Algebra 2, Period 2 – Work for March 16-27 – Dr. Sargent

Days 1-5

During this first week, we are reviewing and continuing our work with Polynomial Functions. You will recall that a polynomial function consists of either zero or of a finite number of non-zero terms, each of which is the product of a number, called the co-efficient of the term, and a variable raised to a non-negative integer power. We had been learning about end behavior of a polynomial function, and had discovered a pattern:

For a polynomial written in standard form:

	Even Degree Polynomial	**Odd Degree Polynomial**
Positive Leading Coefficient	Both ends go up	Left goes down; right goes up
Negative leading coefficient	Both ends go down	Left goes up, right goes down

We had then begun to look at turning points. Unfortunately, we require calculators to determine these points precisely, so it is difficult to assign work at home since no everyone has access to a graphing calculator.

With this in mind, I am choosing, this first week, to give you a review sheet on polynomials that includes adding, subtracting and multiplying polynomials, and touches on factoring. It is titled "Homework 1 – Polynomial Review." If you are doing this with pencil and paper, I am enclosing answers to selected questions so you can check yourself. Please try to do the work first before you check answers, so you do not rob yourself of the opportunity to gain practice. You should return this to me for a grade.

Days 6-10

We are going to skip to the subject of factoring polynomials. Some of this will be review from factoring quadratics. I am including a page called "Factoring Guide," which outlines the major ways we factor polynomials. Let me try and go over these with you.

1) Take out the greatest common factor first – always!
2) With 2 terms, you might be able to do the following
    a. Difference of Squares. $a^2 - b^2$ will always factor as $(a + b)(a - b)$. Example: $4x^2 - 9 = (2x)^2 - 3^2 = (2x + 3)(2x - 3)$
    b. Sum of Cubes. $a^3 + b^3$ will always factor as $(a + b)(a^2 - ab + b^2)$. Example: $8x^3 + 27 = (2x)^3 + 3^3 = (2x + 3)(4x^2 - 6x + 9)$
    c. Difference of Cubes. $a^3 - b^3$ will always factor as $(a - b)(a^2 + ab - b^2)$. Example: $8x^3 - 27 = (2x - 3)(4x^2 + 6x + 9)$
3) With a quadratic trinomial, factor as follows:
    a. Where a = 1, find factors that multiply to "c" and add to "b". Example: $x^2 + 5x + 6 = (x + 2)(x + 3)$

b. Where a > 1, find factors that multiply to "a times c", and add to "b", then go back and split the middle and factor by grouping. Example: $3x^2 + 13x + 4 = 3x^2 + 12x + x + 4 = 3x(x + 4) + 1\,(x + 4) = (3x + 1)(x + 4)$ (We found that 12 and 1 multiply to be 12 (3 times 4) and add to be 13).

4) With more than three terms, try grouping, find the greatest common factor of each part, then factor the binomials that are left. Example: $4x^4 + 12x^3 + 6x^2 + 18x$. You would begin by factoring out the greatest common factor (always begin there!) leaving this: $2x(2x^3 + 6x^2 + 3x + 9)$. Now group the first two terms in the parentheses and the second two terms, and take out their greatest common factors, like so: $2x(2x^2(x + 3) + 3(x + 3))$. Now finish by factoring out the (x+3) from both terms inside the parentheses: $2x(2x^2 + 3)(x + 3)$, giving us out final factored form.

I have created a worksheet for you in ALEKS entitled "Factoring Worksheet 1." You may use this to help you. It will not be graded. I give it to you as a resource to help you gain practice so you can easily look at the examples and explanations provided.

I have also attached two sheets to help you. The first is a practice sheet which begins with the GCF and continues through the various types of factoring. This is for you to use to gain practice, and need not be turned in. The second is entitled: "Unit 5 Homework4." I would like you to do this one and turn your work in. If you are doing this online and have no printer, you may submit your answers on notebook paper, or in a message in Live Grades. Please clearly mark your paper as answers for Unit 5 Homework 4, and write neatly enough that I can read it clearly. I have provided answers to sample questions so you can check your understanding as you go, but please try to do the problems yourself before looking for answers.

ALEKS TOPICS – Please note that your regular assignment of 12 topics per week continues. The week of Spring Break, March 30-Apr 5, is a bonus week of topics.

