

Surds and Indices

index means power

2019 - 191
TNPSC Group-IV
VIDEO #2
Surds and Indices / முக்கீடுகள் + அடுக்குகள்

$$\frac{4^2}{2^3} = 3^8$$
$$2^{-2} = \frac{1}{2^2}$$
$$a^0 = 1$$
$$2^0 = 1$$
$$a^m \div a^n = a^{m-n}$$
$$2^7 \div 2^3 = 2^4$$
$$a^{-m} = \frac{1}{a^m}$$
$$2^{-1} = \frac{1}{2}$$
$$(a^m)^n = a^{mn}$$
$$\sqrt[3]{2^3} = 2^{3/2}$$
$$a^m \times a^n = a^{m+n}$$
$$2^3 \times 2^4 = 2^7$$
$$\sqrt[3]{2^6} = 2^2$$
$$\frac{a^m}{b^m} = \left(\frac{a}{b}\right)^m$$

surds means roots

Surds a

$$\sqrt[6]{3} = 3^{\frac{1}{6}}$$

$$\sqrt{=} \frac{1}{2} \quad \begin{matrix} 2 \\ 2^{\frac{1}{2}} \end{matrix}$$

$$\begin{matrix} 3 \\ \sqrt{2} \end{matrix} \quad \begin{matrix} 2 \\ 2^{\frac{1}{3}} \times 2^{\frac{1}{4}} \end{matrix}$$

Law of Indices

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

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

$$a^{mn} = a^{mn}$$

$$(ab)^n = a^n b^n$$

$$\left[\frac{a}{b}\right]^n = \frac{a^n}{b^n}$$

Law of Surds

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

$$\sqrt[n]{ab} = a^{\frac{1}{n}} b^{\frac{1}{n}}$$

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

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

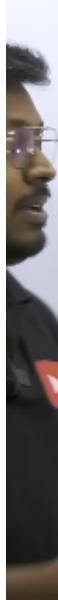
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Surds and Indices / பூஜுகள் + அடுக்குகள்

$$\textcircled{1} \quad 49 \times 49 \times 49 \times 49 = ?$$

$$7^2 \times 7^2 \times 7^2 \times 7^2 = ?$$

$$\begin{aligned} 7^8 &= ? \\ \boxed{? = 8} \end{aligned}$$



Surds & Indices

$$\begin{aligned} \text{(a)} \quad & (81)^{3/4} \\ & (3^4)^{3/4} \\ & 3^{4 \times \frac{3}{4}} \\ & 3^3 = 3 \times 3 \times 3 \\ & \Rightarrow 3^3 = 27 \\ & (81)^{3/4} \xrightarrow{=} 27 \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & (1024)^{-4/5} \\ & (1024)^{-4/5} \\ & (4^5)^{-4/5} \\ & 4^{5 \times -4/5} = 4^{-4} \\ & = \frac{1}{4^4} = \frac{1}{256} \\ & \downarrow \\ & 4 \times 4 \times 4 \times 4 \end{aligned}$$

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Surds and Indices / பூஜுகள் + அடிக்கடி

$$\begin{aligned} a^m \div a^n & \quad (2) \quad 21^? \times 21^{6.5} = 21^{12.4} \\ &= a^{m-n} \quad 21^? = \frac{21^{12.4}}{21^{6.5}} \\ &\boxed{59} \end{aligned}$$

$$\begin{aligned} 21^? &= 21^{12.4-6.5} \\ 21^? &= 21^{5.9} \end{aligned}$$

Surds and Indices / பூஜுகள் + அடிக்கடி

$$(3) \quad (\underline{10})^{24} \times (\underline{10}^{-21}) = ?$$

$$10^{24-21} = ?$$

$$10^3 = \boxed{1000}$$

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Surds and Indices / പുന്തുക്കள് + അഭക്കുകൾ

$$\textcircled{4} \quad (4^3)^4 \div (4^2)^3 \times (4^5)^0 = ?$$

$$4^{12} \div 4^6 \times 4^0 = ?$$

$$4^6 \times 4^0 = 4^?$$

$$\boxed{4^6 = ?}$$

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Surds and Indices / പുന്തുക്കൾ + അഭക്കുകൾ

