SURDS AND INDICES

घातांक और करणी

PRACTICE SHEET

WITH SOLUTIONS

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Maths By Aditya Ranjan

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Surds and indices
(Practice Sheet With Solution)

1. If $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$ then the value of x is:

यदि $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$ तब x का मान है:

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

(c) 2 (d) $\frac{2}{3}$

2. If $a^x = b$, $b^y = c$, $c^z = a$ and $b^2 = ac$, then y equals:

यदि $a^x = b$, $b^y = c$, $c^z = a$ और $b^2 = ac$ है, तो y बराबर है:

(a) $\frac{xy}{x+z}$ (b) $\frac{xz}{2(x-z)}$

(c) $\frac{xz}{2(z-x)}$ (d) $\frac{2xz}{(x+z)}$

3. If $x = 5 + 2\sqrt{6}$, then $\frac{(x-1)}{\sqrt{x}}$ is euqual to:

यदि $x = 5 + 2\sqrt{6}$ है, तो $\frac{(x-1)}{\sqrt{x}}$ बराबर है:

(a) $\sqrt{2}$ (b) $2\sqrt{2}$

(c) $\sqrt{3}$ (d) $2\sqrt{3}$

4. The value of $\frac{(243)^{0.13} \times (243)^{0.07}}{(7)^{0.25} \times (49)^{0.075} \times (343)^{0.2}}$

$\frac{(243)^{0.13} \times (243)^{0.07}}{(7)^{0.25} \times (49)^{0.075} \times (343)^{0.2}}$ का मान है।

(a) $\frac{3}{7}$ (b) $\frac{5}{7}$

(c) $\frac{7}{3}$ (d) $\frac{7}{5}$

5. Which one of the following is the least?
$\sqrt{3}, \sqrt[3]{2}, \sqrt{2}$ and $\sqrt[3]{4}$?
निम्नलिखित में से कौन सा सबसे छोटा है?
$\sqrt{3}, \sqrt[3]{2}, \sqrt{2}$ और $\sqrt[3]{4}$

(a) $\sqrt{2}$ (b) $\sqrt[3]{2}$

(c) $\sqrt{3}$ (d) $\sqrt[3]{4}$

6. Which one of the following is the biggest?
$\sqrt[3]{4}, \sqrt[4]{6}, \sqrt[6]{15}$ and $\sqrt[12]{245}$
निम्नलिखित में से कौन सा सबसे बड़ा है?
$\sqrt[3]{4}, \sqrt[4]{6}, \sqrt[6]{15}$ and $\sqrt[12]{245}$

(a) $\sqrt[3]{4}$ (b) $\sqrt[4]{6}$

(c) $\sqrt[6]{15}$ (d) $\sqrt[12]{245}$

7. If $9^n \times 3^5 \times (27)^3 / 3 \times (81)^4 = 27$, then the value of n is:
यदि $9^n \times 3^5 \times (27)^3 / 3 \times (81)^4 = 27$, तो n का मान है:

(a) 0 (b) 2
(c) 3 (d) 4

8. The value of $5^x \times 25^{x-1} \div (5^{x-1} \times 25^{x-1})$
$5^x \times 25^{x-1} \div (5^{x-1} \times 25^{x-1})$ का मान है

(a) 2 (b) 5
(c) 7 (d) 9

9. If m and n are whole numbers such that $m^n = 121$, then $(m-1)^{n+1}$ = ?
यदि m और n पूर्ण संख्याएँ हैं जैसे कि $m^n = 121$, तो $(m-1)^{n+1}$ = ?

(a) 100 (b) 1000
(c) 10000 (d) 10

10. simplify/सरल करें : $\{(6.25)^{1/2} \times (0.0144)^{1/2} + \{(0.027)^{1/3} \times (81)^{1/4}\}$

(a) 0.14 (b) 1.4
(c) 1 (d) 1.2

11. If $3^{2x+3} - 244 \times 3^x = -9$, then which of the following statements is true?
यदि $3^{2x+3} - 244 \times 3^x = -9$, तो निम्नलिखित में से कौन सा कथन सत्य है?

(a) 'X' is a positive number
(b) 'X' is a negative number
(c) 'X' can be either a positive number or a negative number
(d) None of the above

12. If $x = -0.5$, then which of the following has the smallest value?

यदि $x = -0.5$ है, तो निम्नलिखित में से किसका मान सबसे छोटा है?

