Unit 1: Math II Review

Guided Notes

KEY

Name

Period

If found, please return to Mrs. Brandley's room, M-8.

Concept 1: Order of Operations

1. Two people solve the following problem in the two different ways shown. Which do you think is correct, and why?

Person A	Person B
8-2+1	8-2+1
6+1	8-3
7	5

Using PEMDAS, you do addition and subtraction from left to right.

2. The same two people solve the following problem in the two different ways shown. Which do you think is correct, and why?

Person A	Person B
6-3÷3	6-3÷3
3÷3	6-1
1	5

Division is done before Subtraction using the order of operations.

3. What is the order of operations?

P: Parentheses and other gr

E: Exponents

MD: Multiplication & division from left to right

AS: Addition & Subtraction from left to right

4. What is your favorite number?

5. On the index card given to you, write an expression that is equal to your favorite number and includes at least 4 of the following:

    1. Parentheses (or other grouping symbol)
    2. Exponents
    3. Multiplication
    4. Division
    5. Addition
    6. Subtraction

6. EXAMPLE: 72

7. Trade index cards with the person next to you. Try to solve their problem. When you are both finished, compare your answer to their favorite number. Are they the same? If not, solve the problem together and see if you can come to agreement on what the answer should be. If a mistake was made on either side, that's great! That is the best way to make your brain grow!

8. Solve your problem here:

9. Solve your partner's problem here:

Solve the following:

10. $x + y + z$ when x=1, y=2, and z=3.

$1+2+3=6$

11. $2x(5-y)+z-x$ when x=1, y=2, and z=3.

$2 \cdot 1 \cdot (5-2)+3-1$

$2 \cdot 1 \cdot 3+3-1$

$6+3-1=9$

12. $x - 5 = 3$

$+5 \quad +5$

$x = 8$

13. $3x - 9 = 3$

$+9 \quad +9$

$\frac{3x}{3} = \frac{12}{3}$

$x = 4$

14. $\frac{x}{5} = 4$

$\times 5 \quad \times 5$

$x = 20$

15. $\frac{25}{x} = 5$ $\times x$

$\frac{25}{5} = \frac{5x}{5}$

$x = 5$

Concept 2 WARM-UP

Solve the following equations for x. Simplify the radicals

1. $\sqrt{x^2} = \sqrt{4}$

$x = \pm 2$

2. $x^2 = 36$

$x = \pm 6$

3. $x^2 = -16$

$x = \pm 4i$

4. $x^2 = -49$

$x = \pm 7i$

Simplify the following radicals.

5. $\sqrt{20}$

$\sqrt{2 \cdot 5 \cdot 2}$

$2\sqrt{5}$

2 10

5 2

6. $\sqrt{60}$

$\sqrt{2 \cdot 3 \cdot 2 \cdot 5}$

$2\sqrt{3 \cdot 5}$

$2\sqrt{15}$

6 10

2 3 2 5

7. $\sqrt{-80}$ $= i\sqrt{80}$

$4i\sqrt{5}$

10 8

5 2 4 2

2 2

$4\sqrt{5 \cdot 2 \cdot 2 \cdot 2}$

Concept 2: The Square Root Method

Remember that all quadratics have two solutions. Either one repeated, 2 real, or 2 imaginary.

Solve the following equations for x.

No x-term:

8. $x^2 - 81 = 0$

$x^2 = 81$

$x = \pm 9$

9. $x^2 + 64 = 0$

$x^2 = -64$

$x = \pm 8i$

10. $x^2 - 60 = 0$

$x^2 = 60$

$x = \pm 2\sqrt{15}$

11. $2x^2 - 128 = 0$

$2x^2 = 128$

$x^2 = 64$

$x = \pm 8$

12. $3x^2 + 81 = 0$

$3x^2 = -81$

$x^2 = -27$

$x^2 = i\sqrt{27}$

$x = \pm 3i\sqrt{3}$

13. $4x^2 - 64 = 0$

$4x^2 = 64$

$x^2 = 16$

$x = \pm 4$

Vertex Form:

14. $(x-1)^2 - 9 = 0$

$+9 \quad +9$

$\sqrt{(x-1)^2} = \sqrt{9}$

$x - 1 = \pm 3$

$x = \pm 3 + 1$

$x = 4, -2$

15. $3(x-2)^2 + 27 = 0$

$3(x-2)^2 = -27$

$\sqrt{(x-2)^2} = \sqrt{-9}$

$x - 2 = \pm 3i$

$x = 2 \pm 3i$

16. $4(x+3)^2 - 16 = 0$

$4(x+3)^2 = 16$

$(x+3)^2 = 4$

$x + 3 = \pm 2$

$x = \pm 2 - 3$

$x = -1, -5$

Concept 3: Factoring Preparation

What is a greatest common factor?