$$\textcircled{5} \quad (4^4) \div (16)^3 \times 256 = 4^{?-6}$$

$$4^4 \div (4^2)^3 \times 4^4 = 4^{?-6}$$

$$4^4 \div 4^6 \times 4^4 = 4^{?-6}$$

$$4^{-2} \times 4^4 = 4^{?-6}$$

$$\cancel{4}^2 = \cancel{4}^{?-6}$$

$$2 = ? - 6$$

$$? = 2 + 6 = \textcircled{8}$$

Surds & Indices

3) $(\underline{0.0016})^{3/4}$

$$\left(\frac{16}{10000} \right)^{3/4}$$

$$\left(\frac{2^4}{10^4} \right)^{3/4} = \left(\frac{2^1}{10^1} \right)^{4 \times 3/4}$$

$$= \left(\frac{1}{5} \right)^3 \cdot \frac{1}{125}$$

4) $(\underline{17})^{3.5} \times (\underline{17})^x = \underline{17}^8$

$$3.5 + x = 8$$

$$x = 8 - 3.5$$

$$\boxed{x = 4.5}$$

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Surds and Indices / പുന്നികള്‍ + അടയ്ക്കകൾ

6) $(3 \times 3)^2 \times (9 \times 3)^3 \div 243 = 3^?$

$$(3^2)^2 \times (3^3)^3 \div 3^5 = 3^?$$

$$3^4 \times 3^9 \div 3^5 = 3^?$$

$$3^4 \times 3^4 = 3^?$$

$$3^8 = 3^? \quad ? = 8$$

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Surds and Indices / பூஜுகள் + அடுக்குகள்

$$(7) \left(\frac{6 \times 6 \times 6 \times 6 \times 6}{36} \right)^4 \times \left(\frac{6 \times 6 \times 6 \times 6}{36} \right)^5 \div \left(\frac{6 \times 6}{36} \right)^7 = 36 ?$$

$$(36^3)^4 \times (36^2)^5 \div (36)^7 = 36 ?$$

$$36^{12} \times 36^{10} \div 36^7 = 36 ?$$

$$\boxed{? = 15} \quad 36^{12} \times 36^3 = 36 ?$$

$$36^{15} = 36 ?$$

Surds & Indices

$$(5) \left(\frac{a}{b} \right)^{x-1} = \left(\frac{b}{a} \right)^{x-3}$$

$$\left(\frac{a}{b} \right)^{x-1} = \left(\frac{a}{b} \right)^{-(x-3)}$$

$$x-1 = -(x-3)$$

$$\cancel{x-1} = 3 - \cancel{x}$$

$$2x = 4$$

$$\boxed{x=2}$$

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Surds and Indices / மூலங்கள் + அடுக்குகள்

$$\textcircled{8} \quad 9^3 \times 81^2 \div 27^3 = 3 ?$$

$$(3^2)^3 \times (3^4)^2 \div (3^3)^3 = 3 ?$$

$$3^6 \times 3^8 \div 3^9 = 3 ?$$

$$3^6 \times 3^{-1} = 3 ?$$

$$3^5 = 3 ?$$

$$\textcircled{?} = 5$$

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Surds and Indices / மூலங்கள் + அடுக்குகள்

$$8 \sqrt[6]{512} \quad \textcircled{9} \quad (4 \times 4)^3 \div (512 \div 8)^4 \times (32 \times 8)^4 = (4) ?$$

$$\frac{64}{48} \quad \frac{32}{32} \quad (4^2)^3 \div (64)^4 \times (256)^4 = 4 ?$$

$$4^6 \div (4^3)^4 \times (4^5)^4 = 4 ?$$

$$4^6 \div 4^{12} \times 4^{20} = 4 ?$$

$$\textcircled{?} = 14 \quad 4^6 \times 4^{20} = 4 ?$$

$$4^{14} = 4 ?$$

வினாக்கள் புதிய - 14
VIDEO #2

Surds and Indices / மூடிடுகள் + அடுக்குகள்

$$\text{Q. } \begin{aligned} & (6)^4 \div (1080 \div 36)^4 \times (27 \times 8)^4 = (6 \cdot)^{?+5} \\ & 6^4 \div (36)^4 \times (216)^4 = 6^{?+5} \\ & 6^4 \div (6^2)^4 \times (6^3)^4 = 6^{?+5} \\ & 6^4 \div 6^8 \times 6^{12} = 6^{?+5} \\ & 6^{-4} \times 6^{12} = 6^{?+5} \end{aligned}$$

