



| KGS

KHAN SIR

Surds and Indices



By: P.K Sir

01.

Find the value of $\sqrt{30 + \sqrt{30 + \sqrt{30 + \dots}}}$

$\sqrt{30 + \sqrt{30 + \sqrt{30 + \dots}}}$ कका मान ज्ञात कीजिए ?

(a) 5

(b) $3\sqrt{10}$

~~(c) 6~~

(d) 7

02.

Let $x = \sqrt{272 + \sqrt{272 + \sqrt{272 + \sqrt{272 + \dots}}}}$ to infinity ;

then x equals

$$\downarrow$$

$$16 \times 17$$

(a) 16

(b) $4\sqrt{13}$

(c) 17

(d) 4.35

$$\textcircled{i} x = \sqrt{a + \sqrt{a + \sqrt{a + \dots}}} \rightarrow \infty \Rightarrow x = \frac{\sqrt{4a+1} + 1}{2}$$

$$\textcircled{ii} y = \sqrt{a - \sqrt{a - \sqrt{a - \dots}}} \rightarrow \infty \Rightarrow y = \frac{\sqrt{4a+1} - 1}{2}$$

03.

Let $x = \sqrt{42 - \sqrt{42 - \sqrt{42 - \sqrt{42 - \dots}}}}$ to infinity ;
then x equals

~~(a) 6~~

(b) 7

(c) Between 6 and 7 (d) Greater than 7

04.

What is the value of $2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \dots}}}$?

$2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \dots}}}$ का मान क्या है ?

(a) 1 (b) 2

(c) 3

~~(d) 4~~

$$2 + 2 = 4$$

05.

$$\sqrt{31 + \sqrt{31 + \sqrt{31 + \sqrt{31 \dots \infty}}}} = ?$$

~~(a)~~ $5\sqrt{5} - 1.5$

~~(b)~~ $2.5\sqrt{5} + 0.5$

~~(c)~~ $\frac{5\sqrt{5} - 1}{2}$

(d) $\frac{2\sqrt{31} + 1}{2}$

$$\frac{\sqrt{4a+1} + 1}{2} = \frac{\sqrt{4 \times 31 + 1} + 1}{2} = \frac{\sqrt{125+1}}{2} = \frac{\sqrt{126}}{2}$$

$$\sqrt{125} = 5\sqrt{5}$$

$$2.5\sqrt{5} + 0.5$$

$$\frac{\sqrt{2}\sqrt{5} + 1}{2}$$



06.

$\sqrt{14 + \sqrt{14 + \sqrt{14 + \sqrt{14 + \dots \infty}}}}$ lies between x

~~(a)~~ 4 and 4.5

(b) 4.5 and 5

(c) 3 and 4

(d) none

$$x = \frac{\sqrt{4a+1} + 1}{2} = \frac{\sqrt{57+1}}{2}$$

$$\frac{\sqrt{49} + 1}{2} < x < \frac{\sqrt{64} + 1}{2}$$

$$\frac{7+1}{2} < x < \frac{8+1}{2}$$

$$4 < x < 4.5$$

$$\# x = \sqrt{7 + \sqrt{7 + \sqrt{7} \dots \infty}} \quad x = \frac{\sqrt{4a+1} + 1}{2} = \frac{\sqrt{29+1}}{2}$$

$\sqrt{25} \leftarrow \rightarrow \sqrt{36}$

x 的 Range

$$\frac{\sqrt{25+1}}{2} < x < \frac{\sqrt{36+1}}{2}$$

$$2 < x < 3.5$$

$$\# x = \sqrt{11 - \sqrt{11 - \sqrt{11 - \sqrt{11} \dots \infty}}} \quad x = \frac{\sqrt{4a+1}-1}{2} = \frac{\sqrt{45-1}}{2}$$

$36 \leftarrow \rightarrow 49$

x 的 Range $x = \frac{\sqrt{4a+1}-1}{2} = \frac{\sqrt{45-1}}{2}$

$$\frac{\sqrt{36-1}}{2} < x < \frac{\sqrt{49-1}}{2}$$

$$2.5 < x < 3$$

07.

If $a = \sqrt{13 + \sqrt{13 + \sqrt{13 + \sqrt{13 \dots \infty}}}}$ and

$$x = \sqrt{a + \sqrt{a + \sqrt{a + \dots \infty}}}$$

$$y = \sqrt{a - \sqrt{a - \sqrt{a - \dots \infty}}}$$

$b = \sqrt{13 - \sqrt{13 - \sqrt{13 - \sqrt{13 \dots \infty}}}}$, then which option

is true ?

