

Study Guide

Functions

A special type of relation is called a **function**.

Definition of Function

A **function** is a relation in which each element of the domain is paired with *exactly* one element of the range.

Example 1: Is $\{(6, -3), (4, 1), (7, -2), (-3, 1)\}$ a function? Is the inverse a function?

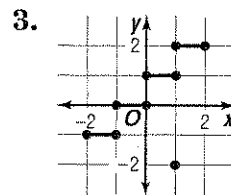
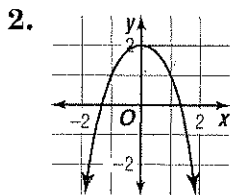
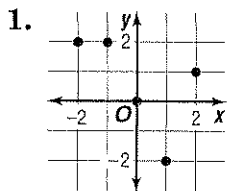
Since each element of the domain is paired with exactly one element of the range, the relation *is* a function. The inverse is not a function because 1 is paired with more than one element of the range.

The equation $y = 2x + 1$ can be written as $f(x) = 2x + 1$. If $x = 3$, then $f(3) = 2(3) + 1$, or 7. Thus, $f(3)$, which is read “ f of 3” is a way of referring to the value of y that corresponds to $x = 3$.

Example: If $f(x) = 3x - 4$, find $f(3)$ and $f(-2)$.

$$\begin{aligned} f(3) &= 3(3) - 4 & f(-2) &= 3(-2) - 4 \\ &= 9 - 4 & &= -6 - 4 \\ &= 5 & &= -10 \end{aligned}$$

Determine whether each relation is a function.



4. $\{(4, 2), (2, 3), (6, 1)\}$

5. $\{(-3, -3), (-3, 4), (-2, 4)\}$

6. $\{(-1, 0), (1, 0)\}$

7. $-2x + 4y = 0$

8. $x^2 + y^2 = 8$

9. $-\frac{1}{4}x = -\frac{1}{4}y - 2$

Given $f(x) = 2x - 4$ and $g(x) = x^2 - 4x$, find each value.

10. $f(4)$

11. $g(2)$

12. $f(-5)$

13. $g(-3)$

14. $f\left(\frac{1}{4}\right)$

15. $g\left(\frac{1}{4}\right)$

QUOTABLE PUZZLES

Relations and Functions A.5, A.15, A.18

Directions: Solve the following problems. Match that answer to the correct letter of the alphabet. Enter that letter of the alphabet on the blank corresponding to the problem number.

15 12 4 2 9 8 14 4 10 3 1 10 10 9 11 7

10 9 6 1 8 5 11 9 13 8 4 7 9 7 10 9

A	B	C	D	E	F	G	H	I	J	K	L	M
9	0	-1	-16	18	16	-2	-4	3	2	-9	1	-3
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
-7	4	5	7	8	23	-5	-8	15	-23	11	42	-18

Simplify:

- | | | | |
|-------------------------------|----------------|---------------------------------|----------------|
| 1. $f(x) = 2x - 1$ | Find $f(5)$. | 9. $f(x) = x^3 - 2x - 1$ | Find $f(-2)$. |
| 2. $f(x) = x^2 - 3x - 1$ | Find $f(3)$. | 10. $f(x) = x^4 + 2x^2 - 1$ | Find $f(2)$. |
| 3. $f(x) = 2x + 5$ | Find $f(0)$. | 11. $f(x) = -4x - 8$ | Find $f(-1)$. |
| 4. $f(x) = -2x^2 - 5$ | Find $f(-1)$. | 12. $f(x) = 2x - 10$ | Find $f(1)$. |
| 5. $f(x) = x + 5$ | Find $f(-7)$. | 13. $f(x) = x^3 - 2x^2 + x + 5$ | Find $f(-1)$. |
| 6. $f(x) = 6x^2 + 2x$ | Find $f(1)$. | 14. $f(x) = x^2 - 21$ | Find $f(5)$. |
| 7. $f(x) = \frac{1}{4}x + 2x$ | Find $f(8)$. | 15. $f(x) = (x - 2)^2$ | Find $f(-2)$. |
| 8. $f(x) = 4x - 5$ | Find $f(2)$. | | |