(a) $2^{\frac{1}{x}}$ (b) $\frac{1}{x}$

(c) $\frac{1}{x^2}$ (d) 2^x

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

$2^{1/2}$, $3^{1/3}$, $4^{1/4}$, $6^{1/6}$, और $12^{1/2}$ में से कौन सा सबसे बड़ा है?

(a) $2^{\frac{1}{2}}$ (b) $3^{\frac{1}{3}}$

(c) $4^{\frac{1}{4}}$ (d) $6^{\frac{1}{6}}$

14. Given that $10^{0.48} = x$, $10^{0.70} = y$ and $x^z = y^2$, then the value of z is close to:

यह देखते हुए कि $10^{0.48} = x$, $10^{0.70} = y$ और $x^z = y^2$, तो z का मान किसके करीब है:

(a) 45 (b) 88

(c) 2.9 (d) 3.7

15. If $\sqrt[3]{7^a \times (35)^{(b+1)} \times (20)^{(c+2)}}$ is a whole number then which one of statements below is consistent with it?

यदि $\sqrt[3]{7^a \times (35)^{(b+1)} \times (20)^{(c+2)}}$ एक पूर्ण संख्या है तो नीचे दिए गए कथनों में से कौन सा इसके अनुरूप है?

(a) a = 3, b = 2, c = 1

(b) a = 3, b = 1, c = 1

(c) a = 2, b = 1, c = 2

(d) a = 1, b = 2, c = 1

16. If a, b, c are non-zero and $14^a = 36^b = 84^c$, then $6b\left(\frac{1}{c} - \frac{1}{a}\right)$ is equal to

यदि a, b, c शून्येतर हैं और $14^a = 36^b = 84^c$, तो $6b\left(\frac{1}{c} - \frac{1}{a}\right)$ बराबर है

(a) 3 (b) 2

(c) 1 (d) 5

17. If $x = (4096)^{7+4\sqrt{3}}$, then which of the followng equals 64?

यदि $x = (4096)^{7+4\sqrt{3}}$ है, तो निम्नलिखित में से कौन सा 64 के बराबर है?

(a) $\frac{x^{7/2}}{x^{4\sqrt{3}}}$ (b) $\frac{x^7}{x^{4\sqrt{3}}}$

(c) $\frac{x^{7/2}}{x^{2\sqrt{3}}}$ (d) $\frac{x^7}{x^{2\sqrt{3}}}$

18. If $(5.55)^x = (0.555)^y = 1000$, then the value of $\frac{1}{x} - \frac{1}{y}$ is

यदि $(5.55)^x = (0.555)^y = 1000$, तो $\frac{1}{x} - \frac{1}{y}$ का मान है

(a) 1 (b) $\frac{1}{3}$

(c) $\frac{2}{3}$ (d) 3

19. Given that $x^{2018}\, y^{2017} = 1/2$ and $x^{2016}\, y^{2019} = 8$, the value of $x^2 + y^3$ is

यह देखते हुए कि $x^{2018}\, y^{2017} = 1/2$ और $x^{2016}\, y^{2019} = 8$, $x^2 + y^3$ का मान है

(a) $\frac{37}{4}$ (b) $\frac{31}{4}$

(c) $\frac{35}{4}$ (d) $\frac{33}{4}$

20. If $9^{x-\frac{1}{2}} - 2^{2x-2} = 4^x - 3^{2x-3}$, then x is

यदि $9^{x-\frac{1}{2}} - 2^{2x-2} = 4^x - 3^{2x-3}$, तो x है

(a) $\frac{3}{2}$ (b) $\frac{2}{5}$

(c) $\frac{3}{4}$ (d) $\frac{4}{9}$

21. Given $A = 2^{65}$ and $B = (2^{64} + 2^{63} + 2^{62} + \ldots + 2^0)$, which of the following is true?

$A = 2^{65}$ और $B = (2^{64} + 2^{63} + 2^{62} + \ldots + 2^0)$ दिया गया है, निम्नलिखित में से कौन सा सत्य है?

