la longitud de todos los objetos. ¿Cuál es el más largo? ¿Cuál es el más corto?

**Libros recomendados:**

*How Tall, How Short, How Far Away*  
de David Adler

*Mr. Archimedes’ Bath*  
de Pamela Allen

*Counting on Frank*  
de Rod Clement
Anticipation Guide

Metric Measurement

**Before you begin Chapter 9**

- Read each statement.
- Decide whether you agree (A) or disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

<table>
<thead>
<tr>
<th>STEP 1 A, D, or NS</th>
<th>Statement</th>
<th>STEP 2 A or D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A gram is a metric unit for measuring mass.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>A kilometer is a metric unit used for measuring capacity.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>millimeters, centimeters and meters are all metric units for measuring length and height.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>1,000 meters = 10 kilometers</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Mass is the amount of matter in an object.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>A liter is a metric unit for measuring mass.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>A gram is a metric unit for measuring mass.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>1 liter = 1,000 milliliters</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>100 centimeters = 1 meter</td>
<td></td>
</tr>
</tbody>
</table>

**After you complete Chapter 9**

- Reread each statement and complete the last column by entering an A (agree) or a D (disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.
Chapter 9 Game

**Ready**
You will need:
56 index cards
Pens

**Set**
Copy the following multiplication sentences on separate index cards. Make two sets of each fact. You will have 56 cards altogether.

<table>
<thead>
<tr>
<th>4 × 4 = 16</th>
<th>4 × 9 = 36</th>
<th>5 × 8 = 40</th>
<th>6 × 8 = 48</th>
<th>7 × 9 = 63</th>
<th>8 × 10 = 80</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 × 5 = 20</td>
<td>4 × 10 = 40</td>
<td>5 × 9 = 45</td>
<td>6 × 9 = 54</td>
<td>7 × 10 = 70</td>
<td>9 × 9 = 81</td>
</tr>
<tr>
<td>4 × 6 = 24</td>
<td>5 × 5 = 25</td>
<td>5 × 10 = 50</td>
<td>6 × 10 = 60</td>
<td>8 × 8 = 64</td>
<td>9 × 10 = 90</td>
</tr>
<tr>
<td>4 × 7 = 28</td>
<td>5 × 6 = 30</td>
<td>6 × 6 = 36</td>
<td>7 × 7 = 49</td>
<td>8 × 9 = 72</td>
<td>10 × 10 = 100</td>
</tr>
<tr>
<td>4 × 8 = 32</td>
<td>5 × 7 = 35</td>
<td>6 × 7 = 42</td>
<td>7 × 8 = 56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**GO!**
1. Shuffle and place the cards facedown in rows and columns.
2. Turn over 2 cards and say the multiplication sentences aloud.
3. Keep the cards if the multiplication sentences match and take another turn.
4. Turn the cards facedown if the multiplication sentences do not match. Then it’s the next player’s turn.
5. The player with the most cards wins.
Metric Units of Length

In the metric system, you use centimeters (cm) to measure length.

This is 1 centimeter (cm). $1$ meter (m) = $100$ cm

A ones cube is about 1 cm wide. A door is about 1 m wide and 2 m high.

Choose the most appropriate unit to measure each length. Write millimeter, centimeter, meter, or kilometer.

1. a football __________
2. a baseball field __________
3. a blade of grass __________
4. the height of a goalpost __________
5. the length of a running shoe __________
6. the distance you can throw a ball __________

Circle the best estimate.

7. a football player’s height
   A. 2 cm          B. 2 mm          C. 2 m

8. the length of an eyelash
   F. 9 cm          G. 9 mm          H. 9 m

9. the height of a tree
   A. 30 cm         B. 30 mm         C. 30 m
Estimate. Then measure to the nearest centimeter.

1.

2. 1st Place

3.

Circle the best estimate.

4. the height of a third grader
   A. 120 cm   B. 120 mm   C. 120 m

5. the length of a race
   F. 100 cm   G. 100 mm   H. 100 m

6. the length of a sneaker
   A. 15 cm   B. 15 mm   C. 15 m
1. List 4 things you may measure in millimeters:


Choose the most appropriate unit to measure each length. Write millimeter, centimeter, meter, or kilometer.

2. width of a pencil ______

3. thickness of a banana peel ______

4. thickness of a pillow ______

5. height of a lamp ______

6. distance to school ______

7. length of a soccer field ______

Choose the best estimate.

8. CD case
   12 mm or 12 cm

9. computer mouse
   13 mm or 13 cm

10. tv monitor
    70 cm or 70 m

Convert. (Lesson 8–7)

11. 3 hours = _____ minutes

12. _____ minutes = 4 quarter hours

13. _____ hours = 120 minutes

14. _____ minutes = 1 hour and half

15. _____ minutes = 1 quarter hour

16. 4 hours = _____ minutes
Problem-Solving Practice

Metric Units of Length

Solve.

1. Which is about 1 centimeter long: a fingernail or a pencil?

2. Which metric unit would you use to measure the distance between the front of the classroom and the back of the classroom?

3. A tomato plant is a little less than 1 yard in height. How can you describe this length in metric units?

4. Estimate the length of the crayon in centimeters.
   about _____ centimeters

   Now use a centimeter ruler to measure the length of the crayon to the nearest centimeter.
   _____ centimeters

5. Gail and Eric estimated the length of a screwdriver. Eric estimated about 11 cm. Gail said about 10 cm. They used a ruler to measure it, and found it was exactly 10 cm and 8 mm. Who had a better estimate? Why?

6. Estimate your height to the nearest meter.
   About _____ meters
   Now use a metric ruler to check your estimate. What is your height?
   _____ meters
   Was your estimate close? _____
   Explain.
   ___________________________
Make an estimate for each body part shown. Then use a metric ruler to find the actual length. Use the lines next to each part to help you measure.

1. Estimate _____ cm  |  Actual _____ cm

2. Estimate _____ cm  |  Actual _____ cm

3. Estimate _____ cm  |  Actual _____ cm

4. Estimate _____ cm  |  Actual _____ cm

Match the following estimates with each item. Draw a line from each item to a reasonable measurement.

5. the height of a third-grader  |  about 5 millimeters
6. the length of a third-grader’s foot  |  about 10 millimeters
7. the length of a third-grader’s arm  |  about 1 meter 45 centimeters
8. the length of a third-grader’s eyelash  |  about 40 centimeters
9. the length of third-grader’s fingernail  |  about 20 centimeters
Guess and Check

If you want to solve a problem, it is important to have a plan. You can use the guess and check strategy to solve problems.

Alicia is making bookmarks for the school fair. She needs 10 centimeters of ribbon for each bookmark. There is a meter of ribbon on each spool. How many bookmarks can she make out of one spool of ribbon? (Hint: Remember there are 100 centimeters in a meter.)

<table>
<thead>
<tr>
<th>Understand</th>
<th>What facts do you know?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Each bookmark uses 10 centimeters of ribbon.</td>
<td></td>
</tr>
<tr>
<td>• There is a meter of ribbon on each spool.</td>
<td></td>
</tr>
</tbody>
</table>

**What do you need to find?**

• How many bookmarks can be made from a spool of ribbon?

<table>
<thead>
<tr>
<th>Plan</th>
<th>You can use the guess and check strategy. Guess how many bookmarks you can make and check the answer with division.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Solve</th>
<th>Each bookmark is 10 centimeters. Each spool holds 1 meter of ribbon. Since 1 meter = 100 centimeters, we can guess that we can make 10 bookmarks. Check: 100 ÷ 10 = 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>So, Alicia can make 10 bookmarks.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Check</th>
<th>Look back at the problem. One way to check the answer is work it backwards. Check your division with multiplication.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 × 10 = 100</td>
</tr>
<tr>
<td></td>
<td>So, the answer is correct.</td>
</tr>
</tbody>
</table>
Solve. Use the guess and check strategy.

1. Ben is swimming in a 50-meter race on Saturday. He needs to measure the length of the swim, but he only has lengths of string 10 centimeters long. How many lengths of string will he need to equal 50 meters?

2. Irene’s crayons are each about 10 cm long. How many crayon lengths will it take to line them up end to end about 3 meters?

3. Mario is growing fresh carrots. Each week he measures his plants. If his plants grow 5 mm each week, how long will it take for his plants to reach 3 cm?

4. Marta has a stack of books 1 meter high. If Marta sorts her books into 10 equal stacks, how high will each stack be in cm?
Solve. Use the **guess and check strategy**.

1. Carmen needs 100 millimeters of yarn to make a bookmark. She has 1 meter of yarn. How many bookmarks can she make?

2. Hugo planted a garden of flowers. He planted 8 yellow flowers and twice as many purple flowers. He also planted some red flowers. Hugo has a total of 30 flowers. How many red flowers did he plant?

3. Each week, Pascul mows the front lawn twice and back lawn once. He walks a total of 824 meters while mowing in a week. He walks 391 meters each time he mows the front lawn. How many meters does he walk when he mows the back lawn?

4. Rogelio likes to run around the block. It takes him about 7 minutes. If Rogelio runs around the block 4 times a day, 2 days a week, how much time does he spend running around the block in a week?

5. Paloma has blocks that are 4 centimeters tall. If she stacks her blocks on top of each other, the stack is 32 centimeters tall. How many blocks does Paloma have?

6. Catalina is thinking of two numbers. Their difference is 3 and their sum is 33. What are the numbers?
**Homework Practice**

*Problem-Solving Strategy*

**Solve. Use the guess and check strategy.**

1. Dolores bought some new pillows for her living room. She bought twice as many green pillows as blue pillows, and one less red pillow than green pillows. She bought 9 pillows altogether. How many pillows of each color did she buy?

2. Pam and Casey swim every day. Pam swims twice as far as Casey, but they always finish at the same time. If they both begin at 8 A.M., and Casey swims 500 meters, how many meters does Pam swim?

3. Arthur reads every day. On weekdays he reads at least 30 minutes a day. On the weekends, he reads twice as long. About how long does he read each week?

4. Cecilia was burning a new CD for a friend. The CD could record up to 60 minutes. How many 3- or 4-minute songs could Cecilia burn on to the CD?

---

**Spiral Review**

Choose the most appropriate unit to measure each length. Write **millimeter, centimeter, meter, or kilometer.** *(Lesson 9–1)*

5. height of a cup ____________

6. distance traveled on a road trip ____________

7. thickness of cardboard ____________
For each problem, circle the statement that is most accurate. Then, explain your thinking.

1. Courtney brought a liter of water to drink after the 50-yard dash. Preston brought 1 quart of water to drink after the race.
   Courtney says, “I have a little more water to drink than Preston.”
   Preston says, “I have exactly the same amount of water as Courtney.”

2. Jennifer and Katy are watching their friend Jill throw the shot-put ball. Jill said the ball for the elementary school weighs about 3 kilograms. Jennifer and Katy are estimating the customary weight of the ball.
   Jennifer says, “I think the ball weighs about 3 pounds.”
   Katy says, “I think the ball weighs about 6 pounds.”

3. Cory and Martin are teammates. They are getting ready to run a 400-meter relay race. Each will run 200 meters. Their friends Jake and Paula want to know how far in yards the boys will run.
   Paula says, “I think 200 meters is about 300 yards.”
   Jake says, “I think 200 meters is about 200 yards.”

4. Brittany and Timothy are baking a batch of oatmeal-raisin snack bars. They will serve the snacks after the track meet. The recipe calls for at least one cup of raisins.
   Brittany says, “We should mix in 8 ounces of raisins.”
   Timothy says, “We should mix in 8 grams of raisins.”
The metric system uses milliliters and liters to measure capacity.

This dropper holds about 1 mL. A drinking glass holds about 240 mL. A bottle of water holds 1,000 mL, or 1 L.

Which unit would you use to measure the capacity of each? Write mL for milliliters and L for liters.

1.  
2.  
3.  

Circle the best estimate to complete each sentence.

