Math365 Chapter 4 Review

Integers and Number Theory

Natural Numbers

Whole Numbers

Integers

Negative integers are **opposites** of positive integers.

Integer Addition

Chip Model

Charged Field Model

Patterns Model

Number Line model

Absolute value

Integer Addition

closed on addition of integers

commutative property

associative property

identity element for addition

additive inverse is unique

Integer Subtraction

Chip Model

Charged Field Model

Patterns Model

Number Line Model

Definition of subtraction

Order of Operations

Integer Multiplication

  Patterns Model

  Charged Field or Chip Model

  Number Line Model

Integer Multiplication

  closed over multiplication

  commutative

  associative

  multiplicative identity element

  distributive property of multiplication over addition

  zero multiplicative property

Difference of squares formula

Integer Division

Order of operations

Definition of Less Than

Property

Extending the Coordinate System: (x,y)

Divisibility

Th 4-1 if $d|a, n \in I$, then $d|(a \cdot n)$

Th 4-2 if $d|a$, and $d|b$, then

if $d|a$, and $d|b$, then

if $d|a$, and $d|b$, then

if $d|a$, and $d|b$, then

Divisibility rules

divisible by 2 if **units digit divisible by two**

divisible by 5 if **units digit divisible by five**

divisible by 10 if **units digit is zero**

divisible by 4 if **last 2 digits represent a number divisible by four**

divisible by 8 if **last 3 digits represent a number divisible by eight**

divisible by 3 if **the sum of the digits is divisible by three**

divisible by 9 if **the sum of the digits is divisible by nine**

divisible by 6 if **divisible by 2 AND divisible by 3**

divisible by 11 if **the sum of the digits in places that are even powers of ten MINUS the sum of the digits in places that are odd powers of ten IS DIVISIBLE BY 11.**

Prime Numbers: any positive integer with exactly two, distinct, positive divisors

Composite Numbers: any integer greater than one that has a positive factor other than 1 or itself

Prime Factorization: to write as a product of primes

Factor Tree

Dividing by primes

Fundamental Theorem of Arithmetic:

each composite number can be written as a product of primes in one, and only one, way.

Number of divisors

Fundamental Counting Principle

Theorem 4-4

If d is a divisor of n, then $\frac{n}{d}$ is also a divisor of n.

Theorem 4-5

If n is composite, then n has a prime factor p such that $p^2 \leq n$.

Theorem 4-6

If $n > 1$, and not divisible by any prime such that $p^2 \leq n$, then n is prime.

Creating a Sieve of Prime numbers

Working with Primes

The local record store sold x copies of their newest CD, *Spring Break Memories*, for a total of $4539. The next day they sold y copies of the same CD, and collected $8245. How many were sold each day?

Greatest Common Divisor

Colored Rods Model

Intersection of Sets Method

Prime Factorization Method

relatively prime

$gcd(0, a) = a$

Euclidean Algorithm Method

Theorem 4-7 $a \geq b, \quad a, b > 0$

$GCD(a, b) = GCD(r, b)$ where r is the remainder when a is divided by b.

Least Common Multiple

Colored Rods Method

Intersection of Sets Method

Prime Factorization Method

Theorem 4-8 $a, b \in N, \quad GCD(a, b) \cdot LCM(a, b) = a \cdot b$

Division by Primes Method

find the lcm(15,80,200)