

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

p.232 # 2def, 4 AND

pp. 203-205 # 1 - 4, 8 - 10 AND 3b, 8a

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:

- Complete the square to obtain the vertex form of a quadratic function.
- Complete the square with functions that involve fractional values.

? Return: CheckPoint 4.1 (Formative)

Finish Correcting Unit 3 Summative

p. 204

$$1a) f(x) = 2(x-3)^2 - 5$$

a is positive
 $V(3, -5) \leftarrow \text{min.} \therefore \text{min.}$

$$3b) f(x) = -(x+1)^2 - 3$$

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

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

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

$(x+1)(x+1)$

p. 204 8. Write the equation of the quadratic function, first in vertex form and then in standard form.

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

$$V(-4, 8); \text{ pt } (2, -4)$$

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

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

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

$$-4 - 8 = 36a$$

$$-12 = 36a$$

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

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

- p. 205 10. The path of a ball is modelled by the quadratic function $h(t) = -5(t - 2)^2 + 23$, where height, $h(t)$, is in metres and time, t , is in seconds.
- What is the maximum height the ball reaches?
 - When does it reach the maximum height?
 - When will the ball reach a height of 18 m?

$$(10) \quad h(t) = -5(t-2)^2 + 23$$

V(2, 23)

a) max height: 23 m

b) when: 2 sec

c) when 18m?

$$18 = -5(t-2)^2 + 23$$

$$0 = -5(t-2)^2 + 23 - 18$$

$$= -5(t^2 - 4t + 4) + 5$$

$$= -5t^2 + 20t - 20 + 5$$

$$= -5t^2 + 20t - 15$$

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

$$= -5(t-3)(t-1)$$

$$\therefore t = 3 \text{ or } t = 1$$

\therefore it is 18m above the ground
at 1 sec (on the way up)
and 3 seconds (on the way down).

4.2 Relating the Standard and Vertex Forms by Completing the Square (Spring 2019) 3/19

MCF 3MI

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

Date: Apr 3/19

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.

$$\begin{aligned} y &= -8(x^2 - 10x) + 7 \\ &= -8(x^2 - 10x + 25 - 25) + 7 \\ &= -8(x-5)^2 - 8(-25) + 7 \\ &= -8(x-5)^2 + 200 + 7 \\ &= -8(x-5)^2 + 207 \end{aligned}$$

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

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

$$\begin{aligned} &= x^2 + 8x + 16 - 16 + 10 \\ &= (x+4)^2 - 6 \end{aligned}$$

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

$$\begin{aligned} &= -4(x^2 - 6x) + 5 \\ &= -4(x^2 - 6x + 3^2 - 3^2) + 5 \\ &= -4(x-3)^2 - 4(-9) + 5 \\ &= -4(x-3)^2 + 36 + 5 \end{aligned}$$

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

$$\begin{aligned} y &= 2(x^2 - \frac{3}{2}x) - 4 \\ &= 2(x^2 - \frac{3}{2}x + (\frac{3}{4})^2 - (\frac{3}{4})^2) - 4 \\ &= 2(x - \frac{3}{4})^2 + 2(\frac{-9}{16}) - 4 \\ &= 2(x - \frac{3}{4})^2 - \frac{9}{8} - \frac{32}{8} \\ &= 2(x - \frac{3}{4})^2 - \frac{41}{8} \end{aligned}$$

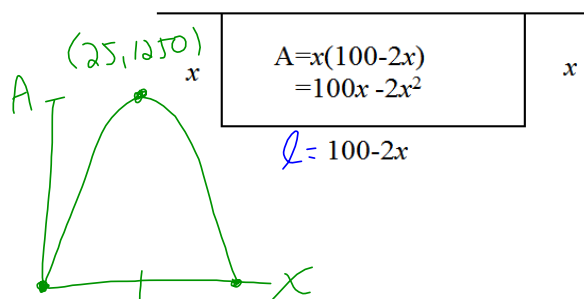
$$\begin{aligned} y &= 2(x^2 - 1.5x) - 4 \\ &= 2(x^2 - 1.5x + (0.75)^2 - 0.75^2) - 4 \\ &= 2(x - 0.75)^2 + 2(-0.5625) - 4 \\ &= 2(x - 0.75)^2 - 1.125 - 4 \\ &= 2(x - 0.75)^2 - 5.125 \end{aligned}$$

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.

$$\begin{aligned}
 A(x) &= 100x - 2x^2 \\
 &= -2x^2 + 100x \\
 &= -2(x^2 - 50x)
 \end{aligned}$$

$$\begin{aligned}
 &= -2(x^2 - 50x + 625 - 625) \\
 &= -2(x - 25)^2 - 2(-625) \\
 &= -2(x - 25)^2 + 1250
 \end{aligned}$$



b) Determine the maximum area that can be enclosed.

is 1250 m^2

$$\begin{aligned}
 &\text{if } x = 25 \\
 &25 \left[\quad \right] 25 \\
 &\quad \textcircled{50} \\
 &l = 100 - 2(25) \\
 &= 100 - 50 \\
 &= 50
 \end{aligned}$$

Today's Homework:

p.194 # 6 **AND**

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

READ p. 225