What's Going On?

Checking In	TIPS Assignment
Minds on	Zeros and Roots and x-Intercepts
Action!	Expanding and Completing the Square
Consolidation	Special Cases

Learning Goal - I will understand what it means to "solve" a quadratic equation.

Checking In

TIPS Assignment

Minds on

Zeros and Roots and x-Intercepts

The **solutions** of a quadratic equation $ax^2 + bx + c = 0$ are known as the **zeros** of the quadratic function $y = ax^2 + bx + c$.

The real zeros are the **x-intercepts** of the parabola $y = ax^2 + bx + c$. (the y-value is zero for all points on the x-axis)

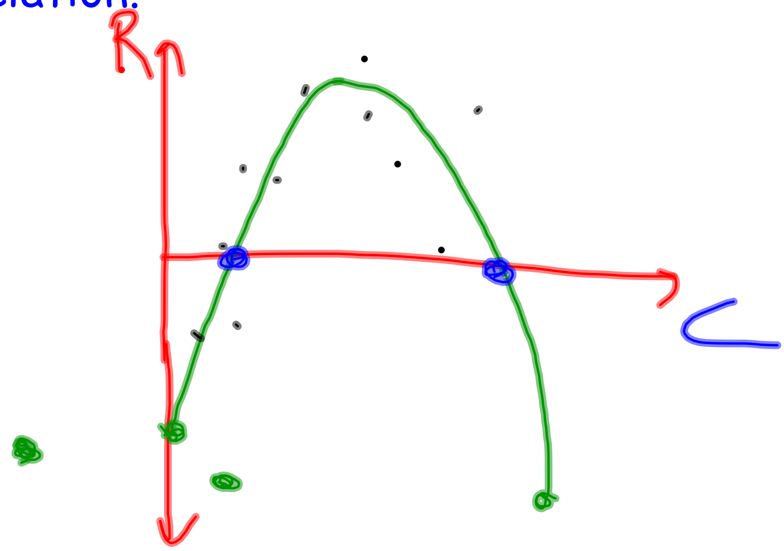
The x-intercepts are called the real solutions, or **real roots** of the quadratic equation.

Minds on

Zeros and Roots and x-Intercepts

This unit will deal with **roots** / **x-intercepts** / **zeros** quite a bit!

That's because the **roots** / **x-intercepts** / **zeros** often tell us a lot about a quadratic equation or relation.



Action!

Expanding and Completing the Square

1. Expand this vertex form equation into standard form.

$$y = -0.5(x - 6)^2 - 11$$

$$y = -0.5(x-6)(x-6) - 11$$

$$y = -0.5(x-6)(x-6) - 11$$

$$y = -0.5(x^2 - 6x - 6x + 36) - 11$$

$$y = -0.5(x^2 - 6x - 6x + 36) - 11$$

$$y = -0.5x^2 + 3x + 3x - 18 - 11$$

$$\boxed{y = -0.5x^2 + 6x - 29}$$

Action!

Expanding and Completing the Square

2. Complete the square to get this standard form equation into vertex form.

$$y = -2x^2 - 20x + 3$$

$$y = -2[x^2 + 10x] + 3$$

$$y = -2[x^2 + 10x + 25 - 25] + 3$$

$$y = -2[(x^2 + 10x + 25) - 25] + 3$$

$$y = -2[(x+5)^2 - 25] + 3$$

$$y = -2(x+5)^2 + 50 + 3$$

$$\boxed{y = -2(x+5)^2 + 53}$$

Action!

Expanding and Completing the Square

1. With a partner, either **expand** your vertex form equation into standard form or **complete the square** to get your standard form equation into vertex form.

2. Find your matching pair.

3. Make a poster!

Consolidation

Special Cases

Two Equal Roots

"Solve" $x^2 - 6x = -9$ by graphing

First, notice that we don't have a 'y = ' in this situation.

