Your Name
Mrs. Theo
12/4/20

Complex Zeros
Notes

Sum and Difference of Cubes

Day 4

Sum of Cubes

Form: $x^3 + a^3$

Binomial of degree 3, addition

Factors into this

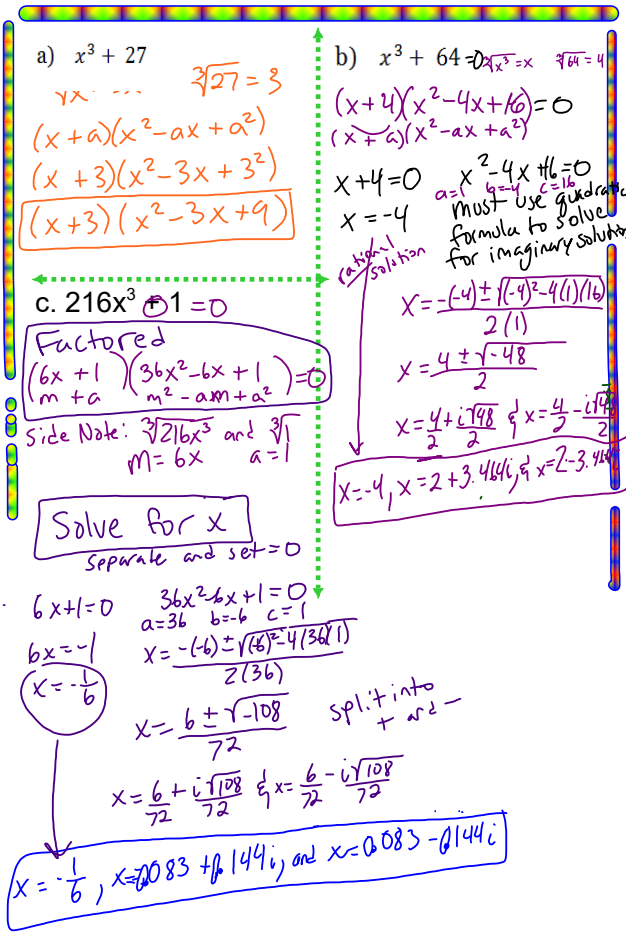
same sign opposite sign Always positive

$$x^3 + a^3 = (x + a)(x^2 - ax + a^2)$$

$\sqrt[3]{}$ 1st term $\sqrt[3]{}$ 2nd term Product of 1st and 2nd terms

SOAP

a linear binomial and a quadratic with 2 imaginary solutions which can be found using the quadratic formula



