The reration of recurring decimal and primitive root

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We begin

$$\frac{1}{7} = 0.14285714857\cdots$$

$10 = 3 + 7$ is devided by 7 as 1 and the rest is 3.30 is devided by 7 as 4 and the rest is 2.20 is devided by 7 as 2 and the rest is 6. This is correspond to $3 \to 2 \to 6$.So,that 3 is the primitive root of 7 equals to recurring decimal of $\frac{1}{7}$.General case is not so easy.

$$\frac{1}{13} = 0.076923076923\cdots$$

case is just about $\frac{1}{13}$ in 100 numeration.We can not understand this case.
$17 + 7 = 24$ case,we calculate 24 numeration. 24 is devided by 17 as 1 and the rest is $7.7 \times 24 = 168$.168 is devided by 7 as 9 and the rest is 15.

$$7 \to 15 \to 3 \to 4 \to 11 \to 9 \to 12 \to 16 \to 10 \to 2 \to 14 \to 13 \to 6$$

$$\to 8 \to 5 \to 1\cdots$$

In this case,7 is primitive root of 17.So recurring decimal in 24 numeration is repeat 16.