① $a+b = \sqrt{4 \times 13 + 1}$ ③ $a \times b = 13$
 ② $a-b = 1$ $= \sqrt{53}$

① $x+y = \sqrt{4a+1}$
 ② $x-y = 1$
 ③ $x \times y = a$

(a) $a+b+1=0$ ~~(b) $a-b-1=0$~~

(c) $a-b+1=0$ (d) $a-b+1=0$

$a-b=1$
 $a-b-1=0$

08.

Find $\sqrt{19 - \sqrt{19 - \sqrt{19 - \sqrt{19 \dots \infty}}}} = ?$ $\frac{\sqrt{4a+1}-1}{2} = \frac{\sqrt{77}-1}{2}$

~~(a)~~ $\frac{\sqrt{77}-1}{2}$

(b) $\frac{\sqrt{19}+3}{2}$

(c) $\frac{\sqrt{77}+1}{2}$

(d) Between 4 and 5

09.

Find $\sqrt{35 \oplus 2\sqrt{35 + 2\sqrt{35 + 2\sqrt{35 + \dots\infty}}} = ?$

(a) 6

(c) 5

~~(b) 7~~

(d) 6.4

$\sqrt{5 \times 7}$
✓
✓

10.

Find $\sqrt{154 + 3\sqrt{154 + 3\sqrt{154 + 3\sqrt{154 + \dots\infty}}} = ?$

(a) 13

 11×14

(b) 14

(c) 11

(d)

$$\frac{\sqrt{613} + 9}{2}$$

$$\textcircled{i} x = \sqrt{a + b\sqrt{a + b\sqrt{a + \dots\infty}}}$$

$$x = \frac{\sqrt{4a + b^2} + b}{2}$$

$$\textcircled{ii} y = \sqrt{a - b\sqrt{a - b\sqrt{a - \dots\infty}}}$$

$$y = \frac{\sqrt{4a + b^2} - b}{2}$$

11.

Find $\sqrt{3 + 4\sqrt{3 + 4\sqrt{3 + 4\sqrt{3 + \dots\infty}}} = ?$

$$x = \frac{\sqrt{4a + b^2} + b}{2}$$

(a) $\sqrt{7} + 2$

(b) $2\sqrt{7} - 3$

(c) $2\sqrt{7}$

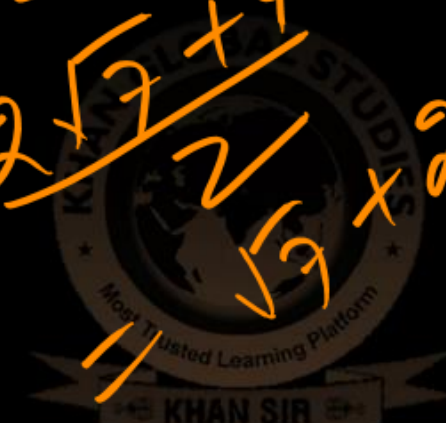
(d) $4 + \sqrt{7}$

$$= \frac{\sqrt{4 \times 3 + 4^2} + 4}{2}$$

$$= \frac{\sqrt{28 + 16}}{2}$$

$$= \frac{2\sqrt{7} + 4}{2}$$

$$= \sqrt{7} + 2$$



12.

Let $x = \sqrt{6 - \sqrt{6 + \sqrt{6 - \sqrt{6 + \dots}}}}$ to infinity ; then x

equals

(a) 3

(b) $\sqrt{21}$

(c) $\frac{\sqrt{21} - 1}{2}$

(d) $\frac{\sqrt{21} + 1}{2}$

① $x = \sqrt{a + \sqrt{a - \sqrt{a + \sqrt{a - \dots}}}}$

$x = \frac{\sqrt{4a-3} + 1}{2}$

② $y = \sqrt{a - \sqrt{a + \sqrt{a - \sqrt{a + \dots}}}}$

$y = \frac{\sqrt{4a-3} - 1}{2}$ ✓

$\frac{\sqrt{4a-3} - 1}{2} = \frac{\sqrt{4 \times 6 - 3} - 1}{2} = \frac{\sqrt{21} - 1}{2}$

13.

Let $x = \sqrt{4 + \sqrt{4 - \sqrt{4 + \sqrt{4 - \dots}}}}$ to infinity; then x

equals $x = \frac{\sqrt{4x-3} + 1}{2} = \frac{\sqrt{4 \times 4 - 3} + 1}{2} = \frac{\sqrt{13} + 1}{2}$

(a) 3

(b) $\sqrt{13}$

(c) $\frac{\sqrt{13} - 1}{2}$

(d) $\frac{\sqrt{13} + 1}{2}$

14.

