

- Index Laws

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

fractional power $a^{\frac{1}{3}} = \sqrt[3]{a}$

$$a^{\frac{p}{3}} = \left(\sqrt[3]{a}\right)^p$$

negative power $a^{-m} = \frac{1}{a^m}$

power zero $a^0 = 1$

Watch for :

$$\frac{1}{3x^2} = \frac{1}{3} \frac{1}{x^2} = \frac{1}{3} x^{-2}$$

$$\left(\frac{8}{27}\right)^{-\frac{2}{3}} = \left(\frac{27}{8}\right)^{\frac{2}{3}} = \frac{\sqrt[3]{27}^2}{\sqrt[3]{8}^2} = \frac{9}{4}$$

- Surds

Simplify

$$\sqrt{12} = \sqrt{4} \sqrt{3} = 2\sqrt{3}$$
$$\sqrt{\frac{9}{4}} = \frac{\sqrt{9}}{\sqrt{4}} = \frac{3}{2}$$

Expand + Simplify

$$(3 + \sqrt{2})(2 - \sqrt{2})$$
$$= 6 - 3\sqrt{2} + 2\sqrt{2} - \sqrt{4}$$
$$= 6 - 1\sqrt{2} - 2$$
$$= 4 - \sqrt{2}$$

Rationalise the Denominator

$$\frac{1}{\sqrt{a}} \Rightarrow \frac{1}{\sqrt{a}} \times \frac{\sqrt{a}}{\sqrt{a}} = \frac{\sqrt{a}}{a}$$

$$\frac{1}{a + \sqrt{b}} \Rightarrow \frac{1}{a + \sqrt{b}} \times \frac{(a - \sqrt{b})}{(a - \sqrt{b})} = \frac{a - \sqrt{b}}{a^2 - b}$$

minus

$$\frac{1}{a - \sqrt{b}} \Rightarrow \frac{1}{a - \sqrt{b}} \times \frac{(a + \sqrt{b})}{(a + \sqrt{b})} = \frac{a + \sqrt{b}}{a^2 - b}$$

plus