# Grade 5 Chapter 10
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### Answer Pages A1
The Chapter 10 Resource Masters includes the core materials needed for Chapter 10. 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-Built 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 10–1. 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. 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 10 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.
- **Form 2A** 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.
- **Form 2D** is written for students with a below-level command of the English language.
- **Form 3** is a free-response test.
- **Extended-Response Test** is an extended response test.

**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 10: Geometry: Angles and Polygons**. Fill in the missing information.

<table>
<thead>
<tr>
<th>Shape Name</th>
<th>Number of Sides</th>
<th>Sketch</th>
</tr>
</thead>
<tbody>
<tr>
<td>trapezoid</td>
<td></td>
<td><img src="image" alt="Sketch" /></td>
</tr>
<tr>
<td>parallelogram</td>
<td></td>
<td><img src="image" alt="Sketch" /></td>
</tr>
<tr>
<td>octagon</td>
<td></td>
<td><img src="image" alt="Sketch" /></td>
</tr>
<tr>
<td>hexagon</td>
<td></td>
<td><img src="image" alt="Sketch" /></td>
</tr>
<tr>
<td>triangle</td>
<td></td>
<td><img src="image" alt="Sketch" /></td>
</tr>
<tr>
<td>pentagon</td>
<td></td>
<td><img src="image" alt="Sketch" /></td>
</tr>
<tr>
<td>rectangle</td>
<td></td>
<td><img src="image" alt="Sketch" /></td>
</tr>
</tbody>
</table>
Student-Built Glossary

This is an alphabetical list of new vocabulary terms you will learn in Chapter 10: Geometry: Angles and Polygons. 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>angle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>congruent angles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>edge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>face</td>
<td></td>
<td></td>
</tr>
<tr>
<td>intersecting lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>parallel lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>parallelogram</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocabulary Term</td>
<td>Found on Page</td>
<td>Definition/Description/Example</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>perpendicular lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>prism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>quadrilateral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rectangle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rhombus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>square</td>
<td></td>
<td></td>
</tr>
<tr>
<td>three-dimensional figure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>trapezoid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vertex</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dear Family,

Today my class started Chapter 10: Geometry: Angles and Polygons. I will be learning to measure angles. I will also be learning to estimate and draw angles. Additionally, I will identify and measure parallel and perpendicular lines, learn to identify and classify triangles, identify angle relationships of quadrilaterals, and draw two-dimensional views of three-dimensional figures. Here are my vocabulary words and an activity that we can do together.

Sincerely, ______________________

Key Vocabulary

angle Two rays with a common endpoint

quadrilateral A shape that has 4 sides and 4 angles. Examples: square, rectangle, parallelogram

parallel lines Lines that are the same distance apart. Parallel lines do not meet.

perpendicular lines Lines that meet or cross each other to form right angles

rectangle A quadrilateral with four right angles; opposite sides are equal and parallel

three-dimensional figure A figure that has length, width, and height

Activity

Cut various triangles out of construction paper. Use a protractor to measure the angles of each triangle. Label each angle with its corresponding measurement.

Books to Read

Changes
by Marjorie N. Allen

The Greedy Triangle
by Marilyn Burns

The Patchwork Quilt
by Valerie Flournoy
Estimada familia:

Hoy mi clase comenzó el Capítulo 10: La geometría: Los ángulos y los polígonos. Aprenderé a medir ángulos. También aprenderé a estimar y a dibujar ángulos. Además, identificaré y mediré rectas paralelas y perpendiculares; aprenderé a identificar y a clasificar triángulos, a identificar relaciones angulares en cuadriláteros y a trazar perspectivas bidimensionales de figuras tridimensionales. A continuación, están mis palabras del vocabulario y una actividad que podemos realizar juntos.

Sinceramente, ____________

Vocabulario clave

ángulo dos rayos con un extremo común

cuadrilátero Figura con 4 lados y 4 ángulos. Ejemplos: cuadrado, rectángulo y paralelogramo

rectas paralelas Rectas separadas por la misma distancia. Las rectas paralelas no se intersecan

rectas perpendiculares Rectas que se intersecan o cruzan formando ángulos rectos

rectángulo Cuadrilátero con cuatro ángulo rectos; los lados opuestos son iguales y paralelos

figura tridimensional Figura que tiene largo, ancho y alto

Actividad

Usen cartulina para recortar varios ángulos. Usen un transportador para medir los ángulos de cada triángulo. Rotulen cada ángulo según sus medidas correspondientes.

Libros recomendados

Changes de Marjorie Allen

The Greedy Triangle de Marilyn Burns

The Patchwork Quilt de Valerie Flournoy
**STEP 1**  
**Before you begin Chapter 10**

- 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>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>An angle is two rays with a common endpoint.</td>
</tr>
<tr>
<td>2.</td>
<td>A degree is a unit for measuring angles.</td>
</tr>
<tr>
<td>3.</td>
<td>A quadrilateral is a shape with five sides.</td>
</tr>
<tr>
<td>4.</td>
<td>All angles have the same degree measurement.</td>
</tr>
<tr>
<td>5.</td>
<td>Parallel lines are lines that are the same distance apart.</td>
</tr>
<tr>
<td>6.</td>
<td>Perpendicular lines are lines that meet or cross each other to form right angles.</td>
</tr>
<tr>
<td>7.</td>
<td>A rectangle is a quadrilateral.</td>
</tr>
<tr>
<td>8.</td>
<td>An octagon is a quadrilateral.</td>
</tr>
<tr>
<td>9.</td>
<td>All lines are parallel.</td>
</tr>
<tr>
<td>10.</td>
<td>Parallel lines form angles.</td>
</tr>
</tbody>
</table>

**STEP 2**  
**After you complete Chapter 10**

- 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.
Geometry tic-tac-toe

Ready

You will need:
• 23 index cards
• Paper and pencil

Set

Write each of the following geometry terms on a separate index card:

- point
- line segment
- line
- ray
- right angle
- acute angle
- straight angle
- obtuse angle
- intersecting lines
- rhombus
- parallel lines
- square
- rectangle
- scalene triangle
- right triangle
- acute triangle
- obtuse triangle
- quadrilateral
- parallelogram
- trapezoid
- isosceles triangle
- perpendicular lines
- equilateral triangle

Shuffle the cards and arrange them facedown on the table. Set up a tic-tac-toe board on the piece of paper. Assign one player X and the other player O.

GO!

1. Have player X randomly choose a card, turn it over, and read the geometry term.

2. Player X should define the term correctly or find a physical example in the room. If the player is able to complete the task, he or she draws an X on the tic-tac-toe board. If the player is not able to complete the task, she or he forfeits her or his turn.

3. Have player O randomly choose a card, turn it over, and read the geometry term. Player O places an O on the tic-tac-toe board if he or she defines or gives an example of the term.

4. Continue until one player gets tic-tac-toe. If the board becomes full before a player completes tic-tac-toe, the player with the most spaces filled is the winner.
You can use a protractor to find the measure of angles.

Measure $\angle FGH$.

**STEP 1** Place the hole of the protractor on the vertex of the angle.

**STEP 2** Line up the 0° mark with one side of the angle.

**STEP 3** Find where the other side of the angle passes through the same scale. Read the measure of the angle.

The measure of $\angle FGH$ is 75°.

Use a protractor to find the measure of each angle.

1. 

2. 

3. 

4. 

Use a protractor to find the measure of each angle. Then classify each angle as *acute*, *obtuse*, *right*, or *straight*.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 

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Use a protractor to find the measure of each angle. Then classify each angle as **acute, obtuse, right, or straight**.

1.  

2.  

3.  

4.  

Use the picture to answer Exercises 5 and 6.

5. What is the measurement between flags 1 and 2?

6. What is the measurement between flags 1 and 3?

Spiral Review

For Exercises 7 and 8, use the following information.  (Lesson 9–10)

Alex won 10 of her last 15 softball games.

7. Find the probability of Alex winning her next game.

8. Suppose Alex plays 75 games. Predict how many she will win.
Problem-Solving Practice

Measuring Angles

Solve.

1. Kyle ate a small slice of pizza. Was the angle made by the cuts on the slice more likely 30° or 130°?

2. Guadalupe drew a triangle and labeled the vertices A, B, and C. If \( \angle ABC \) is one of the angles in the triangle, what are the other two angles?

3. Logan drew a ray on a graph. Its endpoint was at (1, 2), and the ray passed through the point (6, 2). He drew another ray that had the same endpoint and passed through (4, 5). What is the measure of the angle formed?

4. Kaoru drew several different regular polygons. He measured one of the angles inside one of the figures and found that its measure was 108°. Classify the angle as acute, right, or obtuse.

5. Jordan was concerned that a local playground is not accessible to children with disabilities. So, she and her parents built a ramp over the steps at the entrance to the playground. The ramp must be at a 12° angle with the ground. The steps are 1.5 feet high. What is the approximate length of the ramp? Use a piece of graph paper and a protractor to help you. Let the side length of each square grid on the graph paper represent one foot.

6. Derrick and his 7 brothers shared a fruit pie. Their mother cut the pie into 8 equal pieces. What was the angle formed at the point of each slice?
Angles in Regular Polygons

The Department of Defense headquarters in Washington, D.C. is called the Pentagon. The Pentagon gets its name from the actual shape of the building. It is a regular pentagon, so all of the sides are the same length. The angles in a regular polygon are related in a special way.

1. Use a protractor to measure each angle in the regular polygons below.

2. What do you notice about the measures of the angles in the two triangles?

3. What do you notice about the measures of the angles in the two hexagons?

4. What can you conclude about the angles inside a regular polygon?

5. You can find the measure of an interior angle of a regular polygon with \(n\)-sides by using the formula. \(m = \frac{(n - 2)(180°)}{n}\). Find the measure of an interior angle of the Pentagon.

6. If Sabrina builds a pen with 144° interior angles for her turkeys, and all the sides are of equal length, how many sides are on Sabrina’s pen?

7. Draw a regular nonagon. Use a protractor to measure the angles. Use a ruler to measure the sides to make sure that they are equal.
Draw a Diagram

Mark nails a square piece of wood to a wall. The wood measures 35 centimeters on each side. Mark puts a nail every 7 centimeters, including the corners. How many nails does Mark use?

<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>
<tr>
<td>What do you know?</td>
<td></td>
</tr>
<tr>
<td>• The piece of wood is a _____________ shape.</td>
<td></td>
</tr>
<tr>
<td>• Each side of the square is _____________ cm.</td>
<td></td>
</tr>
<tr>
<td>• The nails are _____________ apart.</td>
<td></td>
</tr>
<tr>
<td>What do you need to find?</td>
<td></td>
</tr>
<tr>
<td>• The _____________ Mark uses.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Make a plan.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan</td>
<td>Drawing a diagram will help you solve the problem.</td>
</tr>
<tr>
<td></td>
<td>You can draw a square on graph paper.</td>
</tr>
<tr>
<td></td>
<td>Label the length of each side of the square. Draw and label dots to represent the nails every 7 centimeters.</td>
</tr>
<tr>
<td></td>
<td>Then you can count the number of dots on the drawing to find the number of nails Mark uses.</td>
</tr>
</tbody>
</table>
### Step 3: Solve

**Carry out your plan.**

Draw a diagram.

The piece of wood is square, so you should draw a ____________.

After you draw the diagram, place ________________ at the 4 corners of the square.

Then, draw a dot for every ________________ on the diagram. Keep in mind the length of each side of the square as you draw in each dot. Use the grid to draw a diagram.

To find the number of nails Mark uses, ________________ on the diagram.

How many nails does Mark use? ________________

### Step 4: Check

**Is the solution reasonable?**

Reread the problem.

Have you answered the question? ________________

How can you check that your answer is reasonable?

________________________

________________________

### Solve. Use the draw a diagram strategy.

1. A table 6 feet wide and 8 feet long is set so that there is a plate every 2 feet, except at the corners. How many plates are on the table?

   ____________________________

2. To enclose a garden that is 15 feet long and 12 feet wide, fence posts are set every 3 feet, including the corners. How many posts are needed to enclose the yard?

   ____________________________
Skills Practice
Problem-Solving Strategy

1. For a concert, Ron must set the speakers for a sound system every 10 yards around the walls of a square room. Speakers are not set up in the corners of the room. The room is 60 yards long. How many speakers will Ron set up?

