Assignment

LESSON 2: The Cat's Out of the Bag!

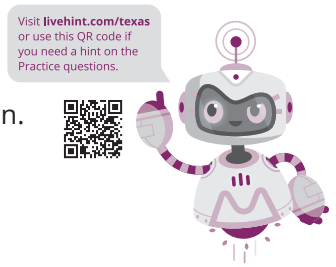
Write

Write three functions: one linear, one exponential, and one quadratic. Describe the differences between the functions.

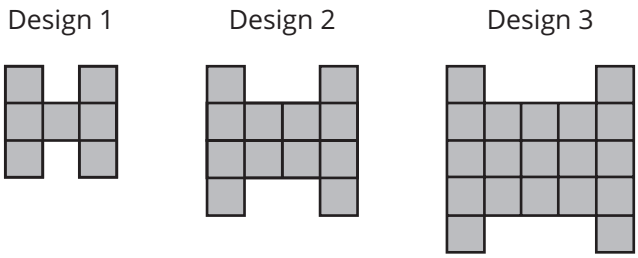
Remember

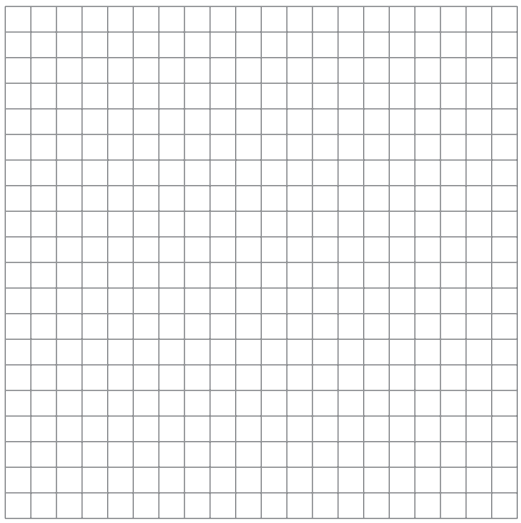
A visual model, a table of values, and a graph are used to identify patterns as linear, exponential, or quadratic. Two or more algebraic expressions are equivalent if they produce the same output for all input values.

Practice



1. Hyatt Home Improvement uses H-shaped tile designs on their buildings, advertisements, and vehicles. The designs they use follow a specific pattern. The first three designs are shown.
   a. Describe the pattern in the designs.
   b. Write two different expressions to represent the number of tiles used in Design *n*. Use algebraic properties to prove the two expressions are equivalent.
   c. Explain how you could use technology to prove the two expressions in part (b) are equivalent.
   d. Create a table that displays the number of tiles used in each of the first 6 designs.
   e. Create a graph of the data points in your table on the coordinate plane shown. Draw a smooth curve to connect the points.
   f. Do all of the points on the smooth curve make sense in terms of the problem situation? Explain your reasoning.
   g. Describe the pattern as linear, exponential, quadratic, or none of these. Explain your reasoning.
   h. The owner of Hyatt Home Improvement wants to put one of their designs on an empty rectangular sign in front of their headquarters. The empty sign is 10 feet tall and 12 feet wide. If he uses square tiles measuring 1 foot by 1 foot, what is the number of the largest design that will fit on the sign? How many tiles will that design require?





Stretch

The figures shown represent a visual pattern of tiles.

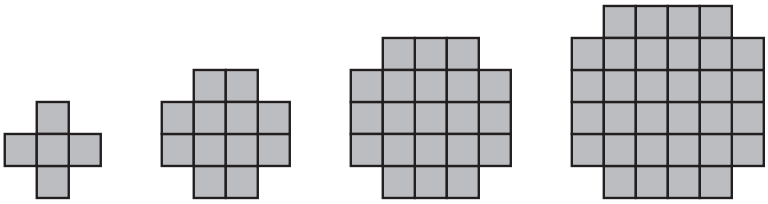


Figure 1 Figure 2 Figure 3 Figure 4

1. Write two different expressions to represent the number of tiles used in Figure *n*.
2. Use algebraic properties to prove the two expressions are equivalent.

Review

1. Taye recruits two people to be election campaign volunteers. The next week he ask each of those volunteers to recruit two more campaign volunteers. He wants all new volunteers each week to recruit two more volunteers.
   a. Determine a method to calculate the number of volunteers in any given week. Use that method to calculate the number of volunteers recruited for each of the first 5 weeks.
   b. Taye wants to recruit 150 volunteers by election day. During which week can some of the volunteers stop recruiting new volunteers? Explain your reasoning.
2. Solve each equation for the unknown value.
   a. $2^{x+2} = 32$ b. $27 = \left(\frac{1}{3}\right)^{x}$