EUREKA MATH

A STORY OF UNITS

Mathematics Curriculum

Grade 4 • MODULE 4

Angle Measure and Plane Figures

Problem Sets

Info for parents: http://bit.ly/pusdmath

Video tutorials: http://embarc.online

Version 3

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GRADE 4 • MODULE 4

Angle Measure and Plane Figures

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 $\overrightarrow{AB}$.

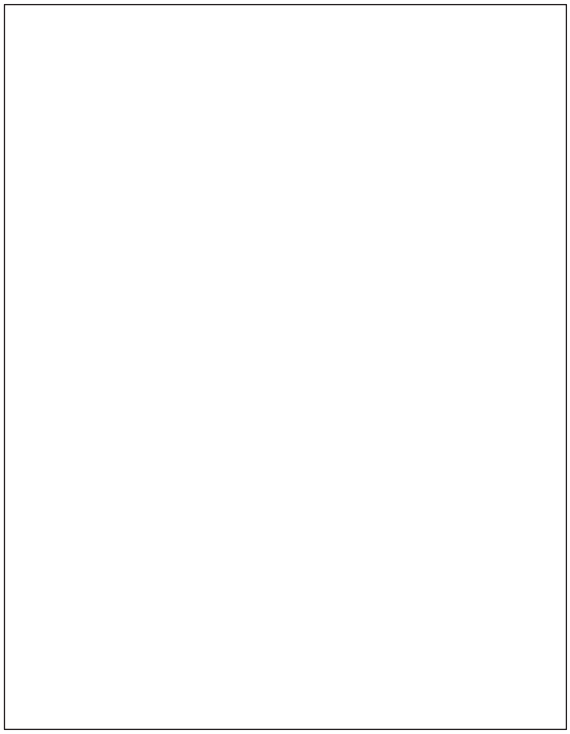
   c. Draw a new point that is not on $\overrightarrow{AB}$. Label it C.

   d. Draw $\overline{AC}$.

   e. Draw a point not on $\overrightarrow{AB}$ or $\overline{AC}$. Call it D.

   f. Construct $\overleftrightarrow{CD}$.

   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 $\overline{AB}$.

   c. Draw a new point that is not on $\overline{AB}$. Label it C.

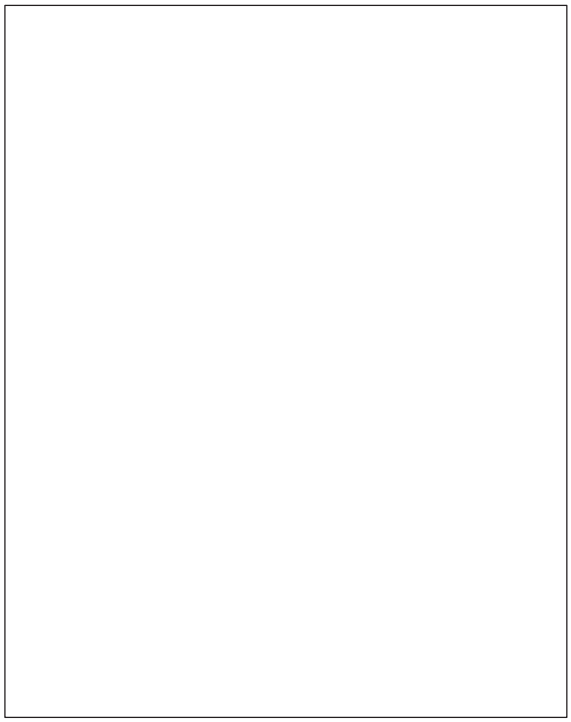
   d. Draw $\overrightarrow{BC}$.

   e. Draw a new point that is not on $\overline{AB}$ or $\overrightarrow{BC}$. Label it D.

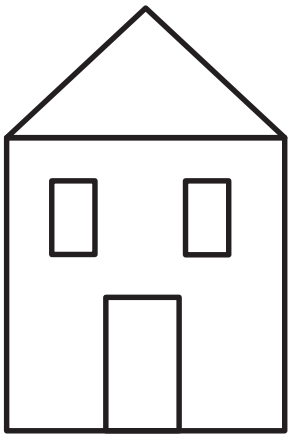
   f. Construct $\overleftrightarrow{AD}$.

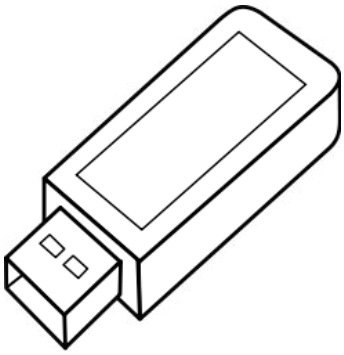
   g. Identify $\angle DAB$ by drawing an arc to indicate the position of the angle.

   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.



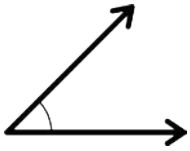


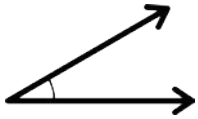
	House	Flash drive	Compass rose
Ray			
Line			
Line segment			
Angle			

Extension: Draw a familiar figure. Label it with points, and then identify rays, lines, line segments, and angles as applicable.

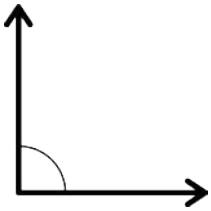
Name _____ Date _____

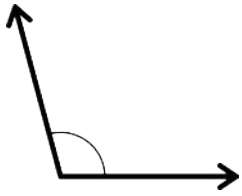
1. Use the right angle template that you made in class to determine if each of the following angles is greater than, less than, or equal to a right angle. Label each as *greater than*, *less than*, or *equal to*, and then connect each angle to the correct label of acute, right, or obtuse.
The first one has been completed for you.

a. 

b. 

Less than

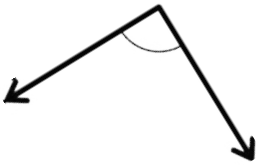
c. 

d. 

Acute

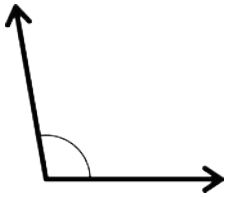
e. 

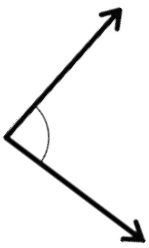
Right

f. 

Obtuse

g. 

h. 

i. 

j. 

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.

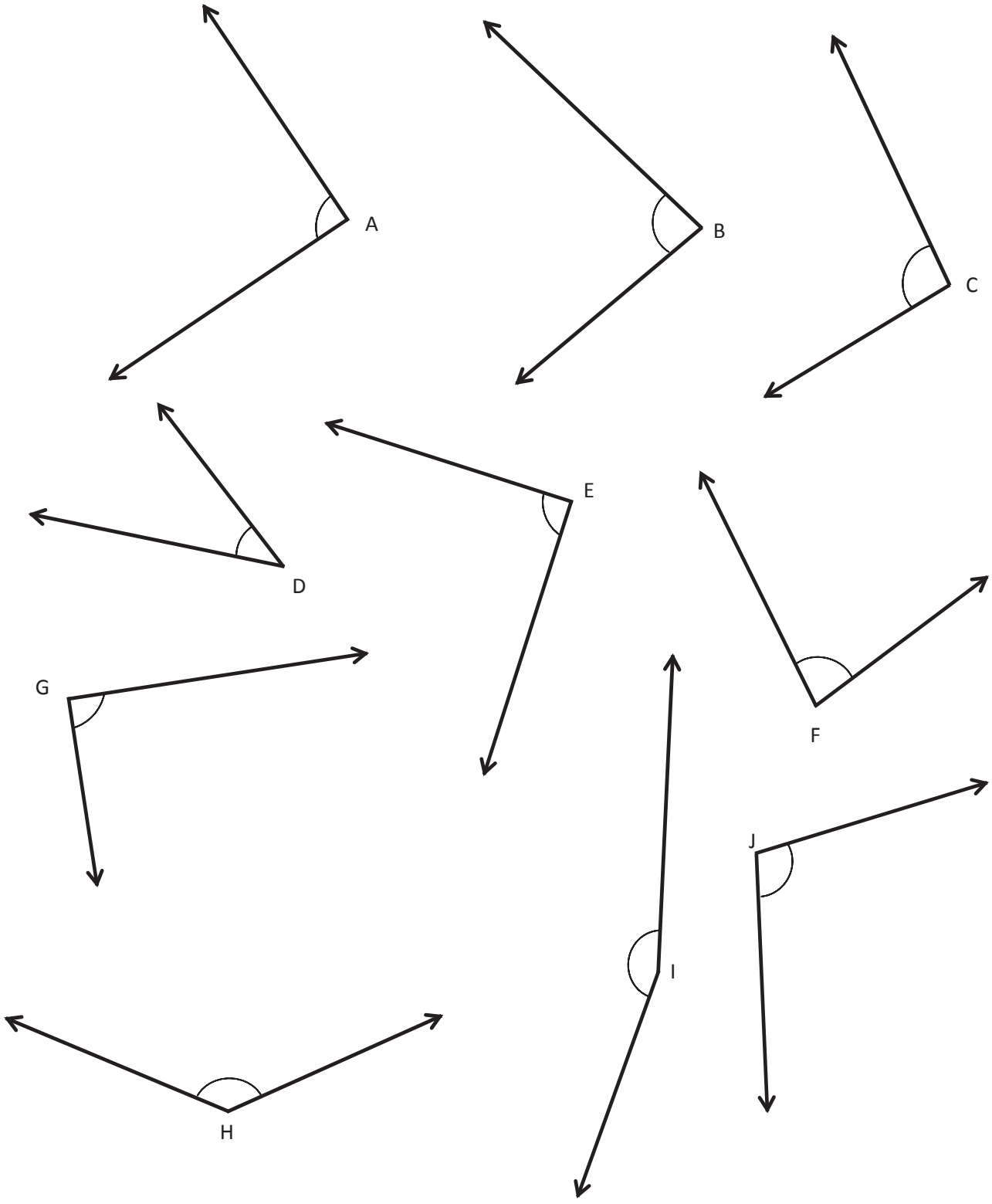
Acute angle		
Obtuse angle		
Right angle		

