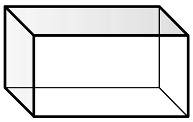
Name ______________________________ Date ____________

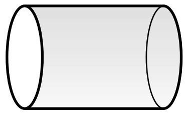
SHAPE NAMES

Three-Dimensional Figures or Space Figures

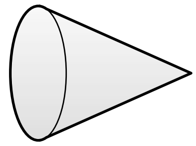
Rectangular Prism



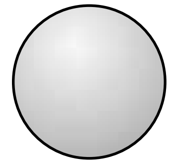
Cylinder



Cone

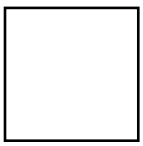


Sphere



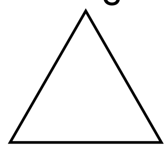
Two-Dimensional Figures or Plane Figures

Square

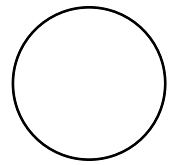


Rectangle

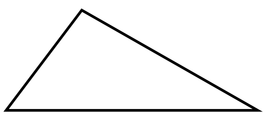
Triangle



Circle



Name each shape.

1. 

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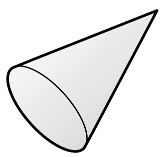
2. 

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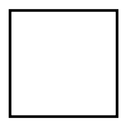
3. 

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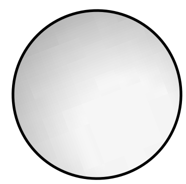
4. 

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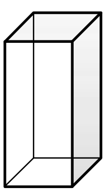
5. 

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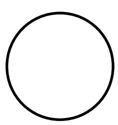
6. 

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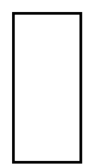
8. 

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9. Which figures in the exercises are plane figures? ________

10. Which figures in the exercises are space figures? ________

CHALLENGE

Name a real-life example of a rectangular prism, a cylinder, a cone, and a sphere.

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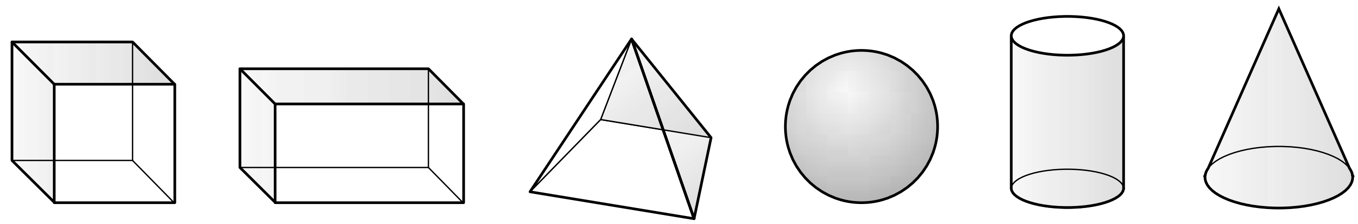
DISCOVERING MATH

LEVEL 1

Name ______________________________ Date ____________

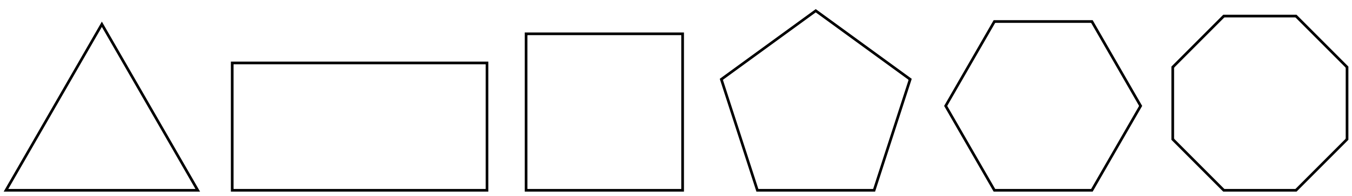
SHAPE NAMES

Three-Dimensional Figures



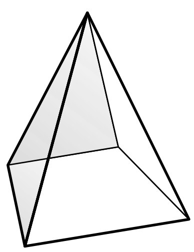
cube | rectangular prism | square pyramid | sphere | cylinder | cone

Polygons



triangle | rectangle | square | pentagon | hexagon | octagon

Name each figure.

1. 

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2. 

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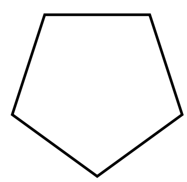
3. 

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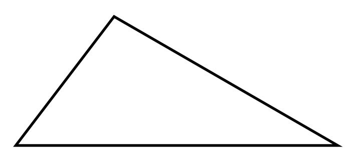
4. 

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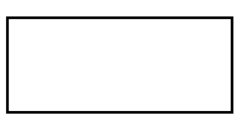
5. 

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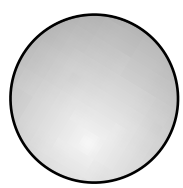
6. 

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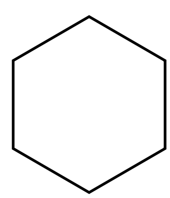
7. 

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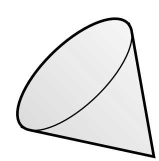
8. 

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CHALLENGE

A polygon with four sides is called a quadrilateral. Draw a quadrilateral that is **not** a rectangle. Then draw another quadrilateral that is not a parallelogram and not a trapezoid.

DISCOVERING MATH

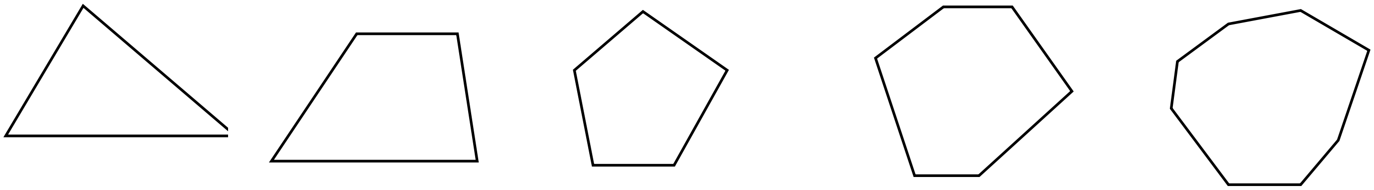
LEVEL 2

Name ______________________________ Date ______________

SHAPE NAMES

Polygons

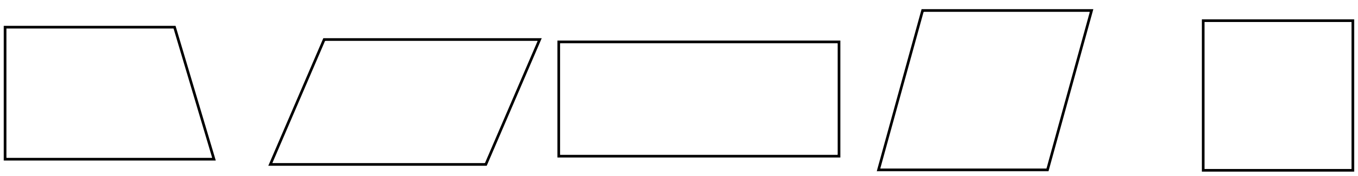
Triangle	Quadrilateral	Pentagon	Hexagon	Octagon



3 sides 3 angles	4 sides 4 angles	5 sides 5 angles	6 sides 6 angles	8 sides 8 angles

Special Quadrilaterals

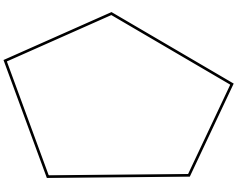
Trapezoid	Parallelogram	Rectangle	Rhombus	Square



Only two parallel sides.	Opposite sides are parallel and the same length.	Parallelogram with 4 right angles.	Parallelogram with all sides the same length.	Rectangle with all sides the same length.

Name each polygon.

1.



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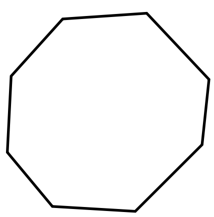
2.



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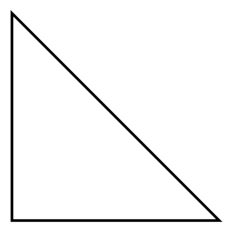
3.



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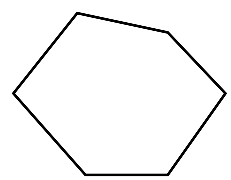
4.



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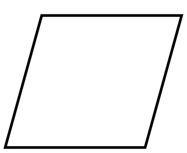
Classify each quadrilateral. Some may have more than one name.

5.



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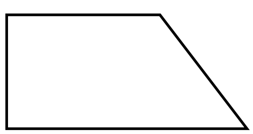
6.



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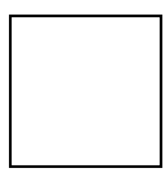

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DISCOVERING MATH

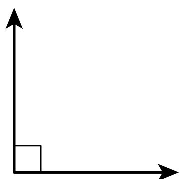
LEVEL 3

Name ______________________ Date ____________

PROPERTIES OF GEOMETRIC FIGURES

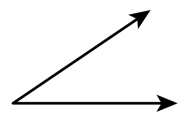
Angles

Right Angle
A right angle forms a square corner.

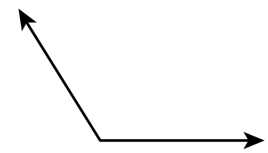


The square in the corner means the angle is a right angle.

Acute Angle
An acute angle is less than a right angle.

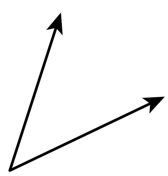


Obtuse Angle
An obtuse angle is greater than a right angle.



Tell whether each angle is right, acute, or obtuse.

1.



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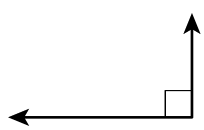
2.



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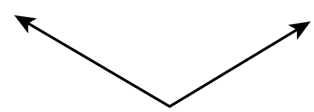
3.



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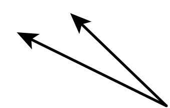
4.



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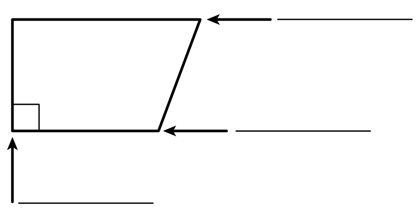
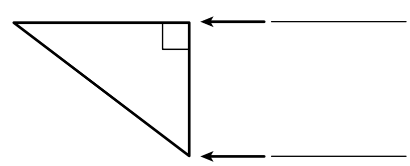
Tell whether the angle each arrow points to is right, acute, or obtuse.

5.



6.



CHALLENGE

Draw a triangle with an obtuse angle.

DISCOVERING MATH

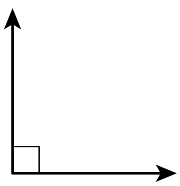
LEVEL 1

Name ______________________ Date ______________

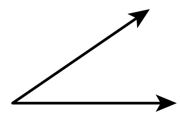
PROPERTIES OF GEOMETRIC FIGURES

Angles

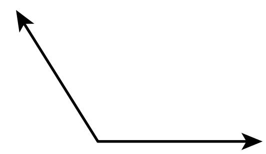
Right Angle
A right angle forms a square corner.



