Lesson 1 Problem Set

Name ___________________________________________ Date _______________________

1. Use the following directions to draw a figure in the box to the right.
   a. Draw two points: \( A \) and \( B \).
   b. Use a straightedge to draw \( 
      \overrightarrow{AB} \n      \).
   c. Draw a new point that is not on \( 
      \overrightarrow{AB} \n      \). Label it \( C \).
   d. Draw \( \overrightarrow{AC} \).
   e. Draw a point not on \( 
      \overrightarrow{AB} \n      \) or \( 
      \overrightarrow{AC} \n      \). Call it \( D \).
   f. Construct \( 
      \overrightarrow{CD} \n      \).
   g. Use the points you’ve already labeled to name one angle. ____________

2. Use the following directions to draw a figure in the box to the right.
   a. Draw two points: \( A \) and \( B \).
   b. Use a straightedge to draw \( 
      \overrightarrow{AB} \n      \).
   c. Draw a new point that is not on \( 
      \overrightarrow{AB} \n      \). Label it \( C \).
   d. Draw \( \overrightarrow{BC} \).
   e. Draw a new point that is not on \( 
      \overrightarrow{AB} \n      \) or \( 
      \overrightarrow{BC} \n      \).
      Label it \( D \).
   f. Construct \( 
      \overrightarrow{AD} \n      \).
   g. Identify \( \angle DAB \) by drawing an arc to indicate the position of the angle.
   h. Identify another angle by referencing points that you have already drawn. ____________
3.  
   a.  Observe the familiar figures below.  Label some points on each figure.  
   b.  Use those points to label and name representations of each of the following in the table below:  ray, line, line segment, and angle.  Extend segments to show lines and rays.

<table>
<thead>
<tr>
<th></th>
<th>House</th>
<th>Flash drive</th>
<th>Compass rose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ray</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line segment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angle</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Extension:  Draw a familiar figure.  Label it with points, and then identify rays, lines, line segments, and angles as applicable.
1. Use the right angle template that you made in class to determine if each of the following angles is greater than, less than, or equal to a right angle. Label each as **greater than**, **less than**, or **equal to**, and then connect each angle to the correct label of acute, right, or obtuse. The first one has been completed for you.

   a. 
   ![Less than](Less than)

   b. 
   ![Acute](Acute)

   c. 
   ![Right](Right)

   d. 
   ![Obtuse](Obtuse)

   e. 
   ![Less than](Less than)

   f. 
   ![Acute](Acute)

   g. 
   ![Right](Right)

   h. 
   ![Obtuse](Obtuse)

   i. 
   ![Less than](Less than)

   j. 
   ![Acute](Acute)
2. Use your right angle template to identify acute, obtuse, and right angles within Picasso’s painting *Factory, Horta de Ebbo*. Trace at least two of each, label with points, and then name them in the table below the painting.

<table>
<thead>
<tr>
<th>Acute angle</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtuse angle</td>
<td></td>
</tr>
<tr>
<td>Right angle</td>
<td></td>
</tr>
</tbody>
</table>

© 2013 Estate of Pablo Picasso / Artists Rights Society (ARS), New York Photo: Erich Lessing / Art Resource, NY.
3. Construct each of the following using a straightedge and the right angle template that you created. Explain the characteristics of each by comparing the angle to a right angle. Use the words greater than, less than, or equal to in your explanations.

a. Acute angle

b. Right angle

c. Obtuse angle
Lesson 3 Problem Set

1. On each object, trace at least one pair of lines that appear to be perpendicular.

2. How do you know if two lines are perpendicular?

3. In the square and triangular grids below, use the given segments in each grid to draw a line that is perpendicular using a straightedge.
4. Use the right angle template that you created in class to determine which of the following figures have a right angle. Mark each right angle with a small square. For each right angle you find, name the corresponding pair of perpendicular lines. (Problem 4(a) has been started for you.)

a. \[ \overline{AB} \perp \overline{BD} \]

b. 

c. 

d. 

e. 

f. 

g. 

h. 
5. Mark each right angle on the following figure with a small square. (Note: A right angle does not have to be inside the figure.) How many pairs of perpendicular sides does this figure have?

![Diagram of a figure with right angles marked]

6. True or false? Shapes that have at least one right angle also have at least one pair of perpendicular sides. Explain your thinking.
Lesson 4 Problem Set

Name ________________________________________ Date __________________

1. On each object, trace at least one pair of lines that appear to be parallel.

   ![Musical note](image1)
   ![Piano keys](image2)
   ![Brick wall](image3)
   ![Notebook](image4)
   ![Stopwatch](image5)
   ![Castle](image6)
   ![Triangle](image7)
   ![Ruler](image8)

2. How do you know if two lines are parallel?

3. In the square and triangular grids below, use the given segments in each grid to draw a line that is parallel using a straightedge.