4. A juice box holds about ______ mL.
   A. 8  
   B. 18  
   C. 180

5. A teaspoon holds ______ mL.
   F. 10  
   G. 100  
   H. 1,000

6. A large pot holds about ______ L.
   A. 1  
   B. 6  
   C. 60
Circle the better estimate.

1. A. 1 mL  
   B. 1 L  
   
2. A. 1 mL  
   F. 1 mL  
   G. 1 L  
   
3. A. 360 mL  
   B. 360 L  
   
4. F. 150 mL  
   G. 150 L  
   
5. A. 50 mL  
   B. 50 L  
   
6. F. 1 mL  
   G. 1 L  
   
Choose the most appropriate unit to measure each capacity. Write milliliter or liter.

7. ____________________________  
8. ____________________________  
9. ____________________________  

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Choose the most appropriate unit to measure each capacity. Write milliliter or liter.

1. bottle of soda
2. water in a pool
3. dressing on salad
4. cream in coffee
5. hot chocolate in a mug
6. water in a birdbath

Compare. Use >, <, or =.

7. 5 L ○ 5 mL
8. 17 mL ○ 17 L
9. 10 mL ○ 5 L
10. 1 L ○ 9 mL
11. 3 mL ○ 4 L
12. 10 mL ○ 1 L

13. Hugo wants to make a pitcher of lemonade. Should he use 2 L or 2 mL of water? Explain.

14. Mirna is making muffins for the bake sale. One batch is blueberry and one batch is banana nut. The third batch is twice as big as the blueberry and banana nut batch. If Mirna made 96 muffins, how many muffins were in the blueberry and banana nut batches?

15. Dan watched soccer practice for an hour on Tuesday. Wednesday and Thursday he watched twice as long, and on Friday, he watched an hour longer than he did the day before. How much time did Dan spend watching soccer practice?
Problem-Solving Practice

Metric Units of Capacity

Solve.

1. Tanya has a cold. What metric unit of measure should her mother use to measure the amount of liquid cold medicine Tanya should take?

2. Circle the best estimate for each.
   Bottle cap: 40 L 40 mL
   Bucket: 7 L 7 mL
   Mug: 480 L 480 mL

   List the containers in order from least to greatest capacity.

3. Stacy invited ten people to her party. Should she buy 4 L of juice or 40 mL of juice? Explain.

4. The chef put 2 spoonfuls of vanilla extract into a cake recipe. About how much vanilla extract is this, 2 mL or 2 L?

5. Maurice wants to measure the amount of water in a mixing bowl. Should he measure in mL or L? Explain.

6. Below is Dena’s recipe for fruit punch. Write the missing metric units of capacity for each ingredient.

   Dena’s Fruit Punch
   Frozen orange juice: 2 _____
   Pineapple juice: 360 _____
   Apple juice: 1 _____

   _________________
Use the metric capacities in the boxes to fill in the blanks for each part of the recipes. You may use some measurements more than once.

**Chocolate Chip Cookies**

- 5 mL
- 240 mL
- 15 mL
- 480 mL
- 180 mL
- 640 mL

*(Hint: 240 mL = about 1 cup)*

1. Combine _______ of flour, _______, of salt, and _______ of baking soda in a small bowl. Set aside.
2. Beat together _______ of softened butter, _______ of brown sugar, and _______ of white sugar. Stir in _______ of vanilla.
3. Add two eggs to butter, sugar, and vanilla mixture. Beat until creamy.
4. Slowly stir in flour, salt, and baking soda mixture.
5. Add _______ of semi-sweet chocolate chips. Stir in _______ of chopped nuts.
6. Form cookie dough into _______ balls and drop onto cookie sheet.
7. Bake at 190° C for 10 minutes.

**Party Punch**

- 360 mL
- 1 L
- 710 mL
- 2 L

1. In a large punch bowl, mix together _______ of frozen orange juice concentrate and _______ of water.
2. Stir in _______ of ginger ale.
3. Add _______ of pineapple juice.
4. Mix in _______ of premixed fruit punch.
Choose a Strategy

Coach Betty wants 11 liters of water in a cooler. She has a 5-liter bottle and an 8-liter bottle. How can she use them to measure exactly 11 liters?

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Be sure you understand the problem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand</td>
<td>Read carefully</td>
</tr>
</tbody>
</table>

**What do you know?**

- Coach Betty wants ______ liters of water in a cooler.
- Coach Betty has bottles that hold _____ liters and _____ liters.

**What do you need to know?**

- You need to find how to use the bottles to measure ________________

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Make a plan.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan</td>
<td>Choose a strategy.</td>
</tr>
<tr>
<td></td>
<td>Use draw a picture to solve the problem.</td>
</tr>
<tr>
<td></td>
<td>You can use the difference of the amount of water in the bottles to measure exactly 11 liters.</td>
</tr>
</tbody>
</table>
## Reteach

### Problem-Solving Investigation (continued)

<table>
<thead>
<tr>
<th>Step 3</th>
<th>Carry out your plan.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solve</td>
<td>Follow the steps.</td>
</tr>
<tr>
<td></td>
<td>• Fill the 8-L bottle.</td>
</tr>
<tr>
<td></td>
<td>• Fill the 5-L bottle from the 8-L bottle.</td>
</tr>
<tr>
<td></td>
<td>• Pour what is left in the 8-L bottle into the cooler.</td>
</tr>
<tr>
<td></td>
<td>• Refill the 8-L bottle</td>
</tr>
<tr>
<td></td>
<td>• Pour the water from the 8-L bottle into the cooler.</td>
</tr>
<tr>
<td></td>
<td>• Add. <strong>8 + 3 = _____</strong>. There are _____ liters in the water cooler.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 4</th>
<th>Is the solution reasonable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Look Back</td>
<td>Reread the problem.</td>
</tr>
<tr>
<td></td>
<td>How can you check your answers?</td>
</tr>
</tbody>
</table>

### Use any strategy to solve. Tell what strategy you used.

1. Ed has a 6-oz cup and an 8-oz cup. How can he use the cups to measure 10 ounces of water?
   
   ____________________________________________
   ____________________________________________
   ____________________________________________

2. Cathy, Ted, and Ella eat lunch. One has a ham sandwich, one has a tuna sandwich, and one has a cheese sandwich. Ted and Cathy do not eat ham. Cathy does not eat fish. What does Ella eat?
   
   ____________________________________________
Use any strategy shown below. Tell what strategy you used.

- Look for a pattern
- Choose an operation
- Make a table
- Work backward
- Guess and check

1. Jack got home from school at 4:30 P.M. Before getting home, he practiced baseball for 30 minutes and played with his friends for 45 minutes. What time did he leave school?

2. Coach Mary has a 5-gallon bottle and a 3-gallon bottle. How can she use the bottles to get exactly 14 gallons of water in a cooler?

3. Dan, Michael, and Jerry play different sports. One plays tennis, another plays baseball, and the third is on the swimming team. Michael and Jerry play sports that use balls. Michael does not play baseball. Who plays baseball?

4. Ellen read 5 pages of a book on the first day, 10 pages the second day, and 15 pages the third day. If the pattern continues, how many pages will she read on the fifth day?

5. A small van has 4 rows of seats. Each row can seat 3 people. How many people in all can 2 vans hold?

6. Leah is 5 feet tall. Her brother Jamie is 50 inches tall. How much taller is Leah than Jamie?
Use any strategy to solve.

1. Leo was building a fence. The fence is sold in sections that are each 7 meters long. How many sections should Leo buy if he needs 63 meters of fence?

2. Ciana baked a batch of cookies. Susana ate 4 cookies, Dimas ate 7 cookies, Pedro ate 6 cookies and Ciana ate 3. There were 4 cookies left over. How many cookies did Ciana bake?

3. Benito was painting some rooms in his house. Each room used 1 liter of paint, but his living room used 2 liters. If Benito paints 6 rooms, how many liters of paint did he use?

4. Olivia has three containers of water. The first container has twice as much water as the second container. The third container has 1 more liter than the first and second container combined. There is a total of 19 L of water. How much water is in each container?

Spiral Review

Compare. Use <, >, or =. (Lesson 9–3)

5. 4 L ____ 4 mL
6. 5 mL ____ 1 L
7. 20 mL ____ 10 L
8. 1 L ____ 1 mL
9. Name three things that could be measured in liters.
10. Name three things that could be measured in milliliters.
Patrick moved from the United States to Great Britain. He is working in a large shop that sells many kinds of pets. He needs to convert customary units to metric units. Help Patrick estimate the weights and sizes of some of the pets for sale.

Complete the conversion chart for Patrick. Match the metric units listed in the boxes to the customary units below. The first two are done for you.

<table>
<thead>
<tr>
<th>Pet</th>
<th>Customary Units</th>
<th>Metric Units (Estimates)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height or Length</td>
<td>Weight</td>
</tr>
<tr>
<td>Llama</td>
<td>3 feet</td>
<td>40 pounds</td>
</tr>
<tr>
<td>Mouse</td>
<td>4 inches (including tail)</td>
<td>2 ounces</td>
</tr>
<tr>
<td>Lizard</td>
<td>5 inches (including tail)</td>
<td>3 ounces</td>
</tr>
<tr>
<td>Horse</td>
<td>4 feet</td>
<td>400 pounds</td>
</tr>
<tr>
<td>Rabbit</td>
<td>12 inches</td>
<td>5 pounds</td>
</tr>
<tr>
<td>Goat</td>
<td>24 inches</td>
<td>22 pounds</td>
</tr>
<tr>
<td>Hamster</td>
<td>3 1/2 inches</td>
<td>5 ounces</td>
</tr>
<tr>
<td>Goldfish</td>
<td>2 inches</td>
<td>1 ounce</td>
</tr>
<tr>
<td>Parakeet</td>
<td>7 inches</td>
<td>4 ounces</td>
</tr>
<tr>
<td>Puppy</td>
<td>13 inches (including tail)</td>
<td>11 pounds</td>
</tr>
<tr>
<td>Kitten</td>
<td>8 inches (including tail)</td>
<td>2 pounds</td>
</tr>
</tbody>
</table>

5 centimeters | 181 kilograms
9 centimeters | 18 kilograms
10 centimeters | 9 kilograms
13 centimeters | 5 kilograms
18 centimeters | 2 kilograms
20 centimeters | 907 grams
30 centimeters | 142 grams
33 centimeters | 113 grams
60 centimeters | 84 grams
1 meter | 56 grams
1.2 meters | 28 grams
Metric Units of Mass

**Mass** is the amount of matter in an object. In the metric system, units of mass are the **gram** and the **kilogram**.

1,000 grams (g) = 1 kilogram (kg)

Use grams to find the mass of small things.

| 1 g  | 145 g | 220 g |

Use kilograms to find the mass of larger things.

| 1 kg  | 5 kg  | 2 kg  |

Choose the most appropriate unit to measure each mass. Write **gram** or **kilogram**.

1. a third grader
2. a juice box
3. a golf ball
4. a golf club
5. a whistle
6. a bag of apples

Draw a line to match each object and its mass.

7. a football helmet
8. a remote control
9. a car
10. a computer disk
11. a bag of groceries

A. 1 kg  
B. 10 kg  
C. 1,200 kg  
D. 22 g  
E. 500 g
Skills Practice

Metric Units of Mass

Circle the better estimate.

1.  
   A. 1 g  
   B. 1 kg

2.  
   F. 600 g  
   G. 600 kg

3.  
   A. 8 g  
   B. 8 kg

4.  
   F. 2 g  
   G. 2 kg

5.  
   A. 22 g  
   B. 22 kg

Choose the most appropriate unit to measure each mass.
Write gram or kilogram.

7.  

8.  

9.  

Homework Practice

Metric Units of Mass

1. List 4 things you may measure in grams:

2. List 4 things you may measure in kilograms:

Choose the most appropriate unit to measure each mass.
Write gram or kilogram.

