

Name _____

Date _____

Advanced Algebra

Unit 5 Polynomials

Assignment #19- Sub of two Cubes and other patterns

The following problems can all be factored with the sum or difference of two cubes. Find the cube root of the first term and that is your "a", find the cube root of the second term and that is your "b". Then follow the minus or plus pattern.

Sum of two Cubes:

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

Difference of two Cubes:

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

1) $64x^3 + 125$ 4x 5 $(4x+5)(16x^2 - 20x + 25)$	2) $8x^3 + 27$ 2x 3 $(2x+3)(4x^2 - 6x + 9)$	3) $512x^3 - 343$ 8x 7 $(8x-7)(64x^2 + 56x + 49)$
4) $27x^3 - 729$ 3x 9 $(3x-9)(9x^2 + 27x + 81)$	5) $8x^3 + 125$ 2x 5 $(2x+5)(4x^2 - 10x + 25)$	6) $8x^3 - 8000$ 2x 20 $(2x-20)(4x^2 + 40x + 400)$
7) $x^3 - 343$ x 7 $(x-7)(x^2 + 7x + 49)$	8) $8x^3 - 125$ 2x 5 $(2x-5)(4x^2 + 10x + 25)$	9) $216x^3 - 27$ 6 3 $(6x-3)(36x^2 + 18x + 9)$
10) $729x^3 - 64$ 9x 4 $(9x-4)(81x^2 + 36x + 16)$	11) $1000x^3 - 8$ 10x 2 $(10x-2)(100x^2 + 20x + 4)$	12) $1331x^3 - 1728$ 11x 12 $(11x-12)(121x^2 + 132x + 144)$

Expand the following binomial Cube patterns.

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

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

1) $(x+3)^3$

$$x^3 + 3x^2(3) + 3x \cdot 9 + 27$$

$$x^3 + 9x^2 + 27x + 27$$

2) $(x-5)^3$

$$x^3 - 3x^2(5) + 3x \cdot 25 - 125$$

$$x^3 - 15x^2 + 75x - 125$$

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

$$8x^3 + 3 \cdot 4x^2 \cdot 4 + 3 \cdot 2x \cdot 16 + 64$$

$$8x^3 + 48x^2 + 96x + 64$$

4) $(4x-4)^3$

$$64x^3 - 3 \cdot 16x^2(4) + 3(4x)16 - 64$$

$$64x^3 - 192x^2 + 192x - 64$$

5) $(2x+3y)^3$

$$8x^3 + 3 \cdot 4x^2(3y) + 3(2x)9y^2 + 27y^3$$

$$8x^3 + 36x^2y + 54xy^2 + 27y^3$$

6) $(3x-2y)^3$

$$27x^3 - 3 \cdot 9x^2(2y) + 3(3x)4y^2 - 8y^3$$

$$27x^3 - 54x^2y + 36xy^2 - 8y^3$$

Mixed Review....either factor or expand the following:

1) $(3x+2y)^2$

$$9x^2 + 12xy + 4y^2$$

2) x^2-9

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

3) $(x-6)^3$

$$x^3 - 3x^2(6) + 3x \cdot 36 + 216$$

$$x^3 - 18x^2 + 108x + 216$$

3) $8x^3+27$

$$2x \quad 3$$

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

4) $(3x-2y)(3x+2y)$

$$9x^2 - 4y^2$$

4) $4x^4-16$

$$4(x^4-4)$$

$$4(x^2-2)(x^2+2)$$