List the greatest common factor in the following expressions:

1. $2x^2 + 6x - 8$

2

2. $6x^2 - 3x + 9$

3

3. $3x^2 - 2x$

x

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

1

Factor out the greatest common factor in the following expressions:

1. $2x^2 + 10x$ 2. $12x^2 - 3x + 6$ 3. $5x^2 - 15x + 10$ 4. $x^2 - 2x + 7$

$2x(x+5)$ $3(4x^2 - x + 2)$ $5(x^2 - 3x + 2)$ N/A

Given the following quadratics, list what AxC is and what B is, then find two numbers that multiply to AC and add to B.

5. $3x^2 - 7x + 4 = 0$

AxC: 12

B: -7

2 #'s: -3 & -4

6. $x^2 + 8x + 16 = 0$

AxC: 16

B: 8

2 #'s: 4 & 4

7. $2x^2 + 8x + 6 = 0$

AxC: 12

B: 8

2 #'s: 6 & 2

Solve the following for x:

8. $(x - 2)(x + 7) = 0$ 9. $(2x - 1)(3x + 4) = 0$ 10. $2(x - 3)(7x - 5) = 0$ 11. $x(x + 8) = 0$

$x = 2, -7$ $x = \frac{1}{2}, -\frac{4}{3}$ $x = 3, \frac{5}{7}$ $x = 0, -8$

Concept 4: WARM-UP

Factor the following:

1. $3x^2 - 6$ 2. $x^2 + 4x$ 3. $4x^2 - 2x$ 4. $5x^2 + 4x$ 5. $6x^2 + 12x$

$3(x^2 - 2)$ $x(x+4)$ $2x(2x-1)$ $x(5x+4)$ $6x(x+2)$

Concept 4: Factoring

Every "factorable" problem can be factored using the following steps.

1. Write the quadratic in standard form. $Ax^2 + Bx + C$
2. Factor out the greatest common factor (GCF). (There will not always be one).
3. Find two numbers that multiply to AC and add to B.
4. Rewrite the quadratic splitting up the x-term into two terms using the two numbers found in step 3.
5. Group two sides of the quadratic in a way that makes the parentheses match.
6. Factor out the term in parentheses and rewrite in factored form.
7. If solving, set each factor equal to 0 and solve for the variable!
8. Smile in relief that your problem is complete. ☺

Example: $-4 + 4x^2 = 6x$

1. $4x^2 - 6x - 4 = 0$
2. $2(2x^2 - 3x - 2)$
3. AC=-4 B=-3. -4 and 1 multiply to -4 and add to -3.
4. $2(2x^2 - 4x + 1x - 2)$
5. $2(2x(x - 2) + 1(x - 2))$
6. $2(2x + 1)(x - 2)$
7. If $2x + 1 = 0, x = -1/2$. If $x - 2 = 0, x = 2$.
8. ☺

When a=1, the two numbers found that multiply to AC and add to B, are the two numbers in parentheses in factored form. For examples, in $x^2 + 8x + 16$, 4 and 4 multiply to 16 and add to 8 and the quadratic factors to (x+4)(x+4).

Let's try it a step at a time!