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

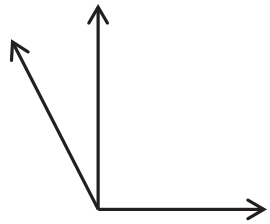
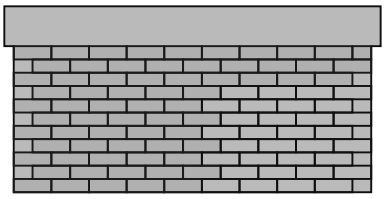
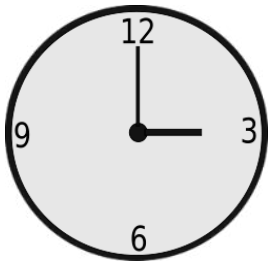


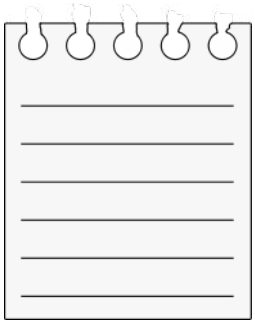
_____

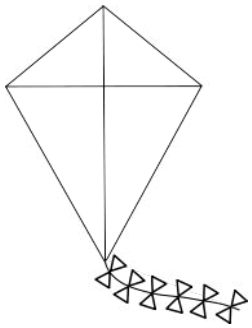
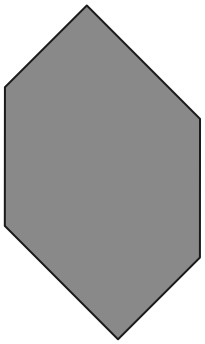
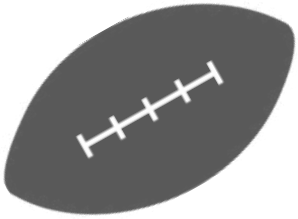
angles

Name _____ Date _____

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

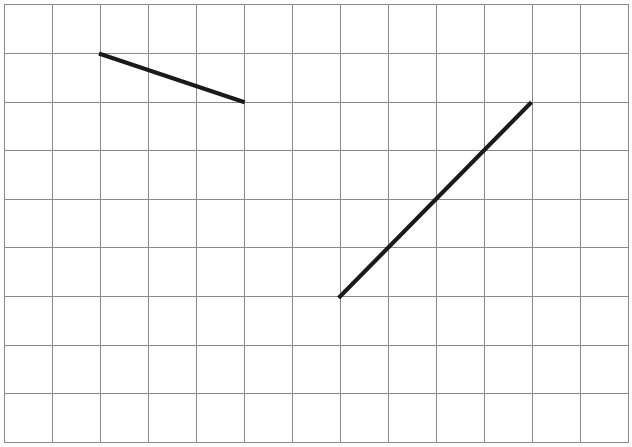




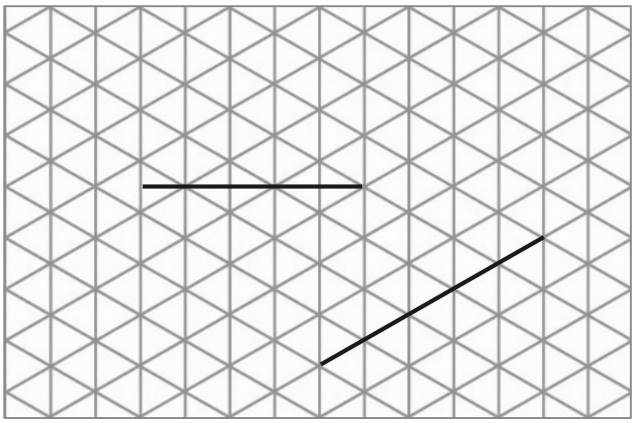


2. How do you know if two lines are perpendicular?

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



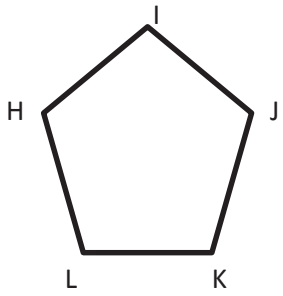


4. Use the right angle template that you created in class to determine which of the following figures have a right angle. Mark each right angle with a small square. For each right angle you find, name the corresponding pair of perpendicular sides. (Problem 4(a) has been started for you.)

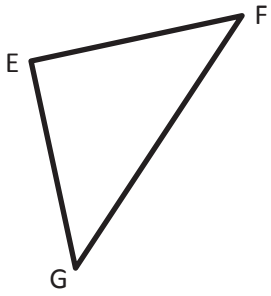
a.

$\overline{AB} \perp \overline{BD}$

b.



c.



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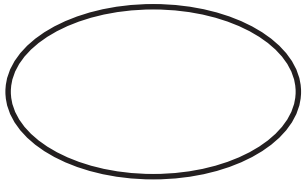
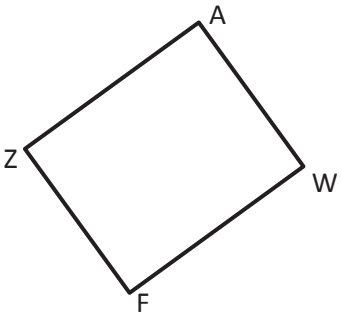
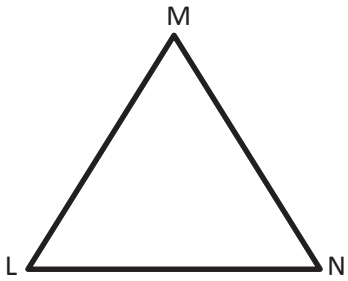


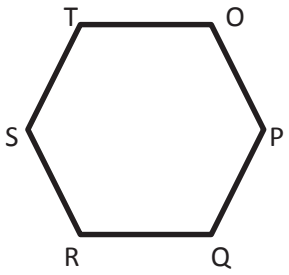
e.



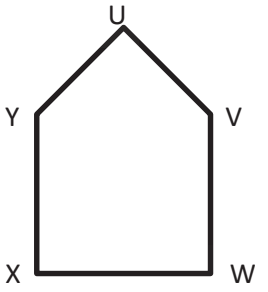
f.



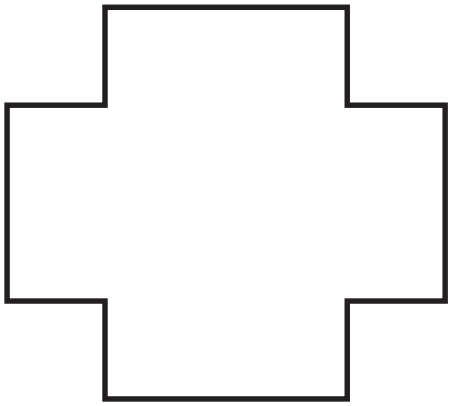
g.



h.



