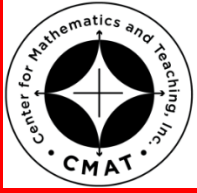


Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_



**MathLinks**

**7-14**

STUDENT PACKET

**MATHLINKS: GRADE 7  
STUDENT PACKET 14  
ANGLES, TRIANGLES, AND QUADRILATERALS**

<b>14.1</b>	<b>Angle Measurements</b> <ul style="list-style-type: none"><li>• Measure and draw angles using a protractor.</li><li>• Review facts about interior angles of triangles and quadrilaterals.</li><li>• Find missing angle measures in geometric diagrams.</li></ul>	<b>1</b>
<b>14.2</b>	<b>Angle Explorations</b> <ul style="list-style-type: none"><li>• Understand facts about supplementary, complementary, vertical, and adjacent angles.</li><li>• Use facts about angles to solve problems.</li><li>• Write and solve equations involving angle measures.</li></ul>	<b>9</b>
<b>14.3</b>	<b>Drawing Triangles and Quadrilaterals</b> <ul style="list-style-type: none"><li>• Draw figures freehand, and with a ruler and protractor.</li><li>• Construct triangles given side lengths and angle measures.</li><li>• Recognize when conditions determine a unique triangle, more than one triangle, or no triangle.</li></ul>	<b>15</b>
<b>14.4</b>	<b>Skill Builders, Vocabulary, and Review</b>	<b>22</b>

## WORD BANK

Word or Phrase	Definition or Description	Example or Picture
adjacent angles		
angle		
complementary angles		
quadrilateral		
supplementary angles		
triangle		
vertical angles		

# ANGLE MEASUREMENTS

### Summary

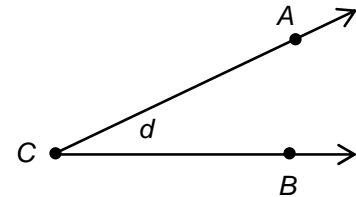
We will explore angle measures by creating our own protractors. We will use a protractor to measure and draw angles. We will review facts about triangles and quadrilaterals.

### Goals

- Measure and draw angles using a protractor.
- Review facts about interior angles of triangles and quadrilaterals.
- Find missing angle measures in geometric diagrams.

### Warmup

1. An acute angle is an angle that measures \_\_\_\_\_  $90^\circ$ .  
more than, less than, or exactly
2. A right angle is an angle that measures \_\_\_\_\_  $90^\circ$ .  
more than, less than, or exactly
3. An obtuse angle is an angle that measures \_\_\_\_\_  $90^\circ$ ,  
more than, less than, or exactly but less than  $180^\circ$ .
4. A straight angle is an angle that measures \_\_\_\_\_.



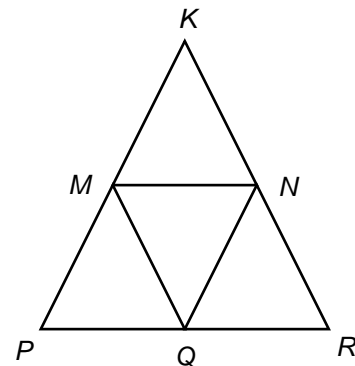
Refer to the angle to the right for problems 5 and 6.

5. Which one of the labeled points represents the vertex of the angle? \_\_\_\_\_
6. Circle all names that can correctly be used to name this angle.

$\angle A$      $\angle B$      $\angle C$      $\angle d$      $\angle ABC$      $\angle ACB$      $\angle BAC$      $\angle BCA$

Refer to the diagram to the right for problems 7 and 8.

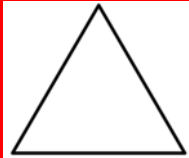



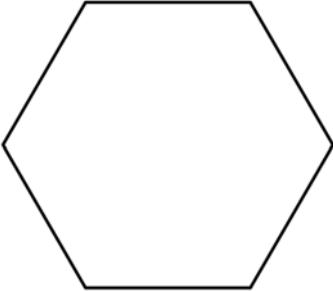

7. A triangle has \_\_\_\_\_ sides and \_\_\_\_\_ angles.  
 Name three different triangles in the diagram.
8. A quadrilateral has \_\_\_\_\_ sides and \_\_\_\_\_ angles.  
 Name two different quadrilaterals in the diagram.



## ANGLE MEASURE EXPLORATION

Your teacher will give you some pattern blocks.

- Name each pattern block piece.
- A straight angle is  $180^\circ$ , and therefore, an angle that turns through a complete rotation is  $360^\circ$ . Use pattern blocks and the properties of the shapes to find the measure of each interior angle. **Do not use protractors**. Label the measures clearly. Explain your reasoning about how you know each of these angle measures.
- Write the sum of the interior angle measures for each of the 6 figures. List any observations.

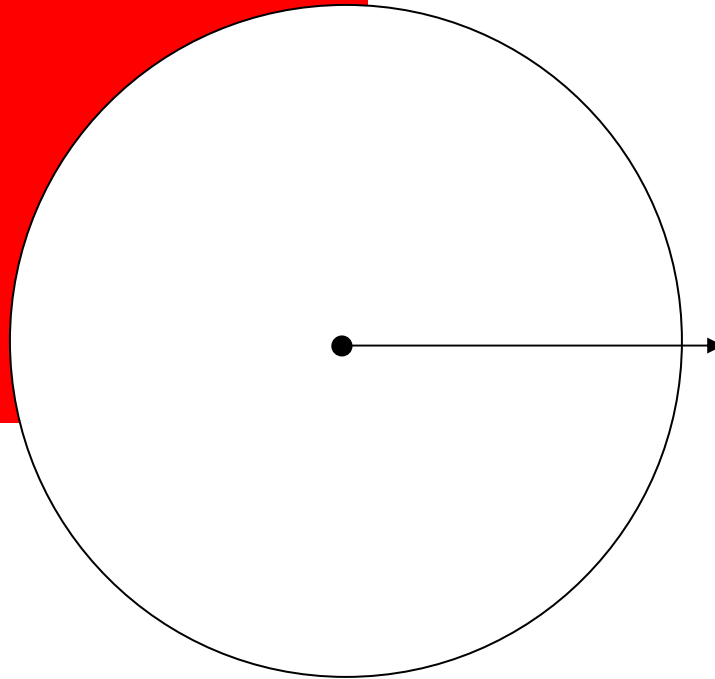
<p>1. Name: _____</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>Sum: _____</p>	<p>2. Name: _____</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>Sum: _____</p>
<p>3. Name: _____</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>Sum: _____</p>	<p>4. Name: _____</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>Sum: _____</p>
<p>5. Name: _____</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>Sum: _____</p>	<p>6. Name: _____</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>Sum: _____</p>

## MAKE A PROTRACTOR

Your teacher will give you some pattern blocks. Use what you know about the measures of the angles of the shapes and choose tools you find helpful (other than a protractor) to create a circular protractor with at least 16 different angle measures on it.

Follow these conventions when labeling your protractor.


