सरलीकरण | Simplification

Type-1 (A)

1. $\sqrt{72-\sqrt{72-\sqrt{72-\sqrt{72-.....\infty}}}}$ = ?

(A) 8 (B) 6
(C) 4 (D) 2

2. $x = \sqrt{6+\sqrt{6+\sqrt{6+.....\infty}}}$, $y = \sqrt{6-\sqrt{6-\sqrt{6-.....\infty}}}$

Find the relation between x & y ?

$x = \sqrt{6+\sqrt{6+\sqrt{6+.....\infty}}}$, $y = \sqrt{6-\sqrt{6-\sqrt{6-.....\infty}}}$

x तथा y का सम्बन्ध ज्ञात कीजिये ?

(A) $x - y - 1 = 0$ (B) $x + y - 1 = 0$
(C) $x - y + 1 = 0$ (D) $x + y + 1 = 0$

3. $\sqrt{63+2\sqrt{63+2\sqrt{63+2.....\infty}}}$ = ?

(A) 7 (B) 5
(C) 9 (D) 3

4. $\sqrt{88-3\sqrt{88-3\sqrt{88-3.....\infty}}}$ = ?

(A) 6 (B) 8
(C) 4 (D) 2

5. $\sqrt{5+\sqrt{5+\sqrt{5+.....\infty}}}$ = ?

(A) between 1 & 2 (B) between 2 & 3
(C) between 4 & 5 (D) between 3 & 4

6. $\sqrt{5-\sqrt{5-\sqrt{5-.....\infty}}}$ = ?

(A) between 1 & 2 (B) between 2 & 3
(C) between 4 & 5 (D) between 3 & 4

7. $\sqrt{7-3\sqrt{7-3\sqrt{7-3.....\infty}}}$ = ?

(A) $\frac{\sqrt{37}-3}{2}$ (B) $\frac{3-\sqrt{37}}{2}$

(C) $\frac{3-3\sqrt{37}}{2}$ (D) $\frac{3\sqrt{37}-3}{2}$

8. $\sqrt{4+\sqrt{4-\sqrt{4+\sqrt{4-.....\infty}}}}$ = ?

(A) $\frac{\sqrt{13}+1}{3}$ (B) $\sqrt{13}$

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

9. $\sqrt{7-\sqrt{7+\sqrt{7-\sqrt{7+.....\infty}}}}$ = ?

(A) 0 (B) 1
(C) 2 (D) 3

10. $\sqrt{7+3\sqrt{7-3\sqrt{7+3\sqrt{7-3.....\infty}}}}$ =?

(A) 3 (B) 1
(C) 2 (D) 0

11. $\sqrt{7-3\sqrt{7+3\sqrt{7-3\sqrt{7+3.....\infty}}}}$ = ?

(A) – 1 (B) 1
(C) 2 (D) – 2

12. $\sqrt{7\sqrt{7\sqrt{7\sqrt{7}}}}$ = ?

(A) $7^{\frac{11}{16}}$ (B) $7^{\frac{13}{16}}$

(C) $7^{\frac{7}{16}}$ (D) $7^{\frac{15}{16}}$

13. $\sqrt{7\sqrt{7\sqrt{7\sqrt{7\sqrt{7}}}}}$ .... 10 terms = ?

(A) $7^{\frac{1023}{1022}}$ (B) $7^{\frac{1}{1023}}$

(C) $7^{\frac{1}{1024}}$ (D) $7^{\frac{1023}{1024}}$

14. $\sqrt{7\sqrt{7\sqrt{7\sqrt{7\sqrt{7\sqrt{7.....\infty}}}}}}$ .... = ?

(A) 7 (B) 5
(C) 4 (D) 3

15. $\sqrt[3]{7\sqrt[3]{7\sqrt[3]{7}}}$ = ?

(A) $7^{\frac{13}{25}}$ (B) $7^{\frac{11}{27}}$

(C) $7^{\frac{13}{21}}$ (D) $7^{\frac{13}{27}}$

16. $\sqrt[4]{2\sqrt[4]{2\sqrt[4]{2\sqrt[4]{2}}}}$ = ?

(A) $2^{\frac{84}{256}}$ (B) $2^{\frac{75}{256}}$

(C) $2^{\frac{85}{256}}$ (D) $2^{\frac{23}{256}}$

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17. $\sqrt{2\sqrt[3]{4\sqrt{2\sqrt[3]{4.....\infty}}}}$ = ?

