

Lesson 6

November 4, 2018 8:05 PM

Name: _____

Lesson #6 - Factoring Trinomials ($ax^2 + bx + c$), where $a = 1$

3 terms

Type I: $x^2 + bx + c$ have a binomial pair answer

1. $x^2 + 7x + 12 = (x + 3)(x + 4)$
 + to = 7 x to = 12
 also work: $\begin{matrix} 1 \cdot 12 \\ 3 \cdot 4 \\ 2 \cdot 6 \end{matrix}$ or $(x + 4)(x + 3)$
 *order is not important

2. $x^2 + 9x + 20 = (x + 4)(x + 5)$
 Add to = 9 multiply to = 20 $\begin{matrix} 2 \cdot 10 \\ 4 \cdot 5 \\ 1 \cdot 2 \end{matrix}$

3. $2x^2 + 22x + 60 = 2(x^2 + 11x + 30) = 2(x + 5)(x + 6)$
 $a \neq 1$ add to = 11 multiply to = 30
 $5 \times 6 = 30$
 $5 + 6 = 11$ ✓

4. $x^2 + 24xy + 44y^2 = (x + 2y)(x + 22y)$
 add to = 24 x multiply to = 44 $\begin{matrix} 44 \cdot 1 \\ 4 \cdot 11 \\ 2 \cdot 22 \end{matrix}$
 $x^2 + 22xy + 2xy + 44y^2$
 $x^2 + 24xy + 44y^2$ ✓

Type II: $x^2 - bx + c$ 2 numbers need to multiply to = \oplus but add to = \ominus , so they both need to be \ominus

1. $x^2 - 8x + 12 = (x - 6)(x - 2)$
 Add to = -8 multiply to = 12 $-6 \cdot -2 = 12$

2. $x^2 - 21x + 20 = (x - 1)(x - 20)$
 Add to = -21 x to = +20 $-20 \cdot -1 = +20$
 $-20 + (-1) = -21$ ✓

3. $y^2 - 11y + 18 = (y - 9)(y - 2)$
 Add to = -11 x to = +18 $-9 \cdot -2 = +18$
 $-9 + (-2) = -11$

4. $3x^2 - 18x + 27 = 3(x^2 - 6x + 9) = 3(x - 3)(x - 3)$
 $a \neq 1$ so need to factor out the 3
 $\therefore \div 3$
 add to = -6 multiply to = +9 $-3 \cdot -3 = +9$
 $-3 + (-3) = -6$ ✓

2 numbers that multiply to = c
 Same 2 numbers must ADD to = b
 CHECK: $x^2 + 3x + 4x + 12 = x^2 + 7x + 12$ ✓
 check $(x + 4)(x + 5) = x^2 + 5x + 4x + 20 = x^2 + 9x + 20$ ✓

Type III: $x^2 \pm bx - c$

middle term is + or -

last term is \ominus . 2 numbers that multiply to $= \ominus$, which means your 2 numbers will be a \oplus and a \ominus

1. $x^2 + 2x - 24 = (x + 2)(x - 24)$

Add to = +2

multiply to = -24

1. 24
2. 12
3. 8
4. 6

$= +6 \cdot (-4) = -24$
 $+6 + (-4) = +2$ ✓

2. $x^2 - 2x - 35 = (x - 7)(x + 5)$

add to = -2

multiply to = -35

1. 35
5. 7

$5 \cdot (-7) = -35$ and $5 + (-7) = -2$ ✓

3. $x^2 + x^2 - 30 = (x^2 - 5)(x^2 + 6)$

your binomial will be x^2

add to = 1

multiply to = -30

$(-5) \cdot 6 = -30$ and $(-5) + 6 = 1$

-30
1. 30
2. 15
3. 10
5. 6

4. $2x^3 - 6x^2 - 20x = 2x(x^2 - 3x - 10) = 2x(x + 2)(x - 5)$

if there is a GCF: 2 factor out

multiply to = -10
add to = -3

$2 \cdot (-5) = -10$
 $2 + (-5) = -3$

-10
1. 10
2. 5

5. $x^2 - x - 90 = (x + 9)(x - 10)$

add to = -1

multiply to = -90

1. 90
2. 45
3. 30
9. 10

$9 \cdot (-10) = -90$
 $9 + (-10) = -1$



ASSIGNMENT # 6
pages 35-38 Questions #189-216

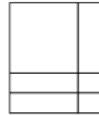
Factoring: $ax^2 + bx + c$ (where $a=1$) with tiles.

