Chapter 10 is about Functions

10.1 We know about $\sqrt{\ }$, square root

$\sqrt{100} = 10$

$\sqrt{36} = 6$

$\sqrt{1.8} \approx 1.3416\ldots$

$\sqrt{\ }$ is a tool for turning numbers into other numbers

This is the core idea with what a function is.
(turns numbers into other numbers)
(it's a process...)

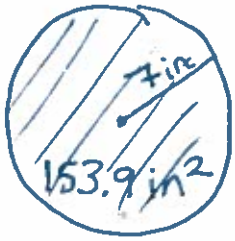
Ex Converting ~~Converting~~ a distance in kilometers (like 12km) to miles. (7.45645 miles)

There's a process: If you have x kilometers, multiply by 0.621371, and then you have the mile amt.

Like 100 km $\longrightarrow \approx 62$ miles

100×0.621371

Ex Take a circle's radius (like 7 inches), and find its area (like $153.938\ in^2$)



$7 \longmapsto 153.938\ldots$

$A = \pi \cdot r^2$

Take r, square it, then multiply by 3.1415926..., and you get the result.

3.1415926...

Notation Functions have names: (processes)

- like $\sqrt{\ }$, might have name "sqrt".
- like the circle area fuction, name: "area"
- in general, you'll see names like "f".

And then we write like sqrt(100) "square root of 100"

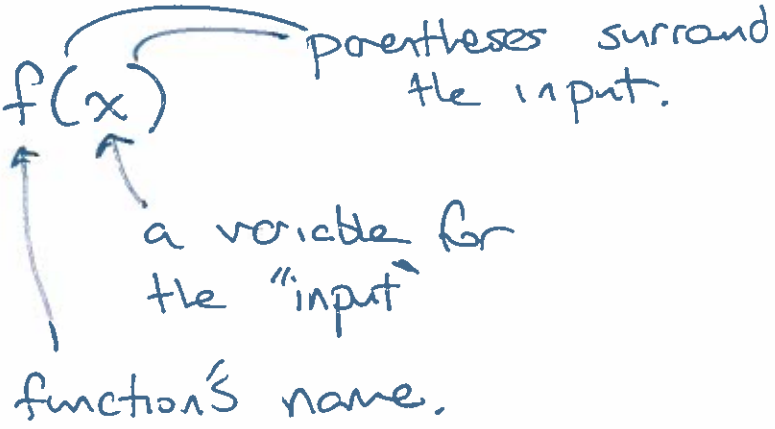
or ... area(7) "area of 7"

"area of 7" → from context, this is ... of a circle 7 inches

or like $f(8)$ "f of 8"

Don't say "f 8"

We also write like $f(x)$



Ex You see ... BudgetDeficit(2017) ...

To say "Budget deficit of 2017" would be the dollar amount more gov't spent than took in.

Ex You see.... Celsius(F)...

What's this about? There's a fucton named Celsius, that take a °F as input, and outputs corresponding °C.

Ex You see ... $g(q)$ ... say "g of q"

there's a number q, and function g is going to change it.

Functions have verbal descriptions
(like "area" finds a circle area from a radius)

Other ways to perceive/communicate a function:
Like a table.

Ex With the "area" function,

input r (inches)	output area(r) (square inches)
7	153.938...
8	202.496...
9	254.469...
10	314.159...

(Remember that $A = \pi \cdot r^2$)

Ex Define h by $h(x) = \frac{x}{10} + 3$.

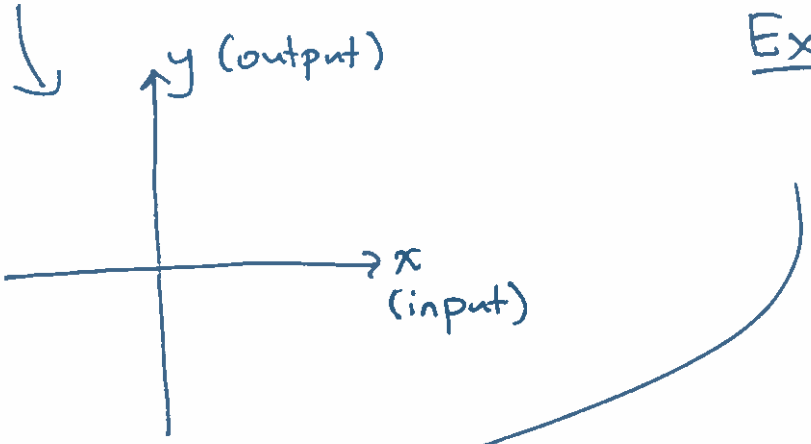
input x	output h(x)
-2	2.8
-1	2.9
0	3
1	3.1
2	3.2
3	3.3

+1 each time

+0.1 each time

we see important things...

