

$$\log_{10} 2^{10} < \log_{10} \left(\frac{5}{4}\right)^n < \log_{10} 2^{20}, \quad 10 \log_{10} 2 < n \log_{10} \frac{10}{8} < 20 \log_{10} 2$$

$$10 \log_{10} 2 < n(1 - 3 \log_{10} 2) < 20 \log_{10} 2, \quad \frac{10 \log_{10} 2}{1 - 3 \log_{10} 2} < n < \frac{20 \log_{10} 2}{1 - 3 \log_{10} 2} \quad \text{--- ① を満たす } n \text{ の個数を求めよ}$$

$$\frac{10 \times 0.301}{1 - 3 \times 0.301} < \frac{10 \log_{10} 2}{1 - 3 \log_{10} 2} < \frac{10 \times 0.3011}{1 - 3 \times 0.3011}$$

$$\begin{array}{r} 0.301 \\ \times \quad 3 \\ \hline 0.903 \end{array} \quad \begin{array}{r} 0.3011 \\ \times \quad 3 \\ \hline 0.9033 \end{array}$$

$$\frac{3.01}{0.097} < \frac{10 \log_{10} 2}{1 - 3 \log_{10} 2} < \frac{3.011}{0.0967}$$

$$\begin{array}{r} 31 \\ 97 \overline{) 3010} \\ \underline{291} \phantom{0} \\ 100 \\ \underline{97} \phantom{0} \\ 3 \phantom{0} \end{array}$$

$$\begin{array}{r} 31.1 \\ 967 \overline{) 30110} \\ \underline{2901} \phantom{0} \\ 1100 \\ \underline{967} \phantom{0} \\ 1330 \\ \underline{967} \\ 363 \end{array}$$

$$\frac{3010}{97} < \frac{10 \log_{10} 2}{1 - 3 \log_{10} 2} < \frac{30110}{967}$$

$$\frac{3010}{97} > 31, \quad \frac{30110}{967} < 31.2 \neq 1$$

$$31 < \frac{10 \log_{10} 2}{1 - 3 \log_{10} 2} < 31.2 \quad \text{--- ②}$$

$$62 < \frac{20 \log_{10} 2}{1 - 3 \log_{10} 2} < 62.4 \quad \text{--- ③}$$

②③より ①を満たす n は n = 32, 33 ... 62 の 31個