Exponents and Logarithms

Logarithms are useful for solving problems that involve exponents (or indices). In fact logarithms are exponents just written in a different way. Whenever you see a logarithm, you should remind yourself of what it means:
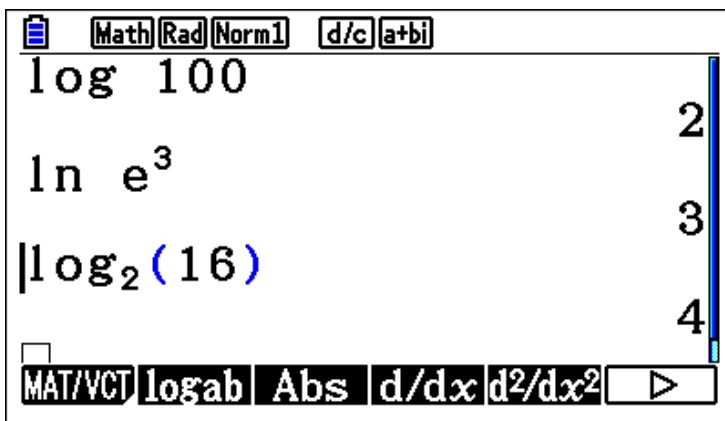
$$\log_a b = x \iff a^x = b$$

There are two special bases:

Base 10: $\log_{10} b$ which can be written $\log b$

Base e: $\log_e b$ which can be written $\ln b$

Your calculator will have a button for those bases, but you should be able to enter logarithms to any base:

Don't be too reliant on your calculator, as questions will often come up on the non-calculator paper. You should, therefore, know how to change the base of a logarithm. The following formula is useful for this:

$$\log_b a = \frac{\log_c a}{\log_c b}$$

Since logarithms are just exponents written in a different way, all the rules of exponents have their equivalent rules for logarithms:

$m^x \times m^y = m^{x+y}$	$\log_c ab = \log_c a + \log_c b$
$m^x \div m^y = m^{x-y}$	$\log_c \dfrac{a}{b} = \log_c a - \log_c b$
$(m^x)^y = m^{x \times y}$	$\log_c a^r = r\log_c a$