(A) 1
(B) 2
(C) 3
(D) 4

18. $\sqrt{3\sqrt[3]{9\sqrt{3\sqrt[3]{9.....\infty}}}}$ = ?

(A) 4
(B) 3
(C) 1
(D) 1

19. If $\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{.....\infty}}}}$ = 4, then x = ?

यदि $\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{.....\infty}}}}$ = 4 हो, तो x = ?

(A) 3 (B) 1
(C) 4 (D) 2

20. $\sqrt{1+2\sqrt{1+3\sqrt{1+4\sqrt{1+5.....\infty}}}}$ = ?

(A) 1 (B) 2
(C) 4 (D) 3

SOLUTIONS

1. (A) $\sqrt{72-\sqrt{72-\sqrt{72.....\infty}}} = x(\text{Let})$

Doing square of both sides

$\Rightarrow x^2 = 72 - x$

$\Rightarrow x^2 + 9x - 8x - 72 = 0$

$\Rightarrow x(x + 9) - 8(x + 9) = 0$

$\Rightarrow (x - 8)(x + 9) = 0$

$\Rightarrow x = 8$ $[\because x \text{ can't be} - \text{ve}]$

2. (A) $x = \sqrt{6+\sqrt{6+\sqrt{6.....\infty}}}$

$\Rightarrow x^2 = 6 + x$ ...(i)

$y = \sqrt{6-\sqrt{6-\sqrt{6.....\infty}}}$

$\Rightarrow y^2 = 6 - y$ ...(ii)

By eq. (i) – eq.(ii)

$x^2 - y^2 = x + y$

$\Rightarrow x - y - 1 = 0$

3. (C) $\sqrt{63+2\sqrt{63+2\sqrt{63.....\infty}}} = x(\text{Let})$

$\Rightarrow x^2 = 63 + 2x$

$\Rightarrow x^2 - 9x + 7x - 63 = 0$

$\Rightarrow x(x - 9) + 7(x - 9) = 0$

$\Rightarrow x = 9$ $[\because x \text{ can't be} - \text{ve}]$

4. (B) $\sqrt{88-3\sqrt{88-3\sqrt{88.....}}} = x(\text{Let})$

$\Rightarrow x^2 = 88 - 3x$

$\Rightarrow x^2 + 11x - 8x - 88 = 0$

$\Rightarrow x(x + 11) - 8(x + 11) = 0$

$\Rightarrow (x - 8)(x + 11)$

$\Rightarrow x = 8$ $[\because x \text{ can't be} - \text{ve}]$

5. (B) $\sqrt{5+\sqrt{5+\sqrt{5+.....\infty}}} = x(\text{Let})$

$\Rightarrow x^2 = 5 + x$

$\Rightarrow x^2 - x - 5 = 0$

$\Rightarrow x = \dfrac{1 \pm \sqrt{1+20}}{2}$

$\Rightarrow x = \dfrac{\sqrt{21}+1}{2}$ $[\because x \text{ can't be} - \text{ve}]$

$\because \sqrt{16} < \sqrt{21} < \sqrt{25}$

$\Rightarrow \dfrac{\sqrt{16}+1}{2} < \dfrac{\sqrt{21}+1}{2} < \dfrac{\sqrt{25}+1}{2}$

$\Rightarrow 2.5 < x < 3$

So, It's value lie between 2 and 3

6. (A) $\sqrt{5-\sqrt{5-\sqrt{5.....\infty}}} = x(\text{Let})$

$\Rightarrow x^2 = 5 - x$

$\Rightarrow x^2 + x - 5 = 0$

$\Rightarrow x = \dfrac{-1 \pm \sqrt{1+20}}{2}$

$\Rightarrow x = \dfrac{\sqrt{21}-1}{2}$ $[\because x \text{ can't be} - \text{ve}]$

$\because \sqrt{16} < \sqrt{21} < \sqrt{25}$

$\Rightarrow \dfrac{\sqrt{16}-1}{2} < \dfrac{\sqrt{21}-1}{2} < \dfrac{\sqrt{25}-1}{2}$

$\Rightarrow 1.5 < x < 2$

So, It's value will be between 1 and 2

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7. (A) $\sqrt{7-3\sqrt{7-3\sqrt{7-3.....\infty}}} = x(\text{Let})$

