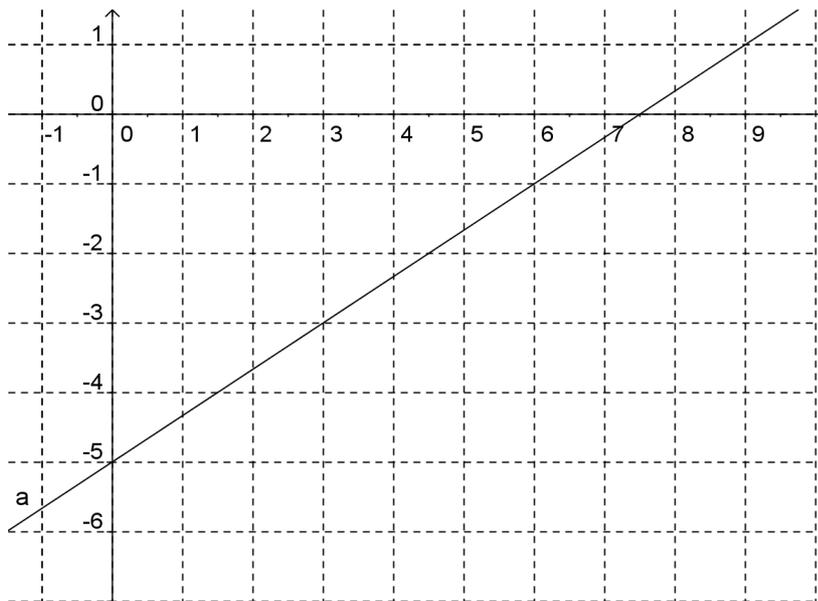


Review - Part 1
Straight Lines & Parabolas

Jan 31-2:27 PM

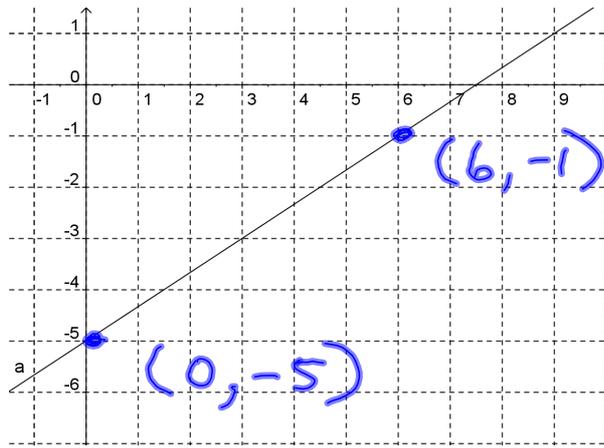
From your worksheet - a Linear Relation



Jan 31-7:08 PM

Properties:

$$\begin{aligned}
 m &= \text{slope} \\
 &= \frac{\text{rise}}{\text{run}} \\
 &= \frac{y_2 - y_1}{x_2 - x_1} \\
 &= \frac{-1 - (-5)}{6 - 0} \\
 &= \frac{4}{6} \\
 &= \frac{2}{3}
 \end{aligned}$$



$$\begin{aligned}
 y\text{-int} &= -5 \\
 x\text{-int} &= 7.5 \text{ ?}
 \end{aligned}$$

Jan 31-7:08 PM

Equation(s):

$$\begin{array}{c}
 y = mx + b \\
 \uparrow \quad \uparrow \\
 \text{slope} \quad y\text{-int}
 \end{array}$$

$$y = \frac{2}{3}x - 5 \quad \text{slope-intercept}$$

Standard Form

$$Ax + By + C = 0$$

A, B, C integers

$$y = \frac{2}{3}x - 5 \quad [\times 3]$$

$$3y = 3\left(\frac{2}{3}x\right) - 3(5) \quad \begin{array}{l} \text{multiply by 3} \\ \text{both sides} \end{array}$$

$$3y = 2x - 15$$

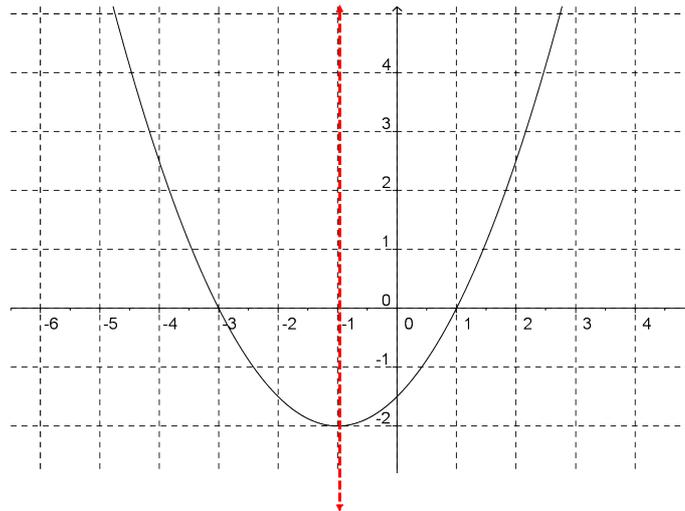
$$-2x + 3y + 15 = 0$$

or

$$2x - 3y - 15 = 0$$

Jan 31-7:08 PM

From your worksheet - a Quadratic Relation



Jan 31-7:08 PM

Properties:

