7th Period

Standards: **A2.F.IF.B.3** (formerly F-IF.C.7c) Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology. b. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

Objectives: Students will be able to classify polynomials. Students will be able to graph polynomial functions and describe end behavior

Section 5-1: Polynomial Functions

Warm Up

Simplify each expression by combining like terms.

1. $3x + 5x - 7x$

   x

2. $-8xy^2 - 2x^2y + 5x^2y$

   $-8xy^2 + 3x^2y$

3. $-4x + 7x^2 + x$

   $7x^2 - 3x$

Key Concepts

monomial – a real number, a variable, or a product of a real number and one or more variables with whole number exponents

degree of monomial – the exponent of the variable

polynomial – a monomial or the sum of monomials

degree of poly. – the largest degree of any term of the polynomial

polynomial function – arranges the terms by degree in a descending numerical order $P(x) = a_nx^n + a_{n-1}x^{n-1} + \ldots + a_1x + a_0$ where n is a nonnegative integer and $a_n, \ldots, a_0$ are real numbers.

Degree	Name
0	Constant
1	Linear
2	Quadratic
3	Cubic
4	Quartic
5	Quintic

Number of Terms	Name
1	Monomial
2	Binomial
3	Trinomial
4	Polynomial of 4 Terms

Examples

1. Write each polynomial in standard form. Then classify it by degree and by number of terms.

a) $9 + x^3$

$x^3 + 9$

cubic binomial

b) $7x^3 - 2x^2 - 3x^4$

$-3x^4 + 7x^3 - 2x^2$

quartic trinomial

2. Write in standard form and classify by its degree and number of terms.

PEMDAS

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

difference of squares

a) $(x^2 - 3x + 4)(-5x^2 + 8x + 3)$

	x^2	$-3x$	$+4$
$-5x^2$	$-5x^4$	$15x^3$	$-20x^2$
$8x$	$8x^3$	$-24x^2$	$32x$
3	$3x^2$	$-9x$	12

$\boxed{-5x^4 + 23x^3 - 41x^2 + 23x + 12}$

quartic polynomial of 5 terms

b) $(4y^2 + 9y + 7) - (y^2 - 5y + 6)$

$4y^2 + 9y + 7 - 1y^2 + 5y - 6$

$\boxed{3y^2 + 14y + 1}$

quadratic trinomial

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

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

	x^2	$4x$	4
x^2	x^4	$4x^3$	$4x^2$
4	$4x^2$	$16x$	16

$\boxed{x^4 + 4x^3 + 8x^2 + 16x + 16}$

quartic polynomial of 5 terms

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

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

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

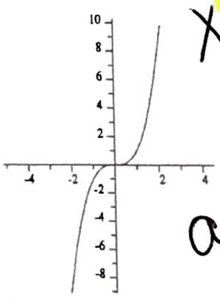
$\boxed{x^4 - 16}$

quartic binomial

End behavior – direction of the graph to the far left and to the far right.

a	Even Degree	Odd Degree
Leading Coefficient Positive	Up and Up	Down and Up
Leading Coefficient Negative	Down and Down	Up and Down

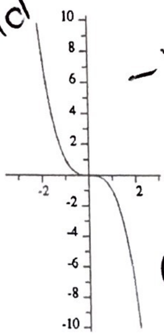
x^3 odd



a^+

Down and Up

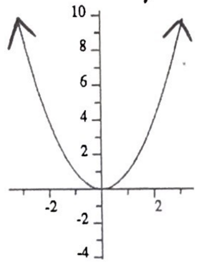
$-x^3$



a^-

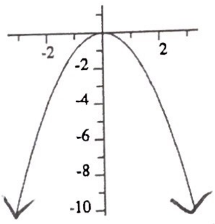
Up and Down

x^2 even



Up and Up

$-x^2$



Down and Down

Examples

What is the ending behavior of the graph? How many turning points are there? Check using graphing calculator and sketch the functions.

