

Ch.4 : Roots & Powers

Entire to Mixed \rightarrow look in Perfect Square or Perfect Cube lists.
 \rightarrow go through and find a # that divides into Radicand

1) i) $\sqrt[3]{56}$
 $\sqrt[3]{8 \times 7}$
 $\sqrt[3]{8} \times \sqrt[3]{7}$
 perfect cube
 $2 \sqrt[3]{7}$

Ex 2) $\sqrt{98}$
 $= \sqrt{49 \times 2}$
 $= \sqrt{49} \times \sqrt{2}$
 perfect sq
 $7 \sqrt{2}$

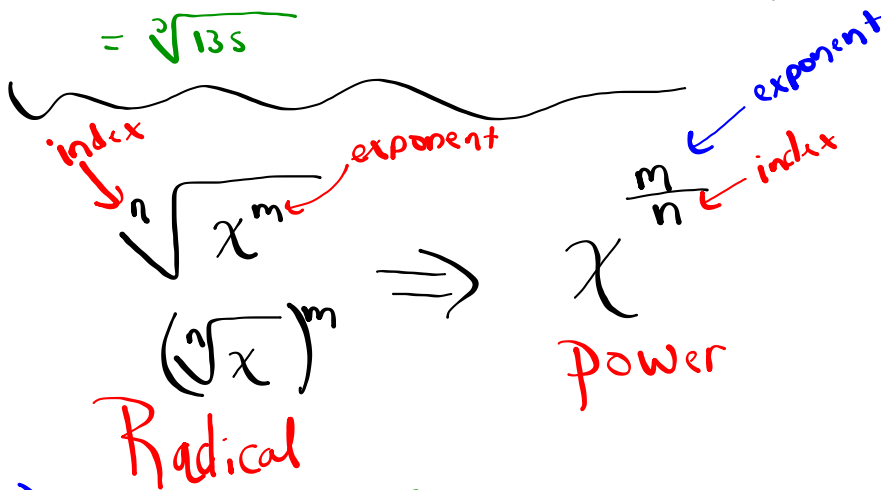
- cubes
- 1
 - 8
 - 27
 - 64
 - 125
 - ...

Mixed \rightarrow Entire

Coefficient is raised to the index, placed under radical then multiply by radicand

$3 \sqrt[3]{5}$
 $= \sqrt[3]{3^3 \times 5}$
 $= \sqrt[3]{27 \times 5}$
 $= \sqrt[3]{135}$

Ex 2) $7 \sqrt{3}$
 $= \sqrt{7^2 \times 3}$
 $= \sqrt{49 \times 3}$
 $= \sqrt{147}$



3) i) $\sqrt[3]{6^2}$

$6^{\frac{2}{3}}$

4) i) $3^{\frac{5}{2}}$

$\sqrt{3^5}$

ii) $15^{-\frac{2}{3}} = (\sqrt[3]{15})^{-2} = (\frac{1}{\sqrt[3]{15}})^2$

Law

Laws of Exponents

1) Multiply powers with the same base, you add exponents

$$x^3 \cdot x^4 = x^7$$

2) Divide powers with the same base, you subtract exponents

like bases

$$\frac{x^7}{x^2 y^3} = \frac{x^5}{y^3}$$

3) Power of a power
 ↳ exponent attached to bracket must apply to all its insided bracket → multiply exponents

Ex) $(2n^3)^4$
 $(2^4 n^{12})$

Ex) $(\frac{x^3}{y^2})^4$
 $= \frac{x^{12}}{y^8}$

$2^4 n^{12}$
 subtract
 $16 n^{12}$

4) Zero Exponent law
 ↳ anything raised to the exponent "0" is 1
 $x^0 = 1$ or $(\frac{x^3 y^2}{15 z^3 y^7})^0 = 1$

5) Negative Exponents

→ flip all terms inside → flip Num Denom
 then apply laws

$$\frac{x^{-14}}{y^{-6}}$$

$$= \frac{y^6}{x^{14}}$$

Ex 2)

$$\frac{x^{-7}}{1}$$

$$\frac{1}{x^7}$$

Ex) $(4x^{-5}y^{-3})^4$
 apply power of power law

169 so move to bottom
 $= 4^{-4} x^{20} y^{12}$

$$= \frac{x^{20} y^{12}}{4^4}$$

$$= \frac{x^{20} y^{12}}{256}$$

2) $\frac{2n^4}{(4m^4 n^0)(m^1 n^1)}$

$$= \frac{2n^4}{24m^5 n^1}$$

$$= \frac{1n^3}{2m^5}$$

2) $\left[\frac{a^5 b^{-3}}{a^{-3} b^3} \right]^2 = (a^{5+3} b^{-3-3})^2 = (a^8 b^{-6})^2 = \frac{(a^8)^2}{(a^6)^2} = \frac{a^{16}}{a^{12}}$

Prime #

2, 3, 5, 7, 11, 13, 17, 19, 23, ...

