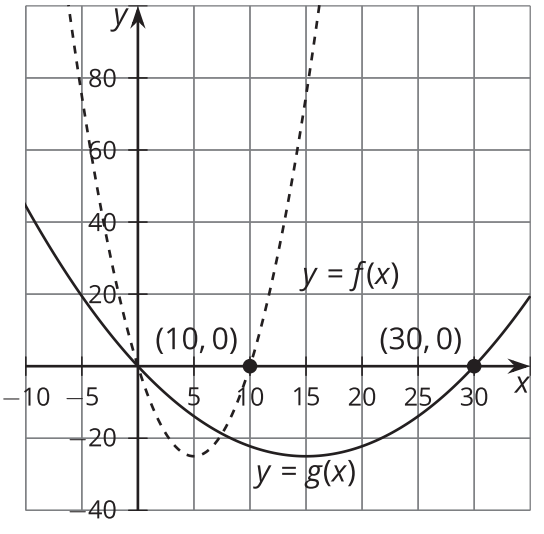
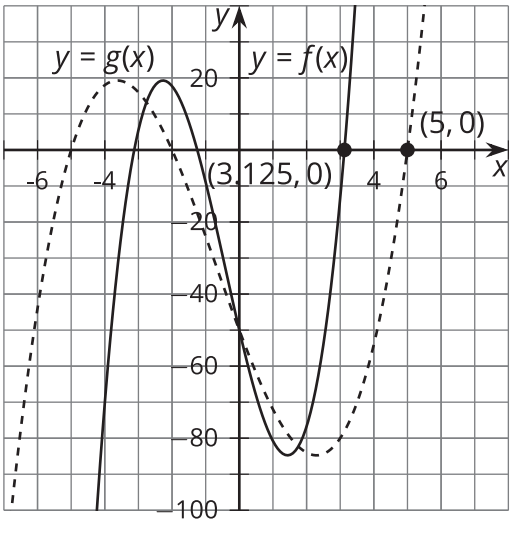
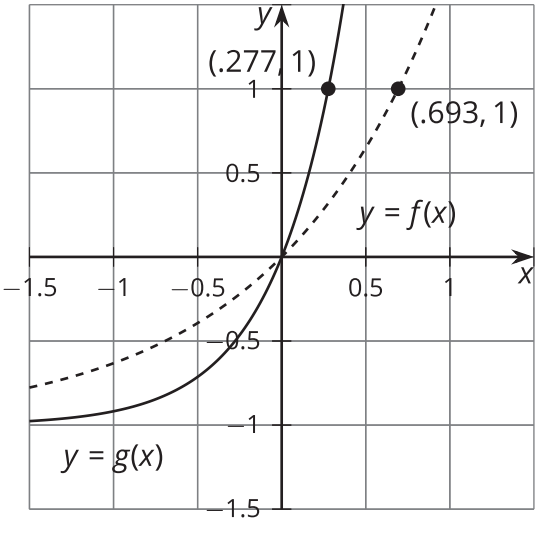
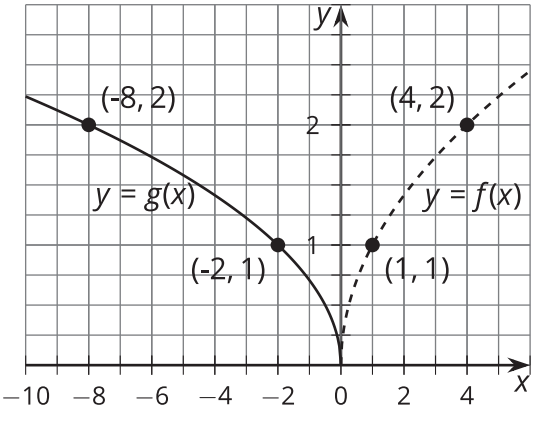
Unit 5 Lesson 9 Cumulative Practice Problems

1. Here are graphs of functions f and g. For each, determine the value of k so that $g(x) = f(kx)$.





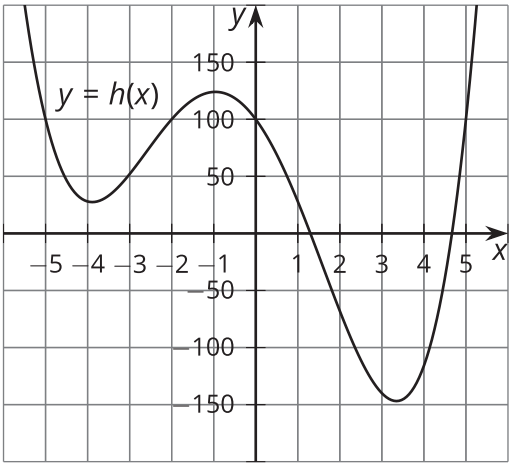




2. Let $f(x) = x(x-5)(x+2)(x+5)$. Decide if the reasoning about each of the following functions is correct. Explain your reasoning.