   ![Square grid](image9)
   ![Triangular grid](image10)
4. Determine which of the following figures have lines that are parallel by using a straightedge and the right angle template that you created. Circle the letter of the shapes that have at least one pair of parallel lines. Mark each pair of parallel lines with arrowheads, and then identify the parallel lines with a statement modeled after the one in 4(a).

a. 

\[ \overline{AB} \parallel \overline{CD} \]

d. 

e. 

\[ \overline{AB} \parallel \overline{CD} \]

h. 

\[ \overline{AB} \parallel \overline{CD} \]
5. True or false? A triangle cannot have sides that are parallel. Explain your thinking.

6. Explain why $\overline{AB}$ and $\overline{CD}$ are parallel, but $\overline{EF}$ and $\overline{GH}$ are not.

7. Draw a line using your straightedge. Now, use your right angle template and straightedge to construct a line parallel to the first line you drew.
Lesson 5: Use a circular protractor to understand a 1-degree angle as $\frac{1}{360}$ of a turn. Explore benchmark angles using the protractor.

Name ____________________________ Date ________________

1. Make a list of the measures of the benchmark angles you drew, starting with Set A. Round each angle measure to the nearest 5°. Both sets have been started for you.

   a. Set A: 45°, 90°,

   b. Set B: 30°, 60°,

2. Circle any angle measures that appear on both lists. What do you notice about them?

3. List the angle measures from Problem 1 that are acute. Trace each angle with your finger as you say its measurement.

4. List the angle measures from Problem 1 that are obtuse. Trace each angle with your finger as you say its measurement.
5. We found out today that $1^\circ$ is $\frac{1}{360}$ of a whole turn. It is 1 out of 360°. That means a $2^\circ$ angle is $\frac{2}{360}$ of a whole turn. What fraction of a whole turn is each of the benchmark angles you listed in Problem 1?

6. How many $45^\circ$ angles does it take to make a full turn?

7. How many $30^\circ$ angles does it take to make a full turn?

8. If you didn’t have a protractor, how could you reconstruct a quarter of it from $0^\circ$ to $90^\circ$?
Lesson 6: Use varied protractors to distinguish angle measure from length measurement.

Date: 9/14/14

1. Use a protractor to measure the angles, and then record the measurements in degrees.
   a. 
   b. 
   c. 
   d. 

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Lesson 6: Use varied protractors to distinguish angle measure from length measurement.

Date: 9/14/14
Lesson 6 Problem Set

2. a. Use three different-size protractors to measure the angle. Extend the lines as needed using a straightedge.

   Protractor #1: ________ °
   Protractor #2: ________ °
   Protractor #3: ________ °

   b. What do you notice about the measurement of the above angle using each of the protractors?

3. Use a protractor to measure each angle. Extend the length of the segments as needed. When you extend the segments, does the angle measure stay the same? Explain how you know.

   a.

   b.
Name ___________________________ Date ________________

Construct angles that measure the given number of degrees. For Problems 1–4, use the ray shown as one of the rays of the angle with its endpoint as the vertex of the angle. Draw an arc to indicate the angle that was measured.

1. 30°  
2. 65°  
3. 115°  
4. 135°
Lesson 7 Problem Set

5. 5°
6. 175°

7. 27°
8. 117°

9. 48°
10. 132°
Lesson 8 Problem Set

Name ________________________________  Date __________________

1. Joe, Steve, and Bob stood in the middle of the yard and faced the house. Joe turned 90° to the right. Steve turned 180° to the right. Bob turned 270° to the right. Name the object that each boy is now facing.

   Joe ____________________
   Steve __________________
   Bob ___________________

2. Monique looked at the clock at the beginning of class and at the end of class. How many degrees did the minute hand turn from the beginning of class until the end?

   Beginning  End

3. The skater jumped into the air and did a 360. What does that mean?

4. Mr. Martin drove away from his house without his wallet. He did a 180. Where is he heading now?

   House ____________________________________________ Store
5. John turned the knob of the shower 270° to the right. Draw a picture showing the position of the knob after he turned it.

Before

After

6. Barb used her scissors to cut out a coupon from the newspaper. How many quarter-turns does she need to turn the paper in order to stay on the lines?

SAVE
$1.00

7. How many quarter-turns does the picture need to be rotated in order for it to be upright?

8. Meredith faced north. She turned 90° to the right, and then 180° more. In which direction is she now facing?

N
W
S
E
1. Complete the table.

<table>
<thead>
<tr>
<th>Pattern block</th>
<th>Total number that fit around 1 vertex</th>
<th>One interior angle measures...</th>
<th>Sum of the angles around a vertex</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>60°</td>
<td>360° ÷ _____ = _____</td>
<td>_____ + _____ + _____ = 360°</td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td></td>
<td>_____ + _____ + _____ = 360°</td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Acute angle)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Obtuse angle)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Acute angle)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Find the measurements of the angles indicated by the arcs.

<table>
<thead>
<tr>
<th>Pattern blocks</th>
<th>Angle measure</th>
<th>Addition sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Diagram A" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Diagram B" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Diagram C" /></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Use two or more pattern blocks to figure out the measurements of the angles indicated by the arcs.

<table>
<thead>
<tr>
<th>Pattern blocks</th>
<th>Angle measure</th>
<th>Addition sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Diagram A" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Diagram B" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Diagram C" /></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lesson 10 Problem Set

Write an equation and solve for the measure of $\angle x$. Verify the measurement using a protractor.

