Patterns in a Staircase

Reporting Category	Pattern, Function, and Algebra
Topic	Exploring patterns
Primary SOL	3.19 The student will recognize and describe a variety of patterns formed using numbers, tables, and pictures, and extend the patterns, using the same or different forms.

Materials

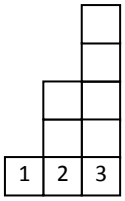
- Linking cubes
- Pattern Staircase Recording Sheet (attached)
- Pattern Staircase Task Cards (attached)
- Additional Growing Patterns Cards (attached)

Vocabulary

pattern, table, rule, growing, repeating, extending, numeric pattern, geometric pattern

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Explain to students that they will be exploring patterns by building a staircase out of linking cubes. The staircase will begin with one cube, and each step will be a "tower" of cubes that is two cubes higher than the previous step. There must be at least eight towers or steps. The towers will be considered steps numbers 1, 2, 3, 4….



2. Ask students whether the focus of this pattern has to do with the color of the linking cubes. Distribute copies of the Pattern Staircase Recording Sheet. Put students into pairs or small groups to build the staircases. Ask groups to describe the pattern in their staircases and record this information on their individual recording sheets. Have students work in their groups to complete their recording sheets.

Assessment

- **Questions**
  - Looking at the grid pattern that you created on the recording sheet, what would you write as the "rule" of the pattern staircase?
  - Would you describe this pattern staircase as a repeating pattern or a growing pattern? Explain your reasoning.
- **Journal/Writing Prompts**
  - Draw a staircase that begins with two linking cubes and add two more to each new tower. Identify how many cubes will be in the fifth tower and how many cubes will be in the tenth tower of this staircase. Explain how you know.

Extensions and Connections (for all students)

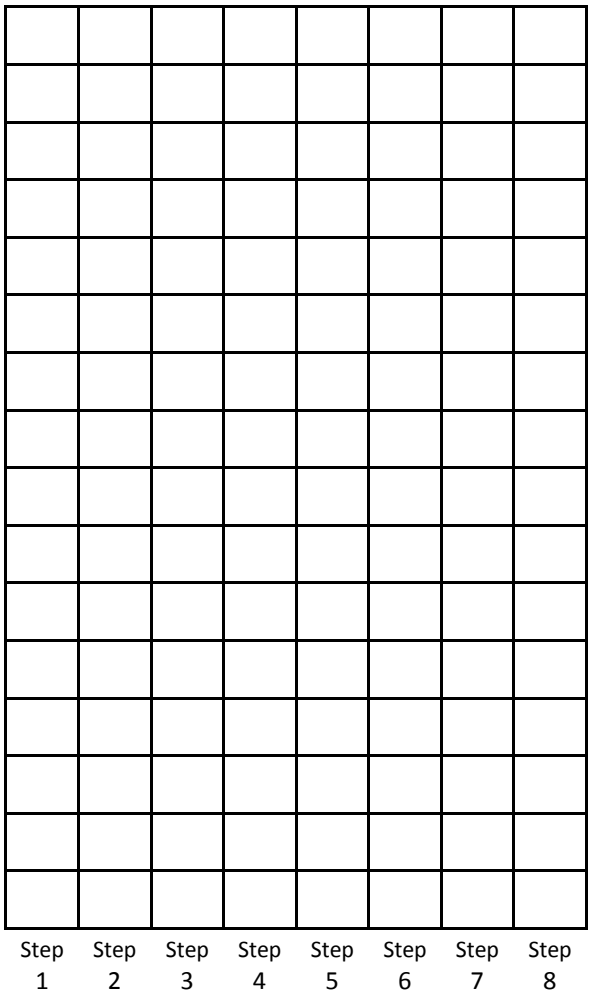
- Distribute copies of the attached Pattern Staircase Task Cards and have students build staircases out of linking cubes, using the information on the cards. Students could use blank copies of the attached recording sheet to record information for the task cards.

- Distribute copies of the attached Additional Growing Patterns Task Cards, and have students complete them. Give assistance, as needed.

Pattern Staircase Recording Sheet

Name: _____ **Date:** _____

Directions: Shade in the grid below to match the pattern staircase model that you created.



Using the pattern in the staircase, fill in the number of linking cubes for steps 9 and 10.

	Step 1	**Step 2**	**Step 3**	**Step 4**	**Step 5**	**Step 6**	**Step 7**	**Step 8**	**Step 9**	**Step 10**
Number of linking cubes										

Using the pattern in the staircase and the numbers recorded in the chart, make a prediction of the number of linking cubes in step 15. _____

Is there a pattern in the chart that helps you explain your answer? _____. If there is, what is it?

_____

_____

Pattern Staircase Task Cards

Pattern Staircase A

Step Number	Number of linking cubes
1	1
2	4
3	7
4	10
5	13
6	
7	

Pattern Staircase B

Step Number	Number of linking cubes
1	2
2	4
3	6
4	8
5	10
6	
7	

Pattern Staircase C

Step Number	Number of linking cubes
1	3
2	4
3	5
4	6
5	7
6	
7	

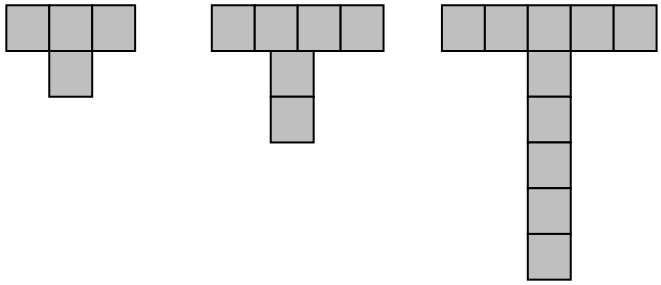
Pattern Staircase D

Step Number	Number of linking cubes
1	2
2	5
3	8
4	11
5	14
6	
7	

Additional Growing Patterns Task Cards

Tile Pattern Task Card

Use tiles to build the first three steps in the pattern shown at right. Extend the pattern, and justify your reasoning. Draw your extension on the task card. Create a table or chart on the back of the card to record the information for this growing pattern.



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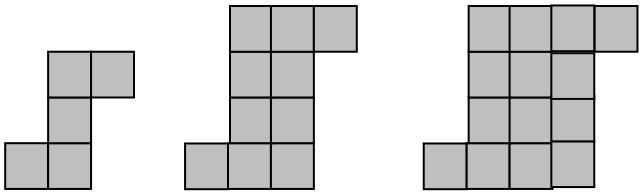

Circle Pattern Task Card

Use circular counters to build the first three steps in the pattern shown at right. Extend the pattern, and justify your reasoning. Draw your extension on the task card. Create a table or chart on the back of the card to record the information for this growing pattern.