

What's Going On?

Checking In

Minds on That's Sketchy

Action! Application Problems

Consolidation 4 Parabolas

Learning Goal - I will be able to use the quadratic formula to solve and graph quadratic equations.

Checking In

Using Your New Best Friend!

Determine the vertex of the parabola defined by the quadratic equation

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

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

$$h = \frac{-(6)}{2(-2)}$$

$$h = \frac{-6}{-4}$$

$$h = \frac{3}{2} \text{ or } 1.5$$

To find k (the y -value of the vertex) plug 1.5 in for x in the original equation and solve.

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

$$y = -2(1.5)^2 + 6(1.5) - 9$$

$$y = -2(2.25) + 9 - 9$$

$$y = -4.5$$

\therefore the vertex is
 $(x, y) = (1.5, -4.5)$

Checking In

The Test

Moved to next Tuesday

Minds on

4 parabolas...

SKETCH the following quadratic equations using roots, the vertex, and the y-intercept.

1 $y = -x^2 - 12x - 11$

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

3 $y = -0.5x^2 - 2x + 13$

4 $y = 2x^2 + 7x + 12$

A "good" sketch
has a labeled vertex,
y-intercept and zeroes

roots
x-intercepts

Minds on

4 parabolas...

SKETCH the following quadratic equations using roots, the vertex, and the y-intercept.

1 $y = -x^2 - 12x - 11$

y-intercept

$$y = -11$$

vertex

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

$$= \frac{-(-12)}{2(-1)}$$

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

$$= -6$$

\therefore the x-value of the vertex is -6.

$$\rightarrow y = -x^2 - 12x - 11$$

$$y = -(-6)^2 - 12(-6) - 11$$

$$y = -36 + 72 - 11$$

$$y = 25$$

\therefore the vertex is (-6, 25)

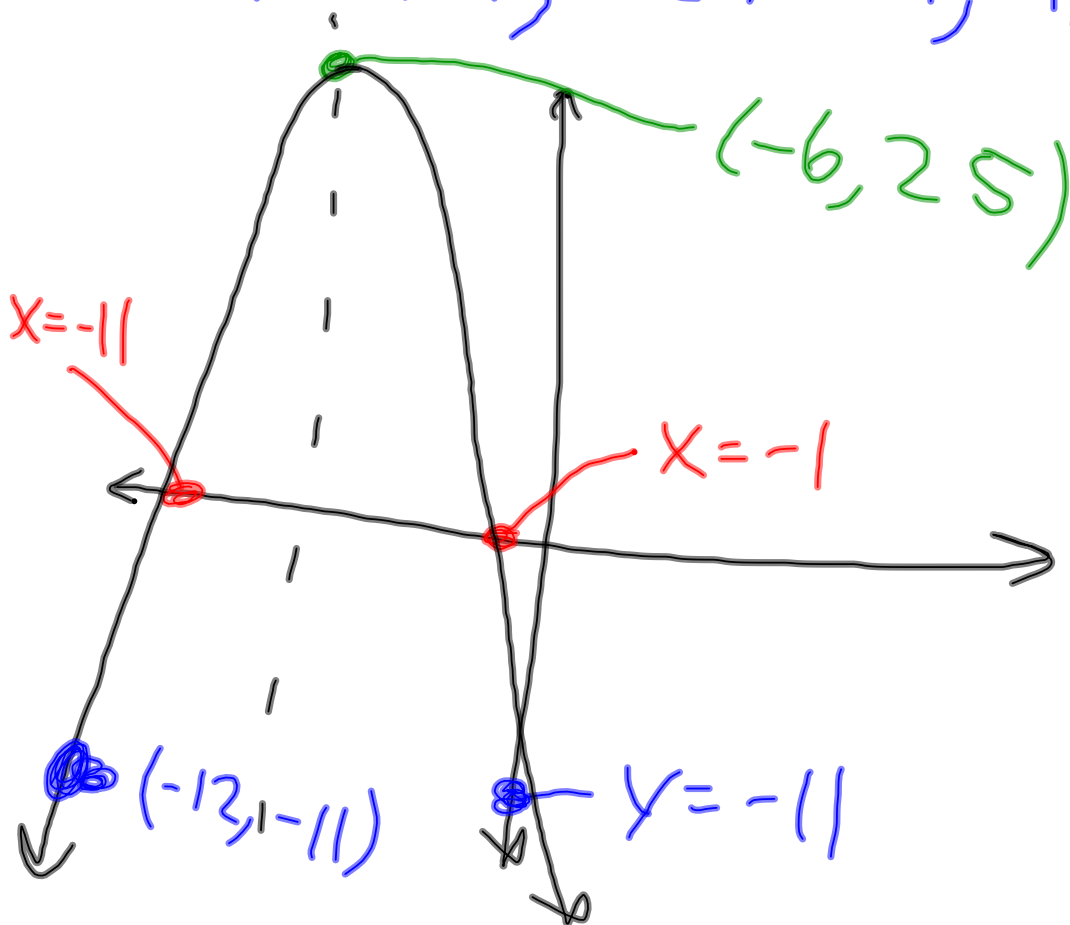
roots

$$y = -x^2 - 12x - 11$$

$$y = -(x^2 + 12x + 11)$$

$$y = -(x+1)(x+11)$$

\therefore the roots are $x = -1, -11$



Minds on

4 parabolas...

