Determining the rule for a parabola (4B)

Friday, 23 February 2018 12:59 PM

Work to be completed at the end of teaching:

Quadratic rules (important and vital)	4B	1-9(s)

Recap

We have been looking at how quadratics can be solved and how writing them in various forms can aid in sketching them.
A lot of work in Mathematics seems to be taught unidirectionally, i.e. we teach it one way and then we hope you'll be able to apply the learning and do it in reverse.

TP axis symmetry
x-axis
y-axis

The different ways of writing quadratics

The standard form of a quadratic: $y = ax^2 + bx + c$

3 points needed to find a, b and c. 3 equations / 3 points on graph

Sim Eqns

Turning point form: $y = a(x \pm b)^2 \pm k$

Turning point and one co-ordinate needed.

$y = 2(x-3)^2 + 4$

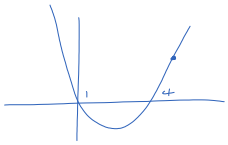
Crossing point form: $y = a(x-b)(x-c)$

This is best used when they give you two "solutions" where they cross the x-axis.

intercept

Dilation

roots



$y = a(x-1)(x-4)$

We can use the above equations and apply them in information given in a questions to find the "equation of the quadratic".

Examples:

E.g. 1: Determine the rule for a parabola which passes through the points (-2, 5) and (0, -3) and (2, 13)

$y = ax^2 + bx + c$ (x, y)

(-2, 5) $5 = a(-2)^2 + b(-2) + c$

$5 = 4a - 2b + c$ (1)

(0, -3) $-3 = a(0)^2 + b(0) + c$

$c = -3$ (2)

(2, 13) $13 = a(2)^2 + b(2) + c$

$13 = 4a + 2b + c$

$4a - 2b + c = 5$

$c = -3$

$4a + 2b + c = 13$ a, b, c

CAS

$a = 3$

$b = 2$

$c = -3$

$y = 3x^2 + 2x - 3$

E.g. 2: Determine the rule for a parabola if you are told the turning point is (-3, 4) and it passes through the point (-1, 12)

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

$y = a(x+3)^2 + 4$

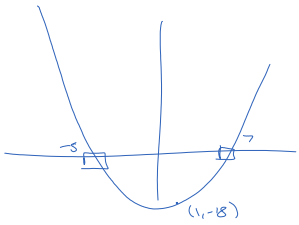
(-1, 12) $12 = a(-1+3)^2 + 4$

$8 = a4$

$a = 2$

$y = 2(x+3)^2 + 4$

E.g. 3: Find the rule for a parabola if you are told that it has two x-axis intercepts at (-5, 0) and (7, 0) and passes through the point (1, -18)



$y = a(x-b)(x-c)$

$y = a(x+5)(x-7)$

(1, -18) $-18 = a(1+5)(1-7)$

$-18 = a(6)(-6)$

$-18 = -36a$

$a = \frac{1}{2}$

$y = \frac{1}{2}(x+5)(x-7)$