

Year 1 Pure Chapter 1 – Algebraic Expression

Index Laws

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

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

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

Fractional Powers

$$a^{\frac{1}{m}} = \sqrt[m]{a}$$

$$a^{\frac{n}{m}} = \sqrt[m]{a^n}$$

Negative Powers

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

Watch out for:

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

Example

$$\left(\frac{8}{27}\right)^{-\frac{2}{3}} = \left(\frac{27}{8}\right)^{\frac{2}{3}}$$

$$= \frac{\sqrt[3]{27}^2}{\sqrt[3]{8}^2}$$

$$= \frac{9}{4}$$

Surds

Simplify

$$\sqrt{5}\sqrt{3} = \sqrt{15}$$

Simplify

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

Simplify

$$\frac{\sqrt{15}}{\sqrt{3}} = \sqrt{5}$$

Simplify

$$\frac{\sqrt{12}}{\sqrt{8}} = \frac{2\sqrt{3}}{2\sqrt{2}} = \frac{\sqrt{3}}{\sqrt{2}}$$

Expand and Simplify

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

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

$$= 6 - \sqrt{2} - 2$$

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

Rationalise the Denominator

$$\frac{2}{\sqrt{3}} =$$

$$\frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

$$\frac{2}{2 + \sqrt{3}} =$$

$$\frac{2}{2 - \sqrt{3}} \times \frac{2 + \sqrt{3}}{2 + \sqrt{3}} =$$

$$\frac{4 - 2\sqrt{3}}{2 - 4\sqrt{3} + 3} =$$

$$\frac{4 - 2\sqrt{3}}{5 - 4\sqrt{3}}$$

$$\frac{2}{1 - 2\sqrt{3}} =$$

$$\frac{2}{1 - 2\sqrt{3}} \times \frac{1 + 2\sqrt{3}}{1 + 2\sqrt{3}} =$$

$$\frac{2 + 4\sqrt{3}}{1 - 4\sqrt{9}} =$$

$$\frac{2 + 4\sqrt{3}}{-11}$$