Order of Operations

P lease   **Parenthesis -** Do all grouped operations first.

E xcuse   **Exponents -** Second

M y
D ear   **Multiplication and Division -** Left to Right.

A unt
S haniqua   **Addition and Subtraction -** Left to Right.

Follow the correct order of operations to evaluate expressions.

Evaluate: Remember to use the correct Order of Operations.

1. $18 - 5 \cdot 2$ 2. $2(12 + 6 \div 2)$ 3. $\dfrac{2(3+2)^2}{10}$

Evaluate for a=3, b=4, c=5, d=10

1. $ab + bc \div d$ 2. $\dfrac{c + ad}{a + b}$ 3. $2\left[(bd + c) \div a^2\right]$

Solve the following using the correct order of operations:

1. $3 \cdot 3 \div 3 \cdot 3$ 6. $3^2 - 3 + 3 \div 3$

2. $3 + 3 + 3 - 3$ 7. $3 \cdot 3 + 3 \div 3$

3. $(3 + 3) \div 3 + 3$ 8. $(3 + 3 + 3) \div 3$

4. $3 \div 3 + 3 \div 3$ 9. $3 \cdot 3 - 3 \div 3$

5. $(3 + 3) \div (3 + 3)$ 10. $3^2 \div 3 + 3 \div 3$

Order of Operations Practice

When evaluating expressions, work using the correct order of operations:

P (Parenthesis) Do all grouped operations first.
E (Exponents) Do all operations involving exponents.
M D (Mult./Div.) Do all multiplication and division from left to right.
A S (Add./Sub.) Do all addition and subtraction last - from left to right.

Solve:

1. $(9 + 1)^2 + 5$

2. $15 - 3 \cdot 2$

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

4. $2[4 + (9 - 2)]$

5. $6 + (9 - 1)^2$

6. $\dfrac{(5 - 2)^2}{3}$

7. $\sqrt{\dfrac{2 + 6 \cdot 3}{5}}$

8. $\sqrt{37 - 2^2 \cdot 3}$

9. $\dfrac{3}{4}(15 - 3) + 6$

10. $\dfrac{3}{8}(5 + 3^2 \div 3)^2$

Order of Operations Practice

Evaluate for a=3, b=4, c=6

11. $c + (2a - b)^2$

12. $b^2 - a^2$

13. $(a + b)(c - b)^2$

14. $2[c + (3b - a)]$

15. $c + (b^2 - a)$

16. $\dfrac{6(c - b)^2}{a}$

17. $\dfrac{c + b \cdot a}{3}$

18. $b + c^2 \cdot a$

19. $b(c - a) + 3c$

20. $a + ab^2 \div c$

Integer Addition

notes:
Integers are positive and negative Whole Numbers like

-9 127 -90 -54 75 120 65 21 -78 -23 -11 70

Integers are NOT decimals or fractions.

Adding and subtracting integers can seem unnecessarily complicated. Try the following practice problems first:

Practice:

1. $13+31$ 2. $13-31$ 3. $31-13$ 4. $-13+(-31)$

5. $-31-13$ 6. $-31-(-13)$ 7. $-31+13$ 8. $31+(-13)$

If you got all of these right, you already have a proven method for adding and subtracting integers. Close your ears, sit quietly, and continue using your own method. If you missed even one, pay close attention and take notes.

notes:
Adding Integers:

Same Sign Sum
When adding integers with the **same sign**, find the **sum** and keep the sign of both numbers.

1. $13+11$ 2. $-13+(-11)$ 3. $23+2$ 4. $-23+(-2)$

Different Sign Difference
When adding integers with **different signs**, find the **difference** and keep the sign of the 'bigger' number.

1. $-13+11$ 2. $13+(-11)$ 3. $23+(-2)$ 4. $-23+2$

Mixed Review
Add:

1. $15+(-14)$ 2. $3+(-8)$ 3. $-7+(-8)$ 4. $13+(-6)$

5. $-12+(-14)$ 6. $-6+11$ 7. $-9+(-5)$ 8. $23+(-23)$

Subtraction

Subtracting Integers:

SMATO Subtraction Means Add The Opposite

Subtracting Integers is more complicated than adding integers.
To subtract integers, change subtraction to addition and switch the sign
of the second number. Then, follow the two rules we have learned
for adding integers.

Examples: SMATO
Change to addition.

1. $-11-15$ 2. $-21-3$ 3. $8-(-14)$ 4. $-30-(-5)$

Practice: Change to addition, then solve.

1. $13-25$

4. $-29-(-6)$

2. $-11-15$

5. $-15-23$

3. $17-(-26)$

6. $-29-21-(-7)$

Adding and Subtracting Rationals:
Use the same rules for fractions and decimals as you would for integers:
Same Sign Sum, Different Sign Difference, SMATO.

Examples:

1. $-\dfrac{1}{4}+\dfrac{1}{10}$ 2. $3.5-4.9$ 3. $-\dfrac{1}{3}+\left(-\dfrac{7}{8}\right)$

4. $4.25+(-2.75)$ 5. $-1\dfrac{1}{6}+5\dfrac{1}{2}$ 6. $-1.4+0.03$

Practice:

1. $-\dfrac{1}{2}+\dfrac{2}{3}$ 2. $-1.9+4.5$ 3. $\dfrac{4}{5}+\left(-\dfrac{9}{10}\right)$

4. $-6.2+(-2.1)$ 5. $-3\dfrac{1}{2}+5\dfrac{1}{4}$ 6. $2.9+(-1.05)$

Matrices

Matrices: A matrix is a rectangular table of numbers.
Horizontal lines are called rows. Vertical lines are called columns.

$$A = \begin{bmatrix} 1 & -3 \\ -2 & 5 \\ -3 & 9 \end{bmatrix} \qquad B = \begin{bmatrix} 0 & -5 \\ 1 & -2 \\ -7 & 3 \end{bmatrix} \qquad C = \begin{bmatrix} -2 & 5 & 0 & 7 \\ 1 & -1 & -3 & -1 \end{bmatrix}$$

Matrix A and B are 3x2 matrices. C is a 2x4 matrix.
Q: In matrix C, which number is in the second row, third column?

Matrix addition/subtraction.
To add A+B, simply add the corresponding parts.
You can only add or subtract matrices with the same dimensions.
Subtraction is easier if you simply add the opposite.

$$A = \begin{bmatrix} 1 & -3 \\ -2 & 5 \\ -3 & 9 \end{bmatrix} \quad B = \begin{bmatrix} 0 & -5 \\ 1 & -2 \\ -7 & 3 \end{bmatrix} \quad A+B = \begin{bmatrix} 1 & -8 \\ -1 & 3 \\ -10 & 12 \end{bmatrix} \quad A-B = \begin{bmatrix} 1 & 2 \\ -3 & 7 \\ 4 & 6 \end{bmatrix}$$

Practice: Solve the following using the given matrices:

$$A = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 5 & -4 \end{bmatrix} \qquad B = \begin{bmatrix} 9 & 0 & -1 \\ 1 & -3 & 4 \end{bmatrix} \qquad C = \begin{bmatrix} -1 & 2 & 7 \\ 0 & -5 & -1 \end{bmatrix}$$

1. A+B   **2.** A-C   **3.** B-C   **4.** A+C

Matrices

Matrix multiplication: Multiplying a matrix by a scalar (a number shown outside the matrix) involves multiplying each term by the scalar.

$$A = \begin{bmatrix} 1 & -3 \\ -2 & 5 \\ -3 & 9 \end{bmatrix} \quad 2A = \begin{bmatrix} 2 & -6 \\ -4 & 10 \\ -6 & 18 \end{bmatrix} \quad -2\begin{bmatrix} 4 & -3 \\ -1 & 1 \\ 0 & -1 \end{bmatrix} = \begin{bmatrix} -8 & 6 \\ 2 & -2 \\ 0 & 2 \end{bmatrix}$$

