Welcome to Honors Pre-Calculus 2018

Your summer assignment includes a review from Algebra 2. It is expected that you complete these assignments and are ready for a test the third day of school.

Pre-Calculus Binder Requirement:

It is required that you get a large binder (at least 2 inches thick) with four sections with dividers. Fill up your binder with lined paper and graph paper.

Section 1 – Notes which includes handouts and homework (homework IS notes)
Section 2 – Vocabulary list
Section 3 – Tests and Quizzes
Section 4 – Warm-Ups

In addition, you will need a zippered pouch with three holes that will hold your materials in your binder. Please include the following tools:

1. At least 6 pencils
2. TI-83 or higher graphing calculator.
3. Protractor
4. Ruler (cm and inches, could be small)
5. Colored Pencils

Your summer assignment:

Pg 48-50 #1-37, 39
Pg 98-100 #1-4
Pg 602 #5-51 odd
Summer Factoring Review Packet (Fill in answers in packet)

Bring all required materials to class.

The written assignment will be collected on the first day of school and will be graded out of 10 points. Be sure to show all your work, this includes how you determined your answer to the worksheet problems. Answers only will not be accepted

The problems listed above are only the minimum assignment. You are responsible for all of the material covered in Chapter One of your Pre-Calculus book and factoring and solving quadratics and Exponent Rules. You should work extra examples and review the section in detail for any problems that you have difficulty with. The third day of school, you will have a test on this material. Two school days are not enough time to re-learn all of that material. It is your responsibility to come to school the first day with only the questions you could not work out on your own.

Check out the website: http://www.khanacademy.com for helpful videos.

This course is very rigorous and there are many projects. Please understand that you cannot drop the course after the first marking period.

Hopefully, this will get us off to a great start and lead us to an enjoyable and rewarding school year! Have a safe and restful summer!

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Multiplying Polynomials and Factoring Review (Summer)

VOCABULARY

Some pairs of binomials have special product patterns as follows.

You can verify with Sneaky Squares or FOIL.

1) Sum & Difference Pattern

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

2) Square of a Binomial Pattern

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

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

EXAMPLE 1 Using the Sum and Difference Pattern

Use the sum and difference pattern to find the product $(4y+3)(4y-3)$.

SOLUTION

For this trinomial, b = 6 and c = 8. You need to find two numbers whose sum is 6 and whose product is 8.

$(a+b)(a-b)=a^2-b^2$	Write pattern.
$(4y+3)(4y-3)=(4y)^2-3^2$	Apply pattern.
$=16y^2-9$	Simplify.

EXAMPLE 2 Squaring a Binomial

Use the square of a binomial pattern to find the product.

a. $(2x+3)^2$ b. $(4x-1)^2$

SOLUTION

a.	$(a+b)^2=a^2+2ab+b^2$	Write pattern.
	$(2x+3)^2=(2x)^2+2(2x)(3)+3^2$	Apply pattern.
	$=4x^2+12x+9$	Simplify.
b.	$(a-b)^2=a^2-2ab+b^2$	Write pattern.
	$(4x-1)^2=(4x)^2-2(4x)(1)+1^2$	Apply pattern.
	$=16x^2-8x+1$	Simplify.

FACTORING

Factoring is similar to breaking up a number into its multiples. For example, 10=5*2. The multiples are '5' and '2'. In a polynomial it is the same way, however, the procedure is somewhat more complicated since variables, not just numbers, are involved. There are different ways of factoring an equation depending on the complexity of the polynomial.

Factoring out the greatest common factor

The first thing to do when factoring is to look at all terms and break up each term into its multiples:

Examples: Factor: $8x^3 + 4x^2 + 10x$

$$2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x + 2 \cdot 2 \cdot x \cdot x + 2 \cdot 5 \cdot x$$

$x(8x^2 + 4x + 10) \rightarrow$ In this polynomial the only variable in common to all is x.

$$2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x + 2 \cdot 2 \cdot x \cdot x + 2 \cdot 5 \cdot x$$

2x(4x+2x+5) $\rightarrow$ The two is also common to all terms. Therefore, this is as far as the polynomial can be factored.

Factor: $6x^3 + 8x^2 + 16x$

$6x^3 + 8x^2 + 16x \quad \rightarrow$ The common variable is x, and the smallest exponent is 1. The common multiple is 2.

$2x(3x^2 + 4x + 8)$ Therefore, the greatest common factor is $2x$.

You can also look at it this way:

$$(2x)(3x^2) = 6x^3$$
$$(2x)(4x) = 8x^2$$
$$(2x)(8) = 16x$$

<u>Factoring the Difference of Two Squares</u>

a. $n^2 - 25$

b. $4x^2 - y^2$

SOLUTION

a. $n^2 - 25 = n^2 - 5^2$ Write as $a^2 - b^2$.