$\boxed{? = 3}$

வினாக்கள் புதிய - 15
VIDEO #2

Surds and Indices / மூடிடுகள் + அடுக்குகள்

$$\text{Q. } \sqrt[3]{8} \times \sqrt[4]{16} = 2^{?}$$

$$(8)^{\frac{1}{3}} \times (16)^{\frac{1}{4}} = 2^{?}$$

$$\text{II. } (2^3)^{\frac{1}{3}} \times (2^4)^{\frac{1}{4}} = 2^{?}$$

$$2^1 \times 2^1 = 2^{?}$$

$\boxed{2=2}$

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Surds and Indices / പ്രയുക്തികൾ + അടിസ്ഥാനങ്ങൾ

$$\text{Ex: } (12) \text{ Find } ? \quad 4^? \times 64^{2?} = 16^{?+5}$$

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

$$4^? \times (4^3)^{2?} = (4^2)^{?+5}$$

$$? = 2? + 10$$

$$? - 2? = 10$$

$$4^? \times 4^{6?} = 4^{2?+10}$$

$$5? = 10$$

$$? = 10/5 = 2$$

$$4^? = 4^{2?+10}$$

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Surds and Indices / പ്രയുക്തികൾ + അടിസ്ഥാനങ്ങൾ

$$(13) \quad 3^{x+4} = 9^{x+13} \quad \text{find } x ?$$

$$3^{x+4} = (3^2)^{x+13}$$

$$3^{x+4} = 3^{2x+26}$$

$$x+4 = 2x+26$$

$$2x-x = 4-26$$

$$(x = -22)$$

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Surds and Indices / முக்கீல் + அடுக்கீல்

TNPSC Question 14

$$\frac{16 \times 32}{9 \times 27 \times 81} = ?$$
$$(a) \left(\frac{2}{3}\right)^9$$
$$\frac{2^4 \times 2^5}{3^2 \times 3^3 \times 3^4} = ?$$
$$(b) \left(\frac{2}{3}\right)^{11}$$
$$\frac{2^9}{3^9} = ?$$
$$(c) \left(\frac{2}{3}\right)^{12}$$
$$(d) \left(\frac{2}{3}\right)^{13}$$

use by choices

~~TEST~~ INDICES : TEST + VIS

$$\textcircled{3} \quad 8^7 \times 2^6 \div 8^{2.4} = 8 ?$$

$$8^7 \times (2^3)^2 \div 8^{2.4} = 8 ?$$

$$8^7 \times 8^2 \div 8^{2.4} = 8 ?$$

$$8^{7+2-2.4} = 8 ?$$

$$8^{7-0.4} = 8 ?$$

$$\boxed{? = 6.6}$$

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Surds and Indices / ഘന്തുകൾ + അഭക്കുകൾ

$\frac{2^{3.5} \times 6^{3.5}}{3^{3.5}} = ?$ $(\frac{18}{27})^{3.5} \times 6^{3.5} = ?$

$(\frac{12}{3})^{3.5} = ?$ $(\frac{2}{3})^{3.5} \times 6^{3.5} = ?$

$(\frac{4}{3})^{3.5} = ?$

$\textcircled{1} \quad 8^{16} \times 8^3 \times 8^4 \div 8^{14} = 2 ?$

$8^{16+3+4-14} = 2 ?$

$8^{23-14} = 2 ?$

$8^9 = 2 ?$

$(2^3)^9 = 2 ?$

$2^{27} = 2 ?$

$$\textcircled{2} \quad (32)^4 \div (128)^9 \times (64)^{12} = ?$$

$$(2^5)^4 \div (2^7)^9 \times (2^6)^{12} = ?$$

$$2^{20} \div 2^{63} \times 2^{72}$$

$$2^{20-63+72} = ?$$

$$2^{20+9} \\ 2^{29} = ?$$

SURDS AND INDICES : TEST + DISCUSSION

$$\textcircled{4} \quad 2^{0.2} \times 64 \times 8^{1.3} \times 4^{0.2} = ?$$

$$8^2 \times 8^{1.3} \times \underbrace{2^{0.2} \times 4^{0.2}}_{a^m \times b^m \Rightarrow (a \times b)^m} = ?$$