2. Katya makes a 4-by-4 grid. She writes the numbers 0 through 15 in order on the grid, starting with the top left square, moving from left to right along each row. What are the four numbers in the right column of the grid?

3. Pine cones are evenly spaced on a circular wreath. The third pine cone is opposite the ninth pine cone. How many pine cones are on the wreath?

4. Jason is building a dog run that is 24 feet by 18 feet. He is setting a fence post every 6 feet and one at each corner. How many posts will he need in all?

5. Tami, Evan, and Scott each prefer a different type of music. They listen to rock, rap, and country. Tami does not like country. Evan does not like country or rap. Which type of music does each person like best?

6. The writer F. Scott Fitzgerald was born in St. Paul, Minnesota, in 1896. The city of his birth was first called Pig’s Eye when it was established 56 years earlier. The name of the city was changed to St. Paul one year after it was established. What year was the city named St. Paul?
Solve. Use the draw a diagram strategy.

1. You want to fill your yard with flowers. If you have a yard that is 8 feet by 12 feet, and every 6 square feet you want to add a flower, how many flowers will you plant?

2. You want to fill a bulletin board with your classmates’ artwork. If the bulletin board measures 10 feet by 4 feet and you have 45 pieces of artwork that each measures 12 inches × 12 inches to hang, how many pieces of work will not fit on the board?

3. The cafeteria serves breakfast. Study the chart below, and tell how many breakfast combinations you could order.

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Drink</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muffin</td>
<td>Milk</td>
</tr>
<tr>
<td>Bread</td>
<td>Juice</td>
</tr>
<tr>
<td>Fruit</td>
<td>Water</td>
</tr>
</tbody>
</table>

4. You decide to go to the Farmer’s Market to buy some fruit. They have bags of peaches on sale for $8.95 and cartons of raspberries for $5.95. You buy two of each. How much will you spend altogether?

Spiral Review

Use a protractor to find the measure of each angle. Then classify each angle as acute, obtuse, right, or straight. (Lesson 10–1)

5. angle A

6. angle B

7. angle C
Enrich

Use a Diagram

Draw a diagram to solve. Use the blank space at right to draw your diagrams.

1. A window design is made of a rectangle divided by two diagonals. How many sections are there and what are their shapes?

2. Sandra draws a regular hexagon. She divides the hexagon into sections by drawing a line from each vertex of the hexagon to the opposite vertex. How many sections are there and what are their shapes?

3. Harold divides a triangle into sections by drawing a line from each vertex of the triangle to the center of the opposite line. How many sections are there and what are their shapes?

4. A tile is shaped like a square. A design on the tile uses 2 lines to divide the square into sections by connecting the center of each side to the center of the opposite side. How many sections are there and what are their shapes?

5. A student divides a pentagon into sections by drawing a line from each vertex to the center of the opposite line. How many sections are there and what are their shapes?
Estimating and Drawing Angles

To estimate the measure of an angle, use measures you know, such as 45°, 90°, and 180°. You can estimate the angle to be a bit smaller or larger than these measures.

Estimate the measurements of these angles. Angle \( a \) is a little larger than 90°. So, a good estimate is 93°. What about angle \( b \)? What measurement is it closest to? Circle the best answer.

45°  90°  180°

Is it smaller or larger than this measurement? Circle the best answer.

smaller    larger

What is a good estimate for angle \( b \)? _____________________________

Estimate the measure of each angle.

1.  
2.  
3.  

______________  ______________  __________________
Skills Practice
Estimating and Drawing Angles

Estimate the measure of each angle.

1. 

2. 

3. 

4. 

5. Use a protractor and a straightedge to draw angles having the following measurements.

5. 125°

6. 50°

7. 80°

8. Look at the letter A. Estimate the measure of the angle inside the top of the letter.

9. Estimate the measure of the angle between the straight back of a chair and the floor.
Homework Practice
Estimating and Drawing Angles

Estimate the measure of each angle.

1. 

3. 

2. 

4. 

Use a protractor and a straightedge to draw angles having the following measurements.

5. 155° 

6. 75°

7. Look at the letter Y. Estimate the measure of the angle inside the upper part of the Y.

Solve. Use the draw a diagram strategy. (Lesson 10–2)

8. You have a paper money and coin collection. Your new display frame has room for one coin and one piece of paper money. How many different combinations of paper money and coin can you display in the frame if you have 5 coins and 3 pieces of paper money?
Problem-Solving Practice

Estimating and Drawing Angles

Solve.

1. Estimate the angle formed by the two flag poles.

2. Estimate the angle formed by the shaded part of the circle.

3. When you write, what angle does your pencil form with the paper?

4. When your spoon is resting in a bowl, what angle does it form with the bottom of the bowl?

5. In the space below, draw a flower stem that has a leaf. Measure the angle that the leaf forms with the stem.
Compass Directions

When a plane is in flight, its direction is expressed as an angle measure. One method of doing this is to give the measure of the angle formed by the plane’s flight path and one of the directions of the compass—north, east, south, or west. For example, this is how you express the two flight paths shown in the figure at the right.

plane A: west 38° north, or W 38° N
plane B: south 72° west, or S 72° W

Write an expression for the direction of each flight path. (You will need to measure the angle with your protractor.)

1. 

2. 

3. 

Use your protractor to draw each flight path.

4. E 70° S

5. E 51° N

6. W 75° N
Look at \( \overrightarrow{AB} \) and \( \overrightarrow{CD} \).

Are these lines parallel, perpendicular, or neither?

You have three answer choices. Ask yourself questions to help choose the right answer.

- Do the lines cross, or intersect, at a point ______? If you answered yes, the lines are not parallel. If you answered no, they are.

- Do the lines form a right angle? ______ If you answered no, the lines are not perpendicular. If you answered yes, they are.

- If you answered yes to the first question and no to the second question, then the lines must be neither.

Use the figure to determine if each pair of lines is parallel, perpendicular, or neither.

1. \( \overrightarrow{FE} \) and \( \overrightarrow{CD} \)
2. \( \overrightarrow{AB} \) and \( \overrightarrow{KD} \)
3. \( \overrightarrow{HG} \) and \( \overrightarrow{IB} \)
4. \( \overrightarrow{HJ} \) and \( \overrightarrow{EF} \)
5. \( \overrightarrow{IF} \) and \( \overrightarrow{AB} \)
6. \( \overrightarrow{AJ} \) and \( \overrightarrow{CK} \)
Skills Practice

Parallel and Perpendicular Lines

Use each figure to determine if the pair of lines is parallel, perpendicular, or neither.

1. ___________  2. ___________  3. ___________

Use the figure for Exercises 4–6.

4. Name a pair of parallel lines.
   _______________________________________________________________________

5. Name two pairs of perpendicular lines.
   _______________________________________________________________________

6. Name a pair of vertical angles.
   _______________________________________________________________________
Use the figure to determine if each pair of lines is parallel, perpendicular, or neither.

1. \( \overrightarrow{AB} \) and \( \overrightarrow{CD} \)

2. \( \overrightarrow{BD} \) and \( \overrightarrow{CD} \)

3. \( \overrightarrow{AD} \) and \( \overrightarrow{CD} \)

Find the value of \( x \) in each figure.

4. \[ 105^\circ \]

5. \[ 43^\circ \]

Solve. Use a protractor and a straightedge to draw angles having the following measurements. (Lesson 10–3)

6. \( 33^\circ \)

7. \( 109^\circ \)

8. \( 130^\circ \)
Use the figure below to determine if each pair of lines is parallel, perpendicular, or neither.

1. \( \overline{ST} \) and \( \overline{UV} \)
2. \( \overline{SU} \) and \( \overline{UV} \)
3. \( \overline{TV} \) and \( \overline{UV} \)

4. Draw a line parallel to \( \overline{SU} \).

5. What lines will be perpendicular to your new line?

6. Sit in a chair with your feet flat on the floor. What angle does your lower leg form with your upper leg? Is your lower leg perpendicular or parallel to the floor?
Parallel Lines and Interior Angles

Parallel lines are always the same distance apart and never meet. A line that intersects two parallel lines is called a transversal. A transversal forms angles with the parallel lines that are related.

On the map, Vining Street is parallel to Summer Street. Blueberry Boulevard is a transversal.

The angles between the two parallel lines are called interior angles. Alternate interior angles are on opposite sides of the transversal.

∠3 and ∠6 are alternate interior angles. ∠4 and ∠5 are alternate interior angles.

Alternate interior angles are congruent, so \( m\angle3 = m\angle6 \) and \( m\angle4 = m\angle5 \).

Interior angles on the same side of the transversal are supplementary.

\[
\begin{align*}
m\angle4 + m\angle6 &= 180^\circ \\
m\angle3 + m\angle5 &= 180^\circ
\end{align*}
\]

You can find the measures of other angles in the diagram by remembering that opposite angles formed by intersecting lines are congruent.

Find the measure of each angle in the figure.

1. \( m\angle5 \) _________
2. \( m\angle7 \) _________
3. \( m\angle1 \) _________
4. \( m\angle3 \) _________
5. \( m\angle8 \) _________
6. \( m\angle6 \) _________
7. \( m\angle2 \) _________
8. \( m\angle4 \) _________
Choose the Best Strategy

Which part of the pizza is larger, \(\frac{3}{8}\) of the first pizza or \(\frac{2}{6}\) of the second pizza?

**Step 1**
Understand
Be sure you understand the problem.
You need to compare the two parts of the pizzas, and find which one is larger.

**Step 2**
Plan
Make a plan.
Choose a strategy.
You already have a diagram of the two pizzas. You can also use the four-step plan. Decide what facts you know. Plan what you will do and in what order. Use your plan to solve the problem. Then check your solution to make sure it makes sense.

**Step 3**
Solve
Carry out your plan.
The pizza parts are close in size, so change each fraction to a decimal in order to compare the sizes accurately.

\[
\frac{3}{8} \text{ and } \frac{2}{6} \text{ can both be changed into a decimal by dividing.}
\]

\[
3 \div 8 = 0.375 \text{ and } 2 \div 6 \approx 0.333
\]

Compare 0.375 to 0.333. Which is larger?

0.375, or \(\frac{3}{8}\).

**Step 4**
Check
Is the solution reasonable?
Reread the problem.
How can you check your answer? 

\[
\text{ }\]
Use any strategy shown below to solve each problem.

• Look for a pattern
• Draw a diagram
• Guess and check

1. Which is more, \( \frac{7}{8} \) of an apple pie or \( \frac{8}{9} \) of the same pie?

2. On Monday, Veronica had 20 minutes of homework. On Tuesday, she had 30 minutes, and on Wednesday, she had 40 minutes. If the pattern continues, how much homework will she have on Friday?

3. Charo is three times as old as Lorena. In 5 years, Lorena will be half Charo’s age. How old are Lorena and Charo now?

4. Justin has 6 shirts and 5 pairs of pants. If he wears a different combination each day, how many days will pass before he has to repeat a combination?

5. An artist drew a circle, two lines, and a triangle. What shape will the artist draw next?

6. At a party, everyone shook hands with everyone else exactly once. There were a total of 28 handshakes in the room. How many people were at the party?
Skills Practice

Problem-Solving Investigation

Use any strategy shown below to solve each problem.

- Look for a pattern
- Draw a diagram
- Guess and check

Use the picture to answer Exercises 1 and 2.

1. Suppose there are 125 marbles in the jar on the right and 25 marbles in the jar on the left. Write a fraction to show the empty part of the first container.

2. What is the difference between the amounts in each container?

3. In 2006 you sold 25 rolls of wrapping paper for a fundraiser. In 2007 you sold 30 rolls. If the trend continues, how many rolls will you sell in 2008?

4. Look at the pattern below. What are the next three bugs?
   Ladybug, ladybug, bee, ant, ladybug, ladybug, bee, ant, ladybug
Use any strategy shown below to solve each problem.

- Look for a pattern
- Draw a diagram
- Guess and check

Use the picture to answer Exercises 1–3.

1. Compare the 2 containers of markers. Which is the better buy?

2. If you bought 1 of the first box and 3 of the second box, and you gave the cashier three $5 bills, how much change would you get back?

