Factoring – Greatest Common Factor

Recall: Factor 24

$24 = 1 \cdot 24$
$24 = 2 \cdot 12$
$24 = 3 \cdot 8$
$24 = 6 \cdot 4$

#'s multiply to = 24

evenly divide 24

Factors of 24 = 1, 2, 3, 4, 6, 8, 12, 24

Prime factorization $\Rightarrow$ $24 = 3 \cdot 8$
$= 3 \cdot 2 \cdot 4$
$= 3 \cdot 2 \cdot 2 \cdot 2$

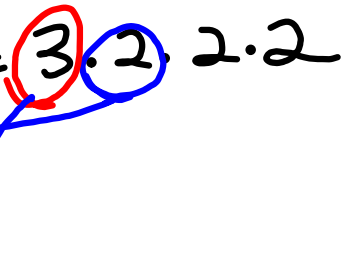
$2^3 \cdot 3$

Greatest Common Factor → largest expression that divides into each term.

Ex. Find the GCF of 24 and 30.

$24 = 3 \cdot 8 = 3 \cdot 2 \cdot 4 = 3 \cdot 2 \cdot 2 \cdot 2$

$30 = 5 \cdot 6 = 5 \cdot 2 \cdot 3$



$GCF = 2 \cdot 3 = 6$

GCF of $15x$, $3x^2$:

$15x = 3 \cdot 5 \cdot x$

$3x^2 = 3 \cdot x \cdot x$

GCF = $3x$

Factor a polynomial completely ⇒ write the polynomial as a product of prime factors.

Use the GCF to factor:

Apply Distributive Prop. in reverse.

$a(b+c) = ab+ac$

$ab+ac = a(b+c)$

GCF

remaining factor

Ex. Factor $6x^2 + 12x$ by removing the GCF.

$$6x^2 + 12x = 6x(x + 2)$$

① GCF $(6x^2, 12x) = 6x$

② $\frac{6x^2}{6x} = x$

③ $\frac{12x}{6x} = 2$

check

$6x(x+2) =$

$6x^2 + 12x$

Factor $13y^8+26y^4-39y^2$.

$13y^8+26y^4-39y^2 = 13y^2(y^6+2y^2-3)$

Check: $13y^2(y^6+2y^2-3) = 13y^8+26y^4-39y^2$

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① GCF$(13y^8, 26y^4, 39y^2) = 13y^2$

② $\frac{13y^8}{13y^2} = y^6$

③ $\frac{26y^4}{13y^2} = 2y^2$

④ $\frac{-39y^2}{13y^2} = -3$

Factor $c(x+2) - d(x+2)$

$c(x+2) - d(x+2) = (x+2)(c - d)$

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① GCF $(c(x+2), d(x+2)) = x+2$

② $\frac{c(x+2)}{x+2} = c$

③ $\frac{-d(x+2)}{x+2} = -d$