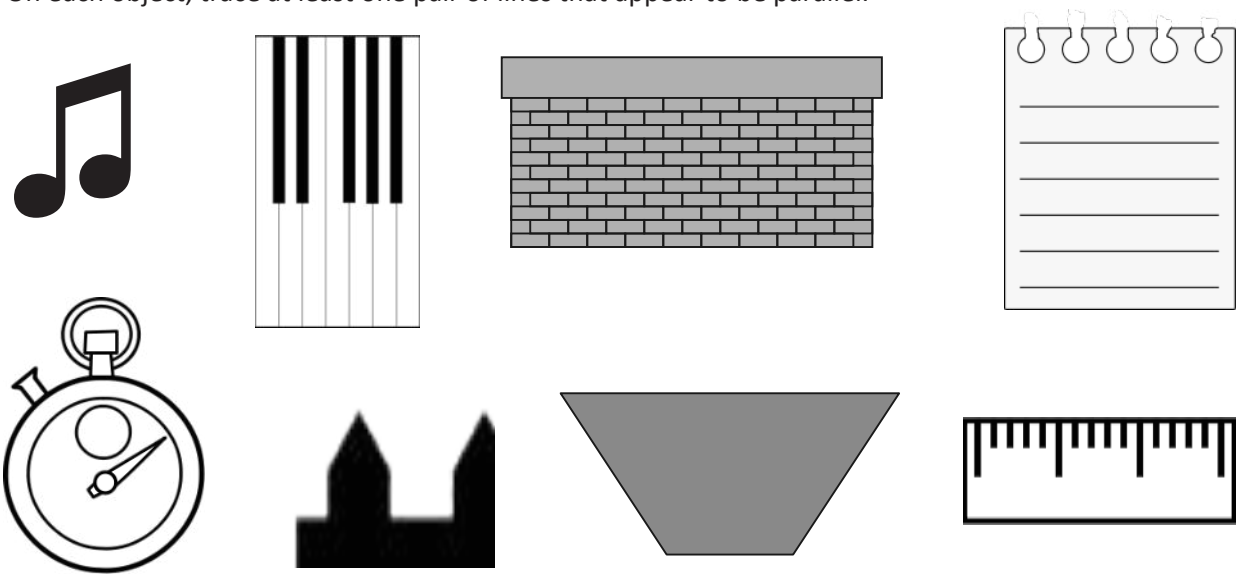
5. Mark each right angle on the following figure with a small square. (Note: A right angle does not have to be inside the figure.) How many pairs of perpendicular sides does this figure have?



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

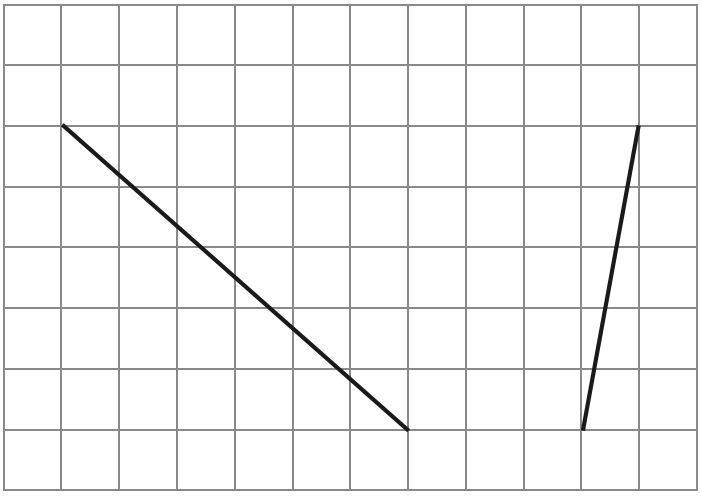
Name _____ Date _____

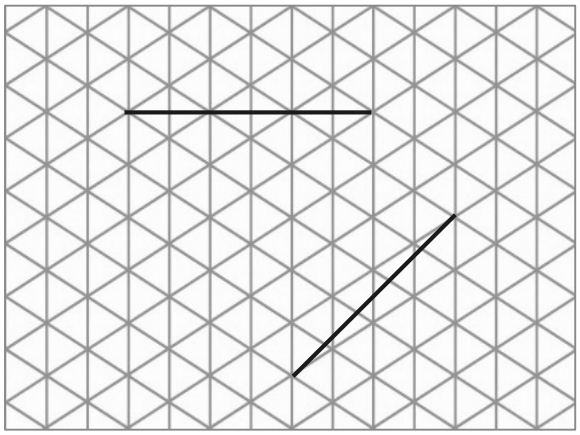
1. On each object, trace at least one pair of lines that appear to be parallel.



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

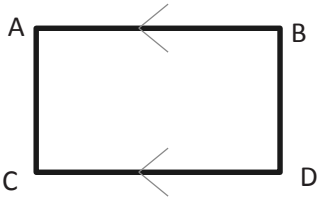
3. In the square and triangular grids below, use the given segments in each grid to draw a segment that is parallel using a straightedge.





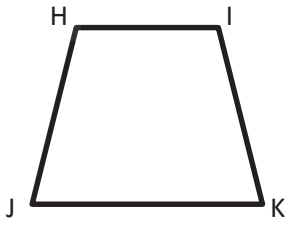
4. Determine which of the following figures have sides that are parallel by using a straightedge and the right angle template that you created. Circle the letter of the shapes that have at least one pair of parallel sides. Mark each pair of parallel sides with arrowheads, and then identify the parallel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

a.

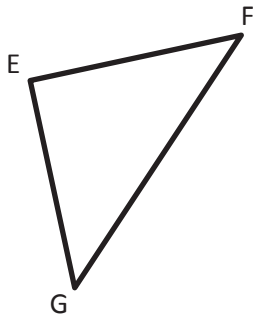


$\overline{AB} \parallel \overline{CD}$

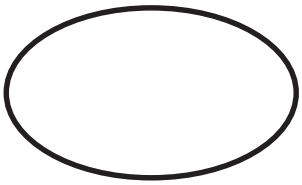
b.



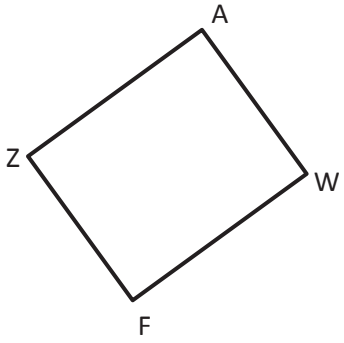
c.



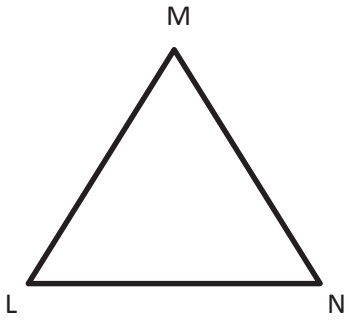
d.



e.



f.



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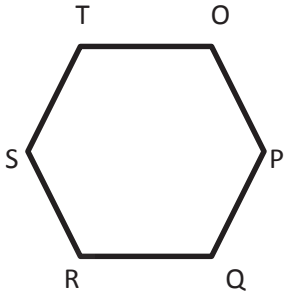
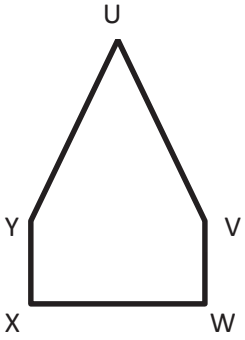


h.



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.

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.