$$8^2 \times 8^{1.3} \times 8^{0.2} = ?$$

$$8^{2+1.3+0.2} = ?$$

$$8^{3.5} = ?$$

? = 3.5

$$\textcircled{5} \quad (80 \times 0.40)^3 = 2^x \div 4^9$$

$$(80 \times \frac{40}{100})^3 = 2^x \div (2^2)^9$$

$$(32)^3 = 2^x \div 2^{18} \quad 15 = x - 18$$

$$(2^5)^3 = 2^x \div 2^{18} \quad x = 15 + 18$$

$$2^{15} = 2^x \div 2^{18}$$

$$2^{15} = 2^{x-18}$$

$$x = 33$$

SURDS AND INDICES : TEST + DISCUSSION

$$\textcircled{6} \quad (80 \times 0.40)^3 \div (40 \times 1.6)^3 \times (128)^3 = 2^{x+7}$$

$$(32)^3 \div (64)^3 \times (128)^3 = 2^{x+7}$$

$$(2^5)^3 \div (2^6)^3 \times (2^7)^3 = 2^{x+7}$$

$$2^{15} \div 2^{18} \times 2^{21} = 2^{x+7} \quad 2^{18} = 2^{x+7}$$

$$2^{15-18+21} = 2^{x+7} \quad x = 18-7$$

$$2^{15+3} = 2^{x+7}$$

$$x = 11$$

$$\textcircled{7} \quad (0.81)^2 \div (0.729)^3 \times (0.9)^2 = (0.9)^{? - 3}$$

$$(0.9^2)^2 \div (0.9^3)^3 \times (0.9)^2 = (0.9)^{? - 3}$$

$$(0.9)^4 \div (0.9)^9 \times (0.9)^2 = (0.9)^{? - 3}$$

$$0.9^{4-9+2} = (0.9)^{? - 3}$$

$$0.9^{-3} = (0.9)^{? - 3} \quad (?=0)$$

$$-3 = ? - 3$$

$$? = -3 + 3$$

SURDS AND INDICES : TEST + DISCUSSION

$$\textcircled{8} \quad (0.64)^4 \div (0.512)^3 \times (0.8)^4 = (0.8)^{x+3}$$

$$(0.8^2)^4 \div (0.8^3)^3 \times (0.8)^4 = (0.8)^{x+3}$$

$$0.8^8 \div 0.8^9 \times 0.8^4 = 0.8^{x+3}$$

$$0.8^{\overbrace{8-9+4}} = 0.8^{x+3} \quad \begin{matrix} x=3-3 \\ (?=0) \end{matrix}$$

$$0.8^3 = 0.8^{x+3}$$

$$3 = x+3$$

SURDS AND INDICES : TEST + DISCUSSION

$$\textcircled{9} \quad (0.49)^4 \times (0.343)^4 \div (0.2401)^4 = (70 \div 100)^{x+3}$$

$$(0.7^2)^4 \times (0.7^3)^4 \div (0.7^4)^4 = (0.7)^{x+3}$$

$$0.7^8 \times 0.7^{12} \div 0.7^{16} = 0.7^{x+3}$$

$$0.7^{8+12-16} = 0.7^{x+3}$$

$$\cancel{0.7^4} = \cancel{0.7^{x+3}} \quad \begin{matrix} x=4-3 \\ x=1 \end{matrix}$$

$$4 = x+3$$

SURDS AND INDICES : TEST + DISCUSSION

$$\textcircled{11} \quad (15 \times 0.40)^4 \div \left(\frac{36}{1080 \div 30}\right)^4 \times (27 \times 8)^4 = (3 \times 2)^{x+5}$$

