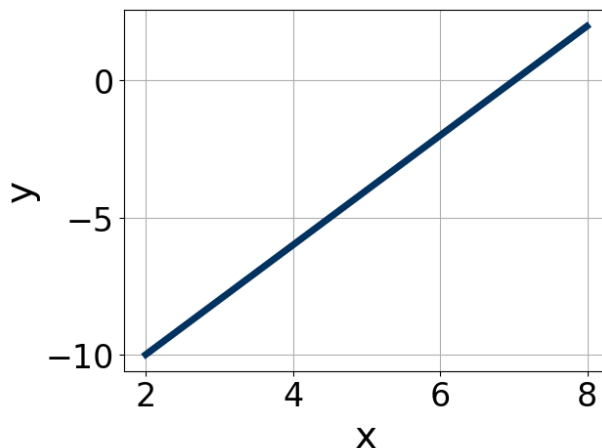


This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found [here](#).

If you have a suggestion to make the keys better, please fill out the short survey [here](#).

*Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.*

1. Is the graph below a linear function?



The solution is yes, the graph is linear., which is option A.

- A. Yes, the graph is linear

\* Correct! The graph has a constant rate of change and is thus a linear function.

- B. No, the graph is not linear.

A linear function has a constant rate of growth. As  $x$  increases/decreases,  $y$  increases/decreases at the same rate. The graph in this example does have a constant rate of change.

**General Comment:** The equation graphed was  $2(x - 5) - 4$ . A linear function has a constant rate of growth. This means that as  $x$  increases or decreases,  $y$  increase or decreases at the same rate. For example,  $x^2$  is NOT a linear function. As  $x$  increases, the  $y$  increases faster and faster. From  $x = 1$  to  $x = 2$ , the  $y$  increases by 3. From  $x = 2$  to  $x = 3$ , the  $y$  increases by 5. From  $x = 3$  to  $x = 4$ , the  $y$  increases by 7. A linear function would have the same change in  $y$  for any change in  $x$ .

2. Is the following relation a function?

x	y
1	5.0
2	7.07
3	8.66
4	10.0
5	-10.0
4	-5.0
3	-7.07

The solution is No, which is option B.

- A. Yes

Notice how one  $x$ -value has two separate outputs? For a relation to be a function, every  $x$ -value needs exactly one output.

B. No

\* Correct! An  $x$ -value has two separate outputs and thus this relation is not a function.

**General Comment:** For a relation to be a function, every  $x$ -value needs exactly one output.

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3. Is the equation below a linear function?

$$f(x) = 4(x + 4) + 1$$

The solution is yes, the graph is linear., which is option A.

A. Yes, the equation is linear

\* Correct! The equation is a degree-1 polynomial and is thus a linear function.

B. No, the equation is not linear.

A linear function is a degree-1 polynomial. Polynomial equations have all variables with positive integer exponents.

**General Comment:** The equation graphed was  $4(x + 4) + 1$ . A linear function is a degree-1 polynomial. Polynomial equations have all variables with positive integer exponents, like  $f(x) = 3x^2 - 2x + 4$ . Square root and cube root functions have rational exponents ( $1/2$  and  $1/3$ ).

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4. Is the following relation a linear function?

x	y
4	10.0
5	11.18
6	12.25
7	-12.25
6	-10.0
5	-11.18
4	-12.25

The solution is No, which is option B.

A. Yes

Notice how one  $x$ -value has two separate outputs? For a relation to be a function, every  $x$ -value needs exactly one output.

B. No

\* Correct! An  $x$ -value has two separate outputs and thus this relation is not a function, let alone a linear function.

**General Comment:** For a relation to be a linear function, every  $x$ -value needs exactly one output AND there needs to be a constant rate of growth (as  $x$  increases/decreases,  $y$  increases/decreases at the same rate).

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