3. You buy four boxes of markers and it costs you $16. Which kind did you buy?

Spiral Review

Determine whether the statement is sometimes, always, or never true. Explain your reasoning. (Lesson 10–4)

4. Parallel lines are also perpendicular.
Complete.

1. Define congruent.

2. Define similar.

3. How many triangles are in the figure?

4. Name a triangle congruent to $\triangle AEF$.

5. Name a triangle congruent to $\triangle ALK$.

6. Name three triangles similar to $\triangle ABC$.

7. Name three triangles similar to $\triangle AIH$.

8. How many quadrilaterals are in the figure?

9. Name a quadrilateral congruent to $JKLM$.

10. Name one quadrilateral similar to $DFIG$. What is it? Explain.

11. Name a quadrilateral similar to $FEHI$. 
You can classify triangles by the lengths of their sides.

**equilateral**
3 congruent sides

**isosceles**
at least 2 congruent sides

**scalene**
no congruent sides

---

You can also classify triangles by the measures of their angles.

**right**
1 right angle

**acute**
3 acute angles

**obtuse**
1 obtuse angle

---

Circle the characteristics of each triangle. Then classify the triangle as **equilateral**, **isosceles**, or **scalene** and **right**, **acute**, or **obtuse**.

1. 3 congruent sides
   - 2 congruent sides
   - no congruent sides
   - 1 right angle
   - 3 acute angles
   - 1 obtuse angle

2. 3 congruent sides
   - 2 congruent sides
   - no congruent sides
   - 1 right angle
   - 3 acute angles
   - 1 obtuse angle

---

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Classify each triangle as *acute, right, or obtuse*. Then classify each triangle as *scalene, isosceles, or equilateral*.

1.  
2.  
3.  

Find the value of $x$ in each triangle drawn or having the given angle measures.

4. 
5. 
6. 

7. $60^\circ, 60^\circ, x^\circ$  
8. $x^\circ, 120^\circ, 30^\circ$  
9. $50^\circ, 115^\circ, x^\circ$  

Solve.

10. Tyler draws a triangle with a $35^\circ$ angle and an $85^\circ$ angle. What is the measure of the third angle?

11. Amber draws an obtuse, isosceles triangle with a $110^\circ$ angle. What are the measures of the other two angles?
Classify each triangle drawn or having the given angle measures as acute, right, or obtuse.

1. \( x \)

2. 

3. \( 70^\circ, 60^\circ, 50^\circ \)

Find the value of \( x \) in each triangle. Then classify each triangle as scalene, isosceles, or equilateral.

4. 

5. 

6. 

Use any strategy shown below to solve. (Lesson 10–5)

- Look for a pattern
- Draw a diagram
- Guess and check

7. In August Daryl ran 3 miles every other day. In September, he ran 3.5 miles every other day, and if the trend continues, how much will he run in October?
**Problem-Solving Practice**

**Triangles**

**Solve.**

1. Kendall found that two angles of a triangle were 68° and 86°. What is the measure of the third angle? What type of triangle is it?

2. Tomeka measured the angles of a triangle and found two of them to be 38° and 52°. What is the measure of the third angle? What type of triangle is it?

3. Martin hit a softball from home plate to center field. The center-fielder threw the ball to the first-base person, who threw it back to home plate. What type of triangle did the path of the ball form? Draw a diagram of a softball diamond to help you.

4. Steve has three lengths of fence. He connects them to make a triangular pen for his dog. If the lengths are 5 meters, 6 meters, and 10 meters, what type of triangle is the dog pen?

5. Kate planned a trip using a road map. She will travel northeast from her house to a city that is 240 miles away. Then she will drive southeast to visit her uncle. On the way from the city to her uncle’s house, she will stop at a store 125 miles from the city and then continue in a straight line to her uncle’s house, which is 115 miles from the store. Then, she will travel west to go home from her uncle’s house. On her way home, she will stop at a state park that is 45 miles from her uncle’s house and 195 miles from her house. Assuming she travels in a direct and straight path, what type of triangle is formed by her path?

6. Miguel has a ladder with legs of equal length. He opened the ladder and placed it on the floor. Classify the type of triangle formed by the ladder and the floor according to its sides. Next, classify the type of triangle formed by the ladder and the floor according to its angles.
African Weaving

For the people of Africa, weaving is a form of art. They have woven intricate and beautiful designs into fabric for many centuries. As with so many other art forms, the beauty of their designs is based on geometric principles.

The designs on this page were created more than 100 years ago in the region of Africa that today is Zaire. They are examples of strip patterns, which were repetitive patterns used as decorative borders on clothing. In the exercises below, you will take a closer look at the geometry of these patterns.

In a strip pattern, the pattern unit is the basic design that is repeated along the strip. For each of these patterns:

a. Identify the pattern unit and make a sketch of it in the space at the right.

b. Name any shapes you recognize that could be used to make the pattern unit.

1. 

2. 

3. 

5MG2.1, 5MG2.2
You can classify quadrilaterals by their sides and angles.

**parallelogram**
- opposite sides congruent
- opposite sides parallel

**rectangle**
- opposite sides congruent
- opposite sides parallel
- 4 right angles

**square**
- all sides congruent
- opposite sides parallel
- 4 right angles

**rhombus**
- all sides congruent, opposite sides parallel

**trapezoid**
- exactly one pair of parallel sides

Circle the characteristics of each quadrilateral. Then classify the quadrilateral in as many ways as possible.

1. parallelogram
   - opposite sides congruent
   - all sides congruent
   - opposite sides parallel
   - exactly one pair of parallel sides
   - 4 right angles

2. trapezoid
   - opposite sides congruent
   - all sides congruent
   - opposite sides parallel
   - exactly one pair of parallel sides
   - 4 right angles
Classify each quadrilateral.

1. 
2. 
3. 

Determine whether each statement is *sometimes*, *always*, or *never* true. Explain your reasoning.

4. A square is a rhombus.

5. A trapezoid has exactly one pair of congruent sides.

6. A rhombus is a parallelogram.

Solve.

7. Lee drew a quadrilateral with three angles that measure 120 degrees, 110 degrees, and 70 degrees. What is the measure of the fourth angle?

8. Robert drew a parallelogram with two 55-degree angles. What are the measures of the other two angles?
Find the value of $x$ in each quadrilateral.

1. $100^\circ \quad x$
   
   
2. $110^\circ \quad 90^\circ \quad 120^\circ \quad x$
   
   
3. $75^\circ, 85^\circ, 115^\circ, x$

Classify each quadrilateral.

4. 

5. 

6. 

---

Spiral Review

Find the value of $x$ in each triangle having the given angle measures. (Lesson 10–6).

7. $100^\circ, 40^\circ, x^\circ$

8. $45^\circ, 100^\circ, x^\circ$

9. $75^\circ, 30^\circ, x^\circ$

Classify each triangle having the given angle measures as acute, right, or obtuse.

10. $120^\circ, 30^\circ, 30^\circ$

11. $70^\circ, 20^\circ, 90^\circ$

12. $65^\circ, 45^\circ, 70^\circ$
1. Linda drew a quadrilateral with angles of 90°, 42°, and 135°. What is the measure of the remaining angle?

2. Natasha’s yard is a square. If one side of her yard is 55 feet, what is the perimeter of her yard?

3. Luisa creates her art project in the shape of a rhombus. If she measures two of the angles and they are 50° and 130°, what must the other two angles measure?

4. Tim has a disagreement with his friend, Jan. Jan’s yard is 20 meters long and 20 meters wide. Tim’s yard is 40 meters long and 10 meters wide. Both yards contain only right angles. Tim says that his yard is both a rectangle and a square. Jan says the same thing about her yard. Who is correct? Explain your answer.

5. Tomoko made a kite for a trip to the beach. She sketched a model of the kite on a piece of graph paper first. The points forming the vertices of the kite were (0, 9), (4, 13), (8, 9), and (4, 0). Was the kite in the shape of any special quadrilaterals? Explain your answer. Graph the points to help you solve.

6. Tomoko is going to ship the kite in Exercise 5 to the beach. She can only ship it in a rectangular box. If the model of the kite was made on graph paper with squares that were 1 centimeter on a side, and the actual kite was 10 times the size of the model, what are the lengths of the sides of the rectangular box she must use?
Enrich
Making Conjectures

A conjecture is an educated guess or an opinion. Mathematicians and scientists often make conjectures when they observe patterns in a collection of data. On this page, you will be asked to make a conjecture about polygons.

Use a protractor to measure the angles of each polygon. Then find the sum of the measures. (Use the quadrilateral at the right as an example.)

1. 

2. 

3. 

4. 

5. Make a conjecture. How is the sum of the angle measures of a polygon related to the number of sides?

6. Test your conjecture. On a clean sheet of paper, use a straightedge to draw a hexagon. What do you guess is the sum of the angle measures? Measure each angle and find the sum. Was your conjecture true?
Look at the figure.

Can you draw the top, front, and side view of this figure?

Pretend you are a bird flying over the figure. What would you see? This is the top view. It should be flat, or two-dimensional.

Now pretend you saw the figure from the side. Draw the side view.

Lastly, shade the front of the figure. Then draw the front view.

Draw a top, a side, and a front view of each figure.
Skills

Drawing Three-Dimensional Figures

Draw a top, a side, and a front view of each prism.

1.

2.

Draw the three-dimensional figure whose top, side, and front views are shown.
Use isometric dot paper.

3.

4.

Determine whether each statement is always, sometimes, or never true.
Explain your reasoning.

5. You can draw the top, side, and front view of a two-dimensional figure.

6. The top view of a pyramid is a square.
10–8

Homework Practice

Drawing Three-Dimensional Figures

Draw a top, a side, and a front view of each figure.

1.

2.

3.

4.

Spiral Review

Find the value of $x$ in each quadrilateral.  (Lesson 10–7)

5. $65^\circ, 125^\circ, 80^\circ, x$

6. $85^\circ, 65^\circ, 105^\circ, x$

7. $90^\circ, 90^\circ, x, 90^\circ$

8. $120^\circ, 60^\circ, 120^\circ, x$
Problem-Solving Practice

Drawing Three-Dimensional Figures

Solve.

1. Ricardo made a model of a cereal box. What kind of three-dimensional figure is it?

2. Diane bought a box with an equal length, width, and height. What kind of three-dimensional figure is the box?

3. Gary is playing a board game. When it is his turn, he tosses a kind of three-dimensional figure that is used in many board games. The figure is 6-sided and has a number printed on each side. What kind of figure is it?

How many faces, edges, and vertices does it have?

4. When Ben bought a lunch box, the salesperson placed it in a box to protect it. What kind of three-dimensional figure is the box?

If the box is laid flat, what shapes would it make?

5. Anna is thinking of a three-dimensional figure. Its top view is a square. Its front and side views are triangles. What is the figure?

6. The Department of Defense headquarters is called the Pentagon. It is a pentagonal prism. Draw a top, front, and a side view of the Pentagon.
The word rep-tiles stands for repeating tiles. A geometric figure is a rep-tile if it can be divided into smaller parts according to these rules.

1. All the smaller parts must be congruent to each other.
2. All the smaller parts must be similar to the original tile.

Here are two examples of figures that are rep-tiles.

Divide each rep-tile into four congruent parts.

1.  
2.  
3.  
4.  
5.  
6.  

7. **CHALLENGE** Show how to use four figures like the one at the right to make a rep-tile.
## Individual Progress Checklist

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<th>D</th>
<th>M</th>
<th>Goal</th>
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<td></td>
<td></td>
<td></td>
<td>measure and classify angles</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>identify and measure parallel and perpendicular lines</td>
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<td></td>
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<td></td>
<td>classify quadrilaterals and find missing angle measures in quadrilaterals</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>draw two-dimensional views of three-dimensional figures</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>solve problems by drawing a diagram</td>
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</tbody>
</table>

### Notes

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________
Chapter Diagnostic Assessment

Solve each equation.

1. \( x + 14 = 80 \)
2. \( 43 + x = 66 \)
3. \( x + 76 = 134 \)
4. \( x + 21 = 96 \)
5. On the first 2 days of swim team practice, Jeanne swam 20 laps. If she swam 11 laps on the second day, how many laps did she swim on the first day?

Solve each equation.

6. \( 81 + 32 + x = 208 \)
7. \( 44 + x + 21 = 95 \)
8. \( x + 72 + 86 = 235 \)
9. \( 51 + 23 + 42 + x = 166 \)
10. A boat ride for 3 people costs $45. If two people pay $14, how much will the third person have to pay?