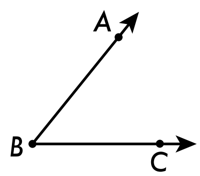
Acute Angle
An acute angle is less than a right angle.



Obtuse Angle
An obtuse angle is greater than a right angle.



An angle can be named in three ways.



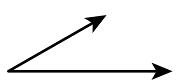
$\angle B$ or $\angle ABC$ or $\angle CBA$

Read: angle B or angle ABC or angle CBA

Two rays meet at an endpoint to form an angle. The endpoint is always included in the angle name.

Tell whether each angle is right, acute, or obtuse.

1.



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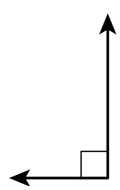

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3.

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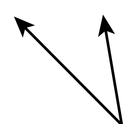

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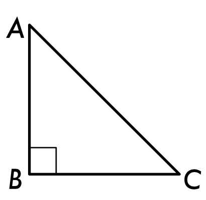
For each figure, tell whether $\angle ABC$ is right, acute, or obtuse.

5.



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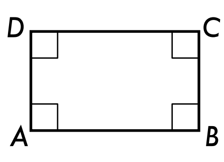
6.



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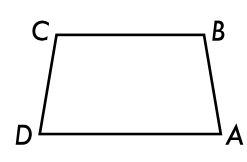

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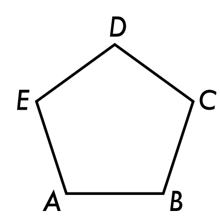

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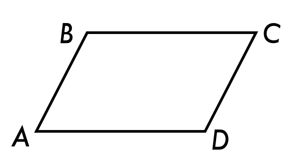
CHALLENGE

Classify each of the angles of the parallelogram.



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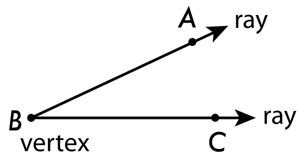
DISCOVERING MATH LEVEL 2

Name ____________________ Date ____________

PROPERTIES OF GEOMETRIC FIGURES

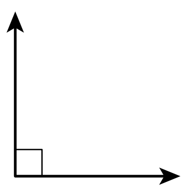
An angle is formed when two rays meet at the same endpoint, or vertex. The angle can be named by three letters or by its vertex:



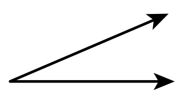
$\angle B$ or $\angle ABC$ or $\angle CBA$

Angles are measured in degrees (°).

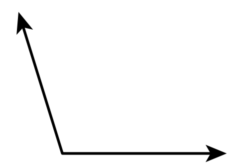
Right Angle
A right angle measures 90°.



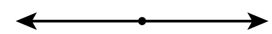
Acute Angle
An acute angle is greater than 0° and less than 90°.



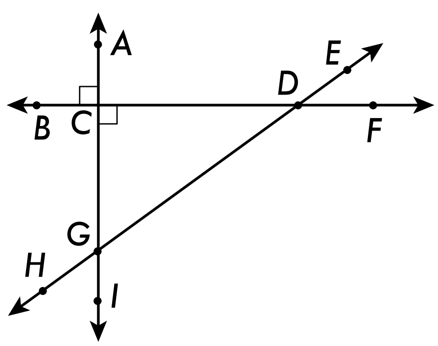
Obtuse Angle
An obtuse angle is greater than 90° and less than 180°.



Straight Angle
A straight angle measures 180°.



Use the figure below. Tell whether each angle is right, acute, obtuse, or straight.



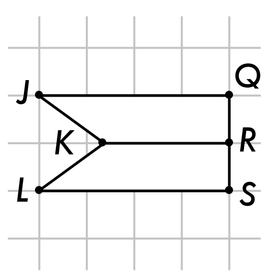
1. $\angle DCG$ ____________

2. $\angle GDE$ ____________

3. $\angle CDE$ ____________

4. $\angle CDG$ ____________

Use the figure below. Name as many examples of each type of angle as possible.



5. acute ____________

6. obtuse ____________

7. right ____________ ____________

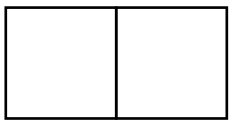
8. straight ____________

Name ______________________________ Date ______________

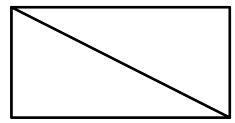
ALTERING SHAPES

Shapes can be combined to make different shapes.

Joining two squares makes a rectangle:

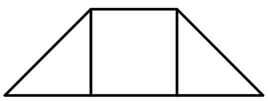


Shapes can be divided to make different shapes.
Dividing a rectangle along the diagonal makes two triangles:



Name the shapes used to make each figure.

1.



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2.

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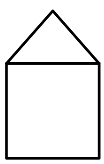
3.



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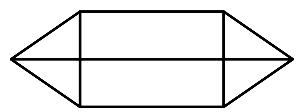

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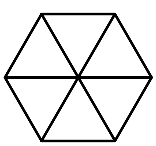
5.



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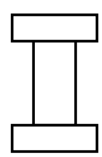
6.



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CHALLENGE

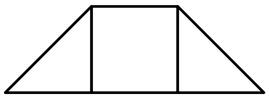
Make a new shape by combining at least 3 different geometric shapes.

Name ____________________________ Date ______________

ALTERING SHAPES

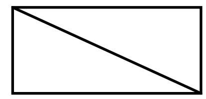
Polygons can be combined to make different polygons.

Joining a square and two triangles makes a trapezoid:



Polygons can be divided to make different polygons.

Dividing a parallelogram along the diagonal makes two triangles:



Name the polygons used to make each figure. Then identify the figure.

1.

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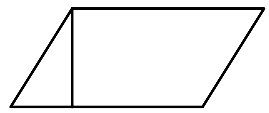
2.



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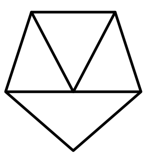
3.



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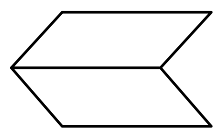
4.



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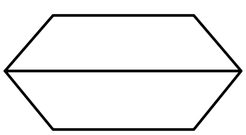
5.



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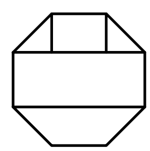
6.



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CHALLENGE

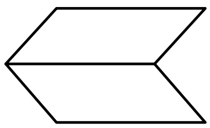
Make a new shape by combining at least 3 different polygons.

Name ______________________ Date ______________

ALTERING SHAPES

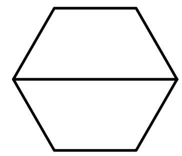
Polygons can be combined to make different polygons.

Joining two parallelograms can make a hexagon:



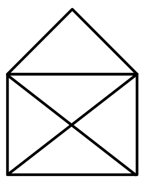
Polygons can be divided to make different polygons.

A hexagon can be divided into two trapezoids:

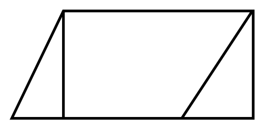


Name the polygons used to make each figure. Then identify the figure.

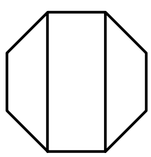
1.



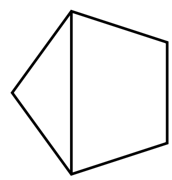
2.



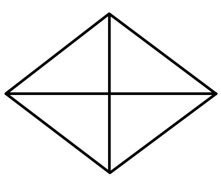
3.



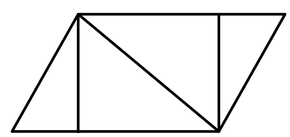
4.



5.



6.



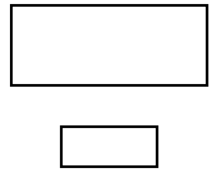
CHALLENGE

Make a pentagon by joining together 4 triangles.

Make a hexagon by joining together 6 triangles.

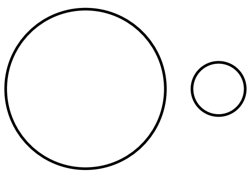
Name ______________________ Date ______________

CONGRUENT AND SIMILAR SHAPES

Congruent Figures	Similar Figures
	
These rectangles are congruent. Congruent figures have the same shape and the same size.	These rectangles are similar. Similar figures have the same shape but not the same size.

Are the figures congruent, similar, or neither?

1.



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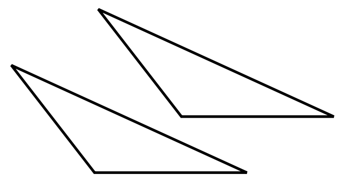
2.



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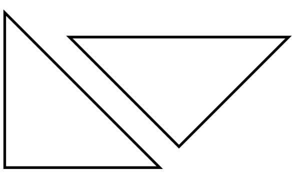
3.



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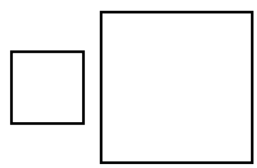
4.



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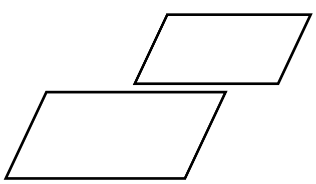
5.



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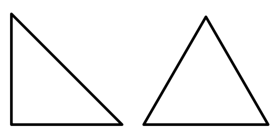
6.



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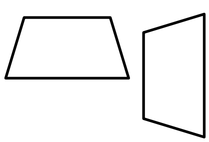
7.



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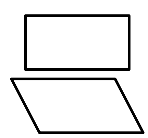
8.



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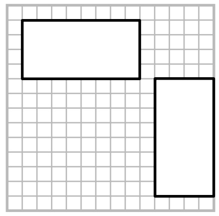
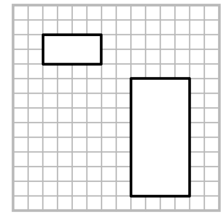
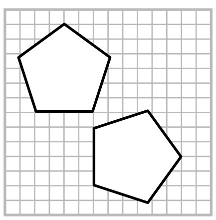
Name ____ Date ________________

CONGRUENT AND SIMILAR SHAPES

Congruent Figures	**Similar Figures**
Congruent figures have the same shape and the same size.  The rectangles are congruent.	Similar figures have the same shape but not the same size. The rectangles are similar. 

Are the figures congruent, similar, or neither?

1.



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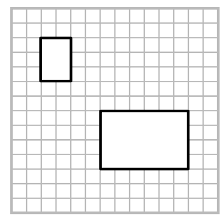
2.



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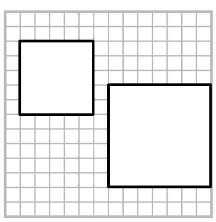
3.



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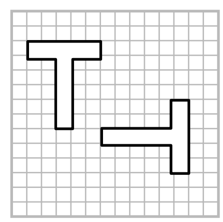
4.



