

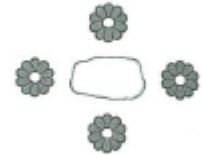
Math Problem

(Adapted from: *Patterns to Algebra – Classroom Resource*, 2012, Nelson Education, p. 107-108)

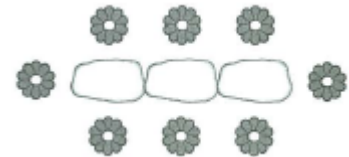
GRANDMA SPLENDIDO'S GARDEN

Chapter 1: The First Rule

Grandma Splendido decided to design a walking path for her flower garden. First, she sketched a stone with flowers around it.



She decided that she needed more stones to make a path. She added 2 more stones, with flowers around them, in her sketch.



Grandma Splendido was still not happy with her path. However, she did not know how to add any more stones or flowers. Her grandson Ferdie suggested, "If we can figure out a rule for your path, we can draw a diagram to see what your path will look like. We can also create a graph so we know exactly how many flowers to buy."

"Bravisimo!" cried Grandma Splendido.

"Let's figure out the rule for the path you've designed," said Ferdie.

Think about It

1. What is the rule for Grandma Splendido's path?

Do the Math

2. Create a graph that shows the trend line for the rule.
3. Sketch a diagram for the rule to show how many flowers would fit around 5 stones.
4. Explain how you figured out the rule.

Chapter 2: Grandma Splendido Changes her Mind

When Grandma Splendido saw the diagram for the rule, she decided that she was not happy with her design. "I want to experiment with the rule," she declared. She changed the rule to "number of flowers" = number of stones $\times 4 + 2$."

Think about It

1. Predict how the diagram for the new rule will be the same as, or different from, the diagram for the first rule.
2. Predict how the trend line for the new rule will be the same as, or different from, the trend line for the first rule.

Do the Math

3. Sketch a diagram for the new rule.
4. Add the trend line for the new rule to the graph you created.

Chapter 3: Grandma Splendido Changes her Mind Again

Grandma Splendid was still not satisfied with her garden path. "Let's try again with another new rule," she said. She took her pen and wrote down a third rule: "number of flowers = number of stones $\times 2 + 6$."

Think about It

1. Predict how the diagram for the third rule will be the same as, or different from the diagrams for the first two rules.
2. Predict how the trend line for the third rule will be the same as or different from, the trend lines for the first two rules.

Do the Math

3. Sketch a diagram for the third rule.
4. Add the trend line for the third rule to your graph.

Extension - Chapter 4 (Grade 6):

Grandma wants to plant 98 flowers.

1. How many stones would she need for each design/rule?
2. Which design/rule will use the smallest (least) number of stones.
Prove your thinking.

Extension: Can you think of a design/rule that would use less stones. Show your thinking

Extension - Chapter 4 (Grade 7):

Grandma says, "I want to use the rule that will give me the most flowers. Which of the three rules will give me the most flowers for every number of stones?"

Her grandson says, "That's a tricky question, Grandma!"

1. Why is it difficult to choose the rule that will give the most flowers for any number of stones?

"Okay Ferdie, forget that, says Grandma. "Can you tell me if there are a certain number of stones that will result in the same number of flowers no matter which rule I use?"

2. Are there a number of stones that would result in the same number of flowers for every rule?
How do you know?

Ferdie gets 102 flowers at a discounted price for the garden.

3. Which rule should Grandma use if she plants all 102 flowers? Show your thinking.
4. How many stones will she need? Show your thinking.