Functions:

An equation — x, y

Function notation — x, f(x)

Two variables

$y = 2|x + 4$

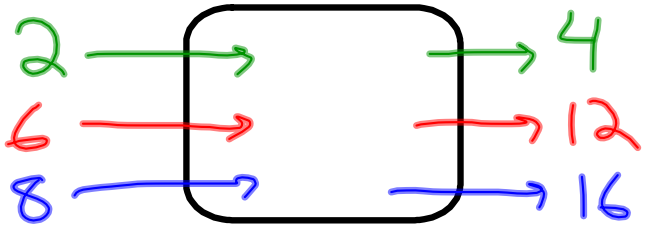
Equation form

$f(x) = 2|x + 4$

If you give a function an "x" value, it will always give you the same "y"

What makes an equation a function?

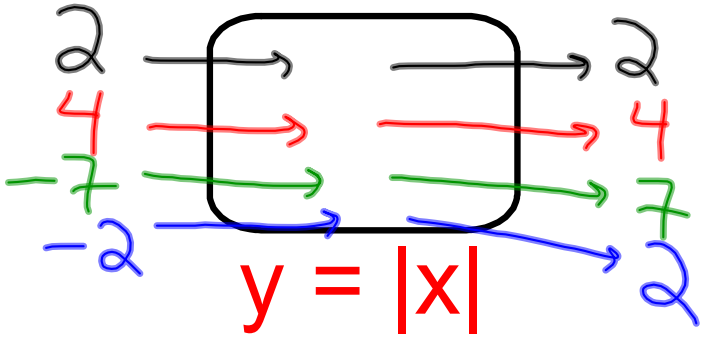
Functions are mathematical machines:



$y = 2x$

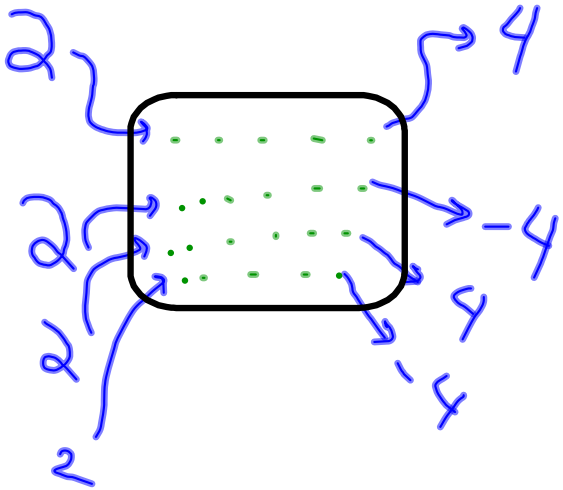
input
(x)

output
(y)



$y = |x|$

Is this a function?



a function has an input of 7
and an output of 12.

give me an example of
a function that would do this

$y = x + 5$

$f(x) = x + 5$

$f(x) = 2x - 2$

$f(x) = 3x - 9$

$f(x) = 12$

Some functions have a limited # of x values (inputs) that will work.

The list of possible x-values is called the "domain"

$y = x + 2$ $(1, 5, 10, 20, 50, 100)$ Restricted by definition

$y = \frac{7}{x}$ $(x \neq 0)$ Restricted by function

$y = x + 1$ No restriction

The possible output values of a function are called the range.

$y=|x|$ range: ?

x domain	y range
1	1
2	2
0	0
−2	2
−15	15

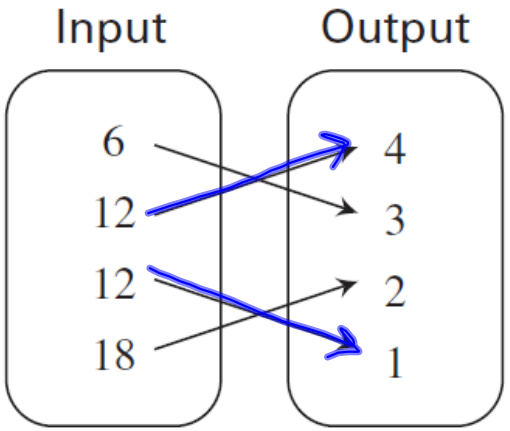
We can show functions as a table

range: $y \geq 0$

Input	Output
1	15
3	20
5	15
7	20

Function!

not a function



Shoe Sizes The table shows men's shoe sizes in the United States and Australia. Write a rule for the Australian size as a function of the United States' size.

