Name _____

Home-School Connection Topic **15** (English)

Classifying Plane Figures

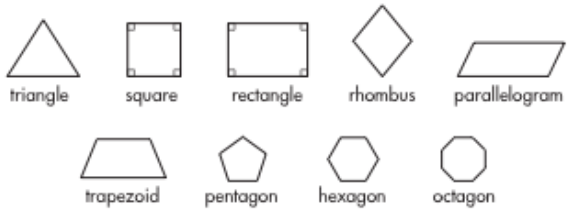
Dear Family,

In math class, your child is learning about geometric concepts. First, your child is learning about polygons and their special names, how to classify quadrilaterals by the properties of their angles and sides, and two ways to classify triangles.

You can help your child reinforce his or her ability to identify polygons. Here is an activity you can do together.

_____

The Presence of Polygons



Step 1: Discuss the properties of the nine polygons on this page. Identify the number of sides and discuss what makes each figure unique.

Step 2: Have your child find an example of each polygon inside or outside of your home.

Step 3: Have him or her place a checkmark on the figure on this page to record that the polygon has been found. Continue this activity until all the polygons are checked.

Name _____

Topic **15**
Vocabulary Cards

polygon	**polygon** A closed plane figure made up of line segments
regular polygon	**regular polygon** A polygon that has sides of equal length and angles of equal measure
triangle	**triangle** A polygon with 3 sides

