Are there any Homework Questions you would like to see on the board?

p.232 # 2def, 4   **AND**   8a
pp. 203-205 # 1 – 4, 8 – 10   **AND**
Work ahead on Mid-chapter Review: p. 226 # 1 – 4

Today's Learning Goal(s):

By the end of the class, I will be able to:
a) Complete the square to obtain the vertex form of a quadratic function.
b) Complete the square with functions that involve fractional values.

8. Write the equation of the quadratic function, first in vertex form and
then in standard form.

a) vertex $(-4, 8)$ and passing through $(2, -4)$

$$y = a(x-h)^2 + k \quad {}^{(x,y)}$$

$$y = a(x+4)^2 + 8$$

$$-4 = a(2+4)^2 + 8$$

$$-4 = a(6)^2 + 8$$

$$-4-8 = 36a$$

$$\frac{-12}{36} = \frac{36a}{36}$$

$$\frac{-1}{3} = a$$

$$\therefore y = -\frac{1}{3}(x+4)^2 + 8$$

is the eq'n in

vertex form.

$$y = -\frac{1}{3}(x+4)^2 - 8$$

$$= -\frac{1}{3}(x^2 + 8x + 16) - 8$$

$$= -\frac{1}{3}x^2 - \frac{8}{3}x - \frac{16}{3} - 8$$

$$= -\frac{1}{3}x^2 - \frac{8}{3}x - \frac{16}{3} - \frac{24}{3}$$

$$= -\frac{1}{3}x^2 - \frac{8}{3}x - \frac{40}{3}$$

?

MCF 3MI

4.2 Relating the Standard and Vertex Forms
(by Completing the Square)

Date: __Apr. 4/18__

STANDARD FORM   VS.   VERTEX FORM

$y = -8x^2 + 80x + 7$ $y = -8(x-5)^2 + 207$

We are able to obtain "vertex form" by completing the square.

$$y = -8(x^2 - 10x) + 7$$
$$= -8(x^2 - 10x + 25 - 25) + 7 \qquad \left(\frac{10}{2}\right)^2$$
$$= -8(x-5)^2 - 8(-25) + 7 \qquad 25$$
$$= -8(x-5)^2 + 200 + 7$$
$$= -8(x-5)^2 + 207$$

Ex. 1 Write each quadratic function in vertex form by completing the square.

a) $y = x^2 + 8x + 10$

$$= x^2 + 8x + 16 - 16 + 10$$
$$= (x+4)^2 - 6$$

b) $f(x) = -4x^2 + 24x + 5$

$$= -4(x^2 - 6x) + 5$$
$$= -4(x^2 - 6x + 9 - 9) + 5$$
$$= -4(x-3)^2 - 4(-9) + 5$$
$$= -4(x-3)^2 + 36 + 5$$
$$= -4(x-3)^2 + 41$$

Ex. 2 Write $y = 2x^2 - 3x - 4$ in vertex form.

$$y = 2\left(x^2 - \tfrac{3}{2}x\right) - 4$$
$$= 2\left(x^2 - \tfrac{3}{2}x + \left(\tfrac{3}{4}\right)^2 - \left(\tfrac{3}{4}\right)^2\right) - 4$$
$$= 2\left(x - \tfrac{3}{4}\right)^2 + 2\left(-\tfrac{9}{16}\right) - 4$$
$$= 2\left(x - \tfrac{3}{4}\right)^2 - \tfrac{9}{8} - 4$$
$$= 2\left(x - \tfrac{3}{4}\right)^2 - \tfrac{9}{8} - \tfrac{32}{8}$$
$$= 2\left(x - \tfrac{3}{4}\right)^2 - \tfrac{41}{8}$$

$$y = 2(x^2 - 1.5x) - 4$$
$$= 2(x^2 - 1.5x + 0.5625 - 0.5625) - 4$$
$$= 2(x - 0.75)^2 + 2(-0.5625) - 4$$
$$= 2(x - 0.75)^2 - 1.125 - 4$$
$$= 2(x - 0.75)^2 - 5.125$$

Ex. 3   Judy wants to fence three sides of the yard in front of her house. She bought 100 m of fence and wants the maximum area she can fence in. The function $A(x) = 100x - 2x^2$ represents the area to be enclosed, where x is the width of the yard in metres.

a) Write the function in vertex form.

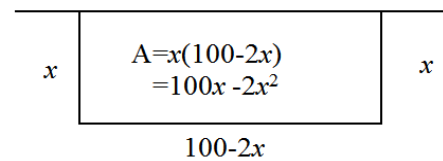$A(x) = 100x - 2x^2$

$= -2x^2 + 100x$

$= -2(x^2 - 50x)$

$= -2(x^2 - 50x + 625 - 625)$

$= -2(x - 25)^2 - 2(-625)$

$= -2(x - 25)^2 + 1250$

	A=x(100-2x) =100x -2x²	
x		x

100-2x

b) Determine the maximum area that can be enclosed.

b)

$\therefore$ max area is

$1250 m^2$

Today's Homework:

p.194 # 6 **AND**
p. 214 # 4, 6a-e, 7a-e, 8   **AND**
READ p. 225