Guide to: Surds

maths Links

Explanation:

A surd is an irrational root that cannot be written as an exact fraction, such as √2, √3, or √5. To simplify a surd, split the number under the root into its largest square factor multiplied by another factor using √(ab) = √a × √b, and only collect like surds when adding or subtracting.

To rationalise the denominator of a fraction, remove the surd from the bottom: for $\frac{a}{\sqrt{b}}$, multiply top and bottom by √b; for $\frac{c}{a+\sqrt{b}}$, multiply top and bottom by the conjugate **a − √b** so the middle surd terms cancel out via the difference of two squares.

Example 1: Simplify fully √75 + √48 − 2√12

Solution:

Extract the largest square factor from each surd:
√75 = √25 × √3 = **5√3**
√48 = √16 × √3 = **4√3**
2√12 = 2 × √4 × √3 = 2 × 2√3 = **4√3**
5√3 + 4√3 − 4√3 = 5√3
Answer: 5√3

Example 2: Rationalise the denominator of $\frac{14}{3-\sqrt{2}}$

Solution:

Multiply numerator and denominator by **3 + √2**:
$= \frac{14(3+\sqrt{2})}{(3-\sqrt{2})(3+\sqrt{2})}$
Denominator: $3^2 - (\sqrt{2})^2 = 9 - 2 = \mathbf{7}$
$= \frac{14(3+\sqrt{2})}{7} = 2(3+\sqrt{2})$
Answer: 6 + 2√2

Worksheets and other links					
Video Lesson on this topic	Video		**Dr Austin Maths**	Qs	Ans
Ken Stafford (Past Paper Qs)	Qs	Ans	**Maths Made Easy**	Qs	Ans
Maths Genie	Qs	Ans	**Metatutor**	Qs	Ans
Corbettmaths (Practice)	Qs	Ans	**Maths Takeaway**	Qs	Ans
Corbettmaths (Textbook)	Qs	Ans	**E Classroom**	Qs	Ans
1st Class Maths	Qs	Ans	**PMT (Edexcel)**	Qs	Ans

Questions by topic | **Past Papers** | **Maths worksheets**

Buy workbook | **Quizzes** | **More resources like this**

ken@mathslinks.co.uk