Vertex $(-1, -2)$

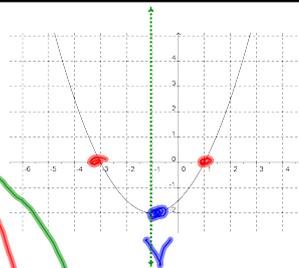
zeros: 1, -3
(or roots
or x-intercepts)

y-int = -1.5 ?

axis of symmetry: $x = -1$

vertically compressed

min. value $y = -2$



opens
up

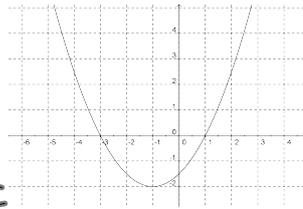
Jan 31-7:08 PM

Equation(s):

Standard

$$y = \underline{a}x^2 + bx + \underline{c}$$

Scale factor
y-int



Factored Form:

$$y = a(x - \underline{s})(x - \underline{t})$$

zeros

Vertex form:

$$y = a(x - \underline{h})^2 + \underline{k}$$

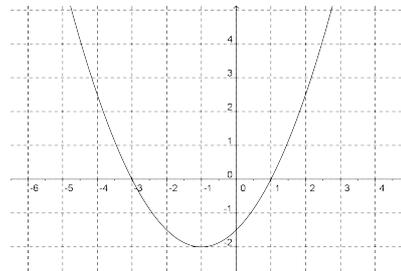
x-vertex
y-vertex

Jan 31-7:08 PM

Equation in vertex form:

$$y = a(x - h)^2 + k$$

The vertex is (-1, -2)
so $h = -1$ and $k = -2$



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

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

To find a , substitute any point *except* the vertex

Sub (1, 0): $0 = a(1 + 1)^2 - 2$

$$0 = a(2)^2 - 2$$

$$2 = 4a$$

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

The equation in vertex form is $y = \frac{1}{2}(x + 1)^2 - 2$

Jan 31-7:08 PM

Equation in factored form:

$$y = a(x - s)(x - t)$$

where s and t are the zeroes, or roots, of the parabola

$$s = -3 \text{ and } t = 1$$

$$y = a(x - (-3))(x - 1)$$

$$y = a(x + 3)(x - 1)$$

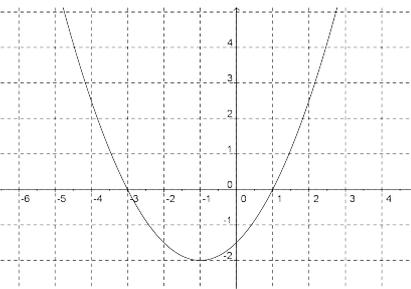
To find a , substitute any point *except* one of the zeroes
- the vertex is $(-1, -2)$

$$-2 = a(-1 + 3)(-1 - 1)$$

$$-2 = a(2)(-2)$$

$$-2 = -4a$$

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



The equation in factored form is

$$y = \frac{1}{2}(x + 3)(x - 1)$$

Jan 31-7:08 PM

Can also obtain standard form by expanding & simplifying vertex and/or factored form

$$y = \frac{1}{2}(x + 1)^2 - 2$$

$$y = \frac{1}{2}(x + 1)(x + 1) - 2$$

$$y = \frac{1}{2}(x^2 + x + x + 1) - 2$$

$$y = \frac{1}{2}(x^2 + 2x + 1) - 2$$

$$y = \frac{1}{2}x^2 + x + \frac{1}{2} - \frac{4}{2}$$

$$y = \frac{1}{2}x^2 + x - \frac{3}{2}$$

$$y = \frac{1}{2}(x + 3)(x - 1)$$

$$y = \frac{1}{2}(x^2 - x + 3x - 3)$$

$$y = \frac{1}{2}(x^2 + 2x - 3)$$

$$y = \frac{1}{2}x^2 + x - \frac{3}{2}$$

F
O
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C

Feb 1-7:11 PM

$$y = a(x-s)(x-t)$$

$$y = a(x - (-3))(x - (1))$$

$$y = \underline{a}(x+3)(x-1)$$

Sub point not used yet

$$\text{Sub } \begin{matrix} (-1, -2) \\ \underline{x} \quad \underline{y} \end{matrix}$$

$$-2 = a(-1+3)(-1-1)$$

$$-2 = a(2)(-2)$$

$$\frac{-2}{-4} = \frac{-4a}{-4}$$

$$a = \frac{1}{2} \quad y = \frac{1}{2}(x+3)(x-1)$$

Feb 1-2:50 PM

$$y = a(x-h)^2 + k$$

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

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

$$\text{Sub } (1, 0)$$

$$0 = a(1+1)^2 - 2$$

$$0 = a(4) - 2$$

$$\frac{2}{4} = \frac{4a}{4}$$

$$a = \frac{1}{2} \quad y = \frac{1}{2}(x+1)^2 - 2$$

Feb 1-2:55 PM