6-5-17

Aim: SWBAT review for the final exam.

Do Now: Review Packet

HW: Final Exam Tuesday, June 13th
Textbook due on or before the final exam

Name: Answer Key Teacher: ________________

FINAL REVIEW PACKET MATH 7A
Unit 1: Rational Numbers

1) Name the largest negative integer. -1

2) Name the smallest positive integer. 1

Absolute Value measures the distance a number is from zero on the number line. The symbol for absolute value is "| |."

Evaluate.

3) $|102| - |-2|$

$102 - 2 = \boxed{100}$

4) $|102 - -2|$

$|102 + 2|$

$|104| = \boxed{104}$

5) $-|10| - |-2|$

$-10 - 2 = \boxed{-12}$

6) $|-36 - 4|$

$|-40|$

$\boxed{40}$

7) $-12 - 20$

-32

8) $-18 + 30$

12

9) $0 - -14$

14

10) $-21 - (-14)$

-7

11) $-9(-11)$

99

12) $(-15)(7)$

-105

13) $\frac{-150}{30}$

-5

14) $-90 \div -15$

6

15) $-(3^2)$ $-(9)$

$\boxed{-9}$

16) -3^2

the opposite of 3 squared $\boxed{-9}$

17) $-(-3^2)$

$-(-9)$

$\boxed{9}$

18) $(-3)^2$

negative 3 squared $-3 \bullet -3$

$\boxed{9}$

Write a number sentence and evaluate.

19) A dolphin swam to a depth of 110 feet below sea level. Then, it rose 85 feet. What was the dolphin's final depth?

$-110 + 85 = x$

$-25 = x$

$\boxed{\text{25 feet below sea level}}$

20) The temperature outside was 22°F. The wind chill made it feel like −8°F. Find the difference between the real temperature and the apparent temperature.

$22 - (-8) = x$

$30 = x$

$\boxed{\text{30 degree difference}}$

21) The temperature one morning in was −16°F. By the afternoon, the temperature had risen 9°F. What was the temperature in the afternoon?

$-16 + 9 = x$

$-7 = x$

$\boxed{-7}$

Evaluate each expression, using the correct order of operations.

22) $6 + 9 \div 3 \bullet 10$

$6 + 3 \bullet 10$

$6 + 30$

$\boxed{36}$

23) $(15 - 7) \bullet 6 + 2$

$8 \bullet 6 + 2$

$48 + 2$

$\boxed{50}$

24) $\frac{25}{(3^2 - 4)} = \frac{25}{(9 - 4)}$

$= \frac{25}{5}$

$\boxed{5}$

Evaluate each expression if: a = 3, b = 6, and c = -5.

*25) $-a - c$

$-3 - (-5)$

$-3 + 5$

$\boxed{2}$

26) $-b^2 + c^3$

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

$-36 + -125$

$-36 - 125$

$\boxed{-161}$

27) $5b - 2c$

$5 \bullet 6 - 2 \bullet -5$

$30 + 10$

$\boxed{40}$

28) $\frac{1}{2}b + \frac{1}{3}a$

$\frac{1}{2} \bullet 6 + \frac{1}{3} \bullet 3$

$3 + 1$

$\boxed{4}$

State whether the following answers will be zero or undefined.

29) $\frac{13}{0}$

undefined

30) $\frac{0}{13}$

zero

31) $0 \div 22$ $\frac{0}{22}$

zero

32) $22 \div 0$ $\frac{22}{0}$

undefined

Unit 2: Expressions, Equations & Inequalities

Term - a part of an expression that is separated by a "plus" or "minus" sign.
Ex: 3x + 4y → 3x is a term & 4y is a term

Coefficient - a number in front of a variable
Ex: 4n → 4 is the coefficient and n is the variable

Constant Term - a term that has a number but no variable. Ex: 5, 7, 100, 2,000

Like Terms - terms with the **EXACT** same variables and **EXACT** same exponents

Examples: 5y and 6y $\quad$ $5x^2$ and $6x^2$ $\quad$ 10 and -2

Non-examples: 5x and 3y $\quad$ 2x and 3 $\quad$ -4x and $3x^2$

List the terms, like terms, coefficient(s), and constant(s) for the following expressions. Remember, the sign in front of the number goes with the number.