3. one strawberry
4. a bag of flour
5. a bag of concrete

6. cocoa mix
7. rubber bands
8. a bag of dog food

Spiral Review

Use any strategy to solve. (Lesson 9–4)

9. Cheryl uses 35 beads to make a bracelet. She uses red, blue, green, yellow, and orange beads. There is an equal number of red and blue beads. There is an equal number of green and yellow beads. There are five orange beads and 8 blue beads. How many yellow beads are there?
Problem-Solving Practice

Metric Units of Mass

Solve.

1. List the items below in order from least to greatest mass.
   - sheet of paper
   - box of crayons
   - feather

2. What metric unit of mass would you use to measure the mass of a spoon?

3. A paper clip has a mass of 1 gram. Is it reasonable to say that a television has a mass of about 30 grams? Explain.

4. Matt has a pencil, a desk, a computer, and a piece of paper. Which items should be measured in kilograms? Which items should be measured in grams?

5. Wendy has 2 erasers. Together, they have the same mass as her pencil box. Her pencil box has a mass of 300 grams. If the erasers have the same mass, is it reasonable that her erasers each have a mass of 150 grams? Explain.

6. One side of a balance scale has a box of computer games. The other side has 1 large book. Another balance scale has three of the same books as the previous scale, and 6 baseball bats on the other side. Each baseball bat is 1 kg. What is the mass of the box of computer games?
Riddle: What has 18 legs and catches flies?

Circle the estimated mass for each sports item. Then write the letters you circled in order on the blank lines below to solve the riddle.

1. B 1,000 g Z 45 kg

2. S 142 g T 1,420 kg

3. E 113 g I 13 kg

4. L 500 g M 5,000 kg

5. L 77 g C 7 kg

6. N 41 kg E 410 g

A ___ A ___ ___ B A ___ ___ T ___ A M
Reteach

Metric Unit Conversions

Convert Metric Units

The metric system is based on tens. So, you can use patterns to change from one unit to another.

To change from meters to centimeters, count by 100s.

<table>
<thead>
<tr>
<th>m</th>
<th>cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>200</td>
</tr>
<tr>
<td>3</td>
<td>300</td>
</tr>
</tbody>
</table>

To change from liters to milliliters, count by 1,000s.

<table>
<thead>
<tr>
<th>L</th>
<th>mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,000</td>
</tr>
<tr>
<td>2</td>
<td>2,000</td>
</tr>
<tr>
<td>3</td>
<td>3,000</td>
</tr>
</tbody>
</table>

To change from kilograms to grams, count by 1,000s.

<table>
<thead>
<tr>
<th>kg</th>
<th>g</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,000</td>
</tr>
<tr>
<td>2</td>
<td>2,000</td>
</tr>
<tr>
<td>3</td>
<td>3,000</td>
</tr>
</tbody>
</table>

Circle the amount that makes each sentence true.

1. 3 m = _____
   A. 3 cm
   B. 300 cm
   C. 3,000 cm

2. 500 cm = _____
   F. 5 m
   G. 500 m
   H. 5,000 m

3. 6,000 g = _____
   A. 6 kg
   B. 60 kg
   C. 600 kg

4. 4 L = _____
   F. 400 mL
   G. 4,000 mL
   H. 40,000 mL

5. 5,000 mL = _____
   A. 5 L
   B. 500 L
   C. 5,000 L

Convert each unit to a smaller unit or larger unit.

6. 8 m = _____ cm
7. 4 kg = _____ g
8. 7 L = _____ mL

9. 400 cm = _____ m
10. 9,000 g = _____ kg
11. 6,000 mL = _____ L

12. 3 kg = _____ g
13. 500 cm = _____ m
14. 5 L = _____ mL

15. 9 m = _____ cm
16. 4,000 mL = _____ L
17. 1,000 g = _____ kg
Skills Practice

Metric Unit Conversions

Complete each table.

1. | Centimeters | 200 | 600 | 800 |
   | Meters      | 2   | 4   |     |

2. | Milliliters | 1,000 | 2,000 | 3,000 |
   | Liters      | 1     |       | 4     |

Convert each unit to a smaller unit or larger unit.

3. 100 cm = _____ m
4. 2,000 mL = _____ L
5. 3,000 g = _____ kg
6. 500 cm = _____ m
7. 6,000 g = _____ kg
8. 1,000 mL = _____ L
9. 3 L = _____ mL
10. 6 m = _____ cm
11. 2 kg = _____ g
12. _____ g = 5 kg
13. _____ cm = 9 m
14. _____ mL = 7 L

Solve.

15. A container holds 5 liters of water. How many milliliters of water does the container hold?

16. A table is 2 meters long. How many centimeters long is the table?

17. A banana has a mass of 125 grams. Use repeated addition to find the mass of two bananas.

18. A spider monkey has a mass of 6 kg. How many grams is this?
Convert each unit.

1. ____ centimeters = 1 meter

2. 10 millimeters = ____ centimeter

3. ____ meters = 2 kilometers

4. 1 liter = ____ milliliters

5. ____ grams = 5 kilograms

6. ____ centimeters = 7 meters

7. 3 kilometers = ____ meters

8. 8,000 milliliters = ____ liters

9. A piece of tape is 2 centimeters wide. How many millimeters wide is this?

10. A poster is 1 meter long. How many centimeters long is the poster?

Spiral Review

Choose the most appropriate unit to measure each mass. Write gram or kilogram. (Lesson 9–5)

11. one grape _____________

12. teapot _____________

13. a quarter _____________

14. teaspoon of salt _____________

15. a bag of pet food _____________

16. a couch _____________
Problem-Solving Practice

Metric Unit Conversions

Solve.

1. A bedroom door is 3 meters tall. What is its height in centimeters?

2. A kitten has a mass of 2,000 grams. What is its mass in kilograms?

3. Each paper cup holds 500 milliliters of water. How many cups of water would you need to fill a 2-liter bottle?

4. A bag of apples has a mass of 2,000 grams. What is the mass of 4 bags of apples in kilograms?

5. The art teacher displays several pictures side-by-side across a wall. Each picture is about 24 cm wide. The line of pictures measures 1 meter from end to end. How many pictures are displayed in the line? Explain.

6. Greg has 6,500 milliliters of water in a large jug. He wants to pour the water into liter bottles so that the water will be easier to store. What is the least number of bottles he will need? Explain.
Look at the items in Column 1. Each one shows its customary measurement. Find the metric amount in Column 2 that is very nearly the same and draw a line to it.

<table>
<thead>
<tr>
<th>Item</th>
<th>Metric Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 2 pounds of flour</td>
<td>1 m</td>
</tr>
<tr>
<td>2. 10 yards of ribbon</td>
<td>4 L</td>
</tr>
<tr>
<td>3. 1 gallon of milk</td>
<td>27 kg</td>
</tr>
<tr>
<td>4. 4 miles</td>
<td>113 g</td>
</tr>
<tr>
<td>5. 6 inches of string</td>
<td>1 kg</td>
</tr>
<tr>
<td>6. 60-pound child</td>
<td>9 m</td>
</tr>
<tr>
<td>7. 2 quarts of juice</td>
<td>6 km</td>
</tr>
<tr>
<td>8. 36-inch wide desk</td>
<td>2,500 mL</td>
</tr>
<tr>
<td>9. 4 ounces of sugar</td>
<td>15 cm</td>
</tr>
</tbody>
</table>
## Individual Progress Checklist

<table>
<thead>
<tr>
<th>B</th>
<th>D</th>
<th>M</th>
<th>Goal</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>choose appropriate measurement tools and units</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>estimate and measure length, capacity, and weight/mass</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>convert metric measurements</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>use the guess and check problem-solving strategy</td>
<td></td>
</tr>
</tbody>
</table>

### Notes

__________________________

__________________________

__________________________

__________________________

__________________________

__________________________

__________________________

__________________________

__________________________
Read each question carefully. Write your answer on the line provided.

What type of measurement do you need: length, capacity, or weight?

1. How tall is your mother?
2. How much can this container hold?
3. How many pounds is a banana?
4. How much sugar is needed for a cake recipe?

Which object holds more?

5. large coffee pot or can of soda
6. pickup truck or sports car

Which is heavier?

7. box of peaches or bag of potato chips
8. bulldog or goldfish
9. Jessica was carrying a bag of groceries. Mindy was carrying a bag of cotton balls. Who was carrying the heavier bag?

Which line is longer?

10. Tell which of these lines is longer. How many inches is it?
11. Dina measured her desk and found that it is just past the 10 \( \frac{1}{2} \) inch mark on the ruler. How long is her desk to the nearest half inch?
Chapter Pretest

Read each question carefully. Write your answer on the line provided.

Choose the best unit to measure.

1. weight of an insect
2. how much water in a kitchen sink
3. length of a fishing rod
4. width of a penny
5. mass of a pig
6. capacity of a teacup

Choose the better estimate.

7. Distance a paper airplane can fly: 6 m or 6 km?
8. Juice a baby can drink: 10 mL or 10 L?
9. Meat a butcher can carry: 20 g or 20 kg?
10. Length of a greeting card: 13 mm or 13 cm?
11. Rain in a wheelbarrow: 12 L or 12 mL?

Convert the measurement.

12. 3,000 mL = _____ L
13. 2 kg = _____ g
14. 400 cm = _____ m
15. 5 cm = _____ mm
16. 3,000 mm = _____ m
Read each question carefully. Write you answer on the line provided.

Compare. Use $>$, $<$, or $=$.

1. 100 mm ____ 100 cm
2. 100 cm ____ 1 mm
3. 300 cm ____ 300 m

Choose the most appropriate unit to measure each length. Write millimeter, centimeter, meter, or kilometer.

4. height of a door
5. length of a kitten
6. distance to the next school

Solve.

7. Estrella is reading a chapter book. Which is the better estimate of the width of the book, 2 centimeters or 2 meters?
8. Carolina spoke long distance on the phone. If Carolina pays six cents a minute, how much will it cost her to speak on the phone for 10 minutes?
Quiz 2 (Lessons 9–3 through 9–4)

Read each question carefully. Write your answer on the line provided.

Compare. Use >, <, or =.

1. 3 L _____ 30 mL
2. 15 mL _____ 15 L
3. 5 mL _____ 1 L

Choose the most appropriate unit to measure each capacity. Write milliliter or liter.

4. glass of orange juice
5. barrel of oil
6. water in a bathtub

Solve.

7. Hector was playing golf. Is Hector’s golf club 1 meter or 1 millimeter long?
8. Erica loves to skip rope. If she can skip rope 8 times in 10 seconds, how many skips can she skip in 60 seconds?
Choose the most appropriate unit to measure each mass. Write *gram* or *kilogram*.

1. a strawberry
2. a pair of sandals
3. a bottle of nail polish
4. a sack of sugar

Convert each unit to a smaller unit.

5. 8 L = ____ mL
6. 5 m = ____ cm
7. 3 kg = ____ g
8. 4 km = ____ m

Convert each unit to a larger unit.

9. 6,000 m = ____ km
10. 2,000 g = ____ kg
11. 3,000 mL = ____ L
12. 7,000 m = ____ km
Mid-Chapter Review (Lessons 9–1 through 9–3)

Read each question carefully. Write your answer on the line provided.

Choose the most appropriate unit to measure each length. Write millimeter, centimeter, meter, or kilometer.

1. length of a book
2. thickness of a penny
3. length of a soccer field
4. length of a stapler

Choose the most appropriate unit to measure each capacity. Write milliliter or liter.

5. kitchen sink
6. bathtub
7. ink in a pen
8. water that can fit in your cupped hand

Compare. Use >, <, or =.

9. 3 cm ___ 3 m
10. 10 km ___ 100 mm
11. 7 L ___ 7 mL
12. 1 L ___ 5 mL
Using the word bank below, complete each sentence by writing the correct word or words in the blank.