$$(6)^4 \div (36)^4 \times (216)^4 = 6^{x+5}$$

$$6^4 \div (6^2)^4 \times (6^3)^4 = 6^{x+5} \quad 8=x+5$$

$$6^4 \div 6^8 \times 6^{12} = 6^{x+5} \quad x=8-5$$

$$6^{4-8+12} = 6^{x+5} \quad \begin{matrix} x=3 \end{matrix}$$

$$6^8 = 6^{x+5}$$

SURDS AND INDICES : TEST + DISCUSSION

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$$\textcircled{12} \quad (28)^{4.9} \times (7)^{0.1} \times (2)^{0.2} \div \left\{ (7)^{-2.5} \times (2)^{-5} \right\} = 28 ?$$

$$\begin{aligned}
 & (28)^{4.9} \times (7)^{0.1} \times (2^2)^{0.1} \div \left\{ 7^{-2.5} \times (2^2)^{-2.5} \right\} = 28 ? \\
 & (a^m \times b^m)^n \curvearrowleft (28^{4.9} \times 7^{0.1} \times 4^{0.1}) \div \left\{ 7^{-2.5} \times 4^{-2.5} \right\} = 28 ? \\
 & 28^{4.9} \times (28)^{0.1} \div (28)^{-2.5} = 28 ? \quad / 28^{7.5} = 28^x \\
 & 28^{4.9+0.1-(-2.5)} = 28 ? \quad / \quad \boxed{x=7.5}
 \end{aligned}$$

SURDS AND INDICES : TEST + DISCUSSION

$$(3\sqrt{7})^{\frac{1}{2}} \div (343)^{-\frac{1}{2}} \times (3\sqrt{7})^2 = (3\sqrt{7}) ?$$

$$(7^{\frac{1}{3}})^{\frac{1}{2}} \div (7^3)^{-\frac{1}{2}} \times (7^{\frac{1}{3}})^2 = (7^{\frac{1}{3}}) ?$$

$$\begin{aligned}
 & 7^{\frac{1}{6}} \div 7^{-\frac{3}{2}} \times 7^{\frac{2}{3}} = 7^{\frac{x}{3}} \quad 7^{\frac{14}{6}} = 7^{\frac{x}{3}} \\
 & 7^{\frac{1}{6} + \frac{3}{2} + \frac{2}{3}} = 7^{\frac{x}{3}} \quad 7^{\frac{1}{2}} = 7^{\frac{x}{3}} \\
 & 7^{\frac{1+9+4}{6}} = 7^{\frac{x}{3}} \quad \boxed{x=7}
 \end{aligned}$$

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SURDS AND INDICES : TEST + DISCUSSION

14

$$\left(\sqrt[5]{27}\right)^3 \times 81 \div \frac{1}{3^{1/5}} = 9^x$$

$$(9^3) = 9^x \quad \left(27\right)^{1/5} \times 9^2 \div 3^{-1/5} = 9^x$$

$3^{\frac{9}{5}+4+\frac{1}{5}} = 9^x$

$3^{\frac{9+20+1}{5}} = 9^x$

$$\left(3^3\right)^{3/5} \times 3^4 \div 3^{-1/5} = 9^x$$

$3^{\frac{30}{5}} = 9^x$

$$3^{9/5} \times 3^4 \div 3^{-1/5} = 9^x$$

$3^6 = 9^x$

$$(3^2)^3 = 9^x$$

RDS AND INDICES : TEST + DISCUSSION

$$(0.2)^{3/2} \times 0.008 \div \frac{1}{\sqrt{0.2}} = (0.2)^?$$

$$(0.2)^{3/2} \times (0.2)^3 \div \frac{1}{(0.2)^{1/2}} = (0.2)^?$$

$$(0.2)^{\frac{3}{2}} \times (0.2)^3 \div (0.2)^{-1/2} = (0.2)^?$$

$$(0.2)^{\frac{3}{2}+3-(-1/2)} = 0.2?$$

$$0.2^{\frac{3}{2}+3+\frac{1}{2}} = 0.2?$$

$$0.2^{\frac{3+6+1}{2}} = 0.2?$$

$$0.2^5 = 0.2?$$

$$? = 5$$

==must need of 4 powers ==

SURDS AND INDICES : TEST + DISCUSSION

* * *
 ⑯ $(2401)^{3/4} \div \frac{1}{343} \div 49^{7/2} = ?$

$$(7^4)^{\frac{3}{4}} \div \frac{1}{7^3} \div (7^2)^{\frac{7}{2}} = ?$$

$$\begin{aligned} 7^3 \div 7^{-3} \div 7^7 &= ? \\ 7^{3+3-7} &= ? \\ 7^{6-7} &= ? \end{aligned}$$

