



Warm Up - Common factoring :)

1. $6x^3y^7z - 12x^7y^5 + 33x^4yz^3$

2. $45a^9b^4c^2 + 18a^4c^5 - 72a^3b^2c^2$

3. $17m^3n^4 - 5m^4n^8 + 3m^9n$

$$1. \quad \underline{6x^3y^7z} - \underline{12x^7y^5} + \underline{33x^4yz^3}$$
$$= 3xy'(2y^6z - 4x^4y^4 + 11x'z^3)$$

$$2. \quad \underline{45a^9b^4c^2} + \underline{18a^4c^5} - \underline{72a^3b^2c^2}$$
$$= 9a^3c^2 (5a^6b^4 + 2a^1c^3 - 8b^2)$$

$$3. \quad \underline{17m^3n^4} - \underline{5m^4n^8} + \underline{3m^9n^1}$$
$$= m^3n^1 (17n^3 - 5m^1n^7 + 3m^6)$$

$$\begin{aligned} 23. & -10e'y^5 - 30e^2y^2 + 45e'y' - 15e' \\ & = 5e'(-2y^5 - 6e'y^2 + 9y' - 3) \end{aligned}$$

$$\begin{aligned} 31. & 42a^2b^2 + 7ab' + 6b \\ & = b'(42a^2b' + 7a + 6) \end{aligned}$$

$$x^2-3x-4$$

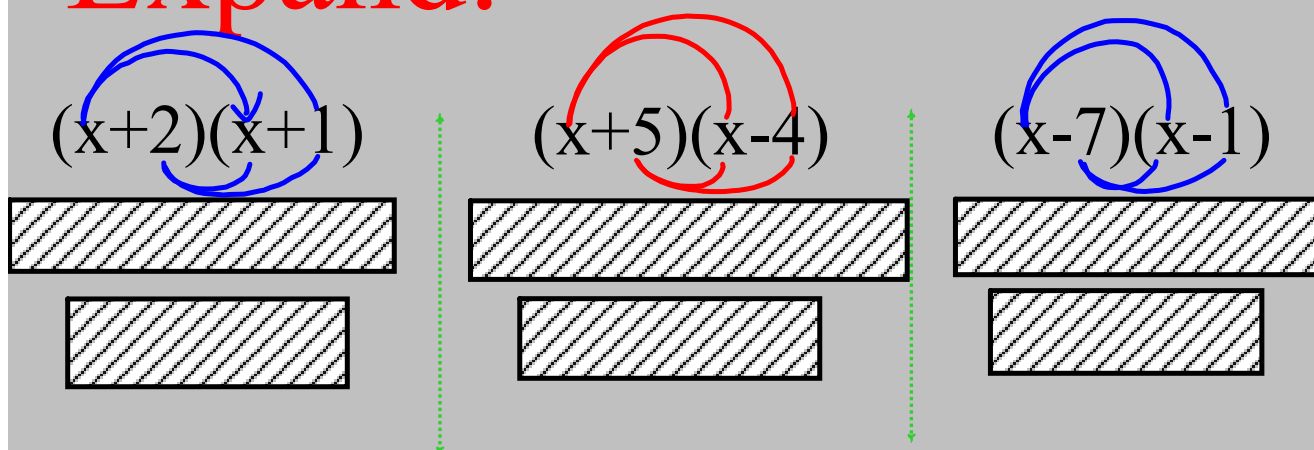
$$y^4+11y^2+30$$

TRINOMIALS

$$z^2+5zy+6y^2$$

$$m^2-8m+16$$

Expand:



Krow sdrawkcab

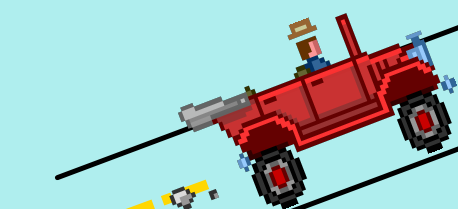


$$1. x^2 + 19x + 18$$

$$= (x + 18)(x + 1)$$

$$\begin{array}{l} \underline{18} \times \underline{1} = 18 \\ \underline{18} + \underline{1} = 19 \end{array}$$

Rules of the road...



$$x^2 - 5x + 6$$

*Sign of the
biggest number.*

*Signs are
the same.*

$$x^2 + 5x - 6$$

*Sign of the
biggest number.*

*Signs are
different.*

$$2. \quad x^2 - 5x + 6$$

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

$$\begin{array}{r} \underline{-2} \quad x - 3 = \oplus 6 \\ \underline{-2} + \underline{-3} = \ominus 5 \end{array}$$

Same \nearrow
Both $\ominus \nearrow$



$$\begin{array}{r} -1 \quad x - 6 \\ -2 \quad x - 3 \end{array}$$

$$r^2 - 5r = -50$$
$$(r+5)(r-10)$$

$$\begin{array}{l} \text{---} \times \text{---} = \ominus 50 \\ \text{---} + \text{---} = \ominus 5 \end{array}$$