<table>
<thead>
<tr>
<th>meter (m)</th>
<th>gram (g)</th>
<th>centimeter (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>liter (L)</td>
<td>milliliter (mL)</td>
<td></td>
</tr>
<tr>
<td>mass</td>
<td>millimeter (mm)</td>
<td>kilometer (km)</td>
</tr>
</tbody>
</table>

1. A _____ is a metric unit for measuring mass.
2. A _____ is a metric unit used for measuring capacity.
3. A _____ is a metric unit for measuring volume or capacity.
4. _____ and _____ are metric units used for measuring length.
5. _____ and _____ are metric units for measuring length and height.
6. _____ is the amount of matter in an object.
Use a metric ruler to measure the length of the following classroom items: (1) blackboard eraser; (2) pencil; (3) pair of scissors; (4) bottle of glue; and (5) piece of chalk.

Read each question aloud to the student. Then write the student’s answers on the lines below the question.

1. What is the length of the blackboard eraser?

2. What is the length of the pencil?

3. What is the length of the scissors?

4. What is the length of the bottle of glue?

5. What is the length of the piece of chalk?

6. Tell how you got your answer.
Oral Assessment  (continued)

7. What is the longest item?

8. What is the shortest item?

9. Explain your answer.

10. A school has 20 classrooms and each classroom can hold 25 students. The school now has 500 students. Does it have enough classrooms?

11. If the school wanted to add 100 students, how many more classrooms would be needed?

12. Tell how you got your answer.
# Chapter Project Rubric

<table>
<thead>
<tr>
<th>Score</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| 3     | Student successfully completed the chapter project.  
       | Student demonstrated appropriate use of chapter information in completing the chapter project.  |
| 2     | Student completed the chapter project with partial success.  
       | Student partially demonstrated appropriate use of chapter information in completing the chapter project.  |
| 1     | Student did not complete the chapter project or completed it with little success.  
       | Student demonstrated very little appropriate use of chapter information in completing the chapter project.  |
| 0     | Student did not complete the chapter project.  
       | Student demonstrated inappropriate use of chapter information in completing the chapter project.  |
## Measurement: Metric System

### Concept Map Foldable

<table>
<thead>
<tr>
<th>Score</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| **3** | Student properly assembled Foldables graphic organizer according to instructions.  
Student recorded information related to the chapter in the manner directed by the Foldables graphic organizer.  
Student used the Foldables graphic organizer as a study guide and organizational tool. |
| **2** | Student exhibited partial understanding of proper Foldables graphic organizer assembly.  
Student recorded most but not all information related to the chapter in the manner directed by the Foldables graphic organizer.  
Student demonstrated partial use of the Foldables graphic organizer as a study guide and organizational tool. |
| **1** | Student showed little understanding of proper Foldables graphic organizer assembly.  
Student recorded only some information related to the chapter in the manner directed by the Foldables graphic organizer.  
Student demonstrated little use of the Foldables graphic organizer as a study guide and organizational tool. |
| **0** | Student did not assemble Foldables graphic organizer according to instructions.  
Student recorded little or no information related to the chapter in the manner directed by the Foldables graphic organizer.  
Student did not use the Foldables graphic organizer as a study guide and organizational tool. |
Read each question carefully. Write your answer on the line provided.

1. Use a centimeter ruler. What is the length of the line segment?

   [______________________]
   A. 4 cm  B. 6 cm  C. 7 cm  D. 8 cm  1. _____

2. Which is the best estimate of the height of a young child?
   F. 1 cm  G. 1 mm  H. 1 m  J. 1 km  2. _____

3. Which is the best estimate of the amount of water a fish bowl can hold?
   A. 2 mL  B. 20 mL  C. 2 L  D. 20 L  3. _____

4. Which is the best estimate of the mass of a pencil?
   F. 1 g  G. 10 g  H. 100 g  J. 1 kg  4. _____

5. 2 m = □ cm
   A. 20  B. 200  C. 2,000  D. 20,000  5. _____

6. 6 kg = □ g
   F. 60  G. 600  H. 6,000  J. 60,000  6. _____

7. 5 L = □ mL
   A. 5  B. 50  C. 5,000  D. 50,000  7. _____

8. 4,000 m = □ km
   F. 4  G. 40  H. 400  J. 40,000  8. _____

9. 30 mm = □ cm
   A. 3  B. 30  C. 3,000  D. 30,000  9. _____

10. 2,000 g = □ kg
    F. 2  G. 20  H. 200  J. 20,000  10. _____
11. $\square$ m = 800 cm
   A. 8          B. 80          C. 800          D. 8,000

12. The gymnasium holds 200 people. Half the seats are filled with students. There are twice as many students as there are parents. How many people are in the gymnasium in all?
   F. 50          G. 150          H. 176          J. 200

Solve.

13. Mr. Costa bought 3 liters of milk. He used 1 liter to make custard. How many milliliters of milk does he have left?
   A. 20 mL       B. 200 mL       C. 2,000 mL      D. 20,000 mL

14. Miss Chin drove 50 kilometers on each of 2 days. How many kilometers did she drive in all?
   F. 25 km       G. 100 km       H. 150 km       J. 200 km

15. In the 100-meter run, Julio finished after Sasha, and Carl finished first. Who was in second place?
   A. Julio       B. Carl       C. Sasha       D. Gina
Chapter Test, Form 2A

Read each question carefully. Write your answer on the line provided.

1. 5 cm = □ mm
   A. 1   B. 5   C. 50   D. 50,000

2. 5,000 m = □ km
   F. 5   G. 50   H. 500   J. 50,000

3. 2 m = □ cm
   A. 20   B. 200   C. 2,000   D. 20,000

4. 4 kg = □ g
   F. 40   G. 400   H. 4,000   J. 40,000

5. 8,000 g = □ kg
   A. 8,000   B. 800   C. 80   D. 8

6. □ m = 600 cm
   F. 6   G. 60   H. 600   J. 6,000

7. Which is the best estimate of the height of a table?
   A. 1 mm   B. 1 m   C. 1 cm   D. 1 km

8. 7,000 mL = □ L
   F. 7   G. 70   H. 700   J. 70,000

9. Which is the best estimate of the mass of an eraser?
   A. 1 g   B. 1 kg   C. 10 g   D. 100 g

10. Use a centimeter ruler. What is the length of the line segment?

   F. 4 cm   G. 6 cm   H. 7 cm   J. 8 cm
11. Which is the best estimate of the amount of water a bucket can hold?
   A. 2 mL  B. 20 mL  C. 20 L  D. 2 L  11. _____

12. The auditorium holds 400 people. Half the seats are filled with students. There are twice as many students as there are parents. How many parents are seated in the auditorium?
   F. 50  G. 75  H. 100  J. 200  12. _____

13. Mr. Hernandez biked 20 kilometers a day for three days. How many kilometers did he bike in all?
   A. 40 km  B. 60 km  C. 100 km  D. 200 km  13. _____

14. Brianna bought 3 liters of juice. She used 1 liter to make punch. How many milliliters of juice does she have left?
   F. 20 mL  G. 200 mL  H. 2,000 mL  J. 20,000 mL  14. _____

15. At the cheerleading competition, the West team finished after the North team, and the East team finished first. Which team finished in second place?
   A. East  B. West  C. North  D. South  15. _____
Read each question carefully. Write your answer on the line provided.

1. $2 \text{ m} = \underline{\quad} \text{ cm}$
   - A. 20
   - B. 200
   - C. 2,000
   1. _____

2. $4 \text{ kg} = \underline{\quad} \text{ g}$
   - F. 4,000
   - G. 400
   - H. 40
   2. _____

3. $8,000 \text{ g} = \underline{\quad} \text{ kg}$
   - A. 8,000
   - B. 80
   - C. 8
   3. _____

4. $\underline{\quad} \text{ m} = 600 \text{ cm}$
   - F. 6
   - G. 60
   - H. 6,000
   4. _____

5. About how tall is a person?
   - A. 2 km
   - B. 2 m
   - C. 2 cm
   5. _____

6. About how much does an eraser weigh?
   - F. 1 g
   - G. 1 kg
   - H. 10 g
   6. _____

7. Use a centimeter ruler. What is the length of the line?

   $\underline{\quad}$
   - A. 4 cm
   - B. 6 cm
   - C. 8 cm
   7. _____

8. $5 \text{ cm} = \underline{\quad} \text{ mm}$
   - F. 5
   - G. 50
   - H. 50,000
   8. _____

9. $5,000 \text{ m} = \underline{\quad} \text{ km}$
   - A. 5
   - B. 50
   - C. 500
   9. _____

10. $8 \text{ L} = \underline{\quad} \text{ mL}$
    - F. 80
    - G. 8,000
    - H. 80,000
   10. _____
11. About how much water can a bucket hold?
   A. 20 ml   B. 20 L   C. 2 L

12. 400 people can sit in the theater. Children are seated in half of the theater. There are twice as many children as adults. How many adults are seated in the theater?
   F. 50   G. 75   H. 100

13. Brianna bought 3 liters of juice. She used 1 liter to make punch. How many milliliters of juice does she have left?
   A. 20 mL   B. 2,000 mL   C. 200 mL

14. At the cheerleading contest, the West team finished after the South team, and the East team finished first. Which team finished in second place?
   F. East   G. West   H. South

15. Mr. Hernandez biked 20 kilometers every day for three days. How many kilometers did he bike in all?
   F. 40 km   G. 60 km   H. 100 km
Read each question carefully. Write your answer on the line provided.

1. $4 \text{ kg} = \square \text{ g}$

2. $8,000 \text{ g} = \square \text{ kg}$

3. $\square \text{ m} = 600 \text{ cm}$

4. Which is the better estimate of the height of a penguin: $1 \text{ m}$ or $1 \text{ km}$?

5. $7,000 \text{ ml} = \square \text{ L}$

6. Which is the better estimate of the mass of an eraser: $100 \text{ g}$ or $10 \text{ g}$?

7. Use a centimeter ruler. What is the length of the line segment?

8. Which is the better estimate of the amount of water a bucket can hold: $2 \text{ L}$ or $2 \text{ ml}$?
9. 500 cm = □ mm

10. 5,000 m = □ km

11. 2,000 mm = □ cm

12. At the cheerleading competition, the East team finished after the North team, and the West team finished first. Which team finished in second place?

13. Coach Jenkins needs 5 gallons of sports drink for the football game. He has a 2-gallon bottle and a 2-quart bottle. What combination of bottles can he use to get exactly 5 gallons?

14. The auditorium holds 400 people. Half the seats are filled with students. There are twice as many students as there are parents. How many parents are seated in the auditorium?

15. Mr. Hernandez biked 20 kilometers a day for three days. How many kilometers did he bike in all?

16. Brianna bought 3 liters of juice. She used 1 liter to make punch. How many milliliters of juice does she have left?
Read each question carefully. Write your answer on the line provided.

1. Which is the better estimate of the mass of an eraser: 100 g or 10 g?

2. Use a centimeter ruler. What is the length of the line segment?

3. Which is the better estimate of the amount of water a bucket can hold: 2 L or 2 mL?

4. 5 cm = □ mm

5. 5,000 m = □ km

6. 8 L = □ mL

7. 2 m = □ cm

8. 4 kg = □ g
9. 8,000 g = □ kg

10. □ m = 600 cm

11. About how tall is a penguin: 1 m or 1 km?

12. Mr. Hernandez biked 20 kilometers every day for three days. How many kilometers did he bike in all?

13. Brianna bought 3 liters of juice. She used 1 liter to make punch. How many milliliters of juice does she have left?

14. At the cheerleading contest, the North team finished after the West team, and the East team finished first. Which team finished in second place?

15. The theater holds 400 people. Half the seats are filled with students. There are twice as many students as there are parents. How many parents are seated in the theater?
Read each question carefully. Write your answer on the line provided.

1. 5,000 m = __ km
2. 8 L = __ mL
3. 5 cm = __ mm
4. 8,000 g = __ kg
5. 2 m = __ cm
6. 4 kg = __ g
7. __ m = 600 cm

8. Which is the better estimate of the amount of water a bucket can hold: 2 L or 2 mL?

9. Which is the better estimate of the mass of an eraser: 100 g or 10 g?

10. Use a centimeter ruler. What is the length of the line segment?

11. Which is the better estimate of the height of a monkey: 1 m or 1 km?
12. At the cheerleading competition, the West team finished after the North team, and the East team finished first. The South team finished last, and the team from Valley finished just before the South team. Which team finished in second place?

