Teaching Algebra

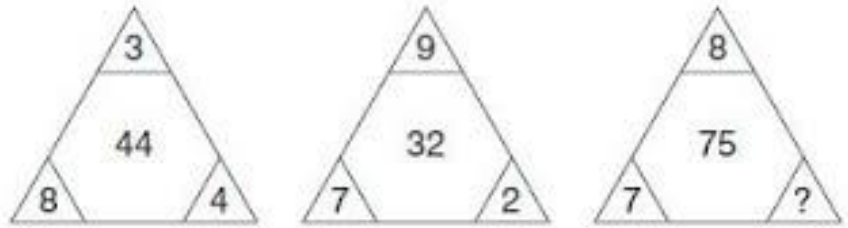
Grade 7, 8 and 9

What’s on the Agenda?

- Patterns
- Constants
- Variables
- Substitution
- Factorising
- Graphs

Patterns

- What are patterns?
  - Patterns are everywhere!



What number should replace the question mark?

  - A sequence of numbers, or objects that follow rules.

Patterns

- Press MODE
- And choose 0 for Normal.
- Lets start with basic addition:
  - Choose a number (e.g. 5)
  - Press + 3 = ENTER
  - Then press + 3 = ENTER
  - And keep pressing = ENTER for each new term.

Patterns again

- Press ON/C
- Type in 5 × 3 = ENTER
- × 3 = ENTER
- Keep pressing = ENTER

Constants

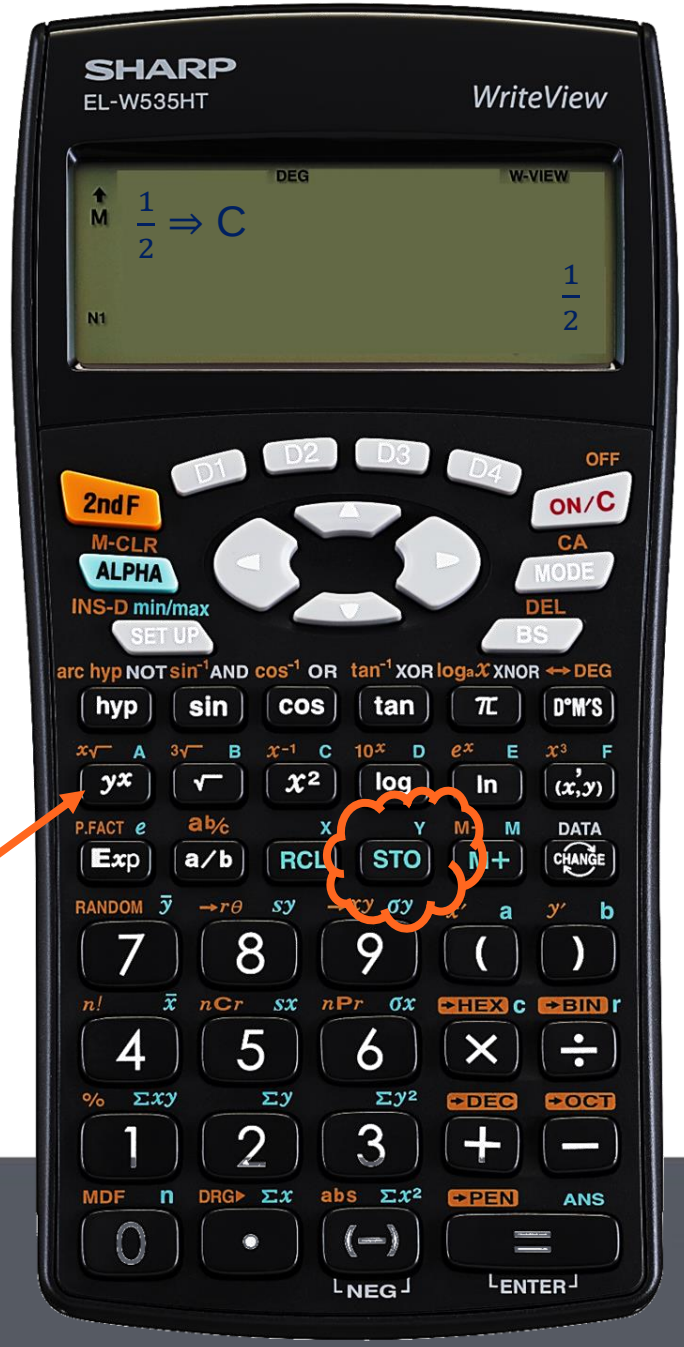
- A constant stays the same.
- We can demonstrate this in table mode (Press MODE 3).
- Type in a constant – e.g. 4
- Press = (ENTER) 3 times.
- No matter where on the table you go (use ▲ and ▼) you will always see 4 in the ANS column.

