1) Determine the vertex by completing the square.
$y = 0.2x^2 - 10x + 63$

2) Determine the x-intercepts and the vertex for the following.
$y = x^2 + 4x - 45$

3) Solve.
$0 = 2x^2 - 8x$

① $y = 0.2x^2 - 10x + 63$

$y = 0.2(x^2 - 50x + 625 - 625) + 63$

$y = 0.2(x^2 - 50x + 625) - 125 + 63$

$y = 0.2(x - 25)^2 - 62$

$\therefore$ Vertex $(25, -62)$

② $y = x^2 + 4x - 45$

$y = (x + 9)(x - 5)$

$x = -9$ $x = 5$

AOS $x = \frac{-9 + 5}{2}$

$= -2$

Sub in to solve for y

$y = (-2)^2 + 4(-2) - 45$

$y = 4 - 8 - 45$

$y = -49$

$\therefore$ Vertex $(-2, -49)$

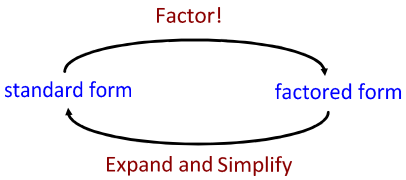
x-ints are: $-9, 5$

③ $0 = 2x^2 - 8x$

$0 = 2x(x - 4)$

$x = 0$ $x = 4$

5.4 Graphing from Factored Form



Ex. 1 Determine the x-intercepts and vertex, then sketch.

a) $y = x^2 - 8x + 12$

$y = (x-2)(x-6)$

$x = 2 \quad x = 6$

AOS $x = \frac{2+6}{2}$

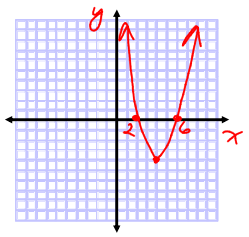
$x = 4$

Sub in

$y = (4-2)(4-6)$

$y = -4$

$V(4,-4)$



b) $y = 9 - x^2$

$y = -x^2 + 9$

$y = -(x^2 - 9)$

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

AOS $x = \frac{-3+3}{2}$

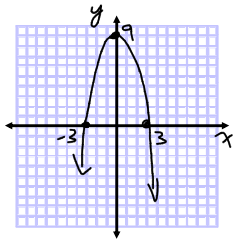
$= 0$

Sub in

$y = 9 - (0)^2$

$y = 9$

$V(0,9)$



c) $y = -x^2 + 3x$

$y = -x(x-3)$

$x = 0 \quad x = 3$

AOS $x = \frac{3+0}{2}$

$= \frac{3}{2}$

Sub in

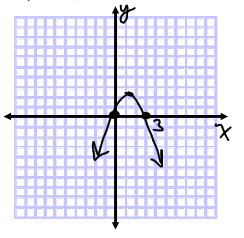
$y = -\left(\frac{3}{2}\right)^2 + 3\left(\frac{3}{2}\right)$

$= -\frac{9}{4} + \frac{9}{2}$

$= -\frac{9}{4} + \frac{18}{4}$

$= \frac{9}{4}$

$V\left(\frac{3}{2}, \frac{9}{4}\right)$

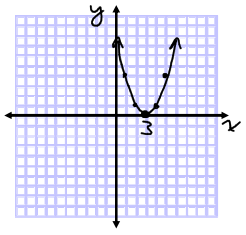


d) $y = x^2 - 6x + 9$

$y = (x-3)^2$

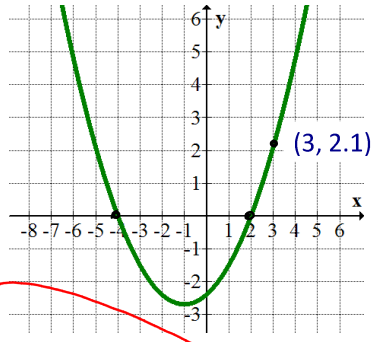
$x = 3$

$\therefore$ Vertex $(3,0)$



Ex. 2 Write an equation in the form $y = ax^2 + bx + c$ for each graph, by first finding the equation in another form.

a)



x-ints are 2, -4

Start w/ generic form....

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

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

Sub in (3, 2.1)

$2.1 = a(3-2)(3+4)$

$2.1 = a(7)$

$\frac{2.1}{7} = a$

$0.3 = a$

$y = 0.3(x-2)(x+4)$

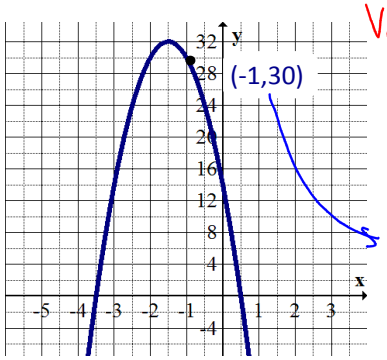
Expand

$y = 0.3(x^2+2x-8)$

$y = 0.3x^2+0.6x-2.4$

$\therefore y = 0.3x^2+0.6x-2.4$

b)



Vertex $(-\frac{3}{2}, 32)$

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

$y = a(x+\frac{3}{2})^2 + 32$

Sub (-1, 30) to solve for a

$30 = a(-1+\frac{3}{2})^2 + 32$

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

$-2 = a(\frac{1}{4})$

$-8 = a$

$\therefore y = -8(x+\frac{3}{2})^2 + 32$

Expand

$y = -8(x+\frac{3}{2})(x+\frac{3}{2}) + 32$

$y = -8(x^2+\frac{3}{2}x+\frac{3}{2}x+\frac{9}{4}) + 32$

$y = -8(x^2+3x+\frac{9}{4}) + 32$

$y = -8x^2-24x-\frac{72}{4} + 32$

$y = -8x^2-24x-18+32$

$y = -8x^2-24x+14$

Ex. 3 The paved surface of a road has a parabolic cross section given by $d = -\frac{1}{125}w^2 + \frac{2}{25}w$ where d is the depth, in metres and w is the width , in metres from the curb.

Check it out!!!

a) Sketch a graph of the relation.

$d = -\frac{1}{125}w(w-10)$

$w = 0$ & $w = 10$

AOS

$x = \frac{0+10}{2}$

$x = 5$

Sub in

$d = \frac{-1}{125}(5)(5-10)$

$= 0.2$

b) For what values of w is this relation valid?

$0 \leq w \leq 10$

c) How wide is the road?

10 m

d) How high is the road?

20 cm (0.2m)

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#3ac,4ac,5ace(no sketch),7,9,12