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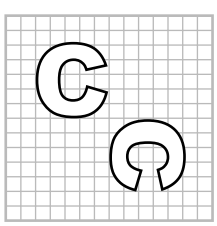
5.



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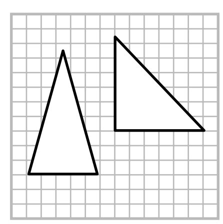
6.



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CHALLENGE

Danny takes a photograph of his house. Then he has the photograph enlarged. Is the house in the enlargement congruent to the house in the original photograph? Is it similar? Explain.

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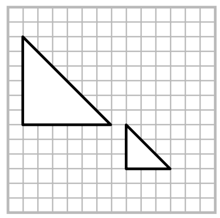
Name ______________________________ Date ______________

CONGRUENT AND SIMILAR SHAPES

Similar Figures

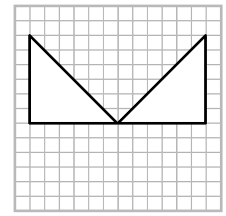
Similar figures have the same shape but not the same size.



The triangles are similar. The corresponding angles of the triangles are equal. The ratios of corresponding sides are equal.

Congruent Figures

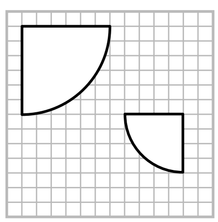
Congruent figures have the same shape and the same size.



The triangles are congruent. Since they are the same shape, the triangles are also similar. The ratios of corresponding sides of the triangles is 1:1.

Are the figures congruent, similar, neither, or both?

1.



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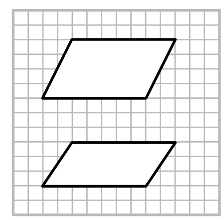
2.



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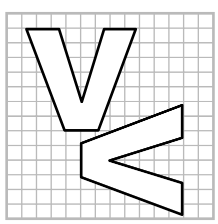
3.



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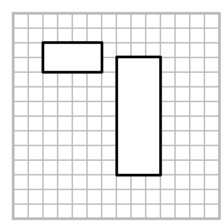
4.



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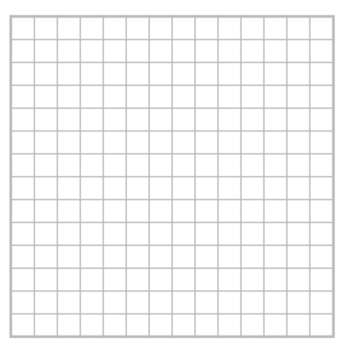
CHALLENGE

Draw a rectangle on the grid. Then draw a rectangle that is similar but not congruent to your rectangle.

Explain how you know the rectangles are similar.



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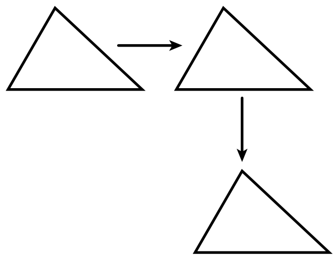
Name ______________________________ Date ______________

MOTION GEOMETRY

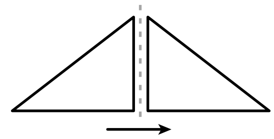
Translation

A translation slides a figure along a straight line left, right, up, or down.



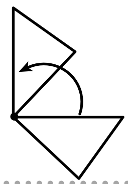
Reflection

A reflection flips a figure across a line. A reflection makes a mirror image.



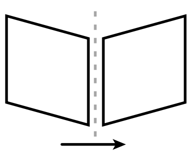
Rotation

A rotation turns a figure around a point.



Write *translation, reflection,* or *rotation* to describe how each figure was moved.

1.



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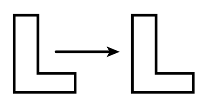
2.



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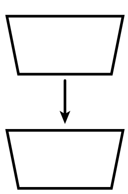
3.



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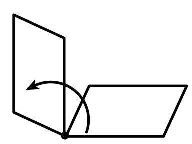
4.



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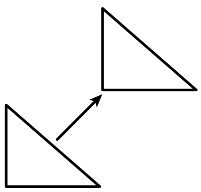
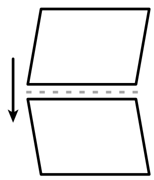
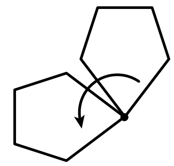
CHALLENGE

Is the reflection of a figure congruent to the original figure? Explain.

____

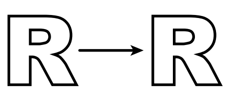
Name ______________________ Date ______________

MOTION GEOMETRY

Translation	Reflection	Rotation
A translation slides a figure along a straight line left, right, up, or down.	A reflection flips a figure across a line. A reflection makes a mirror image.	A rotation is a turn that moves a figure around a point.
		

Write *translation, reflection,* or *rotation* to describe how each figure was moved.

1.



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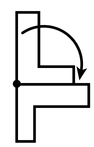
2.



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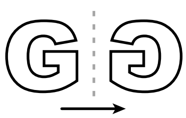
3.



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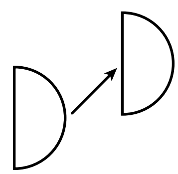
4.



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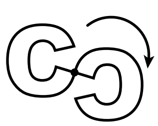
5.



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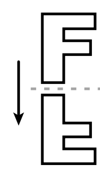
6.



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CHALLENGE

Translations, reflections, and rotations are transformations of a figure. Do these transformations result in a figure congruent to the original figure? Explain.

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Name ______________________ Date ______________________

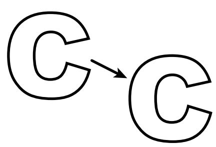
MOTION GEOMETRY

A **transformation** moves a figure without changing its size or shape.

Transformations

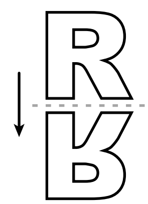
Translation

A translation moves a figure along a straight line.



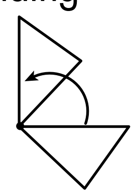
Reflection

A reflection flips a figure across a line. A reflection makes a mirror image.



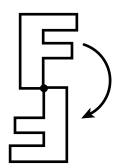
Rotation

A rotation moves a figure by turning it around a point. All the points on the figure move in a circle. Some points move farther than others, depending on how far from the center of rotation they are.



Write *translation, reflection,* or *rotation* to describe how each figure was moved.

1.



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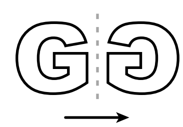
2.



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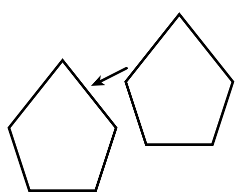
3.



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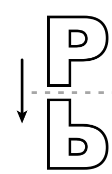
4.



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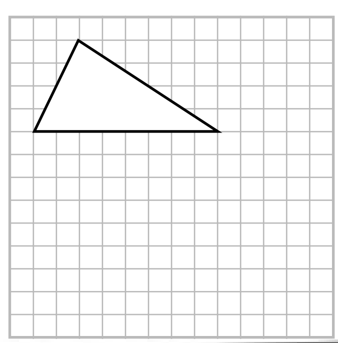
CHALLENGE

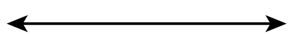
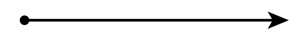
Draw a translation, reflection, and rotation of the triangle shown on the grid. Label each transformation.



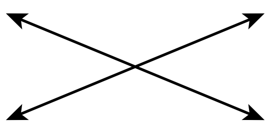
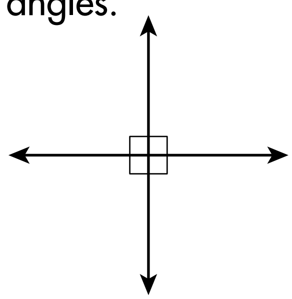
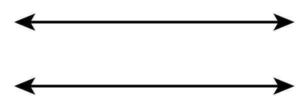
Name ______________________________ Date ______________

LINES AND ANGLES

Lines, line segments, and rays are straight paths.

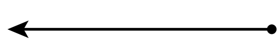
Line	Line Segment	Ray
A line goes on without end in two directions. 	A line segment has two endpoints.	A ray has one endpoint and goes on without end in one direction. 

Special Types of Lines

Intersecting	Perpendicular	Parallel
Intersecting lines are lines that cross at one point. 	Perpendicular lines cross at right angles. 	Parallel lines are lines in one plane that never cross. 

Name each figure.

1.



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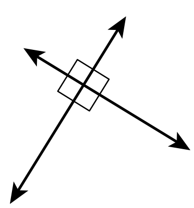
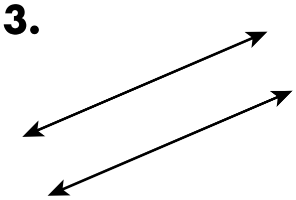
2.



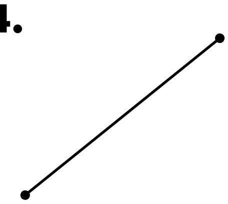
____

3.



____

4.



____

CHALLENGE

Which statement is always true? Explain.

(a) Intersecting lines are always perpendicular.

(b) Perpendicular lines always intersect.

____

____

Name ______________________________ Date ______________

LINES AND ANGLES

Lines, line segments, and rays are straight paths.

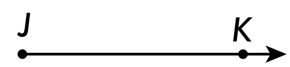
Line
A line is a straight path that goes on without end in two directions.

line *AB*

Line Segment
A line segment is a part of a line. It has two endpoints.

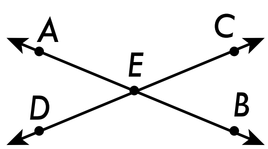
line segment *CD*

Ray
A ray is a part of a line. It has one endpoint and goes on without end in one direction.



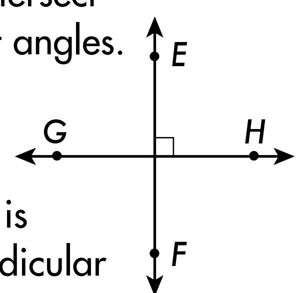
ray *JK*

Intersecting Lines
Intersecting lines are lines that cross at one point.



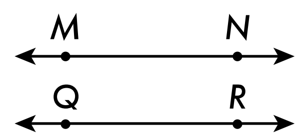
line *AB* and line *CD* intersect at point *E*

Perpendicular Lines
Perpendicular lines intersect at right angles.



line EF is perpendicular to line GH

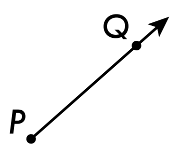
Parallel Lines
Parallel lines are lines in one plane that never intersect.



line *MN* is parallel to line *QR*

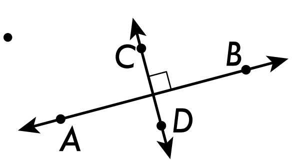
Name each figure.

1.



____

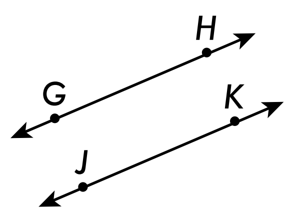
2.



