SURDS

Keywords:	Rational / Irrational / Root / Surd / Expand / Rationalise					
Definition / Description:	**Rational** – A number that can be expressed as either an integer, a terminating decimal or a fraction	**Irrational** - A number that cannot be expressed as either an integer, a terminating decimal or a fraction	**Root** – A root is a quantity that when multiplied by itself a certain number of times equals a given quantity	**Surd** – An expression that includes a square root	**Expand** – To multiply out a set of brackets.	**Rationalise** – To eliminate an irrational number from the denominator of a fraction.
Knowledge points:	**Simplify Surds** – Simplify by factoring out a square number	**Multiply and Divide Surds** $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$ $\sqrt{a \div b} = \sqrt{a} \div \sqrt{b}$	**Add and Subtract Surds** - When adding and subtracting surds the root must be the same number.	**Expand Brackets with Surds** – Multiply each term inside the bracket by the term outside the bracket.	**Rationalise the Denominator 1** – Create an equivalent fraction where the denominator is rational	**Rationalise the Denominator 2** - Use a difference of two squares to rationalise
Knowledge point examples:	$\sqrt{75} = \sqrt{25 \times 3}$ $= \sqrt{25} \times \sqrt{3}$ $= 5 \times \sqrt{3}$ $= 5\sqrt{3}$ $\sqrt{18} = \sqrt{9 \times 2}$ $= \sqrt{9} \times \sqrt{2}$ $= 3 \times \sqrt{2}$ $= 3\sqrt{2}$	$\sqrt{6} \times \sqrt{7} =$ $\sqrt{6 \times 7} =$ $\sqrt{42}$ $\sqrt{50} \div \sqrt{10} =$ $\sqrt{50 \div 10} =$ $\sqrt{5}$ $4\sqrt{6} \times 2\sqrt{5}$ $= 4 \times 2 \times \sqrt{6} \times \sqrt{5}$ $= 8\sqrt{30}$	$5\sqrt{2} + 2\sqrt{2} = 7\sqrt{2}$ $\sqrt{75} - \sqrt{27}$ $= 5\sqrt{3} - 3\sqrt{3}$ $= 2\sqrt{3}$ $\sqrt{98} - \sqrt{50}$ $= 7\sqrt{2} - 5\sqrt{2}$ $= 2\sqrt{2}$	$\sqrt{3}(\sqrt{7} + 5)$ $= \sqrt{21} + 5\sqrt{3}$ $(\sqrt{5} + 4)(\sqrt{5} - 2)$ $= 5 + 4\sqrt{5} - 2\sqrt{5} - 8$ $= 2\sqrt{5} - 3$	$\frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$ $\frac{3}{2\sqrt{5}} = \frac{3\sqrt{5}}{2 \times 5} = \frac{3\sqrt{5}}{10}$	$\frac{2}{4+\sqrt{2}} =$ $\frac{2(4-\sqrt{2})}{(4+\sqrt{2})(4-\sqrt{2})} =$ $\frac{8-2\sqrt{2}}{4^2-(\sqrt{2})^2} =$ $\frac{8-2\sqrt{2}}{12}$
Linked Knowledge Maps	Index numbers / Place value, decimals, rounding estimation and bounds / Fractions / Pythagoras and Trigonometry					