Mathematics 11UC

3.2 – Relating the Standard and Factored Forms

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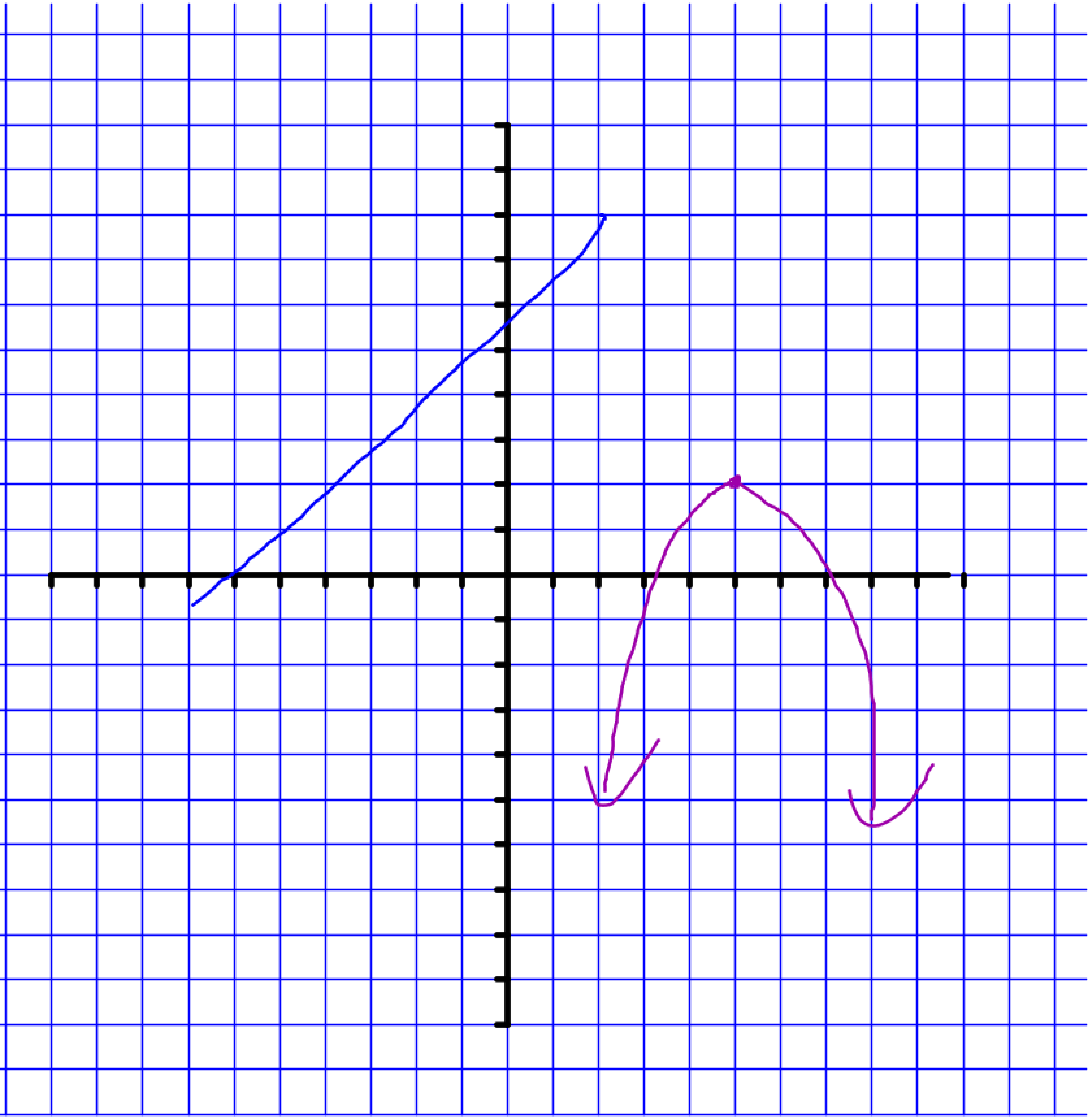


Line: $y = mx + b$

Parabola:

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

(h, k)

