

Bellwork: Convert the expression into vertex form

$$x^2 - 22x + 103$$

$$x^2 - 22x + \underline{121} - \underline{121} + 103$$

$$(x - 11)^2 - 18$$

$$(11, -18)$$

### Homework 3.5 Solutions

1.  $f(x) = (x+3)^2 + 6$        $V: (-3, 6)$
2.  $f(x) = (x-4)^2 + 1$        $V: (4, 1)$
3.  $f(x) = (x+7)^2 - 28$        $V: (-7, -28)$
4.  $f(x) = (x-1)^2$        $V: (1, 0)$
5.  $f(x) = (x-5)^2 - 19$        $V: (5, -19)$
6.  $f(x) = (x+2.5)^2 - 10.25$        $V: (-2.5, -10.25)$
7.  $f(x) = (x-4.5)^2 - 4.25$        $V: (4.5, -4.25)$
8.  $f(x) = 3(x-2)^2 - 7$        $V: (2, -7)$
9.  $f(x) = -(x+9)^2 + 141$        $V: (-9, 141)$
10.  $f(x) = -4(x+2)^2 + 1$        $V: (-2, 1)$
11.  $f(x) = 2(x+2.5)^2 - 25.5$        $V: (-2.5, -25.5)$
12.  $f(x) = 5(x-1.5)^2 - 11.25$        $V: (1.5, -11.25)$
13.  $f(x) = 2x^2 + 20x + 61$
14.  $f(x) = x^2 - 2x - 7$
15.  $f(x) = -x^2 + 18x - 39$
16.  $f(x) = 4x^2 + 16x + 26$
- ★ 17.
  - A.  $l = 68 - w$
  - B.  $A(w) = lw = (68 - w)(w) = -w^2 + 68w$
  - C. 1156 ft<sup>2</sup>
  - D. 34 ft. x 34 ft.

$$10) -4x^2 - 16x - 15$$

$$-4(x^2 + 4x + \underline{4} - \underline{4}) - 15$$

$$-4(x+2)^2 + 16 - 15$$

$$\boxed{-4(x+2)^2 + 1 \quad v: (-2, 1)}$$

$$16) 4(x+2)^2 + 10$$

$$4(x^2 + 4x + 4) + 10 \quad 4x^2 + 16x + 16 + 10$$

$$\boxed{4x^2 + 16x + 26}$$

Today's Objective

Review for the Unit 3 Test

Don't forget to make your 3x5 notecard!

1. Given the following expressions, circle the one that is not quadratic, and draw a box around the one that is a quadratic in vertex form.

A.  $x^2 + 5x$

B.  $2(x+10)(x+7)$

C.  $x(x+4)(x-10)$

D.  $2(x-13)^2 - 1$

E.  $2(x^2 - 1) + 3(x^2 - 9)$

F.  $7x^2 - 8(x+2)$

2. What is the Greatest Common Factor of:

$30x^3y^2 - 90x^2y^2 + 120x^2y$

$30x^2y$

3. Factor completely:  $\underline{28x^2y} - \underline{49xy^2} + \underline{7xy}$

$$7xy(4x - 7y + 1)$$

4. Factor completely:  $x^2 - 49$

$$(x + 7)(x - 7)$$

5. Factor completely:

$20x^2 - 125$

$5(4x^2 - 25)$

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

6. Factor completely:

$x^2 - 4x - 12$

$x^2 + bx + c$

$$\begin{array}{r} -12 \\ -6 \quad 2 \\ \hline 1 \quad 1 \\ -4 \end{array}$$

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

$x^2 + 2x - 6x - 12$

7. Factor completely:

$$\overbrace{3x^2 - 19x + 6}$$

$$(3x-1)(x-6)$$

$$\begin{array}{ccc} & 18 & \\ -\frac{1}{3} & \times & -\frac{18}{3} \\ & + & \\ & -19 & \end{array}$$

$$\begin{array}{ccc} & -\frac{1}{3} & -\frac{6}{1} \\ & \times & \\ & + & \\ & -19 & \end{array}$$

$$ax^2 + bx + c \quad \begin{array}{ccc} & ac & \\ \frac{a}{9} & \times & \frac{c}{9} \\ & + & \\ & b & \end{array}$$

8. Factor completely:

$$6x^2 - 23x + 10$$

$$(2x-1)(3x-10)$$

$$\begin{array}{ccc} & 60 & \\ -\frac{3}{6} & \times & -\frac{20}{6} \\ & + & \\ & -23 & \end{array}$$

$$\begin{array}{ccc} & -\frac{1}{2} & -\frac{10}{3} \\ & \times & \\ & + & \\ & -23 & \end{array}$$

9. Write a quadratic function in standard form with  $x$ -intercepts at  $(5, 0)$  and  $(-8, 0)$ .

$$(x - 5)(x + 8)$$

$$a(x - a)(x - b)$$

$$(a, 0)(b, 0)$$

	$x - 5$	
$x$	$x^2$	$-5x$
$+ 8$	$8x$	$-40$

$$x^2 + 3x - 40$$

10. Write  $f(x) = x^2 + 10x + 1$  in vertex form.

$$x^2 + 10x + \underline{25} - \underline{25} + 1$$

$$(x + 5)^2 - 24$$

$$(-5, -24)$$

11. Identify the vertex; tell whether it's a maximum or minimum.  $f(x) = x^2 + 16x + 27$

$$x^2 + 16x + \underline{64} - \underline{64} + 27$$

$$(x+8)^2 - 37$$

vertex:  $(-8, -37)$   
positive = minimum

12. What are the  $x$ -intercepts of the function?

$$p(x) = 2(x+5)(x-15)$$

$$(-5, 0) \quad (15, 0)$$

↑ ↑  
switch signs



13. Write the following Vertex Form function in Standard Form.  $f(x) = 2(x-9)^2 - 7$

$$2(x^2 - 18x + 81) - 7$$

$$2x^2 - 36x + 162 - 7$$

$$2x^2 - 36x + 155$$

Use for problems 14 through 16.

Given  $h(t) = -16(t-7)(t+1)$  where  $t$  is time in seconds and  $h(t)$  is the height above the ground in feet of a rock thrown from a cliff. Assume  $t = 0$  corresponds to the moment the rock is thrown.

14. Find the time it will take for the rock to hit the ground. height = 0

$$0 = -16(t-7)(t+1) \quad t-7=0 \quad t+1=0$$

$\swarrow \quad \searrow$        $\swarrow \quad \searrow$   
 $7 \quad +7$        $1 \quad -1$   
 $t = 7 \text{ sec}$        $t = -1 \text{ sec}$

15. From what height was the rock thrown? (initial height) time = 0 sec

$$-16(0-7)(0+1) = -16(-7)(1) = 112 \text{ ft}$$

16. What is the maximum height of the rock?

$$-16(t-7)(t+1) = -16(t^2 - 6t - 7)$$

$$-16(t^2 - 6t + 9 - 9 - 7)$$

$$-16(t-3)^2 + 256$$

$-16 \cdot -16 = 256$

256 feet

