## Lesson 12: Changing the Equation

* Let's look at quadratics with negative inputs.

### 12.1: Math Talk: A Negative Input

Evaluate each expression when $x$ is -5:

$-2x$

$x^{2}$

$-2x^{2}$

$-x^{2}$

### 12.2: Equations and Their Graphs

1. Two students are evaluating $x^{2}+7$ when $x$ is -3. Here is their work. Do you agree with either of them? Explain your reasoning.
* Tyler:
* $x^{2}+7$
* $-3^{2}+7$
* $-9+7$
* -2
* Lin:
* $x^{2}+7$
* $\left(-3\right)^{2}+7$
* $9+7$
* 16
1. Evaluate each expression when $x$ is -4:
	1. $x^{2}$
	2. $\frac{1}{2}x^{2}$
	3. $-\frac{1}{8}x^{2}$
	4. $-x^{2}−8$
2. Using graphing technology, graph $y=x$. Then, experiment with the following changes to the function. Record your observations (include sketches, if helpful).
	1. Adding different constant terms to $x$ (for example: $x+4$, $x−3$).
	2. Multiplying $x$ by different positive coefficients greater than 1 (for example: $6x,2.5x$).
	3. Multiplying $x$ by different positive coefficients between 0 and 1 (for example: $0.25x,0.1x$).
	4. Multiplying $x$ by negative coefficients (for example: $-9x,-4x$).
3. Use your observations to sketch these functions on the coordinate plane, which currently shows $y=x$.
	1. $y=-0.5x+2.1$
	2. $y=2.1x−0.5$
	* 
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### 12.3: Match the Graphs

1. Evaluate each expression when $x$ is -3.
	1. $x^{2}$
	2. $-x^{2}$
	3. $x^{2}+20$
	4. $-x^{2}+20$
2. For each graph, come up with an equation that the graph could represent. Verify your equation using graphing technology.
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