Tell whether each pair of figures has the same size and shape.

11. 

12. 

11. 

12. 
Chapter Pretest

Use a protractor to find the measure of each angle. Classify as acute, obtuse, right, or straight.

1.  
2.  

Estimate the measure of each angle. Then classify each angle as acute, obtuse, right, or straight.

3.  
4.  

Tell whether the lines are parallel, perpendicular, or neither.

5.  
6.  

Find the value of $x$ in each figure shown.

7.  
8.  

Fill in the blank.

9. A ______ triangle has no congruent sides.

10. A ______ is a quadrilateral that has exactly one pair of opposite sides parallel.
Use a protractor to find the measure of each angle. Then classify it as **acute**, **obtuse**, **right**, or **straight**.

1.  
2.  
3.  

Estimate the measure of each angle. Classify it as **acute**, **obtuse**, **right**, or **straight**.

4.  
5.  

Use a protractor and a straightedge to draw angles having the following measure.

6. 85°

7. 160°

Solve.

8. You have a garden in your yard, what is its area if it is 15 feet by 20 feet?

8. ______________
Classify each triangle drawn or having the given angle measures as **acute**, **right**, or **obtuse**.

1.  
   \[ \triangle ABC \]

2.  \(55^\circ, 25^\circ, 100^\circ\)

Find the value of \(x\) in each triangle. Classify each triangle as **scalene**, **isosceles**, or **equilateral**.

3.  \[ \triangle DEF \] \(20^\circ, x, 30^\circ\)

4.  
   \[ \triangle GHI \] \(x\)

Use the figure to determine if the pair of lines is **parallel**, **perpendicular**, or **neither** for Exercises 5 and 6.

5.  \( \overrightarrow{EF} \) and \( \overrightarrow{FG} \)

6.  \( \overrightarrow{EF} \) and \( \overrightarrow{GH} \)

**Solve.**

7.  You go to the library 3 times a month in January. In February you go 4 times. If the trend continues, how many times will you go to the library in May?
Find the value of $n$ in each figure. Classify each figure.

1. \[ \begin{align*} 100^\circ & \quad n \\ 80^\circ & \quad 80^\circ \end{align*} \]

2. \[ \begin{align*} 120^\circ & \quad n^\circ \\ 60^\circ & \quad 60^\circ \end{align*} \]

3. $80^\circ$, $75^\circ$, $120^\circ$, $n$

Draw a top, a side, and a front view of each prism.

4. 

5. 

6. 

7. 

Quiz 3 (Lessons 10–7 through 10–8)
Use a protractor to find the measure of each angle. Then classify each angle as acute, obtuse, right, or straight.

1. 
2. 
3. 

Determine if each pair of lines is parallel, perpendicular, or neither.

4. 
5. 

Use a protractor and a straightedge to draw angles having the following measurements.

6. 75°  
7. 150°

Solve. Use the draw a diagram strategy.

8. A bagel store sells blueberry, sesame, poppyseed, and plain bagels. It also sells milk, juice, coffee and water. You are buying a bagel and a drink. How many combinations can you make?
Match each word to its definition. Write your answers on the lines provided.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1. angle</td>
<td>A. the point where two rays meet in an angle</td>
</tr>
<tr>
<td>2. intersecting lines</td>
<td>B. lines that are the same distance apart</td>
</tr>
<tr>
<td>3. parallelogram</td>
<td>C. lines that meet or cross each other to form right angles</td>
</tr>
<tr>
<td>4. quadrilateral</td>
<td>D. a quadrilateral with four right angles; opposite sides are equal and parallel</td>
</tr>
<tr>
<td>5. rhombus</td>
<td>E. lines that meet at a point</td>
</tr>
<tr>
<td>6. vertical angles</td>
<td>F. a shape that has 4 sides and 4 angles</td>
</tr>
<tr>
<td>7. vertex</td>
<td>G. two rays with a common endpoint</td>
</tr>
<tr>
<td>8. parallel lines</td>
<td>H. two pairs of opposite angles that have equal measures that form as a result of two intersecting lines</td>
</tr>
<tr>
<td>9. congruent angles</td>
<td>I. angles with the same measure</td>
</tr>
<tr>
<td>10. perpendicular lines</td>
<td>J. a figure with four sides in which the opposite sides are congruent and parallel and in which the opposite angles are congruent</td>
</tr>
<tr>
<td>11. rectangle</td>
<td>K. a figure with four sides in which all sides are congruent, the opposite sides are parallel, and in which the opposite angles are congruent</td>
</tr>
<tr>
<td>12. face</td>
<td>L. the flat surface of a three-dimensional figure</td>
</tr>
</tbody>
</table>
Use construction paper to cut out a triangle with different-sized angles. Label the triangles with the numbers 1–5. Have the student use a protractor for measuring. You will also need two pencils for Exercises 8 and 9.

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

1. Do all of the triangles seem to have the same size angles?

   ____________________________________________________________

2. What are the measurements of the angles of the triangle?

   ____________________________________________________________
   ____________________________________________________________

3. Is the triangle acute, obtuse, or right?

   ____________________________________________________________

4. Is the triangle equilateral, isosceles, or scalene?

   ____________________________________________________________

5. Tell how you got your answer.

   ____________________________________________________________
   ____________________________________________________________
6. Ali draws a shape. It has two pairs of parallel sides and four right angles. What could it be?

__________________________________________________________________________

7. How is a rhombus like a parallelogram?

__________________________________________________________________________

8. Arrange these two pencils so they are parallel.

__________________________________________________________________________

9. Arrange these two pencils so they are intersecting.

__________________________________________________________________________

10. A quadrilateral has angles that measure 45°, 102°, and 93°. What is the measurement of the fourth angle?

__________________________________________________________________________

11. Name a real-life example of a prism.

__________________________________________________________________________
# 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. |
# Geometry: Angles and Polygons

## Two-Tab 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. |
Chapter Test, Form 1

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

1. Classify the angle as acute, obtuse, right, or straight.
   A. acute
   B. obtuse
   C. right
   D. straight

2. Estimate the measure of the angle.
   F. 65°
   G. 165°
   H. 180°
   J. 205°

3. Choose the best way to classify the pair of lines.
   A. intersecting
   B. parallel
   C. perpendicular
   D. straight

4. Classify the triangle as acute, right, or obtuse. Then classify the triangle as scalene, isosceles, or equilateral.
   F. acute; isosceles
   G. acute; equilateral
   H. obtuse; scalene
   J. right; equilateral

5. Two angles of a triangle have measures 55° and 32°. What is the measure of the third angle?
   A. 103°
   B. 93°
   C. 83°
   D. 73°

6. Choose the best way to classify the quadrilateral.
   F. parallelogram
   G. square
   H. rhombus
   J. trapezoid
7. A quadrilateral has two angles that each measure 120° and one angle that measures 60°. Find the measure of the unknown angle.
   A. 60°   B. 75°   C. 105°   D. 120°  7. _____

8. Choose the statement that is false.
   F. A square is always a rectangle.
   G. A rhombus is always a quadrilateral.
   H. A trapezoid is always a parallelogram.
   J. An equilateral triangle is always acute.  8. _____

9. Choose the figure whose top, front, and side views are shown below.

```
   top    front    side
   ______  ______  ______

A.             B.             C.             D.             
```

9. _____

10. Al needs to pack his laptop computer in a box. The computer measures 9 inches by 12 inches. Which type of box will best store the computer?
    F. rectangular
    G. square
    H. rhombic
    J. trapezoidal  10. _____
Read each question carefully. Write your answer on the line provided.

1. Classify the angle as acute, obtuse, right, or straight.

A. acute  B. obtuse  C. right  D. straight  1. ______

2. Estimate the measure of the angle.

F. 80°  G. 90°  H. 100°  J. 150°  2. ______

3. Choose the best way to classify the pair of lines.

A. intersecting  B. parallel  C. perpendicular  D. straight  3. ______

4. Classify the triangle as acute, right, or obtuse. Then classify the triangle as scalene, isosceles, or equilateral.

F. acute; isosceles  G. obtuse; isosceles  H. acute; equilateral  J. right; equilateral  4. ______
5. Two angles of a triangle have measures 61° and 43°. What is the measure of the other angle?
   A. 104°  B. 76°  C. 74°  D. 18°  5. ______

6. Choose the best way to classify the quadrilateral.
   F. parallelogram  H. rhombus
   G. rectangle  J. trapezoid  6. ______

7. A quadrilateral has three angles that each measure 90°. Find the measure of the fourth unknown angle.
   A. 90°  B. 180°  C. 270°  D. 360°  7. ______

8. Choose the statement that is false.
   F. A square is always a parallelogram.
   G. An obtuse triangle is never right.
   H. An acute triangle is always equilateral.
   J. A quadrilateral is never a triangle.  8. ______

9. Choose the figure whose top, front, and side views are shown below.

   A.  B.  C.  D.  9. ______

10. Karla measures her bedroom and then draws a diagram of it. Three of the four sides of her bedroom measure 11 feet, 11 feet, and 9 \( \frac{1}{2} \) feet. What shape is her bedroom?
   F. rectangle  G. square  H. triangle  J. rhombus  10. ______

11. Brenda draws a triangle that measures 4 yards by 6 yards by 6 yards. What kind of triangle does she draw?
   A. scalene  B. obtuse  C. isosceles  D. equilateral  11. ______
Chapter Test, Form 2B

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

1. Estimate the measure of the angle.

   \[
   \begin{tikzpicture}
   \draw (0,0) -- (2,0) -- (1,1) -- (0,0);
   \end{tikzpicture}
   \]

   A. 90\(^\circ\)  B. 100\(^\circ\)  C. 150\(^\circ\)

   1. ______

2. The angle is ______.
   F. acute  
   G. obtuse  
   H. right

   2. ______

3. The triangle is ______.
   A. acute and isosceles 
   B. acute and equilateral 
   C. obtuse and isosceles

   3. ______

4. The lines are ______.
   F. intersecting 
   G. parallel 
   H. perpendicular

   4. ______

5. The value of \(x\) is ______.
   A. 60\(^\circ\)  
   B. 100\(^\circ\)  
   C. 120\(^\circ\)

   5. ______

6. The quadrilateral is a ______.
   F. parallelogram 
   G. rectangle 
   H. trapezoid

   6. ______
7. Which is false?
   A. A square is a parallelogram.
   B. An obtuse triangle cannot be right.
   C. An acute triangle is always equilateral.

8. The value of $z$ is ______.
   F. $90^{\circ}$
   G. $180^{\circ}$
   H. $270^{\circ}$

9. Choose the figure whose top, front, and side views are shown below.

10. Karla makes a picture of her bedroom. It has 4 sides. 3 sides measure 11 feet, 11 feet, and $9\frac{1}{2}$ feet. What shape is her bedroom?
    F. rectangle    G. square    H. rhombus

11. Brenda draws a picture of her pool. It is a triangle. It measures 4 yards by 6 yards by 6 yards. What kind of triangle is it?
    A. scalene    B. isosceles    C. equilateral
Chapter Test, Form 2C

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

Estimate the measure of each angle. Then classify each angle as **acute**, **obtuse**, **right**, or **straight**.

1. 
2. 

Classify each set of lines as **parallel**, **perpendicular**, or **neither**.

3. 
4. 

5. Classify the triangle as **acute**, **right**, or **obtuse**. Then classify the triangle as **scalene**, **isosceles**, or **equilateral**.

![Triangle](image)

6. Two angles of a triangle have measures 61° and 43°. What is the measure of the other angle?
7. Classify the quadrilateral.

8. Find the measure of angle $x$.

9. Is a square a parallelogram? Explain why or why not.

10. A quadrilateral has three angles that measure 90°. Find the measure of the unknown angle.

11. Find the measure of angle $w$.

12. Draw a figure whose top, front, and side views are shown.

13. Brenda draws a diagram of her pool in the shape of a triangle. It measures 4 yards by 6 yards by 6 yards. What kind of triangle does she draw?

14. Draw a letter of the alphabet that includes parallel lines.
Chapter Test, Form 2D

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

Write *acute*, *obtuse*, or *straight*.

1. The angle is _____.

![Diagram of an angle]

1. ____________

Write *parallel*, *perpendicular*, or *neither*.

2. The lines are _____.

![Diagram of parallel and perpendicular lines]

2. ____________

Estimate the measure of the angle.

