What you will learn about:
Greatest Common Factor

GCF → Greatest Common Factor

54: 6, 9 → 3, 2, 3, 3

36: 6, 6 → 3, 2, 3, 2

48: 6, 8 → 3, 2, 4, 2 → 2, 2

80: 10, 8 → 5, 2, 4, 2 → 2, 2

70: 7, 10 → 5, 2

105: 5, 21 → 7, 3

Find the greatest common factor of 54 and 36.

$54 - 2 \cdot 3 \cdot 3 \cdot 3$

$36 \quad 2 \cdot 2 \cdot 3 \cdot 3$

$GCF = 2 \cdot 3 \cdot 3$
$= 18$

Find the greatest common factor of 48 and 80.

$48 - 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$

$80 \quad 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$

$GCF = 2 \cdot 2 \cdot 2 \cdot 2$
$= 16$

Find the greatest common factor of $27x^3$ *and* $18x^4$.

$27x^3 \rightarrow 3 \cdot 3 \cdot 3 \cdot x \cdot x \cdot x$

$18x^4 \rightarrow 2 \cdot 3 \cdot 3 \cdot x \cdot x \cdot x \cdot x$

$GCF \rightarrow 3 \cdot 3 \cdot x \cdot x \cdot x$
$9x^3$

Find the GCF: $6ab^4, 8a^2b$.

$6ab^4 = 2 \cdot 3 \cdot a \cdot b \cdot b \cdot b \cdot b$

$8a^2b = 2 \cdot 2 \cdot 2 \cdot a \cdot a \cdot b$

$2ab$

Find the GCF: $14x^3, 70x^2, and\ 105x$.

$14x^3 = 2 \cdot 7 \cdot x \cdot x \cdot x$

$70x^2 = 2 \cdot 5 \cdot 7 \cdot x \cdot x$

$3 \cdot 5 \cdot 7 \cdot x$

$GCF = 7x$

Factoring using distributive Property $a(b+c) = ab + ac$ $ab + ac = a(b+c)$ 12 4 3 2 2 $2 \cdot 2 \cdot 3$ 60 6 10 3 2 5 2 $6y^5 = 2 \cdot 3 \cdot y \cdot y \cdot y \cdot y \cdot y$ $15y^3 = 3 \cdot 5 \cdot y \cdot y \cdot y$	How to factor the greatest common factor from a polynomial Factor: $4x + 12$ GCF = 4 $4(x+3)$ $12x - 60$ GCF = 12 $12(x-5)$ $4y^2 + 24y + 16$ GCF = 4 $4(y^2+6y+4)$ $5x^2 - 25x + 15$ GCF = 5 $5(x^2-5x+3)$ $8x^3 - 32x^2$ GCF = $8x^2$ $8x^2(x-4)$ $6y^5 - 15y^3$ GCF = $3y^3$ $3y^3(2y^2-5)$

	Factor: $21x^3 - 9x^2 + 15x$ GCF = $3x$ $3x(7x^2 - 3x + 5)$ $20x^3 - 10x^2 + 14x$ GCF = $2x$ $2x(10x^2 - 5x + 7)$ $8m^3 - 12m^2n + 20mn^2$ GCF = $4m$ $4m(2m^2 - 3mn + 5n^2)$ $9xy^2 + 6x^2y^2 + 21y^3$ GCF = $3y^2$ $3y^2(3x + 2x^2 + 7y)$
When the leading coefficient Is negative GCF should be negative.	$-8y - 24$ GCF = -8 $-8(y+3)$ $-16z - 64$ GCF = -16 $-16(z+4)$ $-6a^2 + 36a$ GCF = $-6a$ $-6a(a-6)$ $-9x^3 - 24x^2$ GCF = $-3x^2$ $-3x^2(3x+8)$

Factoring by Grouping	Factor: GCF $5q(q+7)-6(q+7)$ $(q+7)(5q-6)$ GCF = n-4 $8n(n-4)+5(n-4)$ $(n-4)(8n+5)$
4 term Factor by Grouping	$(xy+3y)+(2x+6)$ $(x+3)(y+2)$ $y(x+3)+2(x+3)$ $(ab+7b)+(8a+56)$ $(a+7)(b+8)$ $b(a+7)+8(a+7)$ $(x^2+2x)(-5x-10)$ $(x-5)(x+2)$ $x(x+2)-5(x+2)$ $(2p^3+5p^2)+(6p+15)$ $(2p+5)(p^2+3)$ $p^2(2p+5)+3(2p+5)$ $(35xy-5x)(-56y+8)$ $(7y-1)(5x-8)$ $5x(7y-1)-8(7y-1)$

$ax^2+bx+c=(x\pm p)(x\pm q)$

What you will learn about:
Factoring Trinomials when
The leading coefficient is 1

Factoring when $a = 1$

$$ax^2 + bx + c$$

Write the factors as two binomials with the first terms x.

$$(x \quad)(x \quad)$$

Find two number m and n that
Multiply to c, $m \cdot n = c$
Add to b, $m + n = b$

Use m and n as the last terms of the factors.

$$(x + m)(x + n)$$

If c is positive then m and n will have the same sign. The sign of b will determine the sign.

If c is negative then m and n will have different signs.

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

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

8
4·2
8·1

Factor: $y^2 + 8y + 15$

$(y+5)(y+3)$

15
5·3

Factor: $u^2 + 11u + 24$

$(u+8)(u+3)$

24
24·1
12·2
8·3
6·4

Factor: $t^2 - 11t + 28$

$(t-7)(t-4)$

28
-28·-1
-14·-2
-7·-4

Factor: $z^2 + 4z - 5$

$(z-1)(z+5)$

-5
-1·5
-5·1

Factor: $h^2 + 4h - 12$

$(h-2)(h+6)$

-12
-2·6

	Factor: $x^2 - 4x - 12$ $(x-6)(x+2)$ Factor: $r^2 - 3r - 40$ $(r-8)(r+5)$ Factor: $2x + x^2 - 48$ $= x^2+2x-48$ $(x+8)(x-6)$ Factor: $-7n + 12 + n^2$ $= n^2-7n+12$ $(n-4)(n-3)$ $\frac{36}{6\cdot 6}$
$(x \quad y)(x \quad y)$	Factor: $x^2 + 12xy + 36y^2$ $(x+6y)(x+6y)$ Factor: $x^2 + 12xy + 36y^2$ $\frac{-28}{14\cdot -2}$ Factor: $u^2 + 12uv - 28v^2$ $(u+14v)(u-2v)$ $\frac{18}{-6\cdot -3}$ Factor: $u^2 - 9uv + 18v^2$ $(u-6v)(u-3v)$

What you will learn about:
Factoring Trinomials when
The leading coefficient is not 1

Factoring trinomials with a GCF

Factor: $2x^2 - 8x - 42$

$2(x^2 - 4x - 21)$

$2(x-7)(x+3)$

$\frac{-2}{-2 \cdot 1}$

Factor: $4m^2 - 4m - 8$

$4(m^2 - m - 2)$

$4(m-2)(m+1)$

Factor: $5k^2 - 15k - 50$

$5(k^2 - 3k - 10)$

$5(k-5)(k+2)$

Factor: $4y^2 - 36y + 56$

$4(y^2 - 9y + 14)$

$4(y-7)(y-2)$

Factor: $4u^3 + 16u^2 - 20u$

$4u(u^2 + 4u - 5)$

$4u(u+5)(u-1)$

Factor: $6y^3 + 18y^2 - 60y$

$6y(y^2 + 3y - 10)$

$6y(y+5)(y-2)$