

Study Guide for Exam 3

Representation of Integers

1. Be able to use them to following methods to represent integers
 - (a) “Drops” of Colored Counters
 - (b) Mail-Time
 - (c) Number-Line
2. Understand Absolute Value.

Addition and Subtraction of Integers

1. Use the 3 representations above to write and solve word problems involving adding and subtraction integers.
2. Be able to explain how integers are ordered using a number line.

Multiplication and Division of Integers

1. Be able to write and solve word problems involving multiplication using the following methods.
 - (a) Patterns of Products
 - (b) Mail-Time Stories
 - (c) Number-Line
2. Be able to explain how division of integers and fact families are related to multiplication.

Clock Arithmetic

1. Be able to add, subtract, multiply, and divide in 12-hour clock arithmetic.
2. Be able to explain how you would teach this to your students.
3. Be able to add and subtract in clock arithmetic with a base other than 12.

Fractions and Rational Numbers

1. Definition of Fraction - Be able to explain what the “unit” is in any situation.
2. Models for Fractions - Be able to use these models to illustrate a given fraction.
 - (a) Colored Regions
 - (b) Set Model
 - (c) Fraction Strips
 - (d) Number-Line
3. Equivalent Fractions - Know the definition and the Cross-Product Property.
4. Simplest Form - Know the definition and be able to simplify using the following methods:
 - (a) Divide by successively common factors
 - (b) Divide a and b by the $\text{GCD}(a,b)$
 - (c) Divide by the common factors in the prime power representations of a and b
5. Be able to find (least) common denominators
6. Understand the distinction between a rational number and a fraction.
7. Be able to order and compare rational numbers.

Arithmetic of Rational Numbers

1. Proper Fractions and Mixed Numbers - Know the definition of a proper fraction and be able to convert mixed numbers to improper fractions.
2. For the following operations be able to create and solve word problems using the models above and the new ones below:
3. Addition
4. Subtraction

5. Multiplication

6. Division

(a) Area Measurement Model

(b) Sharing Model

(c) Missing Factor Model

(d) Invert and Multiply Algorithm

7. Estimation - Be able to approximate rational numbers with other rational numbers and be able to use the density property to find new rational numbers between two given rational numbers.

Over all, be able to explain why we introduce integers, fractions, and the operations on integers and fractions to students the way we do.