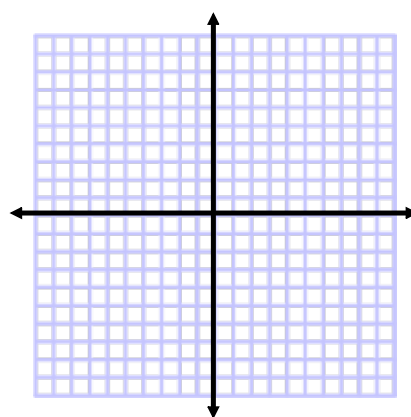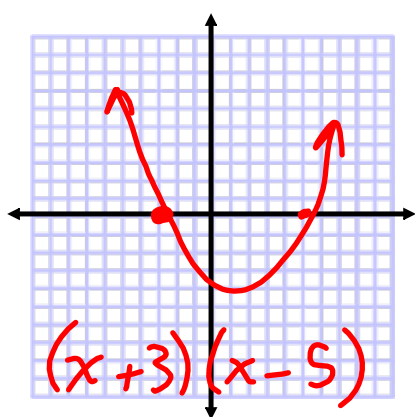Lets look at some equations and graphs on Desmos

Compare the equation y = (x - s)(x - t)

to the graph, what do you notice?

$(x+3)(x-5)$

If a graph has 2 x-intercepts at __Z__ and __V__, then the equation of that curve is:

$$y = \frac{\cancel{\$}}{a}(x - z)(x - v)$$

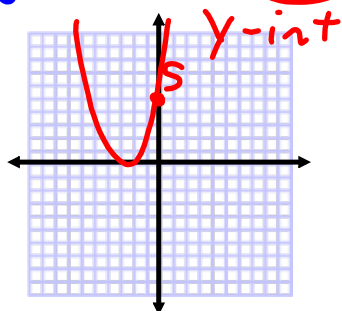If we know ANY other point (x, y) on the curve then we can solve for "a"

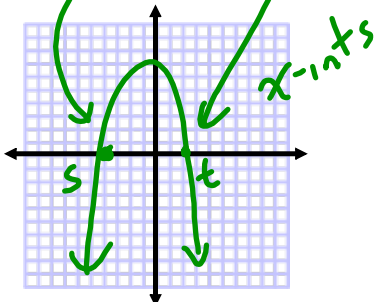$$y = a(x - z)(x - v)$$

Forms of a Quadratic Equation

Standard	Factored	Vertex

$y = ax^2 + bx + c$

$y = 2x^2 - 3x + 5$

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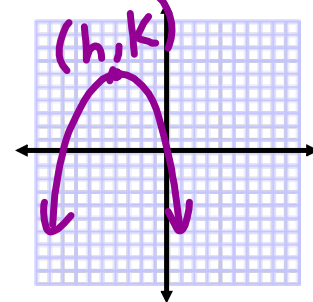
$y = a(x-s)(x-t)$

x-ints

s   t

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

(h,k)

Determine an equation for the following:

a) A parabola with x-intercepts of -2 and 3, passing through the point (5,6)

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

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

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

$$6 = a(5 + 2)(5 - 3)$$

$$6 = a(7)(2)$$
$$6 = a(14)$$
$$\frac{3}{7} = a$$

$$y = \frac{3}{7}(x + 2)(x - 3)$$

b) A parabola with roots of $3 + \sqrt{5}$ and $3 - \sqrt{5}$ and has a y-intercept of 12.

$$(0, 12)$$

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

$$y = a(x - (3 + \sqrt{5}))(x - (3 - \sqrt{5}))$$

$$y = a((x - 3) - \sqrt{5})((x - 3) + \sqrt{5})$$

$$a^2 - b^2$$
$$(a + b)(a - b)$$

$$y = a((x - 3)^2 - \sqrt{5}^2)$$

$$y = a(x^2 - 6x + 9 - 5)$$

$$y = a(x^2 - 6x + 4)$$

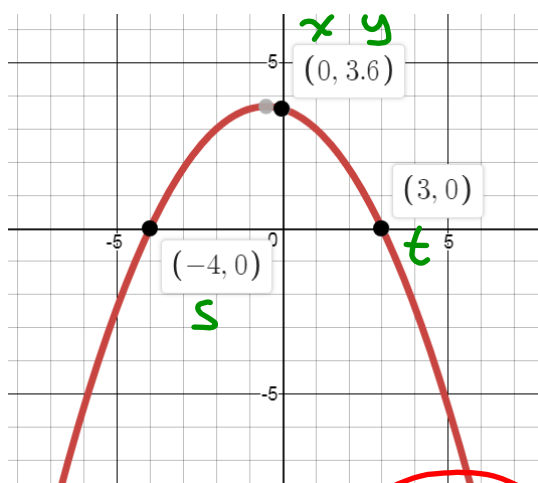$$(x, y) \rightarrow (0, 12)$$

$$12 = a(0^2 - 6(0) + 4)$$

$$12 = a(4)$$

$$3 = a$$

$$y = 3(x^2 - 6x + 4)$$
$$= 3x^2 - 18x + 12$$

Determine an equation, in standard form, for the graph.

x y

(0, 3.6)

(3, 0)

(−4, 0)

s

t

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

$3.6 = a(0 + 4)(0 - 3)$

$3.6 = a(-12)$

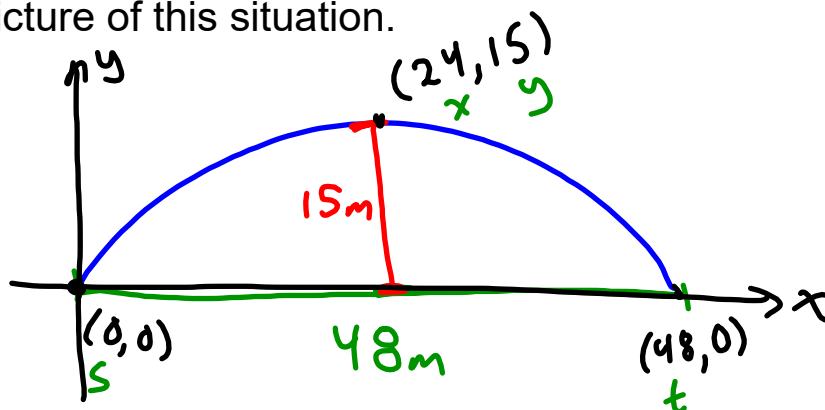$\dfrac{3.6}{-12} = a$

$-0.3 = a$

$y = -0.3(x + 4)(x - 3) \longrightarrow x^2 + 4x - 3x - 12$

$y = -0.3(x^2 + x - 12)$

$y = -0.3x^2 - 0.3x + 3.6$

An arch bridge spans a 48 m wide river and the difference between the height in the middle and the end is 15 m.

a) Draw a picture of this situation.

b) Determine an equation for your graph.

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

$$15 = a(24 - 0)(24 - 48)$$

$$15 = a(24)(-24)$$

$$15 = a(-576)$$

$$-\frac{15}{576} = a$$

$$-\frac{5}{192} = a$$

$$y = -\frac{5}{192}(x)(x - 48)$$

Pg 57
#3, 5, 6, 7, 8, 11