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 following relation a function?

x	y
2	-20
3	-45
4	-80
5	-80
4	20
3	45
2	80

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.

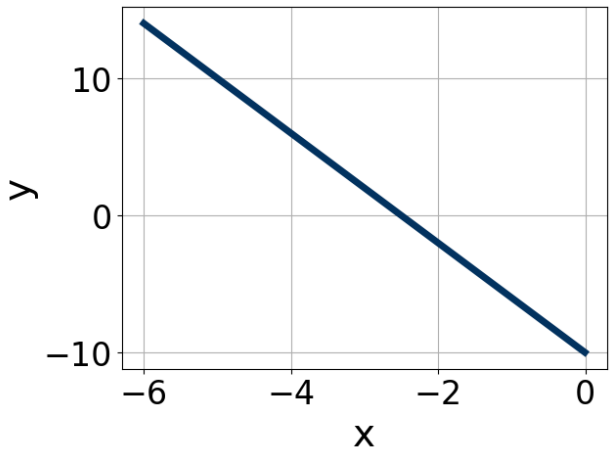
   B. No

      * 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.

---

2. 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 -4(x + 3)+2. 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.

---

3. Is the following relation a linear function?

x	y
4	-64
5	-100
6	-144
7	-196
8	196
7	64
6	100

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).

---

4. Is the equation below a linear function?

$$f(x) = -5(x - 4) + 1$$

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 -5(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).
