

Functions

Function

If the value of the variable y is determined by the value of the variable x , then y is a **function of x** . There is **only one** y for any x . A **function** is a set of ordered pairs (a relation) in which no two ordered pairs have the same first coordinate and different second coordinates.

Given (x,y) : the variable corresponding to the first coordinate, the x , is the **independent** variable and the variable corresponding to the second coordinate, the y , is the **dependent** variable.

Another way of thinking:

Consider the relation: (day, letter) where day is the 'x', letter is the 'y'

{ (Sunday, S), (Monday, M), (Tuesday, T), (Wednesday, W), (Thursday, T), (Friday, F), (Saturday, S)}

If you were asked what y -value goes with the x -value of Tuesday,
do you know exactly what the answer is?

YES – therefore, this set is a function even though both Tuesday and Thursday have y -values of T.

Consider the relation: (letter, day) where letter is the 'x', day is the 'y'

{ (S, Sunday), (M, Monday), (T, Tuesday), (W, Wednesday), (T, Thursday), (F, Friday), (S, Saturday)}

If you were asked what y -value goes with the x -value "S", do you know exactly what the answer is?

NO. It could be either Sunday or Saturday. Therefore this relation is NOT a function.

Two different values of x can map to the same value of y and it is still a function of x .

If one value of x maps to two different values of y , it is NOT a function of x .

Is 'y' a function of 'x'?

Consider all possible rectangles. Let 'y' represent the area of a rectangle and 'x' represent the width.

x (width)	4	4
y (area)	20	???

Is 'y' a function of 'x'? (i.e., Is area a function of width? For any width, will there be only one area?)

Area is actually a function of length and width. Since there are multiple y values possible for any given x, this example is not a function.

Consider all pizzas sold at Pizzaz with a 6% sales tax.

Let 'y' represent the amount of sales tax and 'x' represent the original price of the pizza.

x (original price)	10	10
y (sales tax at 6%)	0.60	???

Is 'y' a function of 'x'? (i.e., Is sales tax a function of the original price? For any original price, will there be only one amount of sales tax?) Given the x, there WILL BE exactly one y in this example. This is a function.

TRY:

Consider the set: $\{(0,3), (2, 5), (4, 7), (2, -5), (4, -7)\}$

If you were given this set and asked what y goes with the x-value of 4, do you know exactly what the answer is?
Is this a function?

Consider the set: $\{(3,0), (5, 2), (7, 4), (-5, 2), (-7, 4)\}$

If you were given this set and asked what y goes with the x-value of 5, do you know exactly what the answer is?
Is this a function?