(a) B is 2^{64} larger than A

(b) A and B are equal

(c) B is larger than A by 1

(d) A is larger than B by 1

22. Simplify/को सरलीकृत कीजिए-

$$\left(\frac{2+\sqrt{3}}{2-\sqrt{3}}+\frac{2-\sqrt{3}}{2+\sqrt{3}}+\frac{\sqrt{3}-1}{\sqrt{3}+1}\right)$$

(a) $2-\sqrt{3}$ (b) $2+\sqrt{3}$

(c) $16-\sqrt{3}$ (d) $4-\sqrt{3}$

23. Let $x=\sqrt{4+\sqrt{4-\sqrt{4+\sqrt{4-\ldots\infty}}}}$ then x equals

मान लीजिए $x=\sqrt{4+\sqrt{4-\sqrt{4+\sqrt{4-\ldots\infty}}}}$ तो x बराबर है

(a) 3 (b) $\sqrt{13}$

(c) $\frac{\sqrt{3}-1}{2}$ (d) $\frac{\sqrt{13}+1}{2}$

24. Let $x=\sqrt{6-\sqrt{6+\sqrt{6-\sqrt{6+\ldots\ldots\ldots\infty}}}}$ then x equals

मान लीजिए $x=\sqrt{6-\sqrt{6+\sqrt{6-\sqrt{6+\ldots\ldots\ldots\infty}}}}$ तो x बराबर है

(a) $\frac{\sqrt{21}-1}{2}$ (b) $\frac{\sqrt{21}+1}{2}$

(c) 2 (d) 12

25. The value of $\sqrt{7\sqrt{7\sqrt{7.....\infty}}}$ is

$\sqrt{7\sqrt{7\sqrt{7.....\infty}}}$ का मान है

(a) 5 (b) 6

(c) 7 (d) None

26. The value of $\sqrt{12+\sqrt{12+\sqrt{12+.....\infty}}}$ is

$\sqrt{12+\sqrt{12+\sqrt{12+.....\infty}}}$ का मान है

(a) 4 (b) 3

(c) 2 (d) 12

27. The value of $\sqrt{30-\sqrt{30-\sqrt{30.....\infty}}}$ is:

$\sqrt{30-\sqrt{30-\sqrt{30.....\infty}}}$ का मान है

(a) 5 (b) 6

(c) 7 (d) 30

28. The value of $\sqrt{5\sqrt{5\sqrt{5\sqrt{5}}}}$ is

$\sqrt{5\sqrt{5\sqrt{5\sqrt{5}}}}$ का मान है

(a) 5 (b) $5^{\frac{15}{16}}$

(c) 10 (d) $5^{\frac{17}{16}}$

29. If $2^{2x+4}-17\times 2^{x+1}=-4$, then which of the following is true?

यदि $2^{2x+4}-17\times 2^{x+1}=-4$, तो निम्नलिखित में से कौन सा सत्य है?

(a) x is a positive value

(b) x is a negative value

(c) x can be either a positive value or a negative value

(d) None of these

30. The value of/का मान क्या होगा?

$$\sqrt{\frac{(0.1)^2+(0.01)^2+(0.009)^2}{(0.01)^2+(0.001)^2+(0.0009)^2}}$$ is:

(a) 10^2 (b) 10

(c) 0.1 (d) 0.01

31. The value of/का मान क्या होगा?

$$\sqrt{\frac{(0.03)^2+(0.21)^2+(0.065)^2}{(0.003)^2+(0.021)^2+(0.0065)^2}}$$ is

(a) 0.1 (b) 10

(c) 10^2 (d) 10^3

32. The value of $(256)^{0.16}\times(256)^{0.09}$ is:

$(256)^{0.16}\times(256)^{0.09}$ का मान क्या है?

(a) 256.25 (b) 64

(c) 4 (d) 16

33. If $\sqrt{0.05\times 0.5\times a}=0.5\times 0.05\times\sqrt{b}$, then $\frac{a}{b}$ is equal to

यदि $\sqrt{0.05\times 0.5\times a}=0.5\times 0.05\times\sqrt{b}$ तो $\frac{a}{b}$ बराबर है

(a) 0.0025 (b) 0.025

(c) 0.25 (d) 0.00025

34. If cube root of 175616 is 56 , then the value of $\sqrt[3]{175.616}+\sqrt[3]{0.175616}+\sqrt[3]{0.000175616}$ is equal to

यदि 175616 का घनमूल 56 है ,तो $\sqrt[3]{175.616}$, $\sqrt[3]{0.175616}$,$\sqrt[3]{0.000175616}$ का मान बराबर है

(a) 0.168 (b) 62.16

(c) 6.216 (d) 6.116

35. The greatest of the numbers $(2.89)^{0.5}$, $2-(0.5)^2$, $\left(1+\frac{0.5}{1-\frac{1}{2}}\right)$, $\sqrt{3}$ is

सबसे बड़ी संख्या $(2.89)^{0.5}$, $2-(0.5)^2$, $\left(1+\frac{0.5}{1-\frac{1}{2}}\right)$, $\sqrt{3}$ है

(a) $(2.89)^{0.5}$ (b) $2-(0.5)^2$

(c) $1+\frac{0.5}{1-\frac{1}{2}}$ (d) $\sqrt{3}$

36. The greatest number among 2^{60}, 3^{48}, 4^{36}, and 5^{24} is :

इनमें सबसे बड़ी संख्या कौन सी है 2^{60}, 3^{48}, 4^{36}, 5^{24} ?