Variables

- A variable is something that changes according to what is put into it.
- Press ON/C twice.
- Press RCL twice.
- Press = 3 times.

Substitution

- Press MODE 0.
- Let's say that a = 2, b = -3 and c = ½ .
- To store these on the calculator:
  - Press 2 STO yx (A)
  - (−) 3 STO $\sqrt{\ }$ (B)
  - 1 a/b 2 STO x^2 (C)

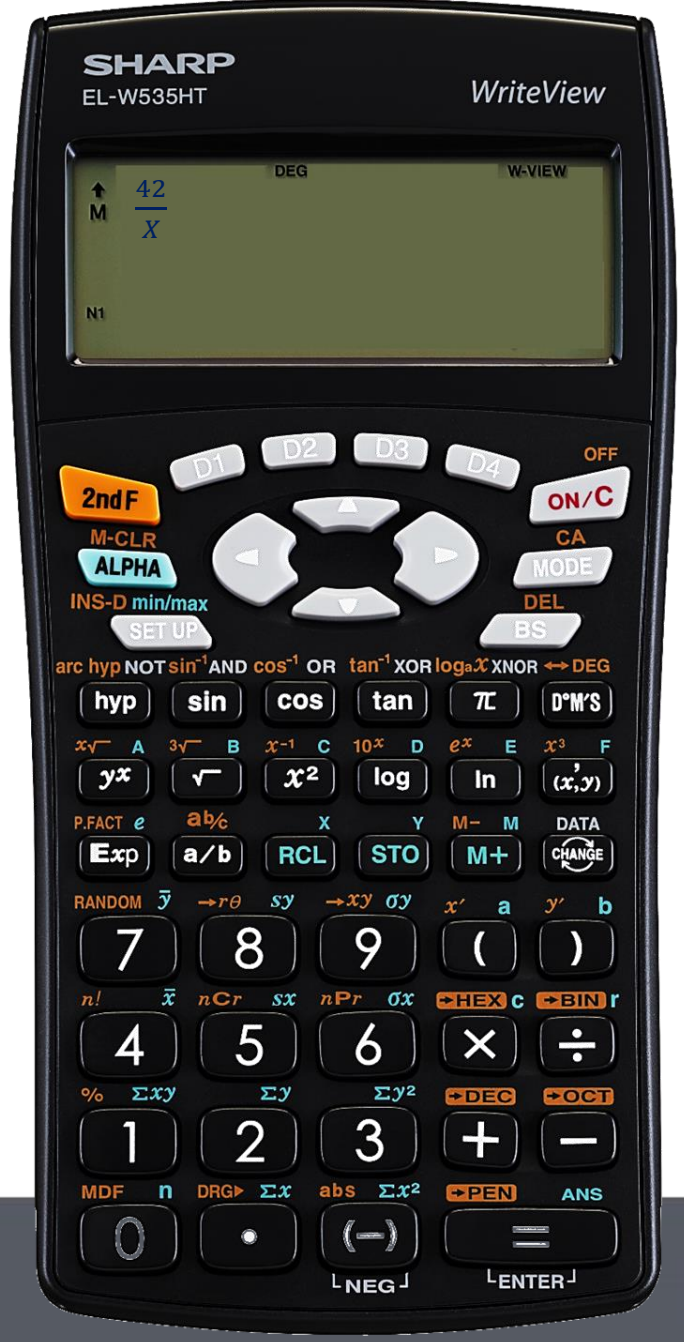


Substitution

- Now we can type in the expression for example: $3a^2 - 2b + 4c$
- Press 3 [ALPHA] [$x\sqrt{}$ A / yx] [x^2]
- [−] 2 [ALPHA] [$3\sqrt{}$ B / $\sqrt{}$]
- [+] 4 [ALPHA] [x^{-1} C / x^2] [=] [ENTER]

