CONCEPT MAP

FORM 4

INDICES, SURDS AND LOGARITHMS

Indices and Laws of Indices

- $a^m \times a^n = a^{m+n}$
- $a^m \div a^n = a^{m-n}$
- $(a^m)^n = a^{mn}$
- $(ab)^n = a^n b^n$
- $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

Logarithms and Laws of Logarithms

- $a^x = y \Leftrightarrow \log_{10} y = x$
- $\log_a xy = \log_{10} x + \log_a y$
- $\log_a \left(\frac{x}{y}\right) = \log_{10} x - \log_a y$
- $\log_a x^n = n \log_a x$
- $a^{\log_a x} = x$

Surds

Non-rational numbers in the form $\sqrt{n}$ such that n is a positive number, is known as surds.

- To rationalise the denominator of a surd means to eliminate the square root of the denominator of the surd.

  $\frac{a}{\sqrt{b}} = \frac{a}{\sqrt{b}} \times \frac{\sqrt{b}}{\sqrt{b}} = \frac{a\sqrt{b}}{b}$

- The conjugate surd of $\left(\sqrt{a} + \sqrt{b}\right)$ is $\left(\sqrt{a} - \sqrt{b}\right)$ and vice versa.

Change of Base of Logarithms

- $\log_a b = \frac{\log_c b}{\log_c a}$
- $\log_a b = \frac{1}{\log_b a}$

Index Equations, Surd Equations and Logarithmic Equations

- If $a^{\frac{m}{n}} = b$, then $a = b^{\frac{n}{m}}$.
- If $\log_a x = \log_a y$, then $x = y$.
- A surd equation such as $\sqrt{x} - \sqrt{x-2} = 1$ can be solved by squaring both sides of the equation twice.