That's okay! Just imagine that y has been set to 0... (remember we are looking for the zeros / x-intercepts / roots)

In order to "solve" this, we need to rewrite the equation in a form we are familiar with...

$$ax^2 + bx + c = 0$$

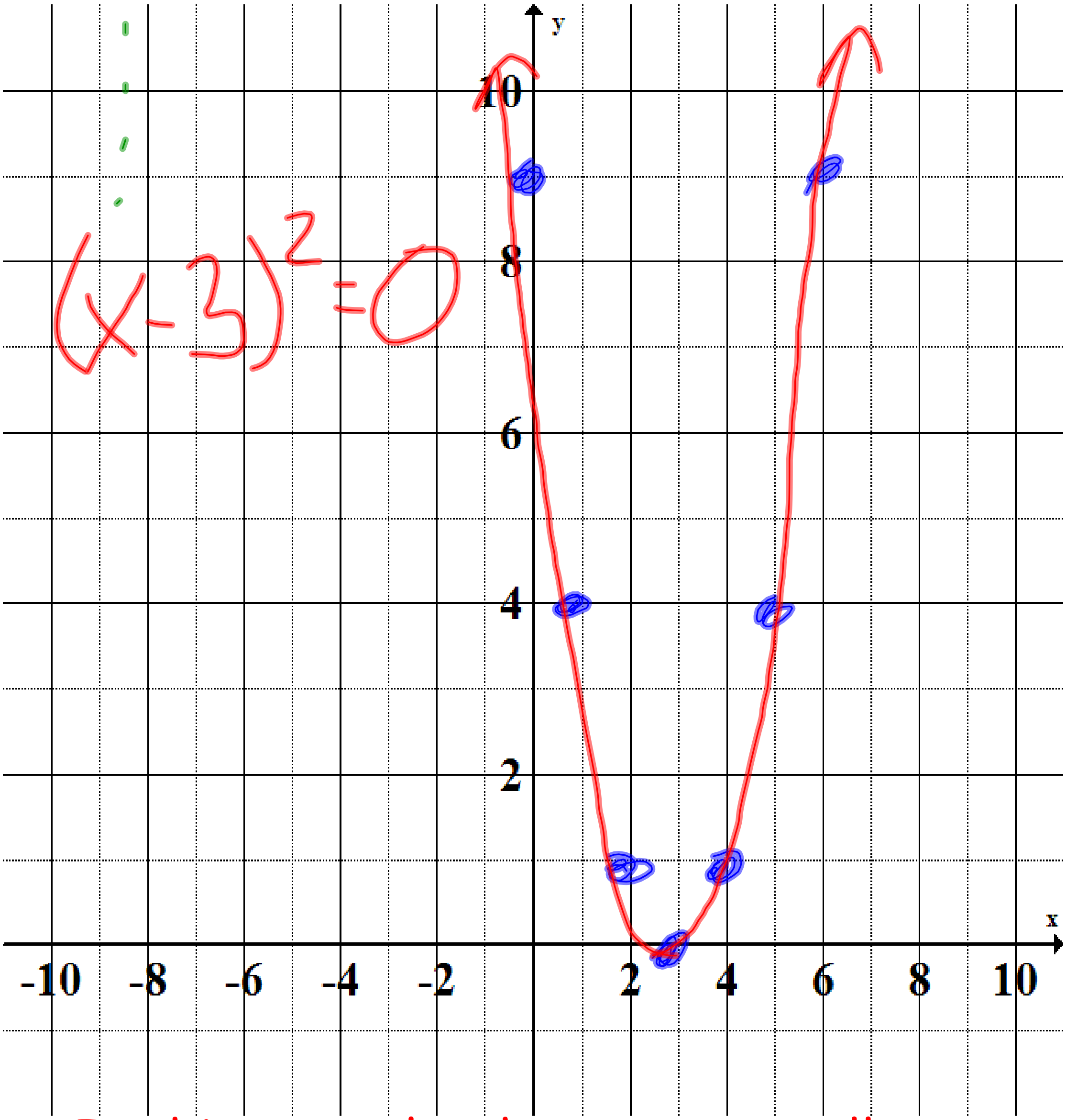
$$x^2 - 6x + 9 = 0$$

It's probably easier to imagine y as 0 now!

From here, we just complete the square or use a table of values to graph.

$x^2-6x+9=0$

$(x-3)^2=0$



In this example, there are actually two roots! Each root equals 3. This equation is said to have a **double root**.

When do we have quadratic equations with double roots?