3. ____________

4. Choose 1 word from Column A and 1 word from Column B in the table to describe the triangle below at the right.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>acute</td>
<td>isosceles</td>
</tr>
<tr>
<td>obtuse</td>
<td>right</td>
</tr>
<tr>
<td>equilateral</td>
<td>scalene</td>
</tr>
</tbody>
</table>

4. ____________

![Diagram of a triangle with side lengths]
5. What is this shape?

6. Is a square a parallelogram? Write yes or no.

7. Find the measure of $\angle x$.

8. Find the measure of $\angle w$.

9. Find the measure of $\angle z$.

10. Draw a figure whose top, front, and side views are shown below.

11. Draw a letter of the alphabet that has parallel lines.

12. Brenda draws a picture of her pool. It is a triangle. It measures 4 yards by 6 yards by 6 yards. What kind of triangle is it?
Chapter Test, Form 3

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

Classify each angle as **acute**, **obtuse**, **right**, or **straight**.

1. ![Angle X](image1)
2. ![Angle Y](image2)

Estimate the measure of each angle.

3. ![Angle Z](image3)
4. ![Angle W](image4)

Use the figure below for questions 5 and 6.

Classify each set of lines as **parallel**, **perpendicular**, or **neither**.

5. lines b and c
6. lines a and d
Classify each triangle as **acute**, **right**, or **obtuse**. Then classify each triangle as **scalene**, **isosceles**, or **equilateral**.

7.  

8.  

9. Two angles of a triangle each measure 41°. What is the measure of the other angle?  

10. Classify the figure in at least two ways.  

11. If one of the angles of an isosceles triangle is 102°, what are the measures of the other two congruent angles?  

12. A parallelogram has 2 angles that each measure 50°. What are the measures of the other two congruent angles?  

13. Draw the figure whose top, front, and side views are shown below.  

14. Draw a letter of the alphabet that has parallel lines and acute angles.  

15. List two types of quadrilaterals that have at least one pair of perpendicular sides.
Chapter Extended-Response Test

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. If necessary, record your answer on another piece of paper.

1. Using a protractor, measure the angles in each figure below and classify the figure in detail. Explain your reasoning.

   a. 
   
   b. 
   
   c. 
   
   d. 

2. Look at the street map below.

   a. Name two streets that are parallel to each other. Explain your reasoning.

   b. Is Maple Street perpendicular to Cherry Street? Why or why not?

   c. If you walked from the school to the library to the post office, what kind of angle would your route form? Explain your reasoning.

   d. Describe the relationship between Elm Street and Cherry Street. Do they intersect? Are they parallel, perpendicular or neither? Explain.

3. What is a solid? Explain in your own words.
Use this recording sheet with pages 578–579 of the Student Edition.

Read each question. Then fill in the correct answer.

1. [ ] [ ] [ ] [ ]

2. [ ] [ ] [ ] [ ]

3. [ ] [ ] [ ] [ ]

4. [ ] [ ] [ ] [ ]

5. [ ] [ ] [ ] [ ]

6. [ ] [ ] [ ] [ ]

7. [ ] [ ] [ ] [ ]

8. [ ] [ ] [ ] [ ]

9. [ ] [ ] [ ] [ ]
Test Example

In which of the figures below does the angle appear to be obtuse?

A. 

B. 

C. 

D. 

Read the Item

You are asked to choose the figure in which the angle appears to be obtuse.

Solve the Item

Find the angle that appears to be greater than 90°. The answer is B.

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

1. Find the value of \( n \) in the parallelogram shown.
   A. 20°   B. 30°   C. 40°   D. 50°
2. Classify angle \( n \) in the triangle shown.
   \[ \text{F. acute} \quad \text{H. obtuse} \]
   \[ \text{G. right} \quad \text{J. straight} \]

3. The drawing shows the shape of the backyard of a house. Find the measure of angle \( n \).
   \[ \begin{align*}
   \text{A.} 60^\circ & \quad \text{C.} 100^\circ \\
   \text{B.} 90^\circ & \quad \text{D.} 120^\circ 
   \end{align*} \]

4. An angle of a right triangle measures 60°. Which method can be used to find the measures of the two other angles?
   \[ \begin{align*}
   \text{F.} & \quad \text{Divide 180° by two and subtract the sum of 90° to 60°.} \\
   \text{G.} & \quad \text{The right angle is 90°. Subtract the sum of 90° and 60° from 180° to find the third angle.} \\
   \text{H.} & \quad \text{The right angle is 90°. Subtract 60° from 180° to find the third angle.} \\
   \text{J.} & \quad \text{Add 90° to 180° and divide by three.} 
   \end{align*} \]

5. Find the measure of angle \( p \) in rectangle \( QRST \).
   \[ \begin{align*}
   \text{A.} 38^\circ & \quad \text{C.} 58^\circ \\
   \text{B.} 49^\circ & \quad \text{D.} 59^\circ 
   \end{align*} \]

6. A clock shows the time as 9:15 P.M. What kind of angle do the hands show?
   \[ \begin{align*}
   \text{F.} & \quad \text{straight} \\
   \text{G.} & \quad \text{acute} \\
   \text{H.} & \quad \text{obtuse} \\
   \text{J.} & \quad \text{right} 
   \end{align*} \]
7. At the bake sale, each fruit pie was cut into 10 equal pieces. Ira sold 5 pieces, Louise sold 8 pieces, and Angelica sold 7 pieces. Find the total number of pies sold by these 3 people.

   A. 1  
   B. $1\frac{9}{10}$  
   C. 2  
   D. $2\frac{1}{10}$  

   7. __________________

8. What is 7,098.226 rounded to the nearest hundred?

   F. 7,000  
   G. 7,100  
   H. 7,101  
   J. 7,200  

   8. __________________

9. How many pairs of opposite sides are parallel in a trapezoid?

10. What is the classification of a triangle with no congruent sides?

11. What is the sum of a quadrilateral’s angles?

12. Can a right triangle have an obtuse angle?

13. What kind of lines never meet?

14. If a triangle has two angles that measure $47^\circ$ and $63^\circ$, what is the measure of its third angle?

15. Two lines that intersect at $90^\circ$ angles can be described as what kind of lines?

16. What kind of triangle has at least 2 congruent sides?

17. If all the angles of a certain triangle measure $60^\circ$, how would you classify it?
**Anticipation Guide**

**Geometry: Angles and Polygons**

**STEP 1**

**Before you begin Chapter 10**

- 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>Statement</th>
<th>STEP 2 A or D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. An angle is two rays with a common endpoint.</td>
<td>A</td>
</tr>
<tr>
<td>2. A degree is a unit for measuring angles.</td>
<td>A</td>
</tr>
<tr>
<td>3. A quadrilateral is a shape with five sides.</td>
<td>D</td>
</tr>
<tr>
<td>4. All angles have the same degree measurement.</td>
<td>D</td>
</tr>
<tr>
<td>5. Parallel lines are lines that are the same distance apart.</td>
<td>A</td>
</tr>
<tr>
<td>6. Perpendicular lines are lines that meet or cross each other to form right angles.</td>
<td>A</td>
</tr>
<tr>
<td>7. A rectangle is a quadrilateral.</td>
<td>A</td>
</tr>
<tr>
<td>8. An octagon is a quadrilateral.</td>
<td>D</td>
</tr>
<tr>
<td>9. All lines are parallel.</td>
<td>D</td>
</tr>
<tr>
<td>10. Parallel lines form angles.</td>
<td>D</td>
</tr>
</tbody>
</table>

**STEP 2**

**After you complete Chapter 10**

- 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 10: Geometry: Angles and Polygons. Fill in the missing information.

<table>
<thead>
<tr>
<th>Shape Name</th>
<th>Number of Sides</th>
<th>Sketch</th>
</tr>
</thead>
<tbody>
<tr>
<td>trapezoid</td>
<td>4</td>
<td><img src="image" alt="Trapezoid Sketch" /></td>
</tr>
<tr>
<td>parallelogram</td>
<td>4</td>
<td><img src="image" alt="Parallelogram Sketch" /></td>
</tr>
<tr>
<td>octagon</td>
<td>8</td>
<td><img src="image" alt="Octagon Sketch" /></td>
</tr>
<tr>
<td>hexagon</td>
<td>6</td>
<td><img src="image" alt="Hexagon Sketch" /></td>
</tr>
<tr>
<td>triangle</td>
<td>3</td>
<td><img src="image" alt="Triangle Sketch" /></td>
</tr>
<tr>
<td>pentagon</td>
<td>5</td>
<td><img src="image" alt="Pentagon Sketch" /></td>
</tr>
<tr>
<td>rectangle</td>
<td>4</td>
<td><img src="image" alt="Rectangle Sketch" /></td>
</tr>
</tbody>
</table>
Use a protractor to find the measure of each angle. Then classify each angle as acute, obtuse, right, or straight.

1. 109°; obtuse
2. 95°; obtuse
3. 135°; obtuse
4. 140°; obtuse
5. 75°; acute
6. 60°; acute
7. 15°; acute
8. 34°; acute
9. 40°
10. 100°
11. 125°
Answers

Grade 5
Chapter 10

Problem-Solving Practice
Measuring Angles

Solve.

1. Kyle ate a small slice of pizza. Was the angle made by the cuts on the slice more likely 30° or 130°?
   - 30°; right
   - 135°; obtuse

2. Guadalupe drew a triangle and labeled the vertices A, B, and C. If ∠ABC is one of the angles in the triangle, what are the other two angles?
   - ∠BCA and ∠CAB

3. Logan drew a ray on a graph. Its endpoint was at (1, 2), and the ray passed through the point (6, 2). He drew another ray that had the same endpoint and passed through (4, 5). What is the measure of the angle formed?
   - 45°

4. Kaoru drew several different regular polygons. He measured one of the angles inside one of the figures and found that its measure was 108°. Classify the angle as acute, right, or obtuse.
   - obtuse

5. Jordan was concerned that a local playground is not accessible to children with disabilities. So, she and her parents built a ramp over the steps at the entrance to the playground. The ramp must be at a 12° angle with the ground. The steps are 1.5 feet high. What is the approximate length of the ramp? Use a piece of graph paper and a protractor to help you. Let the side length of each square grid on the graph paper represent one foot.
   - approximately 7 feet

6. Derrick and his 7 brothers shared a fruit pie. Their mother cut the pie into 8 equal pieces. What was the angle formed at the point of each slice?
   - 45°

Spiral Review

For Exercises 7 and 8, use the following information. (Lesson 9–10)

Alex won 10 of her last 15 softball games.

7. Find the probability of Alex winning her next game.
   - \( \frac{2}{3}; 0.66; 66\% \)

8. Suppose Alex plays 75 games. Predict how many she will win.
   - 50

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Angles in Regular Polygons

The Department of Defense headquarters in Washington, D.C. is called the Pentagon. The Pentagon gets its name from the actual shape of the building. It is a regular pentagon, so all of the sides are the same length. The angles in a regular polygon are related in a special way.

1. Use a protractor to measure each angle in the regular polygons below.

![Protractor angles](image)

- 60° 60° 120° 120°

2. What do you notice about the measures of the angles in the two triangles?

   **They are all the same measure, 60°.**

3. What do you notice about the measures of the angles in the two hexagons?

   **They are all the same measure, 120°.**

4. What can you conclude about the angles inside a regular polygon?

   **They are all the same measure.**

5. You can find the measure of an interior angle of a regular polygon with \( n \) sides by using the formula \( m = \frac{(n-2)(180°)}{n} \). Find the measure of an interior angle of the Pentagon.

   \[ m = \frac{(5-2)(180°)}{5} = 108° \]

6. If Sabrina builds a pen with 144° interior angles for her turkeys, and all the sides are of equal length, how many sides are on Sabrina’s pen?

   **10 sides**

7. Draw a regular nonagon. Use a protractor to measure the angles. Use a ruler to measure the sides to make sure that they are equal.

   See students’ work.
**Reteach**

**Problem-Solving Strategy** (continued)

**Step 3**

**Solve**

Carry out your plan.

Draw a diagram.

The piece of wood is square, so you should draw a **square**.

After you draw the diagram, place **dots** at the 4 corners of the square.

Then, draw a dot for every **7 cm** on the diagram. Keep in mind the length of each side of the square as you draw in each dot. Use the grid to draw a diagram.