↗ Diff
↓ Big ⊖

$$\begin{array}{l} 1 \times -50 \\ 2 \times -25 \\ 5 \times -10 \end{array}$$

$$\begin{aligned} \underline{-2} \times \underline{-2} &= \oplus 4 \quad \rightarrow \text{same} \\ \underline{-2} + \underline{-2} &= \ominus 4 \quad \downarrow \text{Both } \ominus \end{aligned}$$

$$\begin{aligned} \underline{-2} \times \underline{5} &= \ominus 10 \quad \rightarrow \text{Diff} \\ \underline{-2} + \underline{5} &= \oplus 3 \quad \downarrow \text{Big } \oplus \end{aligned}$$

$$\begin{aligned} \underline{2} \times \underline{9} &= \oplus 18 \quad \rightarrow \text{same} \\ \underline{2} + \underline{9} &= \oplus 11 \quad \downarrow \text{Both } \oplus \end{aligned}$$

$$\begin{aligned} \underline{4} \times \underline{-5} &= \ominus 20 \quad \rightarrow \text{Diff} \\ \underline{4} + \underline{-5} &= \ominus 1 \quad \downarrow \text{Big } \ominus \end{aligned}$$

$$\begin{aligned} \underline{-5} \times \underline{-5} &= \oplus 25 \quad \rightarrow \text{same} \\ \underline{-5} + \underline{-5} &= \ominus 10 \quad \downarrow \text{Both } \ominus \end{aligned}$$

$$\begin{array}{l} 1 \times 18 \\ 2 \times 9 \\ -1 \times -20 \\ -5 \times -5 \\ +1 \times -20 \\ 2 \times -10 \\ 4 \times -5 \end{array}$$

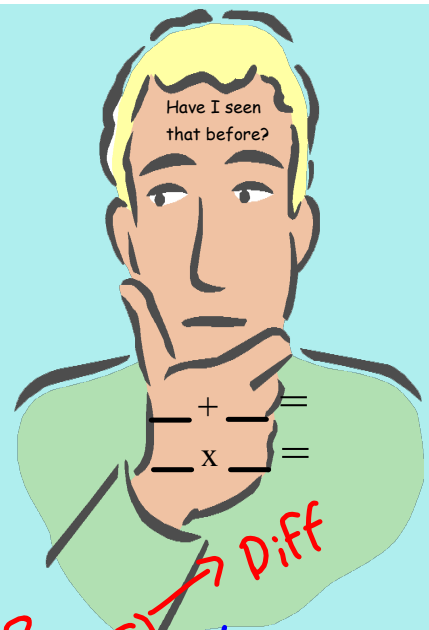
$$3. \quad 2x^2 + 10x - 48$$

$$2(x^2 + 5x - 24)$$

$$= 2(x - 3)(x + 8)$$

$$\begin{array}{l} -1 \quad x + 24 \\ -2 \quad x + 12 \\ -3 \quad x + 8 \end{array}$$

$$\begin{array}{l} -3 \times 8 = \ominus 24 \\ -3 + 8 = \oplus 5 \\ \downarrow \text{Big } \oplus \end{array}$$



4. $3x^2 - 18x - 120$



$$\begin{array}{r} _ + _ = \\ _ x _ = \end{array}$$

$$2x^2 + 7x + 3$$

$$\left(\frac{2x+1}{2} \frac{2x+6}{2}\right)$$

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

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



$$\begin{array}{l} \frac{1}{1} \times \frac{6}{6} = \oplus 6 \rightarrow \text{Same.} \\ \frac{1}{1} + \frac{6}{6} = \oplus 7 \\ \downarrow \\ \text{Both } \oplus \end{array}$$

$$1 \times 6 =$$

$$x^2 - 5x - 24$$

$$= (x+3)(x-8)$$

Check \checkmark

$$x^2 - \underline{8x} + \underline{3x} - 24$$

$$x^2 - 5x - 24$$

$\frac{3}{3} x - 8 = \ominus 24$ (Diff)
 $\frac{3}{3} + -8 = \ominus 5$ (Big \ominus)

$$\begin{array}{r}
 +1 x - 24 \\
 +2 x - 12 \\
 +3 x - 8
 \end{array}$$

$$x^2 + 12x + 35$$
$$(x+5)(x+7)$$

Diagram illustrating the factoring process for $x^2 + 12x + 35$. The constant term 35 is circled in red with an arrow pointing to the word "Same". The coefficient 12 is circled in red with an arrow pointing to the word "Both +".

$$\begin{array}{r} \underline{\quad} x \quad \underline{\quad} = \underline{\quad} 35 \\ \underline{\quad} + \quad \underline{\quad} = \underline{\quad} 12 \end{array}$$