Factorising

- Press MODE 3
- Type in the number you would like to find all the factor pairs of – e.g. 42
- Press a/b
- RCL RCL
- = ENTER



Factorising

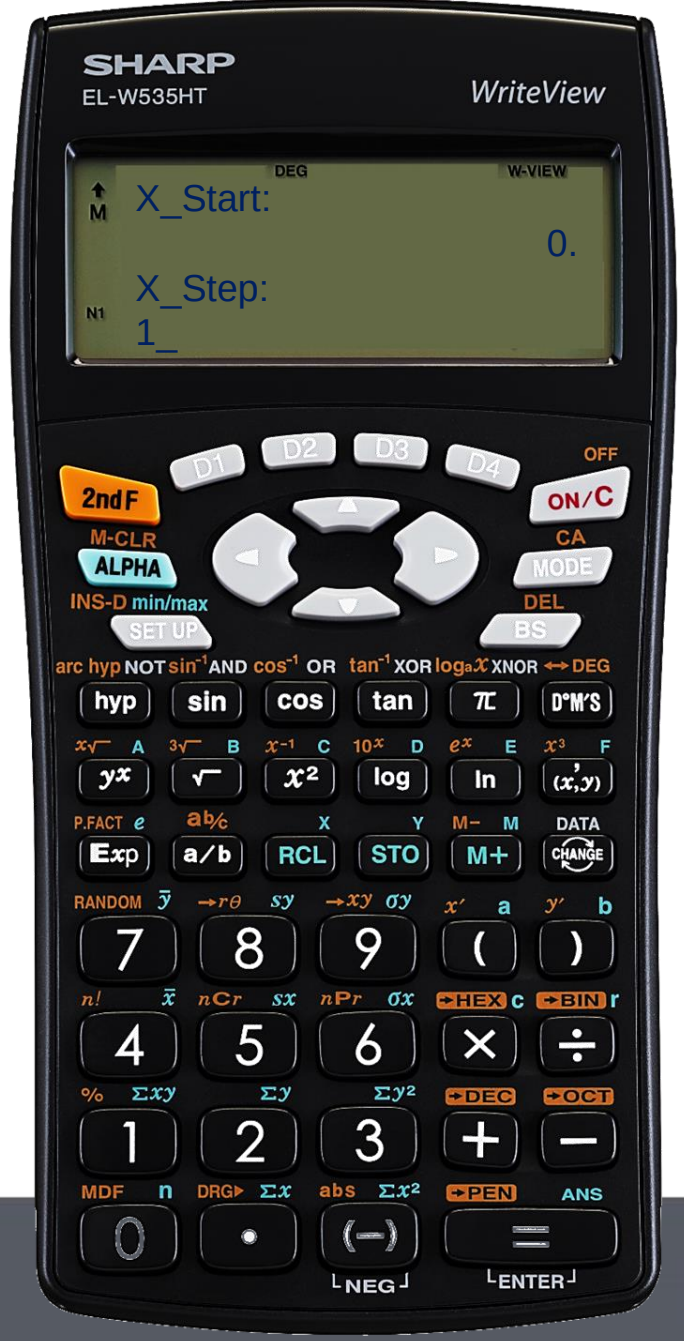
- Leave your start at 0 so press

  =

  ENTER
- Make your step 1 by typing in 1 and press

  =

  ENTER



Factorising

- You should now have a table with the first line as 0 and - - -
- Use your  and  arrow keys to scroll through the table.
- Anything in the ANS column with a decimal is NOT a factor because it has a remainder.
- Your factors are 1 and 42, 2 and 21, 3 and 14, 6 and 7.

Factorising

- E.g. $x^2 + 14x + 48$
- Press ON/C twice.
- Type in the c value (48)
- Press a/b RCL RCL
- Press = (ENTER) three times
- Because the sign at the back is a plus, we add the two columns together.

