

# Factoring Checklist ("undo" FOIL)

## 1. Greatest Common Factor (GCF)

25 & 15 what is the GCF?

$$\begin{array}{r} 1 \\ \textcircled{5} \\ 25 \end{array} \quad \begin{array}{r} 1 \\ 3 \\ \textcircled{5} \\ 15 \end{array}$$

ex  $4x^5 + 8x^3 - 16x^2$

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

$$\frac{4x^5}{4x^2} = x^3$$

$$\frac{8x^3}{4x^2} = 2x$$

$$\frac{-16x^2}{4x^2} = -4$$

→ Check by distribution: should get the original expression

ex

$$\boxed{5x^6 - 15x^3 + 10x^2}$$
$$\boxed{5x^2 (x^4 - 3x + 2)}$$

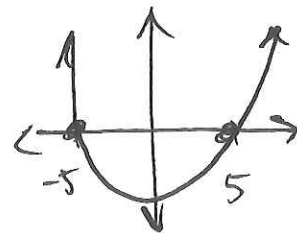
\* REVIEW Exponent Rules!!

## 2. Difference of 2 Squares subtraction      ↳ 2 perfect square

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

ex  $x^2 - 25 = x^2 - 5^2 = (x+5)(x-5)$

$$y = x^2 - 25 \quad y = (x+5)(x-5)$$



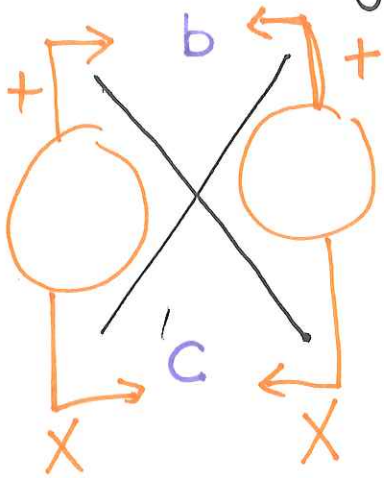
$$-x^2 + 9 = -1(x^2 - 9) = -1(x+3)(x-3)$$

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

$$2x^2 - 8 = 2(x^2 - 4) = \textcircled{2}(x+2)(x-2)$$

don't lose GCF!!

3. 3 terms:  $ax^2+bx+c$   $\begin{cases} a=1 \end{cases}$   
 "Magic X"

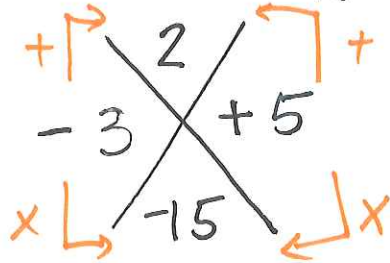


$$(x+5)(x-3) = x^2 - 3x + 5x - 15$$

$$= x^2 + 2x - 15$$

Example

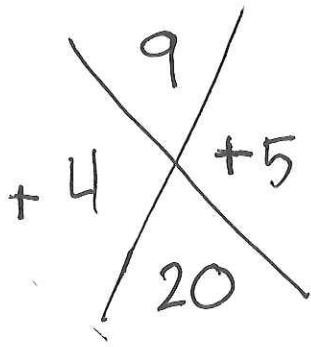
Factor  $x^2+2x-15$



$$= \boxed{(x-3)(x+5)}$$

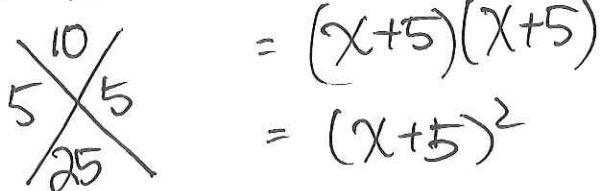
Factor  $x^2+9x+20$

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



Factor

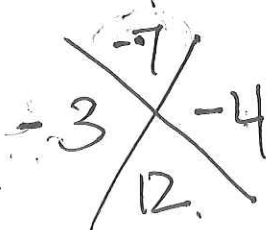
1.  $x^2+10x+25$



$$= (x+5)(x+5)$$

$$= (x+5)^2$$

2.  $x^2-7x+12$



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

# Ex Factor

①  $16x^5 + 24x^3 - 4x^2$   
GCF  $4x^2(4x^3 + 6x - 1)$

②  $x^2 - 25 = (x+5)(x-5)$

$$x^2 - 5^2$$

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

③  $3x^2 - 27$

GCF  $3(x^2 - 9) = 3(x+3)(x-3)$

Diff of 2 squares

④  $x^2 + 9x + 20 = (x+5)(x+4)$

$a=1$   
Magic X

$$\begin{array}{r} + \left( \begin{array}{c} 9 \\ +5 \end{array} \right) + \\ +5 \quad +4 \\ \hline 20 \\ \left( \begin{array}{c} x \\ +c \end{array} \right) x \end{array}$$