SKETCH the following quadratic equations using roots, the vertex, and the y-intercept.

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

y-intercept

$$y = 50$$

vertex

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

$$= \frac{-(-20)}{2(2)}$$

$$= 5$$

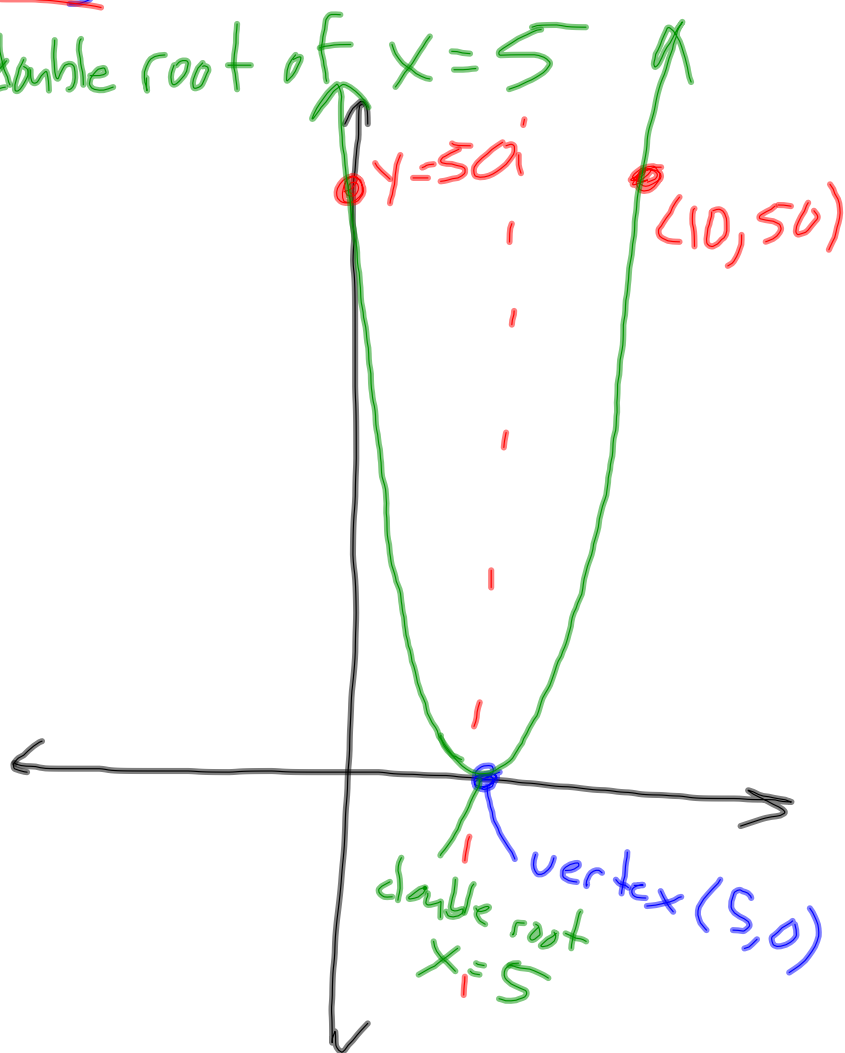
\therefore the x-value of the vertex is 5.

$$\begin{aligned} & \rightarrow y = 2x^2 - 20x + 50 \\ & y = 2(5)^2 - 20(5) + 50 \\ & y = 50 - 100 + 50 \\ & \boxed{y = 0} \end{aligned}$$

\therefore the vertex is $(5, 0)$

roots

double root of f $x=5$



Minds on

4 parabolas...

SKETCH the following quadratic equations using roots, the vertex, and the y-intercept.

3 $y = -0.5x^2 - 2x + 13$

y-intercept

$$y = 13$$

vertex

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

$$= \frac{-(-2)}{2(-0.5)}$$

$$= \frac{2}{-1}$$

$$= -2$$

\therefore the x-value of the vertex is -2 .

$$y = -0.5x^2 - 2x + 13$$

$$y = -0.5(-2)^2 - 2(-2) + 13$$

$$y = -2 + 4 + 13$$

$$y = 15$$

\therefore the vertex is $(-2, 15)$

roots

Factoring doesn't work out...

QUADRATIC FORMULA

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(-0.5)(+13)}}{2(-0.5)}$$

$$x = \frac{2 \pm \sqrt{4 + 26}}{-1}$$

$$x = \frac{2 \pm \sqrt{30}}{-1} \} \text{exact roots}$$

To graph we need the approximate roots.