$= (n+5)(n-5)$ Factor using difference of two squares pattern.

b. $4x^2 - y^2 = (2x)^2 - y^2$ Write as $a^2 - b^2$.

$= (2x+y)(2x-y)$ Factor using difference of two squares pattern.

Factoring *Perfect Square Trinomials*

a. $x^2 - 6x + 9$ b. $9y^2 + 12y + 4$

SOLUTION

a. $x^2 - 6x + 9 = x^2 - 2(x)(3) + 3^2$ Write as $a^2 - 2ab + b^2$.

$= (x-3)^2$ Factor using perfect square trinomials.

b. $9y^2 + 12y + 4 = (3y)^2 + 2(3y)(2) + 2^2$ Write as $a^2 + 2ab + b^2$.

$= (3y+2)^2$ Factor using perfect square trinomial pattern.

Factoring when b and c are Positive ***(Remember you can use reverse Sneaky Squares)***

Factor $x^2 + 6x + 8.$

SOLUTION

For this trinomial, $b = 6$ and $c = 8$. You need to find two numbers whose sum is 6 and whose product is 8.

$x^2 + 6x + 8 = (x+p)(x+q)$ Find p and q when $p + q = 6$ and $pq = 8$

$= (x+4)(x+2)$ $p = 4$ and $q = 2$

Factoring when b is Negative and c is Positive

Factor $x^2 - 5x + 4.$

SOLUTION Because b is negative and c is positive, both p and q must be negative numbers. Find two numbers whose sum is
-5 and whose product is -4.

$x^2 - 5x + 4 = (x+p)(x+q) \longrightarrow$ Find p and q when p + q= -5 and pq = 4

$= (x-4)(x-1) \longrightarrow$ p = - 4 and q = --1

Factoring *when b and c are Negative*

Factor $x^2 - 3x - 10.$

SOLUTION For this trinomial, b = -3 and c = - 10. Because c is negative, you know that p and q cannot both have negative values.

$x^2 - 3x - 10 = (x+p)(x+q) \longrightarrow$ Find p and q when $p + q = -3$ and $pq = -10$.

$= (x+2)(x-5) \longrightarrow$ $p = 2$ and $q = -5$

Always look for a greatest common factor first! Then look for difference of squares, then reverse sneaky squares or reverse FOIL. Don't be afraid to guess and check!

<u>Solving a Quadratic Equation</u> **Solve** $x^2 + 4x = 12.$

$x^2 + 4x = 12$	**Write the equation.**
$x^2 + 4x - 12 = 0$	**Write in standard form.**
$(x+6)(x-2) = 0$	**Factor the left side. Because *c* is negative, *p* and *q* cannot both have negative values; *p* = 6 and *q* = -2**
$(x+6) = 0$ **or** $(x-2) = 0$	**Use zero-product property.**
$x + 6 = 0$	**Set first factor equal to 0.**
$x = -6$	**Solve for *x*.**
$x - 2 = 0$	**Set second factor equal to 0.**
$x = 2$	**Solve for *x*.**
	The solutions are -6 and 2.

Quadratic Formula

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

For the example above, a = 1, b = 4, c = -12

$$\boldsymbol{x = \frac{-4 \pm \sqrt{4^2 - 4 \times 1 \times -12}}{2 \times 1}}$$

$$\boldsymbol{x = \frac{-4 \pm \sqrt{16 - (-48)}}{2}}$$

$$\boldsymbol{x = \frac{-4 \pm \sqrt{64}}{2}}$$

$$\boldsymbol{x = \frac{-4 \pm 8}{2} = 2 \; and - 6}$$

Practice: Complete all exercises below.

Write the product of the sum and difference.

1. $(x+5)(x-5)$
2. $(3x+5)(3x-5)$

Write the square of the binomial as a trinomial.

3. $(x+3)^2$
4. $(7y-3)^2$

Factor the expression.

5. $4q^2-49$
6. $36-25x^2$
7. $x^2-18x+81$
8. $4n^2+20n+25$
9. x^2+5x+6
10. x^2+6x+5
11. x^2-3x+2
12. $x^2-7x+12$
13. x^2-x-2
14. $x^2-4x-12$
15. x^2+x-6
16. $x^2-8x+15$
17. x^2-5x+4
18. x^2-x-42

19. $x^2 - 16x + 64$

20. $x^2 + 13x + 36$

21. $z^3 + 4z^2$

22. $c^3 + -5c$

23. $2x^2 - 18x - 72$

24. $3m^4 - 75$

25. $-8z^3 - 18z^2 - 4z$

Solve the equation by factoring and quadratic formulas.

26. $x^2 + 8x + 15 = 0$

27. $x^2 - 8x + 12 = 0$

28. $x^2 + 3x - 4 = 0$