

Quiz 24

Name: _____

You must show your work to get full credit.

1. State the
- division algorithm*
- .

For any integers a, b , with $b > 0$, there are
 unique integers q and r so that

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

2. Define
- a
- is a
- divisor*
- of
- b
- .

$a \neq 0$ and there is an integer q so that

$$b = qa.$$

3. Define
- a
- is a
- multiple*
- of
- b
- .

$b \neq 0$ and there is an integer q so that

$$a = qb$$

4. Use that
- $5 \times 8 \equiv 1 \pmod{13}$
- to prove:

- (a) If
- $8x \equiv 0 \pmod{13}$
- , then
- $x \equiv 0 \pmod{13}$
- .

Multiply both sides of

$$8x \equiv 0 \pmod{13}$$

by 5:

At $40x \equiv 0 \pmod{13}$
 But $40 = 3 \cdot 13 + 1$ so $40 \equiv 1 \pmod{13}$
 so reduces to

$$x \equiv 0 \pmod{13}$$

- (b) If
- $8x \equiv 2 \pmod{13}$
- , then
- $x \equiv 10 \pmod{13}$
- .

Again multiply by 5

$$40x \equiv 10 \pmod{13}$$

so $x \equiv 10 \pmod{13}.$