## Lesson 11: Zeros of Functions and Intercepts of Graphs

* Let’s see what happens when a function’s input or output is 0.

### 11.1: Which Output is 0?

Which of these functions have an output of 0 when the input is -4?

* $v\left(x\right)=4x$
* $w\left(x\right)=-4x$
* $y\left(x\right)=8+2x$
* $z\left(x\right)=2x−8$

### 11.2: Intercept Detective

Here are the definitions of some functions, followed by some possible inputs for the functions.

$a\left(x\right)=x−5$

$b\left(x\right)=x+5$

$c\left(x\right)=x−3$

$d\left(x\right)=x+1$

$f\left(x\right)=3x−6$

$g\left(x\right)=3x+6$

$h\left(x\right)=\left(x+5\right)\left(x+3\right)$

$m\left(x\right)=\left(x+1\right)\left(x−3\right)$

$n\left(x\right)=\left(3x−6\right)\left(x−5\right)$

Possible inputs: -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, and 5.

1. For each function, decide which input or inputs would give an output of 0.
2. Here are graphs of $b$, $f$, and $m$. Label each intercept with its coordinates, and be prepared to explain how you know.
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### 11.3: Making More Connections

1. For each function, identify the input that would give an output of 0.
	* $p\left(x\right)=x+10$
	* $q\left(x\right)=x−10$
	* $r\left(x\right)=8−x$
	* $s\left(x\right)=-8−x$
	* $t\left(x\right)=2x−8$
	* $u\left(x\right)=2x+8$
2. Match each graph to a function in the previous question. Be prepared to explain your matches.
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1. Label the intercepts on each graph with their coordinates.
2. For each function, identify the inputs that would give an output of 0.
	* $v\left(x\right)=\left(x+10\right)\left(2x−8\right)$
	* $w\left(x\right)=\left(2x+8\right)\left(10−x\right)$
3. Create three different functions whose output is 0 when the input is 7. At least one of your functions must be quadratic.



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