Consolidation

Special Cases

No Real Roots

"Solve" $0.5x^2 - 2x + 3 = 0$ by graphing

From here, we just complete the square
or use a table of values to graph.

$$0.5[x^2 - 4x] + 3 = 0$$

$$0.5[x^2 - 4x + 4 - 4] + 3 = 0$$

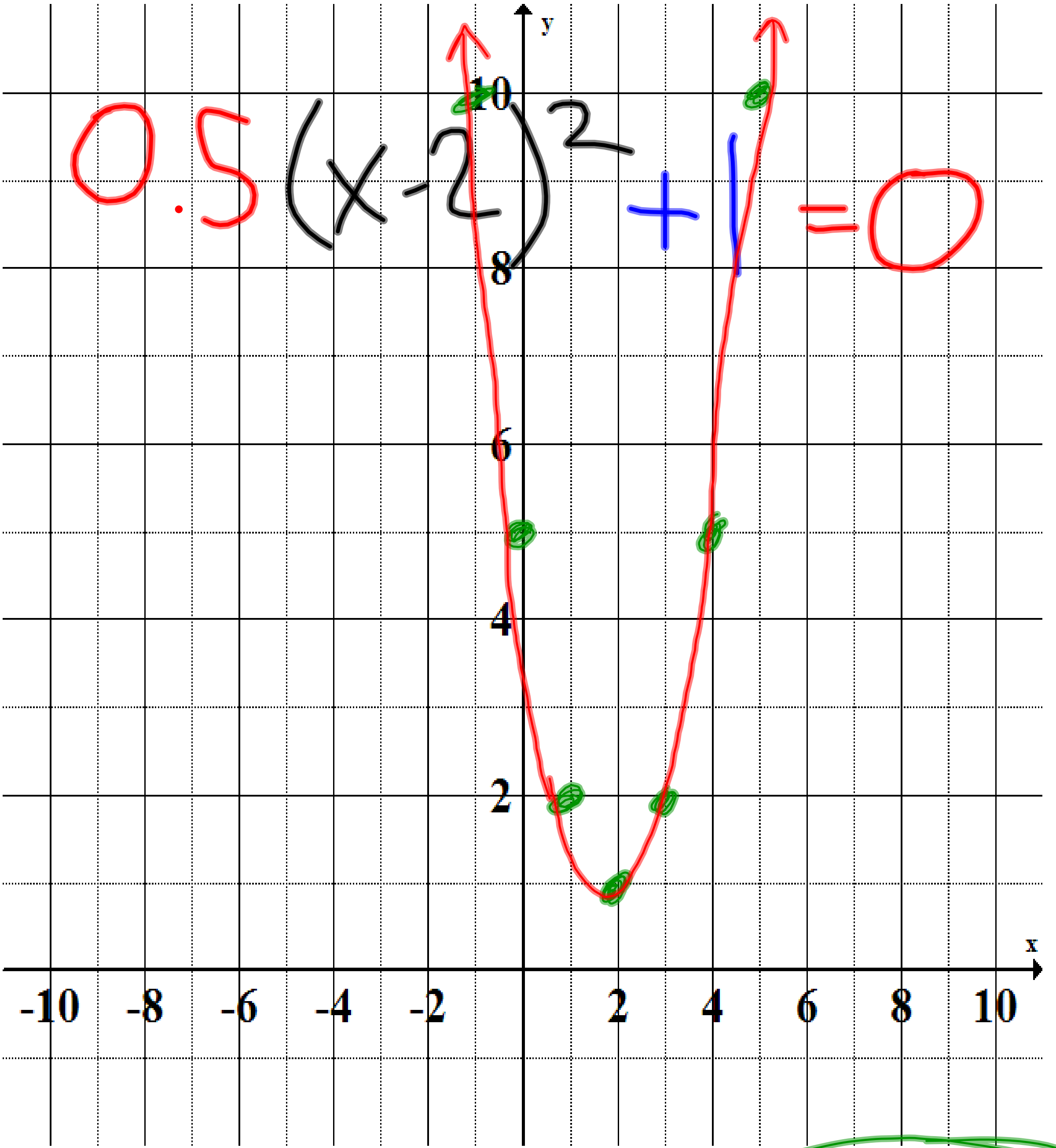
$$0.5[(x^2 - 4x + 4) - 4] + 3 = 0$$

$$0.5[(x-2)^2 - 4] + 3 = 0$$

$$0.5[(x-2)^2 - 4] + 3 = 0$$

$$0.5(x-2)^2 - 2 + 3 = 0$$

$$0.5(x-2)^2 + 1 = 0$$



In this example, there are **no real roots**!

When do we have quadratic equations with no real roots?

Consolidation

Homework

Pg. 275 - 276

1,2 (a, e, h)

4, 5, 15