Factorising

- So – 1 and 48 don’t make 14
- 2 and 24
- 3 and 16
- 4 and 12
- 5 and 9,6 (not factors)
- 6 and 8

Factorising

- So now we put it into the brackets:
- (x)(x)
- (x + 6)(x + 8)

- Second example:
  - $x^2 - 9x - 36$

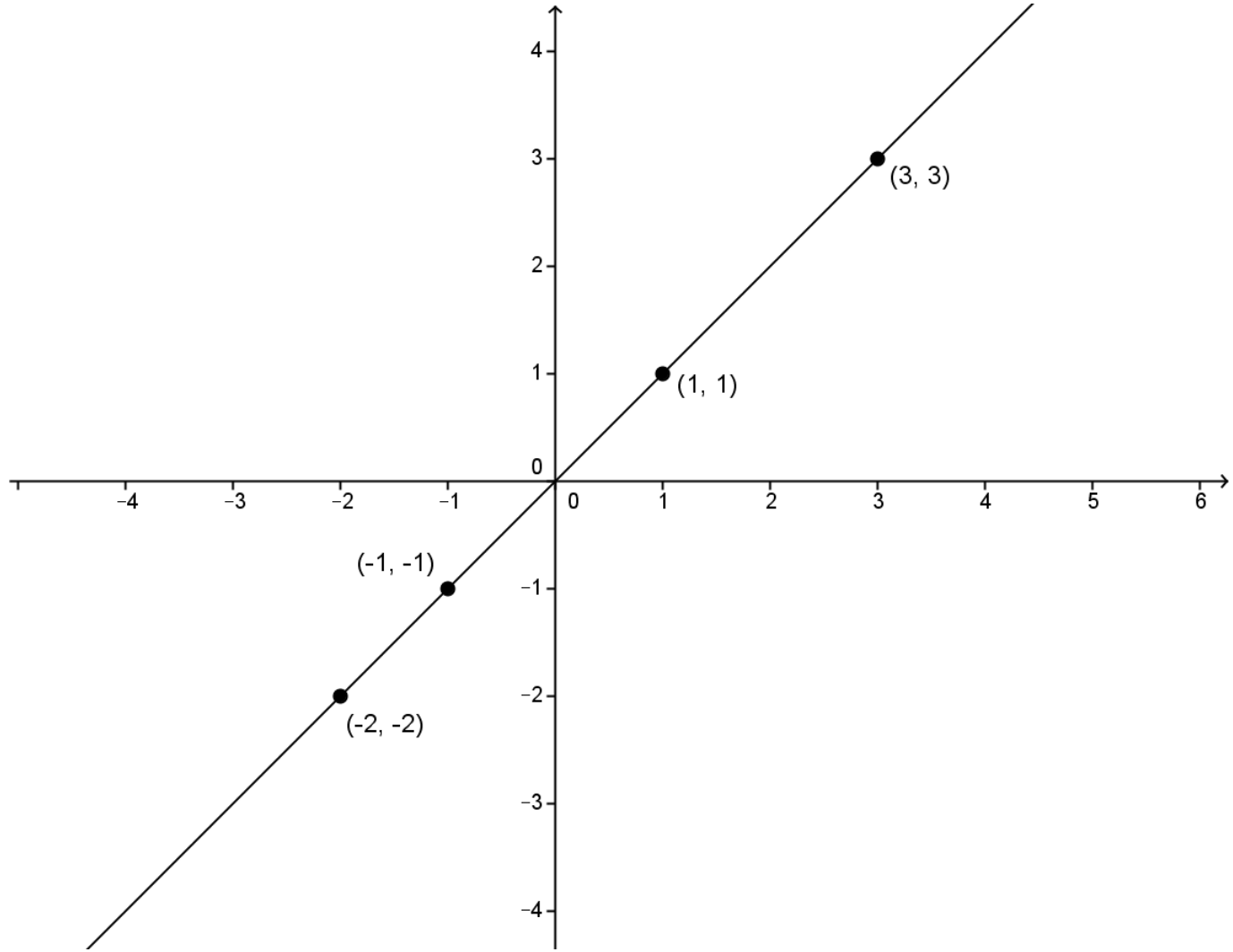
Factorising

- Because the sign at the back is a minus – we subtract the second column from the first column.
- So – + 1 – 36 doesn't give -9
- + 2 – 18 etc

- (x)(x)
- (x + 3)(x – 12)

