Math 0995 CBE 1 Review

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CBE 1

- Covers lessons 1-6 +19
  - Factors
  - Fractions
  - Real Numbers
  - Exponents
  - Order of Operations
  - Algebraic Expressions and Algebraic Equations
  - Logarithms

Factors

Finding and using them, as well as LCM

Factors

- Factors of a number are numbers that multiply to that number (in other words, they divide in with no remainder)

- When you factor something you write it as a product of numbers (noting there may be more than one way to factor a number)

- We call it **Prime Factorization** when a number is written as a product of only prime numbers

Problem 1

- Find all factors of the number 36

- Solution: 1, 2, 3, 4, 6, 9, 12, 18, 36

Problem 2

- Find the prime factorization for 300

- Solution: 2*2*3*5*5

Least Common Multiple

- Given a set of numbers, the **Least Common Multiple (LCM)** is the smallest number that is a multiple of all the numbers

- To find the LCM, we list some multiples of the numbers and find the smallest one that is in all lists

- Note that a number is a multiple of itself (multiplying by 1), so one of the numbers might be the LCM

Problem 3

- Find the LCM of the following numbers: 3,6,8

- List the multiples of 3
- List the multiples of 6
- List the multiples of 8

- Identify the least common multiple

- Solution: 24

Fractions

Definition, Multiplication, Division, Addition, Subtraction

Fractions

- An alternate way of writing division

- $\frac{a}{b}$ = c if and only if c * b = a

- Numerators are the "tops" of fractions
- Denominators are the "bottoms" of fractions

Multiplying and Dividing Fractions

- To multiply fractions, we multiply numerators and we multiply denominators

- To divide by a fraction, we can multiply by the reciprocal
  - The reciprocal of a fraction is the "flipped" version, where the numerator is now the denominator, and the denominator is now the numerator.

- Tip: you can simplify while you are multiplying.

Problem 4

- Perform the indicated operation and give your answer in the simplest form

$$\frac{35}{24} \div \frac{15}{8}$$

- Solution: $\frac{7}{9}$

Adding and Subtracting Fractions

- Adding and subtracting fractions have the same procedure

- To add or subtract fractions, the denominators must be the same, so the first step is to rewrite the fractions with a common denominator using the LCM of the denominators
  - To do this, we multiply each by a fraction with the same numerator and denominator (equivalent to 1). Then, this will be equivalent to the first expression, but the denominators will be different.

- Then, we add/subtract the numerators and keep the common denominator

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Problem 5

- Perform the indicated operation and give your answer in the simplest form

$$\frac{5}{2} - \frac{5}{4}$$

- Solution: $\frac{5}{4}$

Problem 6

- Simplify the complex fraction. Give your answer in lowest terms

$$\frac{\dfrac{-5}{6}}{\dfrac{1}{3} - \dfrac{1}{4}}$$

- Solution: -10

Real Numbers

Definition and Relationship to Other Sets

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Natural Numbers: {1,2,3,…}

- No Decimals
- No Fractions
- No Negatives
- No 0

Whole Numbers: {0,1,2,3,…}

- No Decimals
- No Fractions
- No Negatives

Integers: {…,-3,-2,-1,0,1,2,3,…}

- No Decimals
- No Fractions

Rational Numbers

- Any number that can be written as a fraction
  - Decimals must stop or have a repeating pattern

Irrational Numbers

- Decimals that don't stop and don't have a pattern

Real Numbers

- Any number that is rational or irrational
- Usually represented by a number line
- No imaginary numbers

Problem 7

- What number set(s) do the following numbers belong to?
- -15.25
- 4
- π

- Solutions:
  - -15.25: Rational numbers, Real numbers
  - 4: Natural numbers, Whole numbers, Integers, Rational numbers, Real numbers
  - π : Irrational numbers, Real numbers

Exponents

Definition, Multiplying, Dividing

Exponents

- Exponents: How many times something is multiplied by itself
- Exponent Rules:

$$(a^b)(a^c) = a^{(b+c)}$$

$$(a^b)^c = a^{(bc)}$$

$$\frac{a^b}{a^c} = a^{(b-c)}$$

$$a^{-b} = \frac{1}{a^b}$$

$$a^0 = 1$$

Problem 8

- Simplify the expression $\left(2y^4\right)\left(-5y^3\right)$

- Solution: $-10y^7$

Problem 9

- Simplify the expression $\dfrac{\left(2x^{-1}\right)^{-4}}{\left(2x\right)^{2}}$ write the result with no negative exponents

- Solution: $\dfrac{x^{2}}{4}$

Order of Operations

Order of Operations

- Parentheses
- Exponents
- Multiplication/Division
- Addition/Subtraction

Algebraic Expressions and Algebraic Equations

Differences, Simplifying, and Solving

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Expressions vs Equations

- Expressions are mathematical "statements." They have a value, and we cannot change that value, but we can add like terms and divide out common factors

- Equations have a truth (equal sign), and we can do lots with them as long as we don't change that truth. That is, we must do the same to both sides of the equation

- Vocabulary:
  - Like terms and distribute

Problem 10

- Evaluate the expression: $\dfrac{8 + |3 - 6| - 3^2}{8 - 4}$

- Solution: $\dfrac{1}{2}$

Problem 11

- Simplify the expression: $2(4k - 1) - 5(k + 2)$

- Solution: 3k - 12

Other Resources

- Aggie Math Learning Center
  - Visit usu.edu/math/amlc for more videos, resources, tutoring times, and recitation leader office hours