Complete the following operations involving matrices:

$$A = \begin{bmatrix} 1 & -2 \\ -4 & 5 \end{bmatrix} \qquad B = \begin{bmatrix} -5 & -3 \\ 2 & 6 \end{bmatrix} \qquad C = \begin{bmatrix} 4 & -4 \\ 0 & -1 \end{bmatrix}$$

1. $2A$ **2.** $-2B$ **3.** $-A - B$ **4.** $3B - C$

Solving Matrix Equations:

Ex:

$$5 + x = -9 \qquad\qquad\qquad 2x - 7 = -3$$

One-step. Solve for B: Two-steps. Solve for A:

$$\begin{bmatrix} 1 & -2 \\ -4 & 5 \end{bmatrix} + B = \begin{bmatrix} -2 & -3 \\ -1 & 0 \end{bmatrix} \qquad\qquad 2A - \begin{bmatrix} 0 & -3 \\ -7 & 7 \end{bmatrix} = \begin{bmatrix} 4 & -3 \\ -5 & -1 \end{bmatrix}$$

Practice:

Solve for the missing matrix in each problem below:

1. $\begin{bmatrix} 1 & -3 \\ -2 & 5 \\ -3 & 9 \end{bmatrix} - A = \begin{bmatrix} 3 & -4 \\ 2 & 7 \\ -5 & -1 \end{bmatrix}$ **2.** $2A + \begin{bmatrix} 5 & -6 \\ 1 & 9 \\ -1 & -3 \end{bmatrix} = \begin{bmatrix} 3 & -4 \\ 0 & 7 \\ -1 & -3 \end{bmatrix}$

Matrix Operations

Complete the following problems using the given matrices:
Write 'impossible' if a problem cannot be solved.

$$A = \begin{bmatrix} 1 & -3 \\ -2 & 5 \\ -3 & 9 \end{bmatrix} \qquad B = \begin{bmatrix} 0 & -5 \\ 1 & -2 \\ -7 & 3 \end{bmatrix} \qquad C = \begin{bmatrix} -2 & 5 & 0 & 7 \\ 1 & -1 & -3 & -1 \end{bmatrix}$$

1. $A - B$

2. $-3A$

3. $-2C - C$

4. $C - A$

5. $-2A - B$

6. Solve for matrix X: $\begin{bmatrix} 1 & -1 \\ 4 & -5 \\ -2 & 7 \end{bmatrix} + X = \begin{bmatrix} -13 & -1 \\ 6 & 4 \\ -5 & -3 \end{bmatrix}$

Combining Like Terms

Combining Like Terms:
When adding or subtracting numbers and variables, you can only combine **like terms.**

Like terms contain the same variables, with the same exponents in a single product.

Here are some sets of like terms:

x	xy^2	$3ab$	$6m^3n$	c
$5x$	$9xy^2$	$2ab$	$-2m^3n$	$2c$
$3x$	$-3xy^2$	$-ab$	$2m^3n$	$5c$

Practice: Match each pair or set of like terms below:

x^3	$7xy$	$-2x^2y$	xy^2	x^3y
y^3	x^2+y	$-3x$	$-2y^2$	$5x^2y^2$
$-5xy$	x^2y^2	$-2x^3$	$9xy$	$4x^2y$

You cannot add or subtract unlike terms. It is like trying to add apples and oranges.

Practice: Simplify the following:

1. $9x + 7x$

2. $13z + 2z$

3. $5a + 6a - a$

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

5. $23x + 4 - 15x$

6. $2b^2 - 9c + 7b^3 - 3ab$

You cannot simplify number six because there are NO LIKE TERMS.

Combining Like Terms

Practice: Simplify.

1. $14a + 3a$

2. $8ab + 2ab - 7ab$

3. $4c + 3c - 12c$

4. $8x + 3x^2 - 15x - 20x^2$

5. $7x + 24 - 5x - 12$

6. $5b + 3b^2 - 15b + 6b^3 - 3$

Practice: Simplify.

1. $ax - 3y + 5ax - y$

2. $5ab + ab - 3ab - 7ab$

3. $4a + 3c - 2b - 7c$

4. $3x^2y - 8xy - 15x - 10y^2$

5. $-7x^2 + 4y - 5x^2 - 2y$

6. $\dfrac{1}{2}a^2 + \dfrac{2}{3}b^2 - \dfrac{3}{4}b^2$

Practice: Simplify.

1. $\dfrac{1}{4}a + \dfrac{1}{3}a$

2. $-\dfrac{3}{5}x + \left(-\dfrac{2}{3}x\right)$

3. $a^2 - \dfrac{1}{5}a^2$

4. $-\dfrac{8}{9}a + \dfrac{1}{2}b^2 - \dfrac{2}{3}a$

5. $\dfrac{1}{4}xy + \dfrac{1}{3}x^2y + \dfrac{1}{2}xy^2$

6. $b - \dfrac{2}{5}b + \dfrac{1}{2}b$

Like Terms Reteach:

Combining like terms is just like adding and subtracting integers: Simplify.

1. $-3+7$

2. $4-9$

3. $-1-6$

4. $-3x+7x$

5. $4a-9a$

6. $-xy-6xy$

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

8. $4xy^3-9xy^3$

9. $-x^5y^2-6x^5y^2$

You can only combine terms with the same variables and exponents: Simplify. Write SIMPLIFIED if there are no terms which can be combined. Circle like terms as you combine them.

7. $a-3a+7$

8. $5-4x-9x$

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

10. $3ab^2+b^2-6a^2+2a^2b$

11. $x^2+x^3-x^2-x^3$

12. $m^2-7n^3+2n^3-3m^2$

13. $5y^2+y^3-6y^3+y^2+2y^3$

14. $w^2-2w^2x-wx-w^2x+3w^2$

Like Terms Reteach:

Fraction review: Solve.

15. $\dfrac{1}{2} - \dfrac{2}{3}$

16. $2\dfrac{1}{2} + 1\dfrac{2}{3}$

17. $-2\dfrac{1}{2} - 3\dfrac{4}{5}$

18. $\dfrac{1}{2} \cdot \dfrac{2}{3}$

19. $2\dfrac{1}{2} \cdot 1\dfrac{2}{3}$

20. $-2\dfrac{1}{2} \div 3\dfrac{4}{5}$

Simplify each by combining like terms.

21. $\dfrac{1}{2}a - \dfrac{2}{3}a + 7$

22. $\dfrac{1}{8}b - 2a + \dfrac{7}{10}b - a$

23. $\dfrac{2}{3}x^3y - xy^3 + 3x^3y$

24. $\dfrac{7}{4}a^2 - \dfrac{3}{4}a^2 + a^2$

25. $m^3 - mn^2 + \dfrac{1}{3}mn - m^2n + 7mn - m^2n - \dfrac{2}{5}mn^2 - 5m^3$

Like Terms Practice

Simplify each. Write simplified if no terms can be combined.

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

2. $2m^2 - 7n^3 + 4n^3 - 3m^2$

3. $-xy^2 + 5xy^3 - 3xy^2 - 2xy^3$

4. $2a^2 - 3a^3b + 2a^3 - 3ab^2$

5. $wx^2 + 2wx^2 - 5wx^2 - wx^2$

6. $2 - a^2 + b^3 + a^3 - b^2 - 6$

7. $-5x^3yz - 3x^3yz - 7$

8. $-ab^2 - 2ab^5 + ab^2 + ab^5$

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

10. $2m^2 - 5m^3 + 5m^3 - 2m^2$

11. $7ce^2m^3 - 3ce^2m^3$

12. $5a^2x + ax^3 + 20ax^3 - 10a^2x$

13. $\dfrac{1}{5}x^2 + 2x^2 - \dfrac{2}{5}x^2$

14. $\dfrac{3}{4}a^2b + \dfrac{2}{3}a^2b - \dfrac{2}{5}a^2b$

Exponents

Base:
   The repeated factor in a power.
   In the expression **n³**, n is the <u>base.</u>

Exponent:
   Represents the number of times a factor is being multiplied.
   In the expression **n³**, the **³** is the <u>exponent.</u>

The expression 5^3 means that you multiply $5 \cdot 5 \cdot 5$

The expression x^5 means that you multiply $x \cdot x \cdot x \cdot x \cdot x$

The expression $(ab)^4$ means that you multiply $(ab)(ab)(ab)(ab)$

Practice: Write-out without using exponents:

1. 3^5 2. xy^4 3. $(a^2 b)^3$ 4. $(5x)^3 y^2$

Practice: Write using exponents.