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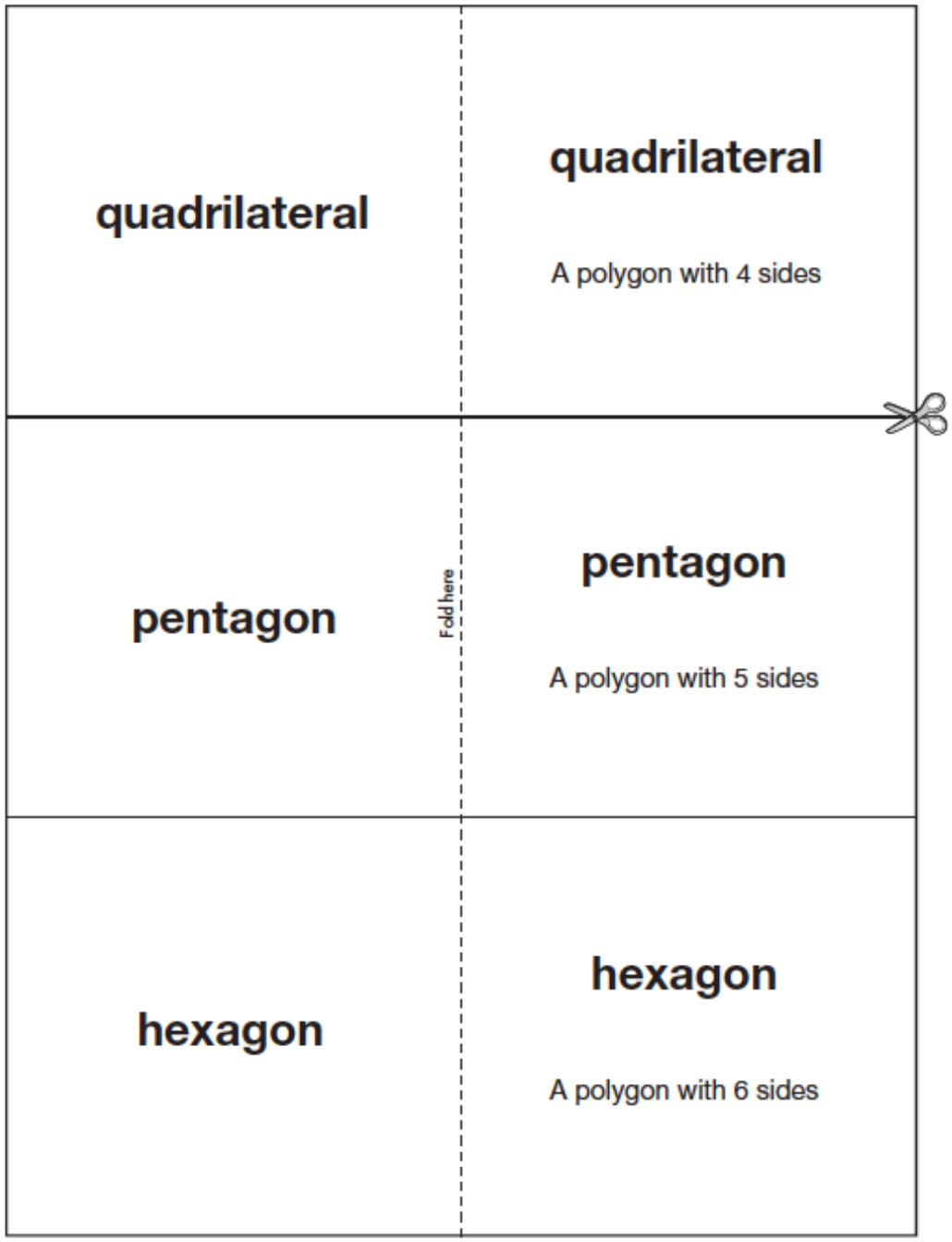
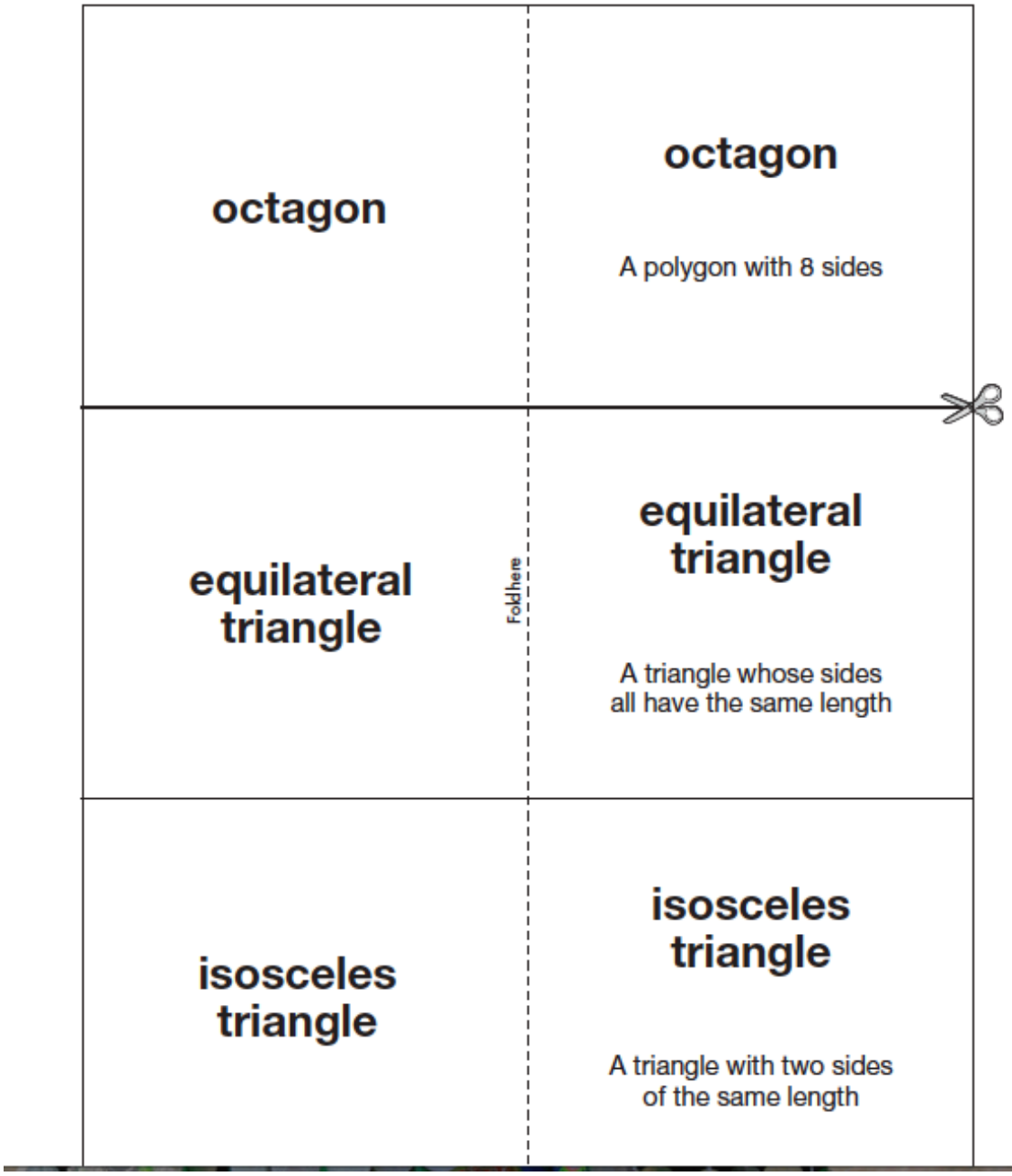
