KHAN GLOBAL STUDIES
Most Trusted Learning Platform
KHAN SIR
KGS

Surds and Indices

By: P.K Sir

20.

If $\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\cdots^{\infty}}}}} = \frac{1}{2}$ then $x = ?$

(a) $\frac{1}{8}$

(b) $\frac{1}{4}$

(c) $\frac{1}{16}$

(d) $\frac{1}{32}$

$\sqrt{x} = x^{\frac{1}{2}}$

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

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

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

$\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\cdots^{\infty}}}}} = \frac{1}{2}$

$\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\cdots^{\infty}}}}} \Rightarrow \frac{1}{2}$

$\left(\sqrt{x}\right)^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\cdots^{\infty}}}}} = \frac{1}{2}$

$\left(\sqrt{x}\right)^{\frac{1}{2}} = \frac{1}{2}$

$\left(x^{\frac{1}{2}}\right)^{\frac{1}{2}} = \frac{1}{2}$

$x^{\frac{1}{4}} = \frac{1}{2}$

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

$x = \frac{1}{16}$

20.

If $\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\cdots^{\infty}}}}} = \frac{1}{2}$ then $x = ?$

(a) $\frac{1}{8}$

(b) $\frac{1}{4}$

(c) $\frac{1}{16}$

(d) $\frac{1}{32}$

II-method

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

21.

If $\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\cdots^{\infty}}}}} = \frac{1}{6}$ then $x = ?$

(a) 6^{-12}

(b) 6^{-18}

(c) 6^{-8}

(d) 6^{-16}

$\# \frac{1}{x} = x^{-1}$

$\frac{1}{x^n} = x^{-n}$

$\# \left(\frac{a}{b}\right)^n = \left(\frac{b}{a}\right)^{-n}$

$\left(\frac{x}{y}\right)^{-n} = \left(\frac{y}{x}\right)^n$

$x^{\frac{1}{12}} = \frac{1}{6}$

$x = \left(\frac{1}{6}\right)^{\frac{12}{1}} = \left(\frac{1}{6}\right)^{12} = (6)^{-12}$

$\left(\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\cdots^{\infty}}}}}\right)^{\frac{1}{6}}$

$\left(\sqrt{x}\right) = \frac{1}{6}$

$\left(\sqrt{x}\right)^{\frac{1}{6}} = \frac{1}{6}$

$\left(x^{\frac{1}{2}}\right)^{\frac{1}{6}} = \frac{1}{6}$

$x^{\frac{1}{12}} = \frac{1}{6}$

21.

If $\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\cdots^{\infty}}}}} = \frac{1}{6}$ then $x = ?$

(a) 6^{-12}

(b) 6^{-18}

(c) 6^{-8}

(d) 6^{-16}

II-method

$x = \left(\frac{1}{6}\right)^{12}$

$= 6^{-12}$

① $\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\cdots\infty}}}}}} = \frac{1}{3}$

$x = \left(\frac{1}{3}\right)^6 = 3^{-6}$

$\left(\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\cdots\infty}}}}}\right)^{\frac{1}{3}} = \frac{1}{3}$

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

$\left(x^{\frac{1}{2}}\right)^{\frac{1}{3}} = \frac{1}{3} \Rightarrow x^{\frac{1}{6}} = \frac{1}{3} \Rightarrow x = \left(\frac{1}{3}\right)^6$

① $\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}\cdots\infty}}}}} = \frac{1}{3}$

II-method

$x = \left(\frac{1}{3}\right)^{6}$

$x = 3^{-6}$

② $\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}\cdots\infty}}}} = \frac{1}{4}$

$x = \left(\frac{1}{4}\right)^{8}$

$x = 4^{-8}$

22.

$$\sqrt[m]{a\sqrt[n]{b\sqrt[m]{a\sqrt[n]{b\sqrt[m]{a\sqrt[n]{b}}}}}}\ldots\ldots\ldots\infty$$

(a) $\sqrt[mn-1]{a^n b}$

(b) $\sqrt[mn]{ab}$

(c) $\sqrt[mn-1]{b^n a}$

(d) $\sqrt[mn+1]{a^n b}$

23. $\sqrt{2\times\sqrt[3]{4\times\sqrt{2\times\sqrt[3]{4\times\sqrt{2\times\sqrt[3]{4}\ldots\ldots\ldots\infty}}}}}$ =

