

# **Polly and the Shapeshifter**

## **Lesson Plan**

**Cube Fellow:** Tricia Muldoon

**Teacher Mentor:** Katrina Easterling

**Goal:** Use patterns in polygons so the students gain a concrete understanding of rate of change.

**Grade and Course:** 8<sup>th</sup> grade Math

**KY Standards:** MA-08-5.1.2, MA-08-5.1.5

**Objectives:** The students should be able to recognize relationships (especially linear) between sets of data. They need to be able to use patterns to write a rule to describe these relationships in words.

**Resources/materials needed:** Worksheet and power point book.

**Description of Plan:** Read the book on the power point. Hand out the worksheet. Work through the first problem with the students and allow them to continue on their own within each section.

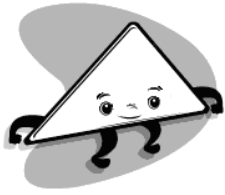
**Lesson Source:** Math Leadership Support Network

**Instructional Mode:** Some class discussion and also group work

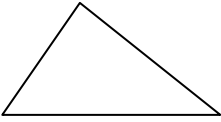
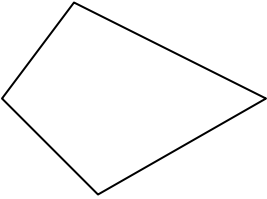
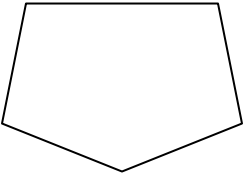
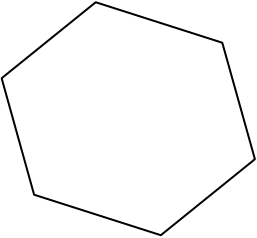
**Date Given:** October 9, 2007

**Estimated Time:** 2-3 class periods

**Date Submitted to Algebra<sup>3</sup>:** November 9, 2007



# Polly and the Shapeshifter

	1 Number of sides	2 Number of vertices	3 Number of diagonals from one vertex	4 Number of pieces	5 Shape of the pieces
					
					
					
					



Discuss the table with your partners. TC \_\_\_\_\_

1. Describe any patterns that you see in each column.



Column 1

Column 2

Column 3

Column 4

Column 5

2. Describe a relationship between column 1 (number of sides) and column 2 (number of vertices).

3. Describe a relationship between column 1 (number of sides) and column 3 (number of diagonals).

4. Describe a relationship between column 1 (number of sides) and column 4 (number of pieces).

5. Describe a relationship between column 3 (number of diagonals) and column 4 (number of pieces).



Discuss the problems with your partners. TC \_\_\_\_\_

6. If a polygon had 10 sides-

- a. How many vertices would it have? \_\_\_\_\_
- b. How many diagonals could you draw from one vertex? \_\_\_\_\_
- c. How many pieces would there be after you draw the diagonals? \_\_\_\_\_
- d. What do you think the shape of these pieces would be? \_\_\_\_\_



7. If a polygon had 20 sides-

- a. How many vertices would it have? \_\_\_\_\_
- b. How many diagonals could you draw from one vertex? \_\_\_\_\_
- c. How many pieces would there be after you draw the diagonals? \_\_\_\_\_
- d. What do you think the shape of these pieces would be? \_\_\_\_\_

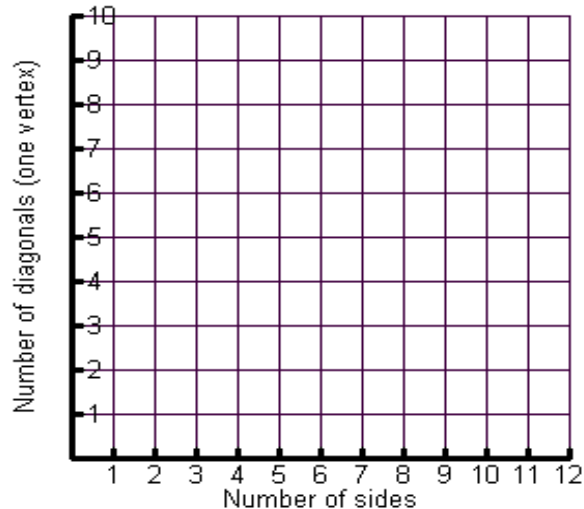
8. Use your information from page 1 to complete the table below.

