

In general, we will be factoring  
quadratic trinomials of the  
form:  $\underline{ax^2} + \underline{bx} + \underline{c}$

Today, we will be factoring

$$x^2 + bx + c \quad (a=1)$$

$$x^2 + bx + c = (x+q)(x+p)$$

Factors

$$x^2 + bx + c = x^2 + qx + px + pq$$

$$x^2 + \underline{bx} + \underline{c} = x^2 + \underline{(q+p)x} + \underline{pq}$$

In order to factor  $x^2 + bx + c$

We need to find  $p, q$  so that

$$p + q = b \quad \text{AND} \quad p \cdot q = c$$

NOTE: this ONLY works if  
 $a=1$

Ex 1 Factor  $x^2 + \overset{b}{6}x + \overset{c}{8}$

$$\begin{array}{l|l} \otimes +8 & (2, 4), (1, 8), (-2, -4), (-1, -8) \\ \oplus +6 & 6 \quad 9 \end{array}$$

$$x^2 + 6x + 8 = (x+2)(x+4)$$

check  $x^2 + 2x + 4x + 8$   
 $x^2 + 6x + 8$  (✓)

$$\begin{array}{l|l} \otimes +8 & \Rightarrow (2, 4) \Rightarrow (x+2)(x+4) \\ \oplus +6 & \end{array}$$

Ex 2 Factor  $x^2 - 15 + 2x$   
 $= x^2 + \overset{b}{2}x - \overset{c}{15}$

$$\begin{array}{l|l} \otimes -15 & (3, -5), (-3, 5), (1, 15), (-1, 15) \\ \oplus +2 & -2 \quad 2 \end{array}$$

$$x^2 + 2x - 15 = (x+5)(x-3)$$

Ex 3 Factor  $x^2 - 5x - 4$

$$\begin{array}{l|l} \otimes -4 & (-2, 2), (1, -4), (-1, 4) \\ \oplus -5 & 0 \quad -3 \quad 3 \end{array}$$

No factors exist  $\therefore$   
cannot be factored.

Ex 4 Factor  $-2x^3 + 2x^2 + 24x$

$$= x \left( \underbrace{-2x^2}_{-2} + \underbrace{2x}_{-2} + \underbrace{24}_{-2} \right)$$

$$= -2x(x^2 - 1x - 12)$$

⊗  $-12 \mid (1, -12), (-1, 12), (3, -4), (-3, 4), (6, -2), (2, 6)$

⊕  $-1 \mid -11 \quad 11 \quad -1$

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

Ex 5 Factor  $x^2 - \overset{b}{5y}x + \overset{c}{6y^2}$

⊗  $+6y^2 \mid (2y, 3y), (-2y, -3y), (1y, 6y), (-1y, -6y)$

⊕  $-5y \mid 5y \quad -5y$

$$= (x-2y)(x-3y)$$



Ex 7 Factor  $x^4 - 16$

$$\sqrt{1^{\text{st}}} = \sqrt{x^4} = x^2$$

$$\sqrt{2^{\text{nd}}} = \sqrt{16} = 4$$

$$\sqrt{1^{\text{st}}} = \sqrt{x^2} = x$$

$$\sqrt{2^{\text{nd}}} = \sqrt{4} = 2$$

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

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

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$$x^2 + 4 = x^2 + 0x + 4$$

$$\begin{array}{c|c} \textcircled{x} +4 & (1, 4), (-1, -4), (2, 2), (-2, -2) \end{array}$$

$$\begin{array}{c|c} \textcircled{+} 0 & 5 \quad -5 \quad 4 \quad -4 \end{array}$$