

1st rule check for GCF?

4 terms - try to factor by grouping

3 terms - trinomial

2 terms - try special factoring
 $x^2 + bx + c$, $ax^2 + bx + c$, $ax^2 + bxy + cy^2$

Factoring $x^2 + bx + c$
opposite signs

$$x^2 + 2x - 15$$
$$= (x-3)(x+5)$$

or

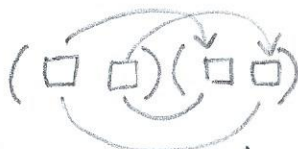
$$= (x+5)(x-3)$$

Mult	$b=2$
$c=-15$	
-3, 5	-3 + 5 ✓

Factoring $ax^2 + bx + c$

where, $a \neq 1$

$$5x^2 + 18x + 9$$



① list all pairs whose product is "a"

② list all pair whose product is "c"

By trial & error find the correct combination of pairs so that you get the middle term bx .

Factor

$$* 5x^2 + 18x + 9$$

$$= (x+3)(5x+3)$$

$$c = 9$$

$$1 \times 9$$

$$3 \times 3$$

$$-1 \times -9$$

$$-3 \times -3$$

A	c	B
5	9	18
5	3	15
1	3	3

$$(5x+3)(x+3)$$

$$* 3x^2 + 11x + 10$$

3	10	11
1	5	5
3	2	6

$$(x+2)(3x+5)$$

check:

$$3x^2 + 5x + 6x + 10$$

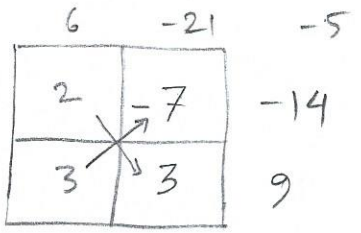
$$= 3x^2 + 11x + 10$$

$$* 10x^2 + 41x + 21$$

10	21	41
2	3	6
5	7	35

$$(2x+7)(5x+3)$$

* $6x^2 - 5x - 21$



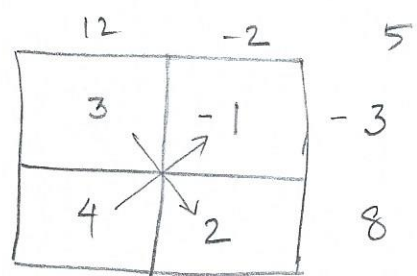
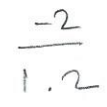
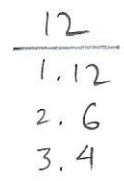
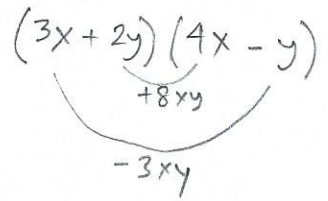
$$(2x+3)(3x-7)$$

$$= 6x^2 - 14x + 9x - 21$$

$$= 6x^2 - 5x - 21$$

Factor

$12x^2 + 5xy - 2y^2$



Difference of squares :

$$u^2 - v^2 = (u - v)(u + v)$$

Proof: $= u^2 + uv - uv - v^2$
 $= u^2 - v^2$

Factor

$$25x^2 - 49y^2 = (5x + 7y)(5x - 7y)$$

$$y^2 - 16 = (y + 4)(y - 4)$$

$$y^4 - 16 = (y^2 - 4)(y^2 + 4) = (y - 2)(y + 2)(y^2 + 4)$$

Difference of two cubes :

$$u^3 - v^3 = (u - v)(u^2 + uv + v^2)$$

Sum of cubes :

$$u^3 + v^3 = (u + v)(u^2 - uv + v^2)$$

Factor

$$27y^3 + 1$$

$$= (3y)^3 + (1)^3 = (3y + 1)(9y^2 - 3y + 1)$$

Factor

$$27a^6 - b^3 = (3a^2)^3 - (b)^3$$

$$= (3a^2 - b)(9a^4 + 3a^2b + b^2)$$

$$W^3 - 64 = (W - 4)(W^2 + 4W + 16)$$

Zero factor property.

if $A \cdot B = 0$, then
either $A = 0$ or $B = 0$

solve, $(6x+1)(x+4) = 0$ then either $6x+1=0$ or $x+4=0$

$$\frac{6x+1=0}{-1}{\frac{6x}{6}} = \frac{-1}{6}$$

$$\frac{x+4=0}{-4}{\frac{x}{x}} = \frac{-4}{-4}$$

To solve equations using factoring, use the zero factor property

check: $x = -\frac{1}{6}$

$$(6(-\frac{1}{6}) + 1)(-\frac{1}{6} + 4) = 0$$

$$0 = 0$$

$x = -4$

$$(6(-4) + 1)(-4 + 4) = 0$$

$$0 = 0$$

To solve an equation by factoring,
first write the equation equal to zero,
* Factor the polynomial.

* Use the zero factor property to set all factors equal to zero:

- * Solve
- * Check

$$4x^2 - 1 = 0$$

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

$$2x+1 = 0$$

$$\text{or } 2x-1 = 0$$

$$x = -\frac{1}{2}$$

$$x = \frac{1}{2}$$

$$\left\{-\frac{1}{2}, \frac{1}{2}\right\}$$

$$* 25x^2 - 60x = -36$$

$$+36 \quad +36$$

$$25x^2 - 60x + 36 = 0$$

$$(5x-6)(5x-6) = 0$$

25	36	-60
5	-6	-30
5	-6	-30

$$5x - 6 = 0$$

$$x = \frac{6}{5}$$

$$\left\{\frac{6}{5}\right\}$$

Solve

$$3x^2 = 12x$$

$$3x^2 - 12x = 0$$

$$3x(x-4) = 0$$

$$3x = 0$$

$$\text{or } x-4 = 0$$

$$x = 0$$

$$\text{or } x = 4$$

$$\{0, 4\}$$

* (2x+1)(x-3) = 6x+3

(2x+1)(x-3) = 3(2x+1)

(2x+1)(x-3) - 3(2x+1) = 0

(2x+1)[(x-3)-3] = 0

(2x+1)(x-6) = 0

2x+1 = 0 or x-6 = 0

x = -1/2 or x = 6

{ -1/2, 6 }