(a) 2^{60} (b) 3^{48}

(c) 4^{36} (d) 5^{24}

37. Simplify:/सरल करें?

$$\sqrt{(12.1)^2-(8.1)^2\div\left[(0.25)^2+(0.25)(19.95)\right]}$$

(a) 1 (b) 2

(c) 3 (d) 4

38. The square root of/का वर्गमूल ज्ञात करें?

$\frac{0.75^3}{1-0.75}+[0.75+(0.75)^2+1]$?

(a) 4 (b) 3

(c) 2 (d) 1

39. The largest numbers among 0.16, $\sqrt{0.16}$,$(0.16)^2$, 0.04 is:

निम्न 0.16, $\sqrt{0.16}$,$(0.16)^2$, 0.04 में सबसे बड़ी संख्या कौन-सी है?

(a) 0.16 (b) $\sqrt{0.16}$

(c) $(0.16)^2$ (d) 0.04

40. Which one of the following is the biggest $\sqrt[3]{4}, \sqrt[4]{6}, \sqrt[6]{15}$, and $\sqrt[12]{245}$

$\sqrt[3]{4}, \sqrt[4]{6}, \sqrt[6]{15}$, तथा $\sqrt[12]{245}$, इनमें से सबसे बड़ा कौन-सा है?

(a) $\sqrt[3]{4}$ (b) $\sqrt[3]{6}$

(c) $\sqrt[6]{15}$ (d) $\sqrt[12]{245}$

41. Which is the greatest among $\left(\sqrt{19}-\sqrt{7}\right)$, $\left(\sqrt{13}-\sqrt{11}\right)$, $\left(\sqrt{7}-\sqrt{5}\right)$ and $\left(\sqrt{5}-\sqrt{3}\right)$?

$\left(\sqrt{19}-\sqrt{7}\right)$, $\left(\sqrt{13}-\sqrt{11}\right)$, $\left(\sqrt{7}-\sqrt{5}\right)$ $\left(\sqrt{5}-\sqrt{3}\right)$ सबसे बड़ी संख्या कौन सी है?

(a) $\sqrt{19}-\sqrt{7}$ (b) $\sqrt{13}-\sqrt{11}$

(c) $\sqrt{7}-\sqrt{5}$ (d) $\sqrt{5}-\sqrt{3}$

42. The value of $\frac{1}{\sqrt{3.25}+\sqrt{2.25}}+\frac{1}{\sqrt{4.25}+\sqrt{3.25}}+\frac{1}{\sqrt{5.25}+\sqrt{4.25}}+\frac{1}{\sqrt{6.25}+\sqrt{5.25}}$ is

का मान ज्ञात कीजिए?

(a) 1.00 (b) 1.25

(c) 1.50 (d) 2.25

43. The value of /का मान ज्ञात करें?

$$\frac{1}{\sqrt{(12-\sqrt{140})}}-\frac{1}{\sqrt{(8-\sqrt{60})}}-\frac{2}{\sqrt{(10+\sqrt{84})}}$$

(a) 0 (b) 1

(c) 2 (d) 3

44. Given $\sqrt{10+\sqrt{24}+\sqrt{40}+\sqrt{60}}=\sqrt{p}+\sqrt{q}+\sqrt{r}$ find (p + q + r)

दिया गया $\sqrt{10+\sqrt{24}+\sqrt{40}+\sqrt{60}}=\sqrt{p}+\sqrt{q}+\sqrt{r}$ (p + q + r) खोजें

(a) 9 (b) 10

(c) 8 (d) 11

45. The simplified value of/का सरलीकृत मान क्या होगा $\frac{1}{\sqrt{2}+\sqrt{3}-\sqrt{5}}+\frac{1}{\sqrt{2}-\sqrt{3}-\sqrt{5}}$?

