### Lesson 19 Practice Problems

1. Functions $a,b,c,d,e,$ and $f$ are given below. Classify each function as linear, exponential, or neither.
	1. $a\left(x\right)=3x$
	2. $b\left(x\right)=3^{x}$
	3. $c\left(x\right)=x^{3}$
	4. $d\left(x\right)=9+3x$
	5. $e\left(x\right)=9⋅3^{x}$
	6. $f\left(x\right)=9⋅3x$
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.
* $a\left(x\right)=5x+3$
* $b\left(x\right)=3x+5$
* $c\left(x\right)=x+4$
* $d\left(x\right)=1+4x$
1. *Technology required*. Function $f$ is defined by $f\left(x\right)=3x+5$ and function $g$ is defined by $g\left(x\right)=\left(1.1\right)^{x}$.
	1. Complete the table with values of $f\left(x\right)$ and $g\left(x\right)$. When necessary, round to 2 decimal places.
	2. Which function do you think grows faster? Explain your reasoning.
	3. 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 $x$?

| * $x$
 | * $f\left(x\right)$
 | * $g\left(x\right)$
 |
| --- | --- | --- |
| * 1
 | *
 | *
 |
| * 5
 | *
 | *
 |
| * 10
 | *
 | *
 |
| * 20
 | *
 | *
 |

1. Functions $m$ and $n$ are given by $m\left(x\right)=\left(1.05\right)^{x}$ and $n\left(x\right)=\frac{5}{8}x$. As $x$ increases from 0:
	1. Which function reaches 30 first?
	2. Which function reaches 100 first?
2. The functions $f$ and $g$ are defined by $f\left(x\right)=8x+33$ and $g\left(x\right)=2⋅\left(1.2\right)^{x}$.
	1. Which function eventually grows faster, $f$ or $g$? Explain how you know.
	2. Explain why the graphs of $f$ and $g$ meet for a positive value of $x$.
3. 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.)
1. 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.)
1. 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
* 
* 1. $f\left(x\right)=\left|x\right|$
	2. $f\left(x\right)=\left|x−5\right|$
	3. $f\left(x\right)=\left|x\right|−5$
	4. $f\left(x\right)=\left|x+5\right|$
	5. $f\left(x\right)=\left|x\right|+5$
	6. Graph 1
	7. Graph 2
	8. Graph 3
	9. Graph 4
	10. Graph 5
* (From Unit 4, Lesson 14.)



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