____

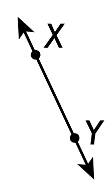
____

3.



____

4.



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CHALLENGE

Draw and label a diagram to illustrate each of the following:

line *GH* parallel to line *LM*

line *RS* and line *XZ* intersecting at point *P*

Name ______________________________ Date ______________

LINES AND ANGLES

Line
A line is a straight path that goes on without end in two directions.

line *AB* or $\overleftrightarrow{AB}$ or
line *BA* or $\overleftrightarrow{BA}$

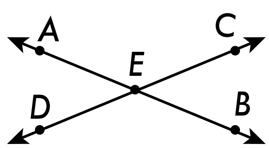
Line Segment
A line segment is a part of a line. It has two endpoints.

line segment *CD* or $\overline{CD}$ or
line segment *DC* or $\overline{DC}$

Ray
A ray is a part of a line. It has one endpoint and goes on without end in one direction.

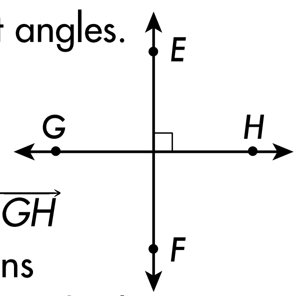
ray *JK* or $\overrightarrow{JK}$

Intersecting Lines
Intersecting lines are lines that cross at one point.



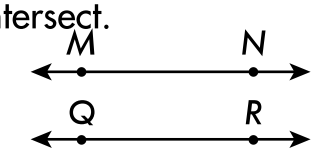
$\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect at point E

Perpendicular Lines
Perpendicular lines intersect at right angles.



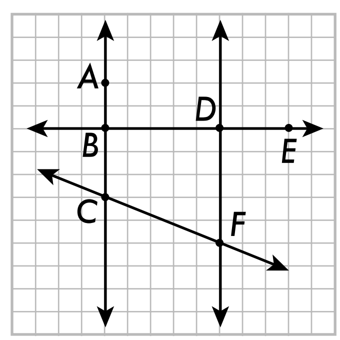
$\overleftrightarrow{EF} \perp \overleftrightarrow{GH}$
$\perp$ means
"is perpendicular to"

Parallel Lines
Parallel lines are lines in one plane that never intersect.



$\overleftrightarrow{MN} \parallel \overleftrightarrow{QR}$
$\parallel$ means "is parallel to"

Use the figure at the right to name an example of each term.



1. perpendicular lines ____________

2. ray ____________

3. line segment ____________

4. intersecting lines ____________

5. parallel lines ____________

6. line ____________

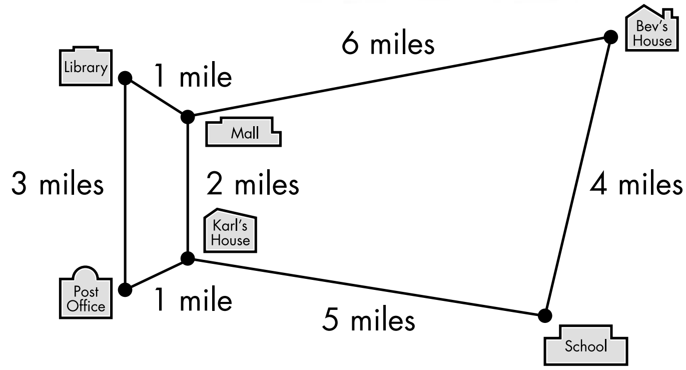
Draw and label a figure for each.

7. line FG **8.** $\overleftrightarrow{PQ} \parallel \overleftrightarrow{ST}$ **9.** $\overline{RS} \perp \overline{MN}$

Name ______________________________ Date ______________

MAP AND DRAWING SCALES

A map is a diagram that shows relationships among places, often including distance information.
This map shows some places near Bev's house.
The map shows that Bev lives 4 miles from her school.



Use the map above to answer each question.

1. How many miles is Bev's house from the library? ______
2. How many miles does Karl live from the mall? ______
3. Who lives closer to school, Bev or Karl? How much closer?

____

4. Bev goes from her house, to the library, and then to the post office. At that point, how far did she travel? ______
5. How many miles is a round trip from Karl's house to school and back? ______
6. Who lives closer to the library, Bev or Karl? Explain.

____

____

CHALLENGE

What is the shortest route to the school from the library shown on the map? What is the distance?

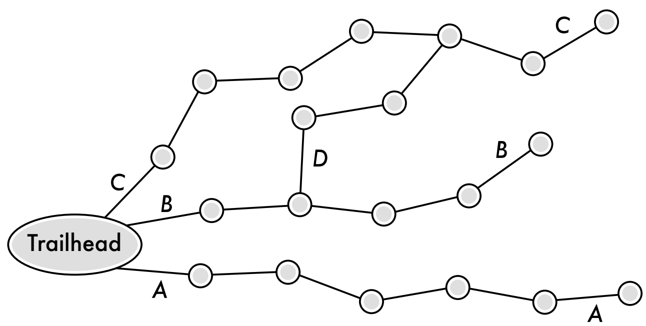
____

____

Name ______________________ Date ______________

MAP AND DRAWING SCALES

A map is a diagram that shows distances between different locations.
The map below shows some trails in a forest.
It is 1 mile between each pair of circle markers shown on the map.
So, it is 6 miles from the trailhead to the top of the Trail A.



Use the map above to answer each question.

1. How far is it from the trailhead to the top of Trail B? ______
2. How far is it from the trailhead to the top of Trail C? ______
3. Trail D connects Trails B and C. How long is Trail D? ______
4. Start at the trailhead and start to follow Trail B. Then go along Trail D to the top of Trail C. How far is it to the top? ______
5. What is the total roundtrip distance from the trailhead to the top of Trail A and back? ______
6. What is the shortest total distance of a hike that starts at Trail C, turns onto Trail D and then follows Trail B to the trailhead of Trail B?
   ______
7. How much longer is a roundtrip hike from the trailhead to the top of Trail C than a roundtrip hike to the top of Trail A? ______

CHALLENGE

Suppose the distance between each pair of markers on the map were 5 miles. How far would it be to the top of Trail A? Explain.

____

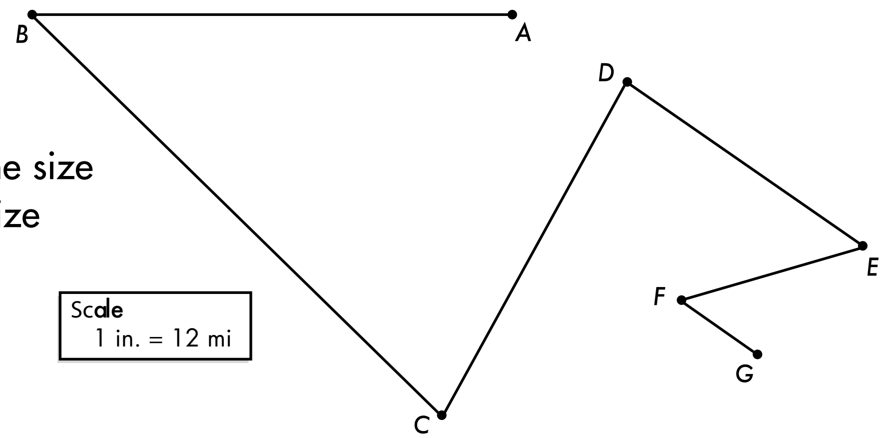
DISCOVERING MATH
LEVEL 2

Name ____________________ Date ____________________

MAP AND DRAWING SCALES

A scale drawing is a drawing that shows a real object enlarged or reduced. The scale is a ratio that compares the size of the object in the drawing to the size of the actual object.

The map shows the location of 7 different sites an archaeologist is mapping.



What is the actual distance between Site A and Site B? The map uses the scale 1 inch = 12 miles.

Use a ruler to measure the distance from Site A to Site B on the map. The distance on the map is $2\frac{1}{2}$ or 2.5 inches

Find an equivalent ratio to find the actual distance.

actual distance → $\frac{12 \text{ mi}}{1 \text{ in.}} = \frac{?}{2.5}$ ← actual distance

map scale distance → ← map scale distance

Think: $2.5 \times 12 = 30$ $\quad \frac{12 \text{ mi}}{1 \text{ in.}} = \frac{30 \text{ mi}}{2.5 \text{ mi}}$

The actual distance between the sites is 30 miles.

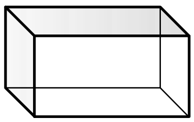
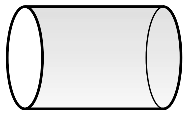
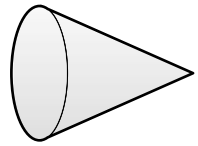
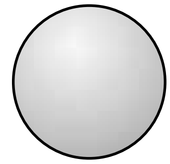
Use the above map and map scale to find each distance.

1. What is the actual distance between Site B and Site C? _______
2. What is the actual distance between Site C and Site D? _______
3. What is the actual distance between Site D and Site E? _______
4. What is the actual distance between Site E and Site F? _______
5. What is the actual distance between Site F and Site G? _______

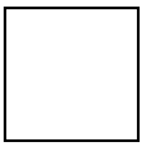
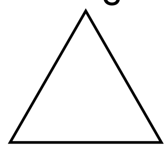
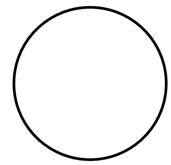
Name ______________________ Date ______________

SHAPE NAMES

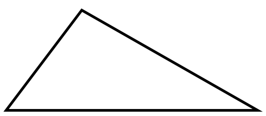
Three-Dimensional Figures or Space Figures

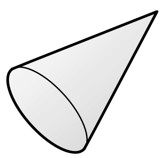
Rectangular Prism	Cylinder	Cone	Sphere
			

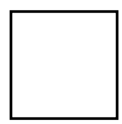
Two-Dimensional Figures or Plane Figures

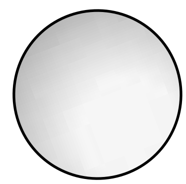
Square	Rectangle	Triangle	Circle
			

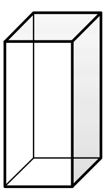
Name each shape.

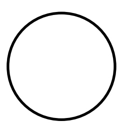
1. 
[triangle]

2. 
[cone]

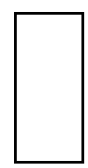
3. 
[square]

4. 
[sphere]

5. 
[rectangular prism]

6. 
[circle]

7. 
[cylinder]

8. 
[rectangle]

9. Which figures in the exercises are plane figures? ________ [1, 3, 6, 8]

10. Which figures in the exercises are space figures? ________ [2, 4, 5, 7]

CHALLENGE

Name a real-life example of a rectangular prism, a cylinder, a cone, and a sphere.

