

Completing the Square with Algebra (recap)

Sunday, 25 February 2018 6:12 pm

★ RECAP

During the last lesson we were looking at how to complete the square to write something in turning point form.

- Re-writing a quadratic in turning point form can be hugely beneficial to us as it allows us to see:
 - Turning point (i.e. where a maximum or minimum is)
 - Axis of symmetry

It can also be used to find the x-axis and y-axis intercepts.

We spent the last lesson looking at how to write things in turning point form.

But it might have confused people :(

$$y = a(x+b)^2 + c$$

T.P. Axis of symmetry
301ve

In the words from The Sound of Music:

LET'S START AT THE
VERY BEGINNING

A VERY GOOD
PLACE TO START



A basic example to highlight the process

E.g. $y = x^2 + 6x - 5$

$$y = (x+3)^2 - 9 - 5$$

$$y = (x+3)^2 - 14$$

$$x^2 + 6x + 9 - 14$$

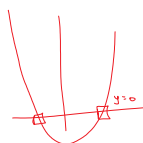
$$x^2 + 6x - 5$$

$$y = x^2 + 6x - 5$$

$$y = (x+3)^2$$

$$= (x+3)(x+3)$$

$$= x^2 + 6x + 9$$



$$y = (x+3)^2 - 14$$

$$(x+3)^2 - 14 = 0$$

$$(x+3)^2 = 14$$

$$x+3 = \pm \sqrt{14}$$

$$x = -3 \pm \sqrt{14}$$

LOWER

EXACT

Going from the sublime to the ridiculous

Just when you thought it was safe to get back in the water ... we throw algebra into this!

Half

Example: Solve the following for x by first completing the square $x^2 - 3x + 1 = 0$



$$x^2 - 3x + 1 = 0$$

$$(x - \frac{3}{2})^2 - \frac{9x^2}{4} + 1 = 0$$

$$(x - \frac{3}{2})^2 + \frac{4 - 9x^2}{4} = 0$$

$$(x - \frac{3}{2})^2 = \frac{9x^2 - 4}{4}$$

$$(x - \frac{3}{2})^2 = \frac{9x^2 - 4}{4}$$

$$x - \frac{3}{2} = \pm \sqrt{\frac{9x^2 - 4}{4}}$$

$$x = \frac{3}{2} \pm \sqrt{\frac{9x^2 - 4}{4}}$$

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$$x = \frac{3}{2} \pm \sqrt{\frac{9x^2 - 4}{4}}$$

$$(x - \frac{3}{2})^2$$

$$(x - \frac{3}{2})(x - \frac{3}{2})$$

$$x^2 - 3x + \frac{9x^2}{4}$$

$$x^2 - 3x + \frac{9x^2}{4}$$

$$-9x^2 + 1 = -\frac{9x^2}{4} + \frac{4}{4}$$

$$= -\frac{9x^2}{4} + \frac{4}{4}$$

$$= \frac{4 - 9x^2}{4}$$

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

$$3[x^2 - 2x - \frac{4}{3}]$$

$$3[(x-1)^2 - \frac{7}{3}]$$

$$3(x-1)^2 - 7$$

$$x^2 - 2x - \frac{4}{3}$$

$$(x-1)^2 - 1 - \frac{4}{3}$$

$$(x-1)^2 - \frac{7}{3}$$

$$-\frac{7}{3}$$

$$x^2 + 2x + 1 = 0$$

$$(x+1)^2 - 1 + 1 = 0$$

$$(x+1)^2 = 1 - K$$

$$x+1 = \pm \sqrt{1-K}$$

$$x = -1 \pm \sqrt{1-K}$$

$$(x+1)(x+1)$$

$$= x^2 + x + x + 1$$

$$= x^2 + 2x + 1$$

The actual completing the square was the easy bit.
The complex part came from using fractions and algebra.

Methods 1 and 2 uses fractions and algebra in EVERY TOPIC.

So ... you have two choices ...



This is hard. You'll make mistakes.
You'll make lots of mistakes. BUT YOU WILL LEARN!
Fractions will become second nature.
You will pass this course and find Methods 3 and 4 much, much easier

You hide your head in the sand and you will basically fail this course. It's time to face the fear :)

LIFE
ISN'T ABOUT WAITING
FOR THE STORM TO PASS...
IT'S LEARNING TO
Dance
in the rain!