To find the number of nails Mark uses, **count the dots** on the diagram.

How many nails does Mark use? **20 nails**

**Step 4**

**Check**

Is the solution reasonable?

Reread the problem. Have you answered the question?

How can you check that your answer is reasonable?

Answers may vary. Sample answer:

Estimate the answer and check that the answer is close to the estimate.

**Solve. Use the draw a diagram strategy.**

1. A table 6 feet wide and 8 feet long is set so that there is a plate every 2 feet, except at the corners. How many plates are on the table?

   **10 plates**

2. To enclose a garden that is 15 feet long and 12 feet wide, fence posts are set every 3 feet, including the corners. How many posts are needed to enclose the yard?

   **18 fence posts**

**Skills Practice**

**Problem-Solving Strategy**

2. Katya makes a 4-by-4 grid. She writes the numbers 0 through 15 in order on the grid, starting with the top left square, moving from left to right along each row. What are the four numbers in the right column of the grid?

   **3, 7, 11, 15**

3. Pine cones are evenly spaced on a circular wreath. The third pine cone is opposite the ninth pine cone. How many pine cones are on the wreath?

   **12 pine cones**

4. Jason is building a dog run that is 24 feet by 18 feet. He is setting a fence post every 6 feet and one at each corner. How many posts will he need in all?

   **14 fence posts**

5. Tami, Evan, and Scott each prefer a different type of music. They listen to rock, rap, and country. Tami does not like country. Evan does not like country or rap. Which type of music does each person like best?

   **Evan: rock; Tami: rap; Scott: country**

6. The writer F. Scott Fitzgerald was born in St. Paul, Minnesota, in 1896. The city of his birth was first called Pig’s Eye when it was established 56 years earlier. The name of the city was changed to St. Paul one year after it was established. What year was the city named St. Paul?

   **1841**

Answers may vary. Sample answer:

Estimate the answer and check that the answer is close to the estimate.
Solve. Use the draw a diagram strategy.

1. You want to fill your yard with flowers. If you have a yard that is 8 feet by 12 feet, and every 6 square feet you want to add a flower, how many flowers will you plant?
   16 flowers

2. You want to fill a bulletin board with your classmates’ artwork. If the bulletin board measures 10 feet by 4 feet and you have 45 pieces of artwork that each measures 12 inches \( \times \) 12 inches to hang, how many pieces of work will not fit on the board?
   5

3. The cafeteria serves breakfast. Study the chart below, and tell how many breakfast combinations you could order.

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Drink</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muffin</td>
<td>Milk</td>
</tr>
<tr>
<td>Bread</td>
<td>Juice</td>
</tr>
<tr>
<td>Fruit</td>
<td>Water</td>
</tr>
</tbody>
</table>

9

4. You decide to go to the Farmer’s Market to buy some fruit. They have bags of peaches on sale for $8.95 and cartons of raspberries for $5.95. You buy two of each. How much will you spend altogether?
   $29.80

Use a protractor to find the measure of each angle. Then classify each angle as acute, obtuse, right, or straight. (Lesson 10–1)

5. angle A
   130°
   obtuse

6. angle B
   20°
   acute

7. angle C
   30°
   acute

Homework Practice

Problem-Solving Strategy

Solve. Use the draw a diagram strategy.

1. You want to fill your yard with flowers. If you have a yard that is 8 feet by 12 feet, and every 6 square feet you want to add a flower, how many flowers will you plant?
   16 flowers

2. You want to fill a bulletin board with your classmates’ artwork. If the bulletin board measures 10 feet by 4 feet and you have 45 pieces of artwork that each measures 12 inches \( \times \) 12 inches to hang, how many pieces of work will not fit on the board?
   5

3. The cafeteria serves breakfast. Study the chart below, and tell how many breakfast combinations you could order.

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Drink</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muffin</td>
<td>Milk</td>
</tr>
<tr>
<td>Bread</td>
<td>Juice</td>
</tr>
<tr>
<td>Fruit</td>
<td>Water</td>
</tr>
</tbody>
</table>

9

4. You decide to go to the Farmer’s Market to buy some fruit. They have bags of peaches on sale for $8.95 and cartons of raspberries for $5.95. You buy two of each. How much will you spend altogether?
   $29.80

Enrich

Use a Diagram

Draw a diagram to solve. Use the blank space at right to draw your diagrams.

1. A window design is made of a rectangle divided by two diagonals. How many sections are there and what are their shapes?
   4; triangles

2. Sandra draws a regular hexagon. She divides the hexagon into sections by drawing a line from each vertex of the hexagon to the opposite vertex. How many sections are there and what are their shapes?
   6; triangles

3. Harold divides a triangle into sections by drawing a line from each vertex of the triangle to the center of the opposite side. How many sections are there and what are their shapes?
   6; triangles

4. A tile is shaped like a square. A design on the tile uses 2 lines to divide the square into sections by connecting the center of each side to the center of the opposite side. How many sections are there and what are their shapes?
   4; squares

5. A student divides a pentagon into sections by drawing a line from each vertex to the center of the opposite line. How many sections are there and what are their shapes?
   10; triangles
Estimate the measure of each angle. 1–4. Sample answers given.

1. 90°
2. 60°
3. 160°
4. 100°

Use a protractor and a straightedge to draw angles having the following measurements.

5. 125°
6. 50°
7. 80°

Estimate the measure of each angle. 8–9. Sample answers given.

8. Look at the letter A. Estimate the measure of the angle inside the top of the letter.
   Sample answer: 90°

9. Estimate the measure of the angle between the straight back of a chair and the floor.
   Sample answer: 40°

To estimate the measure of an angle, use measures you know, such as 45°, 90°, and 180°. You can estimate the angle to be a bit smaller or larger than these measures.

Estimate the measurements of these angles. Angle a is a little larger than 90°. So, a good estimate is 93°. What about angle b? What measurement is it closest to? Circle the best answer.

Sample answer: 40°
Homework Practice
Estimating and Drawing Angles

Estimate the measure of each angle.

1. 45°

2. 140°

3. 65°

4. 100°

Use a protractor and a straightedge to draw angles having the following measurements.

5. 155°

6. 75°

Check students’ drawings.

7. Look at the letter Y. Estimate the measure of the angle inside the upper part of the Y.

Sample answer: 40°

Solve. Use the draw a diagram strategy. (Lesson 10–2)

8. You have a paper money and coin collection. Your new display frame has room for one coin and one piece of paper money. How many different combinations of paper money and coin can you display in the frame if you have 5 coins and 3 pieces of paper money?

Sample answer: 15

Problem-Solving Practice
Estimating and Drawing Angles

Solve.

1. Estimate the angle formed by the two flag poles.

Sample answer: 45°

2. Estimate the angle formed by the shaded part of the circle.

Sample answer: 135°

3. When you write, what angle does your pencil form with the paper?

Answers will vary; accept reasonable answers.

4. When your spoon is resting in a bowl, what angle does it form with the bottom of the bowl?

Answers will vary; accept reasonable answers.

5. In the space below, draw a flower stem that has a leaf. Measure the angle that the leaf forms with the stem.

Check students’ drawings.
Enrich

Compass Directions

When a plane is in flight, its direction is expressed as an angle measure. One method of doing this is to give the measure of the angle formed by the plane’s flight path and one of the directions of the compass—north, east, south, or west. For example, this is how you express the two flight paths shown in the figure at the right.

plane A: west 38° north, or W 38° N
plane B: south 72° west, or S 72° W

Write an expression for the direction of each flight path. (You will need to measure the angle with your protractor.)

1. N 45° E
2. S 60° W
3. E 60° S

Use your protractor to draw each flight path.

1. E 70° S
2. E 51° N
3. W 75° N

Reteach

Parallel and Perpendicular Lines

Look at \( \overline{AB} \) and \( \overline{CD} \).

Are these lines parallel, perpendicular, or neither?

You have three answer choices. Ask yourself questions to help choose the right answer.

- Do the lines cross, or intersect, at a point? If you answered yes, the lines are not parallel. If you answered no, they are.
- Do the lines form a right angle? If you answered no, the lines are not perpendicular. If you answered yes, they are.
- If you answered yes to the first question and no to the second question, then the lines must be neither.

Use the figure to determine if each pair of lines is parallel, perpendicular, or neither.

1. \( \overline{FE} \) and \( \overline{CD} \) perpendicular
2. \( \overline{AB} \) and \( \overline{KD} \) parallel
3. \( \overline{HG} \) and \( \overline{IB} \) neither
4. \( \overline{HJ} \) and \( \overline{EB} \) neither
5. \( \overline{TF} \) and \( \overline{AB} \) perpendicular
6. \( \overline{AJ} \) and \( \overline{CK} \) parallel
**Skills Practice**

Parallel and Perpendicular Lines

Use each figure to determine if the pair of lines is parallel, perpendicular, or neither.

1. \( \overrightarrow{AB} \) and \( \overrightarrow{CD} \)
2. \( \overrightarrow{BD} \) and \( \overrightarrow{CD} \)
3. \( \overrightarrow{AD} \) and \( \overrightarrow{CD} \)

**Homework Practice**

Parallel and Perpendicular Lines

Use the figure to determine if each pair of lines is parallel, perpendicular, or neither.

1. \( \overrightarrow{AB} \) and \( \overrightarrow{CD} \)
2. \( \overrightarrow{BD} \) and \( \overrightarrow{CD} \)
3. \( \overrightarrow{AD} \) and \( \overrightarrow{CD} \)

Find the value of \( x \) in each figure.

4. \( x \)°
5. \( x \)°

Solve. Use a protractor and a straightedge to draw angles having the following measurements. (Lesson 10-3)

6. 33°
7. 109°
8. 130°

**Spiral Review**

Check students’ drawings.
Parallel Lines and Interior Angles

Parallel lines are always the same distance apart and never meet. A line that intersects two parallel lines is called a transversal. A transversal forms angles with the parallel lines that are related.

On the map, Vining Street is parallel to Summer Street. Blueberry Boulevard is a transversal.

The angles between the two parallel lines are called **interior angles**. Alternate interior angles are on opposite sides of the transversal.

∠3 and ∠6 are alternate interior angles. ∠4 and ∠5 are alternate interior angles.

Alternate interior angles are congruent, so m∠3 = m∠6 and m∠4 = m∠5.

Interior angles on the same side of the transversal are **supplementary**.

m∠4 + m∠6 = 180°
m∠3 + m∠5 = 180°

You can find the measures of other angles in the diagram by remembering that opposite angles formed by intersecting lines are congruent.

**Find the measure of each angle in the figure.**

1. m∠5 90° 5. m∠8 90°
2. m∠7 110° 6. m∠6 90°
3. m∠1 90° 7. m∠2 110°
4. m∠3 110° 8. m∠4 90°

---

**Problem-Solving Practice**

Use the figure below to determine if each pair of lines is **parallel**, **perpendicular**, or **neither**.

1. ST and UV
2. SU and UV
3. TV and UV

<table>
<thead>
<tr>
<th>parallel</th>
<th>perpendicular</th>
</tr>
</thead>
</table>

4. Draw a line parallel to SU.

**Check students’ drawing.**

5. What lines will be perpendicular to your new line?

ST and UV

6. Sit in a chair with your feet flat on the floor. What angle does your lower leg form with your upper leg? Is your lower leg perpendicular or parallel to the floor?

about 90° or a right angle, perpendicular
Choose the Best Strategy

Which part of the pizza is larger, \( \frac{3}{8} \) of the first pizza or \( \frac{2}{6} \) of the second pizza?

---

**Step 1**
Understand

Be sure you understand the problem.

You need to compare the two parts of the pizzas, and find which one is larger.

**Step 2**
Plan

- Look for a pattern
- Draw a diagram
- Guess and check

Choose a plan.

You already have a diagram of the two pizzas. You can also use the four-step plan. Decide what facts you know. Plan what you will do and in what order. Use your plan to solve the problem. Then check your solution to make sure it makes sense.

**Step 3**
Solve

Carry out your plan.

The pizza parts are close in size, so change each fraction to a decimal in order to compare the sizes accurately.

\[ \frac{3}{8} \text{ and } \frac{2}{6} \text{ can both be changed into a decimal by dividing.} \]

\[ 3 \div 8 = 0.375 \text{ and } 2 \div 6 = 0.333 \]

Compare 0.375 to 0.333. Which is larger? 0.375, or \( \frac{3}{8} \).

