



# 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?

- $v(x) = 4x$
- $w(x) = -4x$
- $y(x) = 8 + 2x$
- $z(x) = 2x - 8$

## 11.2 Intercept Detective

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

$$a(x) = x - 5$$

$$g(x) = 3x + 6$$

$$b(x) = x + 5$$

$$h(x) = (x + 5)(x + 3)$$

$$c(x) = x - 3$$

$$m(x) = (x + 1)(x - 3)$$

$$d(x) = x + 1$$

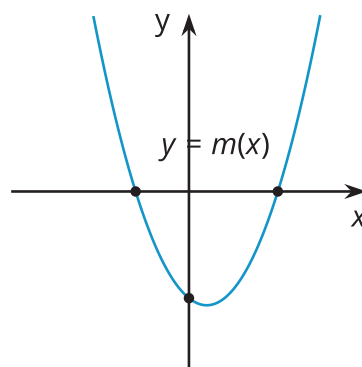
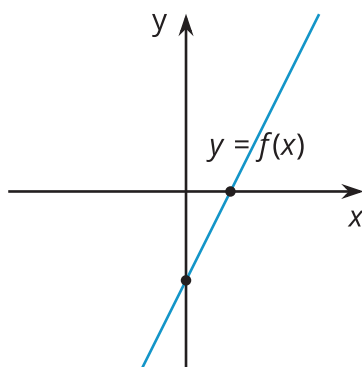
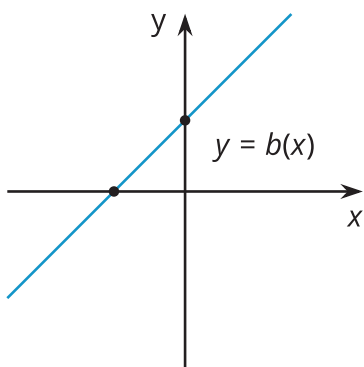
$$n(x) = (3x - 6)(x - 5)$$

$$f(x) = 3x - 6$$

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.



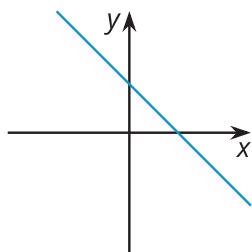
## 11.3 Making More Connections

1. For each function, find the input that would give an output of 0.

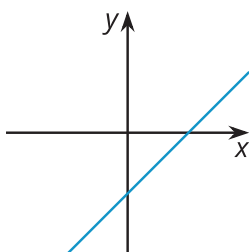
- $p(x) = x + 10$
- $q(x) = x - 10$
- $r(x) = 8 - x$
- $s(x) = -8 - x$
- $t(x) = 2x - 8$
- $u(x) = 2x + 8$

2. Match each graph to a function in the previous question. Be prepared to explain your matches.

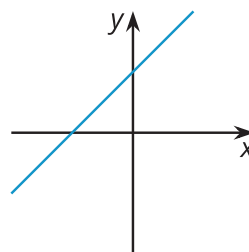
A



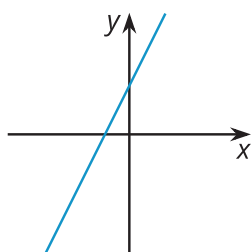
B



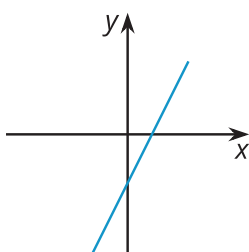
C



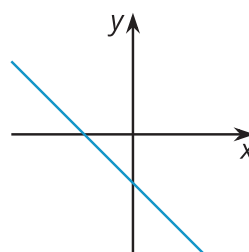
D



E



F



3. Label the intercepts on each graph with their coordinates.

4. For each function, find the inputs that would give an output of 0.

- $v(x) = (x + 10)(2x - 8)$
- $w(x) = (2x + 8)(10 - x)$

5. Create three different functions whose output is 0 when the input is 7. At least one of your functions must be quadratic.