

Lesson 3: Polygon Attributes

Getting Started

? Big Ideas

- What attributes do polygons have?
- How can we use what we know about attributes to identify and create polygons?



Facts and Definitions

- **Side:** a line that makes part of a shape or polygon
- **Angle:** the space created inside a shape where the sides meet
- **Vertex:** the point where two sides of a shape or polygon meet
- **Regular:** a shape that has sides that are all the same length
- **Irregular:** a shape that has sides that are NOT all the same length

⦿ Skills

- Recognize and create shapes having specified attributes, such as a given number of angles
- Identify the parts of polygons
- Distinguish regular and irregular shapes

✂ Materials

- | | |
|---|--------------------------------|
| ✓ <i>The Greedy Triangle</i> by Marilyn Burns | ✓ addition flashcards (kit) |
| ✓ colored pencils or markers | ✓ construction paper (kit) |
| ✓ fine point dry-erase marker (kit) | ✓ geoboard (kit) |
| ✓ glue | ✓ Interactive Notebook (kit) |
| ✓ number cards (kit) | ✓ rubber bands (kit) |
| ✓ scissors | ✓ subtraction flashcards (kit) |
| ✓ whiteboard (kit) | |

Introduction

Say: "I'm a four-sided polygon, and all my sides are the same length. What am I?" (square) Discuss your child's guess, whether it's right or wrong. "How do you know? Why can't I be a rectangle?"

Ask your child to count from 40 to 80 by 2s. Then, give your child 10 more random addition and subtraction flashcards, and ask her to continue the process of determining which ones she knows that she started in Lesson 1. Ask her to also review the ones she didn't know from the previous lesson.

Activities

Activity 1: Polygon Parts

Draw two four-sided shapes on a whiteboard: one that is closed (all the sides are connected) and one that is open (two of the sides are not connected). Ask your child to identify which one is a polygon, and explain why (the one that is closed because all polygons are closed).

Look back through the pages of *The Greedy Triangle*, and ask your child if he remembers what the shape asked for each time it wanted to become something new. Reread a couple of the pages as needed, focusing on the line "I think if I had just one more side and one more angle."

Create a large triangle on a geoboard, and explain that this polygon has three parts: **sides**, **angles**, and **vertices**. Ask your

child to identify its sides. Ask: "How many sides does a triangle have?" (3) Now ask your child to identify its angles. If he can't do so, point to one of them (the space created where two sides meet), and ask him to point to the other two. Now help him identify the vertices. Say "vertex" as you point to each one. Explain that these are the points where the sides meet and that a triangle has three of them. Also explain that we say "one vertex" and "two or more vertices" as "vertices" is the word to use for more than one. Ask your child to explain each of these three parts in his own words: "How would you tell someone else what a side, an angle, and a vertex are on a polygon?"

Now, tell your child to create a large square on the geoboard and ask him to identify its sides, angles, and vertices. How many does it have of each?








Using the "Polygon Parts" sheet, ask your child to cut out the large pentagon, the title, and the following words along the dotted lines: "Polygon Parts," "Side," "Angle," and "Vertex." He will color the pentagon and the words using different colors. Next, he will glue the pentagon onto a piece of construction paper and glue the words where they go to show the parts of a polygon. Finally, he will glue the title, "Polygon Parts," at the top of the page. Store this sheet in his Interactive Notebook so that he can refer back to it as needed.

Activity 2: Counting Polygon Parts

Your child will complete the "How Many Parts" sheet by filling in the table provided to show how many sides, angles, and vertices each of the polygons on the sheet has. When he's finished, ask him if he notices any patterns about the parts of polygons. He should note that polygons always have the same number of sides, angles, and vertices. Ask: "How many of each part do you think a circle has?" (only one side and it's curved)