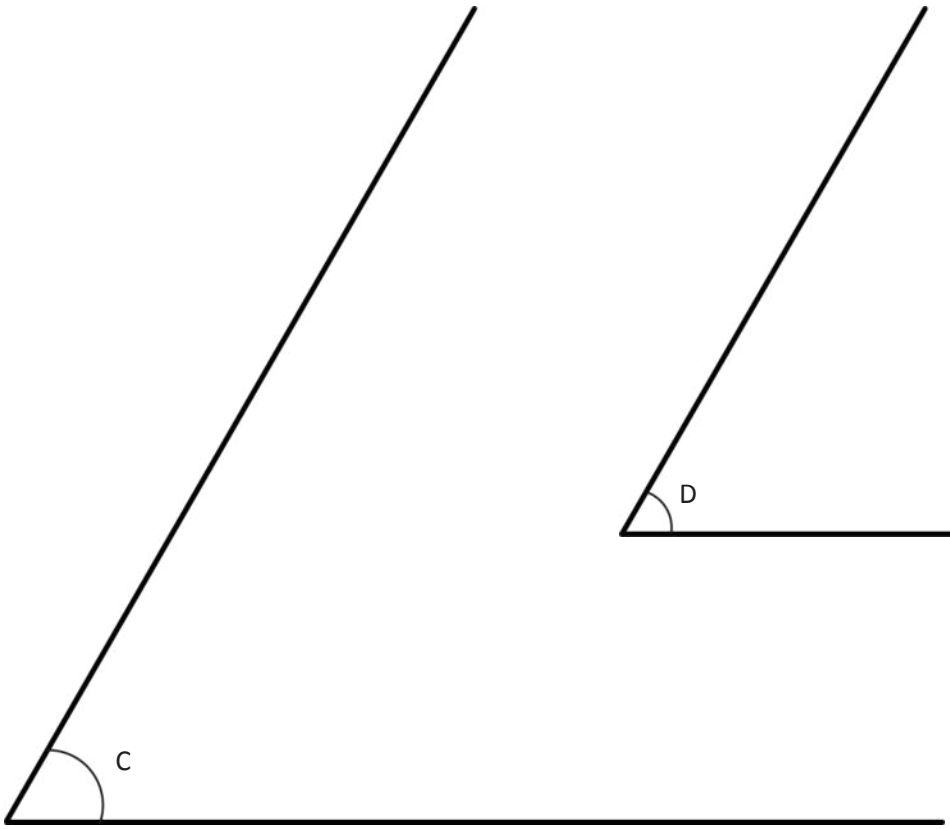
5. We found out today that 1° is $\frac{1}{360}$ of a whole turn. It is 1 out of 360°. That means a 2° angle is $\frac{2}{360}$ of a whole turn. What fraction of a whole turn is each of the benchmark angles you listed in Problem 1?

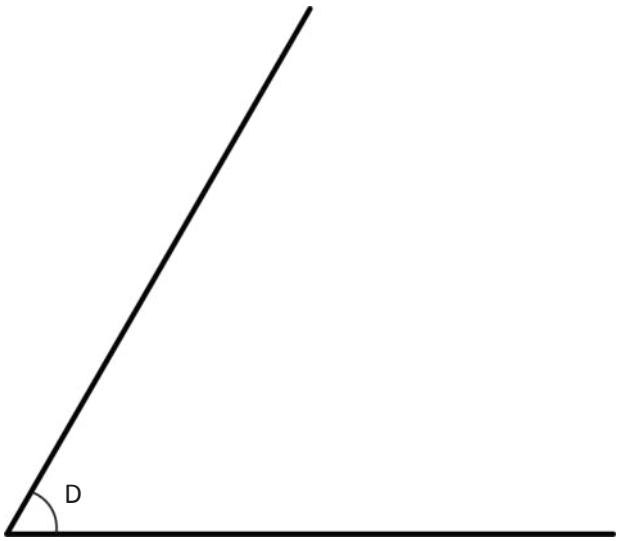
6. How many 45° angles does it take to make a full turn?

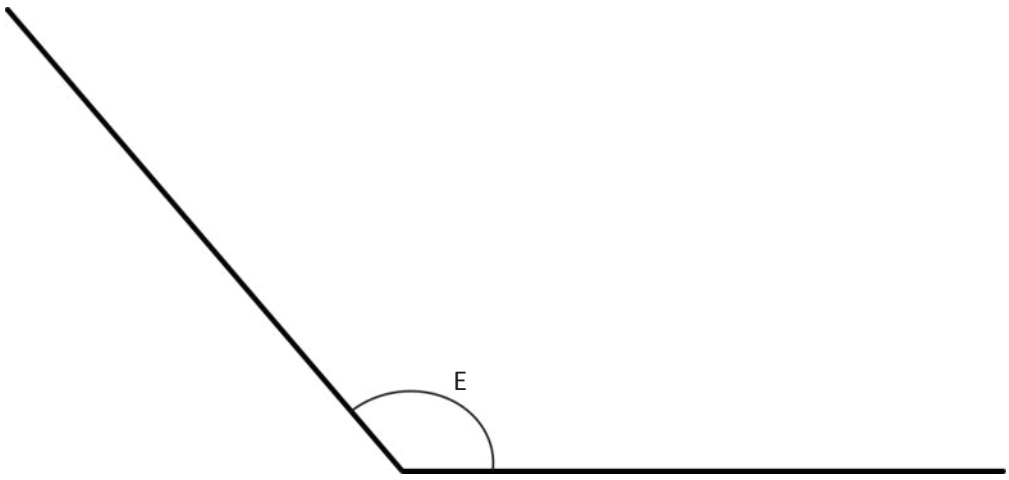
7. How many 30° angles does it take to make a full turn?

8. If you didn't have a protractor, how could you reconstruct a quarter of it from 0° to 90°?

Name _____ Date _____



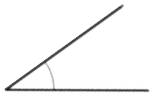




Name _____ Date _____

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

a.



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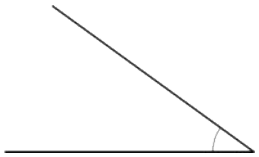

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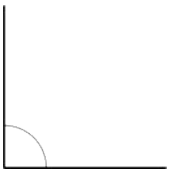
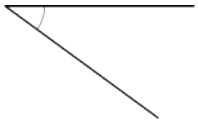


d.

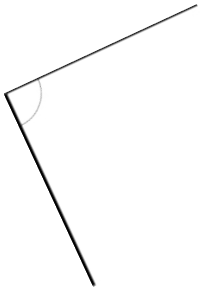
e.



f.

g.

h.



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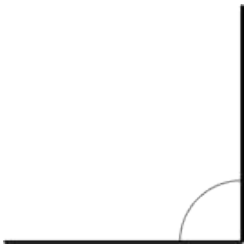


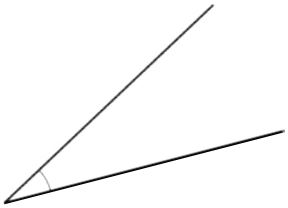
j.

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

Protractor #1: _____ °

Protractor #2: _____ °

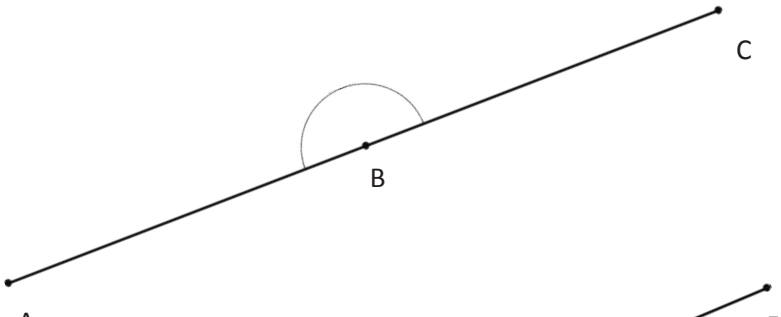
Protractor #3: _____ °



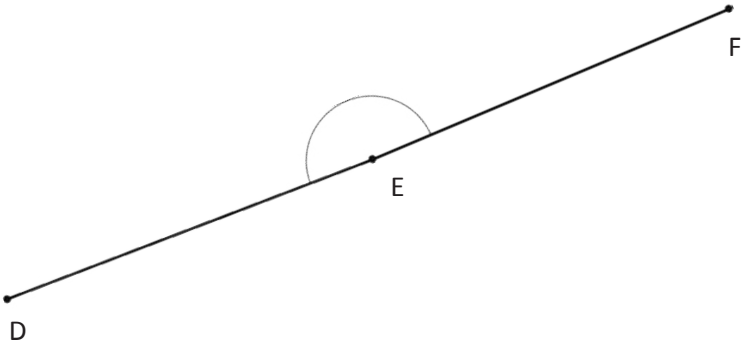
b. What do you notice about the measurement of the above angle using each of the protractors?

