



Problem of the Week

Problem C and Solution

Could You Repeat That?



Problem

The decimal expansion of $\frac{1}{7}$ is the repeating decimal $0.\overline{142857}$.

What digit occurs in the 2018th place after the decimal point?

Solution

The digits after the decimal point occur in repeating blocks of the 6 digits, namely 142857.

Since $\frac{2018}{6} = 336\frac{1}{3}$, then the 2018th digit after the decimal point occurs after 336 blocks of the repeating digits have been used.

In 336 blocks of 6 digits, there are $336 \times 6 = 2016$ digits in total.

The 2018th digit is the second digit into the 337th block of repeating digits. Therefore, the 2018th digit after the decimal point must be 4.

