

Factoring Polynomials

Least Common Factor

Factoring $(x^2 + bx + c)$

Factoring $(ax^2 + bx + c)$

"Special Products" $(a^2 - b^2)$ & $(a^2 + 2ab + b^2)$

① Factor $2x + 42y$

$$2(x + 21y)$$

② Factor $4x^4 + 24x^3$

$$4x^3(x + 6)$$

③ Factor $8a^2b - 6ab^2$

$$2ab(4a - 3b)$$

④ Factor $20x^2y^2 - 4xy$

$$4xy(5xy - 1)$$

SUMMARY: Find the GCF of all terms
GCF (quotients)

Greatest Common Factor

Trinomial Factoring $(x^2 + bx + c)$

Trinomial Factoring $(ax^2 + bx + c)$

“Special Products” $(a^2 - b^2)$ & $(a^2 + 2ab + b^2)$

GCF / Four Terms

5 Factor $x^2 + 11x + 18$

$$\begin{array}{r|l} \cdot 18 & +11 \\ \hline 1 \cdot 18 & 19 \\ 2 \cdot 9 & 11 \\ 3 \cdot 6 & 9 \end{array}$$

$$(x+2)(x+9)$$

6 Factor $m^2 + 9m + 14$

$$(m+7)(m+2)$$

7 Factor $y^2 - 6y + 8$

$$(y-2)(y-4)$$

8 Factor $w^2 + 2w - 15$

$$(w+5)(w-3)$$

SUMMARY: Find 2 factors of the constant (c) that add to linear coefficient (b). These 2 factors are the constants in your linear binomials.

Trinomial Factoring $(x^2 + bx + c)$

Trinomial Factoring $(ax^2 + bx + c)$

"Special Products" $(a^2 - b^2)$ & $(a^2 + 2ab + b^2)$

9 Factor $3y^2 + 4y - 15$

$3(-15)$

-45	$+4$
$-1 \cdot 45$	44
$-3 \cdot 15$	12
$-5 \cdot 9$	4

	$3y$	-5
y	$3y^2$	$-5y$
3	$9y$	-15

$(3y-5)(y+3)$

10 Factor $2x^2 - 7x + 3$

$2(3)$

6	-7
$-1 \cdot 6$	-7

	$2x$	-1
x	$2x^2$	$-x$
-3	$-6x$	3

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

Negative Leading Coefficient? Factor out -1 .

11 Factor $-5m^2 + 6m - 1$

$-1(5m^2 - 6m + 1)$

$5(1)$

5	-6
$-1 \cdot 5$	-6

-1

	$5m$	-1
m	$5m^2$	$-m$
-1	$-5m$	1

$-1(m-1)(5m-1)$

12 Factor $-3k^2 - k + 2$

$-1(3k^2 + k - 2)$

$3(-2)$

	k	1
$3k$	$3k^2$	$3k$
-2	$-2k$	-2

$3 \cdot -2 \mid 1$

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

SUMMARY: Multiply a.c. Find factors of ac that add to b. Make box. Find GCF. *(See top note)

Trinomial Factoring $(ax^2 + bx + c)$

“Special Products” $(a^2 - b^2)$ & $(a^2 + 2ab + b^2)$

20 $66r^2 + 57r + 12$

Factor ~~$3(22r^2 + 19r + 4)$~~

$3(22r^2 + 19r + 4)$

$22(4)$
 $\cdot 88 \mid 19$
 $11 \cdot 8 \mid 19$

$3 \left(\begin{array}{c|cc} & 2r & 1 \\ \hline 11r & 22r^2 & 11r \\ \hline 4 & 8r & 4 \end{array} \right)$

$3(2r+1)(11r+4)$

21 $21h^2 + 72h - 48$

Factor ~~$3(7h^2 + 24h - 16)$~~

$3(7h^2 + 24h - 16)$

$7(-16)$
 $\cdot -112 \mid 24$
 $-7 \cdot 16 \mid 9$
 $-8 \cdot 14 \mid 6$
 $-4 \cdot 28 \mid 24$

$3 \left(\begin{array}{c|cc} & 7h & -4 \\ \hline h & 7h^2 & -4h \\ \hline 4 & 28h & -16 \end{array} \right)$

$3(7h-4)(h+4)$

22 $28m^2 + 28m - 56$

Factor ~~$28(m^2 + m - 2)$~~

$28(m^2 + m - 2)$

$28(m+2)(m-1)$

23 $36y^2 + 114y - 20$

Factor ~~$2(18y^2 + 57y - 10)$~~

$2(18y^2 + 57y - 10)$

$18(-10)$
 $-180 \mid +57$
 $-1 \cdot 180 \mid 179$
 $-2 \cdot 90 \mid 88$
 $-3 \cdot 60 \mid 57$

$2 \left(\begin{array}{c|cc} & 6y & -1 \\ \hline 3y & 18y^2 & -3y \\ \hline 10 & 60y & -10 \end{array} \right)$

$2(6y-1)(3y+10)$

24 Factor $x^3 + 2x^2 + 8x + 16$

$\begin{array}{c|cc} & x & 2 \\ \hline x^2 & x^3 & 2x^2 \\ \hline 8 & 8x & 16 \end{array}$

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

25 Factor $x^3 - 10 - 5x + 2x^2$

$x^3 + 2x^2 - 5x - 10$

$\begin{array}{c|cc} & x & 2 \\ \hline x^2 & x^3 & 2x^2 \\ \hline -5 & -5x & -10 \end{array}$

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