$\Rightarrow x^2 = 7 - 3x$

$\Rightarrow x^2 + 3x - 7 = 0$

$\Rightarrow x = \dfrac{-3+\sqrt{9+28}}{2} = \dfrac{\sqrt{37}-3}{2}$

8. (C) As we know,

If $\sqrt{a \pm b\sqrt{a \mp b\sqrt{a \pm b\sqrt{a \mp ..}}}}...\infty = n$

Then $n = \dfrac{\sqrt{4a-3b^2} \pm b}{2}$

So, $\sqrt{4+\sqrt{4-\sqrt{4+\sqrt{4-...}}}}..\infty$

$= \dfrac{\sqrt{4\times4-3\times(1)^2}+1}{2} = \dfrac{\sqrt{13}+1}{2}$

9. (C) $\sqrt{7-\sqrt{7+\sqrt{7-\sqrt{7+....}}}}.\infty$

$= \dfrac{\sqrt{4\times7-3\times(1)^2}-1}{2} = 2$

10. (C) $\sqrt{7+3\sqrt{7-3\sqrt{7+3\sqrt{7-3}}}}...\infty$

$= \dfrac{\sqrt{4\times7-3\times(3)^2}+3}{2} = 2$

11. (A) $\sqrt{7-3\sqrt{7+3\sqrt{7-3}}}...\infty$

$= \dfrac{\sqrt{4\times7-3\times(3)^2}-3}{2} = -1$

12. (D) $\sqrt{7\sqrt{7\sqrt{7\sqrt{7}}}} = 7^{\frac{1}{2}} \times 7^{\frac{1}{4}} \times 7^{\frac{1}{8}} \times 7^{\frac{1}{16}} = 7^{\frac{15}{16}}$

13. (D) $\sqrt{7\sqrt{7\sqrt{7\sqrt{7}}}}$ ..... 10 terms

$= 7^{\left(\frac{1}{2}\right)^1} \times 7^{\left(\frac{1}{2}\right)^2} \times 7^{\left(\frac{1}{2}\right)^3} \times .....7^{\left(\frac{1}{2}\right)^{10}} = 7^{\frac{1023}{1024}}$

14. (A) $\sqrt{7\sqrt{7\sqrt{7\sqrt{7.....\infty}}}}$ $= 7^{\frac{1}{2}-\frac{1}{4}-\frac{1}{8}.....\infty} = 7^{\frac{1}{1-\frac{1}{2}}} = 7$

15. (D) $\sqrt[3]{7\sqrt[3]{7\sqrt[3]{7}}} = 7^{\frac{1}{3}-\frac{1}{9}+\frac{1}{27}} = 7^{\frac{13}{27}}$

16. (C) $\sqrt[4]{2\sqrt[4]{2\sqrt[4]{2\sqrt[4]{2}}}} = 2^{\frac{1}{4}-\frac{1}{16}+\frac{1}{64}-\frac{1}{256}} = 2^{\frac{85}{256}}$

17. (B) $\sqrt{2\sqrt[3]{4\sqrt{2\sqrt[3]{4.....}}}}\infty = 2^{\frac{1}{2}+\frac{1}{12}+\frac{1}{72}....\infty} \times 4^{\frac{1}{6}+\frac{1}{36}+\frac{1}{108}....\infty}$

$= 2^{\frac{\frac{1}{2}}{1-\frac{1}{6}}} \times 4^{\frac{\frac{1}{6}}{1-\frac{1}{6}}} = 2^{\frac{3}{5}} \times 4^{\frac{1}{5}} = 2$

18. (B) $\sqrt{3\sqrt[3]{9\sqrt{3\sqrt[3]{9}}}.....\infty} = 3^{\frac{1}{2}-\frac{1}{12}+\frac{1}{72}.....\infty} \times 9^{\frac{1}{6}-\frac{1}{36}+\frac{1}{108}....\infty}$

$= 2^{\frac{\frac{1}{2}}{1-\frac{1}{6}}} \times 9^{\frac{\frac{1}{6}}{1-\frac{1}{6}}} = 3^{\frac{3}{5}} \times 9^{\frac{1}{5}} = 3$

19. (D) $\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}.....\infty}}} = 4$

$\Rightarrow \sqrt{x}^4 = 4$

$\Rightarrow x^2 = 4 \Rightarrow x = 2$

20. (D) $\sqrt{1+2\sqrt{1+3\sqrt{1+4\sqrt{1+5+.....\infty}}}} = 3$

$3 = \sqrt{9} = \sqrt{1+2\sqrt{16}} = \sqrt{1+2\sqrt{1+3\sqrt{25}}}$

$= \sqrt{1+2\sqrt{1+3\sqrt{1+4\sqrt{36}}}}$

$= \sqrt{1+2\sqrt{1+3\sqrt{1+4\sqrt{1+5...\infty}}}}$

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