

5.2 Part 1 FACTORING

Review...

Find the factors of 24.

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

Factors are numbers or values multiplied together to get another number/value.

Multiply $(x + 2)(x + 3)$.

FOIL

$$x^2 + 3x + 2x + 6$$

$$\boxed{x^2 + 5x + 6}$$

When factoring,
always check for
a GCF first!

GCF = Greatest Common Factor

Example 1: Find the GCF of $12x^3y^2$ and $42x^2y^4$.

$$12 \Rightarrow 1 \ 2 \ 3 \ 4 \ 6 \ 12$$

$$42 \Rightarrow 1 \ 2 \ 3 \ 6 \ 7 \ 14 \ 21 \ 42$$

$$\text{GCF} = 6x^2y^2$$

Examples: Factor by taking the GCF out.

2. $11x + 44x^2y$ $\text{GCF} = 11x$

$$11x(1 + 4xy)$$

3. $25a^2b^2 - 30ab^3 + 15a^3b$ $\text{GCF} = 5ab$

$$5ab(5ab - 6b^2 + 3a^2)$$

Factor the trinomial: $x^2 + 6x + 8$

STEP 1: Make sure the trinomial is written in ascending or descending order.

STEP 2: Make a sum & product chart.

Multiply the coefficient and the constant to find the PRODUCT.

$$\begin{array}{c} \text{PRODUCT} \\ \swarrow \quad \searrow \\ \textcircled{1}x^2 + \textcircled{6}x + \textcircled{8} \end{array}$$

The coefficient for the middle term is the SUM.

SUM 6	PRODUCT 8
2+4	1·8 -1·-8
	<u>2·4</u> -2·-4

STEP 3: Divide each number by the coefficient of the first term.

$$\frac{2}{1} \quad \frac{4}{1}$$

STEP 4: If possible, reduce.

STEP 5: Denominator = constant/coefficient of first term

Numerator = constant/coefficient of last term

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

4. Factor $6b^2 + 22b + 20$. $ACF=2$

$$2 \left(\underbrace{3b^2}_{\text{m}} + \underbrace{11b}_{\text{m}} + \underbrace{10}_{\text{m}} \right)$$

$$\frac{2}{1} = \frac{\cancel{6}}{\cancel{3}}$$

$$\frac{5}{3}$$

Sum 11	product 30
$b+5$	$b \cdot 5$

$$2(1b+2)(3b+5)$$

5. Factor $20f^2 + 5f - 15$.

6. Factor $3p^2 + 10p + 3$.

Why do we learn to factor?
To solve equations!

ZERO PRODUCT PROPERTY

If the product of 2 factors is zero,
then at least one of the factors
must be zero.

In other words...

If $ab = 0$, then $a = 0$ or $b = 0$.

7. Solve $x^2 - 3x - 10 = 0$.

SUM -3	product -10
$2 + -5$	$1 \cdot -10$ $-1 \cdot 10$ $2 \cdot -5$ $-2 \cdot 5$
2	-5
$\frac{2}{1}$	$\frac{-5}{1}$

$$(1x + 2)(1x - 5) = 0$$

$$\begin{array}{l}
 \swarrow \\
 x + 2 = 0 \\
 -2 \quad -2 \\
 \hline
 x = -2
 \end{array}$$

$$\begin{array}{l}
 \swarrow \\
 x - 5 = 0 \\
 +5 \quad +5 \\
 \hline
 x = 5
 \end{array}$$

8. Solve $6h^2 - 14h + 4 = 0$.

9. Solve $5m^2 + 2 = 7m$.

$$5m^2 - 7m + 2 = 0$$

Sum -7	product 10
$-2 + -5$	$-2 \cdot -5$

$$\frac{-2}{5} \quad \cancel{\frac{-5}{5}} = \frac{-1}{1}$$

$$(5m - 2)(1m - 1) = 0$$

$$\begin{aligned} 5m - 2 &= 0 \\ +2 \quad +2 \\ \hline 5m &= 2 \\ \frac{5m}{5} &= \frac{2}{5} \\ \boxed{m} &= \frac{2}{5} \end{aligned}$$

$$\begin{aligned} m - 1 &= 0 \\ +1 \quad +1 \\ \hline \boxed{m} &= 1 \end{aligned}$$

10. Solve $8g^2 - 32g - 35 = 5$.