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 _____

Figure 1

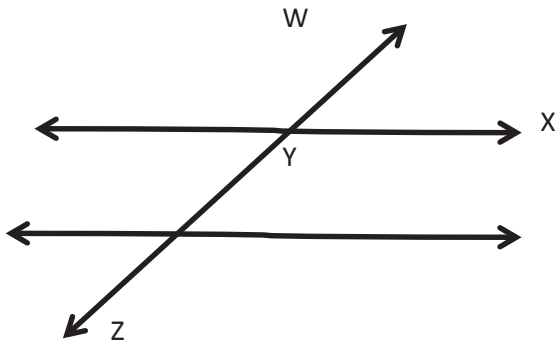


Figure 2

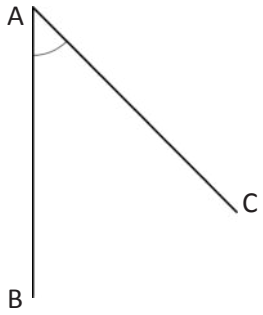


Figure 3

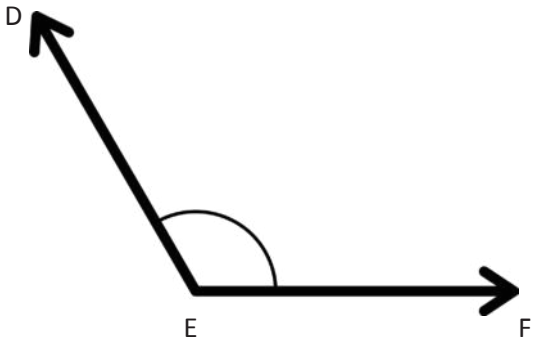
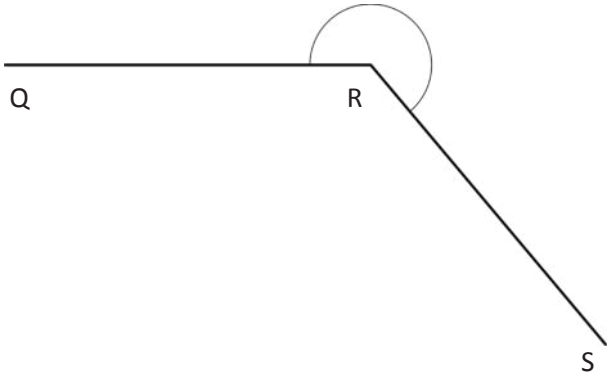


Figure 4



Name _____ Date _____

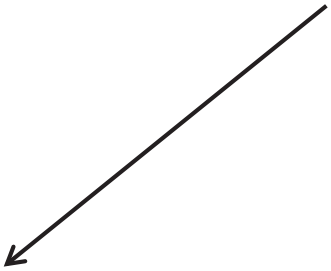
Construct angles that measure the given number of degrees. For Problems 1–4, use the ray shown as one of the rays of the angle with its endpoint as the vertex of the angle. Draw an arc to indicate the angle that was measured.

1. 30°

2. 65°

3. 115°

4. 135°



5. 5°

6. 175°

7. 27°

8. 117°

9. 48°

10. 132°

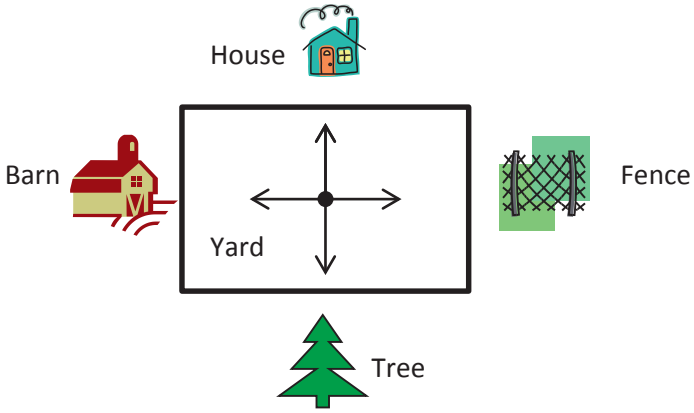
Name _____ Date _____

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.

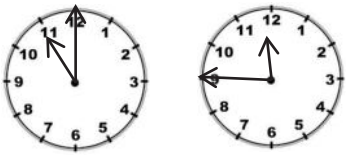
Joe _____

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

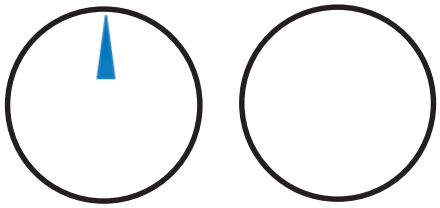
3. The skater jumped into the air and did a 360. What does that mean?

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.

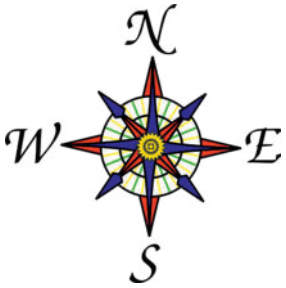


Before After

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?

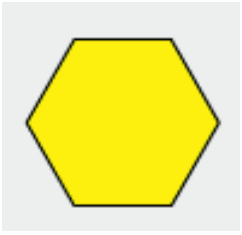
7. How many quarter-turns does the picture need to be rotated in order for it to be upright?

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

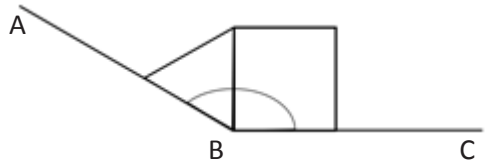
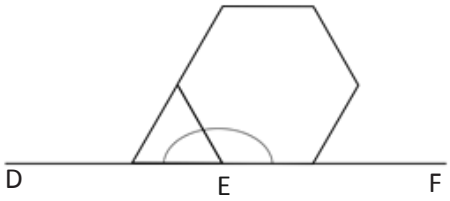
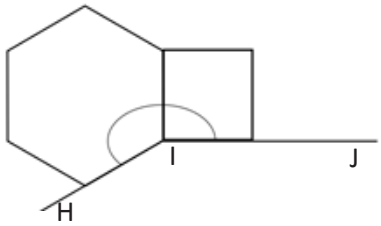


Name _____ Date _____

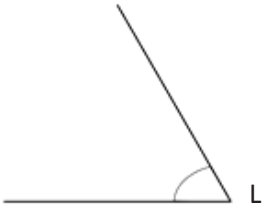
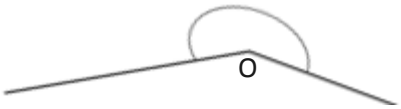
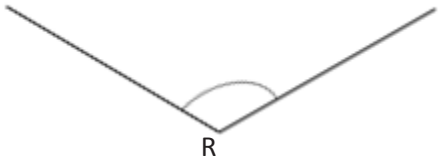
1. Complete the table.

Pattern block	Total number that fit around 1 vertex	One interior angle measures…	Sum of the angles around a vertex
a. 		360° ÷ ____ = ____	____ + ____ + ____ + ____ = 360°
b. 			
c. 			____ +____ + ____ = 360°
d.  (Acute angle)			
e.  (Obtuse angle)			
f.  (Acute angle)			

2. Find the measurements of the angles indicated by the arcs.

Pattern blocks	Angle measure	Addition sentence
a. 		
b. 		
c. 		

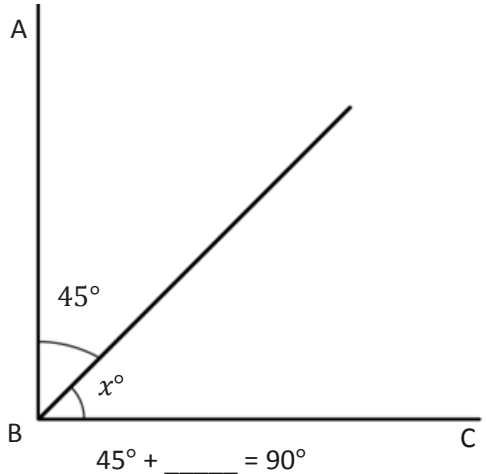
3. Use two or more pattern blocks to figure out the measurements of the angles indicated by the arcs.

Pattern blocks	Angle measure	Addition sentence
a. 		
b. 		
c. 		

Name _____ Date _____

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

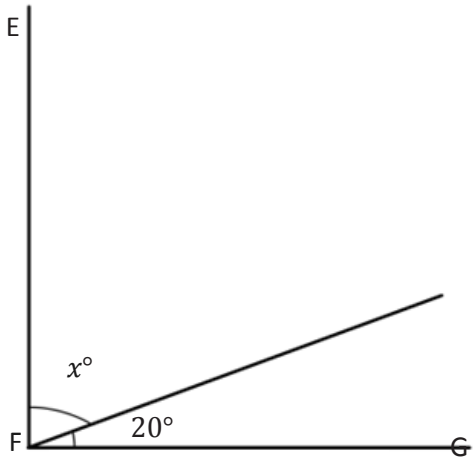
1. $\angle CBA$ is a right angle.