$d-1$

a) $y = 4x^3 - 3x$

degree = 3 (odd)

$a = 4$ (+)

Down and up

turning points 2

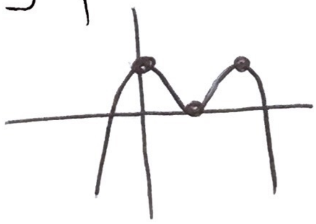
b) $y = -2x^4 + 8x^3 - 8x^2 + 2$

degree = 4 (even)

$a = -2$ (–)

down and down

turning points 3



Workbook page 121

1) 2) 3) 6) 7)

Extra credit: Think about a Plan workbook page 118

Exit ticket: page 121, problem #8

ndards: **A2.A.APR.A.2** (formerly A-APR.A.3) Identify zeros of polynomials when suitable factorizations are available, and use the zeros construct a rough graph of the function defined by the polynomial. **A2.F.IF.A.2** (formerly F-IF.B.6) Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. **A2.F.IF.B.5** (formerly F-IF.C.9) Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Objectives: Students will analyze the factored form of a polynomial. Students will write a polynomial function given its zeros and use the zeros to construct a rough graph of the function defined by the polynomial.

Section 5-2 (Part 1): Polynomials, Linear Factors, and Zeros

Warm Up Factor each polynomial

1. $x^2 + 7x$

$x(x+7)$

2. $3x^2 + 8x + 4$

$\ast x^2 + 8x + 12$

$\ast (x + \frac{6}{3})(x + \frac{2}{3})$

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

3. $3x^3 - 18x^2 + 24x$

$3x(x^2 - 6x + 8)$

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

Key Concepts

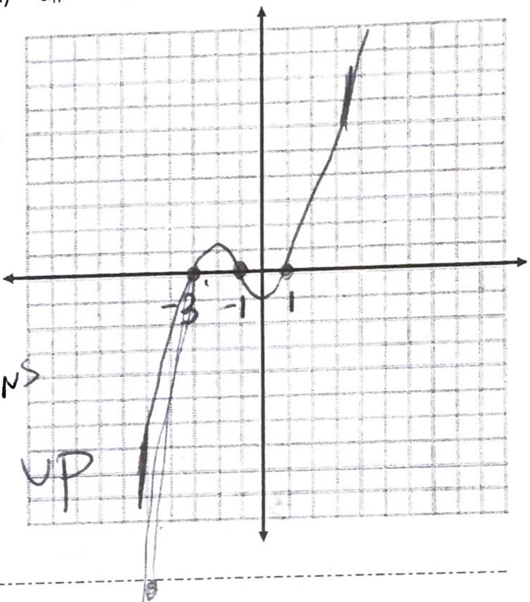
The following are equivalent statements about a real number b and a polynomial $P(x) = a_n x^n + a_{n-1}x^{n-1} + \ldots + a_1 x + a_0$

$x - b$ is a Linear factor of the polynomial $P(x)$ ~~x^2+7~~

b is a ROOT (solution) of the polynomial function $y = f(x)$

b is a ZERO of the polynomial equation $f(x) = 0$

b is an X-intercept of the graph $y = f(x)$



Example

1. Find the zeros of $y = (x + 1)(x - 1)(x + 3)$. Then graph the function.

-1 1 -3

$1x^3$ ← odd (opposite directions)

"good" pts to plug in

-4, -2, 0, 2
L middle R

↑ +

when $x=-4$ $y = (-3)(-5)(-1)$
-15

(GROW) down and UP

Key Concepts

polynomial

Factor Theorem

The expression $x - a$ is a factor of a if the value a is a zero of the related polynomial function.

if I have a zero, I can create a polynomial

Example Write **two** polynomials in standard form with zeros at 2, −3, and 0.

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

	x	-2
x	x^2	$-2x$
$+3$	$3x$	-6

$(x^2 + x - 6) \cdot x$

$\boxed{x^3 + x^2 - 6x}$

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

$5x^2(x^2 + x - 6)$

$\boxed{5x^4 + 5x^3 - 30x^2}$

Workbook page 125
1) 2) 3)

Extra credit: Think about a Plan workbook page 118

Exit ticket: create a polynomial with zeros -1, 0 and 5

Standards: **A2.A.APR.A.2** (formerly A-APR.A.3) Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. **A2.F.IF.B.5** (formerly F-IF.C.9) Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
Objectives: Students will be able to analyze the factored form of a polynomial (multiplicities). Students will be able to identify relative maximums and minimums.