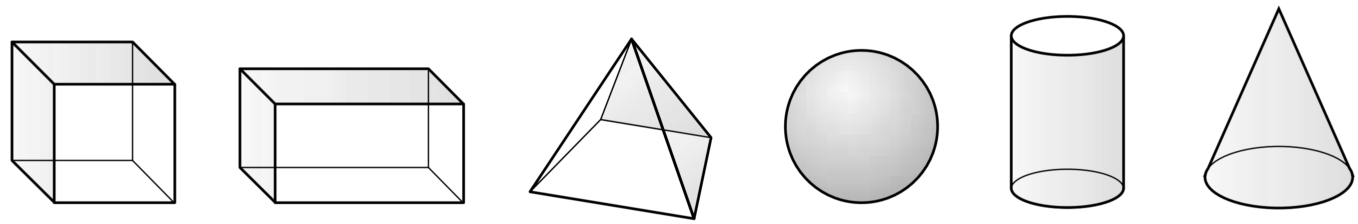
[Answers may vary. Possible answers: rectangular prism: cereal box;
cylinder: can of soup; cone: ice cream cone; sphere: ball]

Name ______________________________ Date ______________

DISCOVERY EDUCATION

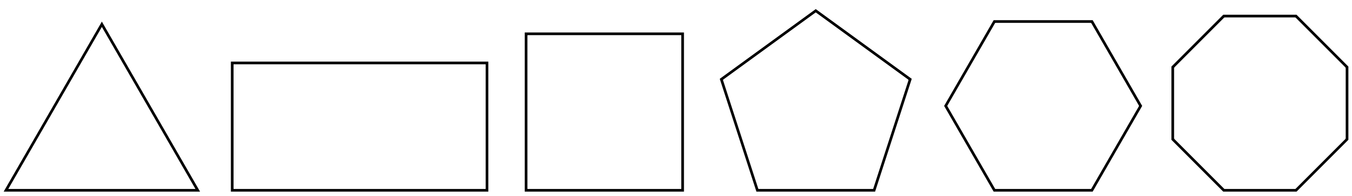
SHAPE NAMES

Three-Dimensional Figures



cube | rectangular prism | square pyramid | sphere | cylinder | cone

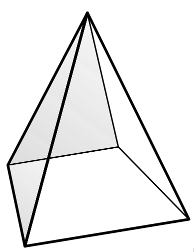
Polygons



triangle | rectangle | square | pentagon | hexagon | octagon

Name each figure.

1.

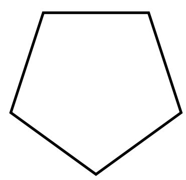


[square pyramid]

2.

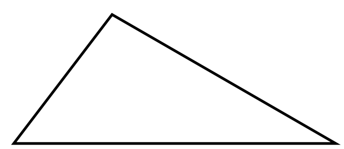
[cylinder]

3.



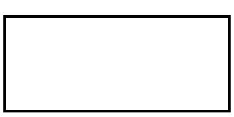
[pentagon]

4.



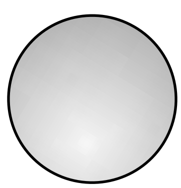
[triangle]

5.



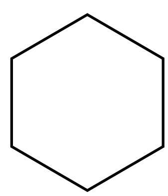
[rectangle]

6.



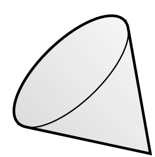
[sphere]

7.



[hexagon]

8.



[cone]

CHALLENGE

A polygon with four sides is called a quadrilateral. Draw a quadrilateral that is **not** a rectangle. Then draw another quadrilateral that is not a parallelogram and not a trapezoid. [Check students' drawings.]

DISCOVERING MATH

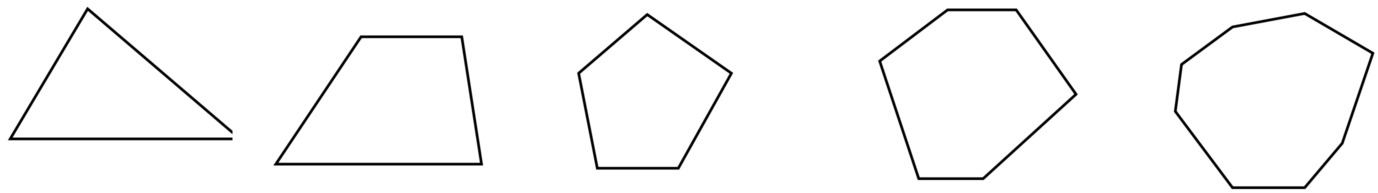
LEVEL 2

Name ____________________ Date ____________

DISCOVERY EDUCATION

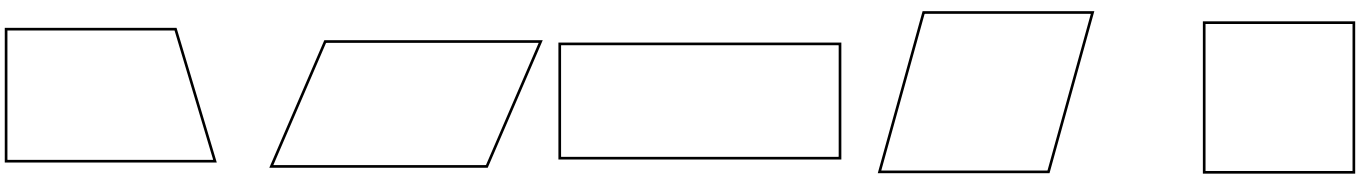
SHAPE NAMES

Polygons



Triangle	Quadrilateral	Pentagon	Hexagon	Octagon
3 sides 3 angles	4 sides 4 angles	5 sides 5 angles	6 sides 6 angles	8 sides 8 angles

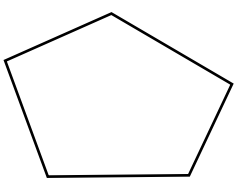
Special Quadrilaterals



Trapezoid	Parallelogram	Rectangle	Rhombus	Square
Only two parallel sides.	Opposite sides are parallel and the same length.	Parallelogram with 4 right angles.	Parallelogram with all sides the same length.	Rectangle with all sides the same length.

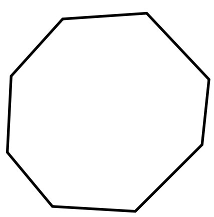
Name each polygon.

1.



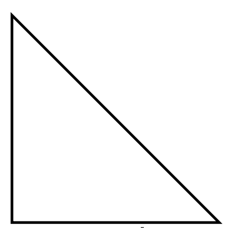
[pentagon]

2.



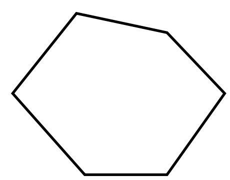
[octagon]

3.



[triangle]

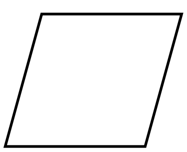
4.



[hexagon]

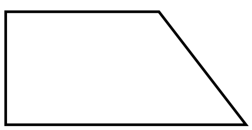
Classify each quadrilateral. Some may have more than one name.

5.



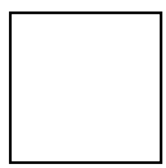
[parallelogram, rhombus]

6.



[trapezoid]

7.

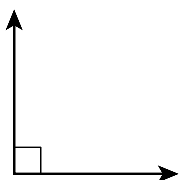
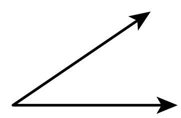
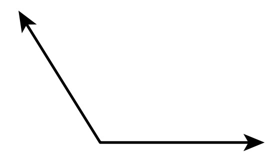


[parallelogram, rectangle, rhombus, square]

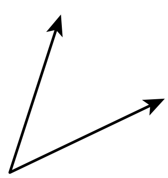
Name ______________________________ Date ________________

PROPERTIES OF GEOMETRIC FIGURES

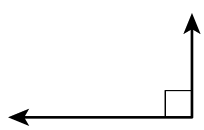
Angles

Right Angle	Acute Angle	Obtuse Angle
A right angle forms a square corner.  The square in the corner means the angle is a right angle.	An acute angle is less than a right angle. 	An obtuse angle is greater than a right angle. 

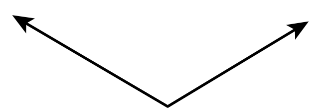
Tell whether each angle is right, acute, or obtuse.

1. 

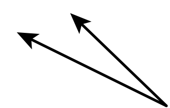
[acute]

2. 

[right]

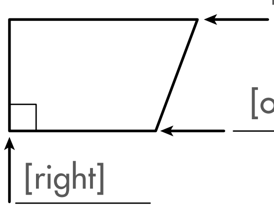
3. 

[obtuse]

4. 

[acute]

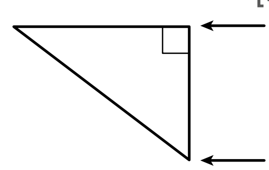
Tell whether the angle each arrow points to is right, acute, or obtuse.

5. 

[acute]

[obtuse]

[right]

6. 

[right]

[acute]

CHALLENGE

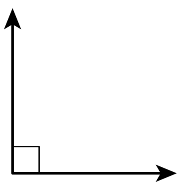
Draw a triangle with an obtuse angle. [Check students' drawings.]

Name ______________________________ Date ______________

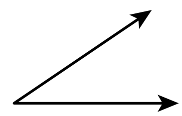
PROPERTIES OF GEOMETRIC FIGURES

Angles

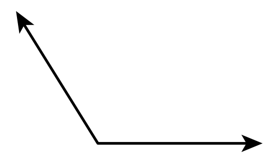
Right Angle
A right angle forms a square corner.



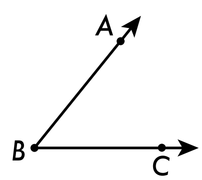
Acute Angle
An acute angle is less than a right angle.



Obtuse Angle
An obtuse angle is greater than a right angle.



An angle can be named in three ways.



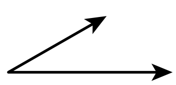
$\angle B$ or $\angle ABC$ or $\angle CBA$

Read: angle B or angle ABC or angle CBA

Two rays meet at an endpoint to form an angle. The endpoint is always included in the angle name.

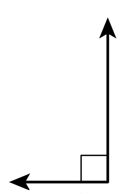
Tell whether each angle is right, acute, or obtuse.

1.



[acute]

2.

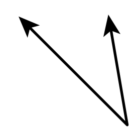


[right]

3.

[obtuse]

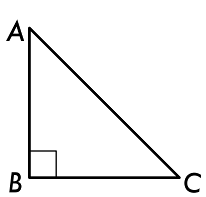
4.



[acute]

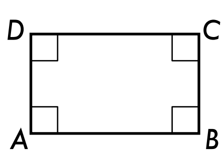
For each figure, tell whether $\angle ABC$ is right, acute, or obtuse.

5.



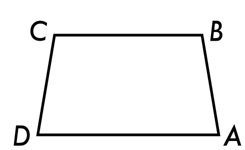
[right]

6.



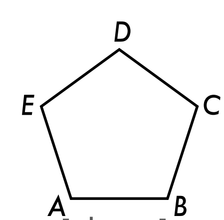
[right]

7.



[obtuse]

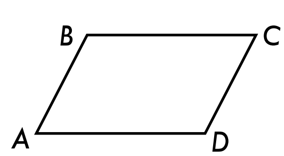
8.



