Lesson 7

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

**Factoring Special Polynomials**

Type 1- Difference of Squares a2 – b2

How to identify

* Must be a binomial with a subtraction sign between the two terms
* Both terms in the binomial must be perfect squares

Ex:

 16x2 – 9

This is a difference of squares binomial. 16x2 is a perfect square [ (4x)(4x)]. 9 is also a perfect square. (3x3). The terms also have a subtraction sign between them.

When we have identified it as a perfect square, factoring can be completed by:

Taking the square root of both terms. In this case 4x and 3. Write two binomials with these terms, one having a + and one having a minus.

 16x2 – 9

 (4x + 3)(4x -3)

Ex 2: 25x2 – 49

25x2 = (5x)(5x)

49= (7)(7)

This is a difference of squares question so

25x2 – 49

= (5x-7)(5x+7)

Type 2 – Perfect Square Trinomial ax2 +2abx + b2

How to Identify

* First and last terms are perfect squares
* The square root of the first term x square root of the last term x 2 is the middle term

For ex:

 49x2 +56x + 16

49x2 = (7x)(7x) so it is a perfect square

16 = (4)(4) so it is a perfect square

(7x)(4) x 2 = 56x..this is the middle term

49x2 +56x + 16 is a perfect square.

To factor a perfect square use the square roots of the end terms and the sign of the middle term to write 2 binomials

 49x2 +56x + 16

= (7x + 4)(7x+4) or (7x+4)2

Ex 2:

36x2 – 60x +25

36x2 = (6x)(6x)

25= (5)(5)

(6x)(5) x 2 = 60x..middle term so

36x2 – 60x +25

= (6x -5)(6x-5) or (6x-5)2

\*\*\*Note- Perfect Square trinomials can be factored using decomposition but some may be difficult if the numbers are too large. If you recognize the trinomial as a perfect square , they can be factored easily in one step\*\*\*

Type 3 – Trinomials with two variables ax2 +bxy + cy2

These can be factored using the methods from lesson 5 & 6.

If the trinomial has a = 1 such as,

 x2 +7xy + 12y2 we factor it in a similar way as x2 +7x + 12

From lesson 5 we know that

x2 +7x + 12 = (x + 3) (x+4)

[3 x 4 = 12 and 3 +4 =7]

To factor with two variables add a variable to the end term in the binomials

So x2 +7xy + 12y2 = (x +3y)(x+4y)

Ex 2 :

Factor : x2 – xy – 6y2

Look for 2 numbers that multiply to give -6 and add to give -1

The numbers would be -3 and +2

So x2 – xy – 6y2 = ( x-3y)(x+2y)

If the trinomial is of the form ax2 + bxy + cy2 and a> 1 then we must use decomposition. ( See lesson 6)

Ex : 2x2 -7xy + 3y2

Look for 2 numbers that multiply to give (2)(3) = 6 and add to -7

Factors of 6

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

The numbers are -1 & -6 so follow the steps for decomposition ( See Lesson 6)

 2x2 -7xy + 3y2

 2x2 -xy -6xy + 3y2

 x(2x – y) -3y(2x – y)

 (2x-y)(x – 3y)

Ex 2:

 10a2 – ab – 2b2

Look for two numbers that multiply to give -20 and add to give -1

Factors of -20

-1, 20 1,-20 2, -10 -2,10 -4,5 4,-5

The numbers that add to -1 are -5 and 4 so

 10a2 – ab – 2b2

10a2 -5ab + 4ab -2b2

5a( 2a -b) + 2b(2a -b)

(2a-b)(5a+2b)

Extra Practice questions from textbook

 p.194-195 #5,6,8, 10 to 12