## Lesson 20: Evaluating Functions over Equal Intervals

* Let’s evaluate and rewrite expressions.

### 20.1: Finding Slopes

1. Find the slope of each line.
	1. The line that passes through $\left(2,2\right)$ and $\left(3,6\right)$.
	2. The graph of $f\left(x\right)=-2+\frac{1}{3}x$.
2. Show on the graph where each slope can be seen.





### 20.2: Incrementing by One

1. For the function $f\left(x\right)=3x+4$, evaluate:
	1. $f\left(0\right)$ and $f\left(1\right)$
	2. $f\left(100\right)$ and $f\left(101\right)$
	3. $f\left(-10\right)$ and $f\left(-9\right)$
	4. $f\left(0.5\right)$ and $f\left(1.5\right)$
2. What do all those pairs of numbers you found have in common?
3. Write an expression for $f\left(w\right)$ and $f\left(w+1\right)$.
4. What would you expect to be the result of subtracting $f\left(w\right)$ from $f\left(w+1\right)$?
5. Subtract $f\left(w\right)$ from $f\left(w+1\right)$. If you don’t get the answer you predicted, work with a partner to check your algebra.
6. For the function $g\left(x\right)=2^{x}$, evaluate:
	1. $g\left(3\right)$ and $g\left(4\right)$
	2. $g\left(0\right)$ and $g\left(1\right)$
	3. $g\left(-1\right)$ and $g\left(-2\right)$
	4. $g\left(10\right)$ and $g\left(11\right)$
7. What do all those pairs of numbers you found have in common?
8. Write an expression for $g\left(u\right)$ and $g\left(u+1\right)$.
9. What would you expect to be the result of dividing $g\left(u+1\right)$ by $g\left(u\right)$?
10. Divide $g\left(u+1\right)$ by $g\left(u\right)$. If you don’t get the answer you predicted, work with a partner to check your algebra.

### 20.3: Rewriting Expressions

1. Evaluate:
	1. $\frac{3^{5}}{3^{4}}$
	2. $\frac{3^{1}}{3^{0}}$
	3. $\frac{3^{-1}}{3^{-2}}$
	4. $\frac{3^{100}}{3^{99}}$
	5. $\frac{3^{x+1}}{3^{x}}$
2. Solve for $m$:
	1. $\frac{2^{m}}{2^{7}}=2$
	2. $\frac{2^{100}}{2^{m}}=2$
	3. $\frac{2^{m}}{2^{x}}=2$
3. Write an equivalent expression using as few terms as possible:
	1. $3\left(x+1\right)+4−\left(3x+4\right)$
	2. $2\left(x+1\right)+5−\left(2x+5\right)$
	3. $2\left(x+2\right)+5−\left(2\left(x+1\right)+5\right)$
	4. $-5\left(x+1\right)+3−\left(-5x+3\right)$
	5. $\frac{5^{x+1}}{5^{x}}$
	6. $\frac{7^{x+4}}{7^{x}}$



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