

Feb. 21, 2018

Sect. 5-4

Trinomial Factoring

$$x^2 + bx + c$$

$$ax^2 + bx + c$$

e.g. $x^2 + 5x + 6$

$$\left(\quad \right) \left(\quad \right)$$

$$x^2 + 5x + 6$$
$$(x + 2)(x + 3)$$

$$\begin{array}{r|l} 6 & \\ \hline 1 & 6 \\ 2 & 3 \\ -1 & -6 \\ -2 & -3 \end{array}$$

$$x^2 - 8x + 12$$
$$(x - 2)(x - 6)$$

$$\begin{array}{r|l} 12 & \\ \hline 1 & 12 \\ -1 & -12 \\ 2 & 6 \\ -2 & -6 \\ 3 & 4 \\ -3 & -4 \end{array}$$

$$x^2 - 8x - 20$$

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

-20	
1	-20
-1	20
2	-10
-2	10
4	-5
-4	5

$$x^2 - 2x - 15$$

$$(x+3)(x-5)$$

-15	
1	-15
-1	15
3	-5
-3	5

$$x^2 + 5xy - 24y^2$$
$$(x - 3y)(x + 8y)$$

	-24
1	-24
-1	24
2	-12
-2	12
3	-8
-3	8
4	-6
-4	6

#1-40A

Factor by Grouping

$$6x^3 - 9x^2 + 4x - 6$$

$$(6x^3 - 9x^2) + (4x - 6)$$

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

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

$$\begin{array}{r} 2 \\ \hline 6x^3 \\ 3x^2 \end{array}$$

$$\begin{array}{r} x^3 + x^2 + x + 1 \\ \underline{x^3 + x^2} \\ x + 1 \\ \underline{x + 1} \\ 0 \end{array}$$

$$x^3 + x^2 + x + 1$$

$$\left(x^3 + x^2 \right) + \left(x + 1 \right)$$

$$x^2(x + 1) + 1(x + 1)$$

$$(x + 1)(x^2 + 1)$$

$$\begin{aligned} & x^3 + 2x^2 - x - 2 \\ & (x^3 + 2x^2) - (x + 2) \\ & x^2(x + 2) - 1(x + 2) \\ & (x + 2)(x^2 - 1) \end{aligned}$$

$$\begin{aligned}
 & \overbrace{3x^2 + 5x + 2} \\
 & \quad \swarrow \quad \searrow \\
 & 3x^2 + 2x + 3x + 2 \\
 & (3x^2 + 3x) + (2x + 2) \\
 & 3x(x+1) + 2(x+1) \\
 & (x+1)(3x+2)
 \end{aligned}$$

$$\begin{array}{r|l}
 3 \cdot 2 = 6 & \\
 \hline
 1 & 6 \\
 -1 & -6 \\
 \hline
 2 & 3 \\
 -2 & -3
 \end{array}$$

$$\begin{array}{l}
 \overbrace{2x^2 - 7x - 4} \\
 \swarrow \quad \searrow \\
 2x^2 + 1x - 8x - 4 \\
 (2x^2 + 1x) - (8x + 4) \\
 1x(2x + 1) - 4(2x + 1) \\
 (2x + 1)(x - 4)
 \end{array}$$

$$\begin{array}{r}
 2 \cdot -4 = -8 \\
 \hline
 \begin{array}{c|c}
 1 & -8 \\
 -1 & 8 \\
 2 & -4 \\
 -2 & 4
 \end{array}
 \end{array}$$

$$2x^2 - 7x - 4$$

$$x^2 - 7x - 8$$

$$(x+1)(x-8)$$

Now "undo" the 2

$$\left(x + \frac{1}{2}\right)\left(x - \frac{8}{2}\right)$$

$$(2x+1)(x-4)$$

1	-8
-1	8
2	-4
-2	4

$$2x^2 + 5x - 12$$
$$x^2 + 5x - 24$$
$$(x - 3)(x + 8)$$
$$\left(x - \frac{3}{2}\right)\left(x + \frac{8}{2}\right)$$
$$(2x - 3)(x + 4)$$

	-24	
3		-8
-3		8

$$12x^2 + 28x - 24$$

$$4[3x^2 - 7x - 6]$$

$$4[x^2 - 7x - 18]$$

$$4(x - 9)(x + 2)$$

$$4\left(x - \frac{9}{3}\right)\left(x + \frac{2}{3}\right)$$

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

~~-244??~~

$$\begin{array}{r|l} -18 & \\ \hline 2 & -9 \\ -2 & 9 \end{array}$$