6.2: Factoring Trinomials (cont'd)

Note Title 3/6/2017

Question over review:

Review Sheet #10 Simplify. $\left(\frac{10}{3}\right)^{-4}$

$$\left(\frac{10}{3}\right)^{-4} = \frac{10^{-4}}{3^{-4}} = \frac{3^4}{10^4} = \frac{81}{10^4} = \boxed{\frac{81}{10000}}$$

$$= .0081$$

$$= \boxed{0.0081}$$

6.2 cont'd

Example: Factor

$x^2 - 35x - 36$ (−) signs are opposite want a difference of 35.

$$\boxed{(x+1)(x-36)}$$

Check: $x^2 - 36x + 1x - 36$

$x^2 - 35x - 36$ ✓

36
1 · 36
2 · 18
3 · 12
4 · 9
6 · 6

Ex: Factor.

$x^2 - 11x + 12$ (+) same signs want a sum of 11

12
1 · 12
2 · 6
3 · 4
none of these have a sum of 11

Trying a bunch of stuff:

$(x+1)(x-12)$
Check $x^2 - 12x + 1x - 12$
$x^2 - 11x - 12$ No!

$(x-1)(x-12)$
Check: $x^2 - 12x - 1x + 12$
$x^2 - 13x + 12$ No!

$(x-1)(x+12)$
Check: $x^2 + 12x - 1x - 12$
$x^2 + 11x - 12$ No!

This polynomial is prime! (Does not factor)

Ex: $x^2 - 13x + 14$ (+) same signs sum of 13

14
1 · 14
2 · 7

Prime.

Ex: $x^2 - 13x - 14$ (−) signs are opposite want a difference of 13

$(x + 1)(x - 14)$

14
1 · 14
2 · 7

Check: $x^2 - 14x + 1x - 14$

$x^2 - 13x - 14$ ✓

Prime polynomial: The only way to factor it (with integer coefficients) is to factor out 1 or −1.
(It only factors as a product of 1 and itself; or of −1 and its opposite)

Prime number: Natural number (counting number) whose only natural number factors are 1 and itself.

Prime numbers: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, etc

6 is a composite number because $6 = 2 \cdot 3$.
(not prime)

1 is neither prime nor composite.

Example: Factor $x^2 - 3xy - 40y^2$ (−) signs are opposite want a difference of 3

$(x + 5y)(x - 8y)$

both are correct

$(x - 8y)(x + 5y)$

40
1 · 40
2 · 20
4 · 10
5 · 8

Check: $x^2 - 8xy + 5xy - 40y^2$

$= x^2 - 3xy - 40y^2$ ✓

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

GCF: 2

$= 2(x^2 + 9x + 14)$ (+) same signs want a sum of 9

$= \boxed{2(x+2)(x+7)}$

14
1.14
2.7

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

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

$= x^2 + 9x + 14$ ✓

Ex: Factor.

$-x^2 + 14x - 40$

$= -1(x^2 - 14x + 40)$ (+) same signs sum of 14 [Factor out -1 first!]

$= -1(x-4)(x-10)$

40
1.40
2.20
4.10
5.8

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

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

$= x^2 - 14x + 40$ ✓

Final answer: $\boxed{-(x-4)(x-10)}$

Example: Factor.

GCF: $4xy$

$-4xy^3 - 20xy^2 + 96xy$

$= -4xy(y^2 + 5y - 24)$ (-) signs are opposite [Factor out $-4xy$]

$= \boxed{-4xy(y-3)(y+8)}$ want a difference of 5

24
1.24
2.12
3.8
4.6

Check: $(y-3)(y+8)$

$= y^2 + 8y - 3y - 24$

$= y^2 + 5y - 24$ ✓

Ex: $x^2 + 3x - 180$. (−) signs are opposite. Factor.

Want a difference of 3.

$(x+15)(x-12)$

Check:

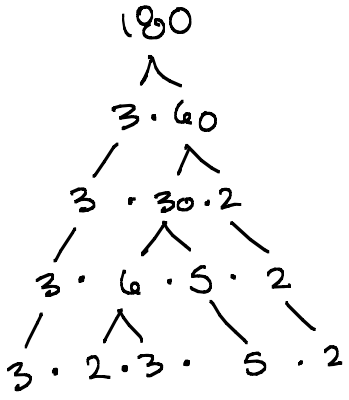
$x^2 - 12x + 15x - 180$

$x^2 + 3x - 180$ ✓

15
12
30

15
180

1 · 180
3 · 60
18 · 10
4 · 45
6 · 30
9 · 20
15 · 12



6.3: Factoring Trinomials (leading coefficient > 1)

(trial-and-error method)

Example: Factor.

$2x^2 + 9x + 10$ ← (+) same signs

GCF: 1

want sum of $9x$ for our middle term

10
↑
1 · 10
2 · 5

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

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

$= 2x^2 + 21x + 10$ No!

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

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

$= 2x^2 + 12x + 10$ No!

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

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

$= 2x^2 + 12x + 10$ No!

Try $\boxed{(2x + 5)(x + 2)}$ ← correct factorization

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

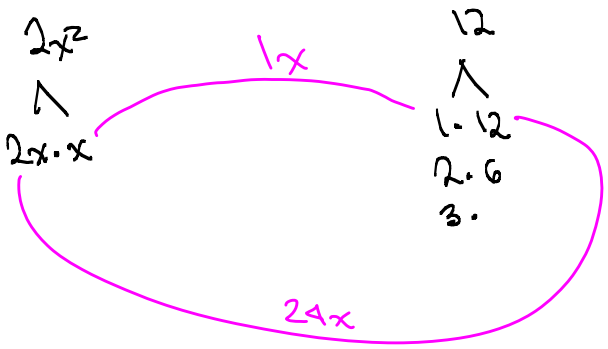
$= 2x^2 + 9x + 10$ ✓ Yes! It works!

Ex: $2x^2 - 25x + 12$ (+) same signs want a sum of 25x for middle term

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

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

$2x^2 - 25x + 12$



Ex: $4x^2 - 7x - 15$ (−) signs are opposite want a difference of 7x for middle term

$(4x + 5)(x - 3)$

Check: $4x^2 - 12x + 5x - 15$

$4x^2 - 7x - 15$ ✓