Buttons Tasks

Engaging in the mathematics

***6th Grade* – 6.EE.C.9**

Gita plays with her grandmother's collection of buttons.
She arranges them in rows.
The first 3 patterns she has created are shown below.

	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5
Number of Buttons					

Draw patterns 4 and 5 and then complete the table.

Create a graph of this problem. Explain your choice of the independent and dependent variables.

Write an equation that represents this situation. Explain how you created your equation. Don't forget to define the variables you use.

Gita's grandmother asked her to create the 7th pattern. If Gita has 30 buttons, will she have enough to create it? Explain how you arrived at your answer.

Citation: This activity, designed as a commentary on a mathematics task for purposes of education, is adapted from a MARS task. A wide range of mathematics education resources by MARS, or the Mathematics Assessment Resource Service, can be found at http://map.mathshell.org. A version of this task can also be found on the Inside Mathematics website at http://www.insidemathematics.org/assets/common-core-math-tasks/buttons.pdf

Engaging in the mathematics

***7th Grade* – 7.RP.2a, 7.RP.2b, 7.RP.2c, 7.RP.2d**

Gita plays with her grandmother's collection of buttons. She arranges them in rows. The first 3 patterns she created are shown below.

Pattern 1 Pattern 2 Pattern 3 Pattern 4 Pattern 5

Draw patterns 4 and 5.

Create a table and graph showing the same relationship as developed in the patterns above.

Gita's friends, Harry and Jamie, are arguing whether this is a proportional relationship.

Harry said:
"This is a proportional relationship because the numbers go up the same every time."

Jamie said:
"This is not a proportional relationship because there is not a pattern #0. So the graph will not start at the origin.

Gita noted that even her friend who is correct didn't get it quite right. Which of Gita's friends is right and what can you add to his reasoning?

Write an equation to represent this situation. Don't forget to define your variables.

What is the constant of proportionality and how is it represented in the table, graph, and equation that you created?

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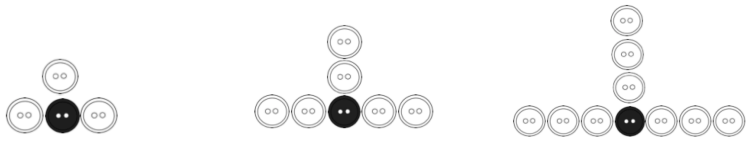
Engaging in the mathematics

***8th Grade* – 8.F.3, 8.F.4**

Gita plays with her grandmother's collection of buttons. She arranges them in patterns. The first 3 patterns she has created are shown below.



Pattern 1 Pattern 2 Pattern 3 Pattern 4

Draw the 4th pattern.

How many white buttons does Gita need for patterns 6 and 8? Explain how you determined this number.

How many buttons will Gita need altogether for pattern 11? Defend your answer by showing this solution in both an *input–output* table and graph.

Construct a function rule for the "nth" pattern.

Is the function rule a linear pattern? Explain your reasoning.

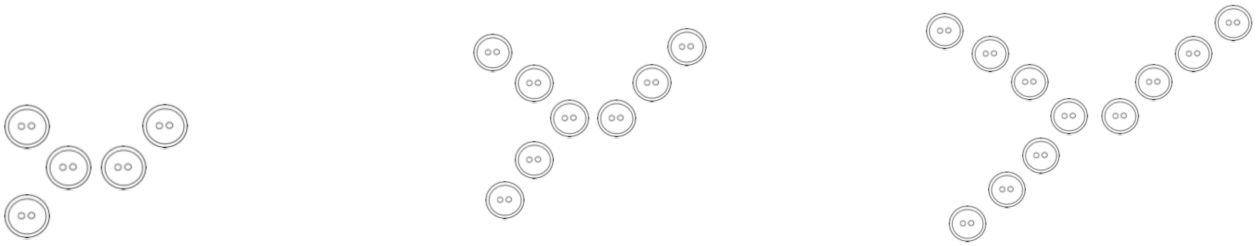
What is the initial value for this rule? What is the rate of change? How are these two values shown in the table, graph, and rule?

Citation: This activity, designed as a commentary on a mathematics task for purposes of education, is adapted from a MARS task. A wide range of mathematics education resources by MARS, or the Mathematics Assessment Resource Service, can be found at http://map.mathshell.org. A version of this task can also be found on the Inside Mathematics website at http://www.insidemathematics.org/assets/common-core-math-tasks/buttons.pdf

Engaging in the mathematics

***HS* – F-IF.2, F-LE.1b,c, F-LE.2**

Gita plays with her grandmother's collection of buttons. She arranges them in patterns. The first three patterns she has created are shown below.



Pattern 1 Pattern 2 Pattern 3

Represent Gita's data from the buttons as a table of values and graph.

Using function notation, create an explicit rule that could be used to find the number of buttons needed for any pattern, p. Using this rule, how many buttons would she need to create pattern 12?

What does $f(10) = 32$ mean in the context of this situation?

What if Gita started with Pattern 1, but doubled the number of buttons she uses in each subsequent pattern. Draw what the next two patterns would look like.

Create a new rule and graph for this situation. How do these compare to Gita's original rule and graph?

Citation: This activity, designed as a commentary on a mathematics task for purposes of education, is adapted from a MARS task. A wide range of mathematics education resources by MARS, or the Mathematics Assessment Resource Service, can be found at http://map.mathshell.org. A version of this task can also be found on the Inside Mathematics website at http://www.insidemathematics.org/assets/common-core-math-tasks/buttons.pdf