Graphs help us too!

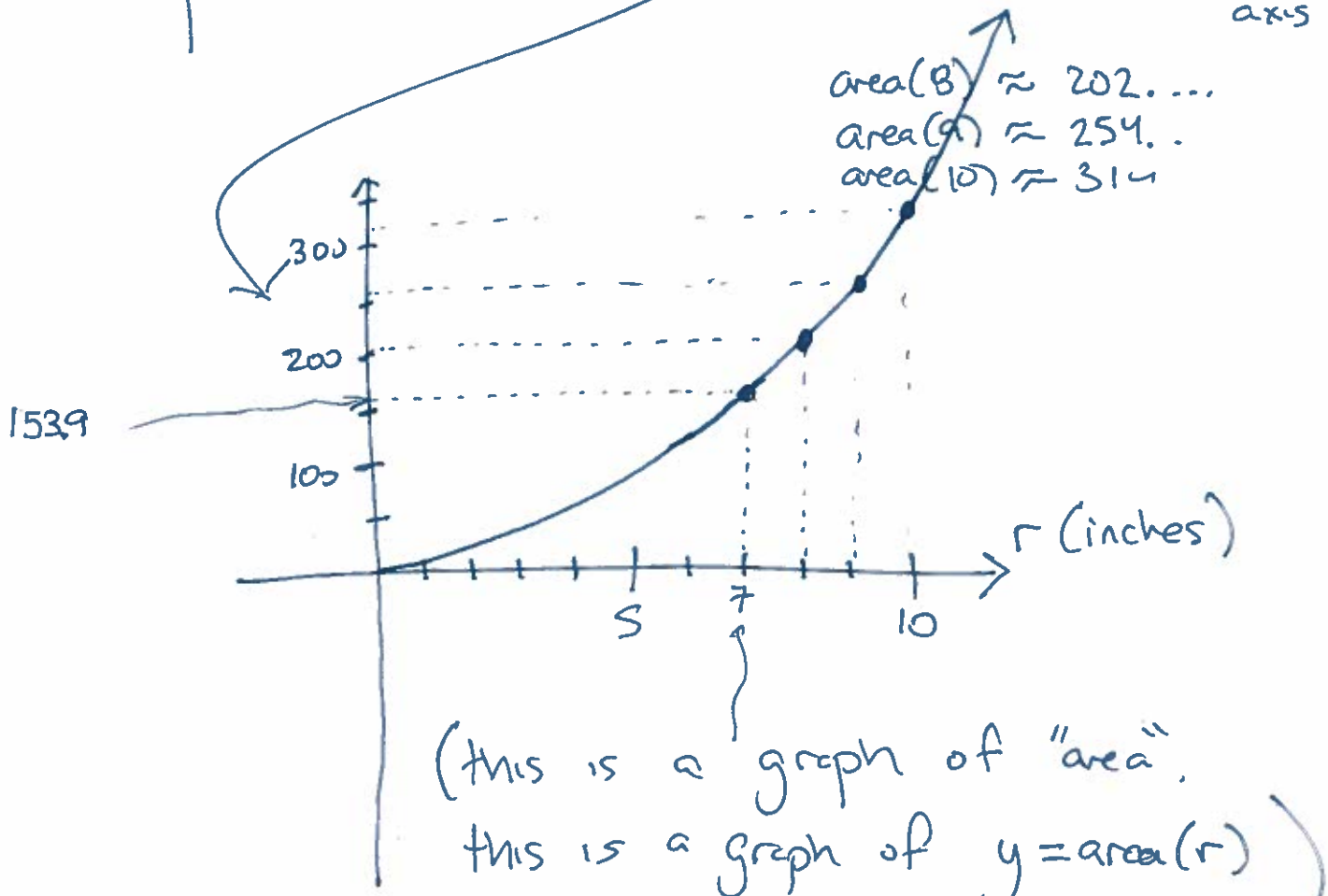


Ex with "area"

area(7) ≈ 153.9

lives on horizontal

lives on vertical axis



(this is a graph of "area".
this is a graph of $y = \text{area}(r)$)