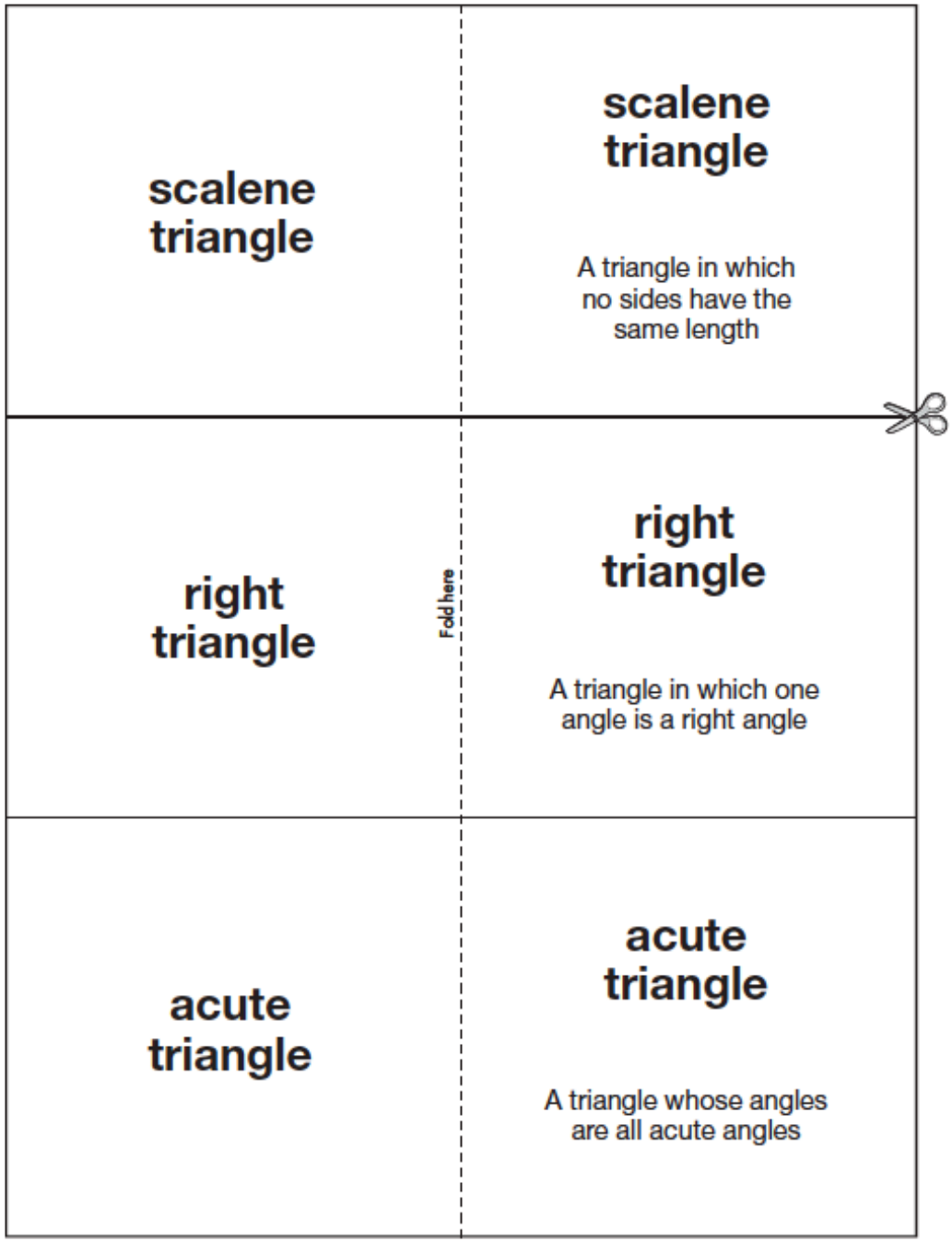
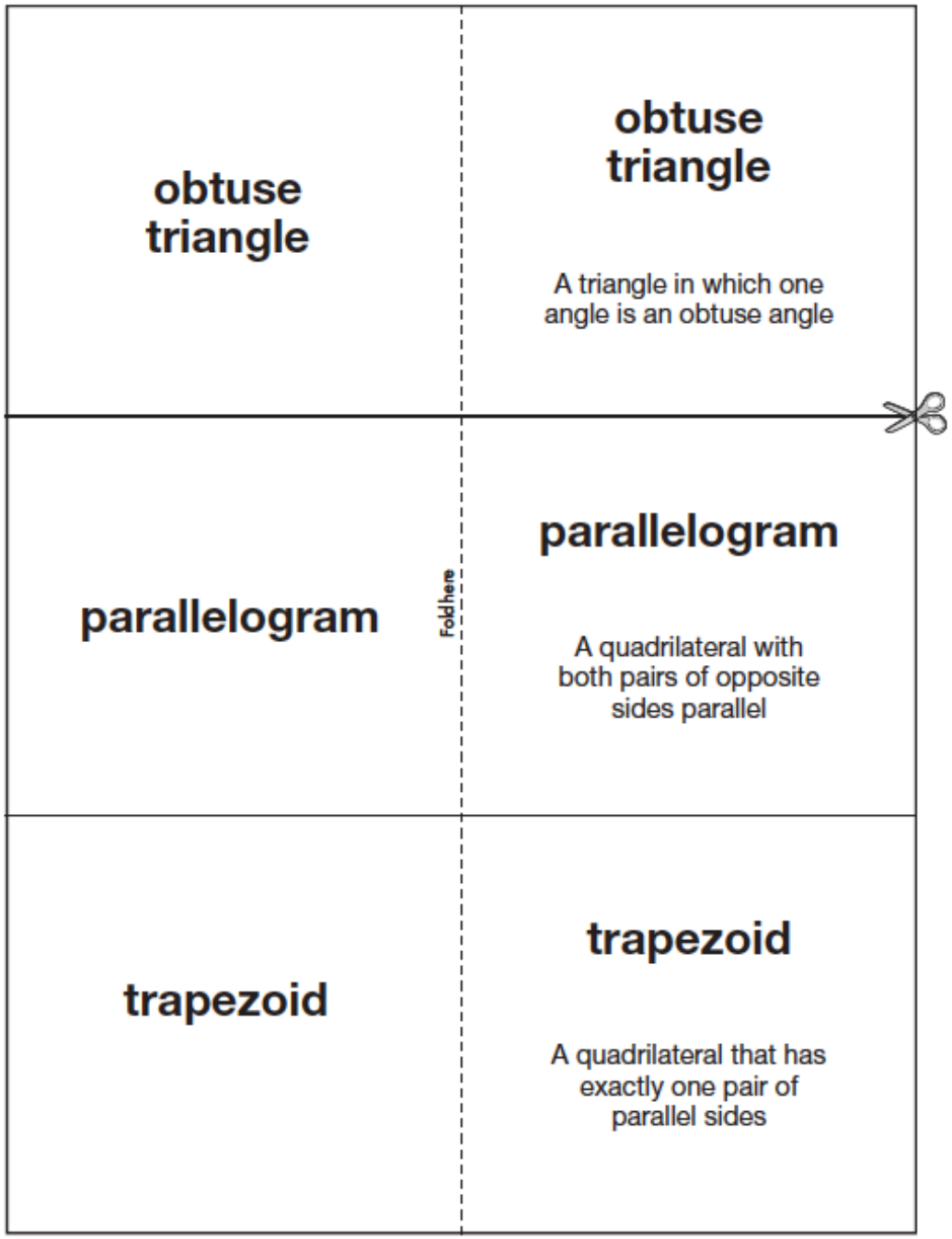