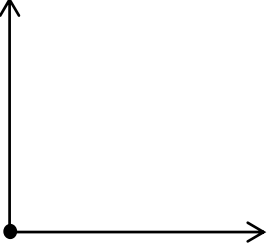
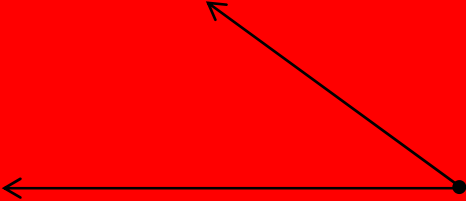
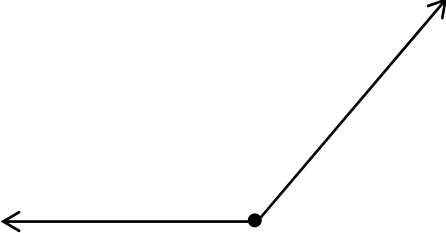
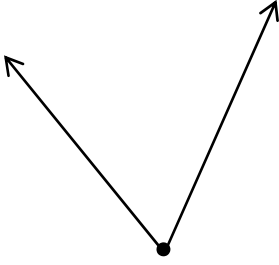
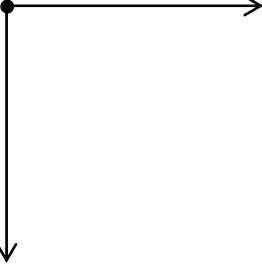

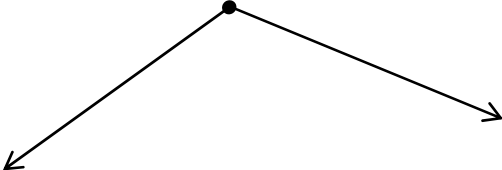
- Locate  $0^\circ$  with a ray that begins at the center of the circle and points to the right.
- Label angles in a counterclockwise direction.
- The angle that makes one full rotation around the circle is  $360^\circ$ .



1. Compare your protractor to a commercially-made protractor. How is the commercial protractor different?
2. What tools did you find most useful when creating your protractor? Explain.

## MEASURING ANGLES WITH A PROTRACTOR


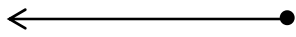
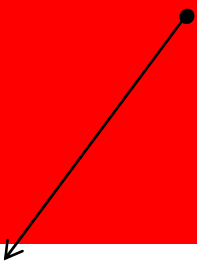
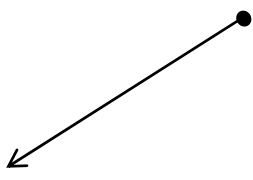

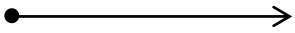

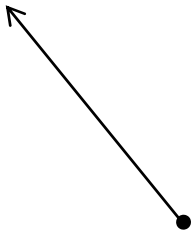
State whether each angle appears to be acute, right, obtuse, or straight. Then use a protractor to find and record the measure of the angle.

<p>1. _____</p> 	<p>2. _____</p> 
<p>3. _____</p> 	<p>4. _____</p> 
<p>5. _____</p> 	<p>6. _____</p> 
<p>7. _____</p> 	<p>8. _____</p> 

9. Lee measured the angle in problem 8 and got  $60^\circ$ . Write a sentence explaining why this is incorrect and how Lee can avoid this mistake.

## DRAWING ANGLES WITH A PROTRACTOR

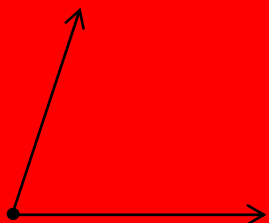
State whether each measure represents an acute, right, straight, or obtuse angle. Then use a protractor to draw the angle. One ray and the vertex of the angle are given.

<p>1. <math>60^\circ</math> _____</p> 	<p>2. <math>100^\circ</math> _____</p> 
<p>3. <math>30^\circ</math> _____</p> 	<p>4. <math>180^\circ</math> _____</p> 
<p>5. <math>90^\circ</math> _____</p> 	<p>6. <math>145^\circ</math> _____</p> 
<p>7. <math>10^\circ</math> _____</p> 	<p>8. <math>90^\circ</math> _____</p> 

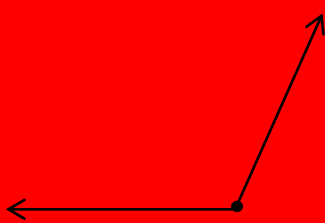
# ANGLES PRACTICE

State whether each angle appears to be acute, right, or obtuse. Then use a protractor to find and record the measure.

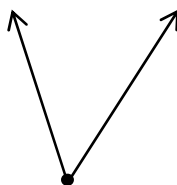
1. \_\_\_\_\_



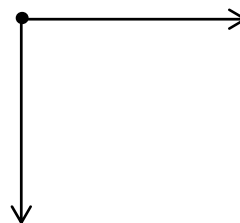
2. \_\_\_\_\_



3. \_\_\_\_\_



4. \_\_\_\_\_



State whether each measure represents an acute, right, or obtuse angle. Then use a protractor to draw the angle. One ray of the angle is given.

5.  $80^\circ$  \_\_\_\_\_



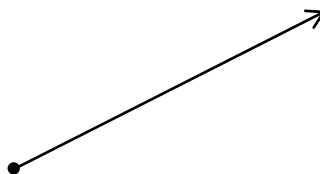
6.  $45^\circ$  \_\_\_\_\_



6.  $150^\circ$  \_\_\_\_\_



7.  $15^\circ$  \_\_\_\_\_





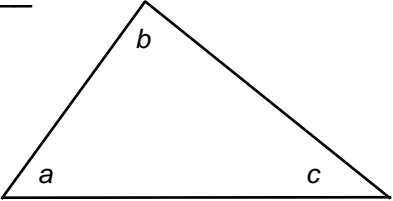

## TEAR IT UP

We will use absolute value symbols to indicate the measure of an angle.  
 "The measure of angle  $P$  equals  $49^\circ$ " will be written as  $|\angle p| = 49^\circ$ .

Your teacher will give you some directions about tearing angles from triangles and quadrilaterals before doing problems 1 and 2.

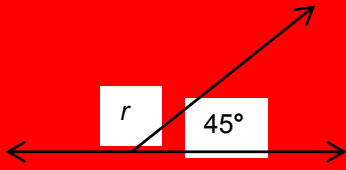
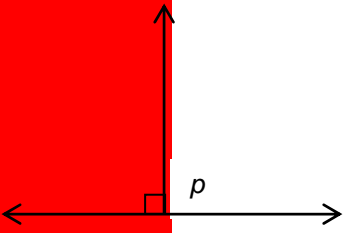
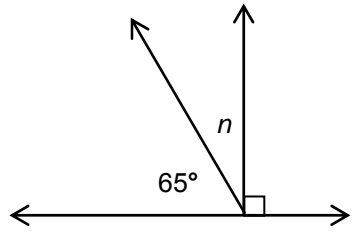
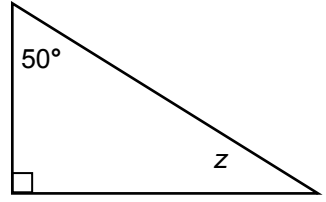
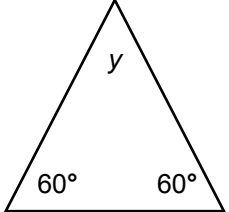
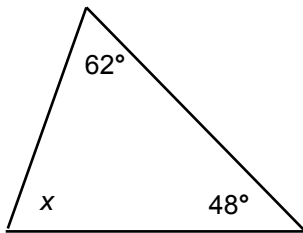
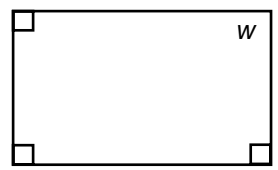
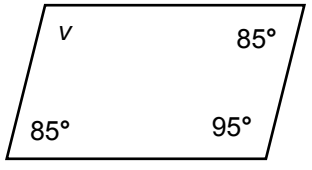
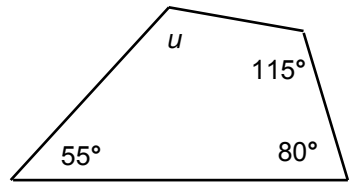
<p>1. The sum of the measures of the interior angles in a triangle is _____ because...</p>	<p>Sketch your diagram here.</p>
<p>2. The sum of the measures of the interior angles in a quadrilateral is _____ because...</p>	<p>Sketch your diagram here.</p>

Find the angle measures and their sum for each polygon below.

