Grade 9 Unit 4

Unit 4.2 - Linear Relations

- As we mentioned in class before:

For a relation to be linear → x changes in a constant pattern AND → y changes in a constant pattern

so

Both have to have a pattern

- If you don't have a "Table of values", make sure you make one

Example

- Is $y = 6x + 2$ a linear relation?

Make a table of values, assigning different values to x.

x	y
0	2
1	8
2	14
3	20

+6, +6

$y = 6(0) + 2 = 0 + 2 = 2$
$y = 6(1) + 2 = 6 + 2 = 8$
$y = 6(2) + 2 = 12 + 2 = 14$
$y = 6(3) + 2 = 18 + 2 = 20$

Substitute each value of x in the equation

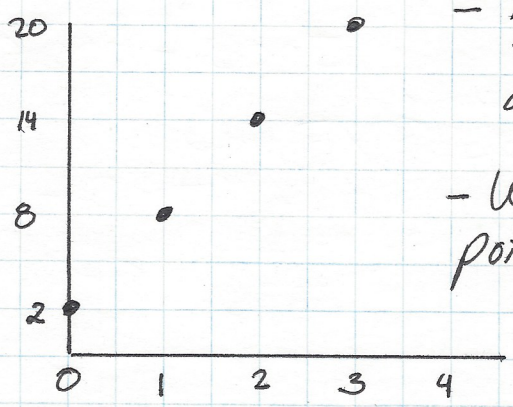
Take it further → What are the next y values?

Since y increases by 6, the next values are:

$20 + 6 = 26$ (when x is 4)
$26 + 6 = 32$ (when x is 5)

So, you can know the terms that follow if you know the pattern • When only given an equation, make a table of values

Let's graph it



- Notice that is a straight line with a positive slope

- We do not join the points because
  - we have little data
  - data is finite
  - data is discrete

Example (page 166)

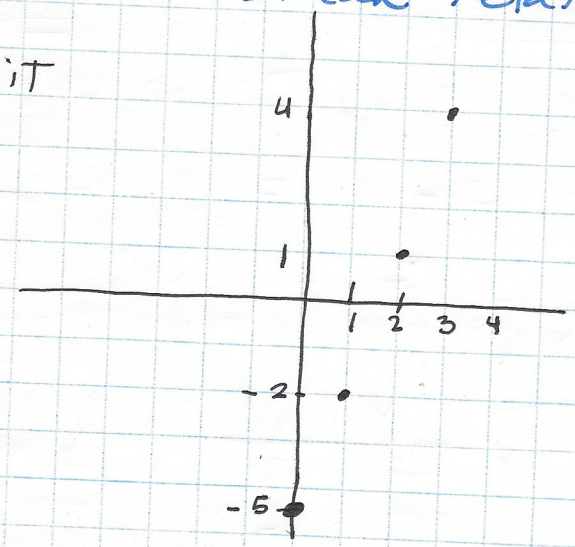
x	y
0	-5
1	-2
2	1
3	4
4	7

+1 (0 → 1), +1 (1 → 2); +3 (-5 → -2), +3 (-2 → 1)

- Notice that x increases by 1 (+1)
  y increases by 3 (+3)

Linear Relation

Let's graph it



- Do not join the dots
- It is a linear (line)

finite data!

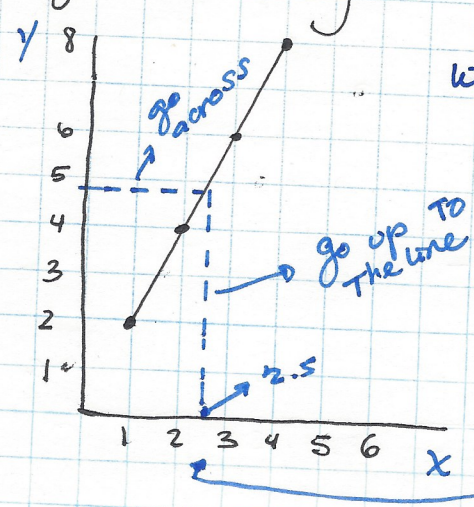
So

- An expression or an equation is linear when BOTH the x and the y values show a constant increase or decrease
  (both x and y can increase or decrease at different rates)

- You can use the table OR the graph to get any value of x or y

So

y is close to 5
$y \approx 4.8$



What is y = ? when x = 2.5?

- OR, we can use the equation

↳ $y = 6x + 3$

↳ what is the value of ~~x~~ when $x = 50$

Substitute x for 50

↳ $y = 6(50) + 3 = 303$

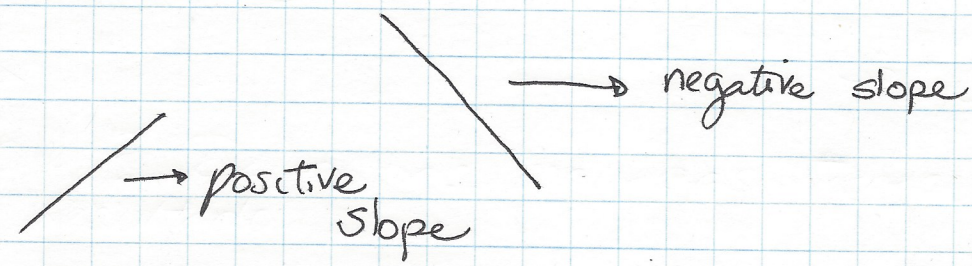
so $x = 50$ and $y = 303$

Remember

↳ $y = 3x - 4$ for $x = 1$

$y = 3(1) - 4 = -1$

- the line can be:



Next sub-unit, you'll see that lines can also be: