

What's Going On?

Checking In

Minds on

Expanding Binomials

Action!

Expanding 2.0

Consolidation

Converting from Vertex Form to Standard Form

Learning Goal - I will be able to change quadratic relations from *vertex form* to *standard form*!

RAFT!

Minds on

Expanding Binomials

Multiply these two binomials (**expand**)

$$\begin{aligned} & (x - 4)(x + 3) \\ &= x^2 + 3x - 4x - 12 \\ &= x^2 - 1x - 12 \end{aligned}$$

Minds on

Expanding Binomials

Expand.

$$(x + 4)^2$$

When we see something

squared,

we know it means

"that thing times itself"

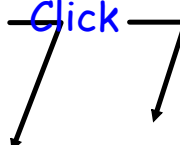
The same is true here!

In this case, *"that thing"*

is $(x + 4)$

Minds on

Expanding Binomials

Expand.Click 

$$(x + 4)^2 \longrightarrow (x + 4)(x + 4)$$

$$= x^2 + 4x + 4x + 16$$

$$= x^2 + 8x + 16$$

Minds on

Expanding Binomials

Expand.

$$(x - 3)^2 \xrightarrow{\text{Click}} (x - 3)(x - 3)$$

$$\begin{aligned} &= x^2 - 3x - 3x + 9 \\ &= x^2 - 6x + 9 \end{aligned}$$

Action!

Expanding and Graphing

Expand.

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

$$y = 3(x - 2)(x - 2)$$

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

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

$$y = 3x^2 - 12x + 12$$

*double up brackets**Multiply everything
by 3*

Action!

Expanding and Graphing

Expand.

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

$$y = -2(x + 5)(x + 5)$$

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

$$y = -2x^2 - 20x - 50$$

Action!

Expanding and Graphing

Expand.

$$y = 2(x + 1)^2 - 5$$

*sits here until
last step*

$$y = 2(x+1)(x+1) - 5$$

$$y = 2(x^2 + x + x + 1) - 5$$

$$y = 2(x^2 + 2x + 1) - 5$$

$$y = 2x^2 + 4x + 2 - 5$$

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

Action!

Expanding and Graphing

Expand.

$$y = 0.5(x + 2)^2 - 2$$

$$y = 0.5(x+2)(x+2) - 2$$

$$y = 0.5(x^2 + 2x + 2x + 4) - 2$$

$$y = 0.5(x^2 + 4x + 4) - 2$$

$$y = 0.5x^2 + 2x + 2 - 2$$

$$y = 0.5x^2 + 2x$$

Action!

Expanding and Graphing

Expand.

$$y = -0.25(x + 4)^2 + 7$$

$$y = -0.25(x+4)(x+4) + 7$$

$$y = -0.25(x^2 + 4x + 4x + 16) + 7$$

$$y = -0.25(x^2 + 8x + 16) + 7$$

$$y = -0.25x^2 - 2x - 4 + 7$$

$$y = -0.25x^2 - 2x + 3$$

Action!

Standard Form Equations

Last unit we dealt with lots of quadratics (parabolas) in **vertex form**

$$\text{Vertex Form: } y = a(x - h)^2 + k$$

This unit we are going to look at quadratics in **standard form** as well!

$$\text{Standard Form: } y = ax^2 + bx + c$$

As you have seen, we can get from Vertex Form to Standard Form by

expanding

Action!

Standard Form Equations

standard form: $y = ax^2 + bx + c$

What does the c in the *standard form equation* tell us?

To Desmos!

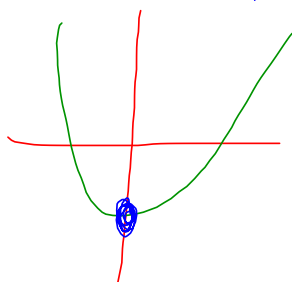
$$y = ax^2 + bx + c$$

Action!

To Desmos!

What does the c in the *standard form equation* tell us?

- c tells us the y -intercept
- c tells us the y -value when $x=0$



Action!

Standard Form Equations

standard form: $y = ax^2 + bx + c$

What does the c in the *standard form equation* tell us?

It's the y-intercept!

It's where the parabola crosses the y-axis!

Consolidation

Converting from Vertex Form to Standard Form

1. Change the $(x - h)^2$ part of the vertex form equation to $(x - h)(x - h)$. *double up brackets*
2. Expand $(x - h)(x - h)$ into a new set of brackets using FOIL or The Grid.
3. Multiply through the new set of brackets by a .
4. Collect like terms and simplify.

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

$$y = -2(x-3)(x-3) + 8$$

$$y = -2(x^2 - 3x - 3x + 9) + 8$$

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

$$y = -2x^2 + 12x - 18 + 8$$

$$y = -2x^2 + 12x - 10$$

Standard Form

Consolidation

Write each in standard form.

State the vertex and y-intercept for each.

1. $y = (x + 6)^2$

2. $y = (x - 1)^2$

3. $y = 3(x + 9)^2$

4. $y = -0.25(x + 8)^2$

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

6. $y = 5(x - 4)^2 + 12$

7. $y = 2(x + 5)^2 - 10$

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

Consolidation

Write each in standard form.

State the vertex and y-intercept for each.

$$1. y = (x + 6)^2 \quad (-6, 0)$$

$$y = (x + 6)(x + 6)$$

$$y = x^2 + 6x + 6x + 36$$

$$y = x^2 + 12x + 36$$

$$y\text{-intercept} = 36$$

Consolidation

Write each in standard form.

State the vertex and y-intercept for each.

$$2. y = (x - 1)^2$$

Consolidation

Write each in standard form.

State the vertex and y-intercept for each.

3. $y = 3(x + 9)^2$

Consolidation

Write each in standard form.

State the vertex and y-intercept for each.

4. $y = -0.25(x + 8)^2$

Consolidation

Write each in standard form.

State the vertex and y-intercept for each.

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

Consolidation

Write each in standard form.

State the vertex and y-intercept for each.

$$6. y = 5(x - 4)^2 + 12$$

Consolidation

Write each in standard form.

State the vertex and y-intercept for each.

$$7. y = 2(x + 5)^2 - 10$$

Consolidation

Write each in standard form.

State the vertex and y-intercept for each.

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