

8. Powers of the form: $x^{\frac{1}{n}}$

The exponent $\frac{1}{n}$ means to take the n^{th} root. i.e. $x^{\frac{1}{n}} = \sqrt[n]{x}$

$$\begin{aligned} \text{Ex 1. } x^{\frac{1}{2}} &= \sqrt[2]{x} \\ &= \sqrt{x} \end{aligned}$$

$$\text{Ex. 2 } x^{\frac{1}{3}} = \sqrt[3]{x}$$

$$\text{Ex. 3 } x^{\frac{1}{12}} = \sqrt[12]{x}$$

$$\begin{aligned} \text{Ex. 4 } 81^{\frac{1}{2}} &= \sqrt{81} \\ &= 9 \end{aligned}$$

$$\begin{aligned} \text{Ex. 5 } (-27)^{\frac{1}{3}} &= \sqrt[3]{-27} \\ &= -3 \end{aligned}$$

$$\begin{aligned} \text{Ex. 6 } (-64)^{\frac{1}{4}} &= \sqrt[4]{-64} \\ &= \text{not possible} \end{aligned}$$

$$\begin{aligned} \text{Ex. 7 } (64)^{\frac{1}{3}} &= \sqrt[3]{64} \\ &= 4 \end{aligned}$$

$$\begin{aligned} \text{Ex. 8 } (64)^{\frac{1}{6}} &= \sqrt[6]{64} \\ &= 2 \end{aligned}$$

(You may not take the even root of a negative number)

9. Powers of the form: $x^{\frac{m}{n}}$

The exponent $\frac{m}{n}$ means to take the n^{th} root and raise the answer to an exponent m .

$$\text{i.e. } x^{\frac{m}{n}} = (\sqrt[n]{x})^m = \sqrt[n]{(x^m)}$$

$$\begin{aligned} \text{Ex 1. } x^{\frac{3}{4}} &= \sqrt[4]{x^3} \\ \text{Or } &= (\sqrt[4]{x})^3 \end{aligned}$$

$$\begin{aligned} \text{Ex. 2 } x^{\frac{2}{3}} &= \sqrt[3]{x^2} \\ \text{Or } &= (\sqrt[3]{x})^2 \end{aligned}$$

$$\begin{aligned} \text{Ex. 3 } 81^{\frac{3}{4}} &= (\sqrt[4]{81})^3 \\ &= (3)^3 \\ &= 27 \end{aligned}$$

$$\begin{aligned} \text{Ex. 4 } (-125)^{\frac{2}{3}} &= (\sqrt[3]{-125})^2 \\ &= (-5)^2 \\ &= 25 \end{aligned}$$

Quiz next class – no notes!