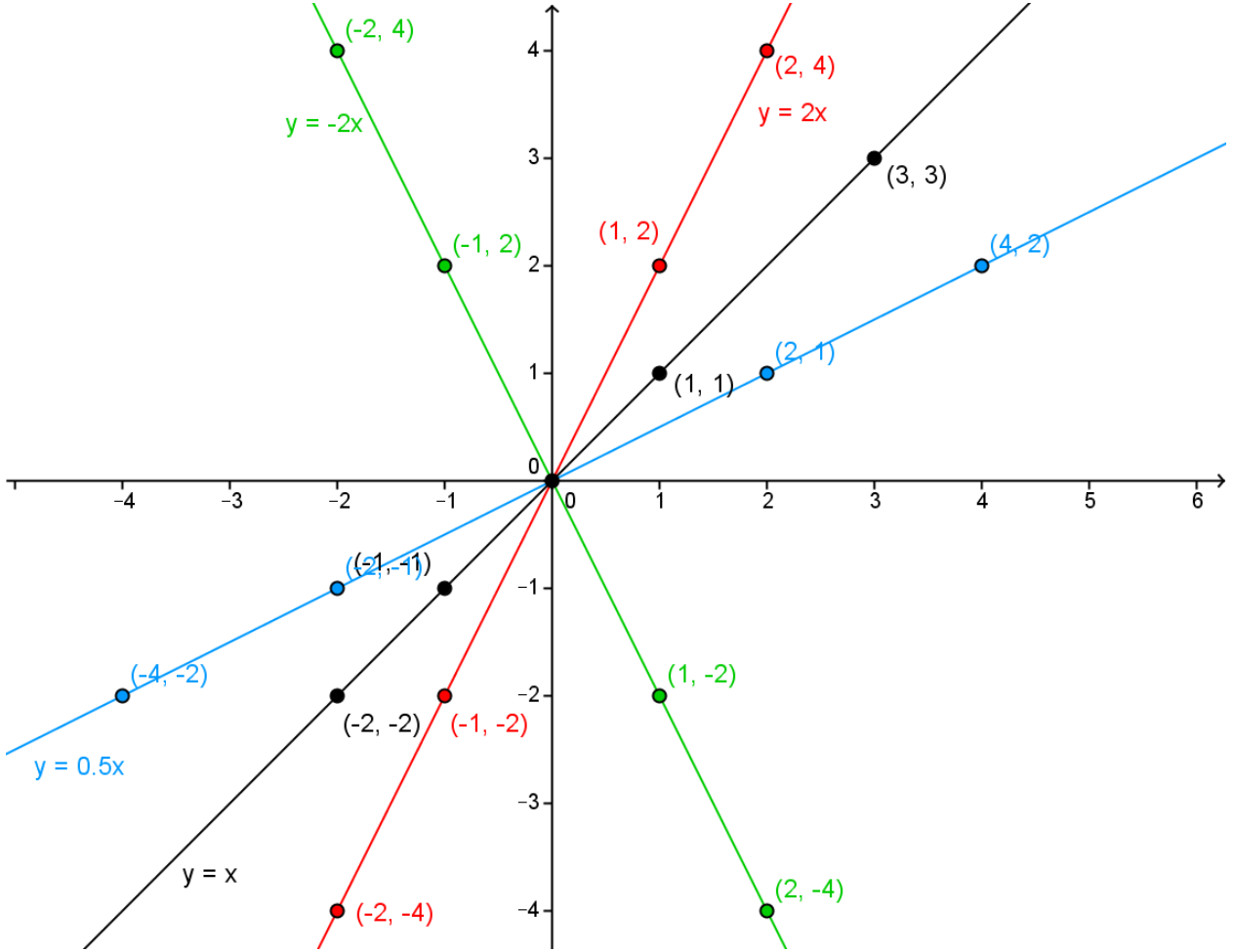
Graphs

- Press ON/C twice
- Remember when we did the variable exercise? This is also a one to one graph.
- We can plot these points on a graph.
- Press RCL twice and = three times.