Answers to selected questions

ALEKS Homework 1 – Polynomial Review

Question 1: Leading Coefficient: 1; Degree: 6

Question 4: $8x^2 - 7x - 7$

Question 6: $90c^3 - 40c^8$

Question 7: $-9x^8 + 24x^7 - 6x^6$

Question 9: $20c^2 - 21c - 5$

Question 12: $x^2 + 10x + 25$

Question 15: $3(u-8)$

Factoring Worksheet

GCF Problem 1: $2a^2(6a+5)$

Difference of Squares Problem 3: $(3x+7y)(3x-7y)$

Problem 6: $10w(w^2+1)(w+1)(w-1)$

Sum of Cubes, Problem 7: $(x+3)(x^2-3x+9)$

Problem 10: $3cd(2c+5d)(4c^2-10cd+25d^2)$

Difference of Cubes, Problem 11: $(x-1)(x^2+x+1)$

Problem 13: $4(1-2h)(1+2h+4h^2)$

Trinomials, Problem 15: $(n^2+6)(n+2)(n-2)$

Problem 17: $2a(a+17)(a+2)$

Problem 19: $(x^2+5)(3x^2-1)$

Four Terms, Problem 21: $(x^2+9)(x-1)$

Problem 23: $(v-2)(v+2)(4v-5)$

Unit 5 Homework 4

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

Problem 8: $2(3x+5y)(9x^2-15xy+25y^2)$

Problem 10: $ab^2(a-1)(a^2+a+1)(a+1)(a^2-a+1)$

Problem 14: $(w+4)(w-4)(w^2+2)$

Problem 15: $k(k+11)(k-4)$

Problem 18: $m^2((m+3)(m-3)(m^2+2)$

Problem 21: $(x^2+1)(x-7)$

Problem 23: $(p-2)(p+2)(3p+5)$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples	
GCF	**1.** $12a^3 + 10a^2$	**2.** $14m^8n^5 - 7m^2n^2$
DIFFERENCE OF SQUARES $a^2 - b^2$	**Perfect Squares:**	
	Rule:	
	3. $9x^2 - 49y^2$	**4.** $72c^4 - 2$
	5. $7m^7n - 28mn^3$	**6.** $10w^5 - 10w$
SUM OF CUBES $a^3 + b^3$	**Perfect Cubes:**	
	Rule:	
	7. $x^3 + 27$	**8.** $m^3 + 216n^3$
	9. $500a^3 + 4$	**10.** $24c^4d + 375cd^4$
DIFFERENCE OF CUBES $a^3 - b^3$	**Rule:**	
	11. $x^3 - 1$	**12.** $216k^3 - 125$
	13. $4 - 32h^3$	**14.** $2x^3 - 54y^3$

TRINOMIALS

15. $n^4 + 2n^2 - 24$

16. $w^3 + w^2 - 20w$

17. $2a^3 + 38a^2 + 68a$

18. $x^5 - 24x^3 - 25x$

19. $3x^4 + 14x^2 - 5$

20. $9m^4 - 12m^2 + 4$

FOUR TERMS

Rule: Use grouping!

Steps		Example
①	**GROUP** the first two terms together and the last two terms.	$x^3 + x^2 - 4x - 4$
②	**FACTOR** the GCF for each group.	
③	**FACTOR** the common binomial.	

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

22. $k^3 + 5k^2 - k - 5$

23. $4v^3 - 5v^2 - 16v + 20$

24. $2x^5 - 18x^4 + 7x - 63$

Name: _____ **Unit 5:** Polynomial Functions

Date: _____ **Bell:** _____ **Homework 4:** Factoring Polynomials

Directions: Complete the following rules.

1. Difference of Squares: $a^2 - b^2 =$ _____

2. Sum of Cubes: $a^3 + b^3 =$ _____

3. Difference of Cubes: $a^3 - b^3 =$ _____

4. How can you tell if you have completely factored a polynomial? _____

_____

Directions: Factor each polynomial **completely.** Make sure to check for a **GCF** first.

5. $x^4 - 36$	**6.** $64c^3 + 1$
7. $k^3 - 27$	**8.** $54x^3 + 250y^3$
9. $3m^4 - 48n^2$	**10.** $a^7b^2 - ab^2$
11. $x^3y^2 - 343y^5$	**12.** $9y^7 - 144y$

13. $x^4 - 12x^2 + 36$	**14.** $w^4 - 14w^2 - 32$
15. $k^3 + 7k^2 - 44k$	**16.** $2a^3 + 28a^2 + 96a$
17. $-x^3 + 4x^2 + 21x$	**18.** $m^6 - 7m^4 - 18m^2$
19. $9y^6 + 6y^4 + y^2$	**20.** $8c^4 + 10c^2 - 3$
21. $x^3 - 7x^2 + x - 7$	**22.** $4r^3 - 3r^2 - 4r + 3$
23. $3p^3 + 5p^2 - 12p - 20$	**24.** $15n^3 - 6n^2 - 25n + 10$