

Date 8.2.2: How are quadratic rules and graphs connected?

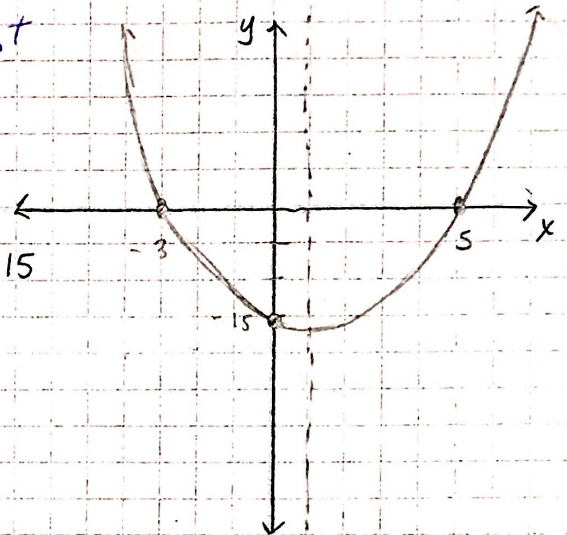
8-64) a) No! I can't graph with just the y-intercept - not enough info.

b) No! With just the x-intercepts we don't know width or direction (+ or -).

c) Use quadratic equation: $y = x^2 - 2x - 15$

* With x-intercepts $(-3, 0)$ $(5, 0)$ and y-intercept $(0, -15)$

d) Line of symmetry: $x = 1$



8-65) a) $y = 0$ for all x-intercepts, ex. $(-2, 0)$

$x = 0$ for all y-intercepts, ex. $(0, 12)$

b) What is the y-intercept for graph $y = 2x^2 + 5x - 12$. ← y-intercept $(0, -12)$

c) $0 = 2x^2 + 5x - 12$ to find x-intercepts

d) The roots or zeros of a quadratic equation are:

the values of x that make $y = 0$ or the equation $= 0$.

~~They~~ They are the x-intercepts.

8-66) What do you know about zero?

$b + 0 = b$ cannot divide by zero

$b \cdot 0 = 0$

has no value

L.L. Zero Product Property: (math notes)

If the product of two or more numbers is zero, then you know one of the factors must be 0.

roots
or
zeros

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8-67) Use Zero Product Property to investigate and graph $y = 2x^2 + 5x - 12$

a) rewrite expression as a product.

$$2x^2 + 5x - 12 = (2x - 3)(x + 4)$$

$\begin{array}{|c|c|} \hline 2x & -3 \\ \hline 8x & -12 \\ \hline 2x^2 & -3x \\ \hline 2x & -3 \\ \hline \end{array}$
 $\begin{array}{l} -24x^2 \\ 8x \quad -3x \\ \hline 5x \end{array}$

* rewrite equation as product, where $y = 0$ (to find roots - use Zero Product Property)

$$0 = (2x - 3)(x + 4)$$

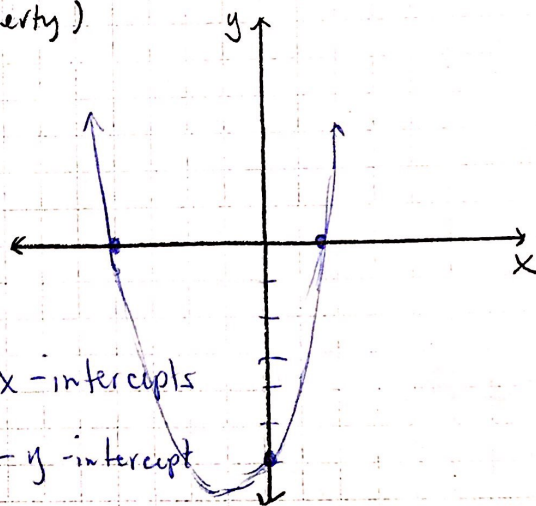
b) $2x - 3 = 0$ $x + 4 = 0$

$$\begin{array}{r} 2x - 3 = 0 \\ +3 \quad +3 \\ \hline 2x = 3 \\ \div 2 \quad \div 2 \\ \hline x = 1.5 \end{array}$$

$$\begin{array}{r} x + 4 = 0 \\ -4 \quad -4 \\ \hline x = -4 \end{array}$$

c) $x = 1.5$ $(1.5, 0)$ $(-4, 0)$ ← x-intercepts

d) find intercepts and graph → $(0, -12)$ ← y-intercept



8-68) Can you make a sketch of a parabola from the x-intercepts and vertex?

a) $y = x^2 - 2x - 8$ ← y-intercept $(0, -8)$

$$\begin{array}{|c|c|} \hline -4 & -8 \\ \hline x & x^2 \\ \hline x & +2x \\ \hline x & 2 \\ \hline \end{array}$$

$\begin{array}{l} -8x^2 \\ -4x \quad +2x \\ \hline -2x \end{array}$

① factor
② set factors = 0
to use zero product property to solve for x and find x-intercepts.

$$0 = x^2 - 2x - 8$$

$$0 = (x + 2)(x - 4)$$

$$\begin{array}{r} x + 2 = 0 \\ -2 \quad -2 \\ \hline x = -2 \end{array}$$

$$\begin{array}{r} x - 4 = 0 \\ +4 \quad +4 \\ \hline x = 4 \end{array}$$

x-intercepts: $(-2, 0)$ $(4, 0)$

Vertex: $x = 1$

$$y = (1)^2 - 2(1) - 8$$

$$y = 1 - 2 - 8$$

$$y = -1 - 8 = -9$$

b) Vertex is easy, if you can easily find the line of symmetry. y-intercept is easy to find, graph more challenging to do.