13. Mr. Hernandez biked 20 kilometers a day for three days. Two of the days he biked primarily uphill, and one day he biked primarily downhill. How many kilometers did he bike in all?

14. Brianna bought 3 liters of juice. She used 1 liter to make punch. In the punch, she also included 2 pounds of ice and 2 liters of carbonated water. How many milliliters of juice does she have left?

15. The auditorium holds 400 students and parents. Half the seats are filled with students. Half of the students are in the third grade, and half are in the fourth grade. There are twice as many students as there are parents. How many parents are seated in the auditorium?
Demonstrate your knowledge by giving a clear, concise solution to each problem. Be sure to include all relevant drawings and justify your answers. You may show your solution in more than one way or investigate beyond the requirements of the problem. Record your answer on another piece of paper.

1. List the 4 metric units for length discussed in the chapter and provide an example of an item that could be appropriately measured by each unit.

Then complete the chart by converting to a larger unit.

<table>
<thead>
<tr>
<th>Metric Units of Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 millimeters =</td>
</tr>
<tr>
<td>100 centimeters =</td>
</tr>
<tr>
<td>1,000 meters =</td>
</tr>
</tbody>
</table>

2. List the 2 metric units for capacity discussed in the chapter and provide an example of a capacity that could be appropriately measured by each unit.

Then complete the chart by converting to a smaller unit.

<table>
<thead>
<tr>
<th>Metric Units of Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 liter (L) =</td>
</tr>
</tbody>
</table>

3. List the 2 metric units of mass discussed in the chapter and provide an example of an item that could be appropriately measured by each unit.

Then complete the chart.

<table>
<thead>
<tr>
<th>Metric Units of Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000 grams (g) =</td>
</tr>
</tbody>
</table>
Use this recording sheet with pages 414–415 of the Student Edition.

Read each question. Then fill in the correct answer.

1. A B C D
2. F G H J
3. A B C D
4. F G H J
5. A B C D
6. F G H J
7. A B C D
8. F G H J
9. A B C D
10. F G H J
Cumulative Standardized Test Practice

Test Example

Which is the most appropriate unit of measurement to use to find the mass of a horse?

A. kilogram  
B. gram  
C. liter  
D. meter

Read the Question

You need to find the best metric unit of measurement for the weight of a horse.

Solve the Question

The units gram and kilogram measure mass. So, eliminate choices C and D.

A gram weighs about the same as a paperclip.

A kilogram is greater than a gram.

A horse weighs much more than a gram.

So, kilogram seems to be the most appropriate unit of measurement.

The answer is A.

Read each question carefully. Write your answer on the line provided.

1. Which is the most appropriate unit of measurement to use to measure the length of a kitten?
   A. meter  
   B. liter  
   C. centimeter  
   D. kilometer

   1. _____
2. Which is most likely to be the mass of a roller skate?
   F. 10 kilograms   G. 10 centimeters
   H. 10 liters      J. 10 grams

3. What is the length of the crayon to the nearest centimeter?
   A. 6   B. 7   C. 8   D. 9

4. Which is most likely to be the capacity of a coffee cup?
   F. about 600 milliliters   G. about 6 liters
   H. about 40 milliliters    J. about 4 liters

5. Which number makes the sentence true?
   6,000 grams = [ ] kilograms
   A. 6   B. 60   C. 60   D. 6,000

6. Which number makes the sentence true?
   4 liters = [ ] milliliters
   F. 40   G. 440   H. 400   J. 4,000

7. Which number has a 5 in the tens place and a 5 in the thousands place?
   A. 5,245   B. 5,358   C. 5,475   D. 6,554

8. What is the sum of 44 + 346 rounded to the nearest ten?
   F. 380   G. 385   H. 390   J. 400

9. $4 + 8 + 6 = 4 + 6 + [ ]$
   A. 6   B. 8   C. 10   D. 18
10. The product of 7 and another factor is 56. What is the missing factor?
   F. 5  G. 6
   H. 7  J. 8

11. Which is the most appropriate metric unit of measurement to use to measure the length of a rabbit: millimeter, centimeter, or meter?

12. Which of the following is most likely to be the mass of a pumpkin: 5 centimeters, 5 kilograms, 5 liters, or 5 grams?

13. What is the length of the carrot to the nearest centimeter?

14. Which of the following is most likely to be the capacity of a juice box: about 200 milliliters, about 7 liters, about 700 milliliters, or about 2 liters?

15. Which number makes the sentence true?
   8,000 grams = □ kilograms

16. Which number makes the sentence true?
   2 liters = □ milliliters

17. Write a number that has a 6 in the tens place and a 6 in the thousands place.

18. What is the sum of 77 + 413 rounded to the nearest ten?
### Anticipation Guide

**Metric Measurement**

**Before you begin Chapter 9**

- Read each statement.
- Decide whether you agree (A) or disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

<table>
<thead>
<tr>
<th>STEP 1</th>
<th>A, D, or NS</th>
<th>Statement</th>
<th>STEP 2 A or D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A</td>
<td>A gram is a metric unit for measuring mass.</td>
<td>A</td>
</tr>
<tr>
<td>2.</td>
<td>D</td>
<td>A kilometer is a metric unit used for measuring capacity.</td>
<td>D</td>
</tr>
<tr>
<td>3.</td>
<td>A</td>
<td>millimeters, centimeters and meters are all metric units for measuring length and height.</td>
<td>A</td>
</tr>
<tr>
<td>4.</td>
<td>D</td>
<td>1,000 meters = 10 kilometers</td>
<td>D</td>
</tr>
<tr>
<td>5.</td>
<td>A</td>
<td>Mass is the amount of matter in an object.</td>
<td>A</td>
</tr>
<tr>
<td>6.</td>
<td>D</td>
<td>A liter is a metric unit for measuring mass.</td>
<td>D</td>
</tr>
<tr>
<td>7.</td>
<td>A</td>
<td>A gram is a metric unit for measuring mass.</td>
<td>A</td>
</tr>
<tr>
<td>8.</td>
<td>A</td>
<td>1 liter = 1,000 milliliters</td>
<td>A</td>
</tr>
<tr>
<td>9.</td>
<td>A</td>
<td>100 centimeters = 1 meter</td>
<td>A</td>
</tr>
</tbody>
</table>

**After you complete Chapter 9**

- Reread each statement and complete the last column by entering an A (agree) or a D (disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

### Graphic Organizer

Use this graphic organizer to take notes on **Chapter 9: Measurement: Metric System**. Fill in the missing information.

<table>
<thead>
<tr>
<th>Centimeter (cm)</th>
<th>Meter (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>5</td>
</tr>
<tr>
<td>700</td>
<td>7</td>
</tr>
<tr>
<td>1,000</td>
<td>10</td>
</tr>
<tr>
<td>1,500</td>
<td>15</td>
</tr>
<tr>
<td>200</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liter (L)</th>
<th>Milliliter (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3,000</td>
</tr>
<tr>
<td>5</td>
<td>5,000</td>
</tr>
<tr>
<td>8</td>
<td>8,000</td>
</tr>
<tr>
<td>10</td>
<td>10,000</td>
</tr>
<tr>
<td>7</td>
<td>7,000</td>
</tr>
</tbody>
</table>
Reteach

Metric Units of Length

In the metric system, you use centimeters (cm) to measure length.

This is 1 centimeter (cm). 1 meter (m) = 100 cm

A ones cube is 1 cm wide. A door is about 1 m wide and 2 m high.

Choose the most appropriate unit to measure each length. Write millimeter, centimeter, meter, or kilometer.

1. a football ______ centimeter
2. a baseball field ______ meter
3. a blade of grass ______ centimeter or millimeter
4. the height of a goalpost ______ meter
5. the length of a running shoe ______ centimeter
6. the distance you can throw a ball ______ meter

Circle the best estimate.

7. a football player's height
   A. 2 cm   B. 2 mm   C. 2 m
8. the length of an eyelash
   F. 9 cm   G. 9 mm   H. 9 m
9. the height of a tree
   A. 30 cm   B. 30 mm   C. 30 m

Answers (Lesson 9-1)
Answers

Problem-Solving Practice
Metric Units of Length

Solve.

1. Which is about 1 centimeter long:
   a fingernail or a pencil?
   a fingernail

2. Which metric unit would you use to measure the distance between the front of the classroom and the back of the classroom?
   meters

3. A tomato plant is a little less than 1 yard in height. How can you describe this length in metric units?
   about 1 meter tall

4. Estimate the length of the crayon in centimeters.
   6: estimates will vary
   about ___ centimeters

Now use a centimeter ruler to measure the length of the crayon to the nearest centimeter.

5. Gail and Eric estimated the length of a screwdriver. Eric estimated about 11 cm. Gail said about 10 cm. They used a ruler to measure it, and found it was exactly 10 cm and 8 mm. Who had a better estimate? Why?
   Sample answer: Eric; 10 cm and 8 mm is closer to 11 cm than 10 cm.

6. Estimate your height to the nearest meter.
   Estimates will vary
   About ___ meters
   Now use a metric ruler to check your estimate. What is your height?

Answer will vary: meters
   Answer will vary
   Explain.
   Answers will vary. Accept all reasonable responses.

Spiral Review

Convert. (Lesson 8–7)

11. 3 hours = 180 minutes
12. 60 minutes = 4 quarter hours
13. 2 hours = 120 minutes
14. 90 minutes = 1 hour and half
15. 15 minutes = 1 quarter hour
16. 4 hours = 240 minutes

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Chapter Resources

9-1

Name __________________ Date __________________

**Enrich**

Metric Measure Me

Make an estimate for each body part shown. Then use a metric ruler to find the actual length. Use the lines next to each part to help you measure.

1. Estimate _____ cm Actual _____ cm

   accept reasonable answers between 4–7

2. Estimate _____ cm Actual _____ cm

   accept reasonable answers between 2–4

3. Estimate _____ cm Actual _____ cm

   accept reasonable answers between 4–6

4. Estimate _____ cm Actual _____ cm

   accept reasonable answers between 3–5

Match the following estimates with each item. Draw a line from each item to a reasonable measurement.

5. the height of a third-grader
   about 5 millimeters

6. the length of a third-grader’s foot
   about 10 millimeters

7. the length of a third-grader’s arm
   about 1 meter 45 centimeters

8. the length of a third-grader’s eyelash
   about 40 centimeters

9. the length of third-grader’s fingernail
   about 20 centimeters

9-2

Name __________________ Date __________________

**Reteach**

Problem-Solving Strategy

**Guess and Check**

If you want to solve a problem, it is important to have a plan. You can use the guess and check strategy to solve problems.

Alicia is making bookmarks for the school fair. She needs 10 centimeters of ribbon for each bookmark. There is a meter of ribbon on each spool. How many bookmarks can she make out of one spool of ribbon? (Hint: Remember there are 100 centimeters in a meter.)

**Understand**

What facts do you know?

• Each bookmark uses 10 centimeters of ribbon.
• There is a meter of ribbon on each spool.

What do you need to find?

• How many bookmarks can be made from a spool of ribbon?

**Plan**

You can use the guess and check strategy. Guess how many bookmarks you can make and check the answer with division.

**Solve**

Each bookmark is 10 centimeters. Each spool holds 1 meter of ribbon. Since 1 meter = 100 centimeters, we can guess that we can make 10 bookmarks. Check: 100 ÷ 10 = 10

So, Alicia can make 10 bookmarks.

**Check**

Look back at the problem. One way to check the answer is work it backwards. Check your division with multiplication.

10 × 10 = 100

So, the answer is correct.
1. Carmen needs 100 millimeters of yarn to make a bookmark. She has 1 meter of yarn. How many bookmarks can she make?

10 bookmarks

2. Hugo planted a garden of flowers. He planted 8 yellow flowers and twice as many purple flowers. He also planted some red flowers. Hugo has a total of 30 flowers. How many red flowers did he plant?