<p>3. <math> \angle a  = \underline{\hspace{2cm}}</math>   <math> \angle b  = \underline{\hspace{2cm}}</math>   <math> \angle c  = \underline{\hspace{2cm}}</math></p> <p>4. The sum of the measures of these three angles is _____.</p> <p>5. Is this what you expected? _____ Explain.</p>	
<p>6. <math> \angle e  = \underline{\hspace{2cm}}</math>   <math> \angle f  = \underline{\hspace{2cm}}</math></p> <p>7. <math> \angle g  = \underline{\hspace{2cm}}</math>   <math> \angle h  = \underline{\hspace{2cm}}</math></p> <p>8. The sum of the measures of these four angles is _____.</p> <p>9. Is this what you expected? _____ Explain.</p>	

## FIND THE MISSING ANGLE MEASURES

Use facts about angles, triangles, and quadrilaterals to write the missing angle measures. Do not use a protractor. Diagrams may not be to scale.

<p>1. <math> \angle r  = \underline{\hspace{2cm}}</math></p> 	<p>2. <math> \angle p  = \underline{\hspace{2cm}}</math></p> 	<p>3. <math> \angle n  = \underline{\hspace{2cm}}</math></p> 
<p>4. <math> \angle z  = \underline{\hspace{2cm}}</math></p> 	<p>5. <math> \angle y  = \underline{\hspace{2cm}}</math></p> 	<p>6. <math> \angle x  = \underline{\hspace{2cm}}</math></p> 
<p>7. <math> \angle w  = \underline{\hspace{2cm}}</math></p> 	<p>8. <math> \angle v  = \underline{\hspace{2cm}}</math></p> 	<p>9. <math> \angle u  = \underline{\hspace{2cm}}</math></p> 

# ANGLE EXPLORATIONS

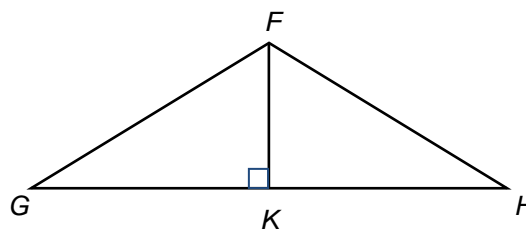
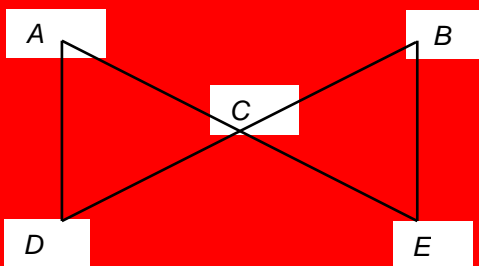
### Summary

We will use patterns to learn facts about angles. We will use these facts to write equations and solve for unknown angle measures in diagrams.

### Goals

- Understand facts about supplementary, complementary, vertical, and adjacent angles.
- Use facts about angles to solve problems.
- Write and solve equations involving angle measures.

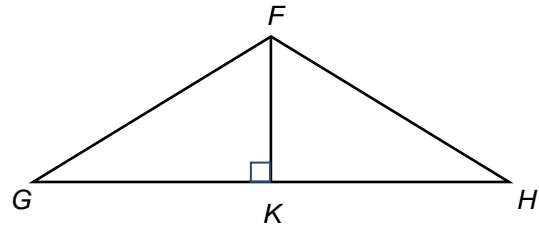
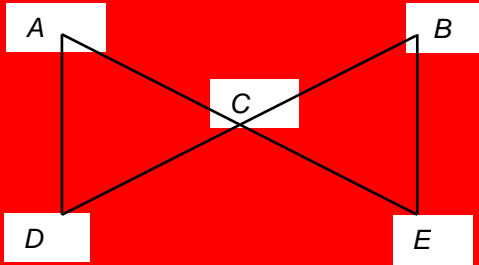
### Warmup



Use the diagrams above.

<p>1. Name two right angles.</p>	<p>2. Name two acute angles.</p>
<p>3. Name two straight angles.</p>	<p>4. Name two obtuse angles.</p>

## SPECIAL ANGLES



Use the two diagrams above and the definitions below to name the angle pairs.

<p>1. <b>Adjacent angles</b> are angles that share a common vertex and a common side, and that lie on opposite sides of the common side. Name two pairs of adjacent angles.</p> <p style="text-align: center;">∠ _____ and ∠ _____</p> <p style="text-align: center;">∠ _____ and ∠ _____</p>	<p>2. <b>Vertical angles</b> are the opposite angles formed by two lines that intersect at a point. Name two pairs of vertical angles.</p> <p style="text-align: center;">∠ _____ and ∠ _____</p> <p style="text-align: center;">∠ _____ and ∠ _____</p>
<p>3. <b>Complementary angles</b> are two angles with measures whose sum is <math>90^\circ</math>. Name two pairs of complementary angles.</p> <p style="text-align: center;">∠ _____ and ∠ _____</p> <p style="text-align: center;">∠ _____ and ∠ _____</p>	<p>4. <b>Supplementary angles</b> are two angles with measures whose sum is <math>180^\circ</math>. Name two pairs of supplementary angles.</p> <p style="text-align: center;">∠ _____ and ∠ _____</p> <p style="text-align: center;">∠ _____ and ∠ _____</p>

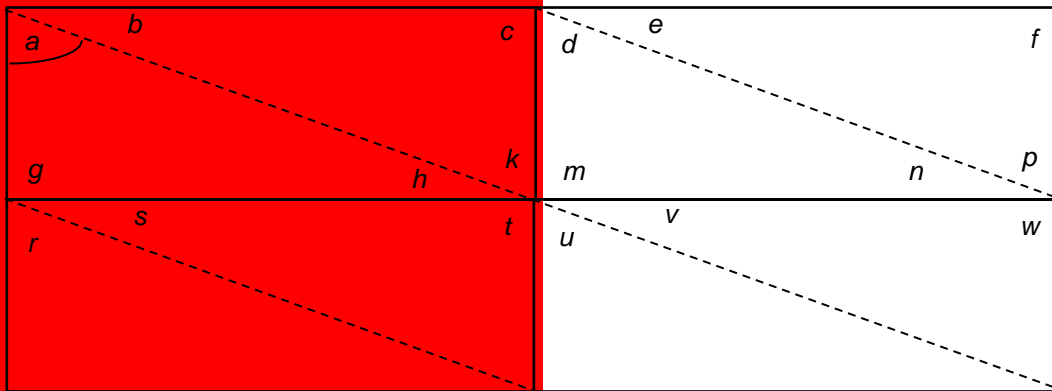
5. If complementary angles have the same measure, each angle measures \_\_\_\_\_ degrees.
6. If supplementary angles have the same measure, each angle measures \_\_\_\_\_ degrees.
7. Vanessa thinks that  $\angle ACD$  and  $\angle BCE$  cannot be vertical angles because they are in a “horizontal” orientation. Why is Vanessa incorrect?

# SHAPES MADE FROM TRIANGLES

1. The sum of the angle measures in the interior of a triangle is \_\_\_\_\_.

Consider the large rectangle below. Four non-overlapping rectangles exactly cover the large rectangle. Their sides and diagonals form triangles.

2. Lightly shade in  $\angle a$ ,  $\angle g$ , and  $\angle h$  using three different colors. Then shade all the other labeled angles using the same color for angles that appear to have the same measure.