1. $7x \cdot 7x \cdot 7x$ 2. $3 \cdot a \cdot a \cdot a \cdot b \cdot b$ 3. $r \cdot 2 \cdot s \cdot s \cdot r \cdot 7$

Practice: Evaluate. (solve)

1. 7^2 2. 3^4 3. $2^3 \cdot 3^2$ 4. $5^2 \cdot 2^4$

Exponents

One of the easiest ways to multiply expressions using exponents is to write them out in factored form, and then recombine terms using exponents:

Ex. $3n(2n^2) = 3 \cdot n \cdot 2 \cdot n \cdot n = 3 \cdot 2 \cdot n \cdot n \cdot n = 6n^3$

Practice: Simplify.

1. $x(2x^2)$ 2. $4xy(x^2 y^5)$ 3. $(-2a^{23}b^{11})3a^{12}b^7$

Rules:
When multiplying variables with exponents, simply add exponents:

Ex. $n^3 \cdot n^5 = n^{5+3} = n^8$ or $x^2 y^3 (x^5 y^2) = x^{2+5} y^{3+2} = x^7 y^5$

Practice: Simplify.

1. $-x^{25}(x^{12})$ 2. $3a^{15}b^{30}(7a^{21}b^{14})$ 3. $(-4m^{10}n^{-7})3m^{-3}n^{20}$

The same rules apply for positive and negative exponents.

Practice: Simplify.

1. $5x^3(3x^4)$ 2. $-4a^5b^{-2}(3a^2b^4)$ 3. $2x^3 y(x^8 y^2)$

4. $5^{12} \cdot 5^{22}$ 5. $12x^{13}y^2(5x^{-11}y)$ 6. $2y^{11}(3y^2)^3$

Challenge: Find the Perimeter AND Area of each shaded figure below:
note: all angles are right angles.

$5ab$

$7ab$ $4ab$

$3ab$

$3x$ $2x$

$3x$

$3x$ $5x$
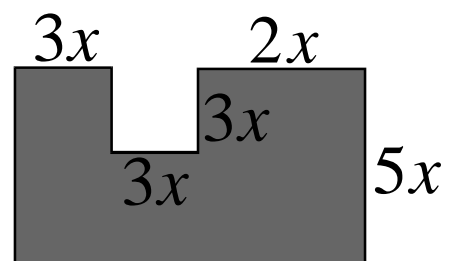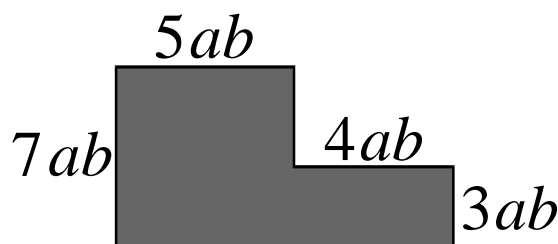
Exponents and Division

Review: Multiply.

1. $3x^{-4}(-x^2 y^5)$ **2.** $(4x^{-3} y^2)^2$ **3.** $5b^3(2b^2)^5$

Dividing Monomials:
You can write-out variables and exponents, or simply subtract exponents:

Examples:

1. $\dfrac{2a^2 b^3}{6a^4 b}$ **2.** $\dfrac{12 x^5 y^{11}}{4x^9 y^2}$

Practice: Divide/ Simplify. Answers should have positive exponents.

1. $\dfrac{10 x^3 y^3}{25 xy^4}$ **2.** $\dfrac{4a^{12} b^8}{16 a^9 b}$ **3.** $\dfrac{20 a^3 b^{-3}}{14 a^{-6} b^2}$

What is a negative exponent?
Look at the following pattern in our own number system:

876.543

The 8 is in the _____ place $10^2 =$ ____.

The 7 is in the _____ place $10^1 =$ ____.

The 6 is in the _____ place $10^0 =$ ____.

The 5 is in the _____ place $10^{-1} =$ ____.

The 4 is in the _____ place $10^{-2} =$ ____.

The 3 is in the _____ place $10^{-3} =$ ____.

Exponents and Division

Negative Exponents: A negative exponent can be expressed as a positive exponent in the denominator:

Examples:

$$x^{-3} = \frac{1}{x^3} \qquad \frac{1}{a^{-4}} = a^4 \qquad x^5 y^{-3} = \frac{x^5}{y^3} \qquad \frac{y^{-5}}{x^{-2}} = \frac{x^2}{y^5}$$

Notice that a negative exponent in the denominator can also be expressed as positive in the numerator.

Practice: Rewrite with positive exponents:

1. x^{-2}

2. ab^{-3}

3. $\dfrac{y^4}{x^{-9}}$

4. $\dfrac{x^{-9}}{b^2}$

5. $(ab)^{-3}$

6. $\dfrac{ab^{-4}}{a^{-2}b}$

Negative Exponents: The easiest way to simplify expressions with negative exponents is to begin by rewriting them:

Examples:

$$\frac{3a^5 b^{-2}}{a^{-4} b^3} \qquad\qquad \frac{5x^{-5} y}{2xy^{-2}}$$

Practice: Rewrite with positive exponents, then simplify:

1. $\dfrac{2x^{-2}}{x^{-5}}$

2. $\dfrac{3xy^{-2}}{9x^{-9} y^3}$

3. $\dfrac{5a^3 b^4}{a^5 b^{-2}}$

You can also use the subtraction method, but it becomes much more confusing.

Name_____ Period _____

Division With Exponents

Algebra 2.3

Simplify each. Your answers should be written with positive exponents.

1. $\dfrac{x^2}{x^7} =$

2. $\dfrac{a^2 b}{ab^3} =$

3. $\dfrac{12 y^5}{4 y^2} =$

4. $\dfrac{7 a^3 x^3}{21 a x^5} =$

5. $\dfrac{25 x^2}{20 xy} =$

6. $\dfrac{6 a^{30} b^{10}}{12 a^{10} b^{15}} =$

7. $\dfrac{(ab)^3}{ab^4} =$

8. $\dfrac{50 ab(a^3 b)}{20 a^5 b^5} =$

9. $\dfrac{16 y^5}{2 y^{-2}} =$

10. $\dfrac{2^3}{2^7} =$

11. $\dfrac{2 a^{-5} b^3}{4 a^{-2} b} =$

12. $\dfrac{(3ab)^3}{2 ab^2 (6a)^2} =$

Division With Exponents

More challenging problems:
Simplify each. Your answers should be written with positive exponents.

13. $\dfrac{x^{-12}}{x^{-7}} =$

14. $\dfrac{21a^{-20}b^{6}}{35a^{15}b^{3}} =$

15. $\dfrac{(ab)^{5}}{(ab)^{4}} =$

16. $\left(\dfrac{x^{3}y}{x^{-2}y^{2}}\right)^{2} =$

17. $\left(\dfrac{x^{-2}}{2x^{5}}\right)^{3} =$

18. $\left(\dfrac{a^{30}b^{-10}}{a^{-10}b^{5}}\right)^{-3} =$

Exponents

Raising a power to a power:

Practice: Simplify each using what you know about exponents.