Name _____

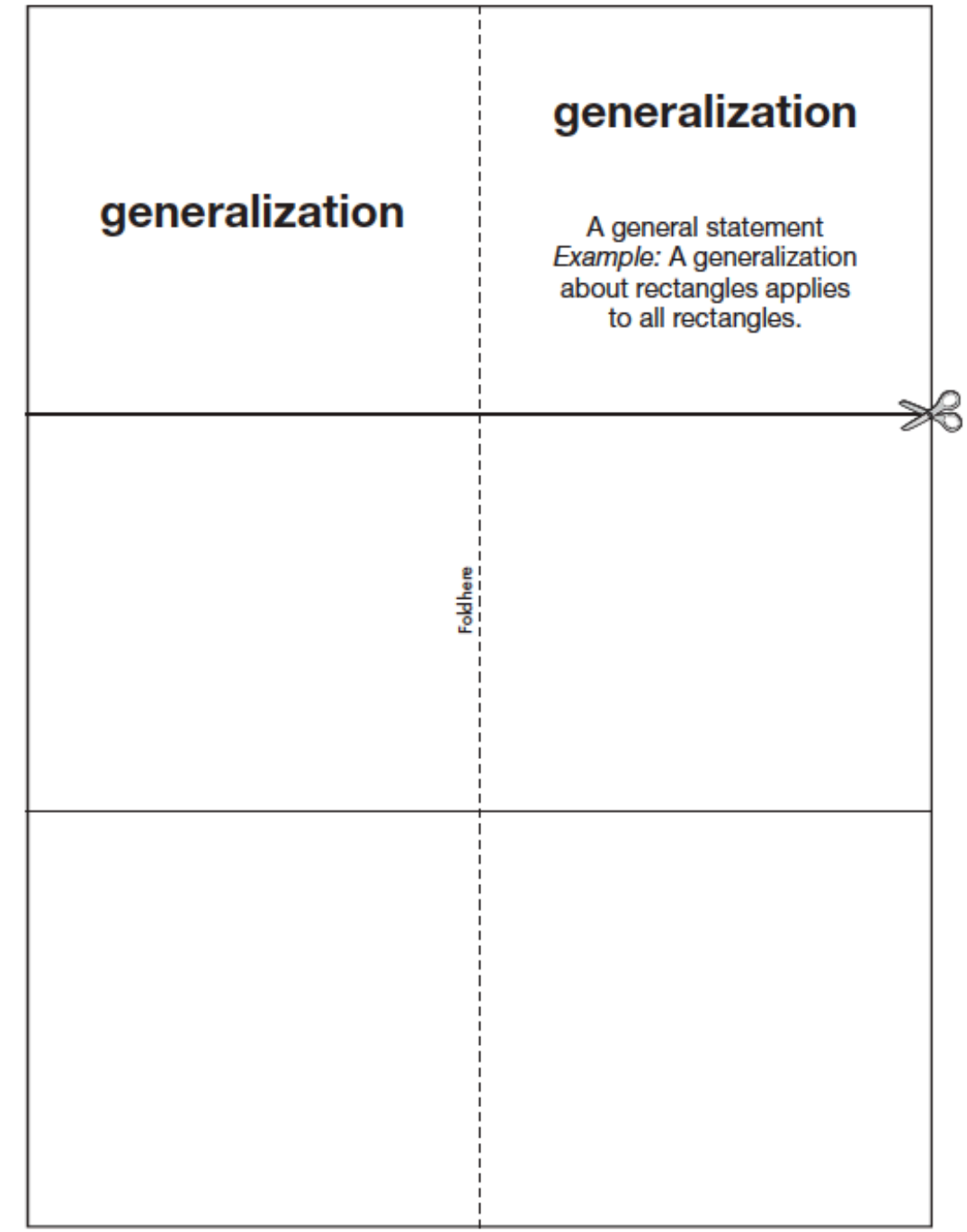

octagon
octagon
A polygon with 8 sides
Fold here
equilateral triangle
equilateral triangle
A triangle whose sides all have the same length
isosceles triangle
isosceles triangle
A triangle with two sides of the same length


scalene triangle
scalene triangle
A triangle in which no sides have the same length
right triangle
Fold here
right triangle
A triangle in which one angle is a right angle
acute triangle
acute triangle
A triangle whose angles are all acute angles



rectangle	**rectangle** A parallelogram with four right angles
rhombus	**rhombus** A parallelogram with all sides the same length
square	**square** A rectangle with all sides the same length

Fold here


generalization
generalization
A general statement
Example: A generalization about rectangles applies to all rectangles.
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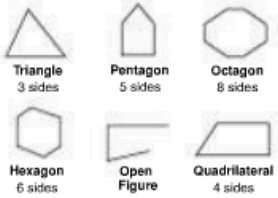
Reteaching Master

Name _____

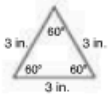
Reteaching
15-1

Polygons

A polygon is a closed plane figure made up of line segments. Common polygons have names that tell the number of sides the polygon has.



