Lesson 19 Practice Problems

1. Functions a, b, c, d, e, and f are given below. Classify each function as linear, exponential, or neither.

   a. $a(x) = 3x$

   b. $b(x) = 3^x$

   c. $c(x) = x^3$

   d. $d(x) = 9 + 3x$

   e. $e(x) = 9 \cdot 3^x$

   f. $f(x) = 9 \cdot 3x$

2. Here are 4 equations defining 4 different functions, a, b, c, and d. List them in order of increasing rate of change. That is, start with the one that grows the slowest and end with the one that grows the quickest.

   $a(x) = 5x + 3$ $\quad$ $b(x) = 3x + 5$ $\quad$ $c(x) = x + 4$ $\quad$ $d(x) = 1 + 4x$

3. *Technology required*. Function f is defined by $f(x) = 3x + 5$ and function g is defined by $g(x) = (1.1)^x$.

   a. Complete the table with values of $f(x)$ and $g(x)$. When necessary, round to 2 decimal places.

   b. Which function do you think grows faster? Explain your reasoning.

   c. Use technology to create graphs representing f and g. What graphing window do you have to use to see the value of x where g becomes greater than f for that x?

x	$f(x)$	$g(x)$
1		
5		
10		
20		

4. Functions m and n are given by $m(x) = (1.05)^x$ and $n(x) = \frac{5}{8}x$. As x increases from 0:

   a. Which function reaches 30 first?

   b. Which function reaches 100 first?

5. The functions f and g are defined by $f(x) = 8x + 33$ and $g(x) = 2 \cdot (1.2)^x$.

   a. Which function eventually grows faster, f or g? Explain how you know.

   b. Explain why the graphs of f and g meet for a positive value of x.

6. A line segment of length ℓ is scaled by a factor of 1.5 to produce a segment with length m. The new segment is then scaled by a factor of 1.5 to give a segment of length n.

   What scale factor takes the segment of length ℓ to the segment of length n? Explain your reasoning.

   (From Unit 5, Lesson 16.)

7. A couple needs to get a loan of $5,000 and has to choose between three options.

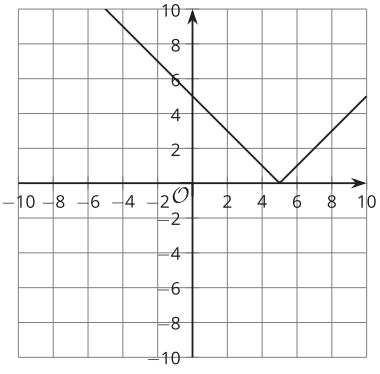
   - Option A: $2\frac{1}{4}\%$ applied quarterly
   - Option B: 3% applied every 4 months
   - Option C: $4\frac{1}{2}\%$ applied semi-annually

   If they make no payments for 5 years, which option will give them the least amount owed after 5 years? Use a mathematical model for each option to explain your choice.

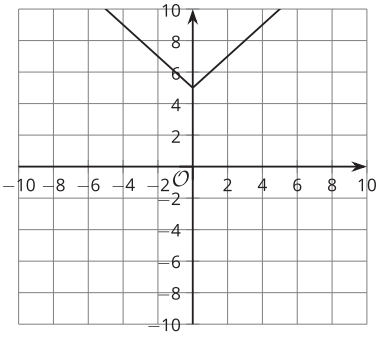
   (From Unit 5, Lesson 17.)

8. Here are graphs of five absolute value functions. Match the graph and equation that represent the same function.

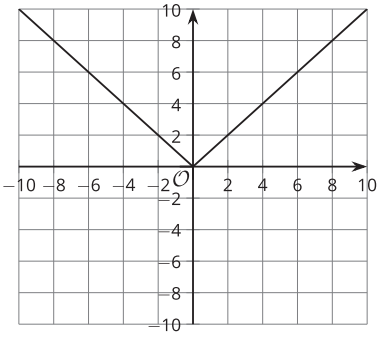
Graph 1



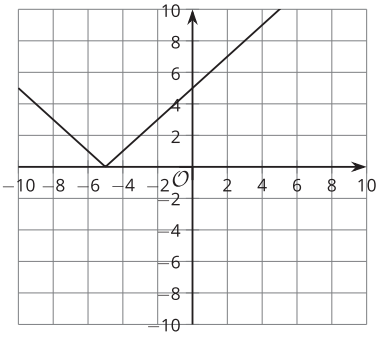
Graph 2



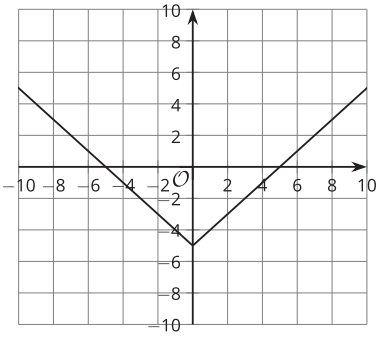
Graph 3



Graph 4



Graph 5



A. $f(x) = |x|$

B. $f(x) = |x - 5|$

C. $f(x) = |x| - 5$

D. $f(x) = |x + 5|$

E. $f(x) = |x| + 5$

1. Graph 1
2. Graph 2
3. Graph 3
4. Graph 4
5. Graph 5

(From Unit 4, Lesson 14.)