Let $x = \sqrt{3 + 2\sqrt{3 - 2\sqrt{3 + 2\sqrt{3 - \dots}}}}$; then x equals

(a) 1

(b) $\sqrt{2}$

(c) 2

(d) none

$$\textcircled{i} \quad x = \sqrt{a+b} \sqrt{a-b} \sqrt{a+b} \sqrt{a-b} \dots \infty \quad x = \frac{\sqrt{4a-3b^2} + b}{2} = \frac{\sqrt{4 \times 3 - 3 \times 2^2} + 2}{2}$$

$$= \frac{\sqrt{0} + 2}{2}$$

$$= \frac{0 + 2}{2} = 1$$

$$\textcircled{ii} \quad y = \sqrt{a-b} \sqrt{a+b} \sqrt{a-b} \sqrt{a+b} \dots \infty \quad y = \frac{\sqrt{4a-3b^2} - b}{2}$$

15.

Let $x = \sqrt{7 - 2\sqrt{7 + 2\sqrt{7 - 2\sqrt{7 + \dots}}}}$; then x equals

~~(a)~~ 1

(b) $\sqrt{2}$

(c) 2

(d) none

$$y = \frac{\sqrt{4a - 3b^2} - b}{2} = \frac{\sqrt{4 \times 7 - 3 \times 2^2} - 2}{2} = \frac{\sqrt{16 - 2}}{2} = \frac{4 - 2}{2} = \frac{2}{2} = 1$$

16.

$$\sqrt{12\sqrt{12\sqrt{12\sqrt{12}\dots\infty}}} = ?$$

(a) 8

~~(b) 12~~

(c) 36

(d) 6

$$x = \sqrt{a\sqrt{a\sqrt{a}\dots\infty}}$$

$$x = a$$

17.

$$\sqrt{7\sqrt{7\sqrt{7\sqrt{7}\dots\infty}}} = 343^{y-1} \text{ then } y = ?$$

$$7 = (343)^{y-1}$$

$$343 = 7^3$$

~~(a)~~ $\frac{4}{3}$

(b) $\frac{3}{2}$

(c) $\frac{5}{4}$

(d) 1

$$y = \frac{4}{3}$$

$$7^1 = 7^{3(y-1)}$$

$$7^1 = 7^{3y-3}$$

$$1 = 3y-3$$

$$4 = 3y$$

(i) $a^m \times a^n = a^{m+n}$

(ii) $\frac{a^m}{a^n} = a^{m-n}$

(iii) $a^x = a^y$

$x = y$

(iv) $a^x = b^x$

$a = b$



$$\overset{24}{(12)} = \overset{24}{(3x)}$$

$$x =$$

$$12 = 3x$$
$$x = 4$$

$$x = \sqrt[n]{a \times \sqrt[n]{a \times \sqrt[n]{a} \dots \infty}}$$

$$\sqrt[16]{16 \times \sqrt[16]{16} \dots \infty}$$

(16)

$$x = (a)^{\frac{1}{n-1}}$$

$$\textcircled{4} \sqrt[4]{27 \sqrt[4]{27 \sqrt[4]{27} \dots \infty}}$$

$$x = \sqrt[n-1]{a}$$

$$\sqrt[3]{27} = 3$$

18.

$$\sqrt[3]{64\sqrt[3]{64\sqrt[3]{64\dots\dots}}} = ? \quad \sqrt{64} = 8$$

(a) 4

(b) 8

(c) 16

(d) $4\sqrt{2}$

$$\sqrt[4]{81} = 3$$

$$\# x = \sqrt[5]{81\sqrt[5]{81\sqrt[5]{81\sqrt[5]{81\dots\dots}}} \quad \infty$$

19.

$$\sqrt[2]{27 \div \sqrt{27 \div \sqrt{27 \div \sqrt{27 \dots \dots \infty}}} = ?$$

$$= \sqrt[3]{27}$$

$$= 3$$

(a) 3

(b) $3\sqrt{3}$

(c) $\sqrt{3}$

(d) 9

$$x = \sqrt[n]{a \div \sqrt[n]{a \div \sqrt[n]{a \dots \dots \infty}}}$$

$$x = \sqrt[n+1]{a}$$

$$x = \sqrt[2]{8 \div \sqrt[3]{8 \div \sqrt[3]{8 \div \sqrt[3]{8 \dots \dots \infty}}}$$

$$x = \sqrt[2]{81} = 9$$

$$y = \sqrt[3]{8 \div \sqrt[4]{8 \div \sqrt[4]{8 \div \sqrt[4]{8 \dots \dots \infty}}}$$

$$y = 3$$