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

triangle  square  rectangle  rhombus  parallelogram

trapezoid  pentagon  hexagon  octagon

**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.
polygons

A closed plane figure made up of line segments

regular polygons

A polygon that has sides of equal length and angles of equal measure

triangles

A polygon with 3 sides
quadrilateral
A polygon with 4 sides

pentagon
A polygon with 5 sides

hexagon
A polygon with 6 sides
octagon
A polygon with 8 sides

equilateral triangle
A triangle whose sides all have the same length

isosceles triangle
A triangle with two sides of the same length
scalene triangle

A triangle in which no sides have the same length

right triangle

A triangle in which one angle is a right angle

acute triangle

A triangle whose angles are all acute angles
obtuse triangle
A triangle in which one angle is an obtuse angle

parallelogram
A quadrilateral with both pairs of opposite sides parallel

trapezoid
A quadrilateral that has exactly one pair of parallel sides
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
generalization

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

- **Triangle**: 3 sides
- **Pentagon**: 5 sides
- **Octagon**: 8 sides
- **Hexagon**: 6 sides
- **Open Figure**: 4 sides
- **Quadrilateral**: 4 sides

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

1. **Quadrilateral**; not regular
2. **Hexagon**; regular
3. **Pentagon**; not regular
4. **Triangle**; regular

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

- **Octagon**; regular
- **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:

**Triangles**

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

- **Acute triangle**: All angles less than 90°
- **Equilateral triangle**: All sides the same length
- **Right triangle**: One angle is 90°
- **Isosceles triangle**: Two sides the same length
- **Scalene triangle**: No sides the same length
- **Obtuse triangle**: One angle greater than 90°

This triangle is both **equilateral** and **acute**.
Not all **acute** triangles are **equilateral**.

This triangle is both **isosceles** and **right**.
Not all **right** triangles are **isosceles**.

This triangle is both **isosceles** and **obtuse**.
Not all **obtuse** triangles are **isosceles**.

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. 8 cm, 12 cm, 6 cm  
   - **Isosceles**; **obtuse**
2. 5 cm, 3 cm, 3 cm  
   - **Scalene**; **acute**
3. 5 cm, 5 cm, 4 cm  
   - **Isosceles**; **right**

Classify the following triangles based on the angles given.

4. 40°, 100°, 40°  
   - **Obtuse triangle**
5. 14°, 86°, 86°  
   - **Obtuse triangle**
6. 30°, 30°, 104°  
   - **Obtuse triangle**

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Practice Master

Name:

**Triangles**

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

1. **Scalene triangle**; **right triangle**
2. **Equilateral triangle**; **acute triangle**

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

3. 47°, 82°, 71°  
   - **Acute triangle**
4. 29°, 90°, 61°  
   - **Right triangle**
5. 75°, 75°, 30°  
   - **Acute triangle**
6. 54°, 39°, 87°  
   - **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.
   - **Equilateral 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.
Properties of Quadrilaterals

Classify each quadrilateral. Be as specific as possible.

1. \[ \text{Parallelogram} \]
2. \[ \text{Trapezoid} \]
3. \[ \text{Parallelogram} \]
4. \[ \text{Rectangle} \]

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 order. What kind of quadrilateral has this shape? How do you know?
   \[ \text{Trapezoid; because the figure has 2 pairs of equal angles and one pair is in sequence.} \]

7. Can a trapezoid have four obtuse angles? Explain.
   \[ \text{Sample answer: The figure would not be able to close the fourth side if all of the angles were obtuse.} \]
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**
6. **Quadrilateral, square**

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.

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, 6   B 2, 0, 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

Classifying Quadrilaterals

How are special quadrilaterals related to each other?
This “family tree” shows how special quadrilaterals are related to each other:

Quadrilaterals
  └── Parallelogram
      ├── Trapezoid
      └── Rectangle
          └── Rhombus
              └── Square

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

Classifying Quadrilaterals
In 1–6, tell whether each statement is true or false. Remember, for a statement to be true, it must 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, 4   C 4, 4, 9, 9   D 4, 9, 9, 9
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 nonspecial 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.
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:

1. Draw a square, ABCD.
2. Draw a diagonal, AC.
3. Inspect the triangles, ABC and CDA.

Triangle ABC:
- $AB = BC$
- All sides of a square are equal length.
- $\angle B = 90°$
- All angles of a square are 90°.

Triangle CDA:
- $CD = DA$
- All sides of a square are equal length.
- $\angle D = 90°$
- 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.

Incorrect; some triangles have one right angle and some triangles don't have any.
Correct.

In 1 through 6, 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.

Correct.

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 900  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.