Difference of Cubes

Form: $x^3 - a^3$

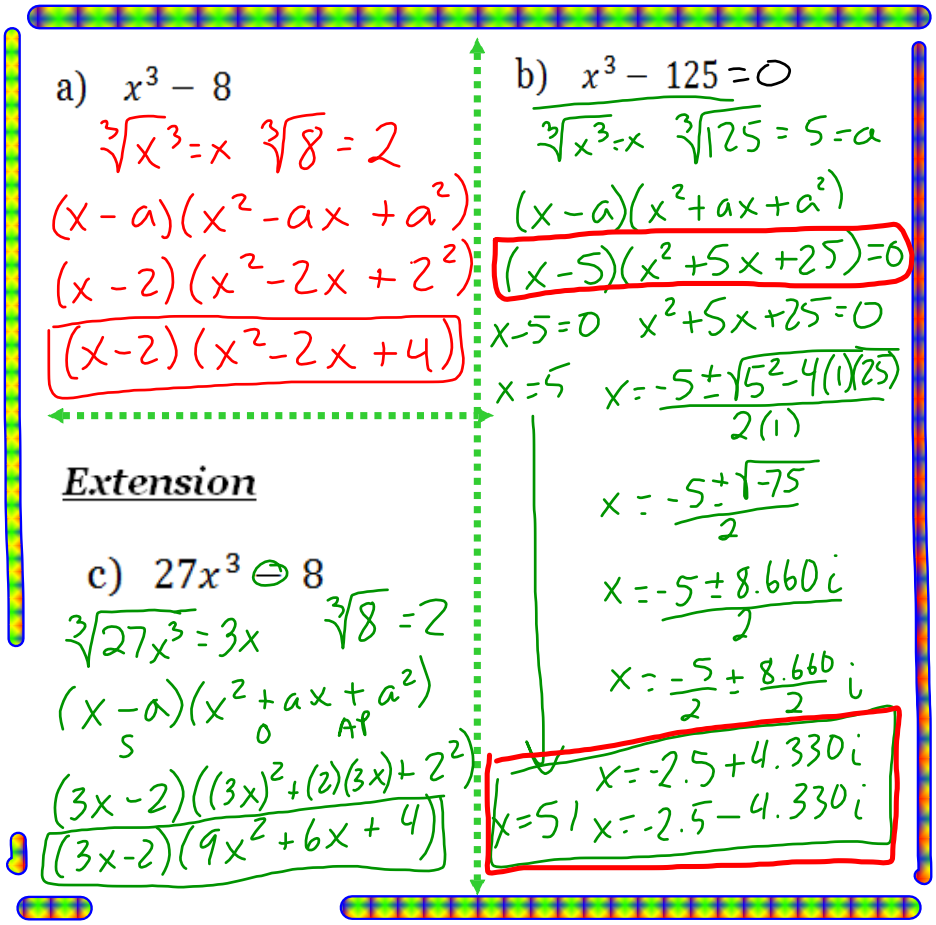
Binomial of degree 3, subtraction

Factors into this

$$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$$

same sign — opposite sign — always positive

a linear binomial and a quadratic with 2 imaginary solutions which can be found using the quadratic formula



$64x^3 = 125$

$64x^3 - 125 = 0$ Difference of cubes Factored

$(4x-5)(16x^2+20x+25)=0$

$m = a$ m^2+ma+a^2

S O AP

Solve for x

$4x-5=0$ $16x^2+20x+25=0$

$4x=5$ $x=\frac{-20\pm\sqrt{(20)^2-4(16)(25)}}{2(16)}$

$x=\frac{5}{4}$ $x=\frac{-20\pm\sqrt{-1200}}{32}$

$x=\frac{-20+i\sqrt{1200}}{32}$ and $x=\frac{-20}{32}-\frac{i\sqrt{1200}}{32}$

$x=\frac{5}{4}$, $x=-0.625+1.083i$ and $x=-0.625-1.083i$

$0=216+8y^6$

$8y^6+216=0$

$\sqrt[3]{8y^6}=2y^2$ $\sqrt[3]{216}=6$

$(2y^2+6)(4y^4-12y^2+36)=0$

$(\sqrt{2}y+\sqrt{6}i)(\sqrt{2}y-\sqrt{6}i)$

$2y^2+6=0$ $4y^4-12y^2+36=0$

$2y^2=-6$ $y^2=\frac{-(-12)\pm\sqrt{(-12)^2-4(4)(36)}}{2(4)}$

$y^2=-3$

$y=\pm i\sqrt{3}$ $y^2=\frac{12+i\sqrt{432}}{8}$ $y^2=\frac{12-i\sqrt{432}}{8}$

2 imag 2 imag

4 imaginary solutions

Factor And Solve

$27x^3 - 8$

x=-1/3 + 0.577i x=-1/3 - 0.577i x=2/3

Factor and Solve :

$64a^3 + 1$

a=-1/4 a= 0.125 + 0.217i a=0.125 - 0.217i

Factor and solve:

$8y^3 - 27$

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

S O AP

1st term 2nd Term squared 1st · 2nd squared

$2y - 3 = 0$ $4y^2 + 6y + 9 = 0$

$y = \frac{3}{2}$

$y = 1.5$

$y = \frac{-6 \pm \sqrt{6^2 - 4(4)(9)}}{2(4)}$

$y = \frac{-6 \pm \sqrt{-108}}{8}$

$y = \frac{-6}{8} \pm \frac{\sqrt{108}}{8} i$

$y = -0.75 \pm \frac{10.39}{8} i$

$y = -0.75 + 1.299i$

$y = -0.75 - 1.299i$

Factor And Solve

$27x^3 - 8$

Factor and Solve :

$64a^3 + 1$

Factor and solve:

$8y^3 - 27$

Polynomials – Factoring Sum and Differences of Two Cubes 2

Draw a line from the cube to its factors. The lines will go through a letter then a number. Write them at the bottom to find what happened when the students went to the Coca-Cola factory.

$8x^3-125y^3$	$(3x-4y)$	$(4x^2+6xy+9y^2)$
$27x^3-125y^3$	$(2x-5y)$	$(9x^2+12xy+16y^2)$
$27x^3-64y^3$	$(3x-5y)$	$(9x^2-12xy+16y^2)$
$27x^3-8y^3$	$(2x-3y)$	$(4x^2+10xy+25y^2)$
$8x^3-27y^3$	$(3x+4y)$	$(9x^2+15xy+25y^2)$
$27x^3+64y^3$	$(3x-2y)$	$(16x^2-20xy+25y^2)$
$8x^3+27y^3$	$(2x+3y)$	$(9x^2+6xy+4y^2)$
$64x^3+125y^3$	$(4x+5y)$	$(4x^2-10xy+25y^2)$
$27x^3+125y^3$	$(2x+5y)$	$(4x^2-6xy+9y^2)$
$8x^3+125y^3$	$(4x+3y)$	$(16x^2-12xy+9y^2)$
$64x^3+27y^3$	$(3x+5y)$	$(9x^2-15xy+25y^2)$
$64x^3-125y^3$	$(4x-5y)$	$(9x^2-6xy+4y^2)$
$27x^3+8y^3$	$(3x+2y)$	$(16x^2+20xy+25y^2)$

