

Math 110A Overview

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1 Arithmetic in \mathbb{Z} Revisited

1.1 Division Algorithm

Division can be conceptualized as how many times a specified sized chunk (the divisor) can be taken out of a number (the dividend). The number of times the divisor is taken out of the dividend is known as the quotient. The division algorithm is a mathematical way to describe this process.

Theorem 1.1 (Division Algorithm). *Let a, b be integers with $b > 0$. Then there exists unique integers q and r such that*

$$a = bq + r \quad \text{and} \quad 0 \leq r < b$$

What this says is that a can be represented as an integer multiple of b , with some r left over. We have $0 \leq r < b$ because for negative r , there are many combinations of q and r that may satisfy the equation.

1.2 Divisibility