

"Divide 7 by 10 (mod 23)" means find a number so that if you multiply it by 10 you get 7, at least after adding and subtracting 23 as many times as needed.

Divide 4 by 10 (mod 26)

4 is not divisible by 10 on its own

$4 + 26 = 30$ is divisible by 10

$$10 \times 3 = 30 \equiv 30 - 26 = 4 \pmod{26}$$

Divide 7 by 10 (mod 23)

$$\frac{7}{10} \text{ nope, } \frac{7+23}{10} = \frac{30}{10} = 3 \checkmark$$

3

Divide 8 by 10 (mod 21)

$$\frac{8}{10} \text{ nope, } \frac{8+21}{10} = \frac{29}{10} \text{ nope, } \frac{29+21}{10} = \frac{50}{10} = 5 \checkmark$$

5

Divide 4 by 5 (mod 21)

$$\frac{4}{10} \text{ nope, } \frac{4+21}{10} = \frac{25}{10} \text{ nope, } \frac{25+21}{10} = \frac{46}{10} \text{ nope, } \frac{46+21}{10} = \frac{67}{10} \text{ nope, } \frac{67+21}{10} = \frac{88}{10} \text{ nope, } \frac{88+21}{10} = \frac{109}{10} \text{ nope, } \frac{109+21}{10} = \frac{130}{10} = 13 \checkmark$$

$$\frac{4}{5} \text{ nope, } \frac{4+21}{5} = \frac{25}{5} = 5 \checkmark$$

5

Divide 3 by 10 (mod 37)

$$\frac{3}{10} \text{ nope, } \frac{3+37}{10} = \frac{40}{10} = 4 \checkmark$$

4

Divide 9 by 10 (mod 37)

$$\frac{9}{10} \text{ nope, } \frac{9+37}{10} = \frac{46}{10} \text{ nope, } \frac{46+37}{10} = \frac{83}{10} \text{ nope, } \frac{83+37}{10} = \frac{120}{10} = 12 \checkmark$$

12

(easier $\frac{9}{10} = 3 \cdot \left(\frac{3}{10}\right) = 3(4) = 12$)

Divide 1 by 10 (mod 37)

$$\frac{1}{10} \text{ nope, } \frac{38}{10} \text{ nope, } \frac{75}{10}, \frac{112}{10}, \frac{149}{10}, \frac{186}{10}, \frac{223}{10}$$

$$\frac{260}{10} = \frac{26}{1} \text{ or } \frac{1}{10}, \frac{-36}{10}, \frac{-73}{10}, \frac{-110}{10} \dots -11 \equiv \frac{26}{1}$$

Divide 4 by 3 (mod 37)

$$\frac{4}{3}, \frac{41}{3}, \frac{78}{3} = \frac{26}{1}$$

(alt: $\frac{4}{3} = \frac{3}{3} + \frac{1}{3} = \frac{1}{10} = 26$)

(alt: $\frac{4}{3} = \frac{14}{10} = 26$)

Divide 3 by 10 (mod 40)

$$\frac{3}{10} \text{ nope, } \frac{43}{10} \text{ nope, } \frac{83}{10} \text{ nope, } \dots$$

NOPE! No answers.

Divide 0 by 10 (mod 40)

$$\frac{0}{10} = \frac{0}{1} \text{ but } \frac{40}{10} = \frac{4}{1} \text{ and } \frac{80}{10} = \frac{8}{1}$$

Ten answers! 4, 8, 12, 16, 20, 24, 28, 32, 36, 40

(44, 48, 52, ..., 80 are repeats, 0 is a repeat of 40)

Divide 0 by 3 (mod 40)

Maybe it has lots of answers too?

$$\frac{0}{3} = \frac{0}{1}, \frac{40}{3} \text{ nope, } \frac{80}{3} \text{ nope, } \frac{120}{3} = 40$$

but 40 is a repeat of 0

So just one standard representative: 40