9 6 1 10 1 8 3 12 3 7 5 7 11 2 13 4

GridWords: Factoring #6 Sum / Difference of Two Cubes

Name: _____

Date: _____ Class: _____

Factor each expression. Write the factors on the lines, then highlight the boxes in the grid containing each factor. When you are finished, write the letters that are formed by the highlighted boxes in order to create a word.

1 $8x^3-125$ _____

2 a^3b^6+64 _____

3 $27y^9+1$ _____

4 $8a^3-b^3$ _____

5 x^6-8 _____

6 b^9+x^6 _____

7 $64a^3-1$ _____

8 $8a^3b^3-x^6$ _____

9 x^3+125 _____

10 $27a^{12}+1$ _____

11 $x^{15}-1$ _____

12 $8b^3+x^6$ _____

13 y^6b^3+1 _____

14 $64a^9+125$ _____

15 b^3+x^3 _____

16 $8y^6-27$ _____

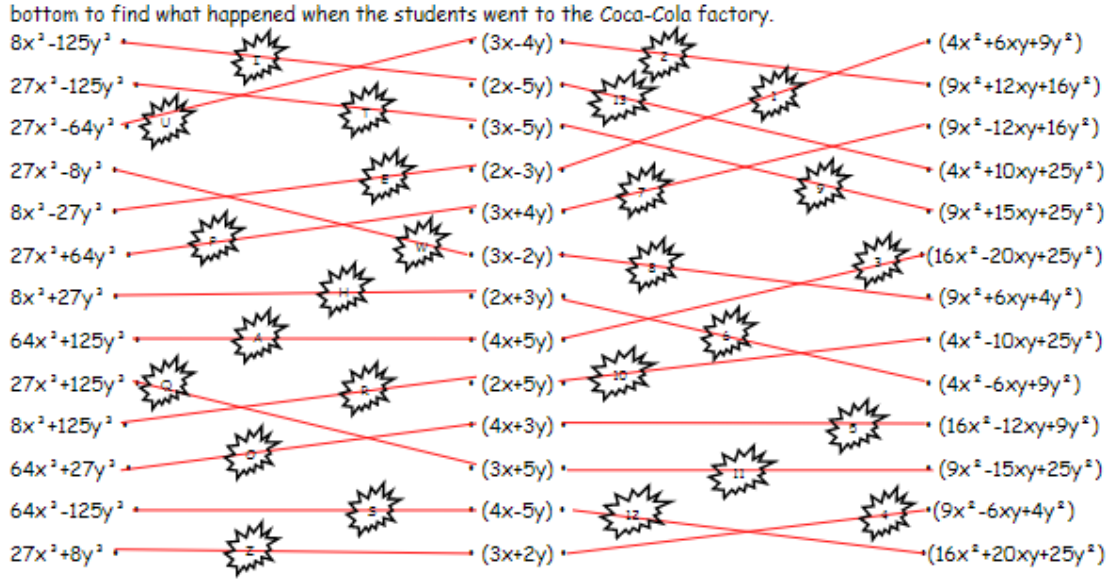
17 a^6b^6-8 _____

Write the GridWord here:

$2ab-x^2$	b^2-bx+x^2	$2x-5$	$a+2$	$a^4+a^2b^2-2$	b^3-x^2	y^2-1	$5x$	$x^{10}+x^5+1$	b^3+x^2	$2a$	$a^4b^2+4ab^2+16$	$x-y$	$4y^4+6y^2+9$	$ab+4$
$3a^4+1$	$64a^2+4a-1$	$b-x$	$5x^2$	$4x^2+10x+25$	$2a+b$	$27a^4-1$	a	$4a^2+2ab+b^2$	$3x^2-6$	3	a^2b^2+8	b^2+2	$9y^6-3y^3+1$	$x+1$
x^2-2	$x^2-5x+25$	y^2b+1	$bx+1$	$9a^8-3a^4+1$	$4a+1$	$4a^2-a-1$	2	$16a^6-20a^3+25$	$4a^3+5$	b^4	$a^2b^4-4ab^2+16$	$4y^2+3$	$b^6-b^3x^2+x^4$	$4a-1$
$2b-x^2$	b^8-bx+2	$x+5$	$yb+1$	a^2b^2-2	$2a-b$	$2y^2-3$	bx	$4a^2b^2+2abx^2+x^4$	b^6+x^4	$8x$	$a^4b^4+2a^2b^2+4$	$b-2x$	$x^2-25x-25$	x^2-3
$b+x$	x^4+2x^2+4	x^5-1	$4x$	$16a^2+4a+1$	x^5+1	$2b+x^2$	y^4	$y^4b^2-y^2b+1$	$3y^3+1$	xy	$4b^2-2bx^2+x^4$	ab^2+4	$x^{10}-x^5+5$	$a-5$

Polynomials – Factoring Sum and Differences of Two Cubes

Draw a line from the cube to its factors. The lines will go through a letter then a number. Write them at the bottom to find what happened when the students went to the Coca-Cola factory.