45° + _____ = 90°

$x°$ = _____

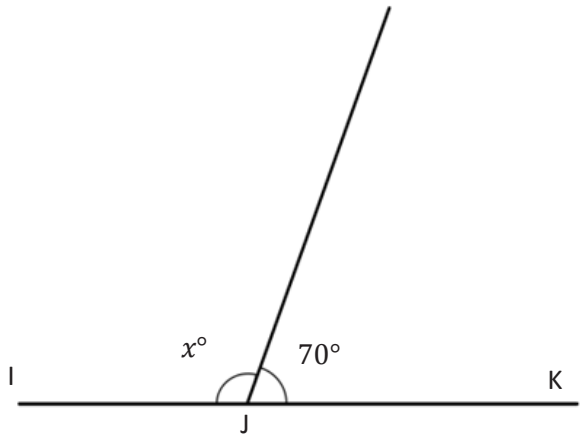
2. $\angle GFE$ is a right angle.



_____ + _____ = _____

$x°$ = _____

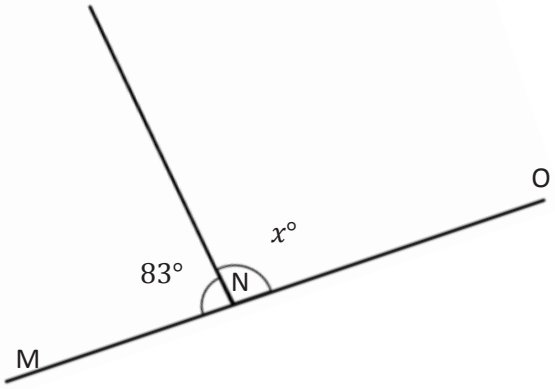
3. $\angle IJK$ is a straight angle.



_____ + 70° = 180°

$x°$ = _____

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

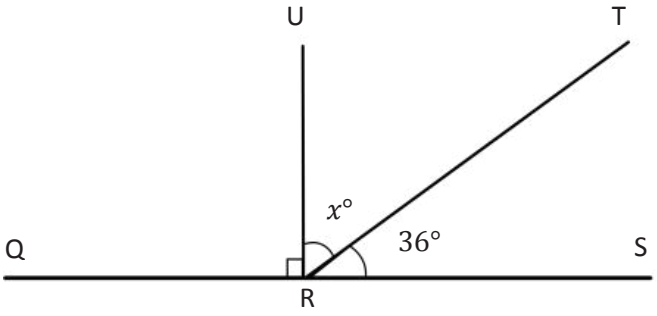


_____ + _____ = _____

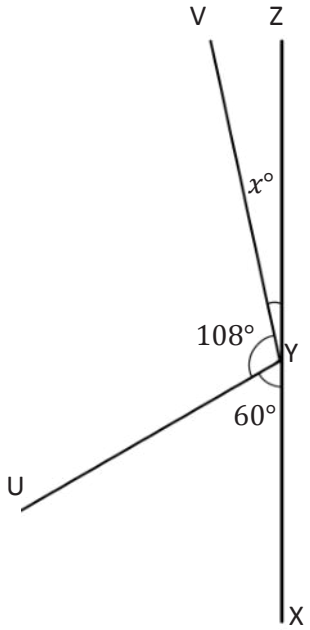
$x°$ = _____

Solve for the unknown angle measurements. Write an equation to solve.

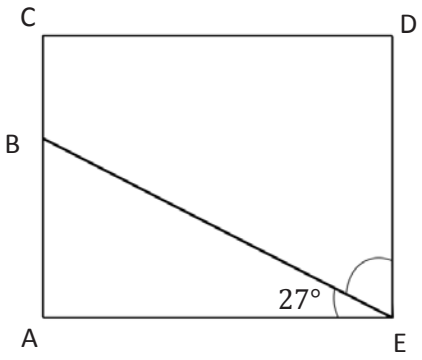
5. Solve for the measurement of $\angle TRU$. $\angle QRS$ is a straight angle.



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.

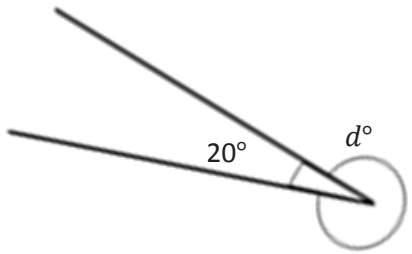


8. Complete the following directions in the space to the right.
   a. Draw 2 points: M and N. Using a straightedge, draw $\overleftrightarrow{MN}$.
   b. Plot a point O somewhere between points M and N.
   c. Plot a point P, which is not on $\overleftrightarrow{MN}$.
   d. Draw $\overline{OP}$.
   e. 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.

Name _____ Date _____

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

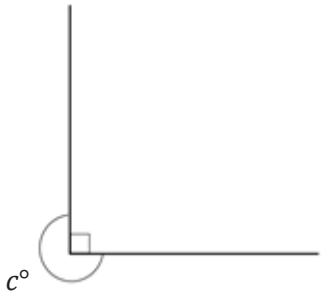
1.



_____° + 20° = 360°

d° = _____°

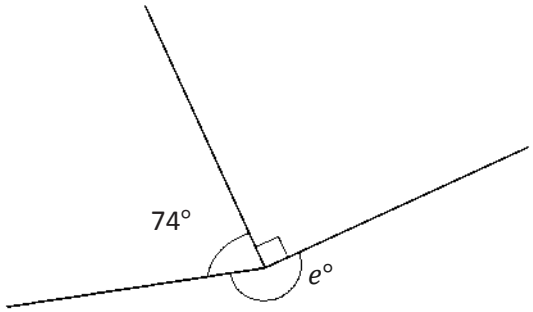
2.



_____° + _____° = 360°

c° = _____°

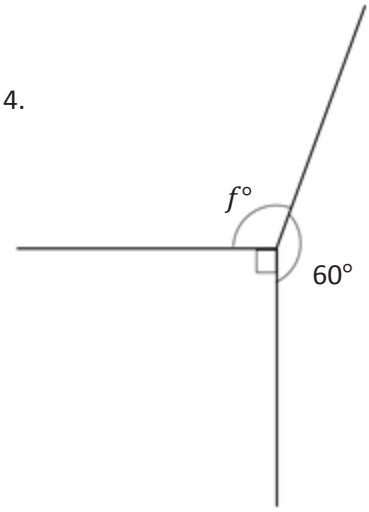
3.



_____° + _____° + _____° = _____°

e° = _____°

4.



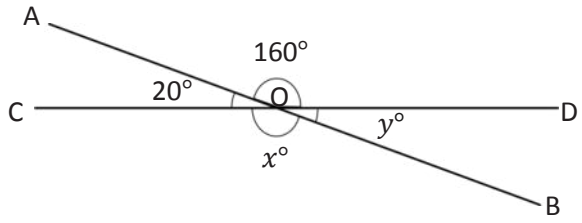
_____° + _____° + _____° = _____°

f° = _____°

Write an equation, and solve for the unknown angles numerically.

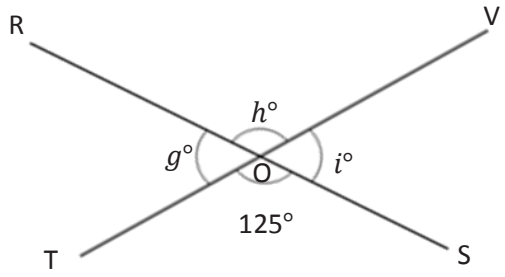
5. O is the intersection of $\overline{AB}$ and $\overline{CD}$. $\angle DOA$ is 160°, and $\angle AOC$ is 20°.

$x°$ = _____ $y°$ = _____



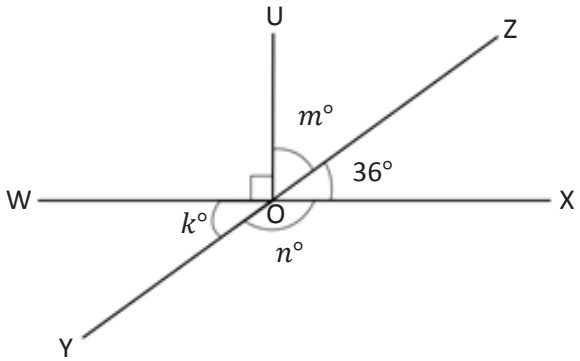
6. O is the intersection of $\overline{RS}$ and $\overline{TV}$. $\angle TOS$ is 125°.