Section 5-2 (Part 2): Polynomials, Linear Factors, and Zeros

Warm Up

decreases ↙ odd

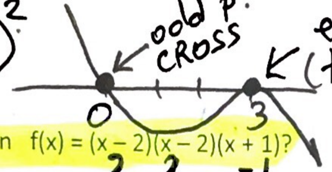
1. Factor and sketch the given function $y = -3x^3 + 18x^2 - 27x$

$-3x(x^2 - 6x + 9)$ ← perfect sq. trinomial

GCF

$-3x^1(x-3)^2$

0　　3



2. Create a polynomial with x intercepts -3, 0, 0, 5

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

$x^2(x^2 - 5x + 3x - 15)$

$x^2(x^2 - 2x - 15)$

$\boxed{x^4 - 2x^3 - 15x^2}$

3. What are the zeros of the function f(x) = (x – 2)(x – 2)(x + 1)?　2　2　-1

**Suppose someone listed the zeros as 2 and -1. Why might someone think this is a quadratic function?

because number 2 is not listed twice

Key Concepts

Multiple zero - repeated zero　　Multiplicity - the number of times the zero occurs

Even multiplicity-function touch the x axis at zero　　Odd multiplicity- function CROSS the x axis at zero

Example

1. What are the zeros of $f(x) = x^5 - 6x^4 + 9x^3$? What are their multiplicities? How does the graph behave at these zeros?

$+x^5 - 6x^4 + 9x^3$

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

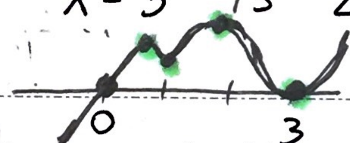
$x^3(x-3)^2$

0　3

Multiplicities of.

x=0 is 3 (odd CROSS) — looks like cubic function

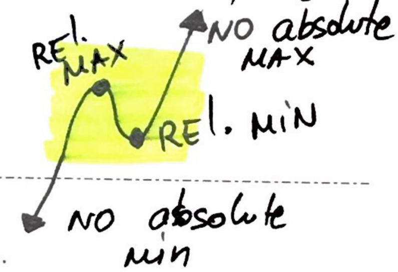
x=3 is 2 (even touch) — looks like Quadratic function down and up



Key Concepts

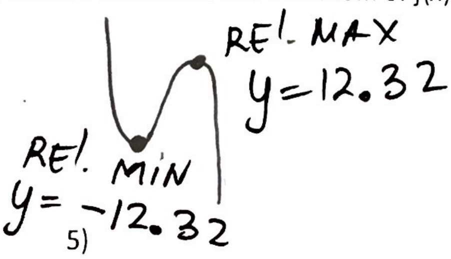
RELATIVE MAXIMUM - the greatest y-value of the points in a region of graph

RELATIVE MINIMUM - the least y-value among nearby points on a graph



Example

2. What are the relative maximum and minimum of f(x) = $-4x^3 + 12x^2 + 4x - 12$.



F5 (6-solu)

MIN, MAX

Workbook page 125

4)　　5)　　6)

Extra credit: Think about a Plan workbook page 118

Exit ticket: Sketch the function $-(x+1)(x-2)^2$

dards: A2.A.APR.A.2 (formerly A-APR.A.3) Identify zeros of polynomials when suitable factorizations are available, and use the zeros to nstruct a rough graph of the function defined by the polynomial.
Objectives: Students will be able to factor, create and analyze polynomials using zeros in order to represent real life problems.
Essential question(s): How do I model real life problems using polynomials?
Vocabulary: Zeros, x-intercepts, relative minimum, relative maximum, linear factors

5-2 (real life problems) Polynomials, Linear Factors and Zeros

Warm up (5-7min)

1) Factor and sketch the polynomial function using your previous knowledge of zeros and their multiplicities
$9x^3 - 81x$

What are the relative minimum and relative maximum values of this function?