1. $\angle CBA$ is a right angle.

2. $\angle GFE$ is a right angle.

3. $\angle IJK$ is a straight angle.

4. $\angle MNO$ is a straight angle.
Solve for the unknown angle measurements. Write an equation to solve.

5. Solve for the measurement of \(\angle TRU\).
\(\angle QRS\) is a straight angle.

6. Solve for the measurement of \(\angle ZYV\).
\(\angle XYZ\) is a straight angle.

7. In the following figure, \(ACDE\) is a rectangle. Without using a protractor, determine the measurement of \(\angle DEB\). Write an equation that could be used to solve the problem.

8. Complete the following directions in the space to the right.

   a. Draw 2 points: \(M\) and \(N\). Using a straightedge, draw \(\overrightarrow{MN}\).
   b. Plot a point \(O\) somewhere between points \(M\) and \(N\).
   c. Plot a point \(P\), which is not on \(\overrightarrow{MN}\).
   d. Draw \(\overrightarrow{OP}\).
   e. Find the measure of \(\angle MOP\) and \(\angle NOP\).
   f. Write an equation to show that the angles add to the measure of a straight angle.
Write an equation, and solve for the unknown angle measurements numerically.

1. \( \_\_\_\_\_\_ \degree + 20\degree = 360\degree \)
   
   \( d\degree = \_\_\_\_\_\_ \degree \)

2. \( \_\_\_\_\_\_ \degree + \_\_\_\_\_\_ \degree = 360\degree \)
   
   \( c\degree = \_\_\_\_\_\_ \degree \)

3. \( \_\_\_\_\_\_ \degree + \_\_\_\_\_\_ \degree + \_\_\_\_\_\_ \degree = \_\_\_\_\_\_ \degree \)
   
   \( e\degree = \_\_\_\_\_\_ \degree \)

4. \( \_\_\_\_\_\_ \degree + \_\_\_\_\_\_ \degree + \_\_\_\_\_\_ \degree = \_\_\_\_\_\_ \degree \)
   
   \( f\degree = \_\_\_\_\_\_ \degree \)
Write an equation, and solve for the unknown angles numerically.

5. \(O\) is the intersection of \(\overline{AB}\) and \(\overline{CD}\).  
\(\angle DOA\) is 160° and \(\angle AOC\) is 20°.  
\[x^\circ = \underline{\phantom{0}}\quad y^\circ = \underline{\phantom{0}}\]

6. \(O\) is the intersection of \(\overline{RS}\) and \(\overline{TV}\).  
\(\angle TOS\) is 125°.  
\[g^\circ = \underline{\phantom{0}}\quad h^\circ = \underline{\phantom{0}}\quad i^\circ = \underline{\phantom{0}}\]

7. \(O\) is the intersection of \(\overline{WX}, \overline{YZ},\) and \(\overline{UO}\).  
\(\angle XOZ\) is 36°.  
\[k^\circ = \underline{\phantom{0}}\quad m^\circ = \underline{\phantom{0}}\quad n^\circ = \underline{\phantom{0}}\]
Lesson 12: Recognize lines of symmetry for given two-dimensional figures. Identify line-symmetric figures, and draw lines of symmetry.

Date: 9/15/14

1. Circle the figures that have a correct line of symmetry drawn.

a. 

b. 

c. 

d. 

2. Find and draw all lines of symmetry for the following figures. Write the number of lines of symmetry that you found in the blank underneath the shape.

a. 

b. 

c. 

d. 

e. 

f. 

g. 

h. 

i. 

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3. Half of each figure below has been drawn. Use the line of symmetry, represented by the dashed line, to complete each figure.

4. The figure below is a circle. How many lines of symmetry does the figure have? Explain.
Lesson 13 Problem Set

1. Classify each triangle by its side lengths and angle measurements. Circle the correct names.

<table>
<thead>
<tr>
<th></th>
<th>Classify Using Side Lengths</th>
<th>Classify Using Angle Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Equilateral Isosceles Scalene</td>
<td>Acute Right Obtuse</td>
</tr>
<tr>
<td>b.</td>
<td>Equilateral Isosceles Scalene</td>
<td>Acute Right Obtuse</td>
</tr>
<tr>
<td>c.</td>
<td>Equilateral Isosceles Scalene</td>
<td>Acute Right Obtuse</td>
</tr>
<tr>
<td>d.</td>
<td>Equilateral Isosceles Scalene</td>
<td>Acute Right Obtuse</td>
</tr>
</tbody>
</table>

2. \(\triangle ABC\) has one line of symmetry as shown. What does this tell you about the measures of \(\angle A\) and \(\angle C\)?