[obtuse]

CHALLENGE

Classify each of the angles of the parallelogram.



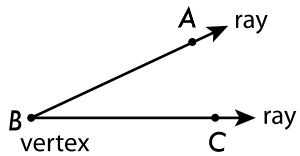
[angles A and C are acute and angles B and D are obtuse]

Name ______________________ Date ______________

DISCOVERY EDUCATION

PROPERTIES OF GEOMETRIC FIGURES

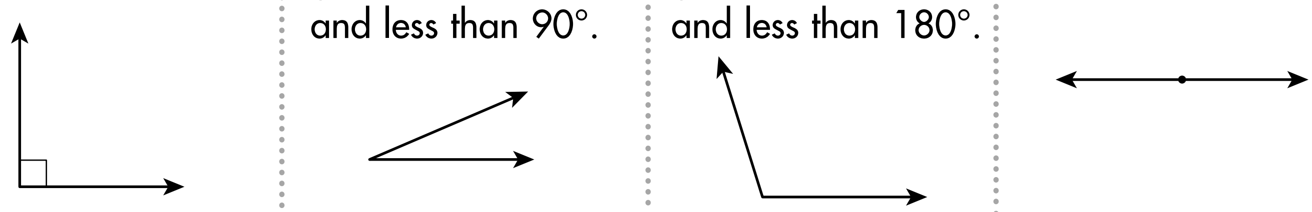
An angle is formed when two rays meet at the same endpoint, or vertex. The angle can be named by three letters or by its vertex:



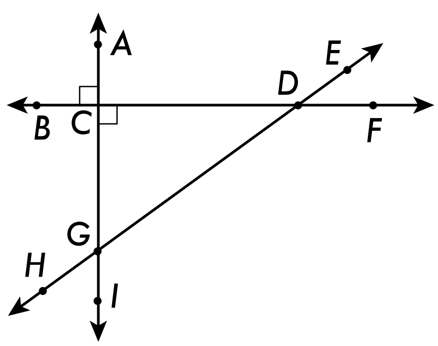
∠B or ∠ABC or ∠CBA

Angles are measured in degrees (°).

Right Angle	Acute Angle	Obtuse Angle	Straight Angle
A right angle measures 90°.	An acute angle is greater than 0° and less than 90°.	An obtuse angle is greater than 90° and less than 180°.	A straight angle measures 180°.



Use the figure below. Tell whether each angle is right, acute, obtuse, or straight.



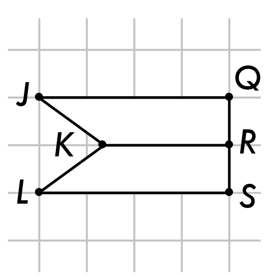
1. ∠DCG [right]

2. ∠GDE [straight]

3. ∠CDE [obtuse]

4. ∠CDG [acute]

Use the figure below. Name as many examples of each type of angle as possible.



5. acute [∠QJK or ∠KLS]

6. obtuse [∠JKR or ∠RKL]

7. right [∠JQR or ∠QRK or ∠KRS or ∠RSL]

8. straight [∠QRS]

DISCOVERING MATH

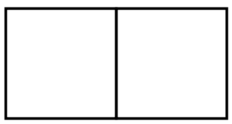
LEVEL 3

Name ______________________________ Date ______________

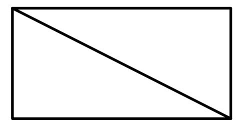
ALTERING SHAPES

Shapes can be combined to make different shapes.

Joining two squares makes a rectangle:

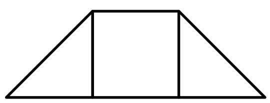


Shapes can be divided to make different shapes.
Dividing a rectangle along the diagonal makes two triangles:



Name the shapes used to make each figure.

1.

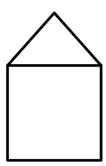


[square and 2 triangles]

2.

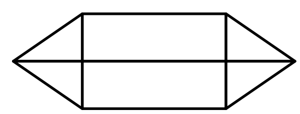
[rectangle and 2 triangles]

3.



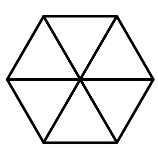
[square and triangle]

4.



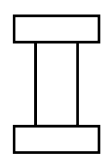
[2 rectangles and 4 triangles]

5.



[6 triangles]

6.



[3 rectangles]

CHALLENGE

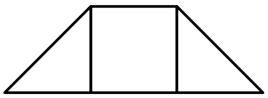
Make a new shape by combining at least 3 different geometric shapes.
[Check students' drawings.]

Name ______________________________ Date ______________

ALTERING SHAPES

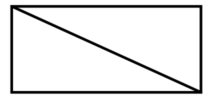
Polygons can be combined to make different polygons.

Joining a square and two triangles makes a trapezoid:



Polygons can be divided to make different polygons.

Dividing a parallelogram along the diagonal makes two triangles:

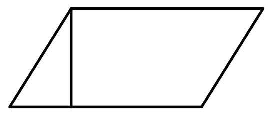


Name the polygons used to make each figure. Then identify the figure.

1.

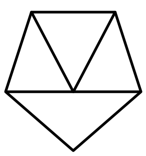
[rectangle and 2 triangles; hexagon]

2.



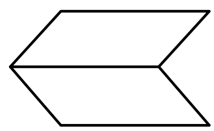
[triangle and trapezoid; parallelogram]

3.



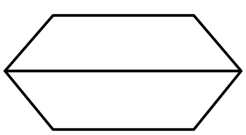
[4 triangles; pentagon]

4.



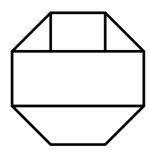
[2 parallelograms; hexagon]

5.



[2 trapezoids; hexagon]

6.



[trapezoid, 2 rectangles, 2 triangles; octagon]

CHALLENGE

Make a new shape by combining at least 3 different polygons.

[Check students' drawings.]

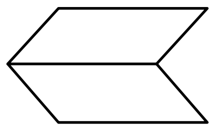
Name ______________________ Date ______________

DISCOVERY EDUCATION

ALTERING SHAPES

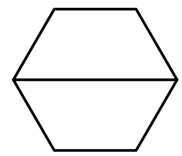
Polygons can be combined to make different polygons.

Joining two parallelograms can make a hexagon:



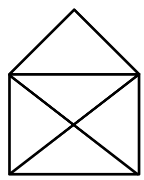
Polygons can be divided to make different polygons.

A hexagon can be divided into two trapezoids:



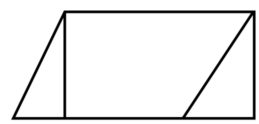
Name the polygons used to make each figure. Then identify the figure.

1.



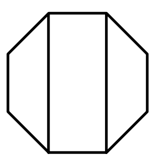
[5 triangles; pentagon]

2.



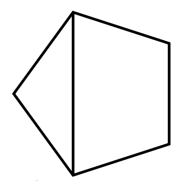
[trapezoid and 2 triangles; trapezoid]

3.



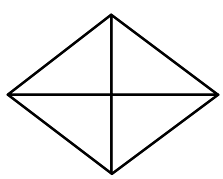
[2 trapezoids and rectangle; octagon]

4.



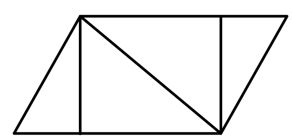
[triangle and trapezoid; pentagon]

5.



[4 triangles; rhombus]

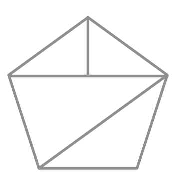
6.



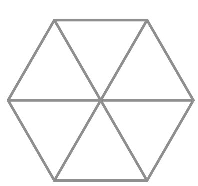
[4 triangles; parallelogram]

CHALLENGE [Check students' drawings. Sample answers shown.]

Make a pentagon by joining together 4 triangles.



Make a hexagon by joining together 6 triangles.

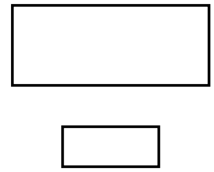


DISCOVERING MATH

LEVEL 3

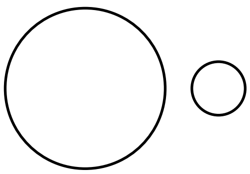
Name ______________________________ Date ____________

CONGRUENT AND SIMILAR SHAPES

Congruent Figures	**Similar Figures**
	
These rectangles are congruent. Congruent figures have the same shape and the same size.	These rectangles are similar. Similar figures have the same shape but not the same size.

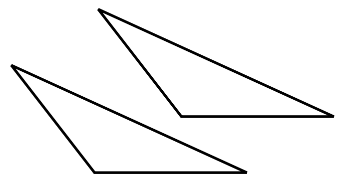
Are the figures congruent, similar, or neither?

1.



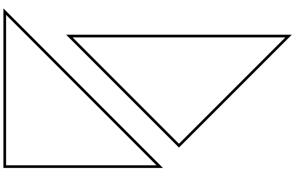
[similar]

2.



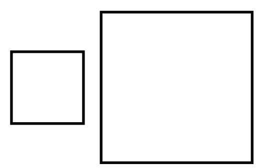
[congruent]

3.



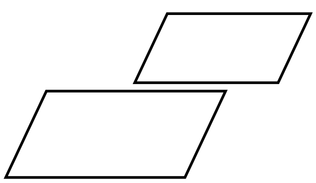
[congruent]

4.



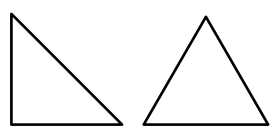
[similar]

5.



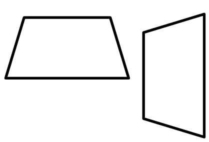
[similar]

6.



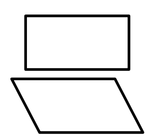
[neither]

7.



[congruent]

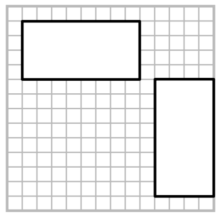
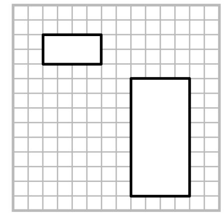
8.



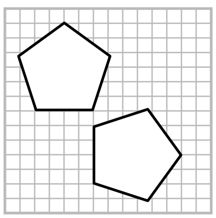
[neither]

Name ____________________ Date ____________________

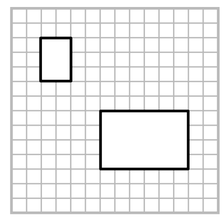
CONGRUENT AND SIMILAR SHAPES

Congruent Figures	Similar Figures
Congruent figures have the same shape and the same size.  The rectangles are congruent.	Similar figures have the same shape but not the same size. The rectangles are similar. 

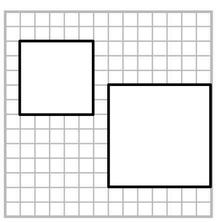
Are the figures congruent, similar, or neither?

1. 