$y_{MAX} = 93.5$ $y_{min} = -93.5$

2) What is the formula for the VOLUME of a prism (Geometry)? $V = L \cdot w \cdot h$

Example 1 *(Teacher models with students' help)* (5-10 min)
A rectangular box has a square base. The combined length of a side of the square base, and the height is 10 in. Let x be the length of a side of the base of the box.

$L = W = \boxed{X}$ $\quad X + h = 10 \quad h = 10 - X$

a) Create a polynomial function in factored form and standard form modeling the volume V of the box.

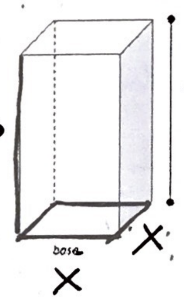
$V = L \cdot \cancel{w} \cdot h$

$V = X \cdot X \cdot (10 - X)$ FACTORED FORM

$h = 10 - X$

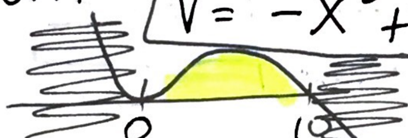
$V = x^2(10 - x) = 10x^2 - x^3$

$\boxed{V = -X^3 + 10X^2}$



b) Sketch the function using its zeros

zeros: $\underbrace{0, 0}_{M2}, \underbrace{10}_{M1}$
TOUCH CROSS



c) What is the maximum possible volume of the box? (round to the nearest whole number)

$V_{MAX} = 148$

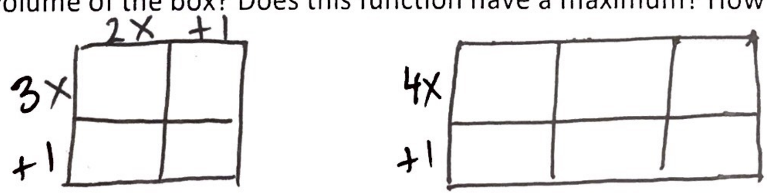
d) What are the limits of each of the factors? What is a realistic domain for the function? Explain.

$X > 0 \qquad X < 10 \qquad D: (0, 10)$

Example 2 *(Students complete task in groups, one group presents answer on the board).* (10min)
You are constructing a gift box for your mom's birthday. The shape of her gift is a rectangular prism with length, width and height of proportion 2 to 3 to 4. In order to fit the gift into the box, you must make the dimension of the box one centimeter bigger in each direction.

$V = \overset{L}{(2X+1)}\overset{W}{(3X+1)}\overset{H}{(4X+1)}$

What polynomial models the volume of the box? Does this function have a maximum? How can you explain that in relationship to this problem?



Early finishers: Think About a Plan in the workbook page 122
Exit ticket: A rectangular box is 24 in long, 12 in wide, and 18 in high. If each dimension is increased by a same length, what is the polynomial function in standard form that models the volume of the box? Show your work!

Standards:A2.A.APR.A.2 (formerly A-APR.A.3) Identify zeros of polynomials when suitable factorizations are available, and use the ze construct a rough graph of the function defined by the polynomial.
Objectives: Students will factor certain forms of polynomial expressions by using the structure of the polynomials. Students will use the factored forms of polynomials to find zeros of a function.

Section 5-3: Solve polynomial equations by factoring (more special cases)

Warm Up

1. $12x^2 + 12x + 3 = 0$ 2. $8x^2 + 10x = 3$ 3. $2x^2 - 162 = 0$ 4. Factor $x^3 + 2x^2 - 3x - 6 = 0$

Key Concepts MORE SPECIAL CASES OF FACTORING (SUM OF SUBES AND DIFFERENCE OF CUBES)

+ Sum of Cubes	− Difference of Cubes
$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$	$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
+ −	− +

NO double

Examples Factor then solve for all imaginary and real solutions.