1. $(2xy^2)^4$
2. $3ab(2a^2b)^2$
3. $(2x^{12}y^8)^5$

Examples: Raising a power to a power.

1. $(x^5y^2)^3$
2. $(2a^2b^{11})^6$
3. $\left[3xy(x^2y^4)^5\right]^2$

Practice: Raising a power to a power.

1. $(x^3)^5$
2. $(3a^{16}b^{21})^2$
3. $ab(a^2b^5)^5$

4. $\left(\dfrac{x^3}{y^3}\right)^5$
5. $(a^{11})^{-2}$
6. $(2a^2b^{-2})^{-3}$

Raising a fraction to a power: When raising a fraction to a power, apply the exponent to the numerator and the denominator:

Examples:

$$\left(\frac{x}{y^2}\right)^3 \qquad \left(\frac{2x^2y^2}{y^5}\right)^3 \qquad \left(\frac{y^5}{x^{-2}}\right)^4$$

Practice: Try these easy ones:
Write-out if necessary.

1. $\left(\dfrac{x}{y}\right)^3$ 2. $\left(\dfrac{3^2}{5^3}\right)^5$ 3. $\left(\dfrac{2x^4}{y^{-3}}\right)^4$

Practice: Try these more difficult problems.
Like most of the math we have done, there are many ways to get the right answer. Answers should have positive exponents.

1. $\left(\dfrac{x^{-2}}{x^5}\right)^5$ 2. $\left(\dfrac{3xy^2}{x^{-9}y^3}\right)^2$ 3. $\left(\dfrac{2x^{-4}}{4x^{-2}}\right)^{-5}$

You can simplify what is in parenthesis before or after applying the exponent.

Exponents Reteach: Multiplying   Algebra

Write each expression out without using exponents (write small!):

1. $5x^3y^4$

2. $(5a^2)^3$

3. $5x^3(xy^3)^2$

Rewrite each expression using exponents:

4. $a \cdot a \cdot a \cdot b \cdot a \cdot b$

5. $3 \cdot x \cdot x \cdot 3 \cdot x \cdot x \cdot 3 \cdot x \cdot x$

6. $a \cdot b \cdot a \cdot 3 \cdot a \cdot 5$

Simplify each using the rules for exponents.

7. $-3a^{12}b^3(2a^4b^5)$

8. $3x^{-5}(2x^{14})$

9. $3ab(5a^2b^7)^2$

10. $(-5a^8b^3)^2$

11. $5x^5(2x^{11})^5$

12. $2a^4b(3a^{10}b)^2$

13. $(x^2y^{-3} \cdot 6xy^5)^2$

14. $2x^3(-x^4)^5$

15. $(m^3n)^2(-2n^2)^2$

16. $2^{-3} \cdot 3 \cdot 2^5 \cdot 3^7$

17. $7^5(7^3)^2$

18. $[(2a^2b^3)^2]^2$

Exponents Reteach: Dividing

Write each expression out without using exponents (write small!): ex. $x^3 = x \cdot x \cdot x$

19. $\dfrac{2x^3}{6x^7}$

20. $\dfrac{(a^2)^3}{a^3}$

21. $\dfrac{(2xy)^2}{10x^2y}$

Simplify each, then rewrite each expression using exponents:

22. $\dfrac{5 \cdot a \cdot a \cdot a}{10 \cdot a \cdot a \cdot a \cdot a}$

23. $\dfrac{5 \cdot a \cdot b \cdot 5 \cdot a \cdot b}{15 \cdot a \cdot a \cdot a \cdot b \cdot b}$

24. $\dfrac{x \cdot x \cdot x \cdot y}{x \cdot x \cdot y \cdot y \cdot y}$

Rewrite each with positive exponents: DO NOT SIMPLIFY, just rewrite using all positive exponents:

25. x^{-4}

26. $\dfrac{a^{-2}b^3}{ab^{-4}}$

27. $\dfrac{x^{-7}y}{2xy^{-4}}$

28. $\left(\dfrac{a^{-2}}{b^{-4}}\right)^2$

Rewrite each then simplify: Take your time and complete several steps.

29. $\dfrac{7a^{-8}b^{30}}{49a^2b^{14}}$

30. $\dfrac{(3x^3y)^2}{6xy^{-5}}$

31. $\left[\dfrac{m^3n}{(mn^{-3})^2}\right]^2$

Quick Review

Cut-out the following and give each table a set (8 sets).
Match the letters to the proper numbers to find the clue.
ans: read it backwards (read backwards)

1. $a^2b^{-2}(ab)^2$

        s. a^4

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

        d. $2a^2b^2$

3. $\dfrac{a^2b^{-2}}{(ab)^2}$

        r. $\dfrac{1}{b^4}$

4. $a^{12}b^{-3}(ab^3)^3$

        a. $a^{15}b^6$

5. $\dfrac{a^{21}b^{-3}}{a^6b^3}$

        w. $\dfrac{a^{15}}{b^6}$

6. $\dfrac{a^2b^{-5}}{a^{17}b^{-11}}$

        k. $\dfrac{b^6}{a^{15}}$

7. $a^2b^6(a^4b^9) - 5a^6b^{15}$

        c. $-4a^6b^{15}$

8. $a^9 b^{12} (3a^3 b^{-2})^2$ **a.** $9a^{15} b^8$

9. $-2c^{11} + 9a^{15} b^8 - 3a^{15} b^8 + 2c^{11}$ **b.** $6a^{15} b^8$

10. $a^{15} - b^8 + 5a^{15} + 2b^8$ **t.** $6a^{15} + b^8$

11. $\dfrac{2a^{11} b^{-4}}{a^{-4} b^4}$ **i.** $\dfrac{2a^{15}}{b^8}$

12. $\dfrac{a^{-3} b^{10}}{2a^5 b^{-5}}$ **d.** $\dfrac{b^{15}}{2a^8}$

13. $(2a^2 b^5)^3 - a^6 b^{15}$ **a.** $7a^6 b^{15}$

14. $a^2 b^2 - 3ab + ab^3 - ab$ **e.** $a^2 b^2 + ab^3 - 4ab$

15. $-2a^6 b + 3a^5 b^7 + 3a^6 b - a^6 b$ **r.** $3a^5 b^7$

Practice Quiz: Chapter 1 (4)

Algebra

Solve for a=3, b=5, c=2

1. $a^2b - ac$

1._____

2. $b^2 - c(a - b)$

2._____

3. $(c-b)(b-a)^2$

3._____

Simplify:

4. $3b^2 - 5b^2$

4._____

5. $-3x^2 + 2 + 13x^2 - 4$

5._____

6. $15 - 11a^4 + a^4 - 12$

6._____

7. $x^{12} - 5x^{11} - 4x^{10}$

7._____

8. $3ab^2 - 4a^2b + 2ab^2 + 7a^2b$

8._____

9. $-9a^3 + 5a^2 + 5a^3 - 9a^3$

9._____

Practice Quiz: Chapter 1 (4)

Algebra

Simplify: All answers should be written with positive exponents.

10. $x^5 \cdot x^3$

10._____

11. $-2ab^3 \cdot 9ab^3$

11._____

12. $-5a^6b(2a^2b)$

12._____

13. $4x^2y(2xy^3)^2$

13._____

14. $7x^{-2}y^{12}(6x^{-8}y^3)$

14._____

15. $\dfrac{y^3}{y^9} =$

15._____

16. $\dfrac{a^3}{a^{-5}} =$

16._____

17. $\dfrac{x^5y^2}{x^7y} =$

17._____

18. $\left(\dfrac{3ab^2}{6b^2}\right)^2 =$

18._____

Practice Quiz: Chapter 1 (5/7)

Algebra

Solve for a=-3, b=5, c=2

1. $a^2b - ac$

1._____

2. $b^2 - c(a - b)$

2._____

3. $(c - b)(c - a)^2$

3._____

Simplify:

4. $3b^2 - 5b^2$

4._____

5. $-3x^2 + 2 + 13x^2 - 4$

5._____

6. $15 - 11a^4 + a^4 - 12$

6._____

7. $x^{12} - 5x^{11} - 4x^{10}$

7._____

8. $3ab^2 - 4a^2b + 2ab^2 + 7a^2b$

8._____

9. $-9a^3 + 5a^2 + 5a^3 - 9a^3$

9._____

Practice Quiz: Chapter 1 (5/7)

Simplify: All answers should be written with positive exponents.

