Mathematics 10D

2 – Zeros/Factored Form

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

↳ y-int

factor

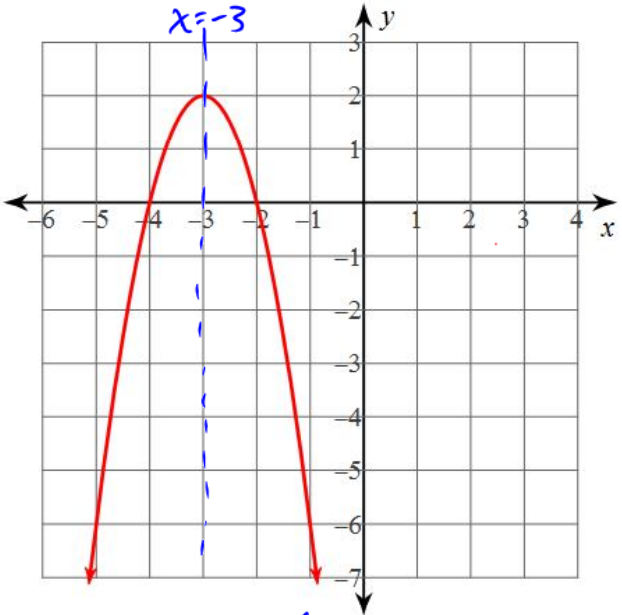
Expand.

Zeros/Factored: $y = a(x - r)(x - s)$

x-intercept, zeros, roots, solutions.

Convert from Standard form to factored form.

$y = -2x^2 - 12x - 16$



Recall, Vertex is (h,k)

(x,y)

$y = -2(x^2 + 6x + 8)$

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

$y = -2(x-(-2))(x-(-4))$

r s

Zeros: $x = -2$ and $x = -4$

AoS: $h = \frac{-2+-4}{2} = \frac{-6}{2} = -3$

To find the rest of the vertex plug $h=-3$ into x of the equation

$y = -2(-3+2)(-3+4)$

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

$y = 2$

$k = 2$

∴ vertex is $(-3, 2)$

Given the standard form, find the zeros then the vertex.

$y = 3x^2 + 15x - 18$

$y = 3(x^2 + 5x - 6)$

$y = 3(x+6)(x-1)$ ($x+6=0$, $x-1=0$)

Zeros: $x = -6$ $x = 1$

AoS: $h = \frac{-6+1}{2} = \frac{-5}{2} = -2.5$

Vertex: $k = 3(-2.5)^2 + 15(-2.5) - 18$

$k = 18.75 - 37.5 - 18$

$k = -36.75$

∴ the vertex is $(-2.5, -36.75)$

Given the standard form, find the zeros then the vertex.

$y = 5x^2 + 8x - 4$ ⊗ -20, ⊕ 8 → $10, -2$

$y = 5x^2 + 10x - 2x - 4$

$y = (5x-2)(x+2)$ ($5x-2=0$, $x+2=0$)

$5x - 2 = 0$

$5x = 2$

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

Zeros: $x = -2$, $x = \frac{2}{5} = 0.4$

AoS: $h = \frac{-2+0.4}{2} = \frac{-1.6}{2} = -0.8$

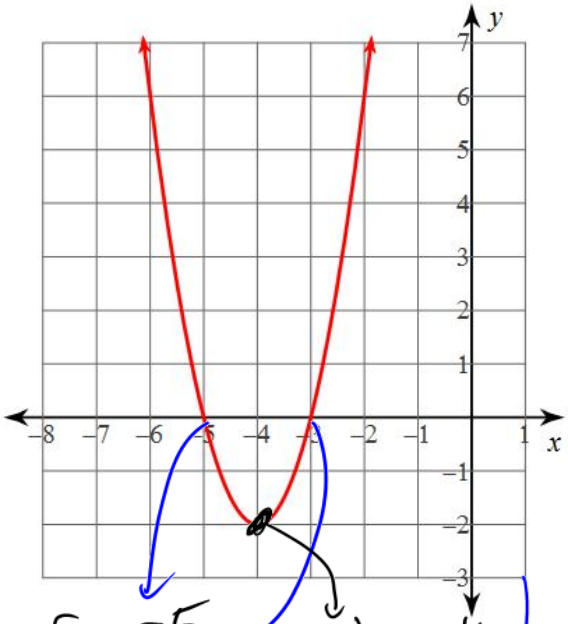
Vertex: $k = 5(-0.8)^2 + 8(-0.8) - 4$

$k = 3.2 - 6.4 - 4$

$k = -7.2$

∴ Vertex is $(-0.8, -7.2)$

Given the graph, state the equation of the parabola in both zeros form and standard form, then state the y-intercept.



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

$-2 = a(-4+5)(-4+3)$

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

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

$2 = a$

$\therefore y = 2(x+5)(x+3)$ ✓

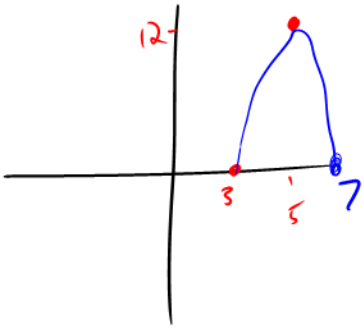
Expand!

$y = 2(x^2+3x+5x+15)$

$y = 2(x^2+8x+15)$

$y = 2x^2+16x+30$ ✓

A parabola has a zero at (3,0) and a vertex at (5,12). State the equation of the parabola in both zeros and standard form.



$r = 3$ $\quad x = 5$

$s = 7$ $\quad y = 12$

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

$12 = a(5-3)(5-7)$

$12 = a(2)(-2)$

$\frac{12}{-4} = \frac{a(-4)}{-4}$

$-3 = a$

$\therefore y = -3(x-3)(x-7)$