CHANGING TO STANDARD FORM

Learning Goals - review different forms of quadratics
- learn procedure to change equation to standard form

Quadratic equations can be written in several forms:

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

e.g. $y = 2(x + 1)^2 - 7$ -> vertex = $(-1, -7)$

e.g. $y = -3(x - 2)^2 + 4$ -> vertex = $(2, 4)$

Standard Form: $y = ax^2 + bx + c$ ← y-int

e.g. $y = 3x^2 + 4x + 9$ -> y-int = (0, 9)

e.g. $y = -2x^2 + 6x - 12$ -> y-int = (0, -12)

Factored Form: $y=a(x-s)(x-t)$

e.g. $y=5(x-4)(x-1)$ -> zeros are 4 and 1

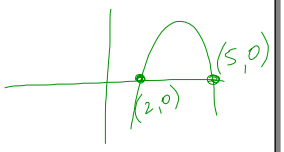
$x-4=0$ $x=4$

$x-1=0$ $x=1$

eg. $y = 3(2x+1)(x-4)$

$2x+1=0$ $2x=-1$ $x=\frac{-1}{2}$

$x-4=0$ $x=4$



Vertex to Standard Form

1. Simplify by removing brackets (FOIL)
2. Collect like terms

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

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

$= x^2 - 2x - 2x + 4 - 3$

$= x^2 - 4x + 1$

$$y = -2(x + 1)^2 + 6$$

$$= -2(x+1)(x+1) + 6$$

$$= (-2x - 2)(x+1) + 6$$

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

$$= -2x^2 - 4x + 4$$

Factored to Standard Form

1. Simplify by removing brackets (FOIL)
2. Collect like terms

$$y=(x+1)(x-4)$$

$$= x^2 - 4x + x - 4$$

$$= x^2 - 3x - 4$$

Water from the fountain must reach a maximum height of 20 meters after 2 seconds. The water's path can be modelled by the quadratic relation $y=-5t^2+bt+c$, where y is the water's height and t is time.

$a=-5$

opens down

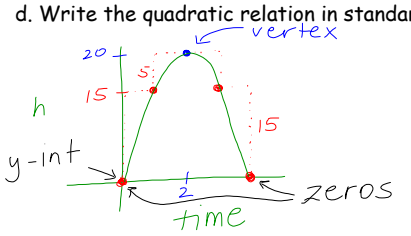
step p $-5(1,3,5) = -5,-15,-25$

a. Make a sketch of the situation.

b. Label main points you know.

c. Write a quadratic relation in vertex form.

d. Write the quadratic relation in standard form.



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

$y=-5(x-2)^2+20$

standard form $y=-5(x-2)(x-2)+20$

$=(-5x+10)(x-2)+20$

$=-5x^2+10x+10x-20+20$

$=-5x^2+20x$

Change to Standard Form

On the Boards...

$y=(x-3)^2$

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

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

$y=-2(x+5)^2+7$

$y = (x - 3)^2$

$= (x - 3)(x - 3)$

$= x^2 - 3x - 3x + 9$

$= x^2 - 6x + 9$

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

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

$= (2x - 8)(x - 4)$

$= 2x^2 - 8x - 8x + 32$

$= 2x^2 - 16x + 32$

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

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

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

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

$= 3x^2 + 12x + 12 - 5$

$= 3x^2 + 12x + 7$

$y = -2(x + 5)^2 + 7$

$= -2(x + 5)(x + 5) + 7$

$= (-2x - 10)(x + 5) + 7$

$= -2x^2 - 10x - 10x - 50 + 7$

$= -2x^2 - 20x - 43$

Homework

pg. 245 # 4ace, 7ace, 8, 10