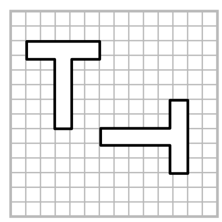
[congruent]

2. 

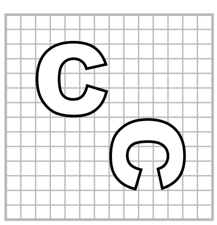
[similar]

3. 

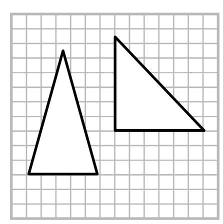
[similar]

4. 

[congruent]

5. 

[congruent]

6. 

[neither]

CHALLENGE

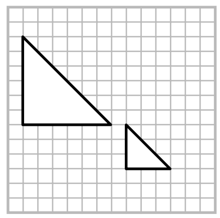
Danny takes a photograph of his house. Then he has the photograph enlarged. Is the house in the enlargement congruent to the house in the original photograph? Is it similar? Explain.

[It is not congruent because the enlargement is larger than the original. It is similar since everything should be enlarged by the same ratio.]

Name ______________________________ Date ______________

CONGRUENT AND SIMILAR SHAPES

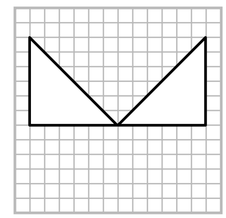
Similar Figures



Similar figures have the same shape but not the same size.

The triangles are similar. The corresponding angles of the triangles are equal. The ratios of corresponding sides are equal.

Congruent Figures

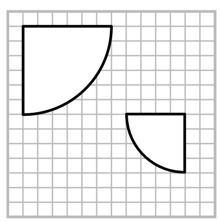


Congruent figures have the same shape and the same size.

The triangles are congruent. Since they are the same shape, the triangles are also similar. The ratios of corresponding sides of the triangles is 1:1.

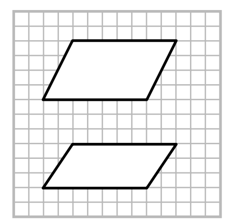
Are the figures congruent, similar, neither, or both?

1.



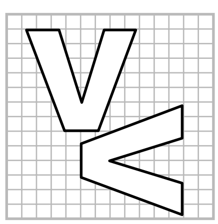
[similar]

2.



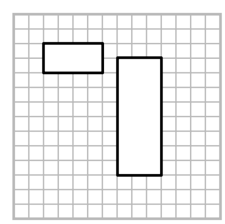
[neither]

3.



[both]

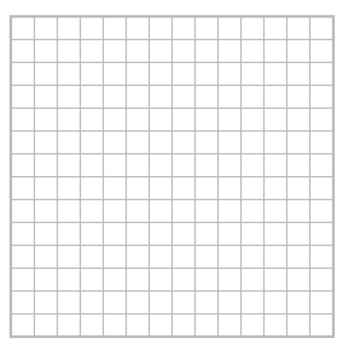
4.



[neither]

CHALLENGE

Draw a rectangle on the grid.
Then draw a rectangle that is similar but not congruent to your rectangle.
[Check students' drawings.]
Explain how you know the rectangles are similar.



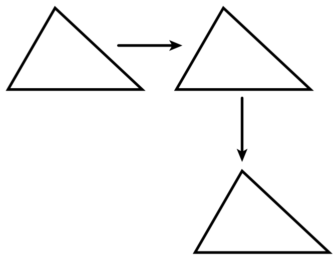
[Answers may vary. Possible answer: I doubled both the length and the width of my original rectangle to draw the similar rectangle.]

Name ______________________________ Date ____________

MOTION GEOMETRY

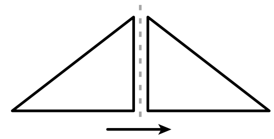
Translation

A translation slides a figure along a straight line left, right, up, or down.



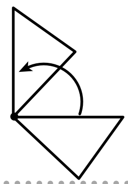
Reflection

A reflection flips a figure across a line. A reflection makes a mirror image.



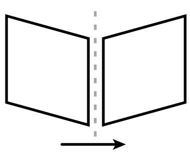
Rotation

A rotation turns a figure around a point.



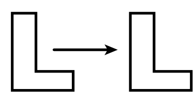
Write *translation, reflection,* or *rotation* to describe how each figure was moved.

1.



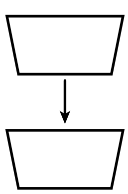
[reflection]

2.



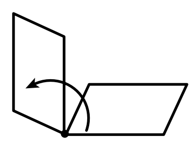
[translation]

3.



[translation]

4.



[rotation]

CHALLENGE

Is the reflection of a figure congruent to the original figure? Explain.

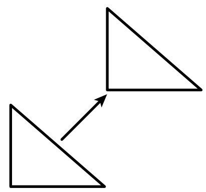
[Yes. The figure is still the same size and shape. Only its position has changed.]

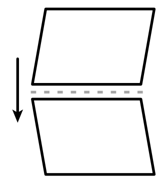
Name _______________________________ Date _______________

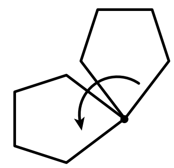
DISCOVERY EDUCATION

MOTION GEOMETRY

Translation	Reflection	Rotation
A translation slides a figure along a straight line left, right, up, or down.	A reflection flips a figure across a line. A reflection makes a mirror image.	A rotation is a turn that moves a figure around a point.

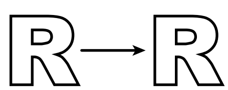






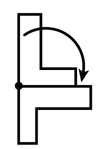
Write *translation, reflection,* or *rotation* to describe how each figure was moved.

1.



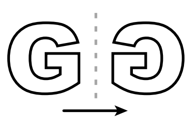
[translation]

2.



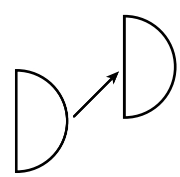
[rotation]

3.



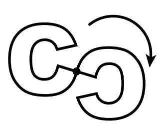
[reflection]

4.



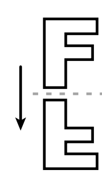
[translation]

5.



[rotation]

6.



[reflection]

CHALLENGE

Translations, reflections, and rotations are transformations of a figure. Do these transformations result in a figure congruent to the original figure? Explain.

[Yes. For these transformations, the transformed figure is still the same size and shape. Only its position has changed.]

DISCOVERING MATH

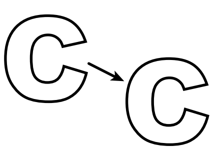
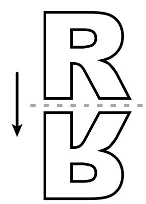
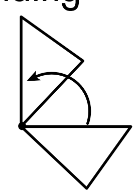
LEVEL 2

Name ______________________ Date ______________

MOTION GEOMETRY

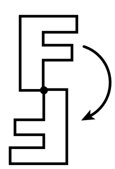
A **transformation** moves a figure without changing its size or shape.

Transformations

Translation	**Reflection**	**Rotation**
A translation moves a figure along a straight line. 	A reflection flips a figure across a line. A reflection makes a mirror image. 	A rotation moves a figure by turning it around a point. All the points on the figure move in a circle. Some points move farther than others, depending on how far from the center of rotation they are. 

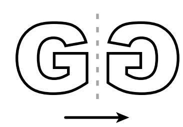
Write *translation, reflection,* or *rotation* to describe how each figure was moved.

1.



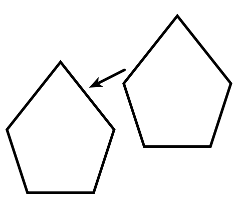
[rotation]

2.



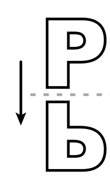
[reflection]

3.



[translation]

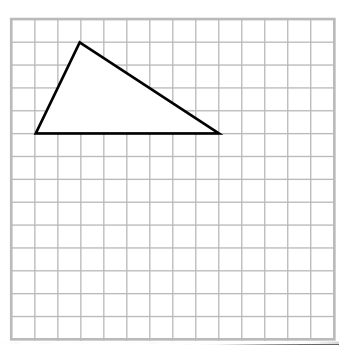
4.



[reflection]

CHALLENGE

Draw a translation, reflection, and rotation of the triangle shown on the grid. Label each transformation.

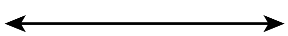
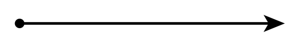


[Check students' drawings.]

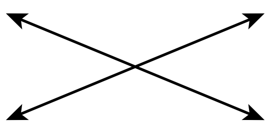
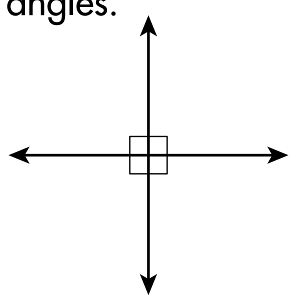
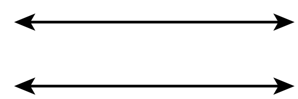
Name ______________________________ Date ______________

LINES AND ANGLES

Lines, line segments, and rays are straight paths.

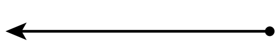
Line	Line Segment	Ray
A line goes on without end in two directions. 	A line segment has two endpoints.	A ray has one endpoint and goes on without end in one direction. 

Special Types of Lines

Intersecting	Perpendicular	Parallel
Intersecting lines are lines that cross at one point. 	Perpendicular lines cross at right angles. 	Parallel lines are lines in one plane that never cross. 

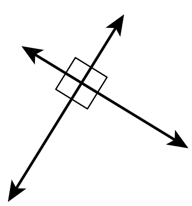
Name each figure.

1.



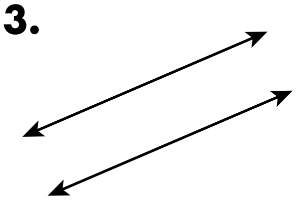
[ray]

2.



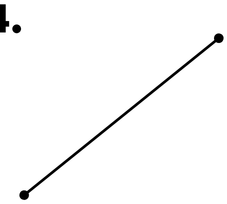
[perpendicular lines]

3.



[parallel lines]

4.



[line segment]

CHALLENGE

Which statement is always true? Explain.

(a) Intersecting lines are always perpendicular.

(b) Perpendicular lines always intersect.

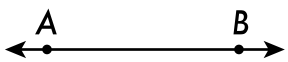
[(b) is always true because perpendicular lines intersect at right angles. Intersecting lines do not always cross at right angles.]

Name ______________________________ Date ______________

LINES AND ANGLES

Lines, line segments, and rays are straight paths.

Line
A line is a straight path that goes on without end in two directions.

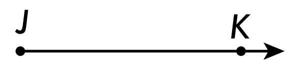


line *AB*

Line Segment
A line segment is a part of a line. It has two endpoints.

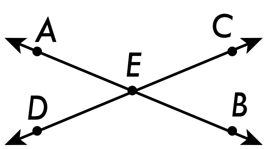
line segment *CD*

Ray
A ray is a part of a line. It has one endpoint and goes on without end in one direction.