$g°$ = _____ $h°$ = _____ $i°$ = _____



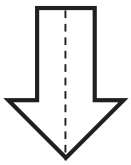
7. O is the intersection of $\overline{WX}$, $\overline{YZ}$, and $\overline{UO}$. $\angle XOZ$ is 36°.

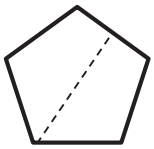
$k°$ = _____ $m°$ = _____ $n°$ =_____

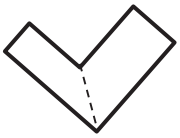


Name _____ Date _____

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

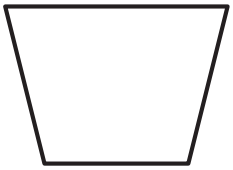
a. 

b. 

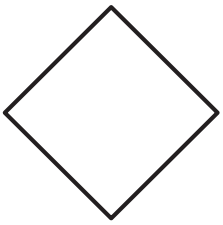
c. 

d. 

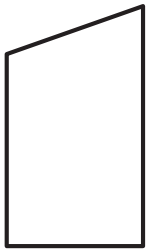
2. Find and draw all lines of symmetry for the following figures. Write the number of lines of symmetry that you found in the blank underneath the shape.



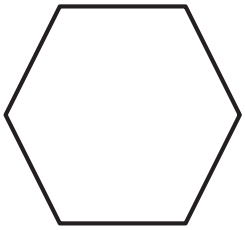
a. _____



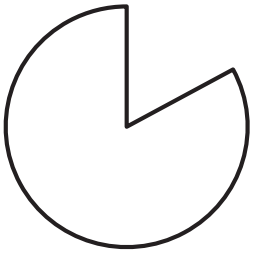
b. _____



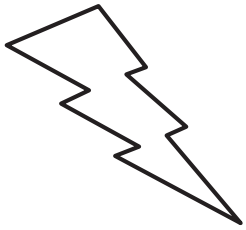
c. _____



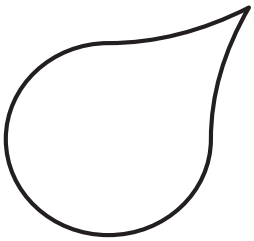
d. _____



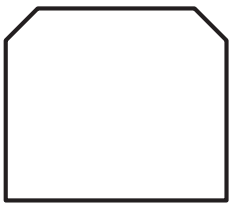
e. _____



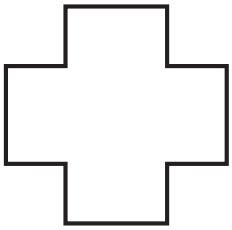
f. _____



g. _____



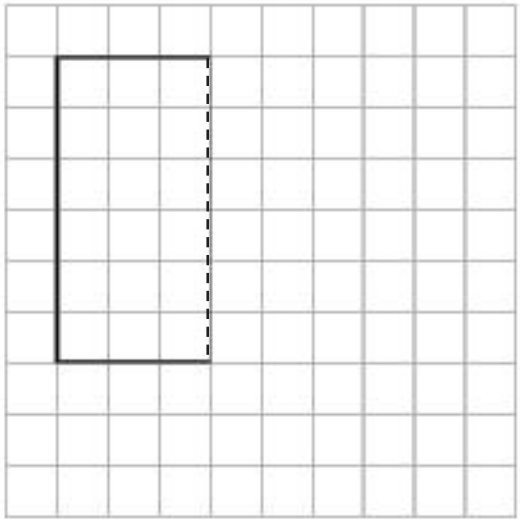
h. _____



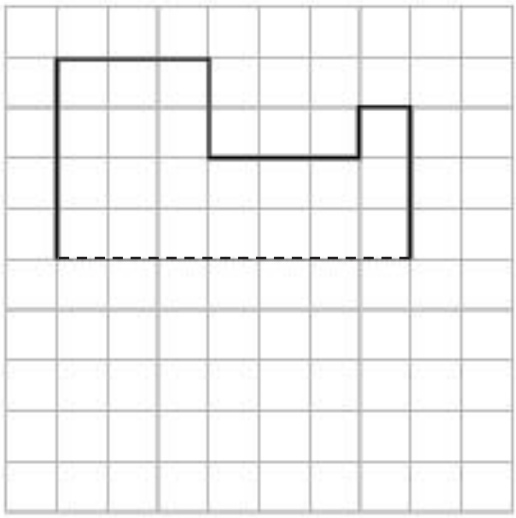
i. _____

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

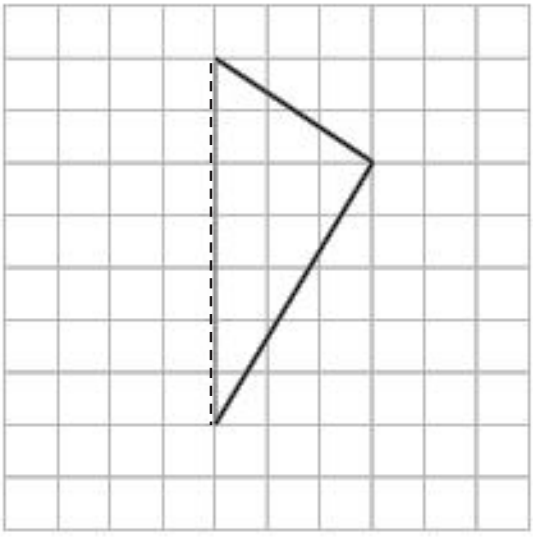
a.



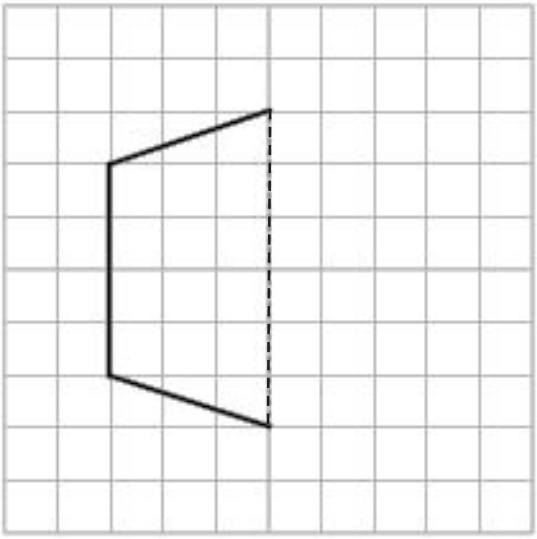
b.



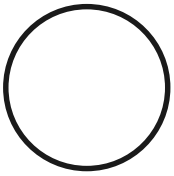
c.



d.



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

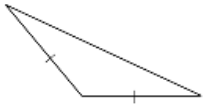
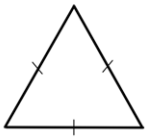
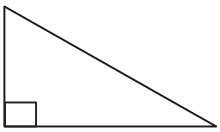


Name _____ Date _____

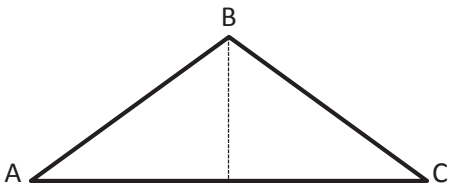
Sketch of Triangle	Attributes (Include side lengths and angle measures.)	Classification	
A			
B			
C			
D			
E			
F			

Name _____ Date _____

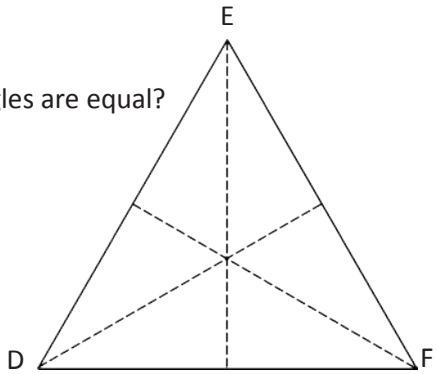
1. Classify each triangle by its side lengths and angle measurements. Circle the correct names.