1) $5x + 2y - 1x + 3y - 7$

Terms: 5x, 2y, -x, 3y, -7

Like Terms: 5x and -x; 2y and 3y

Coefficient(s): 5, -1, 2, 3

Constant(s): -7

2) $-4a - 10c + 8 - 2a + 7$

Terms: -4a, -10c, 8, -2a, 7

Like Terms: -4a and -2a; 8 and 7

Coefficient(s): -4, -10, -2

Constant(s): 8, 7

Distributive Property states: $a(b + c) = ab + ac$ or **$a(b - c) = ab - ac$**

Two steps in **simplifying an expression**:

Step 1: Get rid of parenthesis by using the Distributive Property.

Step 2: Combine like terms.

Simplify each expression.

3) $-7(3 + 4x) + 2(4 + 5x)$

$-21 - 28x + 8 + 10x$

$-18x - 13$

4) $10 - 6(3x + 2) + 9x$

$10 - 18x - 12 + 9x$

$-9x - 2$

5) $(-19x + 24) + (9x - 13)$

$-19x + 24 + 9x - 13$

$-10x + 11$

6) $(12x - 17) -1(-7x + 9)$

$12x - 17 + 7x - 9$

$19x - 26$

7) $\frac{7}{10}(10x - 20) - 19x - 5$

$7x - 14\cancel{0} - 19x - 5$

$-12x - 1\cancel{45}$

19

8) $0.5(-30x - 24y) + 34 - 16$

$-15x - 12y + 34 - 16$

$-15x - 12y + 18$

9) $\frac{3}{2}x + 5 + \frac{5}{2}x - 7$

$\frac{3}{2}x + 5 + \frac{5}{2}x - 7$

$4x - 2$

10) $\frac{1}{4}x - \frac{2}{3}y - \frac{2}{5}x - \frac{1}{2}y$

$\frac{1}{4}x - \frac{2}{3}y - \frac{2}{5}x - \frac{1}{2}y$

$-\frac{3}{20}x - 1\frac{1}{6}y$

Factoring

The **first step** to factoring is to find the GCF of the terms:

The **second step** to factoring is to factor out the GCF.

- First write the GCF, then begin your parenthesis.
- To figure out what goes inside the parenthesis, divide each term by the GCF
- Remember the final answer will look like the distributive property.

Example: Factor the expression $10x + 20$

Step 1: Find the GCF

Factors of: 10: 1, 2, 5, **10**
20: 1, 2, 4, 5, **10**, 20

These two terms DO NOT have a variable in common, so the GCF is 10.

Step 2: Factor

$\underline{10}\,(x + 2)$

10x divided by 10 equals x.
20 divided by 10 equals positive 2

Find the Greatest Common Factor (GCF) of each pair of terms.

11) $25x$ and $30y$ 12) $3x$ and $21xy$ 13) $4y$ and 16 14) $12y$ and $28xy$

GCF: 5 GCF: 3x GCF: 4 GCF: 4y

Factor each expression. Remember, when you factor you are dividing each term by the GCF. Your final answer should look like the Distributive Property.

15) $x - xy$ 16) $-15m + 50$ 17) $18n + 24$ 18) $21xy - 28y$

$x(1 - y)$ $5(-3m + 10)$ $6(3n + 4)$ $7y(3x - 4)$

Simplify each expression, THEN factor (write it as a product of two factors)

19) $8x + 14 - 2x + 4$

$\boxed{8x}\boxed{+14}\boxed{-2x}\boxed{+4}$

$6x + 18$

$6(x + 3)$

20) $6x + 15y + 12y + 3x$

$\boxed{6x}\boxed{+15y}\boxed{+12y}\boxed{+3x}$

$9x + 27y$

$9(x + 3y)$

21) $8x - 2(3x - 4) + 2$

$\boxed{8x}\boxed{-6x}\boxed{+8}\boxed{+2}$

$2x + 10$

$2(x + 5)$

LAWS OF EXPONENTS

(Remember, these shortcuts only work if the bases are the same (x is the base)

Multiplication of Exponents: $x^2 \bullet x^5 = x^{2+5} = x^7$ $5 \bullet 5^4 = 5^{1+4} = 5^5$

If the bases are the same: KEEP the base and ADD the exponents.

Division of Exponents: $\frac{8^9}{8^5} = 8^{9-5} = 8^4$ $\frac{x^2}{x^5} = x^{2-5} = x^{-3} = \frac{1}{x^5}$ (remember no negative exponents)

If the bases are the same: KEEP the base and SUBTRACT the exponents.

Power to a Power: $(x^2)^5 = x^{(2)(5)} = x^{10}$

A power raised to another power: KEEP the base and MULTIPLY the exponents.

Write each expression using exponents.

