Chapter 5 Section 4
Factoring Trinomials

Trinomial: three terms

Form: ax^2+bx+c

Quadratic term: ax^2
Linear term: bx
Constant term: c

Factoring by groups.

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

Step 1: multiply ac

$2 \bullet 12 = 24$

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

List the factors of 24

$1 \bullet 24$
$2 \bullet 12$
$3 \bullet 8$ 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

$\left(2x^2+3x\right)+\left(8x+12\right)$

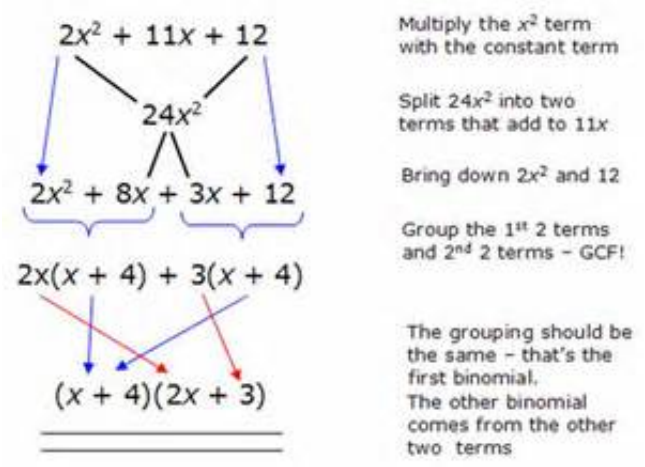
Step5: Factor and factor

$x\left(2x+3\right)+4\left(2x+3\right)$

$\left(x+4\right)\left(2x+3\right)$

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

$2 \bullet 12 = 24$

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

List the factors of 24

$1 \bullet 24$

$2 \bullet 12$

$3 \bullet 8$ 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
$1 \cdot 24$
$2 \cdot 12$
$3 \cdot 8$ 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

$5 \bullet 8 = 40$

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

List the factors of 40

$1 \bullet 40$

$2 \bullet 20$

$4 \bullet 10$ 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

$x\left(5x+4\right)+2\left(5x+4\right)$

$\left(5x+4\right)\left(x+2\right)$

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 $\left(x^3\right)^2 - 8x^3 + 15$