

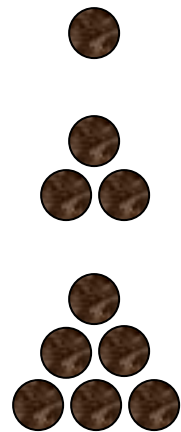


Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Student Exploration: Finding Patterns

**Vocabulary:** pattern, sequence



**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)  
 Marco is playing with his penny collection. First, he places a single penny on the table. Next, he adds two more to make a triangle of 3 pennies. He then adds three more pennies to create a triangle with 6 pennies.

1. If Marco keeps adding pennies to make new triangles, how many pennies will the next two triangles have? (Hint: Draw pictures.)

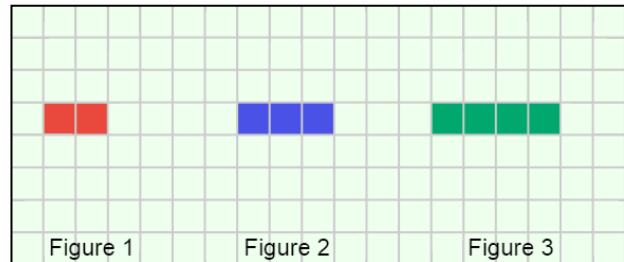
\_\_\_\_\_

2. What is the pattern in the number of pennies added for each new triangle?

\_\_\_\_\_

### Gizmo Warm-up

If you count the pennies in each triangle (1, 3, 6, etc.), you get an ordered list called a **sequence**. A sequence is a type of **pattern**, or arrangement of objects or numbers that follows a rule. The terms in many sequences increase (or decrease) according to a rule, such as “add 2” or “subtract 3.”



You can explore geometric patterns and sequences in the *Finding Patterns* Gizmo. The first pattern you see will look like the image above. (If not, click **NEW** until it does.)

1. How many squares are colored in each figure?

Figure 1: \_\_\_\_\_ Figure 2: \_\_\_\_\_ Figure 3: \_\_\_\_\_

2. How many squares will be colored in the next figure? \_\_\_\_\_

3. Draw Figure 4 by clicking on the grid, one square at a time. Click **CHECK** to see if you were right. If you are incorrect, click **TRY AGAIN** until you have it right.

When you are done, sketch the correct figure in the grid to the right.

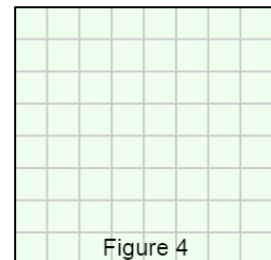
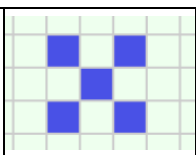
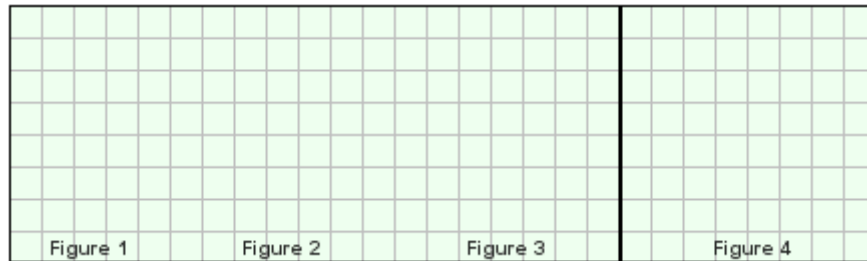


Figure 4



<b>Activity:</b> <b>Continuing the pattern</b>	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> <li>Click <b>NEW</b>.</li> </ul>	
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1. In the space below, draw the shapes that make up the pattern you see. Below each figure, write the number of colored squares. (Leave **Figure 4** blank for now.)



\_\_\_\_\_

2. How many squares do you think **Figure 4** will have? \_\_\_\_\_

Explain your reasoning. \_\_\_\_\_

\_\_\_\_\_

3. Draw **Figure 4** in the Gizmo, and click **CHECK** to see if you were right. Once you get the correct figure, draw it on the grid above.

4. Turn on **Show relationship between figures**.

A. What is the rule given for determining how many squares are in the figure?

\_\_\_\_\_

B. Look at the number line below the table. How does the number line indicate how many squares are in each figure? \_\_\_\_\_

\_\_\_\_\_

C. How many squares would be in the tenth figure of this pattern? Show your work in the space to the right.

Squares in the tenth figure: \_\_\_\_\_

**(Activity continued on next page)**

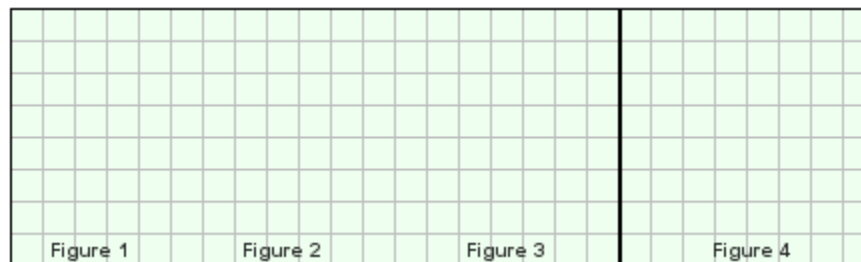


**Activity (continued from previous page)**

5. Click **NEW** to generate two new patterns. For each pattern, do the following:
- Sketch the first three figures in the provided grids.
  - List the number of shaded squares in each figure in the blanks, and calculate the number of shaded squares in **Figure 4**.
  - Sketch **Figure 4** and check your answer in the Gizmo.
  - Write a rule for determining how many squares are in the next figure.

When you have finished this activity, keep solving more patterns in the Gizmo!

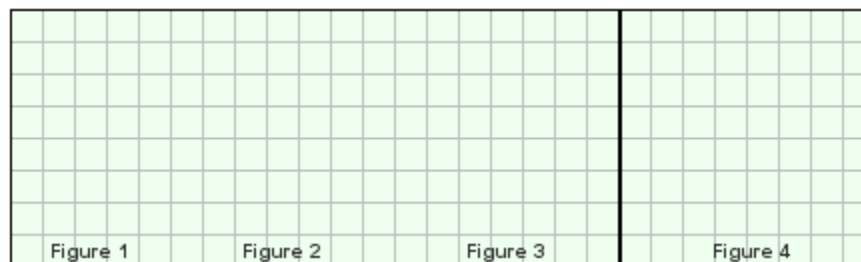
**Pattern 1**



\_\_\_\_\_

Rule: \_\_\_\_\_

**Pattern 2**



\_\_\_\_\_

Rule: \_\_\_\_\_

6. Challenge: The Fibonacci Sequence is the sequence: 0, 1, 1, 2, 3, 5, 8, 13, 21, etc. Try to figure out how each number in the sequence is determined by the previous numbers.

A. What is the rule for finding the next number in the Fibonacci sequence?

\_\_\_\_\_  
\_\_\_\_\_

B. What are the next three numbers in the sequence? \_\_\_\_\_

