Name: _____ Date: _____ Class: _____

Unit 2 Cumulative Review

Solving equations means to find a solution. The solution is the value of the variable that makes the statement true. For example, if you are given x + 4 = 6, you know that x must be 2. 2 is the only value of x that makes the statement true. This is an example of an equation with one solution. Sometimes we have equations that have no solution. This means that there is not a value that will make the equation true. There are also equations that have infinitely many solutions. These equations are true for any and all values.

One Solution	No Solution	Infinitely Many Solutions
Only one number makes the equation true. Example: 2x = x + 1 -x -x x = 1	No number makes the equation true. Example: x + 1 = x + 2 -x -x 1 ≠ 2 (this is never true)	Any number makes the equation true. Example: x + 0 = x x = x (always true)

Solve each equation below. Then, tell how many solutions each equation has.

$3(x+2) = 15$

$3x+6=15$
$-6 \quad -6$
$\frac{3x}{3} = \frac{9}{3}$
$x = 3$ one sol.

$4(x-1) - 3x = -2x - 4 + 3x$

$4x-4-3x = -2x-4+3x$
$x-4 = x-4$
$+4 \quad +4$
$x = x$
infinite solutions

$5(x-6) - 2 = 2x - 5$

$5x-30-2 = 2x-5$
$5x-32 = 2x-5$
$-2x \quad -2x$
$3x-32 = -5$
$+32 \quad +32$
$3x = 27$
$x = 9$
one sol.

$2x + 11 = 2x + 6$

$-2x \quad -2x$
$11 \neq 6$
NO solution

Fill in the blanks so that there is one solution. Solve your equation to prove there is one solution. $4x + \_\_7\_\_ = \_\_3\_\_ \cdot x+3$

$4x+7 = 3x+3$

Fill in the blanks so that there are no solutions. Solve your equation to prove there are no solutions. $4x + \_\_5\_\_ = \_\_4\_\_ \cdot x+3$

$4x+5 = 4x+3$

Fill in the blanks so that there are infinite solutions. Solve your equation to prove there are infinite solutions. $4x + \_\_3\_\_ = \_\_4\_\_ \cdot x+3$

$4x+3 = 4x+3$

$4x+7 = 3x+3$
$-3 \quad -3$
$4x+4 = 3x$
$-4x \quad -4x$
$\frac{4}{-1} = \frac{-x}{-1}$
$-4 = x$

$4x+3 = 4x+3$
$-4x \quad -4x$
$3 = 3$

$4x+5 = 4x+3$
$-4x \quad -4x$
$5 \neq 3$

Which equations are equivalent to -3(2x +4) = -6x-12 (Check all that apply)

✓ -6x-12 = -6x-12 ✓ -6x = -6x ____ x = ∅ ✓ x = x ____ x = -4

$-3(2x+4) = -6x-12$
$-6x-12 = -6x-12$
$+12 \quad +12$

$\frac{-6x}{-6} = \frac{-6x}{-6}$
$x = x$

Properties of Exponents	Examples
Product of Powers When multiplying with like bases, you can add exponents	$a^m \cdot a^n = a^{m+n}$ $8^7 \cdot 8^2 = 8^{7+2} = 8^9$
Quotient of Powers To divide two numbers with like bases, you can subtract exponents	$a^m \div a^n = a^{m-n}$ $\frac{a^{10}}{a^2} = a^{10-2} = a^8$
Power of a Power To raise a power to a power, multiply the exponents	$(a^m)^n = a^{m \cdot n}$ $(6^4)^3 = 6^{4 \cdot 3} = 6^{12}$
Power of Zero Any number raised to the power of zero is 1.	$a^0 = 1$ $7{,}243{,}235^0 = 1$
Power of Product To find a power of a product, find the power of each factor and multiply	$(ab)^m = a^m \cdot b^m$ $(xy)^3 = x^3y^3$
Negative Exponent To change a negative exponent to positive, move it to the denominator and make the exponent positive.	$x^{-4} = \frac{1}{x^4}$

Which expressions are equivalent to $\frac{6^{-2}}{6^{-3}}$? (check all that apply) $6^{-2--3} = 6^{-2+3} = 6^1 = 6$

____ 6^{-5} ____ 6^{-1} ____ 6^5 ____ $\frac{1}{6^5}$ ____ $\frac{1}{6^1}$ ____ 1^{-5} ____ 6^6 ✓ 6^1 ✓ 6

Which expressions are equivalent to $(xy^2)^3$?

____ xy^6 ____ x^6y^6 ____ x^5y^5 ____ x^3y^5 ✓ x^3y^6 ✓ x^3y^{2x3}

Scientific notation is a way to write really big or really small numbers using a base 10. For a number to be in scientific notation, the first number must be between 1 and 10 and be multiplied by a base 10 to some power.

1. Convert each number to standard form.

   1.23×10^4 12,300

   1.23×10^{-4} 0.000123

2. Convert each number to scientific notation.

   67,000,000,000 67,000,000,000 6.7×10^{10}

   0.000000032 0.000000032 3.2×10^{-8}

When operating with scientific notation, use the same rules as with exponents. Start by multiplying or dividing the first numbers. Since the second numbers have the same base (10), you can use your shortcut rules.

3. Evaluate $(5 \times 10^4)(2 \times 10^2) = (5 \cdot 2) \times 10^{(4+2)} = 10 \times 10^6$ ← not ≥1 <10 so 1.0×10^7

4. Evaluate $(9 \times 10^{-10}) \div (3 \times 10^{-2}) = (9 \div 3) \times 10^{(-10--2)} = 3 \times 10^{-8}$

Which equation has both 5 and -5 as a solution?

(a.) $y^2 = 25$ b. $y = \sqrt{25}$ c. $y^3 = 125$ d. $y^3 = 5$