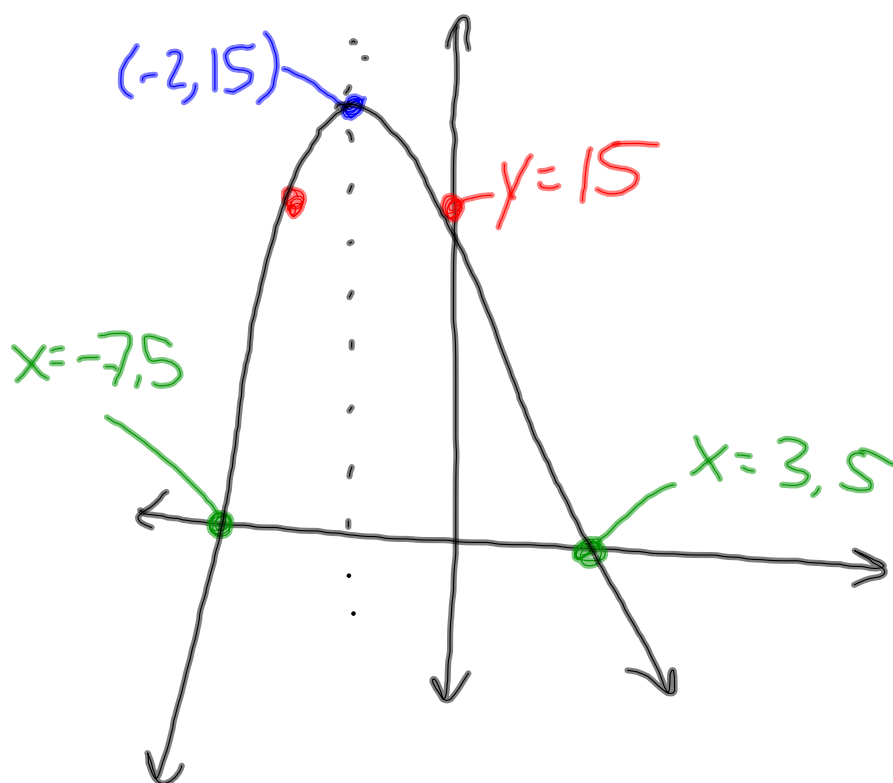
$$x = \frac{2 \pm 5.5}{-1}$$

$$x = \frac{2 + 5.5}{-1}$$

$$x = -7.5$$

$$x = \frac{2 - 5.5}{-1}$$

$$x = 3.5$$



Minds on

4 parabolas...

SKETCH the following quadratic equations using roots, the vertex, and the y-intercept.

4 $y = 2x^2 + 7x + 12$

y-intercept
 $y = 12$

vertex

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

$$= \frac{-(7)}{2(2)}$$

$$= \frac{-7}{4} \Rightarrow -1.75$$

$$y = 2(-1.75)^2 + 7(-1.75) + 12$$

$$y = 6.125 - 12.25 + 12$$

$$y = 5.875$$

roots

- First, try to factor...
- Can't common factor
- Can't find two numbers that add to 7 and multiply to 24...

QUADRATIC
FORMULA

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$X = \frac{-(7) \pm \sqrt{(7)^2 - 4(2)(12)}}{2(2)}$$

$$X = \frac{-7 \pm \sqrt{49 - 96}}{4}$$

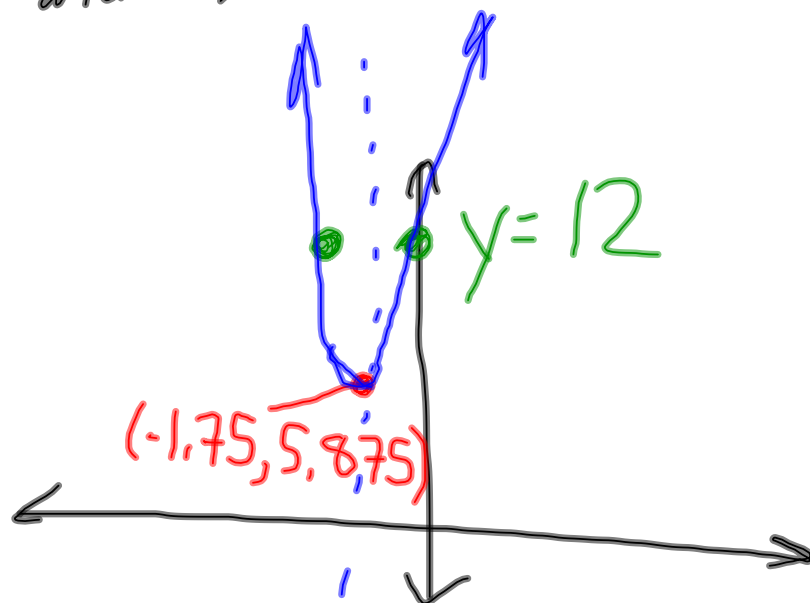
$$X = \frac{-7 \pm \sqrt{-47}}{4}$$

negative

NO REAL ROOTS!

Because we have no real roots. We have no x-intercepts.

To graph, use the vertex, y-intercept and axis of symmetry.



Notice

No x-intercepts,
no real roots.