

Factor $ax^2 + bx + c$

PF7

When a is positive:

- 1) consider the signs of b and c
- 2) make a table to organize your work or guess & check
- 3) consider the order of the factors of c, because the x-terms of the possible factorization are different

EX: $2x^2 - 7x + 3$

$(2x-1)(x-3)$
 $(2x-3)(x+1)$
 $-6x - 1x = -7x$
 $-3x - 2x = -5x$
 $0+1$

Factors of a	Factors of c	Possible factorization	middle term when multiplied
1,2	-1,-3	$(x-1)(2x-3)$	$-3x - 2x = -5x$
1,2	-3,-1	$(x-3)(2x-1)$	$-x - 6x = -7x$

X
✓

EX: $3n^2 + 14n - 5$

$= (n+5)(3n-1)$

factors of a	factors of c	possible factorization	middle term when multiplied
1,3	1,-5	$(n+1)(3n-5)$	$-5n+3n=-2n$
1,3	-1,5	$(n-1)(3n+5)$	$5n-3n=2n$
1,3	5,-1	$(n+5)(3n-1)$	$-n+15n=14n$
1,3	-5,1	$(n-5)(3n+1)$	$n-15n=-14n$

X
X
✓
X

When a is negative:

- 1) factor -1 from each term of the trinomial
- 2) factor the trinomial by using a table to organize your work

EX: $-4x^2 + 12x + 7$
 $-1(4x^2 - 12x - 7) = -1(2x-7)(2x+1)$

factors of 4	factors of -7	possible factorization	middle term when multiplied
1, 4	-1, 7	$(x-1)(4x+7)$	$7x-4x=3x$ X
1, 4	1, -7	$(x+1)(4x-7)$	$-7x+4x=-3x$ X
1, 4	7, -1	$(x+7)(4x-1)$	$-x+28x=27x$ X
1, 4	-7, 1	$(x-7)(4x+1)$	$x-28x=-27x$ X
2, 2	-1, 7	$(2x-1)(2x+7)$	$14x-2x=12x$ X
2, 2	-7, 1	$(2x-7)(2x+1)$	$2x-14x=-12x$ ✓

You may need to factor out the GCF first:

EX: $-8x^2 + 24x + 14$

$$-2(4x^2 - 12x - 7) = -2(2x-7)(2x+1)$$

$$3n^2 + 14n - 5$$
$$(3n - 1)(n + 5)$$
$$\cancel{(3n - 5)(n - 1)}$$
$$n = \frac{1}{3}, -5$$