A **regular polygon** has sides of equal length and angles of equal measure.

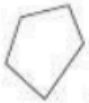


Each side is 3 in. long
Each angle is 60°

Name each polygon. Then tell if it appears to be a regular polygon.

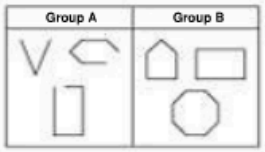
1.  Quadrilateral; not regular

2.  Hexagon; regular

3.  Pentagon; not regular

4.  Triangle; regular

5. Shakira sorted shapes into two different groups. Use geometric terms to describe how she sorted the shapes.



The shapes in Group A are all open and are not polygons. The shapes in Group B are closed and are polygons.

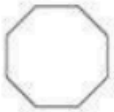
Practice Master

Name _____

Practice
15-1

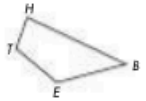
Polygons

Name each polygon. Then tell if it appears to be a regular polygon.

1.  Octagon; regular

2.  Quadrilateral; not regular

3. Name the polygon. Name the vertices.



Quadrilateral;
B, E, H, T

4. Which polygon has eight sides?

A quadrilateral **B** pentagon **C** hexagon **D** octagon

5. **Writing to Explain** Draw two regular polygons and two that are irregular. Use geometric terms to describe one characteristic of each type

Sample answer: A regular polygon has sides all the same length and angles all equal, an irregular polygon has either sides of different lengths or angles of different measure.

Reteaching Master

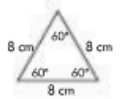
Name _____

Reteaching
15-2

Triangles

You can classify triangles by the lengths of their sides and the sizes of their angles.

acute
all angles less than 90°



equilateral
all sides the same length

This triangle is both equilateral and acute.

Not all acute triangles are equilateral.

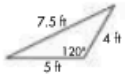
right
one right angle

isosceles
two sides the same length

This triangle is both isosceles and right.

Not all right triangles are isosceles.

obtuse
one obtuse angle



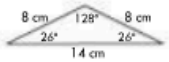
scalene
no sides the same length

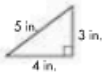
This triangle is both scalene and obtuse.

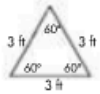
Not all obtuse triangles are scalene.

Remember that the sum of the measures of the angles of a triangle is 180°.

Classify each triangle by its sides and then by its angles.

1. 

2. 

3. 

Isosceles; obtuse

Scalene; right

Equilateral; acute

Classify the following triangles based on the angles given.

4. 40°, 100°, 40° **Obtuse triangle**
5. 14°, 98°, 68° **Obtuse triangle**
6. 38°, 38°, 104° **Obtuse triangle**

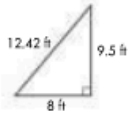
Practice Master

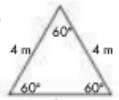
Name _____

Practice
15-2

Triangles

Classify each triangle by its sides and then by its angles.

1. 

2. 

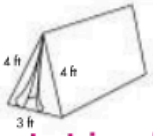
Scalene triangle; right triangle

Equilateral triangle; acute triangle

Given the measures of the angles for a triangle, classify the triangle by angles.

3. 47°, 62°, 71° **Acute triangle**
4. 29°, 90°, 61° **Right triangle**
5. 75°, 75°, 30° **Acute triangle**
6. 54°, 36°, 90° **Right triangle**

7. Judy bought a new tent for a camping trip. Look at the side of the tent with the opening to classify the triangle by its sides and its angles.



Isosceles triangle; acute triangle

8. Which describes a scalene triangle?

A 4 equal sides **B** 3 equal sides **C** 2 equal sides **D** 0 equal sides

9. The lengths of two sides of a triangle are 15 in. each. The third side measures 10 in. What type of triangle is this? Explain your answer using geometric terms.

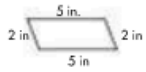
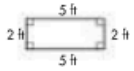
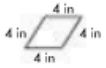
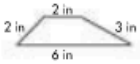
It is an isosceles triangle, because two sides are the same length.