6 red flowers

3. Each week, Pascul mows the front lawn twice and back lawn once. He walks a total of 824 meters while mowing in a week. He walks 391 meters each time he mows the front lawn. How many meters does he walk when he mows the back lawn?

42 meters

4. Rogelio likes to run around the block. It takes him about 7 minutes. If Rogelio runs around the block 4 times a day, 2 days a week, how much time does he spend running around the block in a week?

56 minutes

5. Paloma has blocks that are 4 centimeters tall. If she stacks her blocks on top of each other, the stack is 32 centimeters tall. How many blocks does Paloma have?

8 blocks

6. Catalina is thinking of two numbers. Their difference is 3 and their sum is 33. What are the numbers?

15, 18
9–2

**Homework Practice**

**Problem-Solving Strategy**

Solve. Use the guess and check strategy.

1. Dolores bought some new pillows for her living room. She bought twice as many green pillows as blue pillows, and one less red pillow than green pillows. She bought 9 pillows altogether. How many pillows of each color did she buy?

   **2 blue, 4 green, 3 red**

2. Pam and Casey swim every day. Pam swims twice as far as Casey, but they always finish at the same time. If they both begin at 8 A.M., and Casey swims 500 meters, how many meters does Pam swim?

   **1,000 m or 1 km**

3. Arthur reads every day. On weekdays he reads at least 30 minutes a day. On the weekends, he reads twice as long. About how long does he read each week?

   **4½ hrs**

4. Cecilia was burning a new CD for a friend. The CD could record up to 60 minutes. How many 3- or 4-minute songs could Cecilia burn onto the CD?

   **20 3-minute songs or 15 4-minute songs.**

**Spiral Review**

Choose the most appropriate unit to measure each length. Write millimeter, centimeter, meter, or kilometer. (Lesson 9–1)

5. height of a cup **centimeter**

6. distance traveled on a road trip **kilometer**

7. thickness of cardboard **millimeter**

**Enrich**

**The Track Meet**

For each problem, circle the statement that is most accurate. Then, explain your thinking.

1. Courtney brought a liter of water to drink after the 50-yard dash. Preston brought 1 quart of water to drink after the race.

   - Courtney says, "I have a little more water to drink than Preston."
   - Preston says, "I have exactly the same amount of water as Courtney."

   **Courtney had more water to drink than Preston.**

2. Jennifer and Katy are watching their friend Jill throw the shot-put ball. Jill said the ball for the elementary school weighs about 3 kilograms. Jennifer and Katy are estimating the customary weight of the ball.

   - Jennifer says, "I think the ball weighs about 3 pounds."
   - Katy says, "I think the ball weighs about 6 pounds."

   **6 pounds = about 2.7 kg**

   **Katy’s estimate is closer.**

3. Cory and Martin are teammates. They are getting ready to run a 400-meter relay race. Each will run 200 meters. Their friends Jake and Paula want to know how far in yards the boys will run.

   - Paula says, "I think 200 meters is about 300 yards."
   - Jake says, "I think 200 meters is about 200 yards."

   **100 meters = about 109 yards**

   **Jake’s estimate is closer.**

4. Brittany and Timothy are baking a batch of oatmeal-raisin snack bars. They will serve the snacks after the track meet. The recipe calls for at least one cup of raisins.

   - Brittany says, "We should mix in 8 ounces of raisins."
   - Timothy says, "We should mix in 8 grams of raisins."

   **one cup = 8 ounces**

   **8 grams = about 4 ounce**

   **Brittany’s guess is more accurate.**
Circle the better estimate.

1. A. 1 mL B. 1 L

Choose the most appropriate unit to measure each capacity. Write milliliter or liter.

4. F. 150 mL G. 150 L

Choose the most appropriate unit to measure each capacity. Write milliliter or liter.

9. A. 1 mL B. 1 L

Which unit would you use to measure the capacity of each?

Circle the best estimate to complete each sentence.

3. C. 180 mL

3. C. 60

The metric system uses milliliters and liters to measure capacity.

This dropper holds about 1 mL.

A bottle of water holds about 1,000 mL or 1 L.

A drinking glass holds about 240 mL.

A large pot holds about 6 L.

A juice box holds about 18 mL.

A teaspoon holds about 10 mL.

A large pot holds about 6 L.
**Homework Practice**

**Metric Units of Capacity**

Choose the most appropriate unit to measure each capacity. Write milliliter or liter.

1. bottle of soda ______ liter
2. water in a pool ______ liter
3. dressing on salad ______ milliliter
4. cream in coffee ______ milliliter
5. hot chocolate in a mug ______ milliliter
6. water in a birdbath ______ liter

Compare. Use >, <, or =.

7. 5 L □ 5 mL □
8. 17 mL □ 17 □ L
9. 10 mL □ 5 L □
10. 1 L □ 9 mL □
11. 3 mL □ 4 L □
12. 10 mL □ 1 L □

13. Hugo wants to make a pitcher of lemonade. Should he use 2 L or 2 mL of water? Explain.

   2 L; 2 mL of water is not enough water to make lemonade.

---

**Spiral Review**

Solve. Use the guess and check strategy. (Lesson 9–2)

14. Mima is making muffins for the bake sale. One batch is blueberry and one batch is banana nut. The third batch is twice as big as the blueberry and banana nut batch. If Mima made 96 muffins, how many muffins were in the blueberry and banana nut batches?

   24 muffins

15. Dan watched soccer practice for an hour on Tuesday. Wednesday and Thursday he watched twice as long, and on Friday, he watched an hour longer than he did the day before. How much time did Dan spend watching soccer practice?

   8 hours

---

**Problem-Solving Practice**

**Metric Units of Capacity**

Solve.

1. Tanya has a cold. What metric unit of measure should her mother use to measure the amount of liquid cold medicine Tanya should take?

   milliliters

2. Circle the best estimate for each.
   - Bottle cap: 40 L 40 mL
   - Bucket: 7 L 7 mL
   - Mug: 480 L 480 mL

   List the containers in order from least to greatest capacity.

   bottle cap, mug, bucket

3. Stacy invited ten people to her party. Should she buy 4 L of juice or 40 mL of juice? Explain.

   liters liters

4. The chef put 2 spoonfuls of vanilla extract into a cake recipe. About how much vanilla extract is this, 2 mL or 2 L?

   about 2 mL

5. Maurice wants to measure the amount of water in a mixing bowl. Should he measure in mL or L? Explain.

   Sample answer: L; Liters

   Sample answer: L; Liters are a more appropriate unit because milliliters are too small of a unit.

6. Below is Dena’s recipe for fruit punch. Write the missing metric units of capacity for each ingredient.

   Dena’s Fruit Punch
   - Frozen orange juice: 2 ______ liters
   - Pineapple juice: 360 ______ milliliters
   - Apple juice: 1 ______ liter

   24 muffins

Grade 3 21 Chapter 9
**9–3**

**Name ____________________ Date ____________________**

**Enrich**

*Making Sense with Cookies ‘n’ Punch*

Use the metric capacities in the boxes to fill in the blanks for each part of the recipes. You may use some measurements more than once.

**Chocolate Chip Cookies**

- 5 mL
- 240 mL
- 640 mL
- 15 mL
- 180 mL
- 640 mL

(Hint: 240 mL = about 1 cup)

1. Combine $640 \text{ mL}$ of flour, $5 \text{ mL}$ of salt, and $5 \text{ mL}$ of baking soda in a small bowl. Set aside.
2. Beat together $240 \text{ mL}$ of softened butter, $180 \text{ mL}$ of brown sugar, and $180 \text{ mL}$ of white sugar. Stir in $5 \text{ mL}$ of vanilla.
3. Add two eggs to butter, sugar, and vanilla mixture. Beat until creamy.
4. Slowly stir in flour, salt, and baking soda mixture.
5. Add $480 \text{ mL}$ of semi-sweet chocolate chips. Stir in $240 \text{ mL}$ of chopped nuts.
6. Form cookie dough into $15 \text{ mL}$ balls and drop onto cookie sheet.
7. Bake at 190° C for 10 minutes.

**Party Punch**

- 360 mL
- 1 L
- 710 mL
- 2 L

1. In a large punch bowl, mix together $360 \text{ mL}$ of frozen orange juice concentrate and $710 \text{ mL}$ of water.
2. Stir in $1 \text{ L or 2 L}$ of ginger ale.
3. Add $1 \text{ L}$ of pineapple juice.
4. Mix in $1 \text{ L or 2 L}$ of premixed fruit punch.

---

**9–4**

**Name ____________________ Date ____________________**

**Reteach**

*Problem-Solving Investigation*

**Choose a Strategy**

Coach Betty wants 11 liters of water in a cooler. She has a 5-liter bottle and an 8-liter bottle. How can she use them to measure exactly 11 liters?

**Step 1**

Understand

*Be sure you understand the problem.*

Read carefully

*What do you know?*

- Coach Betty wants 11 liters of water in a cooler.
- Coach Betty has bottles that hold 5 liters and 8 liters.

*What do you need to know?*

- You need to find how to use the bottles to measure exactly 11 liters.

**Step 2**

Plan

*Make a plan.*

Choose a strategy.

- Draw a picture or diagram
- Make a graph
- Look for a pattern
- Choose an operation
- Make a table
- Work backward
- Guess and check

You can use the difference of the amount of water in the bottles to measure exactly 11 liters.
Name ______________________ Date ______________________

## Reteach

### Problem-Solving Investigation (continued)

**Step 3**

Solve

Carry out your plan.

Follow the steps.

- Fill the 8-L bottle.
- Fill the 5-L bottle from the 8-L bottle.
- Pour what is left in the 8-L bottle into the cooler.
- Refill the 8-L bottle.
- Pour the water from the 8-L bottle into the cooler.

\[ 8 + 3 = 11 \]

There are 11 liters in the water cooler.

**Step 4**

Look Back

Is the solution reasonable?

Reread the problem.

How can you check your answers?

Possible answer: Use water containers to check your answer.
Answers may vary.

---

## Skills Practice

### Problem-Solving Investigation

**Use any strategy shown below. Tell what strategy you used.**

- Look for a pattern
- Choose an operation
- Make a table
- Work backward
- Guess and check

**1.** Jack got home from school at 4:30 P.M. Before getting home, he practiced baseball for 30 minutes and played with his friends for 45 minutes. What time did he leave school?

**3:15 P.M.; Work backward.**

**2.** Coach Mary has a 5-gallon bottle and a 3-gallon bottle. How can she use the bottles to get exactly 14 gallons of water in a cooler?

**Pour 3 gal into the cooler three times from the 3-gal bottle. Then pour 5 gal into the cooler from the 5-gal bottle; act it out**

**3.** Dan, Michael, and Jerry play different sports. One plays tennis, another plays baseball, and the third is on the swimming team. Michael and Jerry play sports that use balls. Michael does not play baseball. Who plays baseball?

**Jerry; make a table**

**4.** Ellen read 5 pages of a book on the first day, 10 pages the second day, and 15 pages the third day. If the pattern continues, how many pages will she read on the fifth day?

**25 pages; look for a pattern**

**5.** A small van has 4 rows of seats. Each row can seat 3 people. How many people in all can 2 vans hold?

**24 people; make a table**

**6.** Leah is 5 feet tall. Her brother Jamie is 50 inches tall. How much taller is Leah than Jamie?

**10 inches; guess and check**
Patrick moved from the United States to Great Britain. He is working in a large shop that sells many kinds of pets. He needs to convert customary units to metric units. Help Patrick estimate the weights and sizes of some of the pets for sale.

Complete the conversion chart for Patrick. Match the metric units listed in the boxes to the customary units below. The first two are done for you.