(a) $\sqrt{2}$

(b) 2

(c) 4

(d) $4\sqrt{2}$

$= \sqrt[5]{2^3\times 4}$

$= \sqrt[5]{32}$

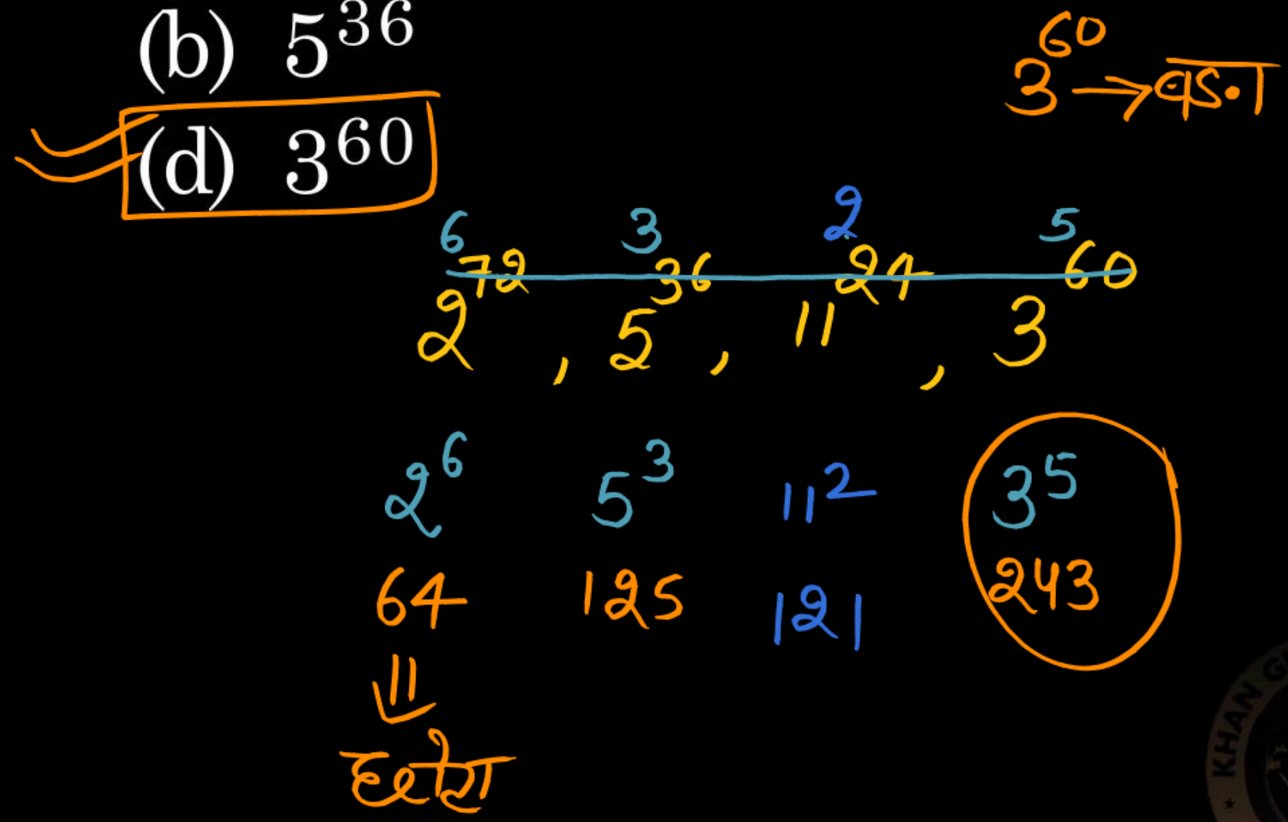
$\sqrt[5]{2^5} = 2$

$\sqrt[m]{a\sqrt[n]{b\sqrt[m]{a\sqrt[n]{b}}}}\ldots\infty$

$\sqrt[(mn-1)]{a^n \times b}$

24. The greatest number among 2^{72}, 5^{36}, 11^{24} and 3^{60} is

(a) 2^{72}
(b) 5^{36}
(c) 11^{24}
(d) 3^{60}



25. The smallest aming the number 7^{200}, 9^{150}, 6^{250} and 5^{300} is

7^{200}, 9^{150}, 6^{250} और 5^{300} निम्नलिखित में से कौन-सी संख्या सबसे छोटी है ?

