MPM 2DI 6.4 The Quadratic Formula (Day2) Date: May 16, 2016

Ex.1: Find the equation of the axis of symmetry and the vertex. Sketch the parabola, and find the x-intercepts.

$y = 3x^2 + 42x + 144$

$= 3(x^2 + 14x + 48)$

$0 = 3(x+6)(x+8)$

$x = -6$ or $x = -8$

AOS: $x = \frac{-6+(-8)}{2}$

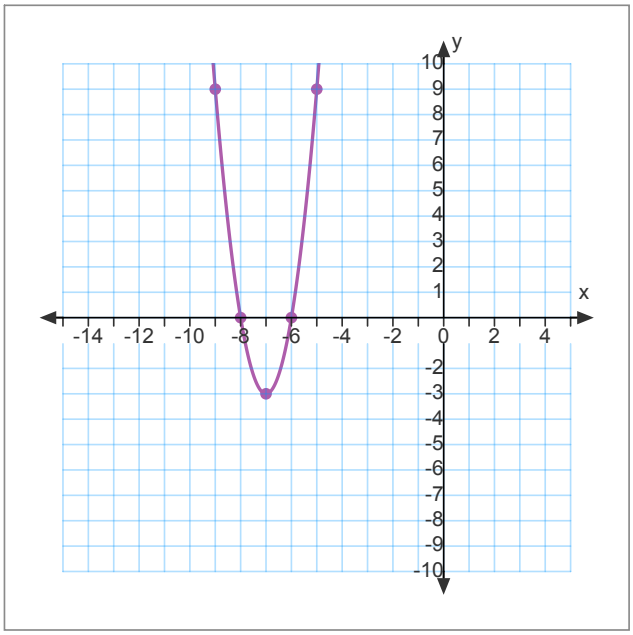
$= \frac{-14}{2}$

$x = -7$

$y = 3(-7+6)(-7+8)$ $\therefore V(-7,-3)$

$= 3(-1)(1)$

$= -3$



$y = 3(x+7)^2 - 3$

Note: Complete the square to get vertex form.

$y = 3x^2 + 42x + 144$

$= 3(x^2 + 14x) + 144$

$= 3(x^2 + 14x + 49 - 49) + 144$

$= 3(x+7)^2 - 147 + 144$

$= 3(x+7)^2 - 3$

$\therefore V(-7,-3)$

The axis of symmetry for **any** quadratic relation

$$y = ax^2 + bx + c$$

can be found using the formula:

$$x = \frac{-b}{2a}$$

This is also the *x*-coordinate of the vertex.

Let's verify the formula using $y = 3x^2 + 42x + 144$

$a = 3$ $b = 42$ $c = 144$

$$x = \frac{-b}{2a}$$

$$= \frac{-(42)}{2(3)}$$

$$= \frac{-42}{6}$$

$$x = -7$$

Same AOS as above.

Ex.2: Find the equation of the axis of symmetry and the vertex. Sketch the parabola, and find the x-intercepts.

$y = 2x^2 + 12x + 8$

$a=2 \quad b=12 \quad c=8$

$x = \frac{-b}{2a}$

$= \frac{-(12)}{2(2)}$

$= \frac{-12}{4}$

$x = -3$

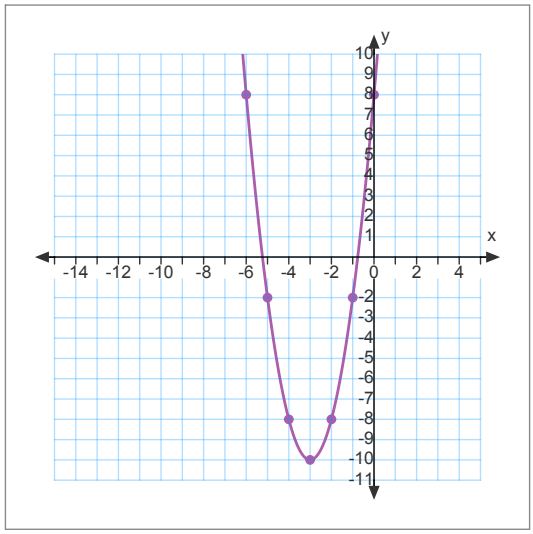
$y = 2(-3)^2 + 12(-3) + 8$

$= 2(9) - 36 + 8$

$= 18 - 36 + 8$

$= -10$

$\therefore V(-3, -10)$



$y = 2(x+3)^2 - 10$

find the x-intercepts: let y = 0

$y = 2x^2 + 12x + 8$

$0 = 2(x^2 + 6x + 4)$

$a=1 \quad b=6 \quad c=4$

$x = \frac{-(6) \pm \sqrt{(6)^2 - 4(1)(4)}}{2(1)}$

$= \frac{-6 \pm \sqrt{36 - 16}}{2}$

$= \frac{-6 \pm \sqrt{20}}{2}$

$x = \frac{-6 + \sqrt{20}}{2}$ or $x = \frac{-6 - \sqrt{20}}{2}$

$\doteq -0.764$ $\doteq -5.236$

Note: Complete the square to get vertex form.

$y = 2x^2 + 12x + 8$

$= 2(x^2 + 6x) + 8$

$= 2(x^2 + 6x + 9 - 9) + 8$

$= 2(x+3)^2 - 18 + 8$

$= 2(x+3)^2 - 10$

$\therefore V(-3, -10)$

Today's entertainment: pp. 300-301 #3bce, 4c, 6, 9bd
p. 300 (top) #C2
Enrichment: p. 302 #14

Attachments

PopGoestheWeasel.mid