Chapter 5 Section 4 Factoring Trinomials

Trinomial: three terms

Form: $ax^2 + bx + c$

Quadratic term: ax^2 Linear term: bxConstant term: c

Factoring by groups.

Factor: $2x^2 + 11x + 12$

Step 1: multiply ac $2 \cdot 12 = 24$

Step 2: Find two factors of 24 whose sum is b or 11

List the factors of 24

1 • 24

2 • 12

3 • 8 product is 24 and the sum is 11.

Step 3: Rewrite the middle term using the two factors found in step 2

$$2x^2 + 3x + 8x + 12$$

Step 4: Group the first 2 and last 2 terms

$$(2x^2+3x)+(8x+12)$$

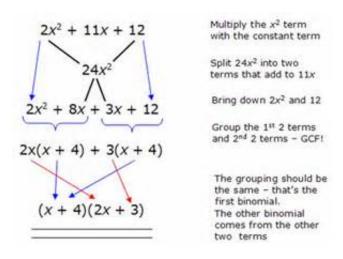
Step5: Factor and factor

$$x(2x+3)+4(2x+3)$$

$$(x+4)(2x+3)$$

Step 6: Check

Multiply the two binomials and should get the original polynomial



Way 2: Steps 1, 2 same

Factor: $2x^2 + 11x + 12$

Step 1: multiply ac $2 \cdot 12 = 24$

Step 2: Find two factors of 24 whose sum is b or 11

List the factors of 24

1 • 24

2 • 12

3 • 8 product is 24 and the sum is 11.

Step 3:

Using the two numbers found in step 2, divide each by the coefficient of the quadratic term

$$\frac{3}{2}$$
 and $\frac{8}{2}$ $\frac{8}{2}$ = 4

with the fraction, the 2 is the linear term and 3 is the constant term in one of the factored terms

$$(2x + 3)(x + 4)$$

Way 3: Using a table - Area model Steps 1, 2 same

Factor: $2x^2 + 11x + 12$

Step 1: multiply ac $2 \cdot 12 = 24$

Step 2: Find two factors of 24 whose sum is b or 11

List the factors of 24

1 • 24

2 • 12

 $3 \cdot 8$ product is 24 and the sum is 11.

Step 3:

Set up a box with information in step 2 and the quadratic term and constant term

$2x^2$	8x
3x	12

Step 4:

Factor the horizontal and vertical and put the common factor on the left side and on top

	X	4
2x	$2x^2$	8x
3	3x	12

Step 5:

Write the factors: top and side

$$(x + 4)(2x + 3)$$

Factor: $5x^2 + 14x + 8$

This is the form $ax^2 + bx + c$ where a = 5, b = 14, c = 8

Step 1: multiply ac $5 \cdot 8 = 40$

Step 2: Find two factors of 40 whose sum is b or 14

List the factors of 40

1 • 40

2 • 20

4 • 10 product is 40 and the sum is 14.

Decide which way to factor:

group, area model

Grouping

Step 3: Rewrite the middle term using the two factors found in step 2

$$5x^2 + 4x + 10x + 8$$

Step 4: Group the first 2 and last 2 terms

$$\left(5x^2+4x\right)+\left(10x+8\right)$$

Step5: Factor and factor

$$x(5x+4)+2(5x+4)$$
$$(5x+4)(x+2)$$

Step 6: Check

Multiply the two binomials and should get the original polynomial

Try using the area model.

Factoring with two variables Example 4: page 354

$$x^2-4xy-21y^2$$

Example 5: page 355

$$8x^3 - 40x^2 - 48x$$

Factor using substitution

$$x^6 - 8x^3 + 15$$
 or $(x^3)^2 - 8x^3 + 15$