$$\begin{aligned} 7^{-1} &= ? \\ ? &= -1 \end{aligned}$$

SURDS AND INDICES : TEST + DISCUSSION

* * *
 ⑰ $(7.2)^{3.2} \times \frac{1}{(7.2)^{1.6}} \div (51.84)^{-1.8} \times (51.84)^{-1.2} = (7.2)^x$

$$(7.2)^{3.2} \times (7.2)^{-1.6} \div (7.2^2)^{-1.8} \times (7.2^2)^{-1.2} = 7.2^x$$

$$7.2^{3.2} \times 7.2^{-1.6} \div 7.2^{-3.6} \times 7.2^{-2.4} = 7.2^x$$

$$\begin{aligned} 7.2^{3.2-1.6+3.6-2.4} &= 7.2^x \\ 7.2^{2.8} &= 7.2^x \\ x &= 2.8 \end{aligned}$$

SURDS AND INDICES : TEST + DISCUSSION

*
⑧ $17^{8.8} \times (289)^{-1.4} \div \frac{1}{(17)^1} = 17^x \times 17^? \quad |$

$17^{8.8} \times (17^2)^{-1.4} \div (17)^1 = 17^{x+1}$

$17^{8.8} \times 17^{-2.8} \div 17^1 = 17^{x+1} \quad \begin{cases} 5 = x+1 \\ 2x = 5-1 \\ x = 4 \end{cases}$

$17^{8.8-2.8-1} = 17^{x+1}$

$17^5 = 17^{x+1}$



SURDS AND INDICES : TEST + DISCUSSION

*
⑨ $(10)^{7.3} \div (100)^{4.15} \times (1000)^2 + 10^5 = ? \times 10^5$

$(10)^{7.3} \div (10^2)^{4.15} \times (10^3)^2 + 10^5 = ? \times 10^5$

$10^{7.3} \div 10^{8.3} \times 10^6 + 10^5 = ? \times 10^5 \quad \boxed{? = 2}$

$10^{-1} \times 10^6 + 10^5 = ? \times 10^5$

$10^5 + 10^5 = ? \times 10^5$

$2 \times 10^5 = ? \times 10^5$



SURDS AND INDICES : TEST + DISCUSSION

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From Data To Content

$$\begin{aligned}
 & \text{Q) } \frac{(243)^{\frac{n}{5}} \cdot 3^{2n+1}}{9^n \cdot 3^{n-1}} = ? \\
 & \quad \left| \begin{array}{l} \frac{3^{n+2n+1}}{3^{2n+n-1}} = ? \\ 3^{3n+1} = ? \\ 3^{3n+1-(3n-1)} = ? \end{array} \right| \\
 & \quad \left| \begin{array}{l} 3^{3n+1-3n+1} = ? \\ 3^2 = ? \\ ? = 9 \end{array} \right|
 \end{aligned}$$

equation on surds and indices

orukita iruthu inukita kotuthaa adhu thaan +-

$x^2 = 25 \Rightarrow x = \pm 5$	$y = \sqrt{25} \Rightarrow y = 5$	$a^m \times a^n = a^{m+n}$ $a^m \times b^m = (ab)^m$ $a^m \div a^n = a^{m-n}$ $(a^m)^n = a^{mn}$
$x = \sqrt{25} \Rightarrow x = \pm 5$	$y = \sqrt[3]{25} \Rightarrow y = 5$	

