

ALGEBRA I

PACKET # 2

## Factoring Polynomials

Ex. 1 Use the distributive property to factor each polynomial.

a)  $12x^3 + 16x$

First, find the GCF of  $12x^3$  and  $16x$ .

$$12x^3 = 2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x$$

$$16x = 2 \cdot 2 \cdot 2 \cdot 2 \cdot x$$

The GCF is  $4x$ , Now divide the polynomial by  $4x$

$$\frac{12x^3 + 16x}{4x} = \frac{12x^3}{4x} + \frac{16x}{4x}$$

$$4x(3x^2 + 4) \text{ Answer}$$

Ex. 2  $18cd^2 + 12c^2d + 9cd$

The GCF =  $3cd$

$$\frac{18cd^2}{3cd} + \frac{12c^2d}{3cd} + \frac{9cd}{3cd} =$$

$$3cd(6d + 4c + 3)$$

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EX 2      FACTOR     $X^2-10x=16$

**FACTORS OF 16**

**SUM OF FACTORS**

-1, 16	-17
-2,-8	-10
-4,-4	-8

Factored Answer

$(X-2)(X-8)$  or  $(X-8)(X-2)$

Ex 3

$$X^2+3x-18$$

**FACTORS OF -18**

**SUM OF FACTORS 3**

-1 18	17
1 <b>-18</b>	-17
-2 9	7
2 -9	-7-
-3 6	3
3 -6	-3

$(X-3)(X+6)$  or  $(x+6)(x-3)$

# FACTOR EACH POLYNOMIAL

1.  $5x + 30y$  \_\_\_\_\_

2.  $16a + 4b$  \_\_\_\_\_

3.  $a^5b - a$  \_\_\_\_\_

4.  $15a^2y - 30ay$  \_\_\_\_\_

5.  $8bc^2 + 24bc$  \_\_\_\_\_

6.  $10x^2 + 15x + 25$  \_\_\_\_\_

7.  $24x + 48y$  \_\_\_\_\_

8.  $x^2y^3 + x^4y^2$  \_\_\_\_\_

## FACTORING TRINOMIALS IN THE FORM $X^2+bx+c$

EX.1  $X^2+6x+8$

You need to find two numbers whose sum is the b value, in this case 6.

The product of the two numbers has to equal C, in this case 8.

<u>FACTORS OF 8</u>	<u>SUM OF FACTORS</u>
1,8	9
2,4	6

Write the pattern  $(X+2)(X+4)$  using the two correct factors

$X^2 + 6x + 8$

EX 2          FACTOR     $X^2 - 10x + 16$

**FACTORS OF 16**

**SUM OF FACTORS**

-1, 16	-17
-2, -8	-10
-4, -4	-8

Factored Answer

$(X-2)(X-8)$  or  $(X-8)(X-2)$

Ex 3

$$X^2 + 3x - 18$$

**FACTORS OF -18**

**SUM OF FACTORS 3**

-1 18	17
1 <b>-18</b>	-17
-2 9	7
2 -9	-7-
-3 6	3
3 -6	-3

$(X-3)(X+6)$  or  $(x+6)(x-3)$

FACTOR EACH TRINOMIAL

1).  $a^2+8a+15$  \_\_\_\_\_

2).  $x^2+12x+27$  \_\_\_\_\_

3).  $c^2+12c+35$  \_\_\_\_\_

4).  $y^2+13y+30$  \_\_\_\_\_

5).  $d^2 - 7d + 10$  \_\_\_\_\_

6).  $p^2-17p+72$  \_\_\_\_\_

7).  $g^2-19g+60$  \_\_\_\_\_

8).  $h^2+3h-40$  \_\_\_\_\_

9).  $y^2-y-42$  \_\_\_\_\_

10).  $z^2-18z-40$  \_\_\_\_\_

## FACTOR TRINOMIALS IN THE FORM $Ax^2 + bx + c$

Ex. 1  $2x^2 + 7x + 6$

First multiply the a and the c values  $2 \times 6 = 12$   
 $2x^2 + 7x + 6$

Now find the product of 12 whose sum is the b value 7.

<u>FACTOR 12</u>	<u>SUM OF FACTORS</u>
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3,4	7
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2,6	8
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Set up this model, use the two factors as the middle 3 terms

$$2x^2 + 3x + 4x + 6$$

$$(2x^2 + 3x) + (4x + 6)$$

factor x (2x+3)    2 (2x+3)    Answer (x+2) (2x+3)    7

Use foil to check

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

$$2x^2 + 3x + 4x + 6$$

$$2x^2 + 7x + 6 \text{ It checks out.}$$

The factored answer again is  $(x+2)(2x+3)$

EX. 2  $5x^2+27x+10$

$$5x^2+27x+10$$

FACTORS OF 50      SUM OF THE FACTORS MUST EQUAL 27

5, 10

15



27

$$5x^2+2x+25x+10$$

$$(5x^2+2x)+(25x+10)$$

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

ANSWER

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

EX. 3  $6p^2+5p-6$

$6p^2+5p-6$	
Factor of -36	Sum must equal +5
-4,9	5

$$6p^2+9p-4p-6$$

$$(6p^2+9p) (-4p-6)$$

$$3p(2p+3) -2(2p+3)$$

$$(3p-2)(2p+3)$$

$$6p^2+9p-4p-6$$

$$6p^2+9p - 4p - 6$$

$$6p^2+5p-6$$

It checks out

Answer  $(3p-2)(2p+3)$



## FACTOR EACH TRINOMIAL

1).  $2x^2 + 7x + 5$  \_\_\_\_\_

2).  $3x^2 + 5x + 2$  \_\_\_\_\_

3).  $5d^2 + 6d - 8$  \_\_\_\_\_

4).  $9x^2 - 12x + 4$  \_\_\_\_\_

5).  $2a^2 - 9a - 18$  \_\_\_\_\_

6).  $2x^2 - 3x - 20$  \_\_\_\_\_

7).  $5c^2 - 17c + 14$  \_\_\_\_\_

8).  $8y^2 - 6y - 9$  \_\_\_\_\_

9).  $14x^2 + 13x - 12$  \_\_\_\_\_

10).  $15z^2 + 17z - 18$  \_\_\_\_\_

## FACTOR DIFFERENCES OF SQUARES

In order to factor differences of squares. The problem must be in the form  $a^2 - b^2$ .

$$a^2 - b^2 = (a+b)(a-b) \text{ or } (a-b)(a+b)$$

$$\text{Ex 1. } m^2 - 64 = (m-8)(m+8)$$

$$\text{Ex 2. } 16y^2 - 81z^2 = (4y + 9z)(4y - 9z)$$

$$\text{Ex3. } -25 + 49x^2$$

Or

$$49x^2 - 25 = (7x - 5)(7x + 5)$$

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READ PAGE 501&502 IN YOUR TEXTBOOK

## FACTOR EACH DIFFERENCE OF SQUARES

1).  $X^2-49$  \_\_\_\_\_

2).  $X^2-36$  \_\_\_\_\_

3).  $25-4p^2$  \_\_\_\_\_

4).  $100c^2-d^2$  \_\_\_\_\_

5).  $1600x^2-2500y^2$  \_\_\_\_\_

6.  $4x^2-121x^2$  \_\_\_\_\_

7.  $16x^2+25$  \_\_\_\_\_

8.  $81x^2-y^2z^2$  \_\_\_\_\_

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