3. Name angles that are shaded the same color as:

$\angle a$  \_\_\_\_\_  $\angle g$  \_\_\_\_\_  $\angle h$  \_\_\_\_\_

4. Label the right angles in the diagram as  $\perp$ .

Suppose  $|\angle k| = 55^\circ$ . Find the following angle measures. Support each answer with an explanation or calculation.

5. $ \angle b  = \underline{\hspace{2cm}}$	6. $ \angle h  = \underline{\hspace{2cm}}$	7. $ \angle u  = \underline{\hspace{2cm}}$	8. $ \angle w  = \underline{\hspace{2cm}}$
9. $ \angle e  +  \angle f  +  \angle p  = \underline{\hspace{2cm}}$		10. $ \angle h  +  \angle k  +  \angle m  = \underline{\hspace{2cm}}$	
11. $ \angle a  +  \angle b  +  \angle c  +  \angle k  +  \angle h  +  \angle g  = \underline{\hspace{2cm}}$			

## SHAPES MADE FROM TRIANGLES (Continued)

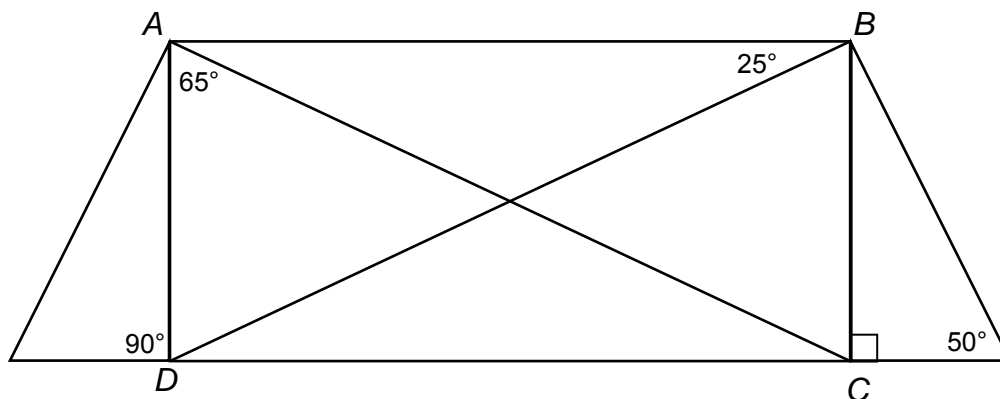
Refer to the rectangle diagram on page 11.

12. Name a pair of vertical angles. \_\_\_\_\_ Does it appear that vertical angles have the same measure? \_\_\_\_\_ Explain.
13. Chase thinks that  $\angle h$  and  $\angle u$  are vertical angles. Is he correct? \_\_\_\_\_ Explain.
14. Name a pair of adjacent complementary angles. \_\_\_\_\_
15. Name a pair of non-adjacent complementary angles. \_\_\_\_\_
16. Name a pair of supplementary angles. \_\_\_\_\_ Must supplementary angles be adjacent? \_\_\_\_\_ Explain.

A trapezoid is a quadrilateral with a pair of parallel sides.

An isosceles trapezoid is a trapezoid with exactly one pair of parallel sides, in which the nonparallel sides are congruent.

Triangles are often used to make structures stronger. Below is a diagram of a trestle bridge that can support trains. This bridge is an isosceles trapezoid, and  $ABCD$  is a rectangle.



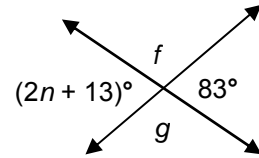
17. Write in the measures of all the angles on the trestle bridge above.

## USING ALGEBRA TO FIND ANGLE MEASURES

1. Find the measures of  $\angle f$  and  $\angle g$  in the diagram below. Explain your reasoning and show your work.

$|\angle f| = \underline{\hspace{2cm}}$

$|\angle g| = \underline{\hspace{2cm}}$



The diagram is not to scale.

2. Refer to the diagram above. Write two different equations that could be used to find the value of  $(2n + 13)$ . Then solve for  $n$  in each equation.

Equation:

Equation:

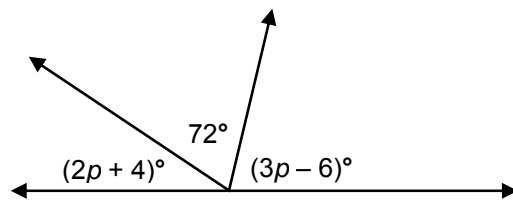
$n = \underline{\hspace{2cm}}$                        $2n + 13 = \underline{\hspace{2cm}}$

$n = \underline{\hspace{2cm}}$                        $2n + 13 = \underline{\hspace{2cm}}$

Check:

Check:

3. Use an equation to find the measure of each angle in this diagram. Show your work. Check your results.

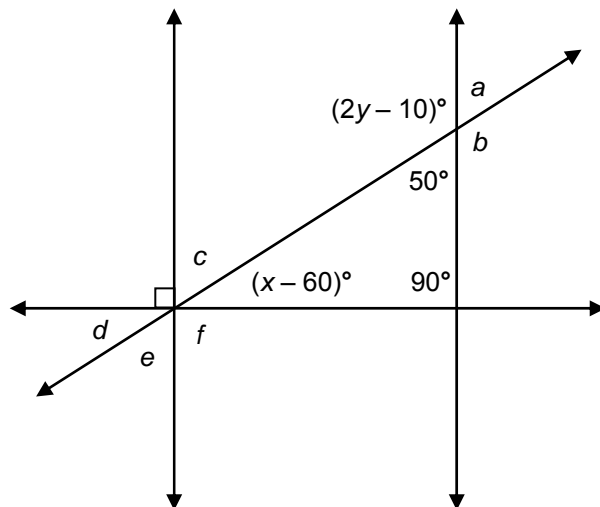


The diagram is not to scale.

## PRACTICE FINDING ANGLE MEASURES

Find the missing values below by writing and solving equations. The diagram may not be to scale.

1. Find  $x$ .



2. Find  $y$ .

Find the measure of each angle and support each answer with an explanation or calculation.

<p>3. <math> \angle a  = \underline{\hspace{2cm}}</math></p>	<p>4. <math> \angle b  = \underline{\hspace{2cm}}</math></p>
<p>5. <math> \angle c  = \underline{\hspace{2cm}}</math></p>	<p>6. <math> \angle d  = \underline{\hspace{2cm}}</math></p>
<p>7. <math> \angle e  = \underline{\hspace{2cm}}</math></p>	<p>8. <math> \angle f  = \underline{\hspace{2cm}}</math></p>



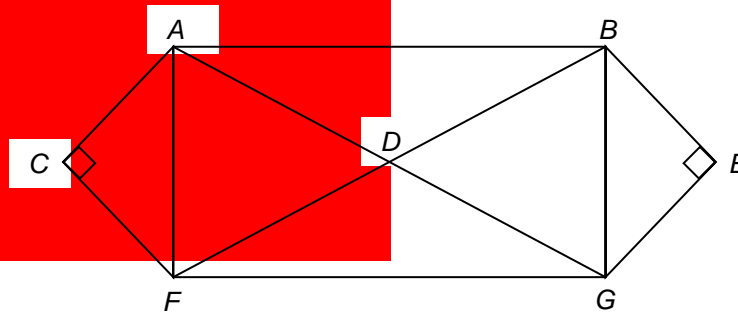
# DRAWING TRIANGLES AND QUADRILATERALS

**Summary**

We will classify triangles based on the measure of their sides and angles. We will draw figures freehand, and using rulers and protractors. We will observe conditions that make a triangle unique.

- Goals**
- Draw figures freehand, with a ruler and protractor.
  - Construct triangles given side lengths and angle measures.
  - Recognize when conditions determine a unique triangle, more than one triangle, or no triangle.

