9.5 Factoring Trinomials-> $ax^2 + bx + c$, when a = 1

Factoring a Trinomial->

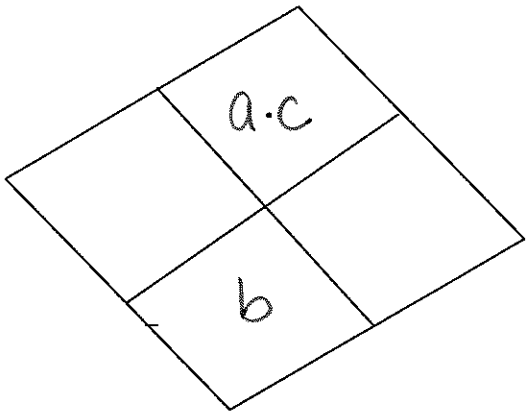
- Converting ax^2+bx+c to $(a \pm b)(a \pm b)$
- "Un" FOIL

$$ax^2 + bx + c$$

Factor By Grouping->

1st-> Make an "x" or diamond. For the top, multiply a times c, and for the bottom, fill in b.

2nd-> Fill in left and right sides with two numbers that multiply to get c, but add to get b



3rd-> Replace middle (usually x-term) with two new numbers (add x to them). Then factor out GCF of each part. Put them together.

$a=1$ for all examples

Examples:

1. $x^2 + 7x + 10$

$\underbrace{x^2+2x}_{\text{GCF: } x} + \underbrace{5x+10}_{\text{GCF: } 5}$

* Group 1st pair, find GCF

10

+2x +5x

7

$x(x+2)+5(x+2)$ * should have common factor in parenthesis

$\boxed{(x+5)(x+2)}$ FOIL to check!

2. $v^2 + 21v + 20$

$\underbrace{v^2+1v}+\underbrace{20v+20}$

20

+1v +20v

21

$v(v+1)+20(v+1)$

$\boxed{(v+20)(v+1)}$

3. $y^2 + 9y + 20$

$\underbrace{y^2+4y}+\underbrace{5y+20}$

20

+4y +5y

9

$y(y+4)+5(y+4)$

$\boxed{(y+5)(y+4)}$

4. $a^2 + 13a + 30$

$\underbrace{a^2+10a}\underbrace{+3a+30}$

$a(a+10)+3(a+10)$

$\boxed{(a+3)(a+10)}$

30

$+10a$ $+3a$

13

5. $c^2 + 6c + 8$

$\underbrace{c^2+2c}\underbrace{+4c+8}$

$c(c+2)+4(c+2)$

$\boxed{(c+4)(c+2)}$

8

$+2c$ $+4c$

6

6. $k^2 - 10k + 25$

$\underbrace{k^2-5k}\underbrace{-5k+25}$

$k(k-5)-5(k-5)$

$\boxed{(k-5)(k-5)}$

OR

$\boxed{(k-5)^2}$

25

$-5k$ $-5k$

-10

7. $x^2 - 11x + 18$

$\underbrace{x^2 - 9x}\ \underbrace{-2x + 18}$

$x(x-9) - 2(x-9)$

$\boxed{(x-2)(x-9)}$

18

$-9x$ $-2x$

-11

8. $g^2 - 9g + 20$

$\underbrace{g^2 - 4g}\ \underbrace{-5g + 20}$

$g(g-4) - 5(g-4)$

$\boxed{(g-5)(g-4)}$

20

$-4g$ $-5g$

-9

9. $m^2 - 15m + 36$

$m^2 - 3m - 12m + 36$

$m(m-3) - 12(m-3)$

$\boxed{(m-12)(m-3)}$

36

$-3m$ $-12m$

-15

10. $n^2 - 3n + 2$

$n^2 - 2n - 1n + 2$

$n(n-2) - 1(n-2)$

$\boxed{(n-1)(n-2)}$

2

$-2n$ $-1n$

-3

11. $m^2 + 8m - 20$

$\underbrace{m^2 + 10m}\ \underbrace{-2m - 20}$

$m(m+10) - 2(m+10)$

$\boxed{(m-2)(m+10)}$

-20

$+10m$ $-2m$

$+8$

12. $p^2 - 3p - 40$

$\underbrace{p^2 - 8p}\ \underbrace{+5p - 40}$

$p(p-8) + 5(p-8)$

$\boxed{(p+5)(p-8)}$

-40

$-8p$ $+5p$

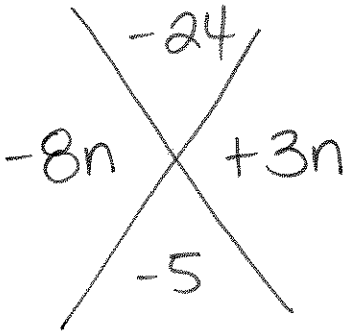
-3

13. $n^2 - 5n - 24$

$\underbrace{n^2 - 8n} + \underbrace{3n - 24}$

$n(n-8) + 3(n-8)$

$\boxed{(n+3)(n-8)}$

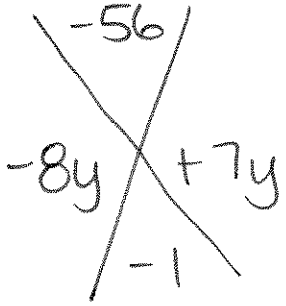


14. $y^2 - y - 56$

$y^2 - 8y + 7y - 56$

$y(y-8) + 7(y-8)$

$\boxed{(y+7)(y-8)}$

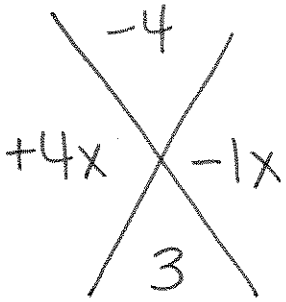


15. $x^2 + 3x - 4$

$\underbrace{x^2 + 4x} - \underbrace{1x - 4}$

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

$\boxed{(x-1)(x+4)}$



16. $x^2 + 11xy + 24y^2$

$x^2 + 8xy + 3xy + 24y^2$

$x(x+8y) + 3y(x+8y)$

$\boxed{(x+3y)(x+8y)}$

$24y^2$

$+8xy$ $+3xy$

$11xy$

17. $m^2 + 2mn - 48n^2$

$m^2 + 8mn - 6mn - 48n^2$

$m(m+8n) - 6n(m+8n)$

$\boxed{(m-6n)(m+8n)}$

$-48n^2$

$+8mn$ $-6mn$

$2mn$