Hint: 3 terms, no common factor, leading coefficient is 1.

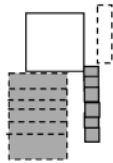
Eg.1. Consider $x^2 + 3x + 2$. The trinomial can be represented by the rectangle below.

Recall, the side lengths will give us the "factors".

$$\therefore x^2 + 3x + 2 = (x + 1)(x + 2)$$



Eg.2. Factor $x^2 - 5x - 6$



Start by placing the "x² tile" and the six "-1 tiles" at the corner. Then you can fill in the "x tiles". You'll need one x tile and six -x tiles.

$$\therefore x^2 - 5x - 6 = (x + 1)(x - 6)$$

Factor the following trinomials using algebra tiles.

189. $x^2 + 6x + 8$

190. $x^2 + 9x + 14$


191. $x^2 - 7x + 6$

192. $x^2 + 9x - 10$

Factoring: $ax^2 + bx + c$ (where $a=1$) without tiles.

Did you see the pattern with the tiles?

If a trinomial in the form $x^2 + bx + c$ can be factored, it will end up as $(x + \underline{\quad})(x + \underline{\quad})$.

The trick is to find the numbers that fill the spaces in the brackets. 

The Method...

If the trinomial is in the form: $x^2 + bx + c$, look for two numbers that multiply to c , and add to b .

Eg.1.

Factor. $x^2 + 6x + 8$

$$(x + \underline{\quad})(x + \underline{\quad})$$

What two numbers multiply to +8 but add to +6? 2 and 4

$$= (x + 2)(x + 4)$$

The numbers 2 and 4 fill the spaces inside the brackets.

Eg.2. Factor. $x^2 - 11x + 18$

$$(x + \underline{\quad})(x + \underline{\quad})$$

What two numbers multiply to +18 but add to -11? -2 and -9

$$= (x - 2)(x - 9)$$

The numbers -2 and -9 fill the spaces inside the brackets.

Eg.3. Factor. $x^2 - 7xy - 60y^2$ The y 's can be ignored temporarily to find the two numbers.
Just write them in at the end of each bracket.

$$(x + \underline{\quad}y)(x + \underline{\quad}y)$$

What two numbers multiply to -60 but add to -7? -12 and +5

$$= (x - 12y)(x + 5y)$$

The numbers -12 and +5 fill the spaces in front of the y 's.

Factor the trinomials if possible.

$$193. a^2 + 6a + 5$$

$$194. n^2 + 7n + 10$$

$$195. x^2 - x - 30$$

Factor the trinomials if possible.

196. $q^2 + 2q - 15$

197. $k^2 + k - 56$

198. $t^2 + 11t + 24$

199. $y^2 - 7y - 30$

200. $g^2 - 11g + 10$

201. $s^2 - 2s - 80$

202. $m^2 - 12m + 27$

203. $x^2 - 27 - 6x$

204. $p^2 + 3p - 54$

205. $2a^2 - 16a + 32$

206. $a^2 - 14a + 45$

207. $6x + 2x^2 - 20$

Factor the trinomials if possible.

208. $x^4 - 3x^2 - 10$

209. $w^6 + 7w^3 + 12$

210. $p^8 - 4p^4 - 21$

211. $56x + x^2 - x^3$

212. $x^4 + 11x^2 - 80$

213. $x^2 - 3x + 7$

214. $x^2 - 6xy + 5y^2$

215. $x^2 + 5xy - 36y^2$

216. $a^2b^2 - 5ab + 6$

Challenge Question
Factor $2x^2 + 7x + 6$.