1. $2x^3 - 16 = 0$

$2 \cdot 2 \cdot 2$

$2(x^3 - 8) = 0$

$2(x^3 - 2^3) = 0$

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$2(x-2)(1x^2 + 2x + 4) = 0$

$\boxed{x = 2}$ REAL

$\frac{-2 \pm \sqrt{4 - 4 \cdot 1 \cdot 4}}{2 \cdot 1}$

$\boxed{x = -1 \pm \sqrt{3}\,i}$

2. Solve $5x^3 + 625 = 0$

$5 \cdot 5 \cdot 5$

$5(x^3 + 125) = 0$

$5(x^3 + 5^3) = 0$

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

$\boxed{x = -5}$ REAL

$\frac{5 \pm \sqrt{25 - 4 \cdot 1 \cdot 25}}{2 \cdot 1}$

$\boxed{x = \frac{5}{2} \pm \frac{5\sqrt{3}}{2} i}$

Factor

3. $x^6 - y^6$

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

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

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

4. Workbook page 129 question #7

Group practice (you may work these problems out on a separate sheet of paper)

What are the real and imaginary solutions to

1. $2x^3 - 5x^2 = 3x$?   2. $x^4 - 3x^2 = 4$ 3. $x^3 = 1$

Extra credit: Think about a Plan workbook page 126

Exit ticket: Solve by factoring (for both real and imaginary solutions) $x^3 - 125 = 0$

Standards: A2.A.APR.A.1 (formerly A-APR.A.2) Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by $x - a$ is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).
A2.A.APR.C.4 (formerly A-APR.C.6) Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.
Objectives: Students will be able to divide polynomials using long division

2nd Period

5-4 Dividing Polynomials (LONG DIVISION)

Warm Up

1) divide
2) Multiply
3) subtract (change sign)
4) Bring down
5) REPEAT!

Divide using long division

1. $532 \div 3$

$532 = 3 \cdot 177 + 1$

$$\begin{array}{r} 177 \\ 3\overline{)532} \\ -3\downarrow \\ 23 \\ -21\downarrow \\ 22 \\ -21 \\ 1 \end{array}$$

R1

3 and 177 are not factors of 532

2. $672 \div 21$

$672 = 21 \cdot 32$

$$\begin{array}{r} 32 \\ 21\overline{)672} \\ -63\downarrow \\ 42 \\ -42 \\ R0 \end{array}$$

21 and 32 are factors of 672

Key Concepts

The Divisor Algorithm
You can divide polynomial P(x) by polynomial D(x) to get the quotient Q(x) and a remainder R(x).
If R(x) = 0, then D(x) and Q(x) are factors of P(x).

Examples

1. Divide $x^2 - 11x + 30$ by $x - 5$

$$\begin{array}{r} x - 6 \\ x-5\overline{)x^2 - 11x + 30} \\ -x^2 + 5x \quad\downarrow \\ -6x + 30 \\ +6x - 30 \\ R\ 0 \end{array}$$

factors
$(x-5)(x-6)$
$= x^2 - 11x + 30$

2. Divide $(2x^3 - 5x^2 - 36) \div (2x - 1)$

$$\begin{array}{r} x^2 - 2x - 1 \\ 2x-1\overline{)2x^3 - 5x^2 - 36} \\ -2x^3 + x^2 \quad\downarrow \\ -4x^2 - 36 \\ +4x^2 - 2x \\ -2x - 36 \\ +2x - 1 \\ R -37 \end{array}$$

NOT factor

NOT factor

Not like terms copy both!

$(2x-1)(x^2-2x-1)$ -37

3. Determine whether $x + 2$ is a factor of the polynomial

$x^2 + 10x + 16$

divisor → $x+2\overline{)x^2 + 10x + 16}$ ← dividend

4. The volume in cubic inches of a box can be expressed as the product of its three dimensions: V(x)= $x^3 - 16x^2 + 79x - 120$. The length is x-8. Find linear expressions with integer coefficients for the other dimensions. Assume that the width is greater than the height.

