### Lesson 9 Practice Problems

1. Here are graphs of functions $f$ and $g$. For each, determine the value of $k$ so that $g(x)=f(kx)$.
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1. 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.
	1. 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.
	2. Clare says this graph is a vertical shift of the graph of $f$ down 100 units.
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	1. 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.
2. A bacteria population, in thousands, is modeled by the function $f(d)=30⋅2^{d}$ 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.
3. The height of a hot air balloon, in feet, $m$ minutes after takeoff is modeled by the function $f(m)=16m$.
	1. How many minutes does it take for the balloon to reach 200 feet?
	2. 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.
	3. Sketch graphs of the two functions $f$ and $g$.
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* (From Unit 5, Lesson 3.)
1. Here is the graph of a function $f$.
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* 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.)
1. 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.

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| * 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.)



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