3. \(\triangle DEF\) has three lines of symmetry as shown.
   a. How can the lines of symmetry help you to figure out which angles are equal?
   b. \(\triangle DEF\) has a perimeter of 30 cm. Label the side lengths.
4. Use a ruler to connect points to form two other triangles. Use each point only once. None of the triangles may overlap. One or two points will be unused. Name and classify the three triangles below. The first one has been done for you.

```
<table>
<thead>
<tr>
<th>Name the Triangles Using Vertices</th>
<th>Classify by Side Length</th>
<th>Classify by Angle Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta FJK )</td>
<td>Scalene</td>
<td>Obtuse</td>
</tr>
</tbody>
</table>
```

5. a. List three points from the grid above that, when connected by segments, do not result in a triangle.

b. Why didn’t the three points you listed result in a triangle when connected by segments?

6. Can a triangle have two right angles? Explain.
Name _________________________________ Date ________________

1. Draw triangles that fit the following classifications. Use a ruler and protractor. Label the side lengths and angles.
   a. Right and isosceles
   b. Obtuse and scalene
   c. Acute and scalene
   d. Acute and isosceles

2. Draw all possible lines of symmetry in the triangles above. Explain why some of the triangles do not have lines of symmetry.
Are the following statements true or false? Explain using pictures or words.

3. If $\triangle ABC$ is an equilateral triangle, $BC$ must be 2 cm. True or False?

![Equilateral Triangle](image)

4. A triangle cannot have one obtuse angle and one right angle. True or False?

![Triangle](image)

5. $\triangle EFG$ can be described as a right triangle and an isosceles triangle. True or False?

![Isosceles Triangle](image)

6. An equilateral triangle is isosceles. True or False?

Extension: In $\triangle HIJ$, $a = b$. True or False?

![Equilateral Triangle](image)
Lesson 15 Problem Set

Name ______________________________ Date __________________

Construct the figures with the given attributes. Name the shape you created. Be as specific as possible. Use extra blank paper as needed.

1. Construct quadrilaterals with at least one set of parallel sides.

2. Construct a quadrilateral with two sets of parallel sides.

3. Construct a parallelogram with four right angles.

4. Construct a rectangle with all sides the same length.
5. Use the word bank to name each shape, being as specific as possible.

<table>
<thead>
<tr>
<th>Parallelogram</th>
<th>Trapezoid</th>
<th>Rectangle</th>
<th>Square</th>
</tr>
</thead>
</table>

a. 

b. 

c. 

d. 

6. Explain the attribute that makes a square a special rectangle.

7. Explain the attribute that makes a rectangle a special parallelogram.

8. Explain the attribute that makes a parallelogram a special trapezoid.
Lesson 16: Reason about attributes to construct quadrilaterals on square or triangular grid paper.

Date: 9/15/14

1. On the grid paper, draw at least one quadrilateral to fit the description. Use the given segment as one segment of the quadrilateral. Name the figure you drew using one of the terms below.

<table>
<thead>
<tr>
<th>Parallelogram</th>
<th>Trapezoid</th>
<th>Rectangle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square</td>
<td></td>
<td>Rhombus</td>
</tr>
</tbody>
</table>

a. A quadrilateral that has at least one pair of parallel sides.

b. A quadrilateral that has four right angles.

c. A quadrilateral that has two pairs of parallel sides.

d. A quadrilateral that has at least one pair of perpendicular sides and at least one pair of parallel sides.
2. On the grid paper, draw at least one quadrilateral to fit the description. Use the given segment as one segment of the quadrilateral. Name the figure you drew using one of the terms below.

<table>
<thead>
<tr>
<th>Parallelogram</th>
<th>Trapezoid</th>
<th>Rectangle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square</td>
<td></td>
<td>Rhombus</td>
</tr>
</tbody>
</table>

a. A quadrilateral that has two sets of parallel sides.

b. A quadrilateral that has four right angles.

3. Explain the attributes that make a rhombus different from a rectangle.

4. Explain the attribute that makes a square different from a rhombus.
Lesson 1 Homework

NYS COMMON CORE MATHEMATICS CURRICULUM

Name ___________________________________________ Date __________________

1. Use the following directions to draw a figure in the box to the right.
   a. Draw two points: \( W \) and \( X \).
   b. Use a straightedge to draw \( WX \).
   c. Draw a new point that is not on \( WX \). Label it \( Y \).
   d. Draw \( WY \).
   e. Draw a point not on \( WX \) or \( WY \). Call it \( Z \).
   f. Construct \( YZ \).
   g. Use the points you’ve already labeled to name one angle. ____________

2. Use the following directions to draw a figure in the box to the right.
   a. Draw two points: \( W \) and \( X \).
   b. Use a straightedge to draw \( WX \).
   c. Draw a new point that is not on \( WX \). Label it \( Y \).
   d. Draw \( WY \).
   e. Draw a new point that is not on \( WY \) or on the line containing \( WX \). Label it \( Z \).
   f. Construct \( WZ \).
   g. Identify \( \angle ZWX \) by drawing an arc to indicate the position of the angle.
   h. Identify another angle by referencing points that you have already drawn. ____________
3.  
a. Observe the familiar figures below. Label some points on each figure.
b. Use those points to label and name representations of each of the following in the table below: ray, line, line segment, and angle. Extend segments to show lines and rays.