Reteaching Master

Name _____

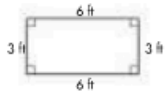
Reteaching
15-3

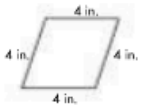
Properties of Quadrilaterals

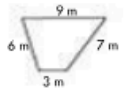
Quadrilateral	Definition	Example
Parallelogram	A quadrilateral with both pairs of opposite sides parallel and equal in length	
Rectangle	A parallelogram with four right angles	
Rhombus	A parallelogram with all sides the same length	
Square	A rectangle with all sides the same length	
Trapezoid	A quadrilateral with only one pair of parallel sides	

Remember that the sum of the measures of the angles of a quadrilateral is 360°.

Classify each quadrilateral. Be as specific as possible.

1. 
   Rectangle

2. 
   Rhombus

3. 
   Trapezoid

4. How is a square similar to a rhombus? How is it different?
   Both have sides of the same lengths. The square has four right angles, the rhombus does not have to have four right angles.

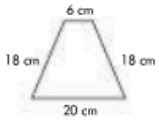
Practice Master

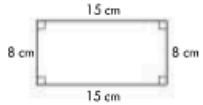
Name _____

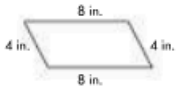
Practice
15-3

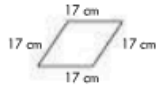
Properties of Quadrilaterals

Classify each quadrilateral. Be as specific as possible.

1. 
   Trapezoid

2. 
   Rectangle

3. 
   Parallelogram

4. 
   Rhombus

5. Name the vertices of the square to the right.
   F, G, A, L

6. The angles of a quadrilateral measure 80°, 100°, 100° and 80° in this order. What kind of quadrilateral has this shape? How do you know?
   Trapezoid; because the figure has 2 pairs of equal angles and one pair is in sequence.

7. Can a trapezoid have four obtuse angles? Explain.
   Sample answer: The figure would not be able to close the fourth side if all of the angles were obtuse.

Reteaching Master

Name _____

Reteaching
15-4

Special Quadrilaterals

Many special **quadrilaterals** have special properties.

A **trapezoid** has exactly one pair of parallel sides.

A **parallelogram** has two pairs of equal parallel sides.

A **rectangle** is a parallelogram with 4 right angles.

A **rhombus** is a parallelogram with 4 equal sides.

A **square** is a parallelogram with 4 right angles and 4 equal sides.

Identify each polygon. Describe each polygon by as many names as possible.

1.  Quadrilateral, trapezoid
2.  Quadrilateral, parallelogram
3.  Quadrilateral, parallelogram, rectangle
4.  Quadrilateral, parallelogram, rhombus
5.  Quadrilateral, parallelogram, rectangle, rhombus, square
6.  Quadrilateral

7. **Writing to Explain** Marvin says that all rhombuses are squares. Aretha says that all squares are rhombuses. Who is correct? Explain.

Aretha is correct. Sample explanation: All squares have 4 equal sides, so all squares are rhombuses. Not all rhombuses have 4 right angles, so not all rhombuses are squares.

Practice Master

Name _____

Practice
15-4

Special Quadrilaterals

In **1–6**, classify each polygon in as many ways as possible.

1.  Quadrilateral, parallelogram, rhombus
2.  Quadrilateral, parallelogram, rectangle
3.  Quadrilateral, parallelogram, rhombus, rectangle, square
4.  Quadrilateral, parallelogram
5.  Quadrilateral
6.  Quadrilateral, trapezoid

7. Draw a quadrilateral with 1 pair of parallel sides. What special quadrilateral have you drawn?

Trapezoid

8. A parallelogram has one side that is 7 inches and one side that is 11 inches. What is the perimeter of the parallelogram?

36 inches

9. Which shows the most likely side lengths for a parallelogram?

A 2, 2, 6, 2 (B) 2, 6, 2, 6 C 2, 2, 3, 6 D 2, 6, 6, 6

10. **Writing to Explain** What characteristics help you tell the difference between a rhombus and a rectangle? Explain.

Sample answer: While both a rectangle and a rhombus are parallelograms, a rectangle always has 4 right angles and a rhombus has 4 equal sides.