   a. Andre says that $g(x) = 0.1x(0.1x-5)(0.1x+2)(0.1x+5)$ is obtained from f by scaling the inputs by a factor of 0.1.

   b. Clare says this graph is a vertical shift of the graph of f down 100 units.



   c. Diego says the graph of $k(x) = -x(x-5)(x+2)(x+5)$ is the reflection of the graph of f over the y-axis.

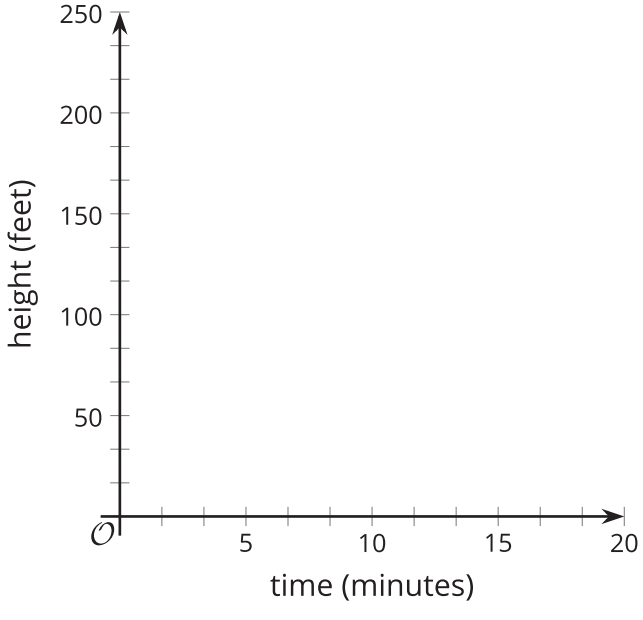
3. A bacteria population, in thousands, is modeled by the function $f(d) = 30 \cdot 2^d$ where d is the number of days since it was first measured. The function g gives the bacteria population, in thousands, w weeks after it was first measured. Express g in terms of f. Explain your reasoning.

4. The height of a hot air balloon, in feet, m minutes after takeoff is modeled by the function $f(m) = 16m$.

   a. How many minutes does it take for the balloon to reach 200 feet?

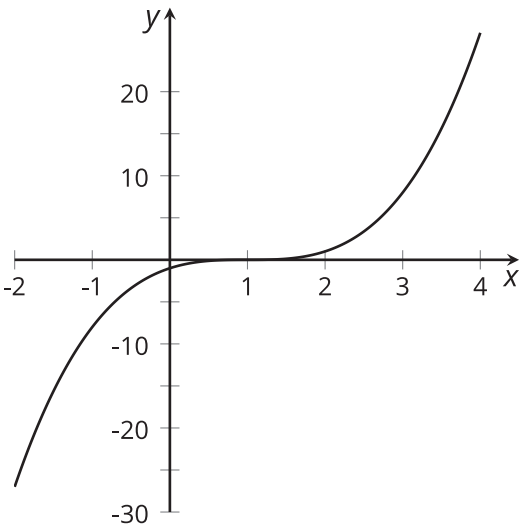
   b. Another balloon takes off 5 minutes later and rises at the same speed. Write an equation for the function g, where $g(t)$ is the height, in feet, of this balloon in terms of m. Explain your reasoning.

   c. Sketch graphs of the two functions f and g.



(From Unit 5, Lesson 3.)

5. Here is the graph of a function f.



Reflecting f across the x-axis and then across the vertical line $y = 1$ takes the graph of f back to itself. Tyler says that this means f is an odd function. Do you agree with Tyler? Explain your reasoning.

(From Unit 5, Lesson 5.)

6. The population of sloths in an area has been increasing by 5% each year since 2000. Let P model the population $P(t)$, in thousands, of sloths t years after the year 2000. The graph of $p(t) = 1.05^t$ has a general shape that fits the data. Find a scale factor k so that $P(t) = kp(t)$ fits the data.

years (since 2000)	population (in thousands)
5	15.7
8	18.2
10	20.0
12	22.1
15	25.6
19	33.1

(From Unit 5, Lesson 8.)