Mathematics 11

3.6 – Zeros of a Quadratic Function

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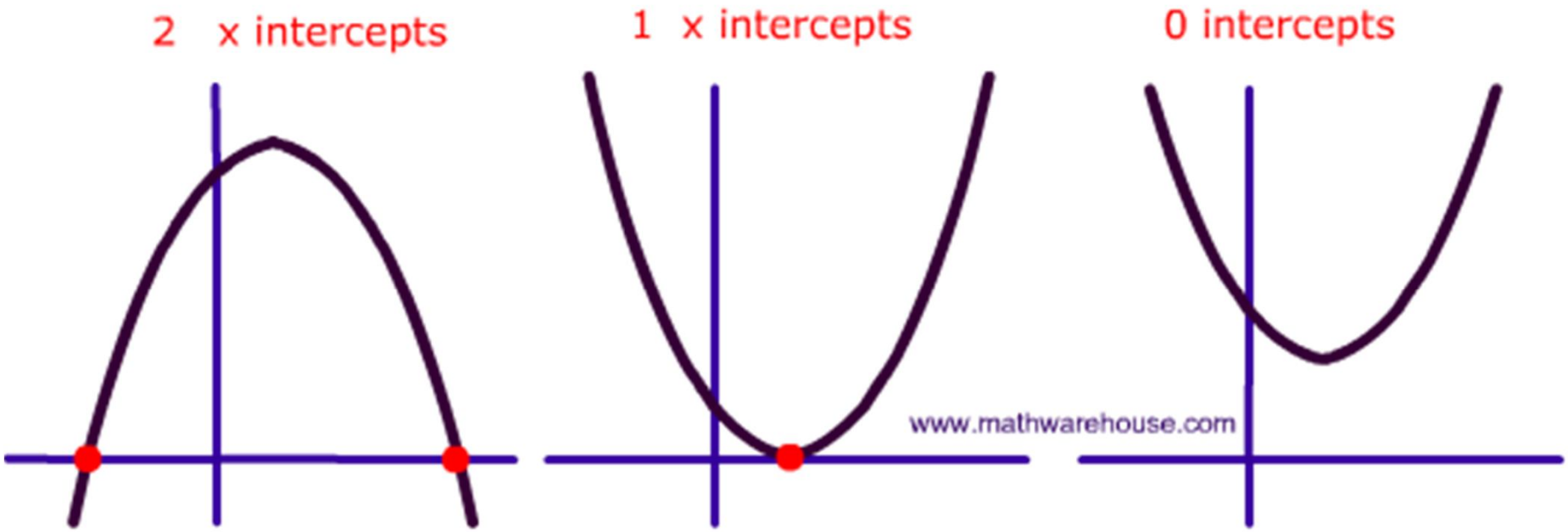
When working with quadratics, you are usually asked to solve for the zeros. Sometimes, we just want to know IF there are zeros.

When we solve quadratics, there are either 2 solutions/zeros, 1 solution (which means the vertex the solution/zeros), or no solutions/zeros.

Let's look at two ways to find the number of solutions/zeros.

1. Look at the graph:



2. Use the discriminant:

The square root part in the quadratic formula is known as the discriminant. By working a small calculation, you can determine the number of zeros/solutions.

If: $b^2 - 4ac > 0$, then there are 2 zeros

$b^2 - 4ac = 0$, then there is 1 zero

$b^2 - 4ac < 0$, then there are no solutions.

Examples of using the discriminant:

1. $4x^2 - 6x + 3 = 0$

$b^2 - 4ac \Rightarrow (-6)^2 - 4(4)(3)$

$= 36 - 48$

$= -12 < 0$ ∴ no solutions

2. $f(x) = 3x^2 + 3x - 8$

$b^2 - 4ac \Rightarrow 3^2 - 4(3)(-8)$

$= 9 + 96$

$= 105 > 0$ ∴ two x-ints or zeros.

3. $-0.5x^2 + 8x - 32 = 0$

(a, b, c)

$b^2 - 4ac \Rightarrow 8^2 - 4(-0.5)(-32)$

$= 64 - 64$

$= 0 = 0$ ∴ only one solution.

4. $2x^2 + 3x - 5 = 7x - 2$

$-7x \quad +2 \qquad -7x \quad +2$

$2x^2 - 4x - 3 = 0$ (a, b, c)

$b^2 - 4ac \Rightarrow (-4)^2 - 4(2)(-3)$

$= 16 + 24$

$= 40$ ∴ there are two solutions