Factoring a Polynomial of the Form: $x^2 + bx + c$

To Factor a Trinomial of the Form $ax^2 + bx + c$ where $a = 1$

1. Factor out the Greatest Common Factor. If there is a common factor, be sure to include it as part of the final factorization.

2. Determine if the trinomial is factorable by finding m and n such that $m+n=b$ and $m \cdot n = c$. If m and n do not exist, we conclude that the trinomial will not factor.

3. Using the m and n values from step 2, write the trinomial in factored form: $(x+m)(x+n)$

   If c is *positive*, then m and n both have the same sign as b.
   If c is *negative*, then m and n have different signs and the one with the greater absolute value has the same sign as b

Consider:
$x^2 + 11x + 24$ … find m and n so that $m \cdot n = c$ or +24 **and** $m+n=b$ or +11, in this case.

What two factors when multiplied together equal +24, but when added equal +11?
Since c is positive, then m and n will have the same sign as b - both will be positive.
While 2 · 12 = 24 and 4 · 6 = 24, only 3 · 8 = 24 and 3 + 8 = 11. So m and n must be +3 and +8.

Now use the m and n values to write the trinomial in factored form $(x+3)(x+8)$.

Consider:
$x^2 + 14x - 32$ … find m and n so that $m \cdot n = c$ or -32 **and** $m+n=b$ or +14, in this case.

What two factors when multiplied together equal -32, but when added equal +14?
Since c is negative, then m and n will have different signs and
the one with the greater absolute value will have the same sign as b.
m and n must be +16 and -2.

Now use the m and n values to write the trinomial in factored form $(x+16)(x-2)$.

Factor: $y^2 - 11y + 24$ $m \cdot n = 24$ and $m + n = -11$ $m = -3$ and $n = -8$

Factors: $(y-3)(y-8)$

Factor: $y^2 - 3y - 18$ $m \cdot n = -18$ and $m + n = -3$ $m = -6$ and $n = 3$

Factors: $(y-6)(y+3)$

TRY:

$y^2 + 5y + 6$

$y^2 - 13y + 30$

$x^2 - x - 30$

$y^2 + 29y - 30$