**Step 4**
Check

Is the solution reasonable?

Reread the problem.

How can you check your answer? Answers will vary; accept reasonable answers.
Name __________________________  Date ____________________

**Skills Practice**
**Problem-Solving Investigation**

Use any strategy shown below to solve each problem.
- Look for a pattern
- Draw a diagram
- Guess and check

Use the picture to answer Exercises 1 and 2.

1. Suppose there are 125 marbles in the jar on the right and 25 marbles in the jar on the left. Write a fraction to show the empty part of the first container.
   \[ \frac{4}{5} \]

2. What is the difference between the amounts in each container?
   \[ \frac{4}{5} \text{ of a container} \]

3. In 2006 you sold 25 rolls of wrapping paper for a fundraiser. In 2007 you sold 30 rolls. If the trend continues, how many rolls will you sell in 2008?
   \[ 35 \text{ rolls} \]

4. Look at the pattern below. What are the next three bugs?
   Ladybug, ladybug, bee, ant, ladybug, ladybug, bee, ant, ladybug
   ladybug, bee, ant

**Homework Practice**
**Problem-Solving Investigation**

Use any strategy shown below to solve each problem.
- Look for a pattern
- Draw a diagram
- Guess and check

Use the picture to answer Exercises 1–3.

1. Compare the 2 containers of markers. Which is the better buy?
   8 markers for $4.00

2. If you bought 1 of the first box and 3 of the second box, and you gave the cashier three $5 bills, how much change would you get back?
   $2.00

3. You buy four boxes of markers and it costs you $16. Which kind did you buy?
   8 markers for $4

**Spiral Review**

Determine whether the statement is sometimes, always, or never true. Explain your reasoning. (Lesson 10–4)

4. Parallel lines are also perpendicular.
   Never; parallel lines never meet but perpendicular lines always do.
Complete.

1. Define congruent. _________ **Same size and shape**
2. Define similar. _________ **Same shape, but not the same size**

3. How many triangles are in the figure? _________ 12
4. Name a triangle congruent to ∆AEF. _________ ∆AED
5. Name a triangle congruent to ∆ALK. _________ ∆AJL
6. Name three triangles similar to ∆ABC. _________ Sample answer: ∆AJL, ∆AGI, ∆ADF
7. Name three triangles similar to ∆ALK. _________ ∆ALM, ∆AMC, ∆AFE
8. How many quadrilaterals are in the figure? _________ 15
9. Name a quadrilateral congruent to JKMB. _________ LKMC
10. Name one quadrilateral similar to DFIG. What is it? Explain. _________ Sample answer: GICB; it is the same shape as DFIG but not the same size.
11. Name a quadrilateral similar to FEHI. _________ IHMC

You can classify triangles by the lengths of their sides.

- **equilateral**
  - 3 congruent sides

- **isosceles**
  - at least 2 congruent sides

- **scalene**
  - no congruent sides

You can also classify triangles by the measures of their angles.

- **right**
  - 1 right angle

- **acute**
  - 3 acute angles

- **obtuse**
  - 1 obtuse angle

Circle the characteristics of each triangle. Then classify the triangle as **equilateral**, **isosceles**, or **scalene** and **right**, **acute**, or **obtuse**.

1. 3 congruent sides
2. (3 congruent sides)

   - 2 congruent sides
   - no congruent sides

   - 1 right angle
   - 3 acute angles
   - 1 obtuse angle
Classify each triangle as acute, right, or obtuse. Then classify each triangle as scalene, isosceles, or equilateral.

1. Scalene; obtuse
2. Isosceles; right
3. Equilateral; acute

Find the value of $x$ in each triangle drawn or having the given angle measures.

4. $x = 33^\circ$
5. $x = 38^\circ$
6. $x = 100^\circ$
7. $60^\circ$, $60^\circ$, $x$
8. $x^\circ$, $120^\circ$, $30^\circ$
9. $50^\circ$, $115^\circ$, $x$

Solve.

10. Tyler draws a triangle with a $35^\circ$ angle and an $85^\circ$ angle. What is the measure of the third angle?
   $60^\circ$

11. Amber draws an obtuse, isosceles triangle with a $110^\circ$ angle. What are the measures of the other two angles?
   $35^\circ$ and $35^\circ$
African Weaving

For the people of Africa, weaving is a form of art. They have woven intricate and beautiful designs into fabric for many centuries. As with so many other art forms, the beauty of their designs is based on geometric principles.

The designs on this page were created more than 100 years ago in the region of Africa that today is Zaire. They are examples of strip patterns, which were repetitive patterns used as decorative borders on clothing. In the exercises below, you will take a closer look at the geometry of these patterns.

In a strip pattern, the pattern unit is the basic design that is repeated along the strip. For each of these patterns:

1. Identify the pattern unit and make a sketch of it in the space at the right.
2. Name any shapes you recognize that could be used to make the pattern unit.
   - square, octagon, rectangle
   - octagon
   - squares, triangles
3. 

---

Problem-Solving Practice

Triangles

Solve.

1. Kendall found that two angles of a triangle were 68° and 86°. What is the measure of the third angle? What type of triangle is it?
   - 26°; acute
2. Tomeka measured the angles of a triangle and found two of them to be 38° and 52°. What is the measure of the third angle? What type of triangle is it?
   - 90°; right
3. Martin hit a softball from home plate to center field. The center-fielder threw the ball to the first-base person, who threw it back to home plate. What type of triangle did the path of the ball form? Draw a diagram of a softball diamond to help you.
   - obtuse triangle
4. Steve has three lengths of fence. He connects them to make a triangular pen for his dog. If the lengths are 5 meters, 6 meters, and 10 meters, what type of triangle is the dog pen?
   - scalene triangle
5. Kate planned a trip using a road map. She will travel northeast from her house to a city that is 240 miles away. Then she will drive southeast to visit her uncle. On the way from the city to her uncle’s house, she will stop at a store 125 miles from the city and then continue in a straight line to her uncle’s house, which is 115 miles from the store. Then, she will travel west to go home from her uncle’s house. On her way home, she will stop at a state park that is 45 miles from her uncle’s house and 195 miles from her house. Assuming she travels in a direct and straight path, what type of triangle is formed by her path?
   - equilateral triangle
6. Miguel has a ladder with legs of equal length. He opened the ladder and placed it on the floor. Classify the type of triangle formed by the ladder and the floor according to its sides. Next, classify the type of triangle formed by the ladder and the floor according to its angles.
   - isosceles; acute

---

Answers (Lesson 10–6)
**Answers (Lesson 10–7)**

### Quadrilaterals

1. **Classify each quadrilateral.**
   - parallelogram
   - rhombus
   - rectangle

2. **Determine whether each statement is sometimes, always, or never true. Explain your reasoning.**
   - A square is a rhombus. **always**
   - A trapezoid has exactly one pair of parallel sides. **sometimes**
   - The opposite sides of a rhombus are congruent and parallel. **always**

3. **Lee drew a quadrilateral with three angles that measure 120 degrees, 110 degrees, and 70 degrees. What is the measure of the fourth angle?**
   - 60º

4. **Robert drew a parallelogram with two 55-degree angles. What are the measures of the other two angles?**
   - 125º and 125º

5. **5MG2.1, 5MG2.2**
   - You can classify quadrilaterals by their sides and angles.
   - **parallelogram**
     - opposite sides congruent
     - opposite sides parallel
   - **square**
     - all sides congruent
     - four right angles
   - **rhombus**
     - all sides congruent
     - opposite sides parallel
   - **trapezoid**
     - exactly one pair of parallel sides

6. **Solve.**
   - Robert drew a parallelogram with two 55-degree angles. What are the measures of the other two angles? **125º and 125º**

7. **Lee drew a quadrilateral with three angles that measure 120 degrees, 110 degrees, and 70 degrees. What is the measure of the fourth angle?**
   - 60º
Homework Practice

Quadrilaterals

Find the value of $x$ in each quadrilateral.

1. $100^\circ$, $80^\circ$, $80^\circ$, $x$
   - $100^\circ$

2. $110^\circ$, $90^\circ$, $120^\circ$, $x$
   - $40^\circ$

3. $75^\circ$, $85^\circ$, $115^\circ$, $x$
   - $85^\circ$

Classify each quadrilateral.

4. rectangle
5. parallelogram
6. trapezoid

Spiral Review

Find the value of $x$ in each triangle having the given angle measures. (Lesson 10–6).

7. $100^\circ$, $40^\circ$, $x$
   - $40^\circ$

8. $45^\circ$, $100^\circ$, $x$
   - $35^\circ$

9. $75^\circ$, $30^\circ$, $x$
   - $75^\circ$

Classify each triangle having the given angle measures as acute, right, or obtuse.

10. $120^\circ$, $30^\circ$, $30^\circ$
    - obtuse

11. $70^\circ$, $20^\circ$, $90^\circ$
    - right

12. $65^\circ$, $45^\circ$, $70^\circ$
    - acute

Problem-Solving Practice

Quadrilaterals

Solve.

1. Linda drew a quadrilateral with angles of $90^\circ$, $42^\circ$, and $135^\circ$. What is the measure of the remaining angle?
   - $93^\circ$

2. Natasha’s yard is a square. If one side of her yard is 55 feet, what is the perimeter of her yard?
   - 220 feet

3. Luisa creates her art project in the shape of a rhombus. If she measures two of the angles and they are $50^\circ$ and $130^\circ$, what must the other two angles measure?
   - $50^\circ$ and $130^\circ$

4. Tim has a disagreement with his friend, Jan. Jan’s yard is 20 meters long and 20 meters wide. Tim’s yard is 40 meters long and 10 meters wide. Both yards contain only right angles. Tim says that his yard is both a rectangle and a square. Jan says the same thing about her yard. Who is correct? Explain your answer.

Jan’s yard has four congruent sides and Tim’s does not, so Tim’s yard is not square. Both yards are rectangles.

5. Tomoko made a kite for a trip to the beach. She sketched a model of the kite on a piece of graph paper first. The points forming the vertices of the kite were $(0, 9)$, $(4, 13)$, $(8, 9)$, and $(4, 0)$. Was the kite in the shape of any special quadrilaterals? Explain your answer. Graph the points to help you solve.
   - no; it has no sides parallel

6. Tomoko is going to ship the kite in Exercise 5 to the beach. She can only ship it in a rectangular box. If the model of the kite was made on graph paper with squares that were 1 centimeter on a side, and the actual kite was 10 times the size of the model, what are the lengths of the sides of the rectangular box she must use?
   - $50 \text{ cm}$ and $130 \text{ cm}$
**Making Conjectures**

A conjecture is an educated guess or an opinion. Mathematicians and scientists often make conjectures when they observe patterns in a collection of data. On this page, you will be asked to make a conjecture about polygons.

1. Use a protractor to measure the angles of each polygon. Then find the sum of the measures. (Use the quadrilateral at the right as an example.)

2. What is the sum of the angle measures of the triangle?

3. The sum of the angle measures of the triangle is 180°. Use the quadrilateral at the right as an example.

4. What is the sum of the angle measures of the parallelogram?

5. Make a conjecture. How is the sum of the angle measures of a polygon related to the number of sides?

6. Test your conjecture. On a clean sheet of paper, use a straightedge to draw a hexagon. What do you guess is the sum of the angle measures of a hexagon? Measure each angle and find the sum. Was your conjecture true?

**Answers**

- **Conjectures will vary. The sum of the angle measures is 720°.**
- **Answers will vary. Sample answer:** When the number of sides increases by 1, the sum of the angle measures increases by 180°.

---

**Answers (Lesson 10–7 and 10–8)**
**Skills**

**Drawing Three-Dimensional Figures**

Draw a top, a side, and a front view of each prism.

1. [Diagram of a prism]

2. [Diagram of a prism]

Check students’ work.

Draw the three-dimensional figure whose top, side, and front views are shown. Use isometric dot paper.

3. [Diagram of a prism]

4. [Diagram of a prism]

Check students’ work.

Determine whether each statement is *always*, *sometimes*, or *never* true. Explain your reasoning.

5. You can draw the top, side, and front view of a two-dimensional figure. **never**; two-dimensional figures do not have depth

6. The top view of a pyramid is a square. **sometimes**; only true for a square pyramid

---

**Homework Practice**

**Drawing Three-Dimensional Figures**

Draw a top, a side, and a front view of each figure.

