Lesson 6

AN5 Demonstrate an understanding of common factors and trinomial factoring, concretely, pictorially and symbolically.

**Factoring Trinomials of the form ax2 + bx + c**

To factor a trinomial of the form ax2 + bx + c where there are no common factors we use the **decomposition** method. The decomposition method follows the steps of the distributive property for multiplication in reverse order.

For example:

Factor: 6x2 + 11x +4

Step 1

Multiply the end 2 numbers together 6 x 4 = 24

Look for 2 numbers that multiply to give 24 and add to give 11.

Pairs that multiply to give 24 1,24 2,12 3, 8 4,6

The pair that adds to 11 is 3 and 8. This is the pair we will use in step 2.

Step 2

Break down the middle term of the trinomial ( decompose) into the factors you found in step 1.

 6x2 + 11x +4

 6x2 + 3x + 8x + 4

Step 3

Group the first two terms together and the last two terms together. Then common factor each bracket.

 6x2 + 3x + 8x + 4

 ( 6x2 + 3x)(+8x+4)

3x( 2x +1) + 4(2x+1)

Note: What is in both sets of brackets will be exactly the same if you have done the question correctly up to this point.

Step 4

The binomial is now the common factor. Write it down(once) and the terms in front go in the second bracket.

 3x(2x+1) + 4(2x+1)

 (2x +1)(3x + 4)

 Common binomial

Ex 2:

Factor:

 3x2 – 13x – 10

Step 1

 3 x -10 = -30

Factors of -30 are

1, -30 -1,30

2, -15 -2,15

3,-10 -3, 10

The factors that add to -13 are 2 and -15. Use these in step 2.

Step 2

Break up the middle term into the factors from step 1

3x2 -13x – 10

3x2 -15x + 2x – 10

Step 3

Group and take out common factors

(3x2 – 15x)(+2x – 10)

3x(x -5)+2(x-5)

Step 4

Answer : (x -5)(3x+2)

Example 3:

Factor: 2x2 - 9x +10

Step 1

2 x 10 = 20

So factors of 20

1,20 -1,-20

2, 10 -2,-10

4,5 -4,-5

The two numbers that multiply to give 20 and add to give -9 are -4 and -5.

Use these in Step 2

Step 2

2x2 -9x + 10

2x2 -4x -5x + 10

Step3

(2x2-4x)(-5x+10)

2x(x -2)-5(x-2)

Step 4

(x-2)(2x-5)

Example 4: Common Factors & Decomposition.

Factor:

6x2 -21x +9

\*\*\*\* When you are factoring **always** look for a common factor first\*\*\*\*

There is a common factor in this case. 3 divides equally into all three terms.

Using common factoring

6x2 -21x + 9 = 3(2x2 -7x +3)

Then proceed with factoring the trinomial using decomposition

2x2 – 7x + 3

2 x 3 = 6

Factors of 6

1,6 -1,-6 2,3 -2,-3

-1 & -6 add to -7 so

2x2 -7x + 3

2x2 -6x -1x + 3

Then

(2x2 -6x)(-1x+3)

2x(x-3) -1(x-3)

(x-3)(2x-1)

Putting it all together

6x2 -21x+9 = 3(x-3)(2x-1)

Extra Practice Questions From Textbook p.177-178 #12,13,15 & 18