<table>
<thead>
<tr>
<th></th>
<th>Clock</th>
<th>Die</th>
<th>Number line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ray</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line segment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angle</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Extension: Draw a familiar figure. Label it with points, and then identify rays, lines, line segments, and angles as applicable.
1. Use the right angle template that you made in class to determine if each of the following angles is greater than, less than, or equal to a right angle. Label each as greater than, less than, or equal to, and then connect each angle to the correct label of acute, right, or obtuse. The first one has been completed for you.

   a. Less than
   b. Acute
   c. Less than
   d. Right
   e. Obtuse
   f. Obtuse
   g. Acute
   h. Obtuse
   i. Less than
   j. Right
2. Use your right angle template to identify acute, obtuse, and right angles within this painting.
Trace at least two of each, label with points, and then name them in the table below the painting.

<table>
<thead>
<tr>
<th>Acute angle</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtuse angle</td>
<td></td>
</tr>
<tr>
<td>Right angle</td>
<td></td>
</tr>
</tbody>
</table>
3. Construct each of the following using a straightedge and the right angle template that you created. Explain the characteristics of each by comparing the angle to a right angle. Use the words greater than, less than, or equal to in your explanations.

   a. Acute angle

   b. Right angle

   c. Obtuse angle
1. On each object, trace at least one pair of lines that appear to be perpendicular.

2. How do you know if two lines are perpendicular?

3. In the square and triangular grids below, use the given segments in each grid to draw a line that is perpendicular. Use a straightedge.

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Lesson 3: Identify, define, and draw perpendicular lines.

Date: 9/14/14

4. Use the right angle template that you created in class to determine which of the following figures have a right angle. Mark each right angle with a small square. For each right angle you find, name the corresponding pair of perpendicular lines. (Problem 4(a) has been started for you.)
Lesson 3 Homework

5. Use your right angle template as a guide, and mark each right angle in the following figure with a small square. (Note: A right angle does not have to be inside the figure.) How many pairs of perpendicular sides does this figure have?

6. True or false? Shapes that have no right angles also have no perpendicular segments. Draw some figures to help explain your thinking.
1. On each object, trace at least one pair of lines that appear to be parallel.

2. How do you know if two lines are parallel?

3. In the square and triangular grids below, use the given segments in each grid to draw a line that is parallel using a straightedge.
4. Determine which of the following figures have lines that are parallel by using a straightedge and the right angle template that you created. Circle the letter of the shapes that have at least one pair of parallel lines. Mark each pair of parallel lines with arrows, and then identify the parallel lines with a statement modeled after the one in 4(a).

a. \[ \overline{AB} \parallel \overline{DD} \]

c.

d.

e.

f.

g.

h.
5. True or false? All shapes with a right angle have sides that are parallel. Explain your thinking.

6. Explain why \( \overline{AB} \) and \( \overline{CD} \) are parallel, but \( \overline{EF} \) and \( \overline{GH} \) are not.

7. Draw a line using your straightedge. Now, use your right angle template and straightedge to construct a line parallel to the first line you drew.
Lesson 5: Use a circular protractor to understand a 1-degree angle as $\frac{1}{360}$ of a turn. Explore benchmark angles using the protractor.

1. Identify the measures of the following angles.

   a. 
   b. 
   c. 
   d. 

Name _____________________________ Date ________________
2. If you didn’t have a protractor, how could you construct one? Use words, pictures, or numbers to explain in the space below.
Lesson 6: Use varied protractors to distinguish angle measure from length measurement.

Date: 9/14/14

1. Use a protractor to measure the angles, and then record the measurements in degrees.

   a. 
   b. 

   c. 
   d.
Lesson 6: Use varied protractors to distinguish angle measure from length measurement.

Date: 9/14/14

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2. Using the green and red circle cutouts from today’s lesson, explain to someone at home how the cutouts can be used to show that the angle measures are the same even though the circles are different sizes. Write words to explain what you told him or her.

3. Use a protractor to measure each angle. Extend the length of the segments as needed. When you extend the segments, does the angle measure stay the same? Explain how you know.
   a.

   ![Diagram A]

   b.

   ![Diagram B]
Lesson 7 Homework

Name ____________________________ Date ______________

Construct angles that measure the given number of degrees. For Problems 1–4, use the ray shown as one of the rays of the angle with its endpoint as the vertex of the angle. Draw an arc to indicate the angle that was measured.

1. 25°
2. 85°
3. 140°
4. 83°
Lesson 7 Homework

5. $108^\circ$  
6. $72^\circ$

7. $25^\circ$  
8. $155^\circ$

9. $45^\circ$  
10. $135^\circ$
1. Jill, Shyan, and Barb stood in the middle of the yard and faced the barn. Jill turned 90° to the right. Shyan turned 180° to the left. Barb turned 270° to the left. Name the object that each girl is now facing.

Jill ____________________  Shyan ____________________  Barb ____________________

2. Allison looked at the clock at the beginning of class and at the end of class. How many degrees did the minute hand turn from the beginning of class until the end?

Beginning  End

3. The snowboarder went off a jump and did a 180. In which direction was the snowboarder facing when he landed? How do you know?

