Additional Definitions for Proofs

Definition of Divisibility: An integer n is divisible by A NON-ZERO INTEGER K IF THERE IS AN INTEGER Q (THE QUOTIENT) SUCH THAT $n = K \cdot Q$ WHERE K IS A FACTOR OF n.

Examples of Divisibility: $n = 10$

FACTOR

$10 = 2 \cdot 5$ ← QUOTIENT

"10 IS DIVISIBLE BY 2."

$n = 18$

FACTOR

$18 = 9 \cdot 2$ ← QUOTIENT

"98 IS DIVISIBLE BY 9."

$n = 40$

FACTOR

$40 = 4 \cdot 10$ ← QUOTIENT

"40 IS DIVISIBLE BY 4."

The Division Theorem: For all integers a and b (where b > 0), THERE EXISTS AN INTEGER Q (THE QUOTIENT) WHEN a IS DIVIDED BY b. THE CAN EXIST AN INTEGER r CALLED THE REMAINDER.

$$a = b \cdot Q + r \quad \text{WHERE} \quad 0 \le r < b$$

Examples of the Division Theorem:

$a = 25$ $\qquad 25 = 5 \cdot 5 + 0$ ✓

$a = 11$ $\qquad 11 = 5 \cdot 2 + 1$ ✓

$a = 32$ $\qquad 32 = 5 \cdot 6 + 2$ ✓

$a = 13$ $\qquad 13 = 5 \cdot 2 + 3$ ✓

$a = 24$ $\qquad 24 = 5 \cdot 4 + 4$ ✓

The Division Theorem written in Mod notation Examples

1. 19 MOD 3 = 1 $\qquad 19 = 3 \cdot 6 + 1$
2. 27 MOD 5 = 2 $\qquad 27 = 5 \cdot 5 + 2$
3. 37 MOD 6 = 1 $\qquad 37 = 6 \cdot 6 + 1$
4. 31 MOD 3 = 1 $\qquad 31 = 3 \cdot 10 + 1$
5. 26 MOD 7 = 5 $\qquad 26 = 7 \cdot 3 + 5$
6. 8 MOD 11 = 8 $\qquad 8 = 11 \cdot 0 + 8$