LESSON-6 : Equation based on Suds and Indices

Feel Free
to
Learn

$$\textcircled{1} \quad \frac{9}{\sqrt{x}} + \frac{19}{\sqrt{x}} = \sqrt{x}$$

$$\frac{y^5 - (14 \times 2)^{\frac{11}{2}}}{1 - \sqrt{y}} = 0$$

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

$$\frac{28}{\sqrt{x}} = \sqrt{x}$$

$$y^5 \cdot y^{\frac{1}{2}} (14 \times 2)^{\frac{11}{2}} = 0$$

$$a^m \times b^m = (ab)^m$$

$$28 = \sqrt{x} \times \sqrt{x}$$

$$y^{5+\frac{1}{2}} = (14 \times 2)^{\frac{11}{2}}$$

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

$$\boxed{x=28}$$

$$\boxed{x=y}$$

$$y^{\frac{11}{2}} = 28^{\frac{11}{2}}$$

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

$$\boxed{y=28}$$

Simplifying Equations with Indices

to
Learn

$$\textcircled{2} \quad \frac{12}{\sqrt{x}} - \frac{23}{\sqrt{x}} = 5\sqrt{x}$$

$$\frac{\sqrt{y}}{12} - \frac{5\sqrt{y}}{12} = \frac{1}{\sqrt{y}}$$

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

$$\frac{-11}{\sqrt{x}} = 5\sqrt{x}$$

$$\frac{-4\sqrt{y}}{12} = \frac{1}{\sqrt{y}}$$

$$a^m \times b^m = (ab)^m$$

$$\frac{-11}{5} = 5x$$

$$-4y = 12$$

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

$$x \geq$$

$$y = \frac{-12}{4}$$

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

$$\boxed{y=-3}$$

LESSON-6 : Equation based on Squds and Indices

$$③ \frac{8}{\sqrt{x}} + \frac{6}{\sqrt{x}} = \sqrt{x}$$

$$\frac{14}{\sqrt{x}} = \sqrt{x}$$

$$\boxed{14 = x}$$

$$y^3 - \frac{(14)^{7/2}}{\sqrt{y}} = 0$$

$$\frac{y^3\sqrt{y} - (14)^{7/2}}{\sqrt{y}} = 0$$

$$y^{3+1/2} - (14)^{7/2} = 0$$

$$y^{3+1/2} = (14)^{7/2}$$

$$y^{7/2} = (14)^{7/2}$$

$$\boxed{y=14}$$

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

$$a^m \times b^m = (ab)^m$$

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

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

$$④ \frac{\sqrt{x}}{1} - \frac{(18)^{15/2}}{x^2} = 0$$

$$x^2 \times x^{1/2} - (18)^{15/2} = 0$$

$$\times x^{5/2} = 18^{15/2}$$

$$x = 18^{\frac{15}{2} \times \frac{2}{5}}$$

$$\boxed{x = 18^3}$$

$$\frac{\sqrt{y}}{1} - \frac{(19)^{9/2}}{y} = 0$$

$$y \cdot y^{1/2} - (19)^{9/2} = 0$$

$$\times y^{3/2} = 19^{9/2}$$

$$y = 19^{\frac{9}{2} \times \frac{2}{3}}$$

$$\boxed{y = 19^3}$$

X X X X X

$$\textcircled{5} \quad (x^{\frac{7}{5}} \div 9) = 169 \div x^{\frac{3}{5}} \quad y^{\frac{4}{3}} \times y^{\frac{1}{4}} \times 7 = 273 \div y^{\frac{1}{2}}$$

$$\begin{array}{r} x^{\frac{7}{5}} \\ \diagdown \quad \diagup \\ 9 \quad x^{\frac{3}{5}} \end{array}$$

$$x^{\frac{7}{5}} \times x^{\frac{3}{5}} = 169 \times 9$$

$$x = \pm 39$$

$$x_1 = 39 \quad x^{\frac{7}{5} + \frac{3}{5}} = 169 \times 9$$

$$x_2 = -39 \quad x^{\frac{10}{5}} = 169 \times 9$$

$$x = \sqrt{169 \times 9}$$

$$x = \pm (39)$$

$a^m \times a^n = a^{m+n}$
 $a^m \times b^m = (ab)^m$
 $a^m \div a^n = a^{m-n}$
 $(a^m)^n = a^{mn}$