$V = L \cdot \underbrace{w \cdot h}_{?} = x^3 - 16x^2 + 79x - 120$

$(x-8)$

$$\begin{array}{r} x^2 - 8x + 15 \\ x-8\overline{)x^3 - 16x^2 + 79x - 120} \\ -x^3 + 8x^2 \quad\downarrow\quad\downarrow \\ -8x^2 + 79x - 120 \\ +8x^2 - 64x \\ 15x - 120 \\ -15x + 120 \\ 0 \end{array}$$

$x^2 - 8x + 15$
$(x-5)(x-3)$
h w ← GREATER

Extra credit: Think about a Plan workbook page 130
Exit ticket: is (x+4) a factor of $x^3 + 64$?

Standards: **A2.A.APR.A.1** (formerly A-APR.A.2) Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by $x - a$ is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).
A2.A.APR.C.4 (formerly A-APR.C.6) Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.
Objectives: Students will be able to divide polynomials using synthetic division

5-4 Dividing Polynomials (SYNTHETIC DIVISION)

Warm Up
is (x+4) a factor of $x^3 + 64$? Use long division.

Steps for Synthetic Division

1. Write down the coefficients of the function that is written in standard form (place 0 for missing terms)
2. Place the zero of the factor you are dividing by in the left "corner" next to the coefficients
3. Underline everything (leave space in between the line and the coefficients)
4. Multiply that number by the corner number, write the product in the next space above the line, add the numbers and repeat

Example
1. Use synthetic division to divide
a) $5x^3 - 6x^2 + 4x - 1$ by $x - 3$. zero? = 3

$$\begin{array}{r|rrrr} 3 & 5 & -6 & 4 & -1 \\ & & 15 & 27 & 93 \\ \hline & 5 & 9 & 31 & 92 \end{array}$$

x^2 x constant R

$\boxed{5x^2+9x+31 \quad R92}$

b) $(x^3 - 57x + 56) \div (x - 7)$ zero ← it is a factor! R=0

$$\begin{array}{r|rrrr} 7 & 1 & 0 & -57 & 56 \\ & \downarrow & 7 & 49 & -56 \\ \hline & 1 & 7 & -8 & 0 \end{array}$$

x^2 x c R

x^2+7x-8
$(x-1)(x+8)$

additional zeros: 1, −8

Key Concepts

Remainder Theorem Linear factor zero
If you divide a polynomial P(x) by $x - a$ then the remainder is P(a).

Example missing x^2
2. Given that $P(x) = x^5 - 3x^4 - 28x^3 + 5x + 20$, what is P(-4)?

"old way" plug in the number −4

$P(-4) = (-4)^5 - 3(-4)^4 - 28(-4)^3 + 5(-4) + 20$
$= 0$

−4 is a zero of P(x), (X+4) is one factor

$$\begin{array}{r|rrrrrr} -4 & 1 & -3 & -28 & 0 & 5 & 20 \\ & \downarrow & -4 & 28 & 0 & 0 & -20 \\ \hline & 1 & -7 & 0 & 0 & 5 & 0 \end{array}$$

R

Workbook page 133 (separate sheet of paper!!!)
Extra credit: Think about a Plan workbook page 130
Exit ticket: is (x+4) a factor of $x^3 + 64$?

Standards: **A2.A.APR.A.2** (formerly A-APR.A.3) Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. **A2.F.IF.A.1** (formerly F-IF.B.4) For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. ★ Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior. **A2.A.APR.A.1** (formerly A-APR.A.2) Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).

Objectives: Students will use the knowledge of polynomials (linear factors, zeros, maximum or minimum, end behavior and multiplicity) to sketch the graph and interpret it in real life application of polynomials (maximum volume of prisms and cylinders). Students will use the Remainder Theorem to justify their reasoning for the realistic domain. Students will through these tasks review the concepts for their test.

REAL LIFE APPLICATION OF POLYNOMIAL FUNCTIONS (5-1 TO 5-4) + TEST REVIEW

Warm up

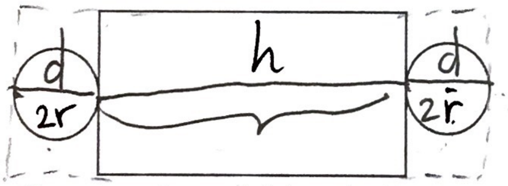
1. Use synthetic division to divide $x^3 - 125$ by (x-5). What else have we learned in lessons 5-3 that you could use to arrive to the same answer in this question?

