

Factoring

* Always look for a GCF first!

ex. $10x^2 + 22x + 2$

GCF: 2

$2(5x^2 + 11x + 1)$

① Grouping (4 terms)

ex) $(4x^2 - 44x)(-x + 11)$

Find GCF of each group

$4x(x-11) - 1(x-11)$

↑ these need to match

$(4x-1)(x-11)$

② Trinomials when $a=1$ [$ax^2 + bx + c$]

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

| Mult. to -15 | Add to 2 |
|--------------|----------|
| -5, 3 | -2 |
| -3, 5 | 2 ✓ |

③ Trinomials when $a \neq 1$ [$ax^2 + bx + c$]

* headphones

EX) $2x^2 + 17x + 21$

Mult. to 42

| | |
|-------------|-----------|
| Mult. to 42 | Add to 17 |
| 14, 3 | 17 ✓ |

$2x^2 + 14x + 3x + 21$
 $(2x^2 + 14x) + (3x + 21)$

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

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

④ Difference of Perfect Squares

* must be 2 perfect squares AND subtraction

EX) $x^2 - 16$

$\downarrow \quad \downarrow$
 $x \quad 4$

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

EX) $25 - 4x^2$

$\downarrow \quad \downarrow$
 $5 \quad 2x$

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

⑤ Sum/Difference of Perfect cubes

Sum: $a^3 + b^3 \rightarrow (a+b)(a^2 - ab + b^2)$

Diff: $a^3 - b^3 \rightarrow (a-b)(a^2 + ab + b^2)$

$$\begin{array}{l} \text{EX) } 8x^3 + 1 \\ \downarrow \quad \downarrow \\ a \ 2x \quad b \ 1 \end{array} = (2x+1)((2x)^2 - (2x)(1) + (1)^2)$$

$$(2x+1)(4x^2 - 2x + 1)$$

$$\begin{array}{l} \text{EX) } x^3 - 27 \\ \downarrow \quad \downarrow \\ a \ x \quad b \ 3 \end{array} (x-3)(x^2 + 3x + 9)$$