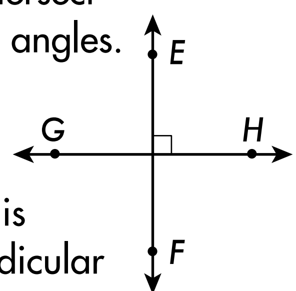
ray *JK*

Intersecting Lines
Intersecting lines are lines that cross at one point.



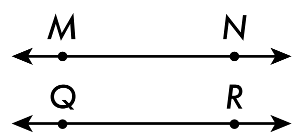
line *AB* and line *CD* intersect at point *E*

Perpendicular Lines
Perpendicular lines intersect at right angles.



line EF is perpendicular to line GH

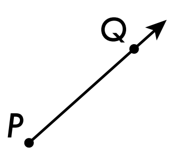
Parallel Lines
Parallel lines are lines in one plane that never intersect.



line *MN* is parallel to line *QR*

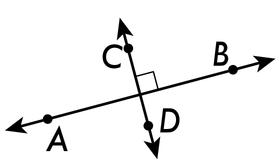
Name each figure.

1.



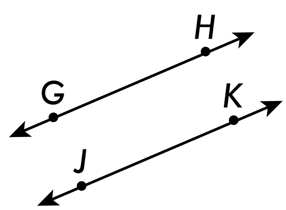
[ray PQ]

2.



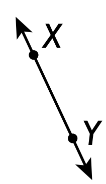
[perpendicular lines *AB* and *CD*]

3.



[parallel lines *GH* and *JK*]

4.



[line XY]

CHALLENGE

Draw and label a diagram to illustrate each of the following: [Check students' drawings.]

line *GH* parallel to line *LM*

line *RS* and line *XZ* intersecting at point *P*

Name ______________________________ Date ______________

LINES AND ANGLES

Line
A line is a straight path that goes on without end in two directions.

line *AB* or $\overleftrightarrow{AB}$ or line *BA* or $\overleftrightarrow{BA}$

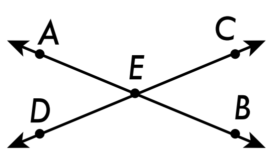
Line Segment
A line segment is a part of a line. It has two endpoints.

line segment *CD* or $\overline{CD}$ or line segment *DC* or $\overline{DC}$

Ray
A ray is a part of a line. It has one endpoint and goes on without end in one direction.

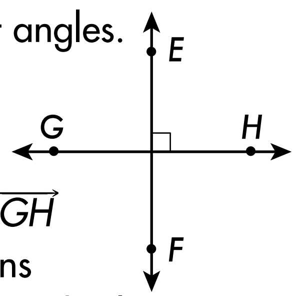
ray *JK* or $\overrightarrow{JK}$

Intersecting Lines
Intersecting lines are lines that cross at one point.



$\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect at point E

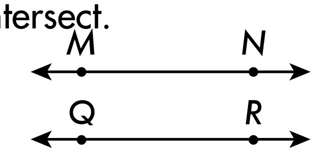
Perpendicular Lines
Perpendicular lines intersect at right angles.



$\overleftrightarrow{EF} \perp \overleftrightarrow{GH}$

$\perp$ means "is perpendicular to"

Parallel Lines
Parallel lines are lines in one plane that never intersect.

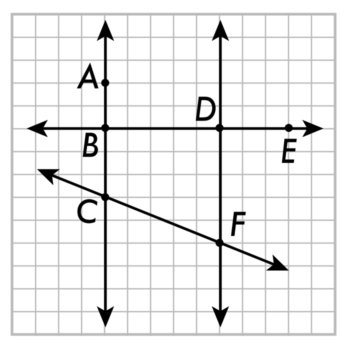


$\overleftrightarrow{MN} \parallel \overleftrightarrow{QR}$

$\parallel$ means "is parallel to"

Use the figure at the right to name an example of each term.

[Sample answers given]



1. perpendicular lines ____________ [$\overleftrightarrow{AC} \perp \overleftrightarrow{BD}$]
2. ray ____________ [$\overrightarrow{DE}$]
3. line segment ____________ [$\overline{BC}$]
4. intersecting lines ____________ [$\overleftrightarrow{AC}$ and $\overleftrightarrow{CF}$]
5. parallel lines ____________ [$\overleftrightarrow{AC} \parallel \overleftrightarrow{DF}$]
6. line ____________ [$\overleftrightarrow{CF}$]

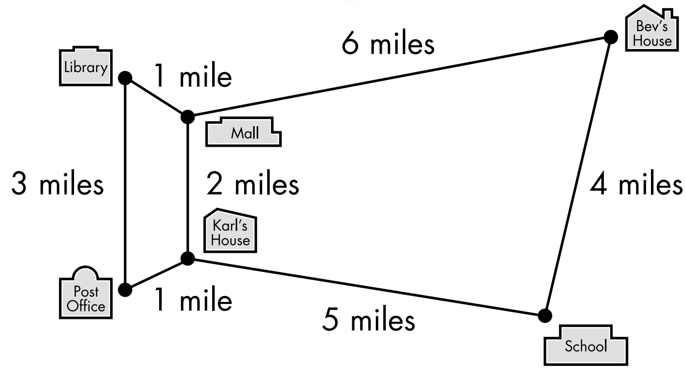
Draw and label a figure for each. [Check student's drawings.]

7. line FG
8. $\overleftrightarrow{PQ} \parallel \overleftrightarrow{ST}$
9. $\overline{RS} \perp \overline{MN}$

Name ______________________________ Date ______________

MAP AND DRAWING SCALES

A map is a diagram that shows relationships among places, often including distance information.
This map shows some places near Bev's house.
The map shows that Bev lives 4 miles from her school.



Use the map above to answer each question.

1. How many miles is Bev's house from the library? _______ [6 miles]
2. How many miles does Karl live from the mall? _______ [2 miles]
3. Who lives closer to school, Bev or Karl? How much closer?

   [Bev lives 1 mile closer.]
4. Bev goes from her house, to the library, and then to the post office. At that point, how far did she travel? _______ [9 miles]
5. How many miles is a round trip from Karl's house to school and back? _______ [10 miles]
6. Who lives closer to the library, Bev or Karl? Explain.

   [Karl lives closer. He can travel either 3 miles or 4 miles to the library.
   Bev lives 6 miles from the library.]

CHALLENGE

What is the shortest route to the school from the library shown on the map? What is the distance?

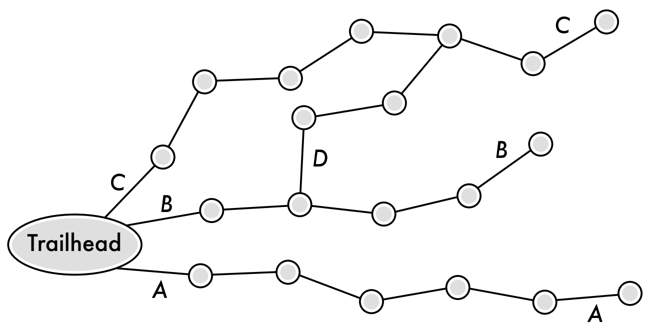
[Start at the library. Go 1 mile to the mall, 2 miles to Karl's house,
then 5 miles to the school. The distance is 8 miles.]

DISCOVERING MATH
LEVEL 1

Name ______________________________ Date ______________

MAP AND DRAWING SCALES

A map is a diagram that shows distances between different locations.
The map below shows some trails in a forest.
It is 1 mile between each pair of circle markers shown on the map.
So, it is 6 miles from the trailhead to the top of the Trail A.



Use the map above to answer each question.

1. How far is it from the trailhead to the top of Trail B? _______ [5 miles]
2. How far is it from the trailhead to the top of Trail C? _______ [7 miles]
3. Trail D connects Trails B and C. How long is Trail D? _______ [3 miles]
4. Start at the trailhead and start to follow Trail B. Then go along Trail D to the top of Trail C. How far is it to the top? _______ [7 miles]
5. What is the total roundtrip distance from the trailhead to the top of Trail A and back? _______ [12 miles]
6. What is the shortest total distance of a hike that starts at Trail C, turns onto Trail D and then follows Trail B to the trailhead of Trail B? _______ [10 miles]
7. How much longer is a roundtrip hike from the trailhead to the top of Trail C than a roundtrip hike to the top of Trail A? _______ [2 miles]

CHALLENGE

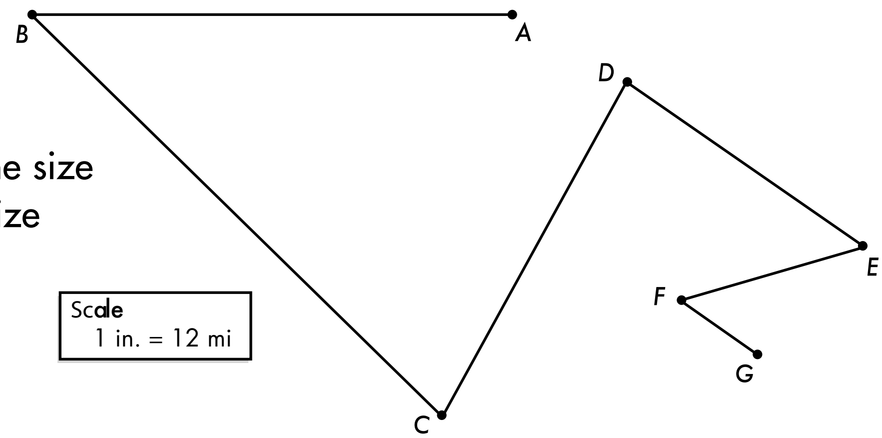
Suppose the distance between each pair of markers on the map were 5 miles. How far would it be to the top of Trail A? Explain.

[30 miles; Possible explanations: $6 \times 5 = 30$ or count by 5s between markers.]

Name ______________________________ Date ______________

MAP AND DRAWING SCALES

A scale drawing is a drawing that shows a real object enlarged or reduced. The scale is a ratio that compares the size of the object in the drawing to the size of the actual object.



The map shows the location of 7 different sites an archaeologist is mapping.

What is the actual distance between Site A and Site B?
The map uses the scale 1 inch = 12 miles.

Use a ruler to measure the distance from Site A to Site B on the map.
The distance on the map is $2\frac{1}{2}$ or 2.5 inches

Find an equivalent ratio to find the actual distance.

actual distance → $\frac{12 \text{ mi}}{1 \text{ in.}} = \frac{?}{2.5}$ ← actual distance
map scale distance → ← map scale distance

Think: $2.5 \times 12 = 30$ $\quad \frac{12 \text{ mi}}{1 \text{ in.}} = \frac{30 \text{ mi}}{2.5 \text{ mi}}$

The actual distance between the sites is 30 miles.

Use the above map and map scale to find each distance.

1. What is the actual distance between Site B and Site C? _______ [36 mi]
2. What is the actual distance between Site C and Site D? _______ [24 mi]
3. What is the actual distance between Site D and Site E? _______ [18 mi]
4. What is the actual distance between Site E and Site F? _______ [12 mi]
5. What is the actual distance between Site F and Site G? _______ [6 mi]