4. As she drove down the icy road, Mrs. Campbell slammed on her brakes. Her car did a 360. Explain what happened to Mrs. Campbell’s car.
5. Jonah turned the knob of the stove two quarter-turns. Draw a picture showing the position of the knob after he turned it.

Before

After

6. Betsy used her scissors to cut out a coupon from the newspaper. How many total quarter-turns will she need to rotate the paper in order to cut out the entire coupon?

7. How many quarter-turns does the picture need to be rotated in order for it to be upright?

8. David faced north. He turned $180^\circ$ to the right, and then $270^\circ$ to the left. In which direction is he now facing?
Name ____________________________ Date ________________

Sketch two different ways to compose the given angles using two or more pattern blocks.
Write an addition sentence to show how you composed the given angle.

1. Points $A$, $B$, and $C$ form a straight line.

$$180^\circ = \underline{\hspace{3cm}}$$

$$180^\circ = \underline{\hspace{3cm}}$$

2. $\angle DEF = 90^\circ$

$$90^\circ = \underline{\hspace{3cm}}$$

$$90^\circ = \underline{\hspace{3cm}}$$
3. $\angle GHI = 120^\circ$

$$120^\circ = \text{_________________________} \quad \quad 120^\circ = \text{_________________________}$$

4. $x^\circ = 270^\circ$

$$270^\circ = \text{_________________________} \quad \quad 270^\circ = \text{_________________________}$$

5. Micah built the following shape with his pattern blocks. Write an addition sentence for each angle indicated by an arc and solve. The first one is done for you.

a. $y^\circ = 120^\circ + 90^\circ$
   
   $y^\circ = 210^\circ$

b. $z^\circ = \text{_________________________}$
   
   $z^\circ = \text{_______}$

c. $x^\circ = \text{_________________________}$
   
   $x^\circ = \text{_______}$
Write an equation and solve for the measurement of $\angle x$. Verify the measurement using a protractor.

1. $\angle DCB$ is a right angle.

2. $\angle HGF$ is a right angle.

3. $\angle JKL$ is a straight angle.

4. $\angle PQR$ is a straight angle.

**Diagram:**

- **Triangle:**
  - $\angle DCB$: $x^\circ + 35^\circ = 90^\circ$
  - $x^\circ = _____$

- **Quadrilateral:**
  - $\angle HGF$: $62^\circ + x^\circ = _____$
  - $x^\circ = _____$

- **Straight Angle:**
  - $\angle JKL$: $145^\circ + _____ = 180^\circ$
  - $x^\circ = _____$

- **Straight Angle:**
  - $\angle PQR$: $____ + _____ = ____$
  - $x^\circ = _____$
Write an equation and solve for the unknown angle measurements.

5. Solve for the measurement of ∠USW. 
   ∠RST is a straight angle.

6. Solve for the measurement of ∠OML. 
   ∠LMN is a straight angle.

7. In the following figure, DEFH is a rectangle. Without using a protractor, determine the measurement of ∠GEF. Write an equation that could be used to solve the problem.

8. Complete the following directions in the space to the right.
   a. Draw 2 points: Q and R. Using a straightedge, draw \overrightarrow{QR}.
   b. Plot a point S somewhere between points Q and R.
   c. Plot a point T, which is not on \overrightarrow{QR}.
   d. Draw \overrightarrow{TS}.
   e. Find the measure of ∠QST and ∠RST.
   f. Write an equation to show that the angles add to the measure of a straight angle.
Lesson 11 Homework

Write an equation, and solve for the unknown angle measurements numerically.

1. \[ a^{\circ} + 320^{\circ} = 360^{\circ} \]
   \[ a^{\circ} = \_\_\_\_\_\_^{\circ} \]

2. \[ b^{\circ} + 45^{\circ} = 360^{\circ} \]
   \[ b^{\circ} = \_\_\_\_\_\_^{\circ} \]

3. \[ \_\_\_\_\_\_^{\circ} + \_\_\_\_\_\_^{\circ} + 115^{\circ} + 100^{\circ} = \_\_\_\_\_\_^{\circ} \]
   \[ c^{\circ} = \_\_\_\_\_\_^{\circ} \]

4. \[ \_\_\_\_\_\_^{\circ} + \_\_\_\_\_\_^{\circ} + 135^{\circ} + 145^{\circ} = \_\_\_\_\_\_^{\circ} \]
   \[ d^{\circ} = \_\_\_\_\_\_^{\circ} \]
Write an equation and solve for the unknown angles numerically.

5.  $O$ is the intersection of $\overline{AB}$ and $\overline{CD}$. $\angle COB$ is $145^\circ$ and $\angle AOC$ is $35^\circ$.

\[ e^\circ = \underline{_______} \quad f^\circ = \underline{_______} \]

6.  $O$ is the intersection of $\overline{QR}$ and $\overline{ST}$. $\angle QOS$ is $55^\circ$.

\[ g^\circ = \underline{_______} \quad h^\circ = \underline{_______} \quad i^\circ = \underline{_______} \]

7.  $O$ is the intersection of $\overline{UV}$, $\overline{WX}$, and $\overline{YO}$. $\angle VOX$ is $46^\circ$.

\[ j^\circ = \underline{_______} \quad k^\circ = \underline{_______} \quad m^\circ = \underline{_______} \]
1. Circle the figures that have a correct line of symmetry drawn.

   a.  
   b.  
   c.  
   d.  

