

**Sums and Differences of Cubes Class Work**

Objective: You will be able to rewrite polynomial expressions in factored form, and use the factored form to solve equations.

✓ Multiply each pair of polynomials.

a.  $(z + 4)(z^2 - 4z + 16)$

b.  $(p - 2)(p^2 + 2p + 4)$

$z^3 + 4z^2 - 4z^2 - 16z + 16z + 64$

$p^3 + 2p^2 + 4p - 2p^2$

$z^3 + 64$   
 ✱ all middle terms canceled  
 ✱ all perfect cubes  
 ✱ first & last matter most

$p^3 - 8$   
 $-4p - 8$

c.  $(n - 5)(n^2 + 5n + 25)$

d.  $(2x - 3)(4x^2 + 6x + 9)$

$n^3 + 5n^2 + 25n - 5n^2 - 25n - 125$

$8x^3 - 12x^2 + 12x^2 - 18x + 18x - 27$

$n^3 - 125$

$8x^3 - 27$

Do you notice any patterns or relationships!?

★ Discover!

What product would result in...

1.  $w^3 + 125$   
 $(w + 5)(w^2 - 5w + 25)$

2.  $64v^3 - 27$   
 $(4v - 3)(16v^2 + 12v + 9)$

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

4.  $a^3 - b^3$   
 $(a - b)(a^2 + ab + b^2)$

★ Sums and Differences of Cubes:

We can use these general formulas to factor binomials that are sums/differences of cubes:

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Unit 6 Class Work

*(sum/difference)(1<sup>st</sup> value squared, opposite sign, 1<sup>st</sup>+2<sup>nd</sup> values, positive 2<sup>nd</sup> value squared)***Guided Examples: Factoring****A. Factor  $24x^3 - 81$ .**

$$3(8x^3 - 27)$$

$$3(2x - 3)(4x^2 + 6x + 9)$$

**B. Factor  $r^6 + 343 = (r^2 + 7)(r^4 - 7r^2 + 49)$**

$$(r^2)^3 = r^6$$

\*Check your work by multiplying!

**Practice:**

Factor each binomial completely.

1.  $w^3 + 125$

2.  $54x^3 - 2$

3.  $p^6 - 8r^3$

4.  $b^{24} + 512$

5.  $500s^3 + 32$

6.  $3h^{12} - 192$

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Unit 6 Class Work

7.  $8m^3 + 27n^6$

8.  $x^9 - y^9$

9.  $3x^4 + 3x - 2x^3 - 2$

10.  $2x^4 + 5x^3 - 16x - 40$

 **Practice:**

Factor each binomial completely.

1.  $w^3 + 125$

2.  $54x^3 - 2$

3.  $p^6 - 8r^3$

4.  $b^{24} + 512$

5.  $500s^3 + 32$

6.  $3h^{12} - 192$

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Unit 6 Class Work

7.  $8m^3 + 27n^6$

8.  $x^9 - y^9$

9.  $3x^4 + 3x - 2x^3 - 2$

10.  $2x^4 + 5x^3 - 16x - 40$

**Guided Examples: Solving**C. Solve the equation  $X^3 - 64 = 0$ .

State the multiplicity of each root.

\*Note, solutions are also known as "roots."

D. Solve the equation  $250x^3 + 2 = 0$ .  
State the multiplicity of each root.✍ **Practice:** Solve each equation,  
and state the multiplicity of each root.

1.  $2x^3 - 2000 = 0$

2.  $32x^3 + 4 = 0$

3.  $3x^3 = -192$

4.  $56x^4 - 40x^3 = 5 - 7x$

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Unit 6 Class Work

5.  $27x^4 + 54x^3 - x = 2$

6.  $250x^4 + 125x^3 - 2x = 1$

*Practice:* Solve each equation,  
and state the multiplicity of each root.

1.  $2x^3 - 2000 = 0$

2.  $32x^3 + 4 = 0$

3.  $3x^3 = -192$

4.  $56x^4 - 40x^3 = 5 - 7x$

5.  $27x^4 + 54x^3 - x = 2$

6.  $250x^4 + 125x^3 - 2x = 1$

**\*Please write down any important reminder related to sums/differences of cubes OR a question you have related to sums/differences of cubes.**