Indices - Lesson 3

Indices - Fractional Powers

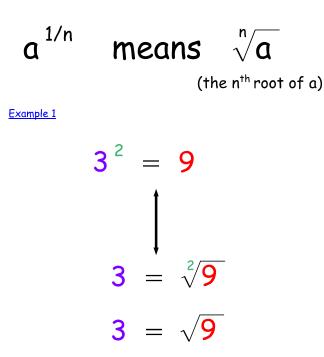
LI

- Know how to work out fractional powers.
- Simplify expressions using fractional powers.

<u>SC</u>

• Notation.

Fractional Powers



$$3 = 9^{1/2}$$

<u>Example 2</u>

$$4^{3} = 64$$

$$\downarrow$$

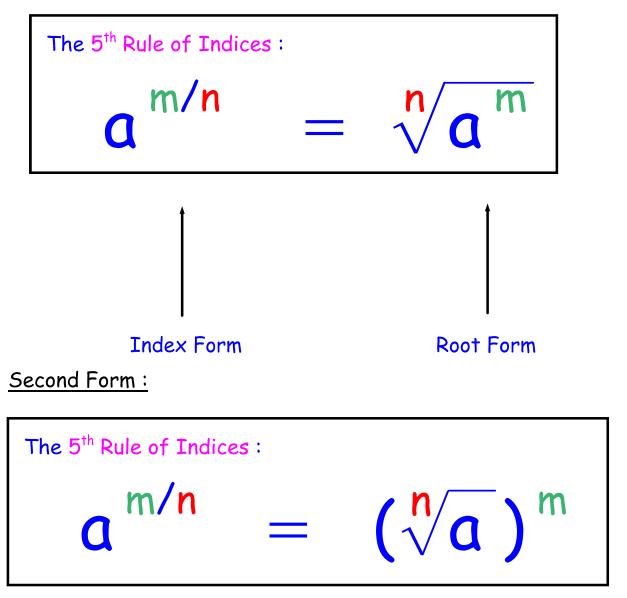
$$4^{3} = \sqrt[3]{64}$$

$$4 = 64^{1/3}$$

Some Common Roots

$a^{\frac{1}{2}}$	\sqrt{a}	square root
$a^{\frac{1}{3}}$	₹a	cube root
$a^{\frac{1}{4}}$	4 √a	fourth root
$a^{\frac{1}{5}}$	₹a	fifth root

First Form :



Example 3

Write these in root form :

(a) $x^{3/5}$ = $\sqrt[5]{x^3}$ (b) $p^{2/7}$ = $\sqrt[7]{p^2}$

$$=$$
 $\sqrt[11]{N^{13}}$

(d)
$$f^{-7/9}$$

$$= \frac{1}{f^{7/9}}$$

$$= \frac{1}{\sqrt[9]{f^7}}$$

Example 4

Write these in index form :

(a)
$$\sqrt[3]{b^4}$$

= $b^{4/3}$
(b) $\sqrt[8]{M^6}$
= $M^{6/8}$
= $M^{3/4}$
(c) $\sqrt[6]{v^6}$
= $v^{6/6}$
= v^1
= v
(d) $\frac{1}{\sqrt[17]{x^{15}}}$
= $\frac{1}{x^{15/17}}$

M. Patel

Example 5

Evaluate :

(a) 49^{1/2}

= $\sqrt{49}$ = 7

(b) 125^{-1/3}

$$= \frac{1}{125^{1/3}} \\ = \frac{1}{\sqrt[3]{125}} \\ = \frac{1}{5}$$

(c) 125^{2/3}

$$= \left(\sqrt[3]{125}\right)^2$$
$$= 5^2$$
$$= 25$$

(d) 64^{-3/2}

=

$$= \frac{1}{\left(\sqrt{64}\right)^3}$$

$$= \frac{1}{8^{3}}$$
$$= \frac{1}{512}$$

						Questi	ons			
1	Us	se the ru	ules te	o expres	s the	followin	g wit	h root si	gns c	of the form $\sqrt[n]{a^m}$.
				$a^{\frac{1}{5}}$						
	f	$t^{\frac{5}{2}}$	g	$x^{\frac{4}{3}}$	h	$y^{\frac{2}{5}}$	i	$p^{\frac{1}{4}}$	j	$m^{\frac{3}{4}}$
2	W	rite in i	ndex	form.						
	a	$\sqrt{t^5}$	b	$\sqrt[4]{a^3}$	С	$\sqrt[5]{x^3}$	d	$\sqrt[7]{m^4}$	e	$\sqrt[3]{a^{12}}$
3	Εv	aluate.								
	a	$9^{\frac{1}{2}}$	b	$16^{\frac{1}{4}}$	С	$8^{\frac{2}{3}}$	d	$49^{\frac{3}{2}}$	e	$25^{-\frac{1}{2}}$
	f	81 ⁻³ 4	g	$100^{-\frac{3}{2}}$	h	$\left(\frac{1}{27}\right)^{\frac{2}{3}}$	i	$\left(\frac{49}{81}\right)^{\frac{1}{2}}$	j	$\left(\frac{16}{25}\right)^{\frac{3}{2}}$

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Answers