2. Find and draw all lines of symmetry for the following figures. Write the number of lines of symmetry that you found in the blank underneath the shape.

   a.  
   b.  
   c.  
   d.  
   e.  
   f.  
   g.  
   h.  
   i.  

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3. Half of each figure below has been drawn. Use the line of symmetry, represented by the dashed line, to complete each figure.

4. Is there another shape that has the same number of lines of symmetry as a circle? Explain.
1. Classify each triangle by its side lengths and angle measurements. Circle the correct names.

<table>
<thead>
<tr>
<th></th>
<th>Classify Using Side Lengths</th>
<th>Classify Using Angle Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a.</strong></td>
<td><img src="image" alt="Triangle" /></td>
<td>Equilateral Isosceles Scalene</td>
</tr>
<tr>
<td><strong>b.</strong></td>
<td><img src="image" alt="Triangle" /></td>
<td>Equilateral Isosceles Scalene</td>
</tr>
<tr>
<td><strong>c.</strong></td>
<td><img src="image" alt="Triangle" /></td>
<td>Equilateral Isosceles Scalene</td>
</tr>
<tr>
<td><strong>d.</strong></td>
<td><img src="image" alt="Triangle" /></td>
<td>Equilateral Isosceles Scalene</td>
</tr>
</tbody>
</table>

2. a. $\triangle ABC$ has one line of symmetry as shown. Is the measure of $\angle A$ greater than, less than, or equal to $\angle C$?

![Triangle](image)

b. $\triangle DEF$ is scalene. What do you observe about its angles? Explain.

![Triangle](image)
3. Use a ruler to connect points to form two other triangles. Use each point only once. None of the triangles may overlap. Two points will be unused. Name and classify the three triangles below.

<table>
<thead>
<tr>
<th>Name the Triangles Using Vertices</th>
<th>Classify by Side Length</th>
<th>Classify by Angle Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔIJK</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. If the perimeter of an equilateral triangle is 15 cm, what is the length of each side?

5. Can a triangle have more than one obtuse angle? Explain.

6. Can a triangle have one obtuse angle and one right angle? Explain.
1. Draw triangles that fit the following classifications. Use a ruler and protractor. Label the side lengths and angles.
   
   a. Right and isosceles  
   b. Right and scalene  
   c. Obtuse and isosceles  
   d. Acute and scalene  

2. Draw all possible lines of symmetry in the triangles above. Explain why some of the triangles do not have lines of symmetry.
Are the following statements true or false? Explain.

3. \( \triangle ABC \) is an isosceles triangle. \( AB \) must be 2 cm. True or False?

4. A triangle cannot have both an acute angle and a right angle. True or False?

5. \( \triangle XYZ \) can be described as both equilateral and acute. True or False?

6. A right triangle is always scalene. True or False?

Extension: In \( \triangle ABC \), \( x^\circ = y^\circ \). True or False?
1. Use the word bank to name each shape, being as specific as possible.

<table>
<thead>
<tr>
<th>Parallelogram</th>
<th>Trapezoid</th>
<th>Rectangle</th>
<th>Square</th>
</tr>
</thead>
</table>

- a. _____________________
- b. _____________________
- c. _____________________
- d. _____________________

2. Explain the attribute that makes a square a special rectangle.

3. Explain the attribute that makes a rectangle a special parallelogram.

4. Explain the attribute that makes a parallelogram a special trapezoid.
5. Construct the following figures based on the given attributes. Give a name to each figure you construct. Be as specific as possible.

   a. A quadrilateral with four sides the same length and four right angles.
   b. A quadrilateral with two sets of parallel sides.
   c. A trapezoid with only one set of parallel sides.
   d. A parallelogram with four right angles.
Lesson 16 Homework

Use the grid to construct the following. Name the figure you drew using one of the terms in the word box.

1. Construct a quadrilateral with only one set of parallel sides.
   Which shape did you create?

2. Construct a quadrilateral with one set of parallel sides and two right angles.
   Which shape did you create?

3. Construct a quadrilateral with two sets of parallel sides.
   Which shape did you create?
4. Construct a quadrilateral with all sides of equal length.
   Which shape did you create?

5. Construct a rectangle with all sides of equal length.
   Which shape did you create?
1. Draw a line segment to connect the word to its picture.

\[\text{Ray} \quad \text{Line} \quad \text{Line segment} \quad \text{Point} \quad \text{Angle}\]

2. How is a line different from a line segment?
Name ________________________________  Date __________________

1. Fill in the blanks to make true statements using one of the following words: acute, obtuse, right, straight.
   a. In class, we made a ________________ angle when we folded paper twice.
   b. An ________________ angle is smaller than a right angle.
   c. An ________________ angle is larger than a right angle, but smaller than a straight angle.

