Functional Relations

A telephone company charges an initial fee of $40 for visiting a house plus $12 for each telephone jack installed. We will investigate the relationship between the total fee charged and the number of telephone jacks installed.

For our purposes we will let

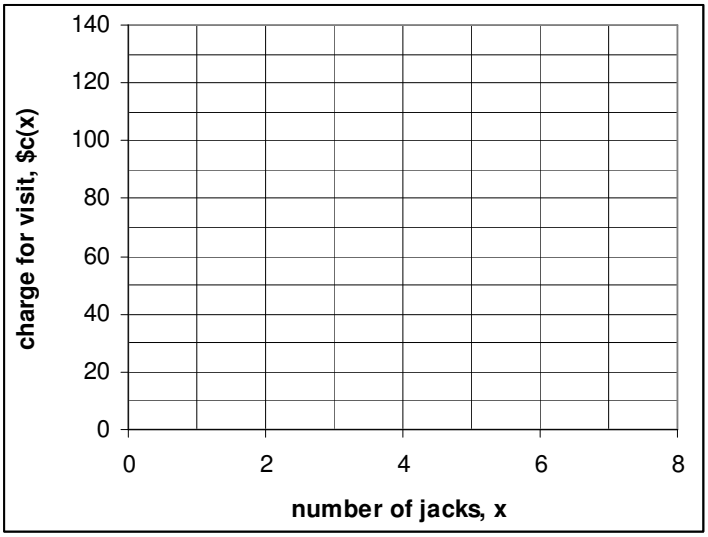
x = the number of telephone jacks installed, and

c(x) = the total charge for the visit, in dollars, when x jacks are installed.

We can represent the relationship between c(x) and x defined by the first paragraph above by means of a table, a graph, or a rule.

Complete the table below and then graph the number pairs in the relationship on the grid below.

x	c(x)	Δc(x)
0		
1		
2		
3		
4		
5		
6		
7		



Write a rule to determine the value of c(x) for any value of x.

What is the value of c(5) and what does that value tell us about this situation?

Suppose the charge for a visit was $112. How can we determine the number of jacks installed by three different methods?

The situation considered here is an example of a *functional relationship*, or a *function*. A relationship between two quantities where the value of the second quantity depends on the value of the first quantity in a way such that each value of the first quantity determines one, and only one, value of the second quantity is called a *function*. The possible values for the first quantity constitute the *domain* of the function, and the possible values for the second quantity constitute the *range* of the function. The function in our example is in a special class of functions called *linear functions*.

Each of the following equations represents a linear function. The variables "x" and "y" represent two quantities, and each case the value of y is determined by the value given to x. A solution to any of the equations is a pair of numbers (x,y) that when substituted for the variables will make the equation true.

Complete each table and graph the solutions for each equation on the grid provided below on the left.

y = 3x + 5

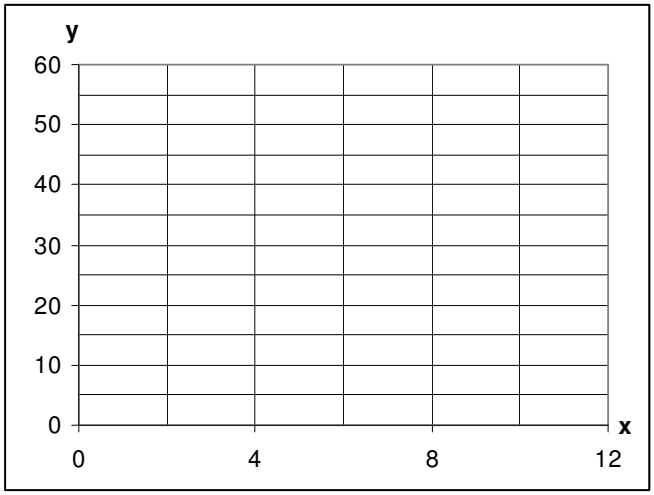
Δx	x	y	Δy	Δy/Δx
	0			
	2			
	4			
	6			
	8			
	10			
	12			

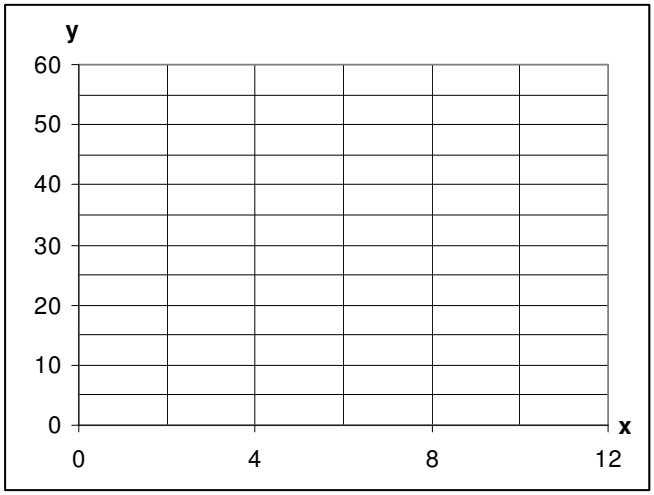
y = 3x + 10

Δx	x	y	Δy	Δy/Δx
	0			
	2			
	4			
	6			
	8			
	10			
	12			

y = 3x + 15

Δx	x	y	Δy	Δy/Δx
	0			
	2			
	4			
	6			
	8			
	10			
	12			





Complete each table and graph the solutions for each equation on the grid provided above on the right.

y = 2x + 10

Δx	x	y	Δy	Δy/Δx
	0			
	2			
	4			
	6			
	8			
	10			
	12			

y = 2x + 30

Δx	x	y	Δy	Δy/Δx
	0			
	2			
	4			
	6			
	8			
	10			
	12			

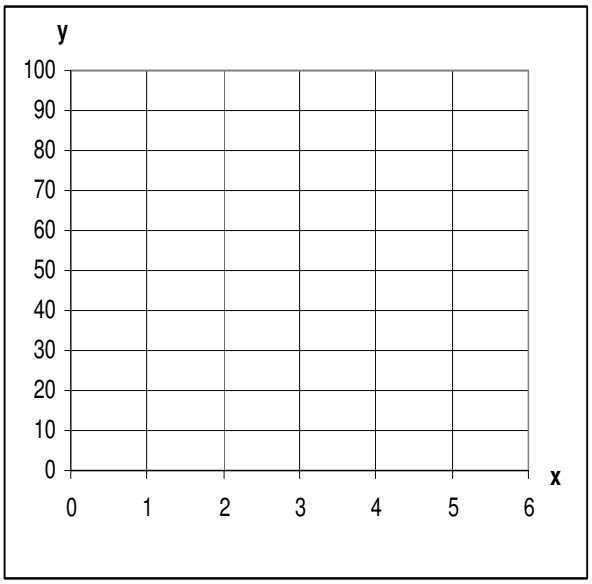
y = -3x + 50

Δx	x	y	Δy	Δy/Δx
	0			
	2			
	4			
	6			
	8			
	10			
	12			

Complete each table and graph the solutions for each equation on the grids provided.

$y = 2x^2 + 1x + 3$

Δx	x	y	Δy	Δy/Δx
	0			
	1			
	2			
	3			
	4			
	5			



$y = 3(2)^x$

Δx	x	y	Δy	Δy/Δx
	0			
	1			
	2			
	3			
	4			
	5