Graphs

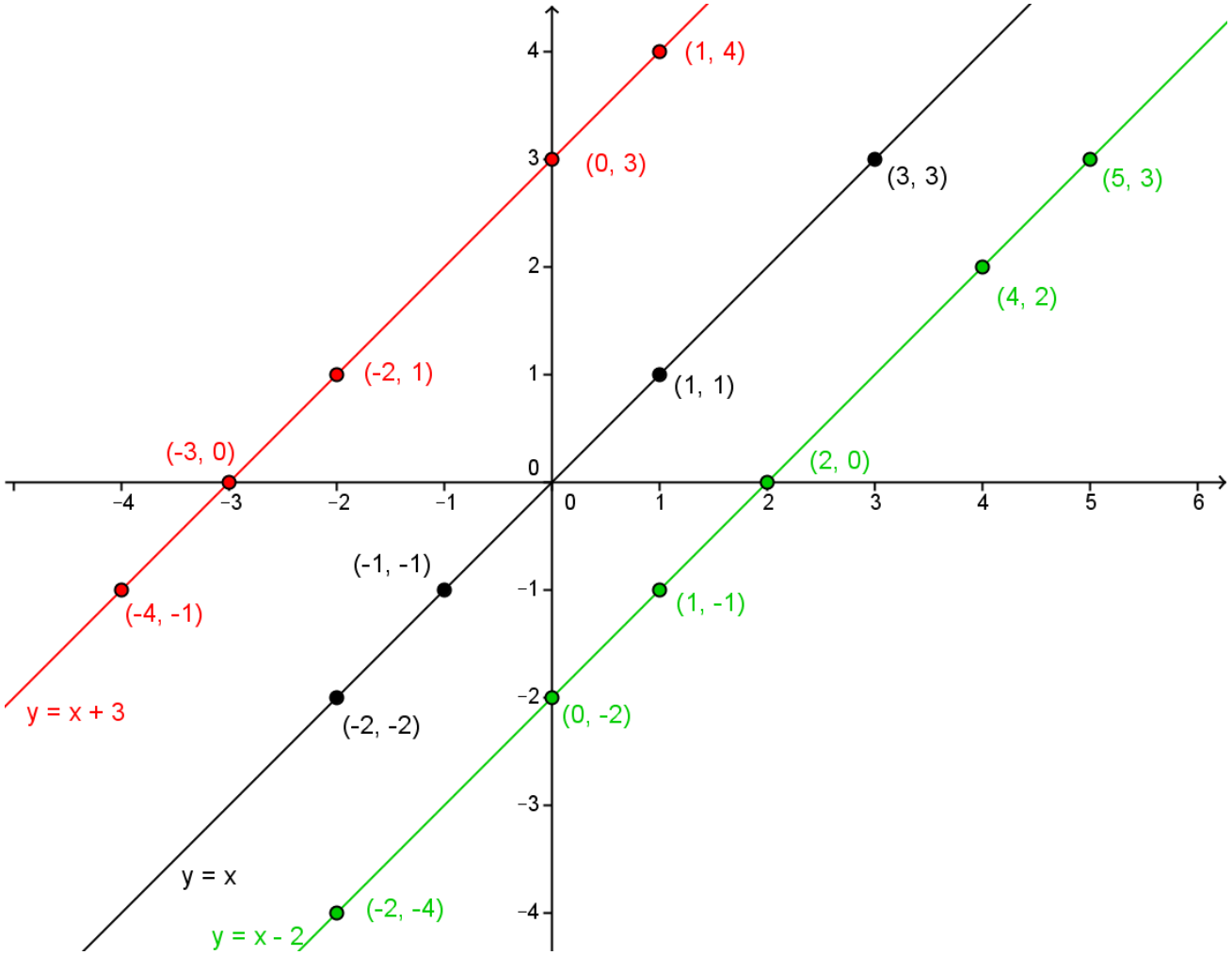
- We can change the gradient.
- Press ON/C once
- Press ◄ so that the cursor is before X, and type in 2
- Press = ENTER = ENTER = ENTER
- Now what happens to all the numbers in the ANS column?
- What happens if we change 2 to -2 or to $\frac{1}{2}$?



- We can draw each of these graphs in another colour to show the changes.
- So, what happens when we change the gradient?

Graphs

- We can also play with the y intercept.
- Press ON/C twice
- Now add 3 so press
  RCL$_{X}$ RCL$_{X}$ + 3
- Then = ENTER = ENTER = ENTER
- What happens to the values in the ANS column? What happens if we subtract 2 instead?



- We can now draw these graphs along with our original graph as well.
- What happens when we change the y-intercept?

Don’t forget the competition ☺

- Drill mode (Press MODE 2 0)
- Choose 25 questions (press )
- Choose + - x ÷ (press )
- Fastest time this week wins a microwave ☺

Thank you ☺

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