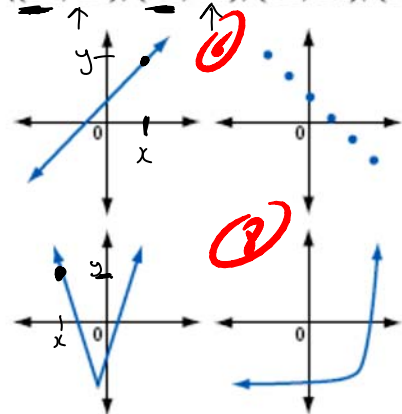


4.5 Functions

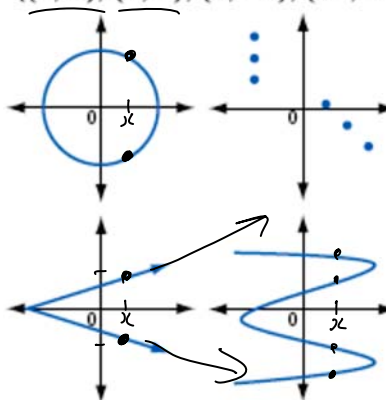
These 8 relations are functions.

x	y	x	y
5 → 10		11 → 3	
6 → 15		21 → 3	
7 → 20		31 → 3	

③ $\{(-2, -5), (0, 4), (2, 13), (4, 22)\}$ ④ $\{(10, 10), (12, 10), (14, 12), (16, 12)\}$ 

These 8 relations are not functions.

x	y	x	y
6 → 10		3 → 11	
6 → 15		3 → 21	
7 → 20		3 → 31	

 $\{(10, 10), (12, 10), (12, 14), (12, 16)\}$ $\{(7, 5), (7, 8), (9, 11), (11, 14)\}$ 

Function: A relation in which each value of the independent variable is associated with exactly one value of the dependent variable.

ie. only one output for each input
 For every value in the domain there is one associated value in the range

Function Notation: symbolic notation used for writing a function

ex. instead of

$$y = 3x + 1$$

in function notation

$$f(x) = 3x + 1$$

name of function $\downarrow$ the input variable

"f of x"

ex. area of a circle

$$A = \pi r^2$$

$$A(r) = \pi r^2$$

$$g(m) = 3m + 1$$

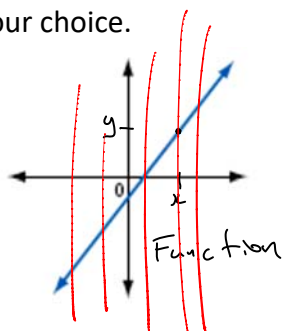
$$\text{ex. } h(t) = 4t - 1$$

$$h(2) = 4(2) - 1$$

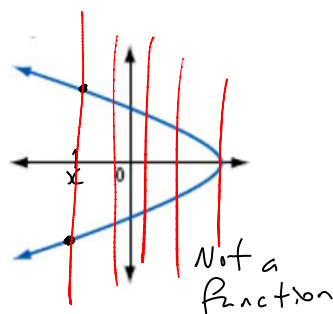
$$\underline{h(2) = 7} \quad h(3) = 11 \quad h(0) = -1$$

Ex. For each pair of relations, decide which relation is a function and which is not a function. Explain your choice.

a) A



B



Vertical Line Test
if any vertical line intersects the graph more than once then that relation is NOT a function.

b) C

x	y
2	5
2	7
4	9
6	11

Not a function

D

x	y
-3	3
-2	4
-1	3
0	4

Function

x	y
2	4
0	3
1	3
2	4

Function

c) E $\{(1, 1), (2, 2), (3, 3), (4, 4)\}$ Function

F $\{(1, 1), (1, 2), (1, 3), (1, 4)\}$ Not Function

Ex. The function $F(C) = 1.8C + 32$ is used to convert a temperature in degrees Celsius ($^{\circ}C$) to a temperature in degrees Fahrenheit ($^{\circ}F$).

a) Determine $F(25)$. Explain your answer.

let $C = 25$

$$F(25) = 1.8(25) + 32$$

$$F(25) = 77$$

$$25^{\circ}C = 77^{\circ}F$$

b) Determine C so that $F(C) = 100$. Explain your answer.