Example 1: $-10 + x^2 = -3x$

1. Write the quadratic in standard form. $Ax^2 + Bx + C$

$x^2+3x-10$

2. Factor out the greatest common factor (GCF). (There will not always be one).

N/A

3. Find two numbers that multiply to AC and add to B.

AC: -10 B: 3 -2 & 5

4. Rewrite the quadratic splitting up the x-term into two terms using the two numbers found in step 3.

$x^2-2x+5x-10$

5. Group two sides of the quadratic in a way that makes the parentheses match.

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

6. Factor out the term in parentheses and rewrite in factored form.

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

7. Set each factor equal to 0 and solve for the variable! ☺

$x=2, -5$

Example 2: $8x + x^2 = -16$

1. Write the quadratic in standard form. $Ax^2 + Bx + C$

$x^2+8x+16$

2. Factor out the greatest common factor (GCF). (There will not always be one).

N/A

3. Find two numbers that multiply to AC and add to B.

AC: 16 B: 8 4 & 4

4. Rewrite the quadratic splitting up the x-term into two terms using the two numbers found in step 3.

$x^2+4x+4x+16$

5. Group two sides of the quadratic in a way that makes the parentheses match.

$x(x+4)+4(x+4)$

6. Factor out the term in parentheses and rewrite in factored form.

$(x+4)(x+4)$

7. Set each factor equal to 0 and solve for the variable! ☺

$x=-4$

Example 3: $3x^2 - 15x - 18 = 0$

1. Write the quadratic in standard form. $Ax^2 + Bx + C$

$3x^2 - 15x - 18$

2. Factor out the greatest common factor (GCF). (There will not always be one).

$3(x^2 - 5x - 6)$

3. Find two numbers that multiply to AC and add to B.

AC: -6 B: -5 -6 & 1

4. Rewrite the quadratic splitting up the x-term into two terms using the two numbers found in step 3.

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

5. Group two sides of the quadratic in a way that makes the parentheses match.

$3(x(x-6) + 1(x-6))$

6. Factor out the term in parentheses and rewrite in factored form.

$3(x-6)(x+1)$

7. Set each factor equal to 0 and solve for the variable! ☺

$x = 6, -1$

As a class: $2x^2 - 4x = -2$

$2x^2 - 4x + 2$

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

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

$2(x(x-1) - 1(x-1))$

$2(x-1)(x-1)$

$x = 1$

With a partner: $-9 - 6x = x^2$

$x^2 + 6x + 9$

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

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

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

$x = -3$

Shoulder Tap: $x^2 - x - 2 = 0$

$x^2 - 2x + x - 2$

$x(x-2) + 1(x-2)$

$(x-2)(x+1)$

$x = 2, -1$

Concept 5: WARM-UP

Put the following quadratics in standard form ($Ax^2 + Bx + C = 0$) and list A, B, and C.

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

SF: $x^2 - 5x + 3$

A: 1

B: -5

C: 3

2. $2x^2 = 5 - 4x$

SF: $2x^2 + 4x - 5$

A: 2

B: 4

C: -5

3. $2x = -6x^2 - 1$

SF: $6x^2 + 2x + 1$

A: 6

B: 2

C: 1

Concept 5: The Quadratic Formula

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

As a class:

1. $4x^2 + 12x = 7$ $4x^2+12x-7$ A: 4, B: 12, C: -7

$X = \frac{-12 \pm \sqrt{12^2-4(4)(-7)}}{2(4)}$

$= \frac{-12 \pm \sqrt{256}}{8} = \frac{-12 \pm 16}{8} = \boxed{\frac{1}{2}, \frac{7}{2}}$

2. $4x^2 + 3 = -6x$ $4x^2+6x+3$ A: 4, B: 6, C: 3

$X = \frac{-6 \pm \sqrt{6^2-4(4)(3)}}{2(4)} = \frac{-6 \pm \sqrt{-12}}{8}$

$\frac{-6 \pm 2i\sqrt{3}}{8} = \boxed{\frac{-3 \pm i\sqrt{3}}{4}}$

With a partner:

3. $2x^2 - 5x = 75$ $2x^2-5x-75$ A: 2, B: -5, C: -75

$X = \frac{5 \pm \sqrt{5^2-4(2)(-75)}}{2(2)} = \frac{5 \pm \sqrt{625}}{4}$

$= \frac{5 \pm 25}{4} = \boxed{\frac{15}{2}, -5}$

4. $3x^2 + 6 = -72$ $3x^2+78$ A: 3, B: 0, C: 78

$X = \frac{0 \pm \sqrt{0-4(3)(72)}}{2(3)}$

$= \frac{\pm\sqrt{864}}{6} = \frac{\pm 12i\sqrt{6}}{6} = \boxed{\pm 2i\sqrt{6}}$

Shoulder Tap:

5. $4x^2 + 9x = 13$ $4x^2+9x-13$ A: 4, B: 9, C: -13

$X = \frac{-9 \pm \sqrt{9^2-4(4)(-13)}}{2(4)}$

$= \frac{-9 \pm \sqrt{289}}{8} = \frac{-9 \pm 17}{8}$

$= \boxed{1, -\frac{13}{4}}$

6. $x^2 = -8x + 19$ $x^2+8x-19$ A: 1, B: 8, C: -19

$X = \frac{-8 \pm \sqrt{8^2-4(1)(-19)}}{2(1)}$

$= \frac{-8 \pm \sqrt{64+76}}{2} = \frac{-8 \pm \sqrt{140}}{2} = \frac{-8 \pm 2\sqrt{35}}{2}$

$\frac{-4 \pm \sqrt{35}}{1} = \boxed{-4 \pm \sqrt{35}}$