1. [Diagram of a prism]

2. [Diagram of a prism]

Check students’ work.

3. [Diagram of a prism]

4. [Diagram of a prism]

Check students’ work.

Find the value of $x$ in each quadrilateral. (Lesson 10-7)

5. $65^\circ$, $125^\circ$, $90^\circ$, $x$

6. $85^\circ$, $65^\circ$, $105^\circ$, $x$

7. $90^\circ$, $90^\circ$, $x$, $90^\circ$

8. $120^\circ$, $60^\circ$, $120^\circ$, $x$

Check students’ work.

---

**Spiral Review**

Find the value of $x$ in each quadrilateral. (Lesson 10-7)

5. $65^\circ$, $125^\circ$, $90^\circ$, $x$

6. $85^\circ$, $65^\circ$, $105^\circ$, $x$

7. $90^\circ$, $90^\circ$, $x$, $90^\circ$

8. $120^\circ$, $60^\circ$, $120^\circ$, $x$

Check students’ work.

---

**Answers (Lesson 10–8)**
**Problem-Solving Practice**

**Drawing Three-Dimensional Figures**

**Solve.**

1. Ricardo made a model of a cereal box. What kind of three-dimensional figure is it?
   - **rectangular prism**

2. Diane bought a box with an equal length, width, and height. What kind of three-dimensional figure is the box?
   - **cube**

3. Gary is playing a board game. When it is his turn, he tosses a kind of three-dimensional figure that is used in many board games. The figure is 6-sided and has a number printed on each side. What kind of figure is it?
   - **cube**

   How many faces, edges, and vertices does it have?
   - **6 faces, 12 edges, 8 vertices**

4. When Ben bought a lunch box, the salesperson placed it in a box to protect it. What kind of three-dimensional figure is the box?
   - **rectangular prism**

   If the box is laid flat, what shapes would it make?
   - **rectangles**

5. Anna is thinking of a three-dimensional figure. Its top view is a square. Its front and side views are triangles. What is the figure?
   - **square pyramid**

6. The Department of Defense headquarters is called the Pentagon. It is a pentagonal prism. Draw a top, front, and a side view of the Pentagon.

7. **CHALLENGE** Show how to use four figures like the one at the right to make a rep-tile.

**Enrich**

**Rep-Tiles**

The word rep-tiles stands for repeating tiles. A geometric figure is a rep-tile if it can be divided into smaller parts according to these rules.

1. All the smaller parts must be **congruent** to each other.
2. All the smaller parts must be **similar** to the original tile.

Here are two examples of figures that are rep-tiles.

![Rep-Tiles Example](image)

Divide each rep-tile into four congruent parts.

1. [Rep-Tile Image 1]
2. [Rep-Tile Image 2]
3. [Rep-Tile Image 3]
4. [Rep-Tile Image 4]
5. [Rep-Tile Image 5]
6. [Rep-Tile Image 6]
7. **CHALLENGE** Show how to use four figures like the one at the right to make a rep-tile.
Use construction paper to cut out a triangle with different-sized angles. Label the triangles with the numbers 1–5. Have the student use a protractor for measuring. You will also need two pencils for Exercises 8 and 9.

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

1. Do all of the triangles seem to have the same size angles?  
   
2. What are the measurements of the angles of the triangle?  
   
3. Is the triangle acute, obtuse, or right?  
   
4. Is the triangle equilateral, isosceles, or scalene?  
   
5. Tell how you got your answer.
   
   No
   
   Answers will vary; student should show proper use of the protractor
   
   Answers will vary; student should demonstrate knowledge of triangle definitions
   
   No
   
   Answers will vary; student should demonstrate knowledge of triangle definitions
   
   Oral Assessment  
   
   10
   
   Student Name  
   Date

Match each word to its definition. Write your answers on the lines provided.

1. angle  
   A. the point where two rays meet in an angle

2. intersecting lines  
   B. lines that meet or cross each other to form right angles

3. parallelogram  
   C. a quadrilateral with four right angles; opposite sides are equal and parallel

4. quadrilateral  
   D. a figure with four sides that have equal measures that form as a result of two intersecting lines

5. rhombus  
   E. two rays with a common endpoint

6. vertical angles  
   F. a shape that has 4 sides and 4 angles

7. vertex  
   G. lines that meet at a point

8. parallel lines  
   H. a quadrilateral with four right angles; opposite sides are equal and parallel

9. congruent angles  
   I. lines that are the same distance apart

10. perpendicular lines  
    J. lines that meet at a point

11. rectangle  
    K. lines that meet at a point

12. face  
    L. the flat surface of a three-dimensional figure

Vocabulary Test  

Answers (Vocabulary Test and Oral Assessment)
6. Ali draws a shape. It has two pairs of parallel sides and four right angles. What could it be?

   square or rectangle

7. How is a rhombus like a parallelogram?

   opposite sides are parallel;
   opposite angles are congruent

8. Arrange these two pencils so they are parallel.

   Check students’ work.

9. Arrange these two pencils so they are intersecting.

   Check students’ work.

10. A quadrilateral has angles that measure 45°, 102°, and 93°. What is the measurement of the fourth angle?

    120°

11. Name a real-life example of a prism.

    answers will vary
Chapter 10 Assessment Answer Key

Chapter Diagnostic Assessment
Page 49

1. \( x = 66 \)
2. \( x = 23 \)
3. \( x = 58 \)
4. \( x = 75 \)
5. \( x = 9 \)
6. \( x = 95 \)
7. \( x = 30 \)
8. \( x = 77 \)
9. \( x = 50 \)
10. \( x = 17 \)

Chapter Pretest
Page 50

1. \( 35^\circ; \) acute
2. \( 108^\circ; \) obtuse
3. \( 60^\circ; \) acute
4. \( 145^\circ; \) obtuse
5. parallel
6. neither
7. \( n = 60^\circ \)
8. \( n = 100^\circ \)

Quiz 1 (10–1 through 10–3)
Page 51

1. \( 130^\circ \)
2. \( 25^\circ \)
3. \( 180^\circ; \) straight
4. \( 70^\circ; \) acute
5. \( 140^\circ; \) obtuse

Check students’ work.

6. scalene
7. \( 300 \text{ sq. ft.} \)
8. trapezoid

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# Chapter 10 Assessment Answer Key

## Quiz 2 (10–4 through 10–6)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>acute</td>
</tr>
<tr>
<td>2.</td>
<td>obtuse</td>
</tr>
<tr>
<td>3.</td>
<td>130°; scalene</td>
</tr>
<tr>
<td>4.</td>
<td>90°; isosceles</td>
</tr>
<tr>
<td>5.</td>
<td>perpendicular</td>
</tr>
<tr>
<td>6.</td>
<td>parallel</td>
</tr>
<tr>
<td>7.</td>
<td>7 times</td>
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## Quiz 3 (10–7 through 10–8)

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>100° quadrilateral</td>
</tr>
<tr>
<td>2.</td>
<td>120° trapezoid</td>
</tr>
<tr>
<td>3.</td>
<td>85°; quadrilateral</td>
</tr>
<tr>
<td>4.</td>
<td>Check students’ work.</td>
</tr>
<tr>
<td>5.</td>
<td>Check students’ work.</td>
</tr>
<tr>
<td>6.</td>
<td>Check students’ work.</td>
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## Mid-Chapter Review (10–1 through 10–4)

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.</td>
<td>65° acute</td>
</tr>
<tr>
<td>2.</td>
<td>180° straight</td>
</tr>
<tr>
<td>3.</td>
<td>135° obtuse</td>
</tr>
<tr>
<td>4.</td>
<td>parallel</td>
</tr>
<tr>
<td>5.</td>
<td>neither</td>
</tr>
<tr>
<td>6.</td>
<td>Check students’ work.</td>
</tr>
<tr>
<td>7.</td>
<td>Check students’ work.</td>
</tr>
<tr>
<td>8.</td>
<td>16</td>
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</table>

Check students’ work.
### Chapter 10 Assessment Answer Key

<table>
<thead>
<tr>
<th>Chapter Test, Form 1</th>
<th>Chapter Test, Form 1</th>
<th>Chapter Test, Form 2A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 60</td>
<td>Page 61</td>
<td>Page 62</td>
</tr>
</tbody>
</table>

1. **A**

2. **G**

3. **A**

4. **G**

5. **B**

6. **H**

7. **A**

8. **H**

9. **C**

10. **F**

(continued on the next page)
## Chapter 10 Assessment Answer Key

<table>
<thead>
<tr>
<th>Question</th>
<th>Chapter Test, Form 2A Page 63</th>
<th>Chapter Test, Form 2B Page 64</th>
<th>Chapter Test, Form 2B Page 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>B</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>2.</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>3.</td>
<td>A</td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>4.</td>
<td>H</td>
<td>H</td>
<td>C</td>
</tr>
<tr>
<td>5.</td>
<td>C</td>
<td>C</td>
<td>F</td>
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<tr>
<td>6.</td>
<td>H</td>
<td>H</td>
<td>B</td>
</tr>
<tr>
<td>7.</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 10 Assessment Answer Key

1. 70º; acute
2. 90º; right
3. perpendicular
4. parallel
5. isosceles
6. 76º
7. trapezoid
8. 120º
   yes; it is a 4-sided polygon with two sets of parallel sides
9. 
10. 90º
11. 130º
12. 
13. isosceles
   sample answer: 100º
14. acute; isosceles
   sample answer: H

1. acute
2. 
3. 
4. isosceles

(continued on the next page)
Chapter 10 Assessment Answer Key

Chapter Test, Form 2D
Page 69

Chapter Test, Form 3
Page 70

Chapter Test, Form 3
Page 71

5. **trapezoid**
6. **yes**
7. **120º**
8. **130º**
9. **90º**
10. [Diagram of a trapezoid]
11. **sample answer: H**
12. **isosceles**

5. **parallel**
6. **neither**

1. **acute**
2. **obtuse**
3. **sample answer: 90º**
4. **sample answer: 180º**

7. **acute; isosceles**
8. **acute; equilateral**
9. **98º**
10. **quadrilateral**
11. **39º**
12. **130º; 130º**
13. [Diagram of a rectangle]
14. **rectangle; squares**
## Scoring Rubric

<table>
<thead>
<tr>
<th>Level</th>
<th>Specific Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4</strong></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><strong>3</strong></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><strong>2</strong></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><strong>1</strong></td>
<td>The student has demonstrated a <strong>very 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><strong>0</strong></td>
<td>The student has provided a <strong>completely incorrect</strong> solution or uninterpretable response, or no response at all.</td>
</tr>
</tbody>
</table>
Chapter 10 Assessment Answer Key

Page 72, Extended-Response Test
Sample Answers

In addition to the scoring rubric found on page A30, the following sample answers may be used as guidance in evaluating open-ended assessment items.

1. a. The angles measure 90°, 45°, and 45°. The figure is a right triangle because it has one right angle.

b. The angles measure 130°, 30°, and 20°. The figure is a scalene, obtuse triangle because it has no congruent sides and it has one obtuse angle.

c. The angles measure 90°, 90°, 90° and 90°. The figure is a rectangle because it has four sides and all right angles, and its opposite sides are congruent and parallel.

d. The angles measure 68°, 43°, 112° and 137°. The figure is a trapezoid because it has four sides and four angles, and exactly one pair of opposite sides is parallel.

2. a. Oak Street and Pine Street are parallel because they will never intersect.

b. No. Perpendicular lines are intersecting lines that meet to form four right angles. While Maple Street and Cherry Street intersect, they do not meet to form 90° angles.

c. The route would form a right angle. Walking from the school to the library on Oak Street, the route intersects Cherry Street. Oak Street is perpendicular to Cherry Street, so turning left on Cherry Street to go to the post office forms a 90° angle along the route.

d. Elm Street intersects Cherry Street but they are neither parallel nor perpendicular. The two streets aren't parallel because they do intersect. But they aren't perpendicular because they don't meet to form right angles.

3. A solid is a three-dimensional geometric figure. It has length, depth and height.
1. C
2. F
3. C
4. G
5. D
6. F
7. C
8. G
9. one pair
10. scalene
11. 360º
12. no
13. parallel lines
14. 70º
15. perpendicular
16. isosceles
17. equilateral or equiangular