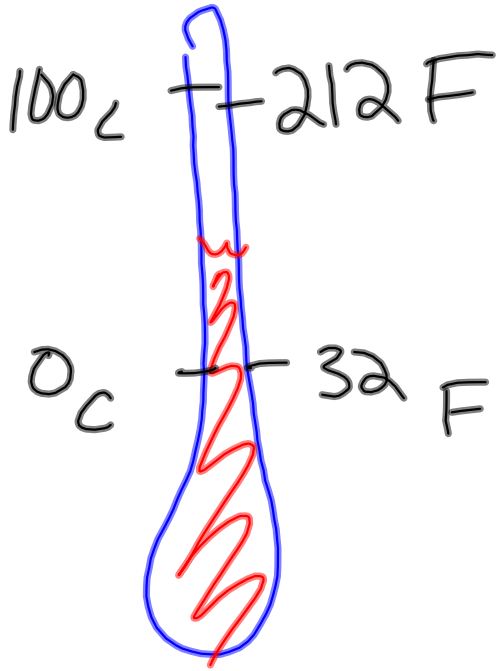
U.S. size	5	6	7	8	9	10
Australian size	3	4	5	6	7	8

U.S. size = x

Aus. size = f(x)

$f(x) = x - 2$

$F = \frac{9}{5}C + 32$



$F-32$	C
$32-32$	0
$212-32$	100
180	

$\frac{180}{100} = \frac{9}{5}$

$C \rightarrow F$

$+32, \times \frac{9}{5}$

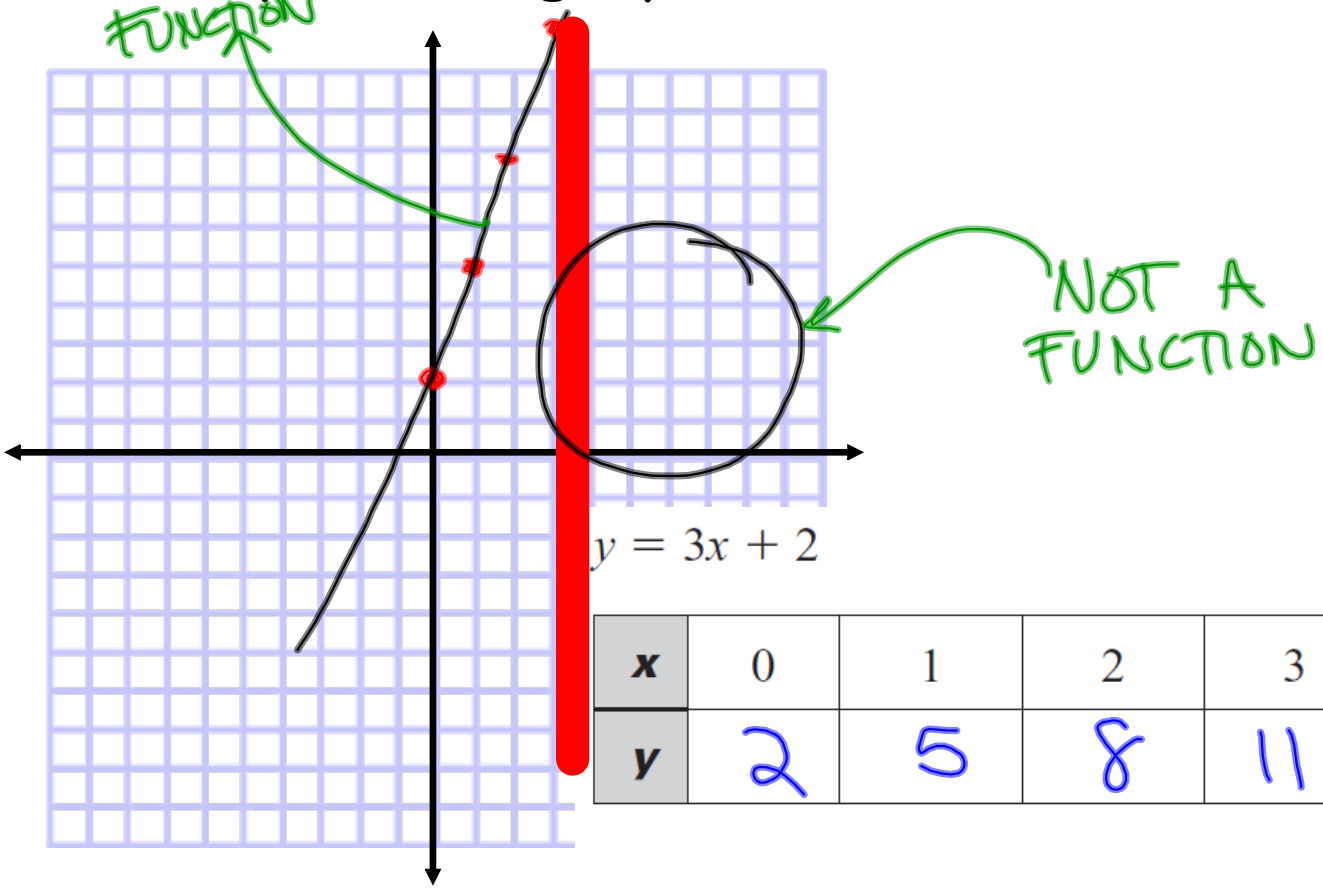
$F = \frac{9}{5}C + 32$

$-32 \quad -32$

$\frac{5}{9} \cdot F - 32 = \frac{9}{5}C \cdot \frac{5}{9}$

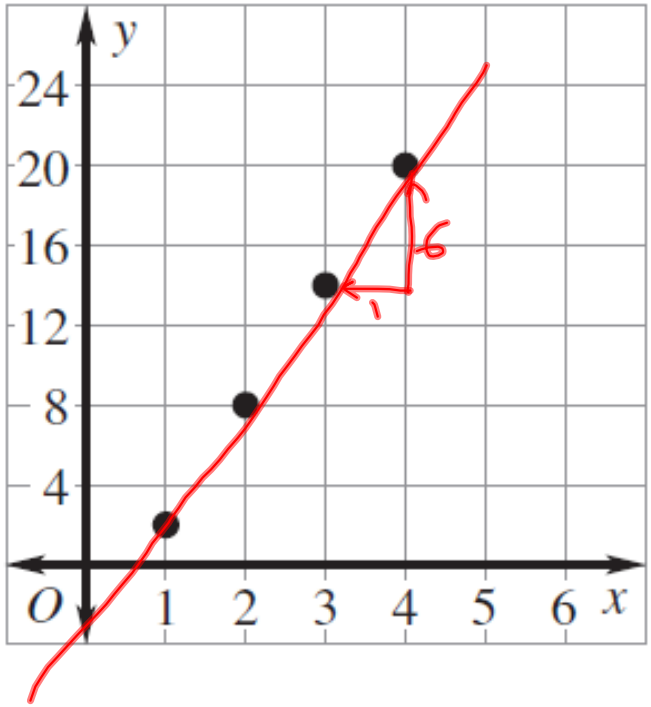
$\frac{5}{9}(F-32) = C$

true functions can be graphed on an x-y axis - any vertical line will only hit the graph once (at most)



x	0	1	2	3
y	2	5	8	11