⑤  $x^2 + 10x + 25$

$$\begin{array}{r} 10 \\ +5 \quad +5 \\ \hline 25 \end{array}$$

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

⑥  $x^2 - 7x + 12$

$$\begin{array}{r} -7 \\ -4 \quad -3 \\ \hline 12 \end{array}$$

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

⑦  $2x^2 - 6x + 4$

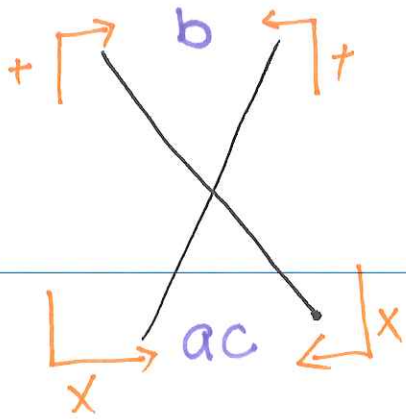
don't lose GCF!!

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

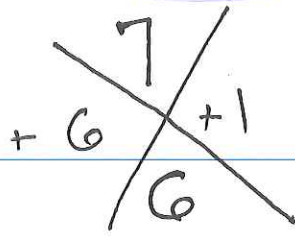
$$\begin{array}{r} -3 \\ -2 \quad -1 \\ \hline 2 \end{array}$$

4. 3 terms  $ax^2+bx+c$   $\begin{cases} a \neq 1 \text{ or } 0 \end{cases}$

"Bottoms up"



Ex: Factor  $2x^2+7x+3$   
 $a=2$   $b=7$   $c=3$

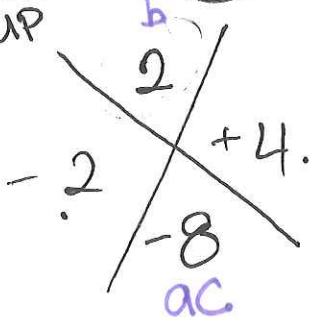


$$(x + \frac{3}{2})(x + 1)$$

\* simplify fractions \*

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

Factor  $8x^2+2x-1$   
 Bottoms up  $a=8$   $b=2$   $c=-1$

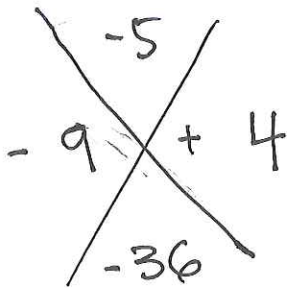


"a times c"

$$(x - \frac{2}{8})(x + \frac{4}{8})$$

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

Factor  $6x^2-5x-6$   
 $a=6$   $b=-5$   $c=-6$



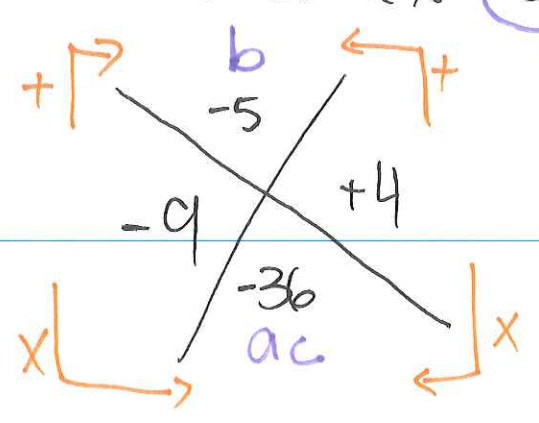
$$(x - \frac{3}{6})(x + \frac{4}{6})$$

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

5. Grouping  $\rightarrow ax^2 + bx + c$   $a \neq 1$  or 0

$\rightarrow$  4 terms (Not quadratic)

Factor  $6x^2 - 5x - 6$



split up into 2 terms

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

Group into pairs

$\rightarrow$  Find GCF for each pair

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

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

$$\begin{aligned} & 5(x+1) \\ & = 5(x) + 5(1) \end{aligned}$$