

Factoring Notes

Review of Greatest Common Factor (GCF)

$$\begin{array}{c} 18 \\ \wedge \\ 2 \times 9 \\ \wedge \\ 3 \times 3 \end{array}$$

$$\begin{array}{c} 24 \\ \wedge \\ 2 \times 12 \\ \wedge \\ 2 \times 6 \\ \wedge \\ 2 \times 3 \end{array}$$

GCF: 6

$$\begin{array}{l} 18: 2 \times 3 \times 3 \\ 24: 2 \times 2 \times 2 \times 3 \\ 2 \times 3 = 6 \end{array}$$

RULE: Factor out (or divide out) the **greatest common factor** from each term. You could check your answer at the point by distributing the **GCF** to see if you get the original question. **Factoring** out the **GCF** is the first step in many **factoring** problems.

Step 1: Determine the **greatest common factor** of the given terms.

A) $6n + 9$

GCF: 3

$$\begin{array}{l} \div 3 \\ 6n + 9 \div 3 \end{array}$$

Divide each term by the GCF

$$3(2n + 3)$$

Take out the GCF

If you start with two terms, there must be 2 terms in the brackets.

check $3(2n + 3)$
 $6n + 9$

B) $4x^2 - 2x$

$\begin{matrix} \div 2x & \div 2x \\ 4x^2 & - 2x \end{matrix}$

$2x(2x - 1)$

Check

$2x(2x - 1) = 4x^2 - 2x$

GCF: $2x$

Divide each term by the GCF

Take out the GCF

If you start with two terms, there must be 2 terms in the brackets.

C) $12x^2 - 6x + 4$

$\begin{matrix} \div 2 & \div 2 & \div 2 \\ 12x^2 & - 6x & + 4 \end{matrix}$

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

GCF: 2

Divide each term by the GCF

Take out the GCF

If you start with three terms, there must be 3 terms in the brackets.

Check

$2(6x^2 - 3x + 2)$
 $12x^2 - 6x + 4$

D) $-a^3 - a^2 + 4a$

$\begin{matrix} \div -a & \div -a & \div -a \\ -a^3 & - a^2 & + 4a \end{matrix}$

$-a(a^2 + a - 4)$

GCF: $-a$ NOTE: If the polynomial begins with a negative, remove the negative as part of the GCF.

Divide each term by the GCF

Take out the GCF

If you start with three terms, there must be 3 terms in the brackets.

Check

$-a(a^2 + a - 4)$

$-a^3 + a^2 + 4a$

E) $-8x^2y^2 - 4y$

$$\begin{array}{r} \div -4y \quad \div -4y \\ -8x^2y^2 - 4y \end{array}$$

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

check

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

$$-8x^2y^2 - 4y$$

GCF: $-4y$ NOTE: If the polynomial begins with a negative, remove the negative as part of the GCF.

Divide each term by the GCF

Take out the GCF

If you start with two terms, there must be 2 terms in the brackets.

F) $20r^2s^2 + 10rs^2 - 15r^2s$ GCF: $5rs$

$$\begin{array}{r} \div 5rs \quad \div 5rs \quad \div 5rs \\ 20r^2s^2 + 10rs - 15r^2s \end{array}$$

Divide each term by the GCF

Take out the GCF

If you start with three terms, there must be 3 terms in the brackets.

G) $36x^4y^3 - 24x^3y^2 + 12x^2y^2 - 6x^2y$ GCF: $6x^2y$

$$\begin{array}{r} \div 6x^2y \quad \div 6x^2y \quad \div 6x^2y \quad \div 6x^2y \\ 36x^4y^3 - 24x^3y^2 + 12x^2y^2 - 6x^2y \end{array}$$

Divide each term by the GCF

Take out the GCF

If you start with three terms, there must be 3 terms in the brackets.

$$6x^2y(6x^2y^2 - 4xy + 2y - 1)$$

check

$$6x^2y(6x^2y^2 - 4xy + 2y - 1)$$

$$36x^4y^3 - 24x^3y^2 + 12x^2y^2 - 6x^2y$$