

9.4A Notes: The Greatest Common Factor

A GCF, or the greatest common factor, is the largest monomial that divides evenly into each term of a polynomial

Part 1. Find the GCF of the following #'s & monomials:

① 3 & 9

$$\begin{array}{r} 3 \\ \hline 3 \cdot 3 \\ \hline 3 \end{array} \quad \begin{array}{r} 9 \\ \hline 3 \cdot 3 \\ \hline 3 \cdot 3 \end{array}$$

② 2 & 11

①

③ $\frac{12}{12}$ & $\frac{24}{12}$

12

③

④ $8x$ & $20x$

$$\begin{array}{r} 8x \\ \hline 2 \cdot 4 \cdot x \\ \hline 2 \cdot 2 \end{array} \quad \begin{array}{r} 20x \\ \hline 10 \cdot 2 \\ \hline 2 \cdot 5 \end{array} \quad \begin{array}{r} 2 \cdot 2 \cdot x \\ \hline 4x \end{array}$$

$2 \cdot 2 \cdot 2 \cdot x$ $2 \cdot 2 \cdot 5 \cdot x$

⑤ $4x^2$ & $18x$

$2x$

$x \cdot x$ x

⑥ $8y^5$, $30y^6$

$2y^5$

$$\begin{array}{r} 8 \\ \hline 2 \cdot 4 \\ \hline 2 \cdot 2 \end{array} \quad \begin{array}{r} 30 \\ \hline 2 \cdot 15 \\ \hline 3 \cdot 5 \end{array}$$

$2 \cdot 2 \cdot 2$ $2 \cdot 3 \cdot 5$

PART 2: Factoring out a GCF (reverse of distribution)

Example:

$3x(4x^5 + 3)$ multiplies out to: $12x^6 + 9x$

$12x^6 + 9x$ factors out to: $3x(4x^5 + 3)$

So factoring focuses on undoing multiplication.

We are dividing out the GCF.

Factor out the GCF of the following polynomials

$$\textcircled{1} \quad \frac{4x^2}{4x^2} + \frac{24x^3}{4x^2}$$

$$\boxed{4x^2(1 + 6x)}$$

$$\textcircled{2} \quad \frac{9}{9} - \frac{9a}{9}$$

$$9(1 - a)$$

$$\textcircled{3} \quad \frac{-4x^2}{-4x} + \frac{20x}{-4x}$$

$$\boxed{-4x(x - 5)}$$

$$\textcircled{4} \quad 8x + 12y$$

$$4(2x + 3y)$$

$$\textcircled{5} \quad 14y^2 + 21$$

$$7(2y^2 + 3)$$

$$\textcircled{6} \quad c^2d^4 - \frac{c^3d}{c^2d}$$

$$c^2d(d^3 - c)$$

$$\textcircled{7} \quad 12m^4n^4 + 3m^3n^2 + 6m^2n^2$$

$$\boxed{3m^2n^2(4m^2n^2 + m + 2)}$$

$$\textcircled{8} \quad -2g^4 + 14g^2 + 6g$$

$$-2g(g^3 - 7g - 3)$$