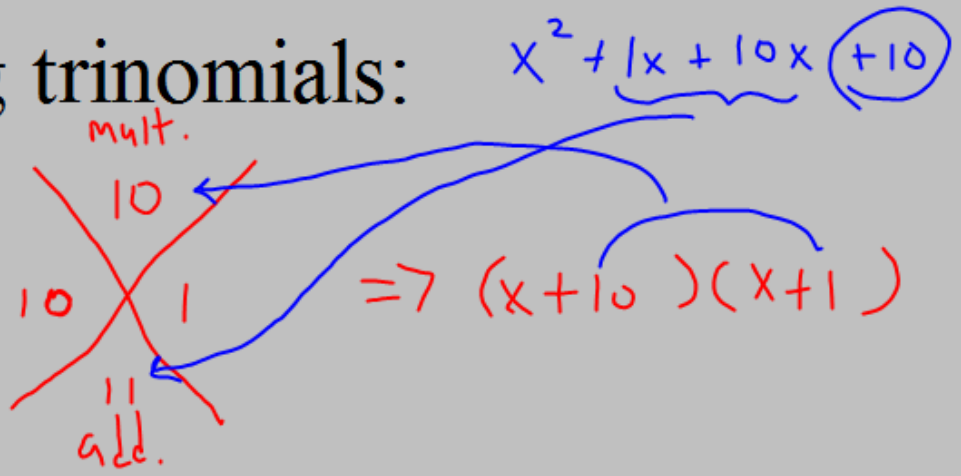
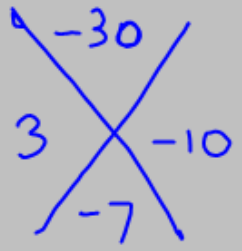
Factor the following trinomials:

$x^2 + 11x + 10$



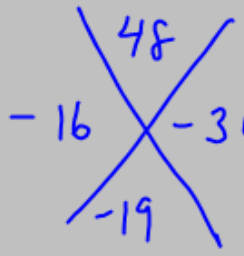
$x^2 - 7x - 30$



$(x+3)(x-10)$

$x^2 - 19x + 48$

48: 1×48, 2×24, 3×16, 4×12, 6×8



$(x-16)(x-3)$

1) $-4x^4 - 4$

$-4(x^4 + 1)$

2) $-9k + 9$

$9(-k + 1)$

3) $3p^3 + 4p$

$p(3p^2 + 4)$

4) $27x - 9x^2$

$9x(3 - x)$

5) $4n^3 + 6n^2$

$2n^2(2n + 3)$

$\frac{4n^3}{2n^2} = 2n$

$\frac{6n^2}{2n^2} = 3$

6) $-42k^5 + 30k^6$

$6k^5(-7 + 5k)$

7) $45x^4 - 20x^3 + 30x^2$

$5x^2(9x^2 - 4x + 6)$

8) $-30x^3 + 27x - 21$

$3(-10x^3 + 9x - 7)$

9) $-35k^7 + 21k^4 + 28k^2$

$7k^2(-5k^5 + 3k^2 + 4)$

10) $-25m^9 + 20m^5 + 10m^4$

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

11) $-70m^4 + 90m^3 - 10m^2$

$10m^2(-7m^2 + 9m - 1)$

12) $3x^6 + 12x^4 - 9x^3$

$3x^3(x^3 + 4x - 3)$

13) $n^2 + 2n - 80$

$(n - 8)(n + 10)$

14) $n^2 - 12n + 20$

$(n - 10)(n - 2)$

15) $x^2 + 12x + 27$

$(x + 9)(x + 3)$

16) $x^2 - 2x - 3$

$(x + 1)(x - 3)$

17) $x^2 - 4x + 3$

$(x - 3)(x - 1)$

18) $p^2 - 2p - 80$

$(p + 8)(p - 10)$

19) $n^2 + 7n + 12$

$(n + 4)(n + 3)$

20) $r^2 - 3r - 18$

$(r + 3)(r - 6)$

21) $m^2 - 10m + 9$

$(m - 9)(m - 1)$

22) $v^2 + 2v - 24$

$(v - 4)(v + 6)$

E.Q.:

How do we factor quadratic expressions that are not trinomials with a leading coefficient of 1?

Trinomials with a leading coefficient not equal to 1

Sometimes, we can factor out the leading coefficient:

2
10
12

Examples:

Factor out the 2!

$2x^2 - 10x - 12$

GCF: 2

-6
-6 +1
-5

$2(x^2 - 5x - 6)$

$2(x-6)(x+1)$

3: 1, 3
33: 1, 3, 11, 33
30: 1, 3, 10, 30

Factor out the 3!

