

Surds

A surd is an irrational number. It is any number that includes a radical symbol, $\sqrt{\quad}$, and cannot be calculated exactly.

Surd Laws

$$1) \sqrt{a} \times \sqrt{b} = \sqrt{ab}$$

$$2) \frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$$

$$3) (\sqrt{a})^2 = a$$

e.g. (i) $\sqrt{50} = \sqrt{25} \times \sqrt{2}$
 $= \underline{5\sqrt{2}}$

(iii) $\sqrt{\frac{5}{4}} = \underline{\frac{\sqrt{5}}{2}}$

(iv) $\sqrt{\frac{20}{9}} = \underline{\frac{2\sqrt{5}}{3}}$

(ii) $\sqrt{x^3} = \sqrt{x^2} \times \sqrt{x}$
 $= \underline{x\sqrt{x}}$

Surd Arithmetic

Like surds can be added or subtracted, unlike surds cannot

$$\begin{aligned} \text{e.g. (i)} \quad & 4\sqrt{3} + 6\sqrt{2} - \sqrt{3} + 2\sqrt{2} \\ & = \underline{3\sqrt{3} + 8\sqrt{2}} \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & (3 + \sqrt{2})(6 + \sqrt{3}) \\ & = \underline{18 + 3\sqrt{3} + 6\sqrt{2} + \sqrt{6}} \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad & (\sqrt{2} + 1)(\sqrt{2} - 1) \longleftarrow \text{conjugate surds} \\ & = 2 - 1 \\ & = \underline{1} \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad & (2 - \sqrt{2})^2 \\ & = 4 - 4\sqrt{2} + 2 \\ & = \underline{6 - 4\sqrt{2}} \end{aligned}$$

Exercise 2C; 1, 2adgj, 3behkm, 4adgj, 5ace, 6behk, 8, 10beh, 11ac, 12bdfh, 13aceg, 14afil, 15bdh, 16ac, 18ce, 19*