22) $2 \bullet 2 \bullet 2 \bullet 2$ 2^4

23) $s \bullet s \bullet s \bullet s \bullet s \bullet s \bullet s$ s^7

24) $a \bullet a \bullet b \bullet a \bullet b \bullet a \bullet a$ a^5b^2

Simplify using the Laws of Exponents. Express your answer using POSITIVE EXPONENTS.

Ex. $-4x^3(7x^5) = -4 \bullet x^3 \bullet 7 \bullet x^5 = -4 \bullet 7 \bullet x^3 \bullet x^5 = -28x^8$

25) 3^{-2} $\frac{1}{3^2} = \frac{1}{9}$

26) $4^{-3} \bullet 4^2$ $4^{-1} = \frac{1}{4^1} = \frac{1}{4}$

27) $x^{-5} \bullet x^{-3}$ $x^{-8} = \frac{1}{x^8}$

28) $2^7 \bullet 2^2$ 2^9

29) $4^2 \bullet 4^4$ 4^6

30) $10^2 \bullet 10^3$ 10^5

31) $k^8 \bullet k$ k^9

32) $a^4c^6(a^2c)$ a^6c^7

33) $2w^2x \bullet 5w^3x^4$ $10w^5x^5$

34) $3x^3 \bullet 7x^3$ $21x^6$

35) $4y^4(-4y^3)$ $-16y^7$

36) $(-6x^7)(5x^2)$ $-30x^9$

37) $7y^3 \bullet 6y$ $42y^4$

38) $(-2w^7z^4)(-8w^3 z^2)$ $16w^{10}z^6$

39) $(-3x^2y^3)(2xy^4)$ $-6x^3y^7$

40) $(a^2c)^4$ a^8c^4

41) $(x^3y^4)^2$ x^6y^8

42) $(m^2n^3)^3$ m^6n^9

43) $(2xy)^4$ $16x^4y^4$

44) $(-3x^4y^7)^3$ $-27x^{12}y^{21}$

45) $(10xy^5)^2$ $100x^2y^{10}$

46) $\frac{3^8}{3^4}$ $3^4 = 81$

47) $\frac{2^3}{2^9}$ $2^{-6} = \frac{1}{2^6} = \boxed{\frac{1}{64}}$

48) $\frac{8^7}{8}$ 8^6

49) $\frac{12n^5}{4n^2}$ $3n^3$

50) $\frac{24x^9}{6x^3}$ $4x^6$

✱51) $\frac{-18y^6}{2y}$ $-9y^5$

52) $\frac{15x^8y^4}{3x^5y^2}$ $5x^3y^2$

53) $\frac{21w^6m^3}{3w^8m}$ $\cancel{7w^4m^2}$ $\frac{7m^2}{w^2}$

Scientific Notation

Scientific Notation is when we rewrite a number as a PRODUCT of 2 factors.

Factor #1:
Must be greater than or equal to 1 AND less than 10.

Factor #2:
Must be a power of 10. Numbers greater than 1 have positive exponents, numbers less than one have negative exponents.

Ex: Write 24,000 in scientific notation.
Scientific notation is 2.4×10^4

EX: Write 0.00045 in scientific notation
Scientific notation is 4.5×10^{-4}

Standard Form:

Remember the exponent tells you: How many places to move the decimal.
Positive exponents are numbers greater than or equal to 1.
Negative exponents are small numbers, numbers less than 1, decimals.

Ex: Write $2.03 \bullet 10^6$ in standard form.
The exponent is a positive 6 so you move the decimal 6 places to the right.
Standard form is 2,030,000

Ex: Write $3.2 \bullet 10^{-8}$ in standard form.
The exponent is a negative 8 so you move the decimal 8 places to the left.
Standard form is 0.000000032

Write each number in scientific notation.

54) 6,590

6.59×10^3

55) 4,733,800

4.7338×10^6

56) 2,204,000,000

2.204×10^9

57) 0.29

2.9×10^{-1}

58) 0.00000571

5.71×10^{-6}

59) 0.0008331

8.331×10^{-4}

Write each number in standard form.

60) $6.7 \bullet 10^1$

67

61) $6.1 \bullet 10^4$

61,000

62) $1.6 \bullet 10^3$

1600

63) $2.91 \bullet 10^{-5}$

0.0000291

64) $8.651 \bullet 10^{-7}$

0.0000008651

65) $3.35 \bullet 10^{-1}$

0.335

Compare using < or >.