"How Many Parts" Answer Key

How Many Parts

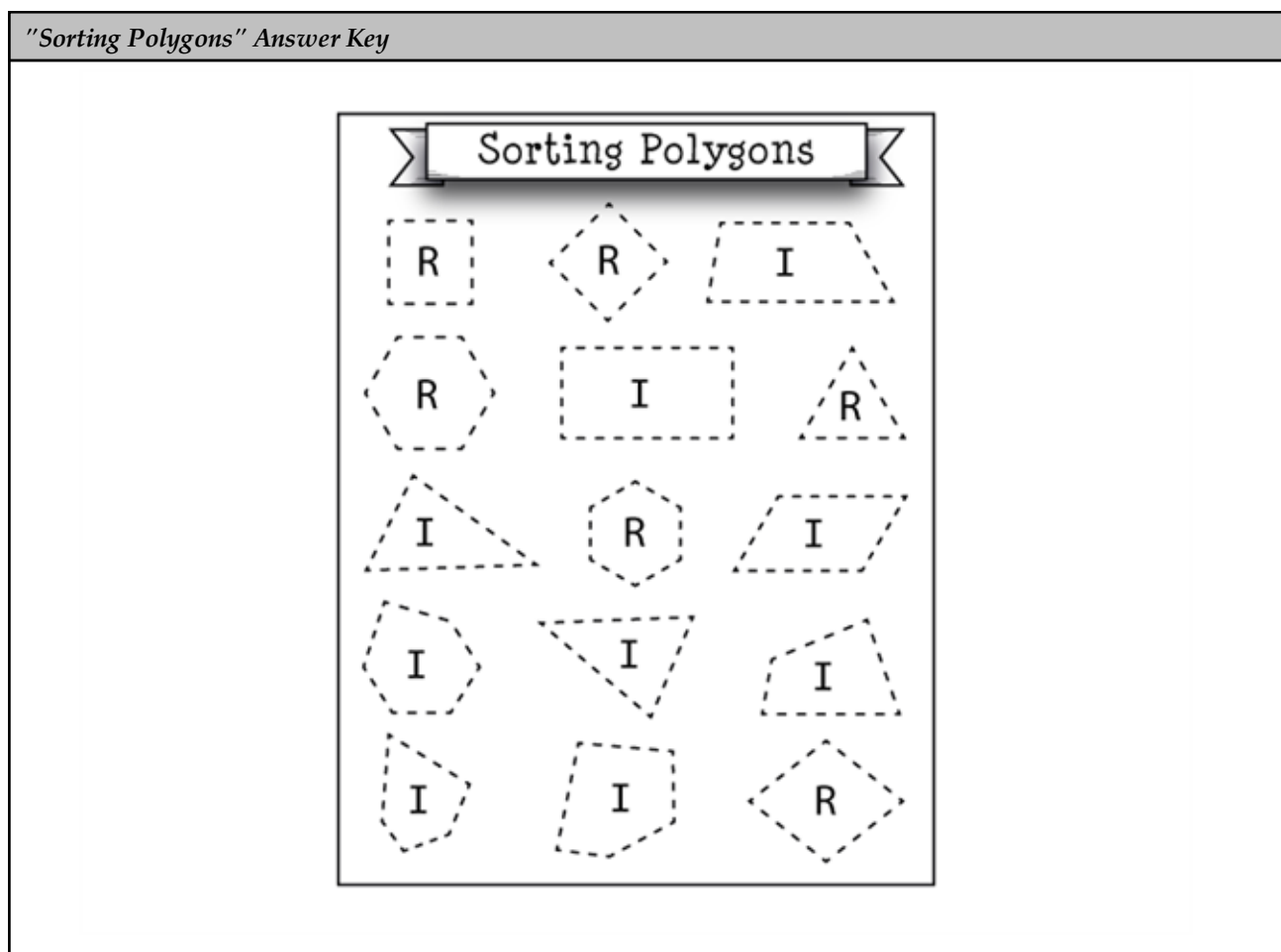
Polygon	Number of Sides	Number of Angles	Number of Vertices
	5	5	5
	4	4	4
	8	8	8
	4	4	4
	6	6	6
	3	3	3
	10	10	10

Activity 3: Is It Regular or Irregular?

Ask your child to cut out all of the shapes on the "Sorting Polygons" sheet. Don't tell your child this yet, but some of these shapes are "regular" (all sides are the same length) and some are "irregular" (the sides are of varying lengths). While your child is cutting out the shapes, draw a line long-ways down the middle of a whiteboard to create two columns. Once all of the shapes are cut out, explain to your child that you are going to put them one-by-one into two different groups and that he should watch to see if he can figure out how you're grouping them.

Without saying the words "regular" and "irregular," begin by placing one of the regular shapes near the top of the left column on the whiteboard. Then place another regular shape right below it. Don't say anything at this point. Just let your child observe your work. Next, place an irregular shape near the top of the right column, again without saying anything. Place another irregular shape below it. Next, select another regular shape, and place it in the left column.

Now show a regular shape, and ask your child which column he thinks it should go in and why. He should want to put it in the left column with the other regular shapes, and he may note that all the regular shapes "look even" or "have the same sides." Pick up an irregular shape and ask him where it should go (the right column). Allow him to place the remaining shapes in the columns where he thinks they belong, and ask him to share why he's putting them where he is as he works. When he's finished, invite him to create names for each group of shapes that explain how the groups are different from each other. Point out that the shapes that have sides that are same length are called **regular**, and the shapes that have sides that are different lengths are called **irregular**. Write "regular" at the top of the left column and "irregular" at the top of the right column.