10. $\left(2x^5\right)^2$

10._____

11. $-2ab^3 \cdot 9ab^3$

11._____

12. $-5a^6b(2a^2b)$

12._____

13. $x^{-2}y^{12}\left(3x^{-8}y^3\right)^2$

13._____

14. $\left[x^2y(2x^2y^3)^2\right]^2$

14._____

15. $\dfrac{y^3}{y^9} =$

15._____

16. $\dfrac{15a^8}{12a^{-3}} =$

16._____

17. $\left(\dfrac{12a^{-3}b^2}{4a^{-7}b^7}\right)^2 =$

17._____

18. $\left(\dfrac{3ab^2}{6b^2}\right)^2 =$

18._____

The Distributive Property

The Distributive Property states:

For any numbers a, b, and c:

$$a(b+c) = ab + ac$$

Examples:

distribute the 5

$5(x + 3) = 5x + 15$

distribute the 3

$3(2a + 4) = 6a + 12$

$11(r^2 - s) = 11r^2 - 11s$

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

Multiply the term outside the parenthesis by both terms inside.

Practice: Rewrite using the Distributive Property.

1. $5(2x + y)$

4. $-9(x^2 - 1)$

2. $7(x - 2y)$

5. $(4 - 13b)2$

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

6. $8 - y(2y + 7)$

Distributing the negative:

Ex:

distribute the -5

$8x - 5(x + 3) =$

distribute the -a

$7a^2 - a(2a - 4) =$

distribute the negative (-1).

$3y - (y + 3) =$

Practice: Rewrite using the Distributive Property.

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

4. $-5 - 4(a^2 - 3)$

2. $8 - 3(-5 + y)$

5. $6x - (4x - y)$

3. $3x - (x - 2)$

6. $(-3 - y) - (2y + 7)$

The Distributive Property

Practice: Rewrite the Following Using the Distributive Property:

1. $14(a+3)$

2. $-4c^5(2c^{-2}+5)$

3. $a^2 - a(2a+5)$

4. $(8x+7)x^2$

5. $xy^2 - (7xy^2 + 5x)$

6. $7ab - 15a(a-b) + a^2$

Practice: Fill-in the blanks. The GCF has been factored out for you.

1. $14a^2b + 18ab^2 = \qquad 2ab(\underline{\quad} + \underline{\quad})$

2. $15x^2y^3 + 21x^2y = \qquad 3x^2y(\underline{\quad} + \underline{\quad})$

3. $12ab^2 - 6ab - 3a = \qquad 3a(\underline{\quad} - \underline{\quad} - \underline{\quad})$

Practice: Factor the Following (Reverse the Distributive Property)

1. $5a^3 + 6a^2$

3. $-9x^2 - 81xy - 3x$

2. $25a^2 + 15ab$

4. $15x^2 - 5x + 12$

Distributing Division

You can use the **Distributive Property** with division.
Example:

1. $$\dfrac{24x - 12}{-6}$$ **Divide** $\dfrac{24x}{-6} = -4x$ **and** $\dfrac{-12}{-6} = 2$

Therefore $\dfrac{24x - 12}{-6} = -4x + 2$

Practice:

1. $\dfrac{-10x - 15}{5}$ 2. $\dfrac{42x + 21}{-7}$ 3. $\dfrac{-18x^2 - 36x}{-6x}$

4. $\dfrac{12x^2 - 16x}{4x}$ 5. $\dfrac{32x^5 - 8x^2 + 2x}{-2x}$ 6. $\dfrac{-50x^3 - 5x^2}{10x}$

Practice: Answers will include fractions.

1. $\dfrac{-20x - 15}{20}$ 2. $\dfrac{2x^5 + 6x^2}{3x}$ 3. $\dfrac{-8x^4 - 3x}{4x}$

Challenge Set: Some answers will include fractions.

1. $\dfrac{6x^4 - 14x^3}{7x}$ 2. $\dfrac{22x^3 - 11x^2 + 10x}{-11x}$ 3. $\dfrac{6x^2 - 9x^{-2}}{3x^{-5}}$

Distributive Property

Rewrite and Simplify using the Distributive Property:

1. $-7x(x-5)$

2. $4(-2a-5)$

3. $-2(6-3y)$

4. $-8a(2a^2-5)$

5. $x^2(2x-7)$

6. $xy^2(2x+y)$

7. $-6a(4a-3)$

8. $2x-3(x+5)$

9. $-6a-4a(a+6)$

10. $12-(9x-5)$

11. $3c-(ab+c)$

12. $(4x^3-2y)-(3x^3+7y)$

Distributive Property

Simplify: Distributing division ('bunny ears'):

13. $\dfrac{12x - 36}{6}$

14. $\dfrac{20ab + 12b}{2b}$

15. $\dfrac{-49b^5 + 35b^3}{7b^2}$

16. $\dfrac{-16y^3 + 32y^2 - 8y}{-4y}$

17. $\dfrac{-15ab - 40bc + 10b}{5b}$

18. $\dfrac{36x^7 + 24x^6 - 8x^5}{-12x^5}$

19. $\dfrac{-8a^3 - 12a^2 + 3a}{4a}$

20. $\dfrac{10x^5 + 4x^3 - 5x^2}{-5x^2}$

Factor (Rewrite using the Distributive Property in reverse):

21. $-6a^2b^3 - 8ab^2 + 12ab$

22. $x^2y^2 - xy^3 + xy^2$

Distributive Reteach: Multiplying   Algebra

Rewrite each problem below using the Distributive Property.
Multiply each term outside of the parenthesis by all terms inside the parenthesis.
Careful with your signs and remember your rules for multiplying with exponents.

1. $2(x-y)$

2. $5(a^2-3)$

3. $5x(2x-y)$

4. $2x(x-y)$

5. $5a(a^2-3a)$

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

7. $2xy(x^3y-y^2)$

8. $5ab^3(a^2b^2-3ab)$

9. $5x^5y^2(2x^2-y^3)$

Now try distributing some negatives. Remember your integer rules.

10. $-2a(a-b)$

11. $-3x^2(x+3)$

12. $4a^2-2(a-3)$

For #12 above: DISTRIBUTE THE -2 NOT THE 4a². Answer: 4a²-2a+6.
Try the following similar problems and combine like terms wherever possible to
simplify your answer.

13. $5a^3-3a^2(2a-b)$

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

15. $3c-c(5a-7)$

16. $2xy-xy(-5x^2y^2+7)$

17. $-2x^3+3x(2x^3-5x^2+1)$

Distributive Reteach: Dividing

Rewrite each problem below using the Distributive Property.
'Bunny-Ear' each term in the numerator with the term in the denominator.
Careful with your signs!

18. $\dfrac{15\,x - 12}{3}$

19. $\dfrac{x^3 - 2\,x}{x}$

20. $\dfrac{20\,x^3 - 10\,x^2}{5\,x}$

21. $\dfrac{10\,x^2 y - 50\,x^2}{5\,x}$

22. $\dfrac{a^2 x^3 - ax^2}{ax}$

23. $\dfrac{30x^3 y - 45x^2 y^2}{15xy}$

24. $\dfrac{21x^2 - 15}{3x^{-1}}$

25. $\dfrac{x^3 y^3 - x^2}{x^2 y^{-2}}$

26. $\dfrac{12x^{30} y^{11} - 48x^{21} y^{24}}{6x^{13} y^6}$

The final three answers involve fractions. The fractions should be simplified and left as coefficients.

