

Turn each quadratic below into vertex form by completing the square.

1) $y = x^2 + 16x + 71$

$$f(x) = (x+8)^2 + 7$$

2) $y = x^2 - 2x - 5$

$$f(x) = (x-1)^2 - 6$$

3) $y = -x^2 - 14x - 59$

$$f(x) = -(x+7)^2 - 10$$

4) $y = 2x^2 + 36x + 170$

$$f(x) = 2(x+9)^2 + 8$$

5) $y = x^2 - 12x + 46$

$$f(x) = (x-6)^2 + 10$$

6) $y = x^2 + 4x$

$$f(x) = (x+2)^2 - 4$$

7) $y = x^2 - 6x + 5$

$$f(x) = (x-3)^2 - 4$$

8) $y = (x+5)(x+4)$

$$f(x) = \left(x + \frac{9}{2}\right)^2 - \frac{1}{4}$$

9) $f(x) = 2x^2 - 4x + 8$

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

10) $y = x^2 - 10x + 5$

$$f(x) = (x-5)^2 - 20$$

11) $y = -3x^2 - 12x - 13$

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

12) $y = x^2 + 7x + 4$

$$f(x) = \left(x + \frac{7}{2}\right)^2 - \frac{33}{4}$$

See next pages for
work

HW 72

$$\textcircled{1} f(x) = \underbrace{x^2 + 16x + 64}_{\downarrow} - \underbrace{71 - 64}_{\downarrow}$$

$$(x+8)^2 + 7$$

$$a = 1 \text{ or } 1^2$$

$$\frac{b}{2a} = \frac{16}{2(1)} = 8$$

$$c = 8^2 \text{ or } 64$$

$$\textcircled{2} f(x) = \underbrace{x^2 - 2x + 1}_{\downarrow} - \underbrace{5 - 1}_{\downarrow}$$

$$(x-1)^2 - 6$$

$$a = 1$$

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

$$c = (-1)^2 \text{ or } 1$$

$$\textcircled{3} f(x) = \underbrace{-x^2 - 14x - 59}_{\downarrow}$$

$$-\underbrace{(x^2 + 14x + 49)}_{\downarrow} - \underbrace{59 + 49}_{\downarrow}$$

$$-(x+7)^2 - 10$$

b/c in the front
half a - times a +
is neg. so its actually
subtracted in the
front half

$$a = 1$$

$$\frac{b}{2a} = \frac{14}{2(1)} = 7$$

$$c = 7^2 \text{ or } 49$$

$$\textcircled{4} f(x) = \underbrace{2x^2 + 36x + 170}_{\downarrow}$$

$$2\underbrace{(x^2 + 18x + 81)}_{\downarrow} + 170 - 2(81)$$

$$2(x+9)^2 + 170 - 162$$

$$2(x+9)^2 + 8$$

b/c in the front
it gets multiplied
by 2

$$a = 1$$

$$\frac{b}{2a} = \frac{18}{2(1)} = 9$$

$$c = 9^2 \text{ or } 81$$

$$\textcircled{5} f(x) = \underbrace{x^2 - 12x + 36}_{\downarrow} + \underbrace{416 - 36}_{\downarrow}$$

$$(x-6)^2 + 10$$

$$a=1 \quad \frac{-12}{2(1)} = -6$$

$$b=-12$$

$$c = (-6)^2 \text{ or } 36$$

$$\textcircled{6} f(x) = \underbrace{x^2 + 4x + 4}_{\downarrow} - \underbrace{4}_{\swarrow}$$

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

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

$$b=4$$

$$c = 2^2 \text{ or } 4$$

$$\textcircled{7} y = \underbrace{x^2 - 6x + 9}_{\downarrow} + \underbrace{5 - 9}_{\swarrow}$$

$$(x-3)^2 - 4$$

$$a=1 \quad \frac{-6}{2(1)} = -3$$

$$b=-6$$

$$c = (-3)^2 \text{ or } 9$$

$\textcircled{8} y = (x+5)(x+4)$ change to standard First!

$$x(x+4) + 5(x+4)$$

$$x^2 + 4x + 5x + 20$$

$$x^2 + 9x + 20$$

$$\underbrace{x^2 + 9x + \frac{81}{4}}_{\downarrow} + \underbrace{20 - \frac{81}{4}}_{\frac{80}{4} - \frac{81}{4}}$$

$$\left(x + \frac{9}{2}\right)^2 - \frac{1}{4}$$

$$a=1 \quad \frac{9}{2(1)} = \frac{9}{2}$$

$$b=9$$

$$c = \left(\frac{9}{2}\right)^2 \text{ or } \frac{81}{4}$$