Concepts from Geometry needed in today's lesson:

Volume of prism formula= **l*w*h** Volume of cylinder formula= $\pi r^2 * h$ **d= 2r**

TASK 1 REAL LIFE PROBLEM *(TEACHER LED GUIDED PRACTICE/REVIEW OF CONCEPTS + APPLICATION)*

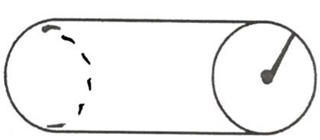
You are creating a gift box for your mom's birthday gift. You have purchased enough material for the total length of two diameters and the height to be 20 inches long. Complete the tasks below.



$V = \pi r^2 h$

$4r + h = 20$

$h = 20 - 4r$



a) Create a polynomial function in **factored** form and **standard** form modeling the volume V of the cylinder, then classify the polynomial based on degree and number of terms.

$V = \pi r^2 (20 - 4r)$ FACTORED FORM

$V = 20\pi r^2 - 4\pi r^3$

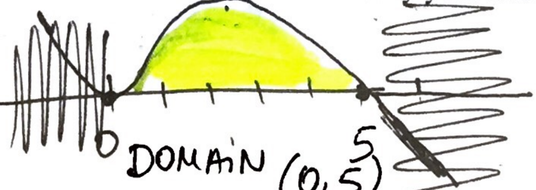
$V = -4\pi r^3 + 20\pi r^2$ STANDARD FORM

cubic binomial

b) Sketch the graph of the function using zeros, end behavior and multiplicities, and determine the realistic domain. Can you make a box with radius of 6 inches? Justify your answer using either long or synthetic division.

zeros: 0, 5

M 2 TOUCH, M1 CROSS



$$\begin{array}{r|rrrr} r=6 & -4 & 20 & 0 & 0 \\ & \downarrow & -24 & -24 & -144 \\ \hline & -4 & -4 & -24 & -144 \end{array}$$

$V = -144\pi$

c) You want to fill in the gift box with candy, the more merrier ☺. What should be the length of the radius in order for this cylindrical box to have the maximum possible volume? What is the maximum volume? (hint: calculator menu 5→ g solve→ max)

$r = 3\frac{1}{3}$ in $V = 74.07\pi \text{ in}^3$

TASK 2 (GROUP WORK- *COLLABORATE AND HELP EACH OTHER COME TO CONCLUSIONS-also use your notes, the groups listed in the text will present that part of the task on the white board- I can pick anyone, so be ready!)*

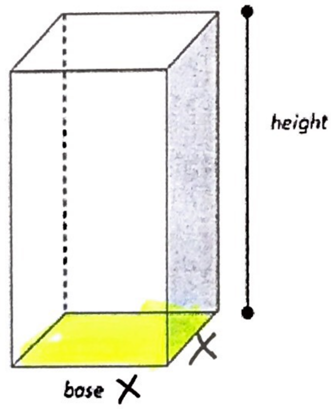
A rectangular box has a square base. The combined length of a side of the square base, and the height is 6 ft. Let x be the length of a side of the base of the box.

a) Create a polynomial function in **factored** form (group 1) and **standard** form (group 2) modeling the volume V of the box, then classify the polynomial based on degree and number of terms.

$x + h = 6$

$h = 6 - x$

$V = L \cdot w \cdot h$



b) Sketch the graph of the function using zeros, end behavior and multiplicities, and determine the realistic domain (group 3). Can you make a box with side of the base 2 feet long? Justify your answer using either long or synthetic division.(group 4)

c) What should be the length of the side in order for this box to have the maximum possible volume (group 5)? What is the maximum possible volume (group 6)? (hint: calculator menu 5→ g solve→ max)

Summarize the key concepts we reviewed today (that will be on your test tomorrow) in your own words

Extra credit: THINK ABOUT A PLAN worksheet page 130

Exit ticket: Create a polynomial in terms of r of a cylinder where r + h = 5. Find the maximum possible volume.