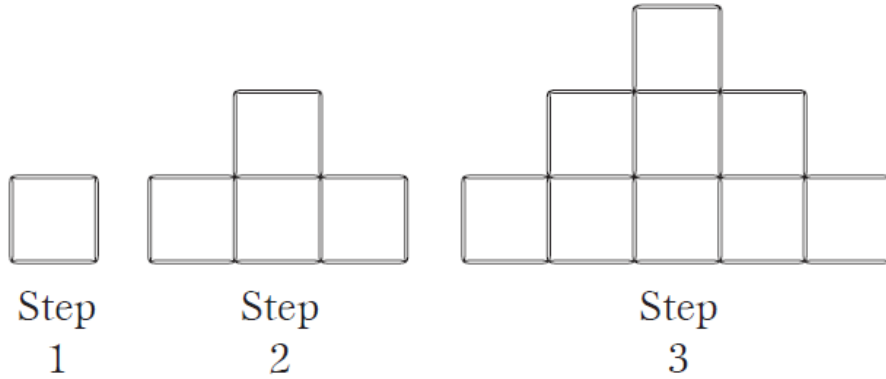


Setting the Stage

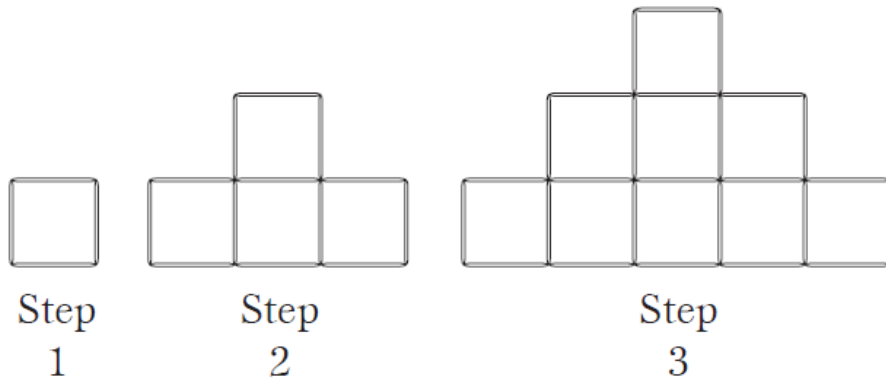
In the figure, as the step changes, _____ also changes.



Peterson, Blake E. "Linear and Quadratic Change: A Problem from Japan," *Mathematics Teacher*, NCTM: Reston, VA, October 2006. Pages 206-212.

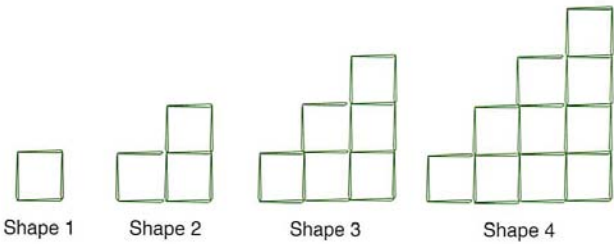
Setting the Stage

In the figure, as the step changes, _____ also changes.



Peterson, Blake E. "Linear and Quadratic Change: A Problem from Japan," *Mathematics Teacher*, NCTM: Reston, VA, October 2006. Pages 206-212.

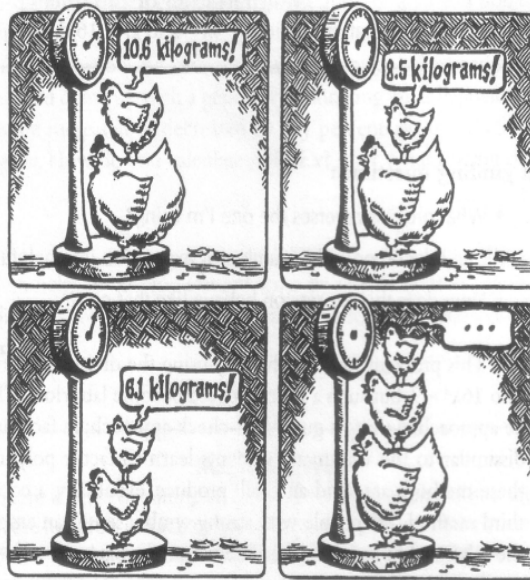
Building with Toothpicks

STAGE ONE	 <p style="text-align: center;">Shape 1 Shape 2 Shape 3 Shape 4</p>
STAGE TWO	<ol style="list-style-type: none"> 1. Use a pattern from the shapes to determine the perimeter of the fifth shape in the sequence. Show or explain how you arrived at your answer. 2. Write a formula that you could use to find the perimeter of any shape n. Explain how you found your formula. 3. Create a table and a graph of the first seven shapes in the pattern. What rule did you use to continue the pattern? Explain how you determined your rule. 4. How would the pattern differ if you used triangles instead of squares?
STAGE THREE	<ol style="list-style-type: none"> 5. Determine the explicit and recursive formulas for finding the perimeter of the n^{th} figure. 6. What would be the perimeter of the 100th figure?

Activity adapted from *Friel, S., Rachlin, S., Doyle, D., Nygard, C., Pugalee, D., & Ellis, M. (2001). Navigating through Algebra in grades 6-8. Reston, VA: NCTM.*

“Chicken/Scale” Problem

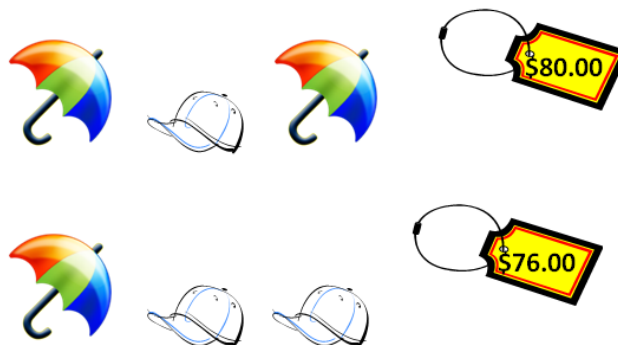
Three chickens were weighed in pairs; the first pair weighed in at 10.6 kg, the second pair weighed 8.5 kg, and the third pair weighed 6.1 kg.



How much would the scale read if all three chickens were weighed at the same time? How many kilograms does each chicken weigh?

“Umbrella/Cap” Problem

The following picture shows the costs of two combinations of umbrellas and hats:



What is the price of one umbrella? One cap?

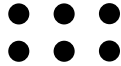
Patterns of Dots

A pattern of dots is shown below. At each step, more dots are added to the pattern. The number of dots added at each step is more than the number added in the previous step. The pattern continues indefinitely.

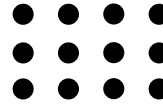
Step 1



Step 2



Step 3



How do you determine the number of dots in Step 20, but not have to draw all 20 pictures and then count the dots?

Explain or show how you could do this and give the answer that you get for the number of dots.