Activity 4: Creating Shapes

Your child will use either a geoboard and rubber bands or the geoboard tool at the following web link to create shapes based on the clues provided on the "Creating Shapes" sheet:

Geoboard
www.movingbeyondthepage.com/link/5498
https://www.mathlearningcenter.org/web-apps/geoboard/

1. This shape is regular and has 3 sides. (triangle whose sides are the same length)
2. This shape is irregular and has 4 angles. (a rectangle or other four-sided polygon whose sides are not all the same length)
3. This shape is irregular and has 5 vertices. (pentagon whose sides are not all the same length)
4. This shape is regular and has 8 angles. (octagon whose sides are the same length)
5. This shape is irregular, has 4 vertices, and 2 sides that are the same length. (rectangle)

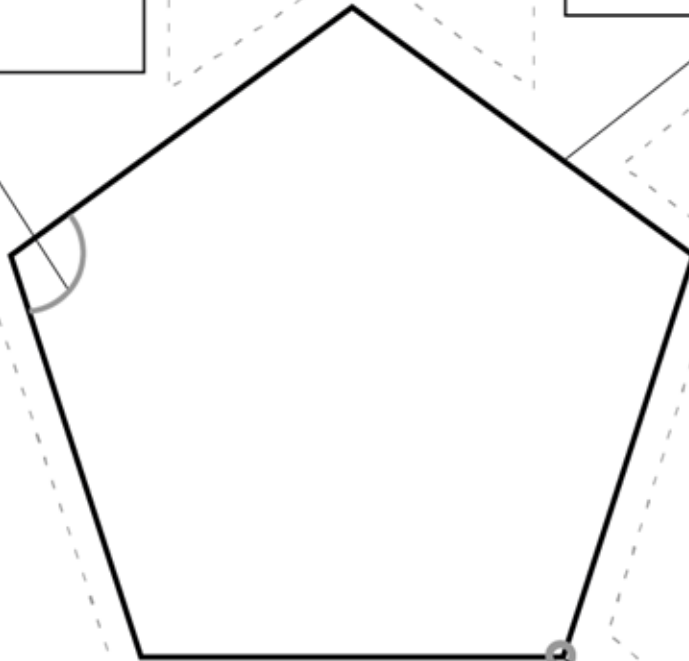
Wrapping Up

Ask your child to draw a regular triangle and an irregular triangle. Which is which? (one has sides that are all the same length; the other's sides are not all the same length) How would he explain the difference to someone else?

To review counting by 10s to 100, ask him to do so while hopping on one foot.

Now, give him a random collection of number cards 1-100, and ask him to select two. Ask, "Which is greater? Which is less? How do you know?" Repeat this process five more times.

Polygon Parts





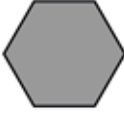




Side

Angle

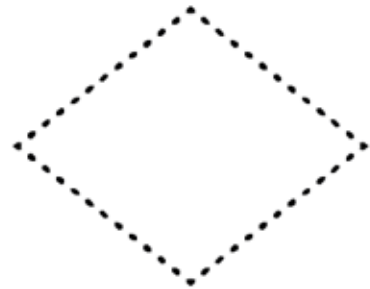
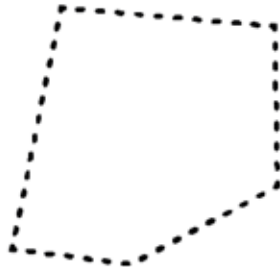
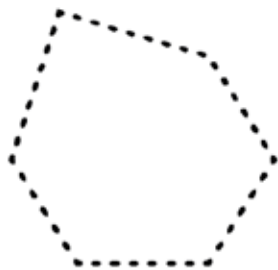
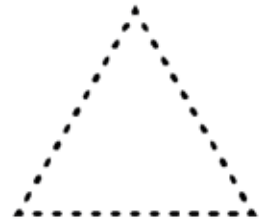
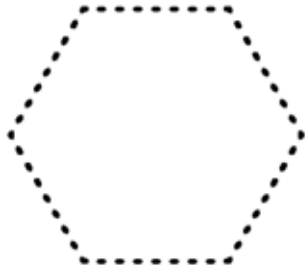
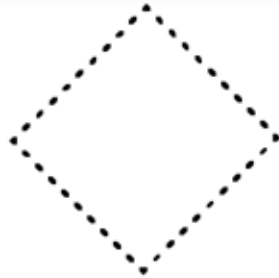
Vertex

How Many Parts

Polygon	Number of Sides	Number of Angles	Number of Vertices
			
			
			
			
			
			
			



Sorting Polygons



Creating Shapes

- 1) This shape is regular and has 3 sides.
- 2) This shape is irregular and has 4 angles.
- 3) This shape is irregular and has 5 vertices.
- 4) This shape is regular and has 8 angles.
- 5) This shape is irregular, has 4 vertices, and 2 sides that are the same length.