27. $\dfrac{2\,x + 12}{3}$

28. $\dfrac{15x^3 y - 20x^2 y}{20xy}$

29. $\dfrac{7x^3 - 4x^2 - 5}{10\,x^{-2}}$

Review

Rewrite and Simplify using the Distributive Property:

1. $4(x + y)$

2. $a^2(a-2)$

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

4. $-12a(2a-5)$

5. $-2a^2b^2(ab-2a)$

6. $5(a-1)+3$

7. $ab-3a(b-5)$

8. $3xy-x(7x-2y)$

9. $5a^3 + a^2(a-2)$

10. $bc-c^3(c^{-2}-5)+c$

Name_____ Period _____

Distributive Property

Algebra   1.7+

Simplify: Distributing division ('bunny ears'):

11. $\dfrac{4a^2 - 8a}{2a}$

12. $\dfrac{7xy^2 - 3xy}{xy}$

13. $\dfrac{4a^2b^3 - 14ab^2}{2b^2}$

14. $\dfrac{a^2 - ab + a}{a}$

15. $\dfrac{40x^{11} - 20x^5 + 15x^3}{5x^2}$

16. $\dfrac{21mn^2 - 14mn}{28m}$

17. $\dfrac{16c^{11} - 6c^4 + 8c^3}{8c^3}$

18. $\dfrac{a^2b - 2ab + b^2}{a^{-3}b}$

Factor Each: Reverse Distribution:

19. $18x^3y - 36xy^2$

20. $a^4b + 3a^2b^2 + a^2b$

21. $40x^3y^2 - 16x^2y + 12xy^3$

22. $120a^4b + 45a^3b - 75a^2b$

Quiz Review

Distributive Property:

100. $a(a-3)$

400. $5-(x+7)-3x$

200. $14a-(a-3)$

500. $-5a-\dfrac{3}{4}(12a-2)$

300. $3a-2(a^2-6a)$

600. $-xy^{-3}(x^2-y^{-2})$

Distributing Division:

100. $\dfrac{6a^2-14a}{2a}$

400. $\dfrac{-8x^3+16x^2-3x}{4x}$

200. $\dfrac{14x^4-7x^2}{7x^2}$

500. $\dfrac{3x^2-15x^{-3}}{3x^{-4}}$

300. $\dfrac{-2a^4-6a^3+12a}{2a}$

600. $\dfrac{-x^3y^3+x^2y^2}{2x^{-2}y}$

Factoring:

100. $2x^2-4x$

400. $17m^2n+51mn^2-34mn$

200. $9a^2b+18ab^2-6ab$

500. $-143x^3y-104x^2y^2$

300. $-33x^2y^2-11x^2y$

600. $91x^5-119x^4+133x^3$

Quiz Review

Order of Operations:

100. $-15(-2) \div (-5)(6)$

200. $-3(-11 + 2 \cdot 4)^2$

300. $\dfrac{-1^2 + 2^2}{2 - 3}$

400. $(-3)4^2 - (2-5)^2$

500. $-2(-6-4)^2 + (-14+9)^2$

600. $-(-2)^2 - 2^3 + (-2^3)^2$

Combining Like Terms

100. $-3a - 11a$

200. $7a^5 - 2b + 5a^5 - 3b^3 - b$

300. $-3a^3b - 3ab^3 + 5a^3b$

400. $2x^2y - 7y^2 + 2x^2y - y^2$

500. $2xy^2(3x) - (xy)^2$

600. $5x(x^2y) - 4xy^4(x^2y^{-3})$

Exponents:

100. $-3ab^3 \cdot 3ab^2$

200. $\dfrac{xy^7}{x^5 y^{-4}}$

300. $3xy^{-3}\left(5x^{13}y^5\right)$

400. $2a^3(3a^3)^2$

500. $\dfrac{(a^{-3}b^3)^3}{(a^2b^3)^2}$

600. $\dfrac{10\,ab^{-12}}{(5a^2b^3)^2}$

Name_____ Period _____

Practice Quiz

Algebra   1.7+

Solve for a=-3, b=5, c=2

1. $bc - (c + ac) =$

1._____

2. $(c-a)(a+bc) =$

2._____

3. $a^3 + b^2 =$

3._____

4. $ab^2 - c =$

4._____

Simplify:

5. $-5xy^3 - 7xy^3 =$

5._____

6. $5a - 6b + a - 3b =$

6._____

7. $2xy + 15 - 11xy =$

7._____

8. $8x^3y + 15x^4 - 3x^3y + 5x^4 =$

8._____

9. $4x^5 \cdot 3x^5 =$

9._____

10. $7x^7 \cdot 5x^{-3} =$

10._____

11. $2y(5y^2)^2 =$

11._____

12. $10a^{11}b^5(5ab^4) =$

12._____

Practice Quiz

Simplify:

13. $\dfrac{y^3}{y^9} =$

13._____

14. $\dfrac{a^3}{a^{-5}} =$

14._____

15. $\dfrac{x^5 y^2}{x^7 y} =$

15._____

16. $\left(\dfrac{3ab^2}{6b^7}\right)^3 =$

16._____

Rewrite Using the Distributive Property and Simplify where possible:

17. $3(a^2 - 10) =$

17._____

18. $7a - 4(2 - a) =$

18._____

19. $7xy - (5xy - 6y) =$

19._____

20. $\dfrac{15x^2 - 6x}{3x} =$

20._____

21. $\dfrac{12a^2 b - 60a^3}{6a} =$

21._____

22. $\dfrac{5x^2 y - 15x^3}{5x} =$

22._____

Pledge: write-out and sign.

Factoring

Reversing the Distributive Property is called Factoring.

Example: Rewrite the Following Using the Distributive Property:

1. $a(a+3)$ 2. $3a^2(5a+4)$ 3. $-2xy(x-3)$

Answers should be:

1. a^2+3a 2. $15a^3+12a^2$ 3. $-2x^2y+6xy$

To factor an expression:
a. Look for the GCF of all terms, including the variables.
b. Place the GCF outside of the parenthesis.
c. Divide each original term by the GCF to get the terms inside the parenthesis.

Examples:

1. $15a^2b-10ab^2$ 2. $9x^2y+18y-6xy$

Practice: Fill-in the blanks.

1. $12a^2b+9ab=3ab(\_\_\_+\_\_\_)$ 2. $7a^2b+14ab^2=\_\_\_(a+2b)$

3. $x^2y-2y^2=y(\_\_\_-\_\_\_)$ 4. $6x^5y+8x^3=\_\_\_(3x^2y+4)$

Practice: Factor the following.

1. $6a^2+15ab$ 2. $9x^2y-27y^2+18xy$ 3. $3x^2y+7x^2$

Practice: Factor the following.

1. $-2a^2b-4ab+6b^2$ 2. $-4a^3-8ab-6$

3. $54ax-36bx+72cx$ 4. $24a^2b^5-8ab^3+72b^2$

Factoring

Rewrite each by factoring (using the Distributive Property in reverse):

1. $4a^2 - 24a$

2. $-3x - 15$

3. $-24a^2 - 18a$

4. $18x^2 - 10x$

5. $-3abc - c^2$

6. $-6x^5 - 3x^3$

7. $2a^3b - 16ab^3 + 42ab^2$

8. $14a^2b - 28a^2 - 56a$

9. $36a^2b - 16ab^2$

10. $10x^3y - 22x^2y^4 + 8xy$

11. $8a^3 - 4a^2b^2 + 6b^3$

12. $15x^5y^2 - 25x^2y + 20xy^3$

Writing Expressions/Equations

Words to indicate:
Addition   **Subtraction**   **Multiplication**   **Division**

Rewrite as an expression:

1. The sum of seven and x.
2. The quotient of a and b.
3. Five times the sum of c squared and nine.
4. Nine less than w.
5. Twice a increased by nineteen.
6. Two times the sum of a and nineteen.
7. Half the product of x and y decreased by the quantity x plus 4.