<table>
<thead>
<tr>
<th>Pet</th>
<th>Customary Units</th>
<th>Metric Units (Estimates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Llama</td>
<td>3 feet</td>
<td>1 meter</td>
</tr>
<tr>
<td>Mouse</td>
<td>4 inches (including tail)</td>
<td>10 centimeters</td>
</tr>
<tr>
<td>Lizard</td>
<td>5 inches (including tail)</td>
<td>13 centimeters</td>
</tr>
<tr>
<td>Horse</td>
<td>4 feet</td>
<td>1.2 meters</td>
</tr>
<tr>
<td>Rabbit</td>
<td>12 inches</td>
<td>30 centimeters</td>
</tr>
<tr>
<td>Goat</td>
<td>24 inches</td>
<td>60 centimeters</td>
</tr>
<tr>
<td>Hamster</td>
<td>3 inches</td>
<td>9 centimeters</td>
</tr>
<tr>
<td>Goldfish</td>
<td>2 inches</td>
<td>5 centimeters</td>
</tr>
<tr>
<td>Parakeet</td>
<td>7 inches</td>
<td>18 centimeters</td>
</tr>
<tr>
<td>Puppy</td>
<td>13 inches (including tail)</td>
<td>33 centimeters</td>
</tr>
<tr>
<td>Kitten</td>
<td>8 inches (including tail)</td>
<td>20 centimeters</td>
</tr>
</tbody>
</table>

**Estimates**

- 5 centimeters = 181 kilograms
- 9 centimeters = 18 kilograms
- 10 centimeters = 9 kilograms
- 13 centimeters = 5 kilograms
- 18 centimeters = 2 kilograms
- 20 centimeters = 907 grams
- 30 centimeters = 142 grams
- 33 centimeters = 113 grams
- 60 centimeters = 84 grams
- 1 meter = 56 grams
- 1.2 meters = 28 grams
- 6 inches = 113 grams
- 8 inches = 2 kilograms
- 9 inches = 9 kilograms
- 13 inches = 5 kilograms
- 18 inches = 2 kilograms
- 20 inches = 907 grams
Reteach

Metric Units of Mass

**Mass** is the amount of matter in an object. In the metric system, units of mass are the **gram** and the **kilogram**.

1,000 grams (g) = 1 kilogram (kg)

Use grams to find the mass of small things.

<table>
<thead>
<tr>
<th>1 g</th>
<th>145 g</th>
<th>220 g</th>
</tr>
</thead>
</table>

Use kilograms to find the mass of larger things.

<table>
<thead>
<tr>
<th>1 kg</th>
<th>5 kg</th>
<th>2 kg</th>
</tr>
</thead>
</table>

Choose the most appropriate unit to measure each mass. Write **gram** or **kilogram**.

1. a third grader ______ **kilogram**
2. a juice box ______ **gram**
3. a golf ball ______ **gram**
4. a golf club ______ **kilogram**
5. a whistle ______ **gram**
6. a bag of apples ______ **gram**

Draw a line to match each object and its mass.

7. a football helmet ______ A. 1 kg
8. a remote control ______ B. 10 kg
9. a car ______ C. 1,200 kg
10. a computer disk ______ D. 22 g
11. a bag of groceries ______ E. 500 g

Skills Practice

Metric Units of Mass

Circle the better estimate.

1. [ ]
   - A. 1 g
   - B. 1 kg
   - F. 600 g
   - G. 600 kg

2. [ ]
   - A. 8 g
   - B. 8 kg
   - F. 2 g
   - G. 20 g

3. [ ]
   - A. 8 g
   - B. 8 kg
   - F. 2 g
   - G. 20 g

Choose the most appropriate unit to measure each mass. Write **gram** or **kilogram**.

7. ______ **kilogram**
8. ______ **gram**
9. ______ **kilogram**
**Metric Units of Mass**

1. List 4 things you may measure in grams:
   - Sample answer: marshmallows, seeds, spices, paper

2. List 4 things you may measure in kilograms:
   - Sample answer: people, animals, books, produce

Choose the most appropriate unit to measure each mass. Write gram or kilogram.

3. one strawberry ____________
   - grams

4. a bag of flour ____________
   - kilograms

5. a bag of concrete ____________
   - kilogram

6. cocoa mix ____________
   - grams

7. rubber bands ____________
   - grams

8. a bag of dog food ____________
   - kilogram

**Spiral Review**

Use any strategy to solve. (Lesson 9–4)

9. Cheryl uses 35 beads to make a bracelet. She uses red, blue, green, yellow, and orange beads. There is an equal number of red and blue beads. There is an equal number of green and yellow beads. There are five orange beads and 8 blue beads. How many yellow beads are there?

   - 7 yellow beads

**Problem-Solving Practice**

1. List the items below in order from least to greatest mass.
   - sheet of paper
   - box of crayons
   - feather

2. What metric unit of mass would you use to measure the mass of a spoon?
   - grams

3. A paper clip has a mass of 1 gram. Is it reasonable to say that a television has a mass of about 30 grams? Explain.
   - no; a television has a mass of much greater than 30 paper clips.

4. Matt has a pencil, a desk, a computer, and a piece of paper. Which items should be measured in kilograms? Which items should be measured in grams?
   - kilograms: desk, computer
   - grams: pencil, paper

5. Wendy has 2 erasers. Together, they have the same mass as her pencil box. Her pencil box has a mass of 300 grams. If the erasers have the same mass, is it reasonable that her erasers each have a mass of 150 grams? Explain.
   - yes; $150 + 150 = 300$

6. One side of a balance scale has a box of computer games. The other side has 1 large book. Another balance scale has three of the same books as the previous scale, and 6 baseball bats on the other side. Each baseball bat is 1 kg. What is the mass of the box of computer games?
   - 2 kg
**Riddle:** What has 18 legs and catches flies?

Circle the estimated mass for each sports item. Then write the letters you circled in order on the blank lines below to solve the riddle.

1. **B** 1,000 g  **Z** 45 kg
2. **S** 142 g  **T** 1,420 kg
3. **E** 113 g  **I** 13 kg
4. **L** 500 g  **M** 5,000 kg
5. **L** 77 g  **C** 7 kg
6. **N** 41 kg  **E** 410 g

---

**Convert Metric Units**

- **To change from meters to centimeters,** count by 100s.
- **To change from liters to milliliters,** count by 1,000s.
- **To change from kilograms to grams,** count by 1,000s.

<table>
<thead>
<tr>
<th>m</th>
<th>cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>200</td>
</tr>
<tr>
<td>3</td>
<td>300</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>L</th>
<th>mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,000</td>
</tr>
<tr>
<td>2</td>
<td>2,000</td>
</tr>
<tr>
<td>3</td>
<td>3,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>kg</th>
<th>g</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,000</td>
</tr>
<tr>
<td>2</td>
<td>2,000</td>
</tr>
<tr>
<td>3</td>
<td>3,000</td>
</tr>
</tbody>
</table>

---

**Circle the amount that makes each sentence true.**

1. 3 m = ______  **A.** 3 cm  **B.** 300 cm  **C.** 3,000 cm
2. 500 cm = ______  **A.** 5 m  **F.** 500 m  **G.** 500 m
3. 6,000 g = ______  **A.** 6 kg  **G.** 4,000 mL  **H.** 4,000 mL
4. 4 L = ______  **A.** 400 mL  **F.** 400 mL  **G.** 4,000 mL  **B.** 500 L
5. 5,000 mL = ______  **A.** 5 L

---

**Convert each unit to a smaller unit or larger unit.**

6. 8 m = ___ cm
7. 4 kg = ___ g
8. 7 L = ___ mL
9. 400 cm = ___ m
10. 9,000 g = ___ kg
11. 6,000 mL = ___ L
12. 3 kg = ___ g
13. 500 cm = ___ m
14. 5 L = ___ mL
15. 9 m = ___ cm
16. 4,000 mL = ___ L
17. 1,000 g = ___ kg
Answers

Grade 3

9–6

Name __________________________ Date ________________

Skills Practice
Metric Unit Conversions

Complete each table.

1. | Centimeters | 200 | 400 | 600 | 800 |
   | Meters       | 2   | 4   | 6   | 8   |

2. | Milliliters  | 1,000 | 2,000 | 3,000 | 4,000 |
   | Liters         | 1     | 2     | 3     | 4     |

Convert each unit to a smaller unit or larger unit.

3. 100 cm = \( \frac{1}{10} \) m
4. 2,000 mL = \( \frac{2}{1} \) L
5. 3,000 g = \( \frac{3}{1} \) kg
6. 500 cm = \( \frac{5}{10} \) m
7. 6,000 g = \( \frac{6}{1} \) kg
8. 1,000 mL = \( \frac{1}{1} \) L
9. 3 L = \( \frac{3,000}{1} \) mL
10. 6 m = \( \frac{600}{1} \) cm
11. 2 kg = \( \frac{2,000}{1} \) g
12. \( \frac{5,000}{1} \) g = 5 kg
13. \( \frac{900}{1} \) cm = 9 m
14. \( \frac{7,000}{1} \) mL = 7 L

Solve.

15. A container holds 5 liters of water. How many milliliters of water does the container hold?
   \( 5,000 \) milliliters

16. A table is 2 meters long. How many centimeters long is the table?
   \( 200 \) centimeters

17. A banana has a mass of 125 grams. Use repeated addition to find the mass of two bananas.
   \( 250 \) grams

18. A spider monkey has a mass of 6 kg. How many grams is this?
   \( 6,000 \) grams

Homework Practice
Metric Unit Conversions

Convert each unit.

1. 100 centimeters = 1 meter
2. 10 millimeters = \( \frac{1}{10} \) centimeter
3. 2,000 meters = 2 kilometers
4. 1 liter = \( \frac{1,000}{1} \) milliliters
5. 5,000 grams = 5 kilograms
6. 700 centimeters = 7 meters
7. 3 kilometers = \( \frac{3,000}{1} \) meters
8. 8,000 milliliters = \( \frac{8}{1} \) liters

9. A piece of tape is 2 centimeters wide. How many millimeters wide is this?
   \( 20 \) millimeters

10. A poster is 1 meter long. How many centimeters long is the poster?
    \( 100 \) centimeters

Choose the most appropriate unit to measure each mass.
Write gram or kilogram. (Lesson 9–5)

11. one grape ______ gram ______
12. teapot ______ kilogram ______
13. a quarter ______ gram ______
14. teaspoon of salt ______ gram ______
15. a bag of pet food ______ kilogram ______
16. a couch ______ kilogram ______

Spiral Review

Grade 3

Chapter 9
Problem-Solving Practice

Metric Unit Conversions

Solve.

1. A bedroom door is 3 meters tall. What is its height in centimeters?
   300 centimeters

2. A kitten has a mass of 2,000 grams. What is its mass in kilograms?
   2 kilograms

3. Each paper cup holds 500 milliliters of water. How many cups of water would you need to fill a 2-liter bottle?
   4 cups

4. A bag of apples has a mass of 2,000 grams. What is the mass of 4 bags of apples in kilograms?
   8 kg

5. The art teacher displays several pictures side-by-side across a wall. Each picture is about 24 cm wide. The line of pictures measures 1 meter from end to end. How many pictures are displayed in the line? Explain.
   4 pictures; 1 meter = 100 cm, and 24 + 24 + 24 + 24 = 96, which is about 100 cm.

6. Greg has 6,500 milliliters of water in a large jug. He wants to pour the water into liter bottles so that the water will be easier to store. What is the least number of bottles he will need? Explain.
   7 bottles; 1,000 milliliters = 1 liter. 6,000 milliliters = 6 liters or 6 bottles. He needs one more bottle for the extra 500 milliliters.

Enrich

Match to Metric

Look at the items in Column 1. Each one shows its customary measurement. Find the metric amount in Column 2 that is very nearly the same and draw a line to it.

