Unit 5 Lesson 7: Expressing Transformations of Functions Algebraically

1 Describing Translations (Warm up)

Student Task Statement

Let $g(x) = \sqrt{x}$. Complete the table. Be prepared to explain your reasoning.

words (the graph of $y = g(x)$ is...)	function notation	expression
translated left 5 units	$g(x + 5)$	
translated left 5 units and down 3 units		$\sqrt{x + 5} - 3$
	$g(\text{-}x)$	$\sqrt{\text{-}x}$
translated left 5 units, then down 3 units, then reflected across the y-axis		

2 Translating Vertex Form

Student Task Statement

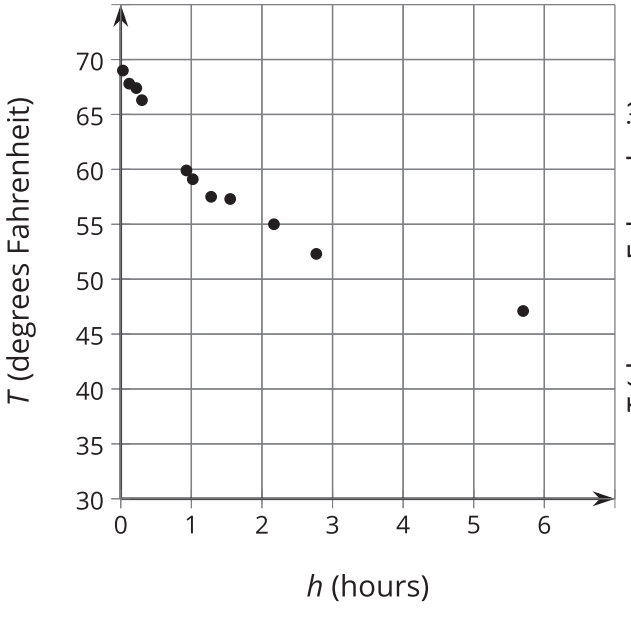
Let f be the function given by $f(x) = x^2$.

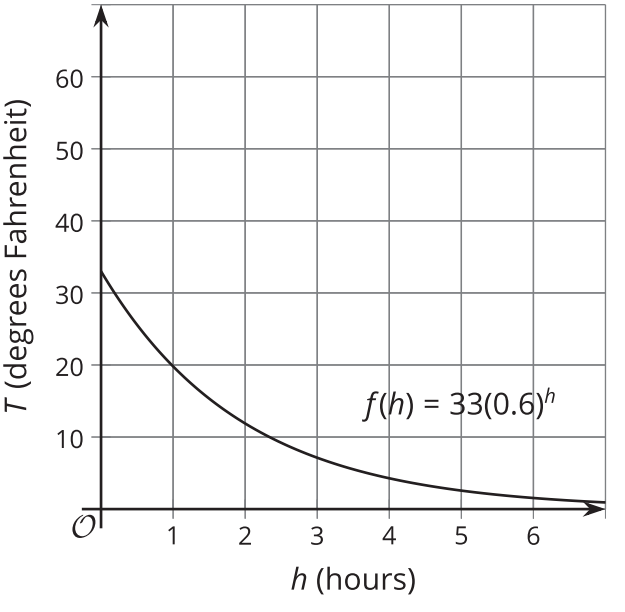
1. Write an equation for the function g whose graph is the graph of f translated 3 units left and up 5 units.
2. What is the vertex of the graph of g? Explain how you know.
3. Write an equation for a quadratic function h whose graph has a vertex at $(1.5, 2.6)$.
4. Write an equation for a quadratic function k whose graph opens downward and has a vertex at $(3.2, -4.7)$.

3 An Even Better Fit

Student Task Statement

In an earlier lesson, we looked at the temperature T, in degrees Fahrenheit, of a bottle of soda water left outside for h hours. Let's model this data with a function. This time, we will start with the function $f(h) = 33(0.6)^h$. This graph has a shape that fits the data well.





1. Describe a translation of this graph that fits the data.
2. Write an equation defining a function g that models the data.
3. What does your function tell you about the temperature outside?