Both +

$$\begin{array}{l} 1 \times 35 \\ 5 \times 7 \end{array}$$

$$\begin{aligned} & 2x^2 + 12x - 54 \\ & 2(x^2 + 6x - 27) \\ & = 2(x - 3)(x + 9) \end{aligned}$$

$$\begin{aligned} \underline{-3} \times \underline{9} &= \ominus 27 \quad \nearrow \text{Diff} \\ \underline{-3} + \underline{9} &= \oplus 6 \quad \searrow \text{Big } \oplus \end{aligned}$$

$$\begin{aligned} & -1x + 27 \\ & -3x + 9 \end{aligned}$$

$$5x^2 + 34x - 7$$



$$\left(\frac{5x-1}{5} \frac{5}{5}\right) \left(\frac{5x+35}{5} \frac{5}{5}\right)$$

$$= (x-1)(x+7)$$

$$= (5x-1)(x+7)$$

$$\begin{aligned} -1 \times 35 &= -35 \\ -1 + 35 &= +34 \\ &\downarrow \text{Big } (+) \\ &\text{Diff} \end{aligned}$$

Check

$$\begin{aligned} 5x^2 + 35x - 1x - 7 \\ 5x^2 + 34x - 7 \quad \checkmark \end{aligned}$$

$$\overbrace{(6x^2 - 7x + 2)}^x$$

$$\begin{aligned} & \left(\frac{6x-3}{6} \quad \frac{6x-4}{6}\right) \\ & \left(x-\frac{1}{2} \quad x-\frac{2}{3}\right) \\ & = (2x-1)(3x-2) \end{aligned}$$



~~Wrong~~

$$\begin{aligned} _ x _ &= +12 \\ _ + _ &= -7 \\ _ - _ & \end{aligned}$$

Same.
Both ⊖

$$\begin{aligned} -1 & x - 12 \\ -2 & x - 6 \\ -3 & x - 4 \end{aligned}$$

$$2x^2 + 13x - 24$$

$$\left(\frac{2x-3}{2}\right) \left(\frac{2x+16}{2}\right)$$

$$\left(x - \frac{3}{2}\right) (x+8)$$

$$= (2x-3)(x+8)$$

$$\begin{array}{l} _ x _ = \ominus 48 \\ _ + _ = \oplus 13 \end{array}$$

↗ Diff
 ↓ Big ⊕

$$-1x + 48$$

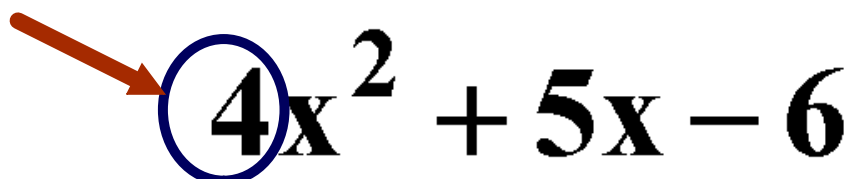
$$-2x + 24$$

$$-3x + 16$$

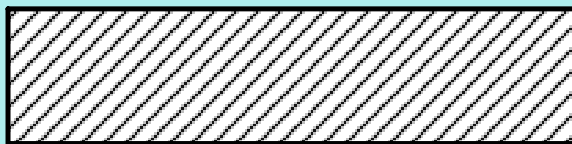
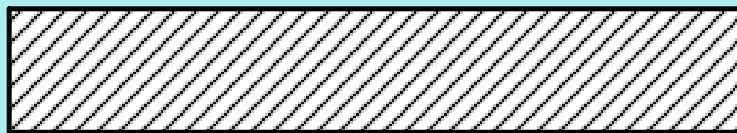
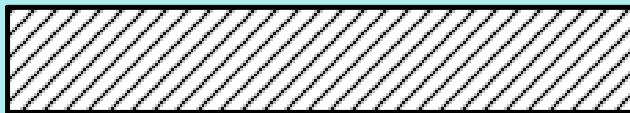
Check out the sheet. :)

DECOMPOSITION

If there is a numerical coefficient in front of x , then we use a method for factoring called *DECOMPOSITION*.


$$4x^2 + 5x - 6$$

$$2x^2 + 5x + 3$$



$$2x^2+5x+3$$

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

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



$$\underline{\quad} + \underline{\quad} = 5$$

$$\underline{\quad} \times \underline{\quad} = 6$$

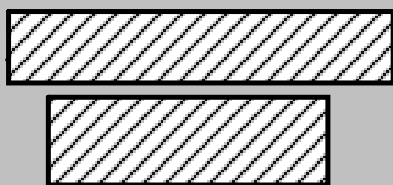
Check out pages 167,177 and 178.

Numbers _____ , 13 and 15. :)

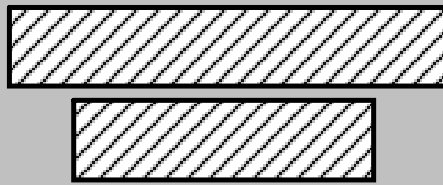


Expand:

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



$$(2x+5)(3x-4)$$



$$(2x-7)(x-1)$$

