Powers of 10 & decimals for fractions

$$
\begin{array}{r}
0.076923 \\
13\overline{)\,1.0000} \\
\underline{91} \\
90 \\
\underline{78} \\
120 \\
\underline{117} \\
30 \\
\underline{26} \\
40 \\
\underline{39} \\
10 \\
\vdots
\end{array}
$$

$$
\begin{aligned}
10^0 &= 0(13) + 1 \\
10^1 &= 0(13) + 10 \\
10^2 &= 7(13) + 9 \\
10^3 &= 76(13) + 12 \\
10^4 &= 769(13) + 3 \\
10^5 &= 7692(13) + 4 \\
10^6 &= 76923(13) + 1
\end{aligned}
$$

Remainders repeat after 6 divisions

WHY Powers of 10 modulo 13 tell us how long it takes the decimal for $1/13$ to repeat