(a) 0 (b) 1

(c) $\sqrt{2}$ (d) $\frac{1}{\sqrt{2}}$

46. The value of $(x^{b+c})^{b-c}(x^{a+c})^{c-a}(x^{b+a})^{a-b}(x \neq 0)$ is

$(x^{b+c})^{b-c}(x^{a+c})^{c-a}(x^{b+a})^{a-b}(x \neq 0)$ का मान है

(a) 1 (b) 2

(c) –1 (d) 0

47. If $\left(\frac{p^{-1}q^2}{p^3q^{-2}}\right)^{\frac{1}{3}} \div \left(\frac{p^6q^{-3}}{p^{-2}q^3}\right)^{\frac{1}{3}} = p^aq^b$, then the value of a + b, where P and q are different positive primes, is

यदि, $\left(\frac{p^{-1}q^2}{p^3q^{-2}}\right)^{\frac{1}{3}} \div \left(\frac{p^6q^{-3}}{p^{-2}q^3}\right)^{\frac{1}{3}} = p^aq^b$ है तो a + b का मान है, जहाँ P और q अलग-अलग धनात्मक अभाज्य संख्याएँ हैं

(a) –1 (b) $-\frac{2}{3}$

(c) $\frac{4}{3}$ (d) 2

48. The value of/का मान है $\sqrt{5+\sqrt{35-26}+\sqrt{448+7}}$

ICAR Mains, 10/07/2023 (Shift-1)

(a) 4 (b) 7

(c) 6 (d) 5

49. The value of/का मान कितना होगा $\sqrt[3]{50+\sqrt[3]{216}+\sqrt[3]{512}}$

ICAR Mains, 10/07/2023 (Shift-2)

(a) 8 (b) 6

(c) 4 (d) 5

50. Which of the following is the smallest among $(14)^{\frac{1}{3}}$, $(12)^{\frac{1}{2}}$, $(16)^{\frac{1}{6}}$ and $(25)^{\frac{1}{12}}$?

निम्नलिखित में सबसे छोटा कौन है?

$(14)^{\frac{1}{3}}$, $(12)^{\frac{1}{2}}$, $(16)^{\frac{1}{6}}$ और $(25)^{\frac{1}{12}}$?

SSC CHSL 10/03/2023 (Shift-03)

(a) $(14)^{\frac{1}{3}}$ (b) $(25)^{\frac{1}{12}}$

(c) $(16)^{\frac{1}{6}}$ (d) $(12)^{\frac{1}{2}}$

51. If $6^X = 3^Y = 2^Z$, then what is the value of $\frac{1}{y}+\frac{1}{z}-\frac{1}{x}$?

यदि $6^X = 3^Y = 2^Z$ है, तो $\frac{1}{y}+\frac{1}{z}-\frac{1}{x}$ का मान क्या है?

SSC CHSL 20/03/2023 (Shift-02)

(a) 1 (b) 0

(c) 3 (d) 6

52. If $x = \sqrt{4+\sqrt{10+2\sqrt{5}}}+\sqrt{4-\sqrt{10+2\sqrt{5}}}$, then the value of x lies between:

यदि $x = \sqrt{4+\sqrt{10+2\sqrt{5}}}+\sqrt{4-\sqrt{10+2\sqrt{5}}}$, तो x का मान इनके बीच स्थित है:

CRPF HCM 28/02/2023 (Shift - 03)

(a) 3.8 and 4.2 (b) 3.4 and 4.8

(c) 3 and 3.4 (d) 2.6 and 3

53. If $3^x = 9^y = 27^z$ and $\frac{1}{3x}+\frac{1}{6y}+\frac{1}{9z}=\frac{32}{3}$, find z.

यदि $3^x = 9^y = 27^z$ और $\frac{1}{3x}+\frac{1}{6y}+\frac{1}{9z}=\frac{32}{3}$ है, तो z ज्ञात कीजिए।

CRPF HCM 01/03/2023 (Shift - 01)

(a) $\frac{1}{5}$ (b) $\frac{5}{8}$

(c) $\frac{1}{32}$ (d) $\frac{8}{5}$

54. Solve the equation $3^{2x+1} - 3^x = 3^{x+3} - 3^2$.

समीकरण $3^{2x+1} - 3^x = 3^{x+3} - 3^2$ को हल कीजिए।

CRPF HCM 01/03/2023 (Shift - 02)

