

Linear Functions & Equations

1. A function assigns the inputs and corresponding outputs shown in the table below.

a) Does the function appear to be linear? Check at least three pairs of inputs and their corresponding outputs.

Input	Output
-2	3
8	-2
10	-3
20	-8

b) Can you write a linear equation that describes the function?

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$$\frac{3 - (-2)}{-2 - 8} = \frac{5}{-10} = -\frac{1}{2}$$

$$\frac{-2 - (-3)}{8 - 10} = \frac{1}{-2} = -\frac{1}{2}$$

$$\frac{-3 - (-8)}{10 - 20} = \frac{5}{-10} = -\frac{1}{2}$$

Yes. The rate of change is the same when I check pairs of inputs and corresponding outputs. Each time it is equal to $-\frac{1}{2}$. Since the rate of change is the same for at least these three examples, the function could well be linear.

b) Can you write a linear equation that describes the function?

We suspect we have an equation of the form $y = -\frac{1}{2}x + b$.

Using the assignment of 3 to -2:

$$3 = -\frac{1}{2}(-2) + b$$

$$3 = 1 + b$$

$$2 = b$$

The equation that describes the function might be $y = -\frac{1}{2}x + 2$.

Checking: When $x = -2$, we get $y = -\frac{1}{2}(-2) + 2 = 3$. When $x = 8$, we get $y = -\frac{1}{2}(8) + 2 = -2$. When $x = 10$, we get $y = -\frac{1}{2}(10) + 2 = -3$. When $x = 20$, we get $y = -\frac{1}{2}(20) + 2 = -8$.

It works.

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