### Warmup





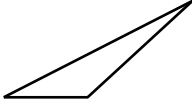
Use the diagram for the problems below.  $ABGF$  is a rectangle.

<p>1. Name two pairs of adjacent angles.</p> <p style="text-align: center;"><math>\angle</math> _____ and <math>\angle</math> _____</p> <p style="text-align: center;"><math>\angle</math> _____ and <math>\angle</math> _____</p>	<p>2. Name two pairs of vertical angles.</p> <p style="text-align: center;"><math>\angle</math> _____ and <math>\angle</math> _____</p> <p style="text-align: center;"><math>\angle</math> _____ and <math>\angle</math> _____</p>
<p>3. Name two pairs of complementary angles.</p> <p style="text-align: center;"><math>\angle</math> _____ and <math>\angle</math> _____</p> <p style="text-align: center;"><math>\angle</math> _____ and <math>\angle</math> _____</p>	<p>4. Name two pairs of supplementary angles.</p> <p style="text-align: center;"><math>\angle</math> _____ and <math>\angle</math> _____</p> <p style="text-align: center;"><math>\angle</math> _____ and <math>\angle</math> _____</p>

## TRIANGLE AND QUADRILATERAL REVIEW



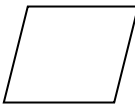
<u>Sides Names</u>	<b>Triangles</b>	<u>Angle Names</u>
<ul style="list-style-type: none"> <li>• An <u>equilateral</u> triangle is a triangle with three congruent sides.</li> <li>• An <u>isosceles</u> triangle is a triangle with at least two congruent sides.</li> <li>• A <u>scalene</u> triangle is a triangle with no congruent sides.</li> </ul>		<ul style="list-style-type: none"> <li>• An <u>acute</u> triangle is a triangle with three acute angles.</li> <li>• A <u>right</u> triangle is a triangle with one right angle.</li> <li>• An <u>obtuse</u> triangle is a triangle with one obtuse angle.</li> </ul>

Classify each triangle below using one word from the list of side names and one word from the list of angle names. If sides or angles appear to be equal in measure, assume that they are.

<p>1. _____ _____</p> 	<p>2. _____ _____</p> 	<p>3. _____ _____</p> 
--	--	--

<b>Quadrilaterals</b>
<ul style="list-style-type: none"> <li>• A <u>trapezoid</u> is a quadrilateral with at least one pair of parallel sides.</li> <li>• A <u>parallelogram</u> is a quadrilateral with two pairs of congruent, parallel sides.</li> <li>• A <u>rectangle</u> is a parallelogram with four right angles.</li> <li>• A <u>rhombus</u> is a parallelogram with four congruent sides.</li> <li>• A <u>square</u> is a rectangle with four congruent sides.</li> </ul>

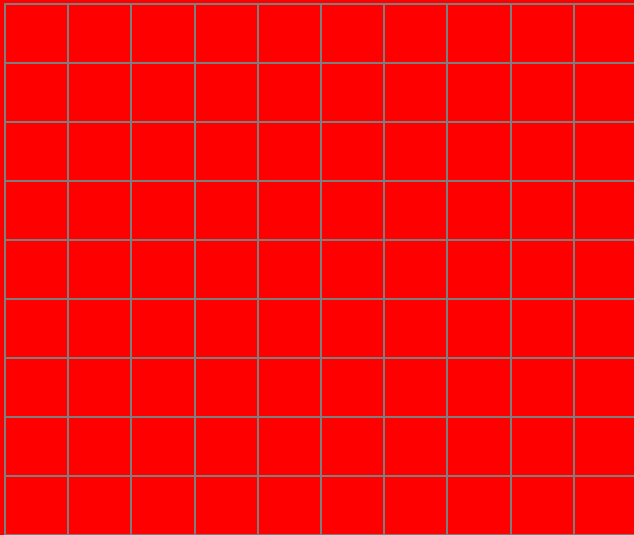
Use at least two quadrilateral names to classify each figure. If sides or angles appear to be equal in measure, assume they are.

<p>4. _____ _____</p> 	<p>5. _____ _____</p> 	<p>6. _____ _____</p> 
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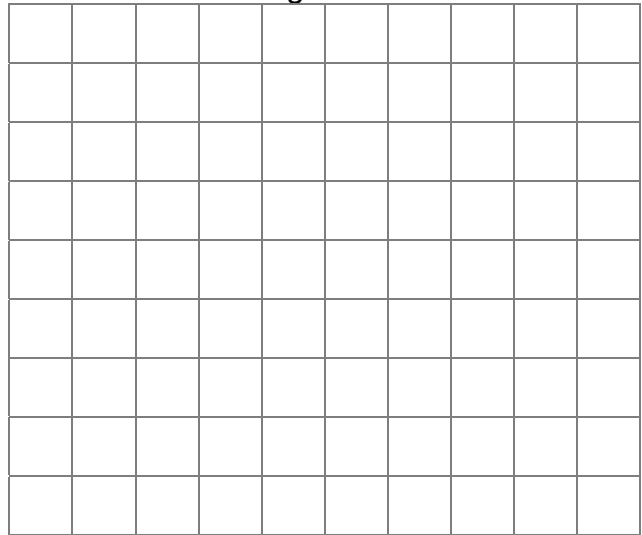
## SKETCHING FIGURES

Draw each figure described below freehand. Do not use rulers or protractors.

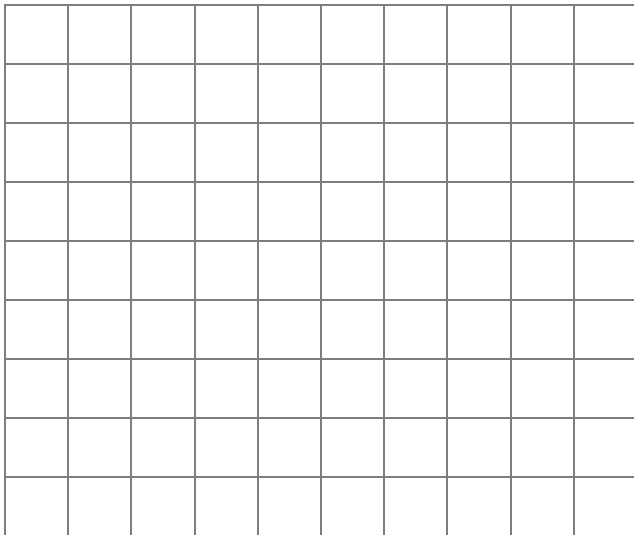
1. A square with side lengths that measure 7 units each.



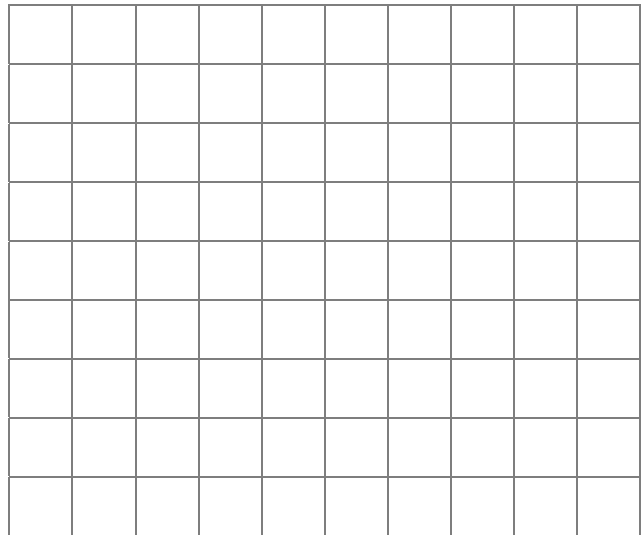
2. An isosceles right triangle with the two sides measuring 6 units each.