Surds &

$$(5) \quad \left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$$

$$\left(\frac{a}{b}\right)^{x-1} = \left(\frac{a}{b}\right)^{(x-3)}$$

$$x-1 = -(x-3)$$

$$x-1 = 3-x$$

$$2x = 4$$

$x = 2$

LESSON-6 : Equation based on Suds and Indices

$$⑤ (x^{\frac{7}{5}} \div 9) = 169 \div x^{\frac{3}{5}}$$

$$\frac{x^{\frac{7}{5}}}{9} = \frac{169}{x^{\frac{3}{5}}}$$

$$x^{\frac{7}{5}} \cdot x^{\frac{3}{5}} = 169 \times 9$$

$$x^{\frac{7}{5} + \frac{3}{5}} = 169 \times 9$$

$$x^{\frac{10}{5}} = 169 \times 9$$

$$x^2 = 169 \times 9$$

$$x = \sqrt{169 \times 9}$$

$$x = \pm(39)$$

feel
to
Learn

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

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

$$a^m \times b^m = (a \times b)^m$$

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

LESSON-6 : Equation based on Suds and Indices

$$⑥ (x^{\frac{1}{4}} \div 16)^2 = 144 \div x^{\frac{3}{2}}$$

$$\left(\frac{x^{\frac{1}{4}}}{16}\right)^2 = \frac{144}{x^{\frac{3}{2}}}$$

$$\frac{(x^{\frac{1}{4}})^2}{16^2} = \frac{144}{x^{\frac{3}{2}}}$$

$$x^{\frac{1}{2}} \cdot x^{\frac{3}{2}} = 144 \div 16^2$$

$$x^{\frac{1}{2}} \cdot x^{\frac{3}{2}} = 144 \div 16^2$$

$$x^2 = 144 \div 16^2$$

$$x = \sqrt{144 \div 16^2}$$

$$= \pm(12 \div 16)$$

feel
to
Learn

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

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

$$a^m \times b^m = (a \times b)^m$$

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

Surds & Indices

Given that $x = 10^{0.48}$ $y = 10^{0.70}$ and $x^2 = y^2$

the value of z is close to?

$$x^2 = y^2 \Rightarrow (10^{0.48 \times z}) = (10^{0.70 \times 2})$$

$$\frac{10^{0.48 \times z}}{10^{0.70 \times 2}} = 10^{-0.22 \times z}$$

$$\frac{0.48 \times z - 0.70 \times 2}{0.48 \times z - 1.4} \Rightarrow z = \frac{1.4}{0.48} = \frac{140}{48} = 2.9 \text{ approx}$$

Surds & Indices

$$\frac{1}{1 + x^{b-a} + x^{c-a}} + \frac{1}{1 + x^{a-b} + x^{c-b}} + \frac{1}{1 + x^{b-c} + x^{a-c}} = ?$$

$$\frac{1}{1 + \frac{x^b}{x^a} + \frac{x^c}{x^a}} + \frac{1}{1 + \frac{x^a}{x^b} + \frac{x^c}{x^b}} + \frac{1}{1 + \frac{x^b}{x^c} + \frac{x^a}{x^c}}$$

$$\frac{x^a}{x^a + x^b + x^c} + \frac{x^b}{x^a + x^b + x^c} + \frac{x^c}{x^a + x^b + x^c} = \frac{x^a + x^b + x^c}{x^a + x^b + x^c} = 1$$

Surds & Indices

$5^a = 3125$ then what is the value of $5^{(a-3)}$

$$\downarrow \\ \sqrt[5]{5^a} = \sqrt[5]{3125} \\ 5^a = 5^5$$

$$5^a = 5^5$$

$$\boxed{a=5}$$

$$5^{(5-3)} = 5^2 \Rightarrow 25$$



Surds & Indices

$$\frac{(243)^{n/5} \times 3^{2n+1}}{9^n \times 3^{n-1}} = ?$$

$$= 3^{3n+1} - 3^{3n-1} \\ = 3^{3n+1 - 3n+1} \\ = 3^2 \Rightarrow 9$$

$$\frac{3^{5 \times n/5} \times 3^{2n+1}}{3^{2n} \times 3^{n-1}} = \frac{3^{n+2n+1}}{3^{2n+n-1}} = \frac{3}{3^{3n-1}}$$