T	H	E	R	E	W	A	S	A	P	O	P	Q	U	I	Z
9	6	1	10	1	8	3	12	3	7	5	7	11	2	13	4

There was a pop quiz.

	$8x^3 - 125$	$(2x - 5)(4x^2 + 10x + 25)$
	$a^2b^6 + 64$	$(ab^2 + 4)(a^2b^4 - 4ab^2 + 16)$
	$27y^9 + 1$	$(3y^3 + 1)(9y^6 - 3y^3 + 1)$
	$8a^3 - b^3$	$(2a - b)(4a^2 + 2ab + b^2)$
	$x^6 - 8$	$(x^2 - 2)(x^4 + 2x^2 + 4)$
	$b^9 + x^6$	$(b^3 + x^2)(b^6 - b^3x^2 + x^4)$
	$64a^3 - 1$	$(4a - 1)(16a^2 + 4a + 1)$
	$8a^3b^3 - x^6$	$(2ab - x^2)(4a^2b^2 + 2abx^2 + x^4)$
	$x^3 + 125$	$(x + 5)(x^2 - 5x + 25)$
0	$27a^{12} + 1$	$(3a^4 + 1)(9a^8 - 3a^4 + 1)$
11	$x^{15} - 1$	$(x^5 - 1)(x^{10} + x^5 + 1)$
12	$8b^3 + x^6$	$(2b + x^2)(4b^2 - 2bx^2 + x^4)$
13	$y^6b^3 + 1$	$(y^2b + 1)(y^4b^2 - y^2b + 1)$
14	$64a^9 + 125$	$(4a^3 + 5)(16a^6 - 20a^3 + 25)$
15	$b^3 + x^3$	$(b + x)(b^2 - bx + x^2)$
16	$8y^6 - 27$	$(2y^2 - 3)(4y^4 + 6y^2 + 9)$
17	$a^6b^6 - 8$	$(a^3b^3 - 2)(a^6b^6 + 2a^3b^3 + 4)$

Write the GridWord here.

SHELL

$2ab - x^2$	$b^2 - bx + x^2$	$2x - 5$	$a + 2$	$a^4 + a^2b^2 - 2$	$b^2 - x^2$	$y^2 - 1$	$5x$	$x^{10} + x^5 + 1$	$b^3 + x^3$	$2a$	$a^4b^2 + 4a^2b^2 + 16$	$x - y$	$4y^4 + 6y^2 + 9$	$ab + 4$
$3a^4 + 1$	$64a^2 + 4a - 1$	$b - x$	$5x^2$	$4x^2 + 10x + 25$	$2a + b$	$27a^6 - 1$	a	$4a^2 + 2ab + b^2$	$3x^2 - 6$	3	$a^2b^2 + 8$	$b^2 + 2$	$9y^4 - 3y^2 + 1$	$x + 1$
$x^2 - 2$	$x^2 - 5x + 25$	$y^2b + 1$	$bx + 1$	$8a^6 - 3a^4 + 1$	$4a + 1$	$4a^2 - a - 1$	2	$16a^6 - 20a^3 + 25$	$4a^2 + 5$	b^4	$a^2b^4 - 4ab^2 + 16$	$4y^2 + 3$	$b^4 - b^2x^2 + x^4$	$4a - 1$
$2a - x^2$	$b^6 - bx + 2$	$x + 5$	$yb + 1$	$a^2b^2 - 2$	$2a - b$	$2y^2 - 3$	bx	$4a^2b^2 + 2abx^2 + x^4$	$b^6 + x^4$	$8x$	$a^6b^6 + 2a^3b^3 + 4$	$b - 2x$	$x^2 - 25x - 25$	$x^2 - 3$
$b + x$	$x^4 + 2x^2 + 4$	$x^2 - 1$	$4x$	$16a^2 + 4a + 1$	$x^2 + 1$	$2b + x^2$	y^4	$y^6b^2 - y^2b + 1$	$3y^2 + 1$	xy	$4b^2 - 2bx^2 + x^4$	$ab^2 + 4$	$x^{10} - x^2 + 5$	$a - 3$