Number of Sides	Number of Diagonals (from one vertex)

9. Describe the *rate of change* in the column “Number of Diagonals” with respect to the “Number of Sides.”

10. Plot the ordered pairs (Number of sides, Number of diagonals) in the grid below.

Investigating Polygons



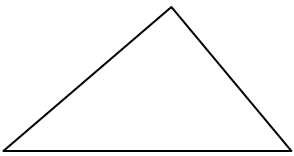
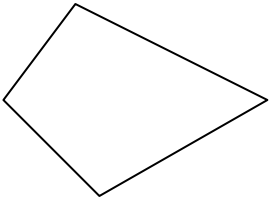
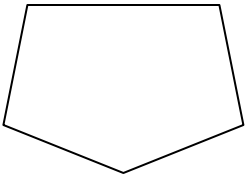
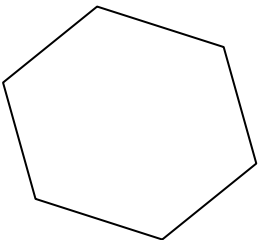
11. Describe any pattern you observe from the plot.



Discuss the problems with your partners. TC \_\_\_\_\_

12. For each polygon in the table below, draw all of the diagonals (from all vertices).



	Number of Sides	Number of diagonals
		
		
		
		

13. Describe a pattern that you see in the column “Number of Diagonals.”

14. Based on the pattern you identified in #13, how many diagonals could you draw-
- in a seven-sided polygon (heptagon/septagon)? \_\_\_\_\_
  - in an eight-sided polygon (octagon)? \_\_\_\_\_



Discuss the problems with your partners. TC \_\_\_\_\_

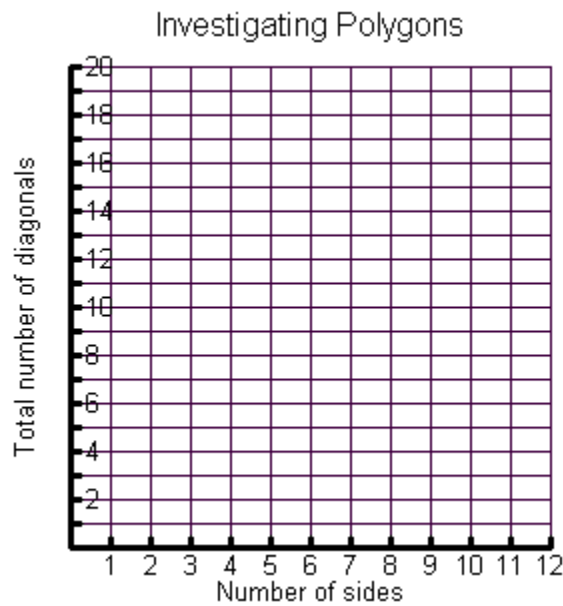
15. Describe the *rate of change* in the column “Number of Diagonals” with respect to the “Number of Sides.”



16. Consider the consecutive differences in the column “Number of Diagonals.” Describe a pattern that you observe in the consecutive differences.

17. Describe the *rate of change* in these consecutive differences.

18. Plot the ordered pairs (Number of sides, Number of diagonals) in the grid below.



19. Describe any pattern you observe from the plot.



Discuss the problems with your partners. TC \_\_\_\_\_

20. Examine the data shown in the tables below, then respond to parts a, b, and c for each table.

- Describe a pattern that you see in the  $y$  column.
- Describe the *rate of change* in the  $y$  column with respect to the  $x$  column.
- What do you think a graph of the points  $(x,y)$  would look like?

x	y
1	3
2	5
3	7
4	9
5	11

- 
- 
- 

x	y
2	5
4	11
6	17
8	23
10	29

- 
- 
- 

x	y
1	1
2	4
3	9
4	16
5	25

- 
- 
- 

x	y
2	2
4	14
6	34
8	62
10	98

- 
- 
- 



Discuss the problems with your partners. TC \_\_\_\_\_