(a) 2, – 2 (b) 2, 3

(c) –1, 2 (d) –1, 1

Answer Key

1.(c)	**2.**(d)	**3.**(b)	**4.**(a)	**5.**(b)	**6.**(a)	**7.**(c)	**8.**(b)	**9.**(b)	**10.**(d)
11.(c)	**12.**(b)	**13.**(b)	**14.**(c)	**15.**(a)	**16.**(a)	**17.**(c)	**18.**(b)	**19.**(d)	**20.**(a)
21.(d)	**22.**(c)	**23.**(d)	**24.**(a)	**25.**(c)	**26.**(a)	**27.**(a)	**28.**(b)	**29.**(c)	**30.**(b)
31.(b)	**32.**(c)	**33.**(b)	**34.**(c)	**35.**(c)	**36.**(b)	**37.**(d)	**38.**(c)	**39.**(b)	**40.**(a)
41.(d)	**42.**(a)	**43.**(a)	**44.**(b)	**45.**(d)	**46.**(a)	**47.**(b)	**48.**(a)	**49.**(c)	**50.**(b)
51.(b)	**52.**(b)	**53.**(c)	**54.**(c)						

SOLUTIONS

1. (c)

ATQ,

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

$\Rightarrow x - 1 = 3 - x$

$\Rightarrow 2x = 4$

$x = 2$

2. (d)

ATQ,

$a^x = b^y = c^z = k$ (Let)

$$a = k^{\frac{1}{x}}, b = k^{\frac{1}{y}}, c = k^{\frac{1}{z}}$$

$b^2 = ac$

$$\Rightarrow \frac{2}{y} = \frac{1}{x} + \frac{1}{z}$$

$$\Rightarrow \frac{2}{y} = \frac{x+z}{xz}$$

$$\Rightarrow y = \frac{2xz}{x+z}$$

3. (b)

$x = 5 + 2\sqrt{6}$

$\sqrt{x} = \left(\sqrt{3} + \sqrt{2}\right)$

$$\Rightarrow \frac{x-1}{\sqrt{x}} = \frac{4+2\sqrt{6}}{\sqrt{3}+\sqrt{2}} \Rightarrow 2\sqrt{2}\frac{\left(\sqrt{2}+\sqrt{3}\right)}{\left(\sqrt{2}+\sqrt{3}\right)}$$

$= 2\sqrt{2}$

4. (a)

$$\frac{(243)^{0.13} \times (243)^{.07}}{(7)^{0.25} \times (49)^{0.075} \times (343)^{0.2}}$$

$$\Rightarrow \frac{3^{5\times0.13} \times 3^{5\times0.07}}{(7)^{0.25} \times (7)^{2\times0.075} \times (7)^{0.6}}$$

$$\Rightarrow \frac{3^{0.65+0.35}}{7^{0.25+0.15+0.6}} = \frac{3}{7}$$

5. (b)

$\Rightarrow (3)^{\frac{1}{2}}, (2)^{\frac{1}{3}}, (2)^{\frac{1}{2}}, (4)^{\frac{1}{3}}$

LCm of 2, 3 = 6

$(3)^{\frac{1}{2}\times6}, (2)^{\frac{1}{3}\times6}, (2)^{\frac{1}{2}\times6}, (4)^{\frac{1}{3}\times6}$

$\Rightarrow 3^3,\ 2^2,\ 2^3,\ 4^2$

$\Rightarrow 24,\ 4,\ 8,\ 16$

Least = $4 = \sqrt[3]{2}$

6. (a)

$\Rightarrow (4)^{\frac{1}{3}}, (6)^{\frac{1}{4}}, (15)^{\frac{1}{6}}, (245)^{\frac{1}{12}}$

LCM of 3, 4, 6, 12 = 12

$\Rightarrow (4)^{\frac{1}{3}\times12}, (6)^{\frac{1}{4}\times12}, (15)^{\frac{1}{6}\times12}, (245)^{\frac{1}{12}\times12}$

$= (4)^4, (6)^3, (15)^2, (245)^1$

$= 256, 216, 225, 245$

biggest = $256 = \sqrt[3]{4}$

7. (c)

$$\frac{9^n \times 3^5 \times (27)^3}{3 \times (81)^4} = 27$$

$$\Rightarrow \frac{3^{2n+5+9}}{3^{17}} = (3)^3$$

$= 3^{2n+14-17} = 3^3$

$= 2n - 3 = 3$

$2n = 6$

$n = 3$

8. (b)

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

$$= \frac{5^{-2}}{5^{-3}} = 5$$

9. (b)

