

Warm Up

Factor the expression.

1)  $x^2 + 9x + 20$

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

2)  $9x^2 - 64$

$(3x+8)(3x-8)$

## Agenda

Warm Up

Pre-req ws

Notes

Test Corrections

In chapter 4 you learned...

Type	Example
General trinomial	$2x^2 - 3x - 20 = (2x + 5)(x - 4)$
Perfect square trinomial	$x^2 + 8x + 16 = (x + 4)^2$
Difference of two squares	$9x^2 - 1 = (3x + 1)(3x - 1)$
Common monomial factor	$8x^2 + 20x = 4x(2x + 5)$

X

Take out  
GCF

Factor

1.)  $y^3 - 4y^2 - 12y$

$y(y^2 - 4y - 12) = y(y - 6)(y + 2)$

2.)  $3x^3 + 30x^2 + 75x$

$3x(x^2 + 10x + 25) = 3x(x + 5)^2$

3.)  $5g^5 - 80g^3$

$5g^3(g^2 - 16)$

$= 5g^3(g + 4)(g - 4)$

**Unit 3**  
**Polynomial Functions**  
**(5.4)**  
**Factoring and Solving**  
**Polynomial Equations**

- Special Patterns
- Grouping
- Greatest Common Factor
- Sum & Difference of Cubes

## Solving Higher Order by Factoring (5.4)

### Factor using the Greatest Common Factor

1)  $x^3 + 2x^2 - 15x$

2.  $2x^5 - 18x^3$

3.  $4x^4 - 16x^3 + 16x^2$

## Solving Higher Order by Factoring (5.4)

Difference of Squares

$$a^2 - b^2 = (a - b)(a + b)$$

Ex:  $4x^2 - 9$

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

## Solving Higher Order by Factoring (5.4)

**The Sum of Two Cubes**

$$\underline{a^3} + \underline{b^3} = \underline{(a+b)(a^2 - ab + b^2)}$$

Find the real zeros.

1.)  $x^3 + 27 = 0$       $(x+3)(x^2 - 3x + 9)$   
 $a = x$       $b = 3$

## Factoring WS

$$(18) \quad 216 + 125y^3 \quad (6 + 5y)(36 - 30y + 25y^2)$$

$$a = 6 \quad b = 5y$$

$$(19) \quad 8a^3 - 343 \quad (2a - 7)(4a^2 + 14a + 49)$$

$$a = \underline{2a} \quad b = \underline{7}$$



## Solving Higher Order by Factoring (5.4)

### The Sum of Two Cubes

$$a^3 + b^3 = (\underline{a} + \underline{b})(\underline{a}^2 - \underline{ab} + \underline{b}^2)$$

Find the real zeros.

2.)  $\underline{2x^4} + \underline{250x} = 0$

$$2x(x^3 + 125) = \boxed{2x(\underline{x} + 5)(\underline{x}^2 - 5x + 25)}$$

$a = x \quad b = 5$

## Factoring WS

## Solving Higher Order by Factoring (5.4)

### The Difference of Two Cubes

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Find the real zeros.

1.)

$$x^3 - 1 = 0$$

$$a = x \quad b = 1$$

$$(x - 1)(x^2 + x + 1)$$

$$x^3 + \cancel{x^2} + \cancel{x} - 1\cancel{x^2} - \cancel{x} - 1$$

$$x^3 - 1$$

**Solving Higher Order by Factoring (5.4)****The Difference of Two Cubes**

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Find the real zeros.

2.)  $8x^3 - 125 = 0$

## Factoring WS

Solving Higher Order by Factoring (5.4)

## Factoring by grouping ( 4 terms )

$$ra + rb + sa + sb = r(a + b) + s(a + b)$$

$$= (r + s)(a + b)$$

Find the real zeros.

1.)  $2x^3 + 2x^2 + 4x + 4 = 0$

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

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

$$x^2(x + 1) + 2(x + 1)$$

$$(x + 1)(x^2 + 2)$$

2.)  $x^3 - 3x^2 - 16x + 48$

$$x^2(x - 3) - 16(x - 3)$$

$$(x - 3)(x^2 - 16)$$

← x  
Difference of □'s

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

20, 21, 31

20)  $(15x^2 + 20x)(6x - 8) \quad 5x(3x + 4) - 2(3x + 4)$   
 $(15x^2 + 14x - 8) \quad (5x - 2)(3x + 4)$

$\begin{array}{r} 120 \\ 20 \times -6 \\ 14 \end{array}$

$(15x^2 + 20x) - 6x - 8$   
 $5x(3x + 4) - 2(3x + 4)$   
 $(5x - 2)(3x + 4)$

21)  $(2ab + 5b) - 6a - 15$   
 $b(2a + 5) - 3(2a + 5)$   
 $(2a + 5)(b - 3)$

31)  $3x^3 + 6x^2 - 27x - 54$   
 $3((x^3 + 2x^2) - 9x - 18)$   
 $x^2(x + 2) - 9(x + 2)$   
 $(x^2 - 9)(x + 2)$   
 $(x + 3)(x - 3)(x + 2)$

### III. Factoring by grouping

$$\begin{aligned}ra + rb + sa + sb &= r(a + b) + s(a + b) \\ &= (r + s)(a + b)\end{aligned}$$

Find the real zeros.

2.)  $x^3 + 3x^2 - 9x = 27$

Example

## Factoring WS



## Solving Higher Order by Factoring (5.4)

### Polynomials in Quadratic Form

Find the real zeros.

$$x^2 + 3x + 2 \quad (x+2)(x+1)$$

1.)  $x^4 + 3x^2 + 2 = 0$

$$(x^2 + 2)(x^2 + 1)$$

## Solving Higher Order by Factoring (5.4)

### IV. Polynomials in Quadratic Form

Find the real zeros.

2.)  $2x^4 - 162 = 0$

$2(x^4 - 81)$

$(x^2 - 9)(x^2 + 9)$

$(x+3)(x-3)(x^2+9)$

$(x+3)(x+3)$   
 $x^2 + 3x + 3x + 9$   
 $x^2 + 6x + 9$

$(x+3)(x-3)$

$x^2 - 3x + 3x - 9$

$x^2 - 9$

## Factoring WS

## Solving Higher Order by Factoring (5.4)

TRY THESE:

Factor.

1.)  $y^4 - 14y^2 + 45$

2.)  $x^3 - 4x^2 + 4x - 16$

3.)  $125x^3 - 216$

Solve by factoring.

4.)  $x^3 - 5x^2 - 9x + 45 = 0$

5.)  $8x^3 + 27 = 0$

6.)  $2x^3 - 32x = 0$

\*Please do the work on a separate sheet of paper to turn in.

## Solving Higher Order by Factoring (5.4)

HW: Day one Unit Plan

-Factoring ws

★ CH 4 retakes due by Thanksgiving Break! ★