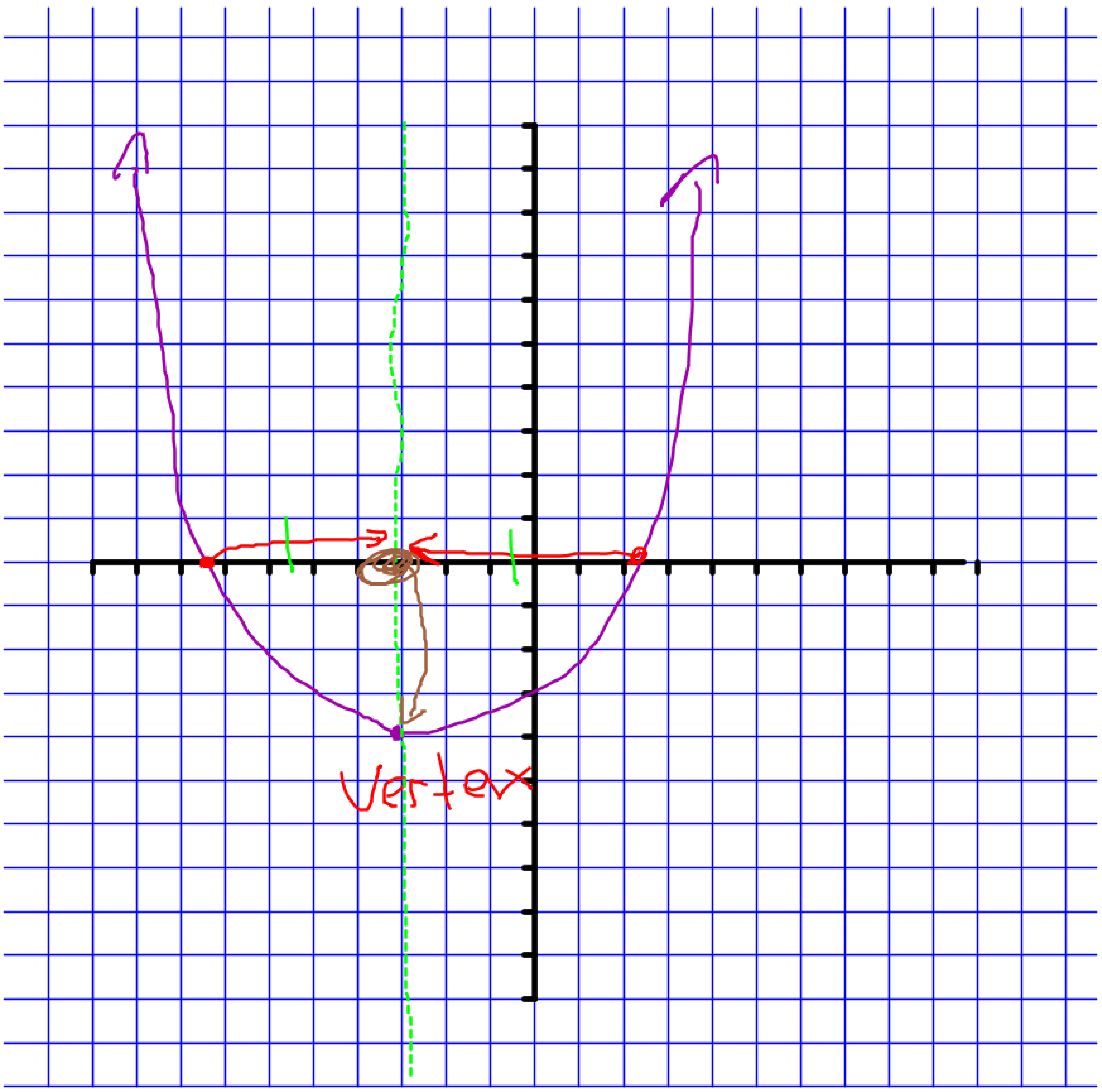
standard: $y = ax^2 + bx + c$

y-int

factored: $y = a(x-r)(x-s)$

zeros

x-int



Vertex = max/min

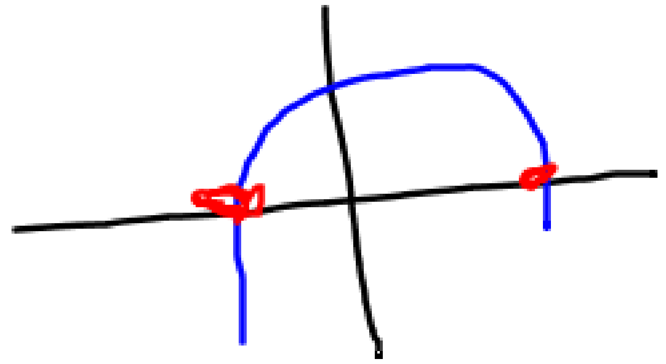
Axis of symmetry

$x = \boxed{h}$

The average of the x-intercepts is the axis of symmetry.

↳ find the max/min

Express each quadratic function in factored form. Then determine the zeros, the equation of the axis of symmetry, and the coordinates of the vertex.



$(x)\ 6$

$(+)\ 5$

$-1, 6$

$$f(x) = 2x^2 + 5x - 3$$

$$= 2x^2 - 1x + 6x - 3$$

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

$$f(x) = \boxed{}\,(\underbrace{2x-1}_{=0})(\underbrace{x+3}_{=0})$$

$2x-1=0$

$2x = 1$

$x = \frac{1}{2} = .5$

$x+3=0$

$x = -3$

$$h = \frac{0.5 + -3}{2} = \frac{-2.5}{2}$$

$$= -1.25$$

$$x = -1.25$$

$$f(-1.25) = 2(-1.25)^2 + 5(-1.25) - 3$$

$$= 3.125 - 6.25 - 3$$

$$= -6.125$$

Vertex is $(-1.25, -6.125)$

$f(x) = x^2 - 8x + 12$

$f(x) = \underbrace{(x-6)}_{=0}\underbrace{(x-2)}_{=0}$

$x - 6 = 0$	$x - 2 = 0$
$x = 6$	$x = 2$

$h = \frac{6+2}{2} = \boxed{4}$

vertex is $(4, -4)$

$f(4) = 4^2 - 8(4) + 12$

$= 16 - 32 + 12 = -4$

Express each quadratic function in standard form. Determine the y-intercept.

$$f(x) = (3x - 4)(2x + 5)$$

$$= 6x^2 + 15x - 8x - 20$$

$$= 6x^2 + 7x \boxed{-20}$$

y-int is -20