$\Rightarrow m = 11, n = 2$

$\Rightarrow (m-1)^{n+1} = (11-1)^{2+1} = 1000$

10. (d)

$$\left\{(6.25)^{\frac{1}{2}} \times (0.0144)^{\frac{1}{2}} + (0.027)^{\frac{1}{3}} \times (81)^{\frac{1}{4}}\right\}$$

$= 2.5 \times 0.12 + 0.3 \times 3$

$= 0.3 + 0.9 = 1.2$

11. (c)

$3^x (3^x \times 27 - 244) = -9$

$y (27y - 244) = -9$

$27y^2 - 244y + 9 = 0$

$$y = 9, y = \frac{1}{27}$$

$$3^x = \frac{1}{27}$$

$3^x = 3^{-3}$

$x = -3$

$3^x = 9$

$3^x = 3^2$

$x = 2$

x is either negative or positive

12. (b)

$x = -0.5$

$$2^{1/x} = 2^{-\frac{1}{0.5}} = 2^{-2} = \frac{1}{4}$$

$$\frac{1}{x^2} = \frac{1}{0.25} = 4$$

$$2^{-0.5} = \frac{1}{2^{0.5}} = \frac{1}{\sqrt{2}}$$

$$\frac{1}{x} = \frac{1}{-0.5} = -2$$

So smallest value = $\frac{1}{x}$

13. (b)

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

LCM of 2, 3,4,6 = 12

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

Largest = $3^4 \Rightarrow 3^{\frac{1}{3}}$

14. (c)

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

$\Rightarrow 10^{(0.48)z} = 10^{1.40}$

$\Rightarrow 0.48z = 1.40$

$$\Rightarrow Z = \frac{140}{48} = 2.9$$

15. (a)

$\sqrt[3]{7^a \times (35)^{b+1} (20)^{(C+2)}}$ → Whole no.

By option A

$\sqrt[3]{7^3 \times 35^3 \times 20^3}$

$\Rightarrow 7 \times 35 \times 20 = 4900$ (Whole no)

So option (a) is correct

16. (a)

$14^a = 36^b = 84^c \Rightarrow 14^a = 6^{2b} = 84^c = k$ (Let)

$14 = k^{\frac{1}{a}}$

$6 = k^{\frac{1}{2b}}$

$84 = k^{\frac{1}{c}}$

We know that $14 \times 6 = 84$

$$\Rightarrow \frac{1}{a} + \frac{1}{2b} = \frac{1}{c}$$

$$\Rightarrow \left(\frac{1}{c} - \frac{1}{a}\right) = \frac{1}{2b}$$

$$\Rightarrow 6b \times \frac{1}{2b} = 3$$

17. (c)

$x = (4096)^{7+4\sqrt{3}}$

$$(4096) = \frac{1}{x^{7+4\sqrt{3}}}$$

$\Rightarrow (4096) = (x)^{7-4\sqrt{3}}$

$(64)^2 = (x)^{(7-4\sqrt{3})}$

$$\Rightarrow 64 = x^{\frac{7-4\sqrt{3}}{2}}$$

$$64 = \frac{x^{\frac{7}{2}}}{x^{2\sqrt{3}}}$$

18. (b)

ATQ

$$\Rightarrow \left(\frac{5.55}{0.555}\right) = 10$$

$$\Rightarrow \frac{1}{x} - \frac{1}{y} = \frac{1}{3}$$

19. (d)

$$x^{2018}\ y^{2017} = \frac{1}{2} \quad \text{.....(i)}$$

$$x^{2016}\ y^{2019} = 8 \quad \text{.....(ii)}$$

(i) ÷ (ii)

$$\Rightarrow \frac{x^2}{y^2} = \frac{1}{16}$$

$\Rightarrow$ $y = 4x$ Put in (i)

$$x^{2018} \times 4^{2017} \times x^{2017} = \frac{1}{2}$$

$$x^{4035} = \left(\frac{1}{2}\right)^{4035}$$

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

$y = 2$

$$\Rightarrow x^2 + y^3 = \frac{1}{4} + 8 = \frac{33}{4}$$

20. (a)

$$9^{x-\frac{1}{2}} - 2^{2x-2} = 4^x - 3^{2x-3}$$

$$\Rightarrow 3^{(2x-1)} - 2^{(2x-2)} = 2^{2x} - 3^{(2x-3)}$$

$$\Rightarrow 3^{(2x-1)} + 3^{(2x-3)} = 2^{2x} + 2^{(2x-2)}$$

$$= 3^{2x}\left[\frac{1}{3} + \frac{1}{27}\right] = 2^{2x}\left[1 + \frac{1}{4}\right]$$

$$\Rightarrow 3^{2x}\left[\frac{10}{27}\right] = \left[\frac{5}{4}\right]2^{2x}$$

$$= 3^{2x} \times 8 = 27 \times 2^{2x}$$

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

$$x = \frac{3}{2}$$

21. (d)