2. Look at the following angles.

   A  B  C  D  E  F  G  H
   \[\text{V} \quad \text{\small circle} \quad \text{\small right} \quad \text{\small acute} \quad \text{\small obtuse} \quad \text{\small acute} \quad \text{\small obtuse} \quad \text{\small right} \quad \text{\small straight}\]

   a. Which angles are right angles? _________________________________________________
   b. Which angles are obtuse angles? _______________________________________________
   c. Which angles are acute angles? ________________________________________________
   d. Which angles are straight angles? ______________________________________________
Lesson 3 Exit Ticket

Name _______________________________ Date ________________

For each figure, mark perpendicular lines with the right angle symbol. Then, name the perpendicular lines. Use your right angle template as your guide.

1. 

\[ BA \perp \_\_\_\_\_ \]

2. 

\[ MN \perp \_\_\_\_\_ \]
Lesson 4 Exit Ticket

Look at the following pairs of lines. Identify if they are parallel, perpendicular, or intersecting.

1. ____________________
2. ____________________
3. ____________________
4. ____________________
Lesson 5 Exit Ticket

1. How many right angles make a full turn?

2. What is the measurement of a right angle?

3. What fraction of a full turn is 1°?

4. Name at least four benchmark angle measurements.
Lesson 6 Exit Ticket

Name ___________________________ Date __________________________

Use any protractor to measure the angles, and then record the measurements in degrees.

1. 

2. 

3. 

4. 

Lesson 6: Use varied protractors to distinguish angle measure from length measurement.

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Construct angles that measure the given number of degrees. Draw an arc to indicate the angle that was measured.

1. 75°
2. 105°
3. 81°
4. 99°
Lesson 8 Exit Ticket

Name ___________________________   Date ______________________

1. Marty was doing a handstand. Describe how many degrees his body will turn to be upright again.

2. Jeffrey started riding his bike at the ✪. He travelled north for 3 blocks, then turned 90° to the right and rode for 2 blocks. In which direction was he headed? Sketch his route on the grid below. Each square unit represents 1 block.
1. Describe and sketch two combinations of the blue rhombus pattern block that create a straight angle.

2. Describe and sketch two combinations of the green triangle and yellow hexagon pattern block that create a straight angle.
Lesson 10 Exit Ticket

Write an equation and solve for $x$. $\angle TUV$ is a straight angle.

Equation: ___________________________________________________

$x^\circ = \underline{\phantom{0}}$
Write equations using variables to represent the unknown angle measurements. Find the unknown angle measurements numerically.

1. \( x^\circ = \) 

2. \( y^\circ = \) 

3. \( z^\circ = \)
1. Is the line drawn a line of symmetry? Circle your choice.

   - Yes
   - No

2. Draw as many lines of symmetry as you can find in the figure below.
Use appropriate tools to solve the following problems.

1. The triangles below have been classified by shared attributes (side length or angle type). Use the words **acute, right, obtuse, scalene, isosceles, or equilateral** to label the headings to identify the way the triangles have been sorted.

   ![Triangles classified by attributes](image)

2. Draw lines to identify each triangle according to angle type and side length.

   a. ![Triangle labeled as acute](image)
   b. ![Triangle labeled as right](image)
   c. ![Triangle labeled as isosceles](image)

3. Identify and draw any lines of symmetry in the triangles in Problem 2.
Name _____________________________ Date __________________

1. Draw an obtuse isosceles triangle, and then draw any lines of symmetry if they exist.

2. Draw a right scalene triangle, and then draw any lines of symmetry if they exist.

3. Every triangle has at least ____ acute angles.
1. In the space below, draw a parallelogram.

2. Explain why a rectangle is a special parallelogram.
Lesson 16 Exit Ticket

1. Construct a parallelogram that does not have any right angles on a rectangular grid.

2. Construct a rectangle on a triangular grid.
Lesson 2: Use right angles to determine whether angles are equal to, greater than, or less than right angles. Draw right, obtuse, and acute angles.

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Lesson 6: Use varied protractors to distinguish angle measure from length measurement.

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Lesson 7: Measure and draw angles. Sketch given angle measures, and verify with a protractor.

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Lesson 8: Identify and measure angles as turns and recognize them in various contexts.

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Lesson 12:
Recognize lines of symmetry for given two-dimensional figures.
Identify line-symmetric figures, and draw lines of symmetry.

Date:
9/15/14

pentagon
Lesson 12: Recognize lines of symmetry for given two-dimensional figures. Identify line-symmetric figures, and draw lines of symmetry.

Date: 9/15/14

lines of symmetry

Figure 1

Figure 2
## Lesson 13 Practice Sheet

Name ___________________________ Date _________________

<table>
<thead>
<tr>
<th>Sketch of Triangle</th>
<th>Attributes (Include side lengths and angle measures.)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lesson 13:
Analyze and classify triangles based on side length, angle measure, or both.

Date: 9/15/14

4.31
Lesson 13: Analyze and classify triangles based on side length, angle measure, or both.

Date: 9/15/14

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Lesson 13: Analyze and classify triangles based on side length, angle measure, or both.

Date: 9/15/14