Unit 5 Lesson 2: Moving Functions

1 What Happened to the Equation? (Warm up)

Student Task Statement

Graph each function using technology. Describe how to transform $f(x) = x^2(x - 2)$ to get to the functions shown here in terms of both the graph and the equation.
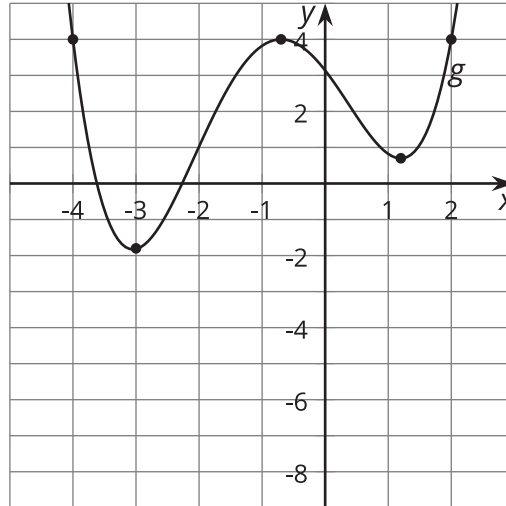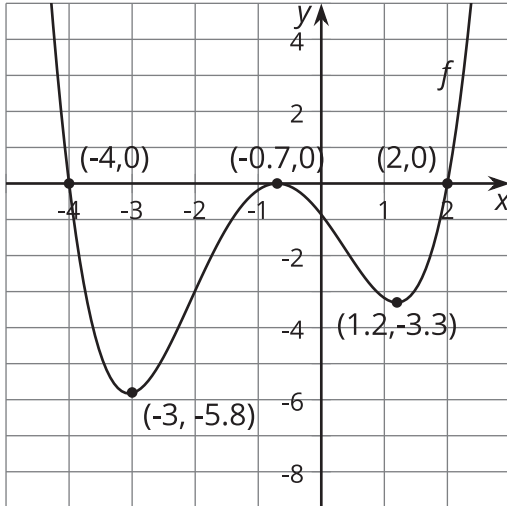
1. $h(x) = x^2(x - 2) - 5$
2. $g(x) = (x - 4)^2(x - 6)$

2 Writing Equations for Vertical Translations
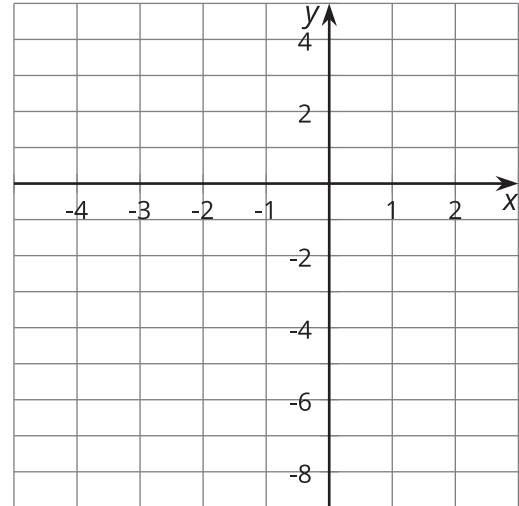
Student Task Statement

The graph of function g is a vertical translation of the graph of polynomial f.

1. Complete the $g(x)$ column of the table.

2. If $f(0) = $ -0.86, what is $g(0)$? Explain how you know.

3. Write an equation for $g(x)$ in terms of $f(x)$ for any input x.

4. The function h can be written in terms of f as $h(x) = f(x) - 2.5$. Complete the $h(x)$ column of the table.

| x	$f(x)$	$g(x)$	$h(x) = f(x) - 2.5$
-4	0		
-3	-5.8		
-0.7	0		
1.2	-3.3		
2	0		

5. Sketch the graph of function h.

6. Write an equation for $g(x)$ in terms of $h(x)$ for any input x.

3 Heating the Kitchen

Student Task Statement

A bakery kitchen has a thermostat set to $65°\text{F}$. Starting at 5:00 a.m., the temperature in the kitchen rises to $85°\text{F}$ when the ovens and other kitchen equipment are turned on to bake the daily breads and pastries. The ovens are turned off at 10:00 a.m. when the baking finishes.

1. Sketch a graph of the function H that gives the temperature in the kitchen $H(x)$, in degrees Fahrenheit, x hours after midnight.
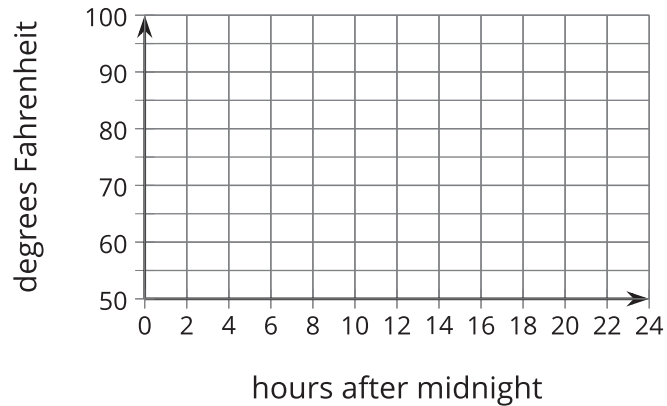
2. The bakery owner decides to change the shop hours to start and end 2 hours earlier. This means the daily baking schedule will also start and end two hours earlier. Sketch a graph of the new function G, which gives the temperature in the kitchen as a function of time.

degrees Fahrenheit

100
90
80
70
60
50

0   2   4   6   8   10 12 14 16 18 20 22 24

hours after midnight
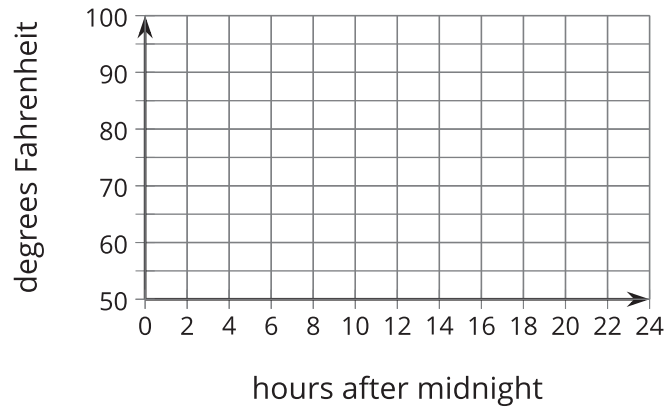
3. Explain what $H(10.25) = 80$ means in this situation. Why is this reasonable?

4. If $H(10.25) = 80$, then what would the corresponding point on the graph of G be? Use function notation to describe the point on the graph of G.

5. Write an equation for G in terms of H. Explain why your equation makes sense.

Images for Activity Synthesis