Properties of exponents
Let $a$ and $b$ be positive numbers with $a \neq 1$, $b \neq 1$ and let $x$ and $y$ be real numbers. Then:

A) Exponent Laws:
1. $a^x a^y = a^{x+y}$
2. $(a^x)^y = a^{xy}$
3. $(ab)^x = a^x b^x$
4. $(\frac{a}{b})^x = \frac{a^x}{b^x}$
5. $\frac{a^x}{a^y} = a^{x-y}$

Properties of Logarithms
Let $b$ be a positive real number with $b \neq 1$, and let $x$ be any real number. Then:

1. $\log_b(1) = 0$ i.e. $b^0 = 1$
2. $\log_b(b) = 1$ i.e. $b^1 = b$
3. $\log_b(b^x) = x$ i.e. $b^x = b^x$
4. $b^{\log_b(x)} = x$ if $x > 0$
5. $\log_b(MN) = \log_b(M) + \log_b(N)$
6. $\log_b \left(\frac{M}{N}\right) = \log_b(M) - \log_b(N)$
7. $\log_b(M^p) = p \log_b(M)$
8. $\log_b(M) = \log_b(N) \iff M = N$

The natural logarithm
This is the same as before but now we use base $e$. Since the log base $e$ shows up so often we call it the **natural log**.

$$\log_e(x) = \ln(x)$$

We also use log base 10 very often so we abbreviate that as

$$\log_{10}(x) = \log(x).$$

Your calculator follows the same convention.

**Change of Base Formula**
Let $a, b, x$ be positive real numbers with $a \neq 1, b \neq 1$. Then

$$\log_a(x) = \frac{\log_b(x)}{\log_b(a)} \quad \text{(For any } b)$$

For the calculator you can use either base 10 or base $e$.

$$\log_a(x) = \frac{\log(x)}{\log(a)} \quad \text{OR} \quad \log_a(x) = \frac{\ln(x)}{\ln(a)}.$$