Last name _____

First name _____

LARSON—MATH 401—CLASSROOM WORKSHEET 10
Division Algorithm.

Given positive integers a and b you can write one as a multiple of the other with a non-negative remainder that's less than what you're "dividing" by.

Formally, the **Division Algorithm** says: if $a \in \mathbb{Z}, b \in \mathbb{N}$ then there are unique integers q and r with $a = bq + r$, and $0 \leq r < b$.

q is the *quotient* and r is the *remainder*.

1. Suppose there is a 2nd pair of integers r', q' with $a = bq' + r'$, and $0 \leq r' < b$. Show $r = r'$ and $q = q'$.

The *greatest common divisor* (gcd) of integers a and b (not both 0) is the largest natural number d such that d divides both a and b.

We write: $\gcd(a, b) = d$. By definition $\gcd(a, b) \geq 1$. If $\gcd(a, b) = 1$ we say that a and b are *relatively prime*.

2. Find $\gcd(30, 12)$.

3. Find $\gcd(30, 31)$.