66) $3.7 \bullet 10^7$ __>__ $8.5 \bullet 10^4$

67) $7.5 \bullet 10^3$ __<__ $9.42 \bullet 10^3$

68) $9.5 \bullet 10^{-6}$ __<__ $3.7 \bullet 10^{-2}$

69) $9.75 \bullet 10^{-4}$ __>__ $3.5 \bullet 10^{-6}$

Find the product. Write your answer in scientific notation.

70) $(2 \bullet 10^6) \bullet (3 \bullet 10^{-4})$

$6 \bullet 10^2$

71) $(4 \times 10^6)(2 \times 10^3)$

$8 \bullet 10^9$

Find the quotient. Write your answer in scientific notation.

72) $(8.5 \times 10^4) \div (1.7 \times 10^2)$

$5 \bullet 10^2$

$$\frac{8.5}{1.7} \times \frac{10^4}{10^2}$$

73) $\dfrac{(4.4 \bullet 10^5)}{(4 \bullet 10^{-7})}$

$1.1 \bullet 10^{12}$

The Real Number System

ALL the numbers we worked with this year are REAL NUMBERS. That means every number we worked with was either RATIONAL or IRRATIONAL.

RATIONAL Numbers are numbers that CAN be written as fractions.

RATIONAL NUMBERS

- **COUNTING NUMBERS** $\rightarrow 1, 2, 3... \rightarrow \frac{1}{1}$ also known as **NATURAL NUMBERS**
- **WHOLE NUMBERS** $\rightarrow 0, 1, 2, 3... \rightarrow \frac{0}{1}$
- **INTEGERS** $\rightarrow ..., -5, -4, -3, -2, -1, 0, 1, 2, 3... \rightarrow \frac{-5}{1}$
- FRACTIONS $\rightarrow \frac{2}{3} \rightarrow$ ALREADY A FRACTION!!
- TERMINATING DECIMALS $\rightarrow 0.13 \rightarrow \frac{13}{100}$
- REPEATING DECIMALS $\rightarrow 0.333... \rightarrow \frac{3}{9} = \frac{1}{3}$
- PERFECT SQUARES $\rightarrow \sqrt{49} \rightarrow 7 \rightarrow \frac{7}{1}$

IRRATIONAL Numbers are numbers that CANNOT be written as fractions.

IRRATIONAL NUMBERS

- **PI** $\rightarrow \pi \rightarrow 3.1415926...$
- **NON-PERFECT SQUARES** $\rightarrow \sqrt{5}, \sqrt{17}, \sqrt{31}$ ...
- **NON-TERMINATING NON-REPEATING DECIMALS** $\rightarrow 0.12112111211112...$

WHAT ARE PERFECT SQUARES? A number is a perfect square if its square root is a whole number. That is, the number is equal to a number times itself.

FOR EXAMPLE: $25 = 5 \bullet 5$ AND $25 = -5 \bullet -5$ therefore, **25 IS A PERFECT SQUARE.**

Name ALL the sets of numbers to which each number belongs.
Real, Irrational, Rational, Integer, Whole, Counting/Natural

74) -8 Integer, Rational, Real

75) $\sqrt{36}$ Natural, Whole, Integer, Rational, Real

76) $\sqrt{7}$ Irrational, Real

77) $7.\overline{2}$ Rational, Real

78) $\frac{2}{3}$ Rational, Real

79) $-\frac{12}{4}$ Integer, Rational, Real

80) 0.25 Rational, Real

81) π Irrational, Real

82) 5 Natural, Whole, Integer, Rational, Real

Answer each of the following with ALWAYS, SOMETIMES or NEVER true.

83) Integers are Always rational numbers.

84) Real Numbers are Sometimes irrational numbers.

85) Whole numbers are Always integers.

86) Rational numbers are Never irrational numbers.

87) List the first 15 Perfect Squares.

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225

The opposite of squaring a number is finding a square root. A square root of a number is one of its two equal factors. EX. Since 3 • 3 = 9, a square root of 9 is 3.
Since −3 • −3 = 9, a square root of 9 is −3.

Remember there are positive roots and negative roots. Be sure you know which root you are looking for. When solving for a variable there will ALWAYS be 2 solutions. Read carefully to see if you need to reject the negative root.

$\sqrt{64}$ indicates the ***positive***, or ***principal*** square root of 64. Therefore, $\sqrt{64} = 8$.

$-\sqrt{121}$ indicates the ***negative*** square root of 121. Therefore, $-\sqrt{121} = -11$.

$\pm\sqrt{225}$ indicates BOTH ***positive*** and ***negative*** square roots of 225. Therefore, $\pm\sqrt{225} = \pm 15$