Axis of Symmetry & Zeros

$\boxed{\text{Online Applet}}$ Math Warehouse $\longrightarrow$ Online Parabola Grapher

www.mathwarehouse.com/quadratic/parabola/interactive-parabola.php

Ex 1 $y = x^2 - x - 2$

Opens Up or Down? $\boxed{\text{Up}}$

Zeros - places where function line crosses the x-axis.
(In our example $x = -1, 2$)

When you plug zeros into equation, should get $y = 0$.

$$y = (-1)^2 - (-1) - 2 = 1 + 1 - 2 = 0 \checkmark$$

$$y = (2)^2 - (2) - 2 = 4 - 2 - 2 = 0 \checkmark$$

Axis of Symmetry - line that divides the parabola into 2 equal parts (symmetrical)

- Axis of symmetry will be halfway between the two zeros

In our example: $\dfrac{-1+2}{2} = 1/2$ $\boxed{x = 1/2}$

Ex 2 $y = -2x^2 + 4x - 2$

Opens Up or Down? $\boxed{\text{Down}}$

Zeros: $x = 1$

Check: $y = -2(1)^2 + 4(1) - 2 = -2 + 4 - 2 = 0 \checkmark$

Axis of Symmetry: When there is only 1 zero, the axis of symmetry will be the same line as the zero.

Therefore Axis of Symmetry is $\boxed{x = 1}$

Ex 3 $y = x^2 - 6x + 10$

Opens Up or Down? $\boxed{\text{Up}}$

Zeros? Since the function line does not cross the x-axis there are no zeros.

So how do we find the axis of symmetry if there are no zeros?

We use this formula $\longrightarrow$ $x = -b/2a$

b and a come from our equation $y = ax^2 + bx + c$

Our example $y = x^2 - 6x + 10$

Therefore $a = 1$ $b = -6$ $\longrightarrow$ $x = \frac{-(-6)}{2(1)}$

$x = 6/2 = 3$

Axis of Symmetry: $\boxed{x = 3}$

Assignment: pg 603 # 3-12, 19-28