3. An isosceles trapezoid with a height of 4 units and bases that measure 3 units and 5 units.



4. An obtuse scalene triangle with a height and a base that measure 4 units each.



5. Compare your figures with those drawn by classmates. Did you draw the same figures? Explain.

## PROTRACTOR AND RULER DRAWINGS

Your teacher will read directions for drawing triangles. Listen carefully and use the space below to draw your triangles with a centimeter ruler and a protractor.

1.

Triangle names: \_\_\_\_\_

Do these directions provide for a unique triangle? \_\_\_\_\_

2.

Triangle names: \_\_\_\_\_

Do these directions provide for a unique triangle? \_\_\_\_\_

## PROTRACTOR AND RULER DRAWINGS (Continued)

Your teacher will read directions for drawing a triangle. Listen carefully and use the space below to draw your triangle with a centimeter ruler and a protractor.

3.

Triangle names: \_\_\_\_\_

Do these directions provide for a unique triangle? \_\_\_\_\_

4. For each triangle you drew in problems 1-3, measure and label all of the sides and angles.
5. Under what conditions do you think you can draw a unique triangle? Explain.

**PRACTICE DRAWING GEOMETRIC FIGURES**

We will use absolute value symbols to indicate the length of a line segment.

“The length of segment  $AB$  ( $\overline{AB}$ ) equals 3 cm” will be written as  $|AB| = 3$  cm.

1. Each of the angles in an equilateral triangle measures \_\_\_\_\_. Draw an equilateral triangle  $XYZ$  with sides measuring 4.5 cm each.

2. An isosceles triangle that is not equilateral has \_\_\_\_\_ sides of equal length and \_\_\_\_\_ angles of equal measure. Draw an isosceles triangle with  $\angle UVW$  measuring  $40^\circ$  and  $|UV| = |VW| = 3.5$  cm.

3. A right trapezoid that is not a parallelogram has \_\_\_\_\_ sides, \_\_\_\_\_ of which are parallel. Draw right trapezoid  $QRST$  with bases  $\overline{QR}$  and  $\overline{TS}$  measuring 5 cm and 7 cm, respectively, and a height of 2 cm. Measure the angles and write them inside the figure.

## IMPOSSIBLE TRIANGLES

Your teacher will lead you through an experiment prior to doing this page. Then complete problems 1-6.

1. The sum of the interior angles of any triangle is \_\_\_\_\_.
2. A(n) \_\_\_\_\_ angle measures exactly  $90^\circ$ .
3. A(n) \_\_\_\_\_ angle measures more than  $90^\circ$ , but less than  $180^\circ$ .
4. An equilateral triangle has \_\_\_\_\_ sides of equal length and \_\_\_\_\_ angles of equal measure.
5. A scalene triangle has \_\_\_\_\_ sides of equal length and \_\_\_\_\_ angles of equal measure.
6. An isosceles triangle has at least \_\_\_\_\_ sides of equal length and \_\_\_\_\_ angles of equal measure.

Explain why it is impossible to draw each triangle described below. Use diagrams to support your answers.

7. A triangle with two right angles	8. An equilateral triangle with an obtuse angle
9. An isosceles triangle with three different angle measures	10. A scalene triangle with one obtuse angle and one right angle
11. A triangle with side lengths 6 cm, 8 cm and 15 cm	12. A triangle with side lengths 2 in, 4 in, and 6 in

# SKILL BUILDERS, VOCABULARY, AND REVIEW

## SKILL BUILDER 1

- There are 36 students in a classroom, and boys make up about 40% of the class. How many boys and how many girls do you think are in the class? Show your work and explain your reasoning.
- Julian went to the store and bought a pair of shoes for \$40. The cashier asked him for \$42. How much tax did he pay, and what was the percent sales tax?

Compute.

3. $-8 + (4 - 7)$	4. $24 - 4(8 + 2)$	5. $7 - (-3)(9) + 32$
6. $\frac{4 - 8(2)}{3(-8)}$	7. $\frac{5 - 12 + (-4)}{8 + 2(-6)}$	8. $2^3 + (5 - 3)^2$

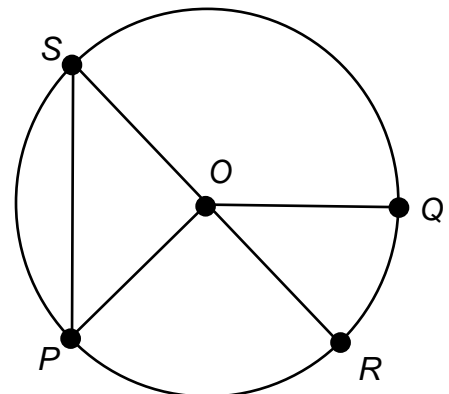
- A bird is flying 45 feet above sea level and a fish is swimming 27 feet below sea level directly below the bird. What is the distance between them?

Name the parts of the circle  $O$ . Assume that if points appear to be collinear, then they are collinear.

10. All radii: \_\_\_\_\_

11. All diameters: \_\_\_\_\_

12. All chords: \_\_\_\_\_





## SKILL BUILDER 2

Simplify each complex fraction. Use a strategy of your choice.

<p>1. <math>\frac{\frac{3}{4}}{\frac{5}{12}}</math></p>	<p>2. <math>\frac{\frac{15}{16}}{\frac{3}{8}}</math></p>
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During a game, if you roll a number cube and get a 5, you get an extra turn.

3. What is the theoretical probability of rolling a 5? \_\_\_\_\_
4. If you played the game and took a total of 20 turns, how many extra turns would you expect out of the 20? Explain.

5. Roll a number cube as many times as it takes to get the number of extra turns you predicted in problem 4. Record your data in the table to the right.

What was your total number of turns (including the extras)?

Does this change your prediction from problem 4?

Result	Tally	Total
1		
2		
3		
4		
5		
6		

Simplify.

<p>6. <math>3n + 5(n - 7) + 3</math></p>	<p>7. <math>4 - 2(x + 9) - 32</math></p>	<p>8. <math>3y - 2y + 5 - y + 9</math></p>
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**SKILL BUILDER 3**

1. As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write and solve an inequality for the number of sales,  $x$ , you need to make. What is the minimum number of sales you must make?

Compute.

2. $3.5 + (-4.2)(0.9)$	3. $3\frac{1}{2} + \left(2\frac{1}{2} - 3\frac{3}{4}\right)$	4. $\frac{5}{8}\left(-2\frac{3}{4}\right) - 6.7$
------------------------	--	--

5. Hazel was getting dressed, but she couldn't see what was inside the drawers. In her pants drawer, she had one pair of blue jeans, one pair of black pants, and two pairs of khaki pants. In her shirt drawer, she had a pink shirt, 3 red shirts, and 2 blue shirts.
- a. Hazel chooses one pair of pants and one shirt at random. Create a display to show the sample space for this experiment.
- b. What is the probability that Hazel chooses blue jeans and a red shirt?
6. Gus was 15 miles away from home and from that spot drove 60 miles per hour to reach his destination, which was 285 miles from his house. Write and solve an equation to find how many hours he traveled at that rate.
7. Daniel and Javi are playing a game at school. For every 5 steps that Daniel takes, Javi takes 2 steps. If together they take a total of 112 steps, how many steps did Daniel take?

### SKILL BUILDER 4

1. About how many times would you expect to roll a 6 if you rolled a number cube 200 times?
  
2. If you flipped a fair coin 300 times, do you think it is very likely you would get tails exactly 150 times? Explain.
  
3. Gloria and Gennifer are selling pistachios in front of grocery stores to raise money for their softball team. They went to a different store each day for 6 days. They each raised the following amounts of money:

Gloria: \$52, \$14, \$28, \$40, \$40, \$32

Gennifer: \$32, \$16, \$16, \$74, \$24, \$30

- a. Draw a dot plot to represent each girl's sales. Label and scale the graphs appropriately.