Reteaching Master

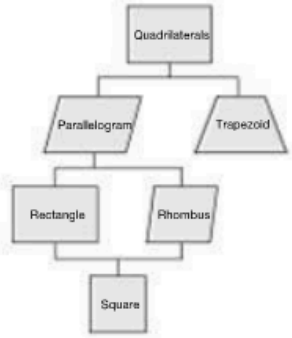
Name _____

Reteaching
15-5

Classifying Quadrilaterals

How are special quadrilaterals related to each other?

This "family tree" shows how special quadrilaterals are related to each other.



Tell whether each statement is true or false.

1. All squares are rhombuses. True
2. Every trapezoid is a rectangle. False
3. Squares are special parallelograms. True
4. All quadrilaterals are squares. False
5. All rhombuses are rectangles. False
6. Every trapezoid is a quadrilateral. True
7. Rhombuses are special parallelograms. True
8. All rectangles are quadrilaterals. True

Practice Master

Name _____

Practice
15-5

Classifying Quadrilaterals

In **1–8**, tell whether each statement is true or false. Remember, for a statement to be true is has to be true in EVERY circumstance.

1. A rectangle is a quadrilateral. True
2. All parallelograms are trapezoids. False
3. A quadrilateral is a square. False
4. A quadrilateral is a trapezoid. False
5. A rhombus is a rectangle. False
6. A trapezoid is a parallelogram. False
7. A square is a rectangle. True
8. A rectangle is a quadrilateral. True
9. Which shows the most likely side lengths for a parallelogram?

   A 9, 4, 9, 4 **B** 9, 9, 9, 4 **C** 4, 4, 4, 9 **D** 4, 9, 9, 6

10. Draw 3 different quadrilaterals with 2 pairs of parallel sides. What are the names of the special quadrilaterals you have drawn?

    Students may draw a square, a rectangle, a rhombus, or a nondescript parallelogram.

11. A parallelogram has one side that is 9 millimeters and one side that is 13 millimeters. What is the perimeter of the parallelogram?

    44 millimeters

12. **Writing to Explain** What characteristics help you tell the difference between a parallelogram and a trapezoid? Explain.

    Sample answer: While both a parallelogram and a trapezoid are quadrilaterals, a parallelogram always has 2 pairs of parallel sides and a trapezoid has exactly one pair of parallel sides.

Reteaching Master

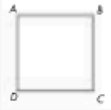
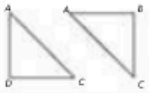
Name _____

Reteaching
15-6

Problem Solving: Make and Test Generalizations

Here is a generalization to be tested: any square can be cut in half through a diagonal. The result is always two isosceles triangles, each with a 90° angle.

Test one example of this generalization:

Draw a square, *ABCD*	Draw a diagonal, *AC*	Inspect the triangles, *ABC* and *CDA*
		

Triangle *ABC*:		Triangle *CDA*:	
1. *AB* = *BC*	*All sides of a square are equal length.*	1. *CD* = *DA*	*All sides of a square are equal length.*
2. Angle *B* = 90°	*All angles of a square are* 90°.	2. Angle *D* = 90°	*All angles of a square are* 90°.

Conclusion: Each triangle has two equal sides and contains a right angle. The generalization is true for the square *ABCD*.

Repeat for more squares. If for each square the conclusion is the same, the generalization appears to be correct.

Show that the triangles *ABC* and *CDA* are the same size and the same shape.

Sample answer: *AB* = *CD* and *BC* = *DA* (All sides of a square are equal length.) *AC* = *AC*. Two triangles are the same size and same shape if all three sides have matching lengths.

Practice Master

Name _____

Practice
15-6

Problem Solving: Make and Test Generalizations

In **1** through **5**, test the generalization and state whether it appears to be correct or incorrect. If incorrect, give an example to support why.

1. All triangles have right angles.
   Incorrect; some triangles have one right angle and some triangles don't have any.
2. All rectangles have right angles.
   Correct.
3. Any two triangles can be joined to make a rhombus.
   Incorrect; only two identical isosceles triangles can be joined to make a rhombus.
4. All rectangles can be cut in half vertically or horizontally to make two smaller rectangles that are the same size and same shape.
   Correct.
5. Intersecting lines are also parallel.
   Incorrect; parallel lines will never intersect.
6. How many whole numbers have exactly three digits?
   Hint: 999 is the greatest whole number with three digits.

   A 890 **B** 900 **C** 990 **D** 999

7. How can you show that a generalization is likely correct?
   Sample answer: test it several times to show that it is correct every time.