

Surds

Example 1 Simplify each of the following (a) $\sqrt{75}$ (b) $\sqrt{72}$

Example 2 Simplify each of the following:

(a) $\sqrt{2} + \sqrt{3}$

(b) $\sqrt{5} + \sqrt{5}$

(c) $4\sqrt{3} + 5\sqrt{3}$

(d) $6\sqrt{7} - 9\sqrt{7}$

Example 3 Simplify each of the following

(a) $\sqrt{8} + \sqrt{32}$

(b) $\sqrt{12} - \sqrt{27}$

(c) $2\sqrt{20} - 3\sqrt{45}$

Example 4 Simplify out each of the following:

(i) $(2\sqrt{3})(4\sqrt{5})$

(ii) $(4\sqrt{5})(3\sqrt{5})$

(iii) $3(2 + \sqrt{5})$

(iv) $2\sqrt{3}(4 - 5\sqrt{3})$

Example 5 Multiply out

(i) $(2 + \sqrt{3})(4 + \sqrt{3})$

(ii) $(2\sqrt{3} + 4\sqrt{7})(2\sqrt{3} - 4\sqrt{7})$

Example 6 Simplify $\left(\sqrt{12} + \frac{1}{\sqrt{12}}\right)\left(\sqrt{12} - \frac{1}{\sqrt{12}}\right)$

Example 7 Simplify $\frac{4}{\sqrt{2}}$ multiply above and below by $\sqrt{2}$

$$\frac{4}{\sqrt{2}} \frac{\sqrt{2}}{\sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$$

Example 8 Solve $x + \sqrt{x} = 6$

Example 9 Simplify

$$\left(\sqrt{x} + \frac{3}{\sqrt{x}}\right)\left(\sqrt{x} - \frac{3}{\sqrt{x}}\right) \text{ where } x > 0.$$

Hence solve for x if $\left(\sqrt{x} + \frac{3}{\sqrt{x}}\right)\left(\sqrt{x} - \frac{3}{\sqrt{x}}\right) = 8$ where $x > 0$, $x \in R$

Indices

Example 1 Simplify each of the following

(a) $8^{\frac{2}{3}}$

(b) $64^{-\frac{3}{2}}$

Example 2 Find the value of 2^3 and $27^{-\frac{2}{3}}$ leaving the answer in form $\frac{a}{b}$.

Example 3 Simplify $\frac{3^2 \times 9^{\frac{1}{2}}}{3^4 \times 27^{\frac{2}{3}}}$. Give your answer in the form 3^n , where $n \in Z$

Example 4 Find the value of x in each of the following

(a) $8^x = \frac{16}{\sqrt{2}}$

(b) $25^x = \frac{1}{125}$

Calculator Use

Example 1 Find the value of $2.5 \times 10^{-5} + 1.4 \times 10^{-6}$ in the form $a.bc \times 10^n$.

Example 2 Find the value of

(i) $(3.4 \times 10^5) \times (2.1 \times 10^6)$

(ii) $(2.5 \times 10^3)^2$

(iii) $\frac{3.6 \times 10^4}{1.2 \times 10^2}$

(iv) $\frac{(2.1 \times 10^3) \times (4 \times 10^5)}{7 \times 10^{-2}}$

Example 3 Round 3.567 off to two decimal places

Example 4 Round 23.6953

to one decimal place,
to two decimal places,
to three decimal places.

Example 5 Round 53643

to one significant figure,
to two significant figures,
to three significant figures.

Example 6 Estimate the value of $\sqrt{34.56}$

Example 7 Estimate the value of $(5.3)^3$

Example 8 Estimate the value of $\frac{1}{0.23}$

Example 9 By rounding appropriately, estimate the value of

$$(3.57)^2 + \frac{1}{1.65} \times \sqrt{24.3}$$

Evaluate $(3.57)^2 + \frac{1}{1.65} \times \sqrt{24.3}$, correct to two decimal places.

Example 10 Find the value of

(i) $\frac{1}{2} + \frac{1}{3}$

(ii) $1\frac{2}{3} + 2\frac{3}{5}$

(iii) $3\frac{1}{2} \times 4\frac{3}{5}$