(a) 7^{200}
(b) 5^{300}
(c) 9^{150}
(d) 6^{250}

7^4 2401 | 9^3 729

6^5 6×6^4 $6 \times (36)^2$ 6×1296

5^6 $(5^2)^3$ $(25)^3$

26. Which among $2^{1/2}, 3^{1/3}, 4^{1/4}, 6^{1/6}$ and $12^{1/12}$ is the largest ?

(a) $2^{1/12}$

(b) $3^{1/3}$

(c) $4^{1/4}$

(d) $6^{1/6}$

(e) $12^{1/12}$

2, 3, 4, 6, 12 → LCM → 12

$2^{\frac{1}{2}}, 3^{\frac{1}{3}}, 4^{\frac{1}{4}}, 6^{\frac{1}{6}}, 12^{\frac{1}{12}}$

$2^6, 3^4, 4^3, 6^2, 12^1$

64, 81, 64, 36, 12

81 → बड़ा value

12 → छोटा value

2, 3, 6 $\xrightarrow{LCM}$ 6

$\sqrt[2]{2}$, $\sqrt[3]{7}$, $\sqrt[6]{15}$ $\Rightarrow$ $2^{\frac{1}{2}}$ $7^{\frac{1}{3}}$ $15^{\frac{1}{6}}$

2^3 7^2 15^1

8 49 15

छोटा बड़ा

(i) बड़ा मान $\rightarrow$ $\sqrt[3]{7}$

(ii) छोटा मान $\rightarrow$ $\sqrt{2}$

concept

(i) अंतर समान (diff. constant)

(ii) योग समान (Sum constant)

(iii) गुणनफल समान (product constant)

27. Which i the greatet among $(\sqrt{17}-\sqrt{14})$, $(\sqrt{19}-4)$, $(\sqrt{22}-\sqrt{19})$, $(\sqrt{13}-\sqrt{10})$?

$(\sqrt{17}-\sqrt{14})$, $(\sqrt{19}-4)$, $(\sqrt{22}-\sqrt{19})$, $(\sqrt{13}-\sqrt{10})$ निम्नलिखित में से कौन-सी संख्या सबसे बड़ी है ?

(a) $(\sqrt{17}-\sqrt{14})$ (b) $(\sqrt{19}-4)$

(c) $(\sqrt{22}-\sqrt{19})$ (d) $(\sqrt{13}-\sqrt{10})$

diff. constant

(I) योगबड़ा → छोटा value

(II) योग छोटा → बड़ा value

$(\sqrt{17}-\sqrt{14})$, $(\sqrt{19}-\sqrt{16})$, $(\sqrt{22}-\sqrt{19})$, $(\sqrt{13}-\sqrt{10})$

3 3 3 3

31 35 41 23

सबसे छोटी सं० सबसे बड़ी सं०

28. Which one among the following is the smallest ?

निम्नलिखित में से कौन-सी संख्या सबसे छोटी है ?

(a) $\sqrt{201} - \sqrt{199}$

(b) $\sqrt{101} - \sqrt{99}$

(c) $\sqrt{301} - \sqrt{299}$

(d) $\sqrt{401} - \sqrt{399}$ = सबसे छोटा

29. The smalest of $\left(\sqrt{8}+\sqrt{5}\right),\left(\sqrt{7}+\sqrt{6}\right),\left(\sqrt{10}+\sqrt{3}\right)$ and $\left(\sqrt{11}+\sqrt{2}\right)$ is:

H.W/R.W

(a) $\left(\sqrt{8}+\sqrt{5}\right)$ (b) $\left(\sqrt{7}+\sqrt{6}\right)$

(c) $\left(\sqrt{10}+\sqrt{3}\right)$ (d) $\left(\sqrt{11}+\sqrt{2}\right)$