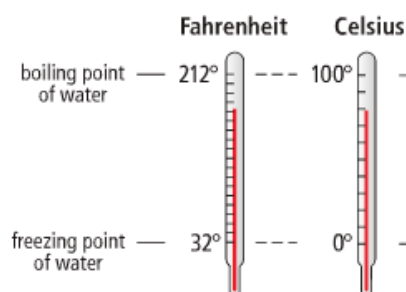
$$100 = 1.8C + 32$$

$$68 = 1.8C$$

$$\frac{68}{1.8} = C$$

$$37.8 = C$$

$$100^{\circ}F = 37.8^{\circ}C$$



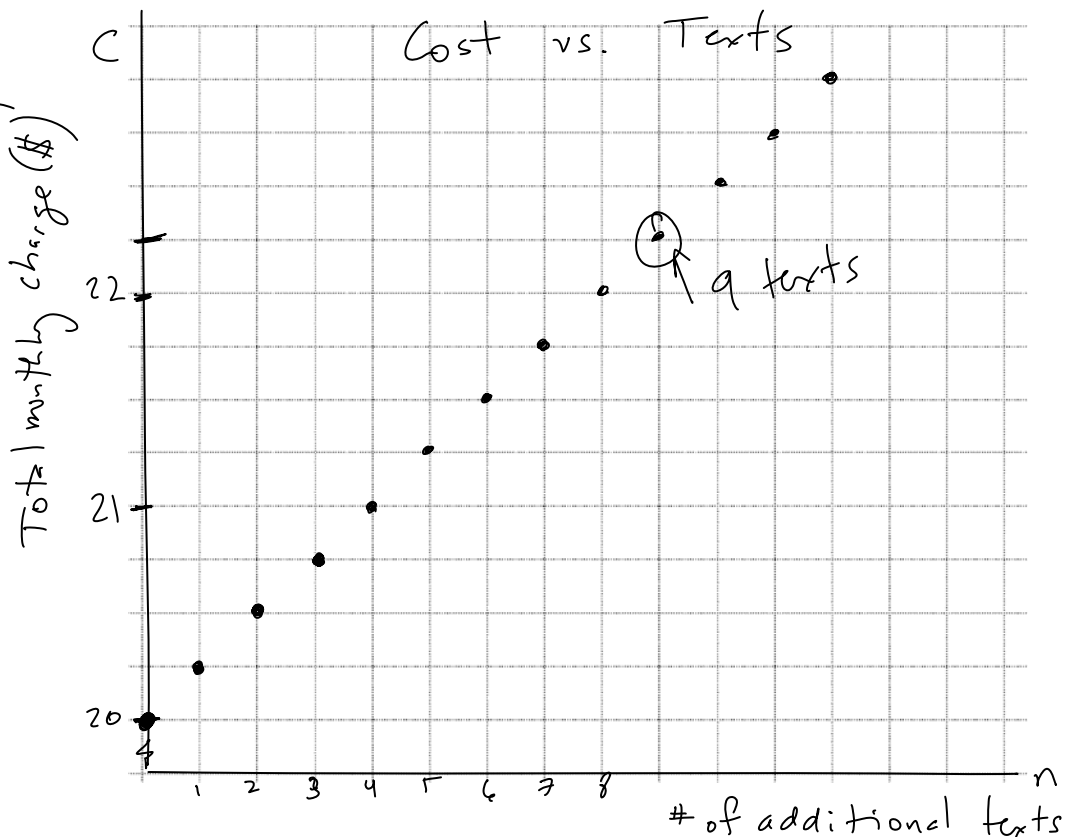
Ex. Skye has a cell phone plan for a monthly fee of \$20 plus 25¢ for each text message to or from a number not on a list of favourites.

- a) Write the relation modeling the monthly bill in function notation using C as the name of the function & n as the number of additional text messages.

$$C(n) = .25n + 20$$

- b) Make a table of values. Graph the function if Skye sends up to four additional text messages.

n	C
0	20
1	20.25
2	20.50
3	20.75
4	21.00
...	...
8	22



Discrete!

- c) If Skye's cell phone bill for a certain month is \$22.25, how many additional text message charges are there?

\$ 22.25 from graph
at 9 texts

OR

$$C(n) = .25n + 20$$

$$22.25 = .25n + 20$$

$$\begin{array}{r} 22.25 \\ -20 \\ \hline 2.25 \end{array} = \begin{array}{r} .25n \\ .25 \\ \hline \end{array}$$

$$n = \underline{9 \text{ texts}}$$