In each case below, replace 'a number' with the variable _n_ :

1. The sum of seven and a number.
2. The quotient of a number and three.
3. Five times the sum of a number squared and nine.
4. Nine less than a number.
5. Three times a number increased by ten.
6. Two times the sum of a number and four.
7. The product of a number and 3 increased by the number squared.

In the following problems, try to use variables that represent what is being given in the problem (For example, a could be used to represent the number of apples. c could represent the cost. etc.)

1. The number of apples increased by six.
2. Half the cost.
3. Twice the number of cabs increased by three times the number of buses.
4. Nine less than the number of days.
5. Three times as many computers increased by ten.
6. One third of the total number of boys and girls.
7. The cost increased by 20%.

Writing Expressions/Equations

In word problems, the word **IS usually means equals.**
Terms with no equals sign are called **expressions.**
If there is an equals sign, it is called an **equation.**

The following should be written as equations using variables.

1. The sum of seven and a number is 16.

2. Twenty is three times a number increased by ten.

3. One fifth of the total number of boys and girls is nine more than the number of girls.

4. Four less than the number of pineapples is twice the number of pears.

5. Tom is three years younger than his sister Katie.

The word WHAT usually means USE A VARIABLE, often we use x.
Ex. What is the sum of 2 and a number: x = 2 + n

1. What is the total number of cars and trucks?

2. What is 40% of the total cost?

3. What number is three times the sum of itself and seven?

Defining a variable:
        To solve many word problems, you must use a variable to represent an unknown quantity (or quantities). Read the following example:

Margaret has a basket of apples and pears. The number of apples equals three more than twice the number of pears. If there are 15 pieces of fruit altogether, how many apples and pears are there?

Using p for pears and a for apples, write two equations that could help you solve this problem.

Write three equations:
Amy is five inches taller than James. James is twice as tall as Pamela. Pamela is 41 inches shorter than Amy.

Practice: Writing Expressions

Algebra

Write an expression for each statement below.

If you need help, there is a list of answers on the back of the sheet to choose from. Write the expression/equation AND the letter that goes with it. There will not be a word/phrase spelled.

1. Together, Alice and Betsy have $36.

2. Nine less than a number.

3. The product of nine and a number is four.

4. Six times the difference of a and b is 36.

5. Four less than the product of nine and a number is the number itself.

6. Nine less than the product of four and a number.

7. Nine added to the quotient of a number and four.

8. Nine decreased by a number.

9. Four less than the product of nine and a number is nine more than the product of four and the same number.

10. Brenda has thirty-six less than Amy.

11. Four less than the product of nine and a number.

12. Nine more than a number.

13. Nine times the sum of a number and four equals the same number.

14. Four times the sum of a number and nine.

15. Three more than the quotient of two numbers.

16. The product of two numbers is 36.

17. One-fourth the sum of a number and nine.

18. Nine is four more than Nancy's age.

19. Four more than the product of a number and nine.

20. The product of nine and the sum of a number and four.

1._____   _____

2._____   _____

3._____   _____

4._____   _____

5._____   _____

6._____   _____

7._____   _____

8._____   _____

9._____   _____

10._____   _____

11._____   _____

12._____   _____

13._____   _____

14._____   _____

15._____   _____

16._____   _____

17._____   _____

18._____   _____

19._____   _____

20._____   _____

Name_____ Period_____

Practice: Writing Expressions | Algebra |

Answer list for the front of the sheet: Each answer below appears once, one answer is unused.
(note: There will **not** be a word or phrase spelled with the answers on the front.)

a. $n+9$ b. $n-9$ r. $9-n$ d. $\dfrac{n+9}{4}$ w. $4(n+9)$ y. $4n-9$

s. $ab=36$ h. $9n=4$ i. $9n-4=4n+9$ u. $3+\dfrac{a}{b}$ k. $9(n+4)=n$

m. $a+b=36$ n. $b=a-36$ p. $9n+4=36$ q. $6(a-b)=36$

c. $9(n+4)$ t. $9n-4$ o. $9n+4$ e. $9+\dfrac{n}{4}$ x. $9=n+4$ f. $9n-4=n$

Simplify each expression below and find the answer above. The letters **will** create a phrase.

21. $7n-7-3n-2$ _____

22. $\dfrac{18mn^3+8mn^2}{2mn^2}$ _____

23. $\dfrac{3ab^2+a^2b}{ab^2}$ _____

24. $4(n-3)-3(n-7)$ _____

25. $3\left(3-\dfrac{1}{3}n\right)$ _____

26. $\dfrac{36n+n^2}{4n}$ _____

27. $9ab-8ab=36$ _____

28. $1-3n+3+12n$ _____

29. $\dfrac{5n^2-45n}{5n}$ _____

30. $\dfrac{72+2n}{8}$ _____

31. $5(3+n)-4(n+1.5)$ _____

32. $\dfrac{a^{13}b^{-3}}{a^{12}b^{-4}}=4a-4(a-9)$ _____

33. $\dfrac{3}{4}\left(12n-\dfrac{16}{3}\right)$ _____

answer:

____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ **!**
21. 22. 23.   24. 25. 26.   27. 28.   29. 30. 31. 32. 33.

Quick Review

This set of equations can be grouped into sets of letters which can be rearranged into words that form a question.
To group the letters, find expressions or equations that are equal. Rearrange the letters in each set to form words and rearrange the words to form a question.
Raise your hand when you know the answer to the question.

W. $x(x-3y)$

H. $3x^2 - xy - 2x^2 - 2xy$

A. $\dfrac{x^5 - 3x^4 y}{x^3}$

T. $\dfrac{1}{4}(4x^2 - 12xy)$

I. $\dfrac{4x^2 - xy}{2x}$

S. $x - \dfrac{2}{3}y + \dfrac{1}{6}y + x$

T. $2(x-5)$

H. $\dfrac{-8x^3 + 40x^2}{-4x^2}$

E. Twice a number decreased by ten.

C. $xy + 3x^3 - y - xy - x^3$

U. $\dfrac{2x - x^{-2}y}{x^{-2}}$

B. $x(2x^2 - x^{-1}y)$

E. Twice the cube of a number decreased by y.

Algebra

R. $\left(\dfrac{8x^5}{4x^3y^{-1}}\right)^3$

O. $\dfrac{24x^7y^{-3}}{3xy^{-6}}$

O. $-3x^6y^3+11x^6y^3$

T. $16x^9y^3-24x^6y^7 =$ ____$(2x^3-3y^4)$

O. $2x(x-y)$

F. $4xy-3x^2+5x^2-6xy$

E. $\dfrac{x^3y+2xy}{xy}$

I. $\dfrac{1}{2}x^{11}(2x^{-9}+4x^{-11})$

G. $\dfrac{2x^2+4}{2}$

H. $5x^3y^2+10xy^2 =$ $5xy^2(\underline{\hspace{1cm}})$

T. $5-7x^2-3+8x^2$

?. The sum of a number squared and two.

