6.4 57 $x^2 - 7x + \frac{49}{4}$

$\frac{49}{4} = \left(-\frac{7}{2}\right)^2$

$(x)^2$ $\left(-\frac{7}{2}\right)^2$

$-\frac{7}{2}x(2)$

$-7x$

$\left(x - \frac{7}{2}\right)^2$

$-\frac{7}{2}x - \frac{7}{2}x$

$-\frac{14}{2}x$

$-7x$

69

$$\underbrace{x^2 + 6x + 9} - y^2$$

$$(\underbrace{x + 3})^2 - y^2$$

$$[(x+3)-y][(x+3)+y]$$

$$(x+3-y)(x+3+y)$$

$$x^2 + 6x + 9$$

$$(x)^2 \quad 3 \cdot x \cdot 2 \quad (3)^2$$

$$(x+3)^2$$

ex #43

start

$4a^2 + 12a + 9$

prod = 36

sum 12

6(6)

$4a^2 + 6a + 6a + 9$

$2a(2a+3) + 3(2a+3)$

$(2a+3)(2a+3)$

$(2a+3)^2$

6.3 35

$$4x^2 + 2x - 6$$

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

prod -6
sum 1

$3(-2)$

$$2[2x^2 \underbrace{- 2x + 3x}_{} - 3]$$

$$2[2x(x-1) + 3(x-1)]$$

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

6.4 71 $\underbrace{x^2 + 2xy + y^2}$ $- 9$

$(x)^2$

$x \cdot y \cdot 2$ $(y)^2$

$(x + y)^2 - 9$

$[(x+y) - 3][(x+y) + 3]$

$(x+y-3)(x+y+3)$

6.5 3 $a^3 + 8$

$(a)^3 + (2)^3$

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

a a^2

a

a 2a

2

2 4

2

ex $a^3 - 8$

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

6.5 21 $10a^3 - 640b^3$ $(a)^3$

$10(a^3 - 64b^3)$ $(4b)^3$

$10(a-4b)(a^2+4ab+16b^2)$

$a \quad a^2$

a

$a \quad 4ab$

$4b$

$\left.\begin{matrix}4b\\4b\end{matrix}\right\} 16b^2$

$\boxed{6.7}$ Solving Equations by Factoring

Any equation written $ax^2 + bx + c = 0$ a quadratic

$a \neq 0$

$ax^2 + bx + c = 0$ is called standard form.

Zero Factor Property

Let A and B be algebraic expressions

$A \cdot B = 0$, Then $A = 0$ or $B = 0$

(24) $-x^2 - x - 6 = 0$

prod -6
sum -1
$(-3)(2)$

$(x-3)(x+2) = 0$

$x - 3 = 0$ or $x + 2 = 0$

$+3 \quad +3$ $\qquad$ $-2 \quad -2$

$x = 3$ or $x = -2$

$x^2 - 3x + 2x - 6 = 0$

$x(x-3) + 2(x-3) = 0$

$(x-3)(x+2) = 0$

STRATEGY for solving a Quadratic Equation by Factoring

1. Put in standard form
2. Factor Completely
3. Use the zero-factor property to set each variable factor from #2 equal to zero
4. Solve the equations you get in #3

ex

$$2x^2 = 3x + 20$$
$$\underline{-3x-20 \quad -3x \quad -20}$$

$$2x^2 - 3x - 20 = 0$$ now in standard form

$$2x^2 - 8x + 5x - 20 = 0$$ prod -40 $\quad 2(20)$

sum -3 $\quad -8(5)$

$$2x(x-4) + 5(x-4) = 0$$

$$(x-4)(2x+5) = 0$$

$$x - 4 = 0 \qquad 2x + 5 = 0$$
$$\underline{+4 \quad +4} \qquad \underline{-5 \quad -5}$$
$$\frac{2x}{2} = \frac{-5}{2}$$

$$x = 4 \quad \text{OR} \quad x = \frac{-5}{2}$$

$$\left\{-\frac{5}{2}, 4\right\}$$

ex $16t^2 - 64t + 48 = 0$

prod 3 $(-3)(-1)$

sum -4

$4(4t^2 - 16t + 12) = 0$

$4 \cdot 4(t^2 - 4t + 3) = 0$

$16(t-3)(t-1) = 0$

$t - 3 = 0$ OR $t - 1 = 0$

$t = 3$ $\qquad$ $t = 1$

#74

$$\underbrace{(a+2)(a-3)} = -2a$$

$$a^2 - a - 6 = -2a$$
$$\underline{+2a \qquad\qquad +2a}$$
$$a^2 + a - 6 = 0$$
$$(a+3)(a-2) = 0$$
$$a = -3 \text{ or } a = 2$$

prod -6
sum 1
$3(-2)$

6.5 29 $t^3 + \frac{1}{27}$

$\left(\frac{1}{3}\right)^3 = \frac{1}{27}$

$t^3 + \left(\frac{1}{3}\right)^3$

$(t)^3 + \left(\frac{1}{3}\right)^3$

answer $\left(t + \frac{1}{3}\right)\left(t^2 - \frac{1}{3}t + \frac{1}{9}\right)$

$$\left.\begin{array}{l} t \\ \cdot t \end{array}\right\} t^2$$

$$\left.\begin{array}{l} \cdot t \\ \cdot \frac{1}{3} \end{array}\right\} \frac{1}{3}t$$

$$\left.\begin{array}{l} \cdot \frac{1}{3} \\ \cdot \frac{1}{3} \end{array}\right\} \frac{1}{9}$$

$$\begin{array}{r} t^2 - \frac{1}{3}t + \frac{1}{9} \\ t + \frac{1}{3} \\ \hline t^3 - \frac{1}{3}t^2 + \frac{1}{9}t \qquad\qquad \\ \frac{1}{3}t^2 - \frac{1}{9}t + \frac{1}{27} \\ \hline t^3 + \frac{1}{27} \qquad\qquad\qquad \end{array}$$

$\frac{1}{3}\left(\frac{1}{9}\right)$

memorize these

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

opposite

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

a a	a^2
a b	ab
b b	b^2

$$\begin{array}{r} a^2 - ab + b^2 \\ a + b \\ \hline a^3 - a^2b + ab^2 \\ a^2b - ab^2 + b^3 \\ \hline a^3 + b^3 \end{array}$$

(39) $64x^6 - y^6$

$(x^2)^3 = x^6$

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

$a = 4x^2$

$b = y^2$

$(4x^2 - y^2)\overbrace{(16x^4 + 4x^2y^2 + y^4)}$

1st term squared

1st x 2nd with opposite sign

2nd term squared

$4x^2 \cdot 4x^2 = 16x^4$

$4x^2 \cdot y^2 = 4x^2y^2$

$y^2 \cdot y^2 = y^4$