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 2 pounds of flour</td>
<td>1 m</td>
</tr>
<tr>
<td>2. 10 yards of ribbon</td>
<td>4 L</td>
</tr>
<tr>
<td>3. 1 gallon of milk</td>
<td>27 kg</td>
</tr>
<tr>
<td>4. 4 miles</td>
<td>113 g</td>
</tr>
<tr>
<td>5. 6 inches of string</td>
<td>1 kg</td>
</tr>
<tr>
<td>6. 60-pound child</td>
<td>9 m</td>
</tr>
<tr>
<td>7. 2 quarts of juice</td>
<td>6 km</td>
</tr>
<tr>
<td>8. 36-inch wide desk</td>
<td>2,500 mL</td>
</tr>
<tr>
<td>9. 4 ounces of sugar</td>
<td>15 cm</td>
</tr>
</tbody>
</table>
### Oral Assessment

Use a metric ruler to measure the length of the following classroom items: (1) blackboard eraser; (2) pencil; (3) pair of scissors; (4) bottle of glue; and (5) piece of chalk.

Read each question aloud to the student. Then write the student's answers on the lines below the question.

1. What is the length of the blackboard eraser? Sample answer: 16 cm
2. What is the length of the pencil? Sample answer: 17 cm
3. What is the length of the scissors? Sample answer: 20 cm
4. What is the length of the bottle of glue? Sample answer: 10 cm
5. What is the length of the piece of chalk? Sample answer: 4 cm

Tell how you got your answer.

Student should indicate aligning each object with 0 on the ruler and reading the tick mark.

### Vocabulary Test

Using the word bank below, complete each sentence by writing the correct word or words in the blank.

- meter (m)
- gram (g)
- liter (L)
- centimeter (cm)
- milliliter (mL)
- millimeter (mm)
- kilometer (km)

1. A **gram** is a metric unit for measuring mass.
2. A **liter** is a metric unit for measuring volume or capacity.
3. A **millimeter** and **centimeter** are metric units for measuring length.
4. A **meter** and **kilometer** are metric units for measuring length and height.
5. **Mass** is the amount of matter in an object.
7. What is the longest item?

**Sample answer: scissors**

8. What is the shortest item?

**Sample answer: piece of chalk**

9. Explain your answer.

**Answers will vary. Sample answer:** The piece of chalk is 4 cm, less than all the other measurements.

10. A school has 20 classrooms and each classroom can hold 25 students. The school now has 500 students. Does it have enough classrooms?

**yes; 500 \( \div \) 25 = 20**

11. If the school wanted to add 100 students, how many more classrooms would be needed?

**4 classrooms**

12. Tell how you got your answer.

**Answers will vary. Sample answer:**

**Divide 100 \( \div \) 25 = 4, so 4 more classrooms.**
Chapter 9 Assessment Answer Key

Chapter Diagnostic Assessment
Page 39

1. length
2. capacity
3. weight
4. capacity
5. large
6. coffee pot
7. pickup
8. truck
9. box of peaches
10. bulldog
11. Jessica

The student should indicate that the 7-inch line is longest.
11. \(10\frac{1}{2}\) inches

Chapter Pretest
Page 40

1. g
2. L
3. m
4. mm
5. kg
6. mL
7. 6 m
8. 10 mL
9. 20 kg
10. 13 cm
11. 12 L
12. 3
13. 2,000
14. 4
15. 50
16. 3

Quiz 1 (9–1 through 9–2)
Page 41

1. <
2. >
3. <
4. meter
5. centimeter
6. kilometer
7. 2 centimeters
8. 60¢

(continued on the next page)
Chapter 9 Assessment Answer Key

**Quiz 2** (9–3 through 9–4)
Page 42
1. _________ > _________
2. _________ < _________
3. _________ < _________
4. milliliter
5. liter
6. liter
7. 1 meter
8. 48 skips

**Quiz 3** (9–5 through 9–6)
Page 43
1. _________ gram
2. kilogram
3. gram
4. kilogram
5. 8,000
6. 500
7. 3,000
8. 4,000
9. _________ 6
10. _________ 2
11. _________ 3
12. _________ 7

**Mid-Chapter Review**
(9–1 through 9–3)
Page 44
1. _________ centimeter
2. _________ millimeter
3. _________ meter
4. _________ centimeter
5. _________ liter
6. _________ liter
7. _________ milliliter
8. _________ milliliter
9. _________ < _________
10. _________ > _________
11. _________ > _________
12. _________ > _________

(continued on the next page)
## Chapter 9 Assessment Answer Key

### Chapter Test, Form 1
Page 50

<p>| | |</p>
<table>
<thead>
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</tr>
<tr>
<td>2</td>
<td>H</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
</tr>
<tr>
<td>4</td>
<td>G</td>
</tr>
<tr>
<td>5</td>
<td>B</td>
</tr>
<tr>
<td>6</td>
<td>H</td>
</tr>
<tr>
<td>7</td>
<td>C</td>
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<td>8</td>
<td>F</td>
</tr>
<tr>
<td>9</td>
<td>A</td>
</tr>
<tr>
<td>10</td>
<td>F</td>
</tr>
<tr>
<td>11</td>
<td>A</td>
</tr>
<tr>
<td>12</td>
<td>G</td>
</tr>
<tr>
<td>13</td>
<td>C</td>
</tr>
<tr>
<td>14</td>
<td>G</td>
</tr>
<tr>
<td>15</td>
<td>C</td>
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### Chapter Test, Form 2A
Page 52

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<tbody>
<tr>
<td>1</td>
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<td>2</td>
<td>F</td>
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<td>D</td>
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<td>6</td>
<td>F</td>
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<td>B</td>
</tr>
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<td>8</td>
<td>F</td>
</tr>
<tr>
<td>9</td>
<td>C</td>
</tr>
<tr>
<td>10</td>
<td>J</td>
</tr>
</tbody>
</table>

(continued on the next page)
Chapter 9 Assessment Answer Key

Chapter Test, Form 2A
Page 53

11. D

12. H

13. B

14. H

15. C

Chapter Test, Form 2B
Page 54

1. B

2. F

3. C

4. F

5. B

6. H

7. C

8. G

9. A

10. G

Page 55

11. C

12. H

13. B

14. H

15. G
## Chapter 9 Assessment Answer Key

### Chapter Test, Form 2C

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.</td>
<td>4,000</td>
</tr>
<tr>
<td>2.</td>
<td>8</td>
</tr>
<tr>
<td>3.</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>1 m</td>
</tr>
<tr>
<td>5.</td>
<td>7</td>
</tr>
<tr>
<td>6.</td>
<td>10 g</td>
</tr>
<tr>
<td>7.</td>
<td>8 cm</td>
</tr>
<tr>
<td>8.</td>
<td>2 L</td>
</tr>
<tr>
<td>9.</td>
<td>5,000</td>
</tr>
<tr>
<td>10.</td>
<td>5</td>
</tr>
<tr>
<td>11.</td>
<td>200</td>
</tr>
<tr>
<td>12.</td>
<td>North</td>
</tr>
<tr>
<td>13.</td>
<td>two 2-gallon bottles and two 2-quart bottles</td>
</tr>
<tr>
<td>14.</td>
<td>100 parents</td>
</tr>
<tr>
<td>15.</td>
<td>60 km</td>
</tr>
<tr>
<td>16.</td>
<td>2,000 mL</td>
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### Chapter Test, Form 2D

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<tbody>
<tr>
<td>1.</td>
<td>10 g</td>
</tr>
<tr>
<td>2.</td>
<td>8 cm</td>
</tr>
<tr>
<td>3.</td>
<td>2 L</td>
</tr>
<tr>
<td>4.</td>
<td>50</td>
</tr>
<tr>
<td>5.</td>
<td>5</td>
</tr>
<tr>
<td>6.</td>
<td>8,000</td>
</tr>
<tr>
<td>7.</td>
<td>200</td>
</tr>
<tr>
<td>8.</td>
<td>4,000</td>
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<th>Chapter Test, Form 2D</th>
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<td>Page 59</td>
<td>Page 60</td>
</tr>
<tr>
<td></td>
<td>Page 61</td>
</tr>
<tr>
<td>9. 8</td>
<td>1. 5</td>
</tr>
<tr>
<td>10. 6</td>
<td>2. 8,000</td>
</tr>
<tr>
<td>11. 1 m</td>
<td>3. 50</td>
</tr>
<tr>
<td>12. 60 km</td>
<td>4. 8</td>
</tr>
<tr>
<td>13. 2,000 mL</td>
<td>5. 200</td>
</tr>
<tr>
<td>14. West</td>
<td>6. 4,000</td>
</tr>
<tr>
<td>15. 100</td>
<td>7. 6</td>
</tr>
<tr>
<td></td>
<td>8. 2L</td>
</tr>
<tr>
<td></td>
<td>9. 10 g</td>
</tr>
<tr>
<td></td>
<td>10. 8 cm</td>
</tr>
<tr>
<td></td>
<td>11. 1 m</td>
</tr>
<tr>
<td></td>
<td>12. North</td>
</tr>
<tr>
<td></td>
<td>13. 60 km</td>
</tr>
<tr>
<td></td>
<td>14. 2,000 mL</td>
</tr>
<tr>
<td></td>
<td>15. 100</td>
</tr>
</tbody>
</table>
## Chapter 9 Assessment Answer Key

Page 62, Extended-Response Test

### Scoring Rubric

<table>
<thead>
<tr>
<th>Level</th>
<th>Specific Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>The student demonstrates a <strong>thorough understanding</strong> of the mathematics concepts and/or procedures embodied in the task. The student has responded correctly to the task, used mathematically sound procedures, and provided clear and complete explanations and interpretations. The response may contain minor flaws that do not detract from the demonstration of a thorough understanding.</td>
</tr>
<tr>
<td>3</td>
<td>The student demonstrates an <strong>understanding</strong> of the mathematics concepts and/or procedures embodied in the task. The student’s response to the task is essentially correct, with the mathematical procedures used and the explanations and interpretations provided demonstrating an essential but less than thorough understanding. The response may contain minor errors that reflect inattentive execution of the mathematical procedures or indications of some misunderstanding of the underlying mathematics concepts and/or procedures.</td>
</tr>
<tr>
<td>2</td>
<td>The student has demonstrated only a <strong>partial understanding</strong> of the mathematics concepts and/or procedures embodied in the task. Although the student may have used the correct approach to obtaining a solution or may have provided a correct solution, the student’s work lacks an essential understanding of the underlying mathematical concepts. The response contains errors related to misunderstanding important aspects of the task, misuse of mathematical procedures, or faulty interpretations of results.</td>
</tr>
<tr>
<td>1</td>
<td>The student has demonstrated a very <strong>limited understanding</strong> of the mathematics concepts and/or procedures embodied in the task. The student’s response to the task is incomplete and exhibits many flaws. Although the student has addressed some of the conditions of the task, the student reached an inadequate conclusion and/or provided reasoning that was faulty or incomplete. The response exhibits many errors or may be incomplete.</td>
</tr>
<tr>
<td>0</td>
<td>The student has provided a <strong>completely incorrect</strong> solution or uninterpretable response, or no response at all.</td>
</tr>
</tbody>
</table>
In addition to the scoring rubric found on page A1, the following sample answers may be used as guidance in evaluating open-ended assessment items.

1. Millimeter – you could measure the length of a dollar bill using millimeters.
   Centimeter – you could measure the length of a piece of paper using centimeters.
   Meter – you could measure the length of a carpet using meters.
   Kilometer – you could measure the distance from one end of a street to the other end using kilometers.

2. Liter – you could measure the capacity of a bottle of water using liters.
   Milliliter – you could measure the capacity of an eye dropper using milliliters.

3. Gram – you could measure the mass of an eraser by using grams.
   Kilogram – you could measure the mass of a large book using kilograms.

<table>
<thead>
<tr>
<th>Metric Units of Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000 grams (g) = 1 kilogram (kg)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Metric Units of Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 millimeters = 1 centimeter</td>
</tr>
<tr>
<td>100 centimeters = 1 meter</td>
</tr>
<tr>
<td>1,000 meters = 1 kilometer</td>
</tr>
</tbody>
</table>
Chapter 9 Assessment Answer Key

Cumulative Standardized Test Practice

Page 64

1. C

2. F

10. J

11. centimeter

12. 5 kilograms

13. 4 centimeters

14. about 200 milliliters

15. 8

16. 2,000

17. 6_6_; with the missing digits between 0 and 9

18. 490