

AC METHOD

Factoring Trinomials when the leading coefficient is not 1; a is not equal to 1.

Using the general form of a quadratic equation; $ax^2 + bx + c$.

We first multiply a times c, we then look at the factors of ac, and find two that add to be b. We break up the middle term using the two factors. We now will have a polynomial with 4 terms, which means we will use factor by grouping.

Example

$$3x^2 + 14x + 8$$

$$ac = 24 \text{ and } b = 14$$

since both b and ac are positive, both factors will be positive

the factors of 24 are 1, 24
 2, 12
 3, 8
 4, 6

2 and 12 add to 14

so we use the factor pair of 2 and 12 to break up the middle term

$$3x^2 + 2x + 12x + 8; \text{ note: we have not changed the problem since } 2x + 12x = 14x$$

Now we can use factoring by grouping

$$(3x^2 + 2x) + (12x + 8)$$

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

and our answer is $(3x + 2)(x + 4)$

Example

$$4x^2 - 11x - 15$$

$$ac = -60 \text{ and } b = -11$$

since both b and ac are negative, the larger factor is negative and the smaller is positive

the factors of -60 are 1, -60
 2, -30
 3, -20
 4, -15
 5, -12
 6, -10

4 and -15 add to be -11

so we use the factor pair of 4 and -15 to break up the middle term

$$4x^2 + 4x - 15x - 15; \text{ note: we have not changed the problem since } 4x + -15x = -11x$$

Now we can use factoring by grouping

$$(4x^2 + 4x) + (-15x - 15)$$

$$4x(x + 1) - 15(x + 1)$$

and our answer is $(x + 1)(4x - 15)$