$3x^2 + 33x + 30$

$3(x^2 + 11x + 10)$

$3(x+10)(x+1)$

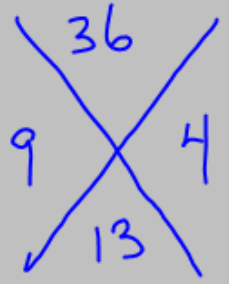
Trinomials with a leading coefficient not equal to 1

Sometimes, we **can not** factor out the leading coefficient:

Examples:

$6x^2 + 13x + 6$

First, multiply the leading coefficient and the constant term

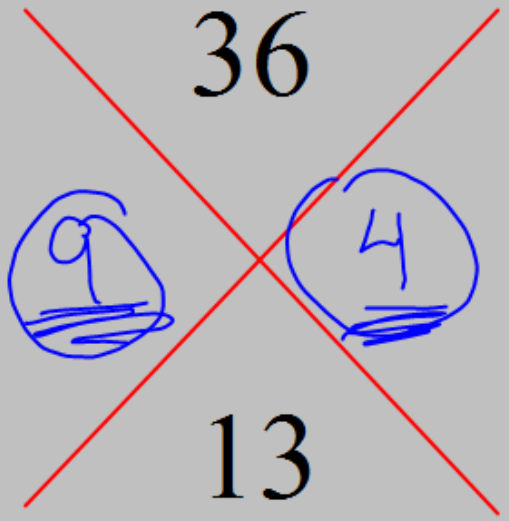


6 times 6 = 36

Trinomials with a leading coefficient not equal to 1

Sometimes, we **can not** factor out the leading coefficient:

$(x+9)(x+4)$ ★ $6x^2 + 13x + 6$ ★



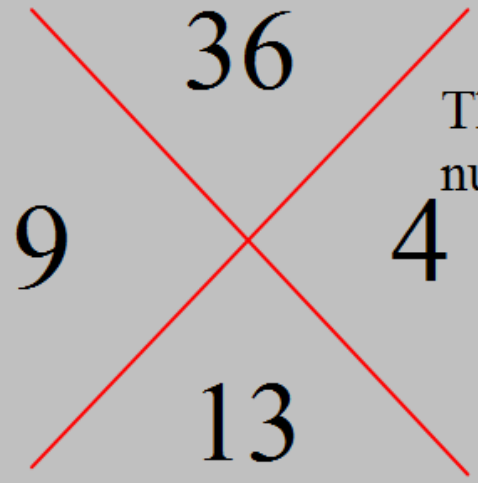
Second, set up your x-factor with this product on the top

$6x^2 + 9x + 4x + 6$

Trinomials with a leading coefficient not equal to 1

Sometimes, we **can not** factor out the leading coefficient:

$$6x^2 + 13x + 6$$



Third, rewrite the middle term using these two numbers

$$6x^2 + 9x + 4x + 6$$

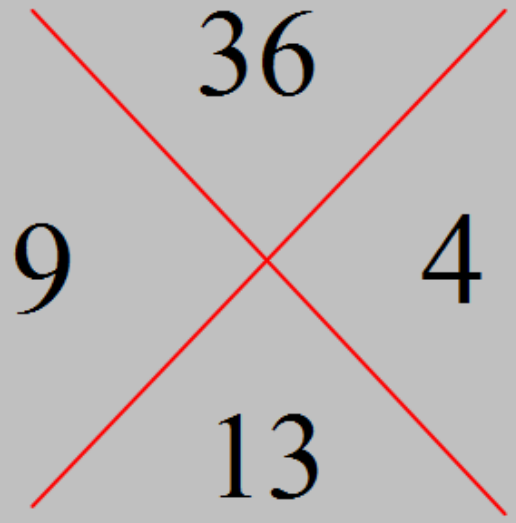
$3x(2x + 3)$ $+2(2x+3)$

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

Trinomials with a leading coefficient not equal to 1

Sometimes, we **can not** factor out the leading coefficient:

$$6x^2 + 13x + 6$$

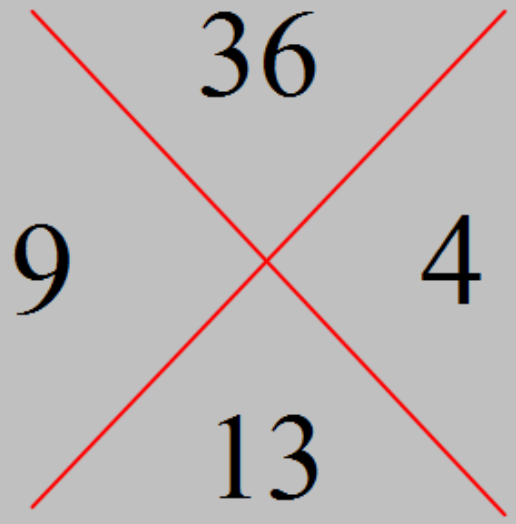


Now we factor the first pair and the second pair separately using the GCF:

$$6x^2 + 9x + 4x + 6$$

Trinomials with a leading coefficient not equal to 1

Sometimes, we **can not** factor out the leading coefficient:



$$6x^2 + 13x + 6$$

$$6x^2 + 9x + 4x + 6$$

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

Finally, we write our factored form

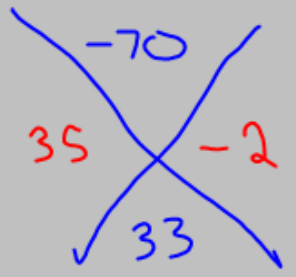
$$(3x + 2)(2x + 3)$$

Factoring by grouping

Examples:

$$10x^2 + 33x - 7$$

$10 \cdot -7 = -70$



$10x^2 + 35x - 2x - 7$

$5x(2x+7) - 1(2x+7)$

$(2x+7)(5x-1)$

Factoring by grouping

Examples:

$$4x^2 - 4x - 3$$

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

Factoring by grouping

Examples:

$$6x^2 + 11x - 10$$

$6x - 10$

-60

$15 \quad -4$

11

$6x^2 + 15x - 4x - 10$

$3x(2x+5) \quad -2(2x+5)$

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

Factoring by grouping

Examples:

$$40x^2 + x - 6$$

HW #3 Factoring Quadratics