# Logarithms

i. **Use a calculator to find the value of the following logarithms:**

- $\log_3 81$
- $\log_2 1024$
- $\log_{10} 200$
- $\log_7 343$
- $\log_{11} 121$
- $\log_{20} 100$

ii. **Simplify the following expressions involving logarithms into a single logarithm:**

- $\log_2 5 + \log_2 2$
- $\log_5 9 + \log_5 2$
- $\log_{10} 12 - \log_{10} 2$
- $\log_3 8 + \log_3 2 - \log_3 4$
- $\log_x 5 + \log_x 12$
- $\log_3 x + \log_3 y$
- $\log_2 4 - \log_2 2$
- $\log_8 12 - \log_8 3 - \log_8 4$

iii. **Express the following logarithms in the form $a \log_b c$ where $a, b, c$ are integers to be found:**

- $\log 5^3$
- $\log x^2$
- $\log_y 4^5$
- $\log_5 xx$
- $\log \sqrt{x}$
- $\log_3 125$
- $\log 36$
- $\log \frac{1}{4}$
- $2 \log_{10} 27$
- $\log_2 49$

iv. **Change the base of these logarithms to the base given in brackets (you don't need to calculate them):**

- $\log_6 12$ (new base: 10)
- $\log_8 16$ (new base: 2)
- $\log_5 19$ (new base: 3)
- $\log_2 24$ (new base: 8)

v. **Rearrange the following expressions to find $x$:**

- $2^x = 64$
- $6^x = 216$
- $5 \times 5^x = 125$
- $8^{2x} = 500$
- $10 \times 8^x = 640$
- $10^x = 300$
- $\log_3 x = 50$
- $3 \log_5 x = 6$