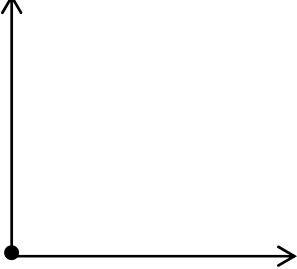
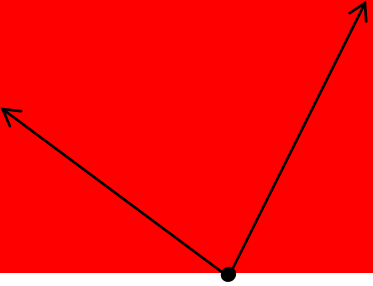
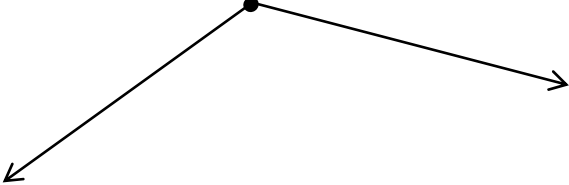
- b. Calculate the following statistics.

Statistic	Gloria	Genivra
number of observations ( $n$ )		
range		
mode(s)		
mean $\bar{x}$		

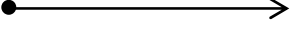
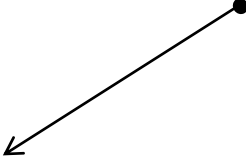
- c. Find the MAD for each girl's sales data. Explain what the MAD statistic means in the context of the amount of money they earned.

### SKILL BUILDER 5

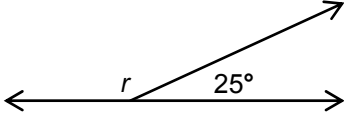
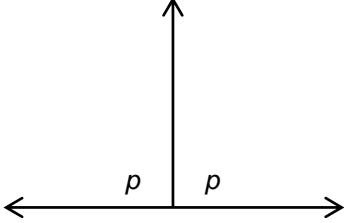
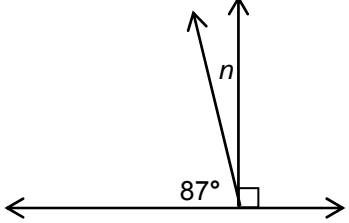
State whether each angle appears to be acute, right, obtuse, or straight. Then use a protractor to find and record the measure.

<p>1. _____</p> 	<p>2. _____</p> 
<p>3. _____</p> 	<p>4. _____</p> 

State whether each measure represents an acute, right, straight, or obtuse angle. Then use a protractor to draw the angle. One ray of the angle is given.

<p>5. <math>45^\circ</math> _____</p> 	<p>6. <math>110^\circ</math> _____</p> 
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Use facts about angles to write the missing angle measures. Do not use a protractor. Diagrams may not be to scale.

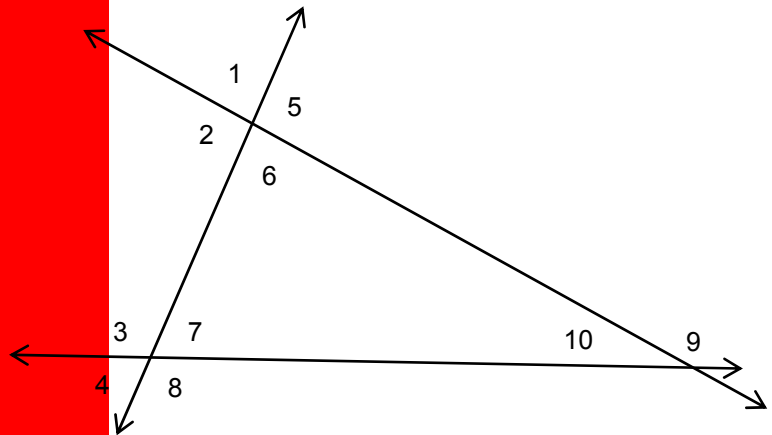
<p>7. <math> \angle r  = \underline{\hspace{2cm}}</math></p> 	<p>8. <math> \angle p  = \underline{\hspace{2cm}}</math></p> 	<p>9. <math> \angle n  = \underline{\hspace{2cm}}</math></p> 
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### SKILL BUILDER 6

- Find the measure of each angle in the diagram to the right (in any order).
- Support each answer below with a short explanation or a calculation.
- The diagram may not be to scale.

Given:  $|\angle 1| = 85^\circ$

$|\angle 3| = 108^\circ$



1. $ \angle 2  = \underline{\hspace{2cm}}$	2. $ \angle 4  = \underline{\hspace{2cm}}$
3. $ \angle 6  = \underline{\hspace{2cm}}$	4. $ \angle 7  = \underline{\hspace{2cm}}$
5. $ \angle 9  = \underline{\hspace{2cm}}$	6. $ \angle 10  = \underline{\hspace{2cm}}$

- Describe what it means for a pair of angles to be supplementary and support your description with a diagram.
- Describe what it means for a pair of angles to be complementary and support your description with a diagram.
- Describe what it means for a pair of angles to be vertical angles and support your description with a diagram.

### SKILL BUILDER 7

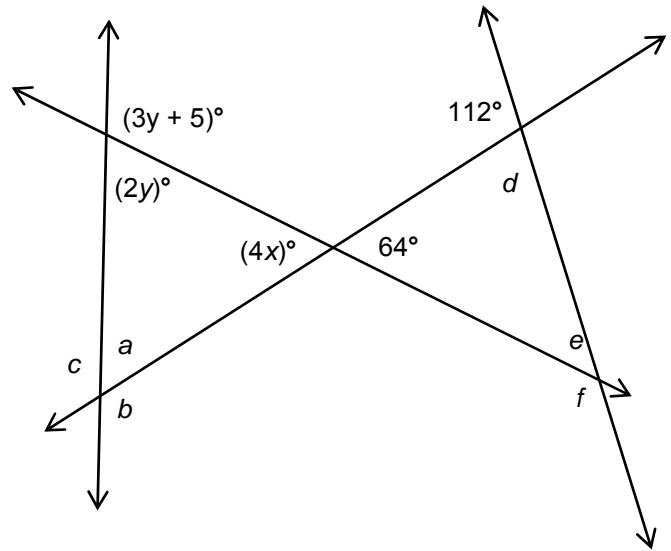
Write and solve equations to find the values for the variables below. Show your work.

1. Find  $x$ .

$x = \underline{\hspace{2cm}}$

2. Find  $y$ .

$y = \underline{\hspace{2cm}}$



The diagram may not be to scale.

Find the measure of each angle and support each answer below with an explanation or calculation.

<p>3. <math> \angle a  = \underline{\hspace{2cm}}</math></p>	<p>4. <math> \angle b  = \underline{\hspace{2cm}}</math></p>
<p>5. <math> \angle c  = \underline{\hspace{2cm}}</math></p>	<p>6. <math> \angle d  = \underline{\hspace{2cm}}</math></p>
<p>7. <math> \angle e  = \underline{\hspace{2cm}}</math></p>	<p>8. <math> \angle f  = \underline{\hspace{2cm}}</math></p>

**SKILL BUILDER 8**

Draw each figure using appropriate tools.

1. Draw an equilateral triangle with side lengths of 3 cm.	2. Draw a quadrilateral where opposite sides have the same length, and no sides meet at right angles.
3. Draw a right triangle with two angles that have equal measure.	4. Draw a quadrilateral whose opposite sides have equal length and that has at least two right angles.