Test Review

Like Terms:

100. $2x + 8x$

400. $5ax - 2x + 3a - ax$

200. $a^2 + 3a^2$

500. $x + y - (x - y)$

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

600. $a^2(x - 5) + 5a^2 - a^2x$

Distribution:

100. $\dfrac{22x + 4y}{2}$

400. $3x^2 - (5x^2 - 2)$

200. $-2(x^3 - x^2 + x - 6)$

500. $\dfrac{15x^{-2} + 9x^3}{3x^{-3}}$

300. $\dfrac{18x^3y^2 - 12x^2y^3}{3xy}$

600. $x^{-3}y(3x^2y^{-5} - 5x^4)$

Factoring:

100. $2x^2 - 2xy$

400. $-10a^2b^3 - 4ab^4 - 2ab^3$

200. $7x^7 - 21x^2y^2$

500. $-15x^4 - 45x^3 - 30x^2$

300. $42x^2y - 56xy^2$

600. $143a^2 - 187a$

Test Review

Exponents:

100. $-2xy^3(3x^2y)$

400. $2a^{30}(5a^{-12})^2$

200. $3xy^{-3}(5x^{13}y^5)$

500. $\dfrac{10\,ab^{-12}}{(5a^2b^3)^2}$

300. $\left(\dfrac{6x^2}{4x^5}\right)^2$

600. $[(a^{-2}b^3)^{-2}]^3$

Equations and Expressions: Write.

100. Twice the sum of a number and seven.

200. The quotient of four and a number is increased by 12.

300. Mary is five years older than seven times her dog Peaches' age.

400. The cost of a cab ride if you pay $3.50 per mile, and tip the driver $5 is $90.

500. A rectangle is twice as wide as it is long. The area of the same rectangle is 52 inches squared. Write two equations to describe this rectangle.

600. In a right triangle, the shortest side is five inches less than half as long as the longest side. The middle side is four inches longer than twice the shortest side. The longest side is three times the shortest side. Draw the triangle and label all three sides, using x for the shortest side.

Tricky Review Problems

1. Simplify $x\left(x\left(x\left(x^2\right)^2\right)^2\right)^2$

2. Simplify $\left(\dfrac{\dfrac{x^{-1}}{x^{-2}}}{\dfrac{x^{-2}}{x^{-1}}}\right)$

3. Distribute $x(x(x-1)-1)-1$

4. Simplify $\dfrac{(6x)^3+(6x)^2+6x}{6x}$

5. Distribute $a+b(a+b(a+b(a+b)))$

6. Simplify $\dfrac{x^0}{y}\left(\dfrac{x^1}{y}\left(\dfrac{x^2}{y}\right)^3\right)^4$

7. Greg, Hank, Iris, Josh, and Kelly each collect silver dollars. Kelly has three more than twice as many as Josh, who has three more than twice as many as Iris, who has three more than twice as many as Hank, who has three more than twice as many as Greg, who has three. How many does Kelly have?

8. Combine like terms:

$$x-y+2x-2y+3x-3y+4x-4y....+9x-9y+10x-10y$$

9. Factor the answer above.

Tricky Review Problems

10. Factor $x^{45} + x^{44} + x^{43}$

11. Which is greater, $\left(2^3\right)^4$ or $\left(4^3\right)^2$?

12. Solve for x: $81^9 = 9^x$

13. Find the numerator: $\dfrac{2}{yz} + \dfrac{3}{xz} + \dfrac{4}{xy} = \dfrac{}{xyz}$

Challenge: When you solve the following, how many zeroes are in the answer? $\left(10^{10}\right)^{10} - \left(10^{11}\right)^9$

Practice Test (5,7)

Simplify:

1. $7x^2 - 5x - x^2$

1._____

2. $-x^2y^2 + 2x^2y - 7x^2y - xy^2$

2._____

3. $-2b - 9b^3 + b^2 + 5b - b^3$

3._____

4. $-5x^3y(9x^3y)$

4._____

5. $-4a^{-2}b(7a^2b)$

5._____

6. $4x^5y^2(5x^2y^2)^2$

6._____

7. $\dfrac{-5x^3y}{10\,x^4y}$

7._____

8. $\dfrac{12\,a^{-2}b^3}{2a^5b^{-3}}$

8._____

9. $\dfrac{(2x^2y^2)^2}{16\,xy^{-2}}$

9._____

Practice Test (5,7)

Algebra 1.9

Write an expression or equation for each:

10. Five times the difference of a number and eleven.

10._____

11. Claudia is eleven years older than her brother James.

11._____

12. The quotient of x and five decreased by twelve is fifteen.

12._____

Rewrite each using the Distributive Property:

13. $-3 + 5(a^2 - 6)$

13._____

14. $7x - 3(2 - x)$

14._____

15. $4ab - (8ab + 7)$

15._____

16. $\dfrac{15a^2 - 10a}{5a}$

16._____

17. $\dfrac{12x^3y - 15xy^3}{3xy}$

17._____

18. $\dfrac{-9x^4y - 2x^3y^2}{3xy}$

18._____

Factor Completely (reverse distribution):

19. $14ab^2 - 7ab + 21b$

19._____

20. $21x^3y - 28x^2y^2$

20._____

Practice Test (4th)

Solve for a=4, b=-5, c=2

1. $bc - (c + ac) =$

1._____

2. $(c - a)(a + bc) =$

2._____

3. $a^3 + b^2 =$

3._____

Simplify:

4. $a^2 - 7a^2$

4._____

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

5._____

6. $7c^2 - 4c^3 - 5c + 9c^3$

6._____

7. $7c^2(-9c^2)$

7._____

8. $2x^2 y^9 (-9x^5 y^{-4})$

8._____

9. $10a^2 b(2a^2)^3$

9._____

10. $\dfrac{a^{15}}{a^5}$

10._____

11. $\left(\dfrac{x^{-4} y^2}{xy^{-2}} \right)^2$

11._____

Practice Test (4th)

Rewrite Using the Distributive Property and Simplify where possible:

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

12._____

13. $-3a(a-3b)+ab$

13._____

14. $-3xy-x(y+4)$

14._____

15. $\dfrac{30x^2-15x}{5x}$

15._____

16. $\dfrac{14ab+21ac}{-7a}$

16._____

17. $\dfrac{-32x^5y+12xy^2}{2xy}$

17._____

Write each sentence as an algebraic expression or equation. DO NOT TRY TO SOLVE OR SIMPLIFY.

18. Meredith is three years older than her cousin Nina.

18._____

19. Three less than twice the square of a number.

19._____

20. Six more than the number of cars.

20._____

21. Four times the sum of a number and two is eight less than the same number.

21._____

22. The quotient of x and y is three less than the product of x and y.

22._____

Practice Test 2 (4th)

Algebra

Solve for a=4, b=-3, c=2

1. $a^2b - ab^2$

1._____

2. $b(a-c)+b$

2._____

3. $\dfrac{ab(a-c)^2}{c}$

3._____

Simplify:

4. $a^2b - 7ab^2 - 9ab$

4._____

5. $x + 3xy - 3x - 9xy$

5._____

6. $7x^2 - 2x^5 - x^2 + 6x^5$

6._____

7. $-9b^5c^2(2b^{-2}c^2)$

7._____

8. $(2a^5b^4)^3$

8._____

9. $10ab^2(12ab^2)$

9._____

10. $\dfrac{x^5}{x^{-5}}$

10._____

11. $\left(\dfrac{x^4y^2}{xy^3}\right)^3$

11._____

Practice Test 2 (4th)

Algebra

Rewrite Using the Distributive Property and Simplify where possible:

12. $a^2(a^3 - 3a)$

12._____

13. $-5x(x - y) + x^2$

13._____

14. $-3x - 5x(x + 3)$

14._____

15. $\dfrac{24x^3 - 18x^2}{6x}$

15._____

16. $\dfrac{14b^2 - 21ab}{-7b}$

16._____

17. $\dfrac{42x^3 y - 3xy}{6xy}$

17._____

Write each sentence as an algebraic expression or equation. DO NOT TRY TO SOLVE OR SIMPLIFY.

18. Tim has 19 dollars more than Rachel.

18._____

19. The sum of a number squared and ten is twenty-six.

19._____

20. Five less than x is divided by three.

20._____

21. Four more than the quotient of a number and two.

21._____

22. The difference of x and y is nine more than x cubed.

22._____