	Classify Using Side Lengths	Classify Using Angle Measurements
a. 	Equilateral Isosceles Scalene	Acute Right Obtuse
b. 	Equilateral Isosceles Scalene	Acute Right Obtuse
c. 	Equilateral Isosceles Scalene	Acute Right Obtuse
d. 	Equilateral Isosceles Scalene	Acute Right Obtuse

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



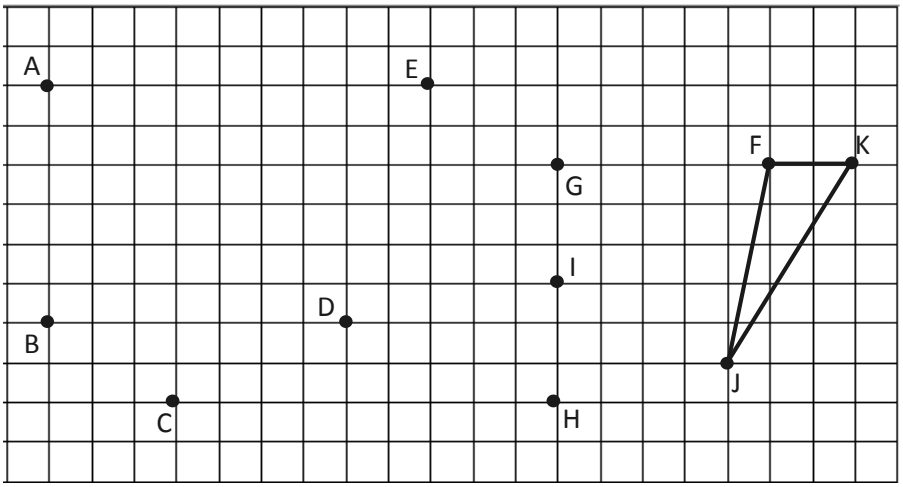
3. $\triangle DEF$ has three lines of symmetry as shown.



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.



Name the Triangles Using Vertices	Classify by Side Length	Classify by Angle Measurement
$\triangle FJK$	Scalene	Obtuse

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

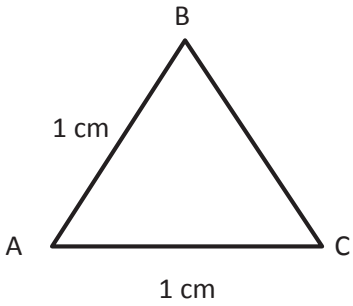
   c. Acute and scalene

   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.

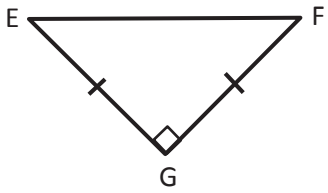
Are the following statements true or false? Explain using pictures or words.

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



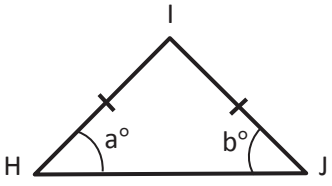
4. A triangle cannot have one obtuse angle and one right angle. True or False?

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



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

Extension: In △ HIJ, a = b. True or False?



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.

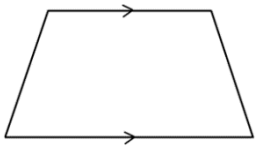
2. Construct a quadrilateral with two sets of parallel sides.

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.

Parallelogram	Trapezoid	Rectangle	Square

a. 

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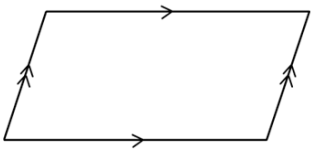
b. 

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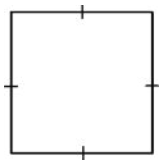
c. 

_____

d. 

_____

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

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

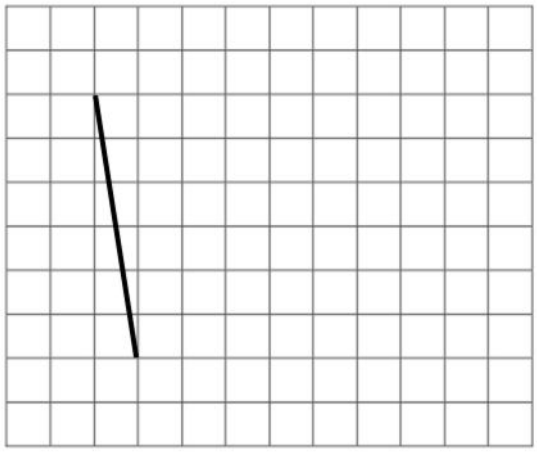
8. Explain the attribute that makes a parallelogram a special trapezoid.

Name _____ Date _____

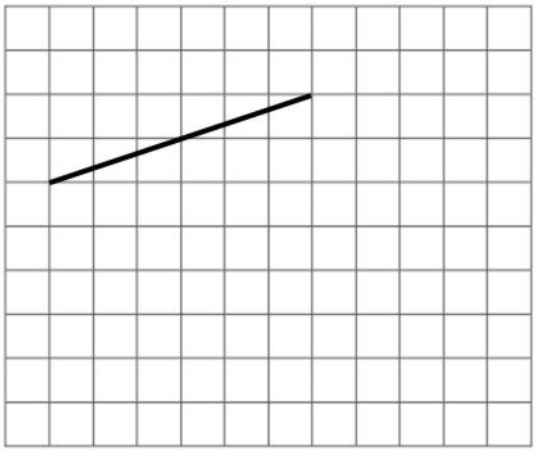
1. On the grid paper, draw at least one quadrilateral to fit the description. Use the given segment as one segment of the quadrilateral. Name the figure you drew using one of the terms below.

Parallelogram	Trapezoid	Rectangle
Square		Rhombus

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

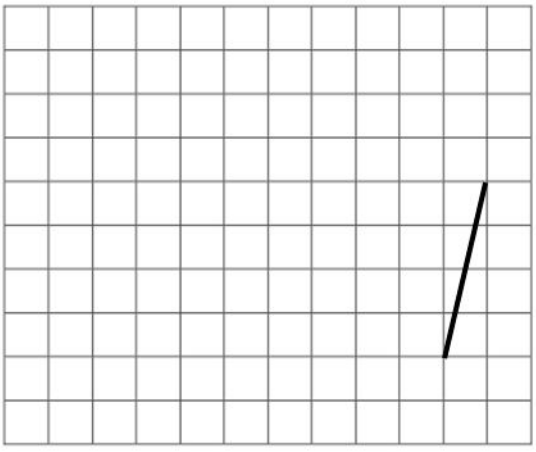


b. A quadrilateral that has four right angles.



c. A quadrilateral that has two pairs of parallel side

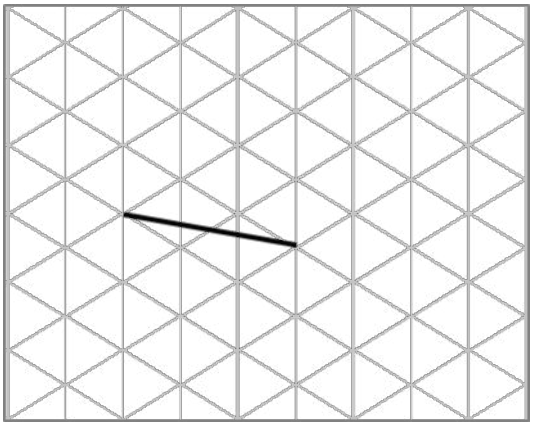
d. A quadrilateral that has at least one pair of perpendicular sides and at least one pair of parallel sides.



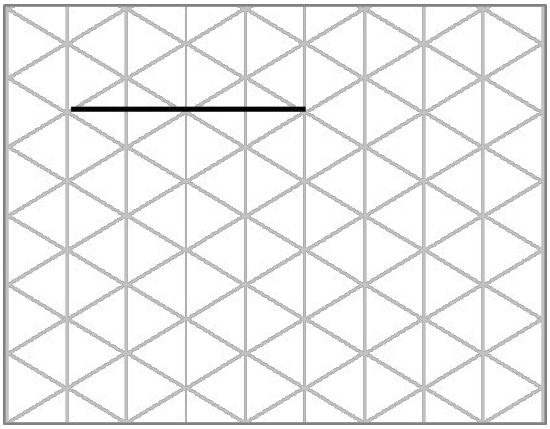
2. On the grid paper, draw at least one quadrilateral to fit the description. Use the given segment as one segment of the quadrilateral. Name the figure you drew using one of the terms below.

Parallelogram	Trapezoid	Rectangle
Square		Rhombus

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

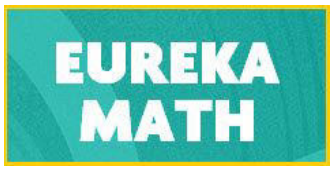


b. A quadrilateral that has four right angles.



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

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