$y = 6x - 4$



What's the rule?

$y = 6x$

x	y
1	2
2	8
3	14
4	20

Metal Screws The table shows the number of threads per inch on a screw as a function of screw size.

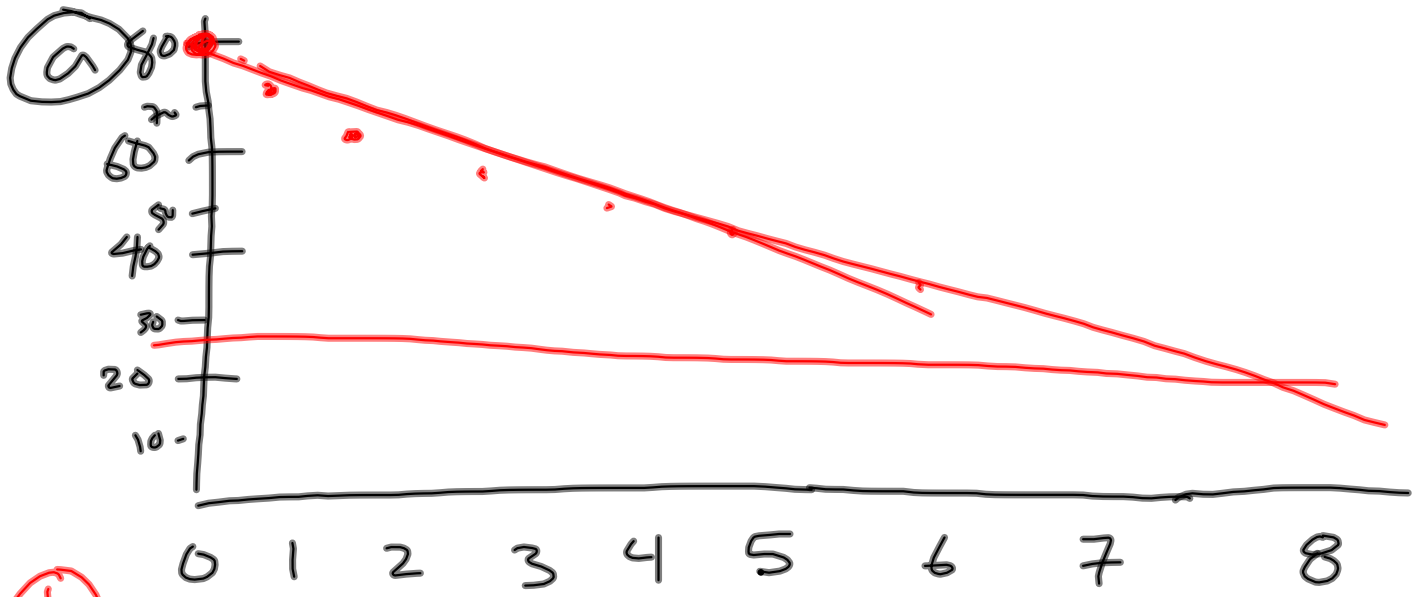
Screw size number, *x*	0	1	2	3	4	5	6
Number of threads per inch, *y*	80	72	64	56	48	44	40

a. Graph the function.

b. Describe how the number of threads per inch changes as the screw size increases.

c. Would it be reasonable to expect a #8 screw to have 32 threads per inch? *Explain.*

(a)



(b) As screw size goes up by 1, the thread count drops by 4 or 8

Homework:

p. 38 4-18 (even), 24

p. 46 2-8 (even), 16, 19