5. Which of the sets of three lengths below can be lengths of sides of a triangle? Explain.

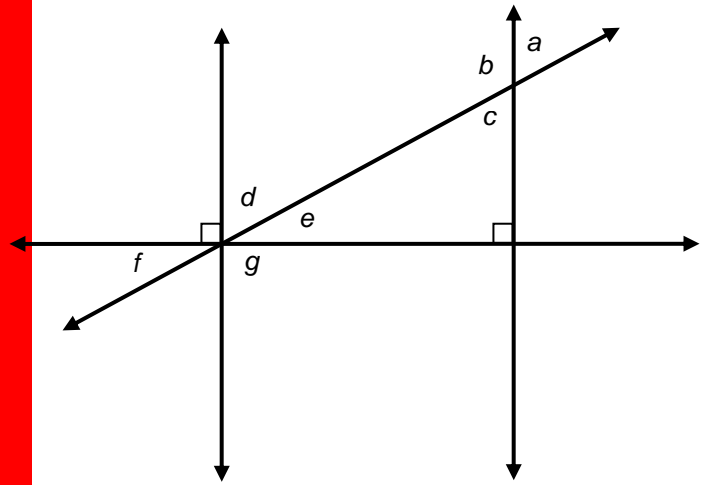
- Sides that are 2 cm, 3 cm, and 6 cm.
- Sides that are 6 cm, 3 cm, and 5 cm.
- Sides that are 5 cm, 6 cm, and 11 cm.

Explain why it is impossible to create each triangle described below. Use diagrams to support your answers.

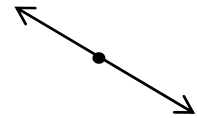
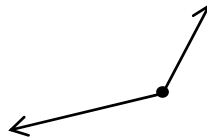
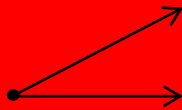
6. A scalene triangle with two congruent angles.	7. An obtuse triangle with a right angle.
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# FOCUS ON VOCABULARY

Word List	
straight	acute
right	obtuse
adjacent	complementary
supplementary	vertical



Choose the best word to describe each angle.



1. \_\_\_\_\_      2. \_\_\_\_\_      3. \_\_\_\_\_      4. \_\_\_\_\_

Write ALL the words that apply to each **pair** of angles below.

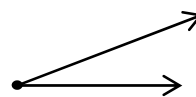
5. $\angle a$ and $\angle b$	
6. $\angle a$ and $\angle c$	
7. $\angle d$ and $\angle e$	
8. $\angle e$ and $\angle f$	
9. $\angle e$ and $\angle c$	



**SELECTED RESPONSE**

Show your work on a separate sheet of paper and select the best answer(s).

1. Choose all the statements that are true about the angle to the right.

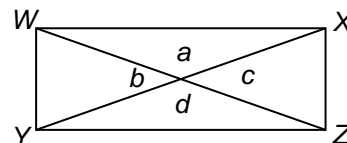


- A. It is acute.  
 B. It measures less than  $90^\circ$ .  
 C. It is obtuse.  
 D. It measures more than  $90^\circ$ .

2. Choose the pairs of angles that *always* have equal measure.

- A. Adjacent angles  
 B. Complementary angles  
 C. Supplementary angles  
 D. Vertical angles

Use rectangle  $WXZY$  to answer problems 3-4.



3. Choose all the statements that are true for rectangle  $WXZY$ .

- A. Angles  $d$  and  $c$  are supplementary angles.  
 B. Angles  $b$  and  $d$  are complementary angles.  
 C. Angles  $a$  and  $d$  are equal in measure.  
 D. Angles  $a$  and  $b$  are adjacent angles.

4. Choose all the statements that are true for rectangle  $WXZY$ .

- A. If  $|\angle a| = 30^\circ$ ,  $|\angle b| = 60^\circ$   
 B. If  $|\angle c| = 30^\circ$ ,  $|\angle d| = 30^\circ$ .  
 C. If  $|\angle a| = 150^\circ$ ,  $|\angle b| = 30^\circ$ .  
 D.  $|\angle a| + |\angle b| + |\angle c| + |\angle d| = 360^\circ$ .

5. Choose all the shapes that are possible to draw.

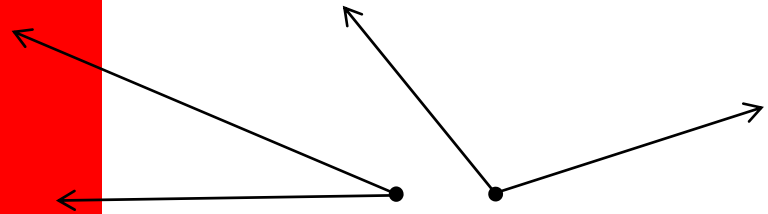
- A. A triangle with angle measures of  $30^\circ$ ,  $60^\circ$ , and  $90^\circ$ .  
 B. A triangle with two right angles.  
 C. A trapezoid with angle measures of  $80^\circ$ ,  $80^\circ$ ,  $100^\circ$ ,  $100^\circ$ .  
 D. A triangle with side lengths of 10, 5, and 3 units.

## KNOWLEDGE CHECK

Show your work on a separate sheet of paper and write your answers on this page.

### 14.1 Angle Measurements

1. Measure the angles to the right.



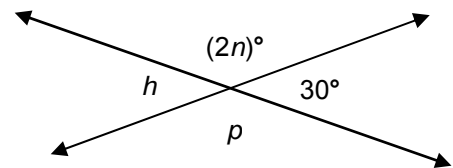
2. Draw an angle that measures  $15^\circ$ .

3. Two angles in a triangle measure  $45^\circ$  and  $50^\circ$ . What is the measure of the third angle?

### 14.2 Angle Explorations

4. What is the measure of an angle that is complementary to an angle measuring  $47^\circ$ ?

5. Find the measures of the unknown angles in the diagram to the right.



### 14.3 Drawing Triangles and Quadrilaterals

6. Draw an isosceles triangle with two sides equal to 3 inches.

7. Is the triangle you drew in problem 6 unique? Explain.

**HOME-SCHOOL CONNECTION**

Here are some problems to review with your young mathematician.

1. Name a pair of vertical angles and a pair of adjacent angles in the diagram to the right. Which of the pairs of angles you named are equal in measure?

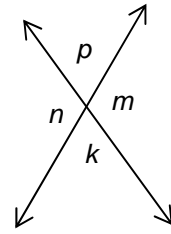


Diagram may not be to scale.

2. If  $|\angle p| = 62^\circ$ , find the measures of the other three angles in the diagram above.
3. A trapezoid has angle measures of  $45^\circ$ ,  $65^\circ$ , and  $120^\circ$ . What is the measure of the fourth angle?
4. Use a ruler to draw a triangle that has side lengths of 3, 4, and 5 inches. What kind of triangle does it appear to be (side name and angle name)?
5. Explain why it's impossible to make a triangle that has two right angles.

Parent (or Guardian) Signature \_\_\_\_\_

# COMMON CORE STATE STANDARDS – MATHEMATICS

## STANDARDS FOR MATHEMATICAL CONTENT

<b>7.EE.B</b>	<b>Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</b>
7.EE.4a	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities: Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$ , where $p$ , $q$ , and $r$ are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. <i>For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?</i>
<b>7.G.A</b>	<b>Draw, construct and describe geometrical figures and describe the relationships between them.</b>
7.G.2	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
<b>7.G.B</b>	<b>Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</b>
7.G.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

## STANDARDS FOR MATHEMATICAL PRACTICE

MP3	Construct viable arguments and critique the reasoning of others.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.



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