

6.2: Factoring Trinomials (Leading coefficient is 1) (continued)

6.2.2

Note Title

10/24/2018

Ex: Factor.

$$x^2 + 13x + 30$$

$$= (x + 3)(x + 10)$$

Check: $x^2 + 10x + 3x + 30$
 $= x^2 + 13x + 30 \checkmark$

(+) same signs

same signs

so I want a sum of 13

$$\begin{array}{r} 30 \\ \wedge \\ 1 \cdot 30 \\ 2 \cdot 15 \\ \boxed{3 \cdot 10} \\ 5 \cdot 6 \end{array}$$

Always

* Arrange in descending order

* Factor out the GCF

* Make sure leading coefficient is positive

Ex: $x^2 + 13x - 30$

$$= (x - 2)(x + 15)$$

Check: $x^2 + 15x - 2x - 30$
 $= x^2 + 13x - 30 \checkmark$

(-) signs are opposite

signs are opposite, so I want a difference of 13

$$\begin{array}{r} 30 \\ \wedge \\ 1 \cdot 30 \\ \boxed{2 \cdot 15} \\ 3 \cdot 10 \\ 5 \cdot 6 \end{array}$$

Also correct: $(x + 15)(x - 2)$

Ex: $x^2 - 13x + 30$

$$= (x - 3)(x - 10)$$

signs are
the same,

so I want

a sum

of 13

30

1

1 · 30

2 · 15

3 · 10

5 · 6

Check: $x^2 - 10x - 3x + 30$

$$= x^2 - 13x + 30 \checkmark$$

Ex: $x^2 - 13x - 30$

$$(x + 2)(x - 15)$$

(-) signs are
opposite

signs opposite,

so I want

a difference

of 13

30

1

1 · 30

2 · 15

3 · 10

5 · 6

Check: $x^2 - 15x + 2x - 30$

$$= x^2 - 13x - 30 \checkmark$$

Ex: $x^2 - 10x - 24$

$$(x + 2)(x - 12)$$

or $(x - 12)(x + 2)$

6.2.4

Ex.: $x^2 + 16x - 36$
 $(x + 18)(x - 2)$

Ex.: $x^2 + 7x - 12$

This polynomial
cannot be factored.

It is prime.

signs
opposite
Signs are
opposite, so I
want a difference
of 7

Not possible!

12
^
1.12
2.6
3.4

Prime number: can only be factored
(using natural/counting numbers) as a
product of 1 and itself.

Ex.: 5 is prime

$$5 = 1 \cdot 5$$

Ex.: 6 is composite. (not prime)

$$6 = 2 \cdot 3$$

Prime Polynomial: can only be factored (using integer coefficients) except by factoring out 1 or -1. 6.2.5

Ex.: $x^2 - 11xy - 12y^2$ (-) Signs are opposite
(very similar to $x^2 - 11x - 12$)
 $(x + 1y)(x - 12y)$

Check: $x^2 - 12xy + 1yx - 12y^2$
 $= x^2 - 11xy - 12y^2$

$(x + y)(x - 12y)$

Signs are opposite, so I want a difference of 11

12
 $\wedge$
1 · 12
 2 · 6
 3 · 4

Ex.: $18x + 2x^2 + 28$

$= 2x^2 + 18x + 28$

$= 2(x^2 + 9x + 14)$ (+) same signs

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

check: $(x + 2)(x + 7)$

$= x^2 + 7x + 2x + 14$

$= x^2 + 9x + 14$

14
 $\wedge$
1 · 14
2 · 7

6.2.6

Ex.: $-x^2 + 14x - 40$

$= -1(x^2 - 14x + 40)$ (+ same signs

$= \boxed{-1(x-4)(x-10)}$

we want the leading coefficient to be positive. So factor out -1 .

check: $(x-4)(x-10)$

$= x^2 - 10x - 4x + 40$

$= x^2 - 14x + 40$ ✓

same signs,
so I want a
sum of 14

40
^
1 • 40
2 • 20
4 • 10
5 • 8

usually written:

$\boxed{- (x-4)(x-10)}$

6.3: Factoring Trinomials (when the leading coefficient is greater than 1)

6.3.1

Ex.: Factor

$$2x^2 + 9x + 10$$

(+) same signs

sum of

9-x for middle term

GCF: 1

Try: $(2x + 1)(x + 10)$

$$2x^2 + 20x + 1x + 10$$

$$2x^2 + 21x + 10 \quad \text{No!}$$

10
1
1 · 10
2 · 5

Try: $(2x + 10)(x + 1)$

$$2x^2 + 2x + 10x + 10$$

$$2x^2 + 12x + 10 \quad \text{No!}$$

Try: $(2x + 2)(x + 5) \quad \text{No!}$

$$2x^2 + 10x + 2x + 10$$

$$= 2x^2 + 12x + 10$$

Try

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

correct factorization

Yes!!

Check: $2x^2 + 4x + 5x + 10$

$$= 2x^2 + 9x + 10$$

Ex:

$$2x^2 - 25x + 12$$

(+) same signs
want a sum of $25x$ for middle term

$$(2x - 1)(x - 12)$$

Check: $2x^2 - 24x - 1x + 12$

$$2x^2 - 25x + 12$$

$2x^2$		12
$\swarrow$		$\swarrow$
$2x \cdot x$	$1x$	$1 \cdot 12$
		$2 \cdot 6$
		$3 \cdot 4$

$24x$