$A = 2^{65}$

$B = 2^{64} + 2^{63} + 2^{62} + \text{.....} + 2^0$

$2^0 + 2^1 + 2^2 + \text{.....} + 2^{64}$

$$= \frac{1(2^{65} - 1)}{(2-1)}$$

$= (2^{65} - 1)$

So A is greater than B by 1

22. (c)

$$\left[\frac{2+\sqrt{3}}{2-\sqrt{3}} + \frac{2-\sqrt{3}}{2+\sqrt{3}} + \frac{\sqrt{3}-1}{\sqrt{3}+1}\right]$$

$$\Rightarrow \frac{2(4+3)}{1} + \frac{\sqrt{3}-1}{\sqrt{3}+1}$$

$$\Rightarrow 14 + \frac{\sqrt{3}-1}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1}$$

$$= 14 + \frac{4-2\sqrt{3}}{2} = 16 - \sqrt{3}$$

23. (d)

$$x = \sqrt{4 + \sqrt{4 - \sqrt{4 + \text{.....}\infty}}}$$

$$\Rightarrow \frac{\sqrt{4 \times 4 - 3} + 1}{2}$$

$$= \frac{\sqrt{13}+1}{2}$$

24. (a)

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

$$\Rightarrow \frac{\sqrt{4 \times 6 - 3} - 1}{2}$$

$$= \frac{\sqrt{21}-1}{2}$$

25. (c)

$$\sqrt{7\sqrt{7\text{.....}\infty}}$$

$= 7$

26. (a)

$$\sqrt{12 + \sqrt{12 + \sqrt{12 + \text{.....}\infty}}}$$

$= 4$

27. (a)

$\sqrt{30-\sqrt{30-\sqrt{30.....\infty}}}$

$= 5$

28. (b)

$\sqrt{5\sqrt{5\sqrt{5\sqrt{5}}}}$

$\Rightarrow (5)^{\frac{(2^4-1)}{2^4}}$

$= 5^{\frac{15}{16}}$

29. (c)

$2^{2x} \times 16 - 17 \times 2^x \times 2 = -4$

Let $2^x = y$

$16y^2 - 34y + 4 = 0$

$y = \frac{32}{16} = 2$

$2^x = 2^1$

$x = 1$

$2x = 2^{-3}$

$x = -3$

So x is either positive or negative

30. (b)

$\sqrt{\frac{(0.1)^2+(0.01)^2+(0.009)^2}{(0.01)^2+(0.001)^2+(0.0009)^2}}$

$\Rightarrow \sqrt{\frac{0.01+0.0001+0.000081}{0.0001+0.000001+0.00000081}}$

$= 10$

31. (b)

$\Rightarrow \sqrt{\frac{(0.03)^2+(0.21)^2+(0.005)^2}{(0.003)^2+(0.021)^2+(0.0065)^2}}$

$= 10$

32. (c)

$(256)^{0.16} \times (256)^{0.09}$

$\Rightarrow (256)^{0.25}$

$\Rightarrow (256)^{\frac{1}{4}}$

$= 4$

33. (b)

$\sqrt{0.05 \times 0.5 \times a} = 0.5 \times 0.05 \times \sqrt{b}$

Squaring both sides

$0.05 \times 0.5 \times a = 0.5 \times 0.5 \times 0.05 \times 0.05 \times b$

$\frac{a}{b} = 0.025$

34. (c)

$\sqrt[3]{175.615} + \sqrt[3]{0.175616} + \sqrt[3]{0.000175616}$

$\Rightarrow 5.6 + 0.56 + 0.056$

$\Rightarrow 6.216$

35. (c)

$(2.89)^{\frac{1}{2}}, 2-0.25, \left(\frac{1+\frac{0.5}{1-\frac{1}{2}}}{}\right), \sqrt{3}$

$\Rightarrow (1.7), 1.75, 2, 1.732$

$\Rightarrow$ Largest = 2

36. (b)

$2^{60}, 3^{48}, 4^{36}, 5^{24}$

HCF of 60, 48, 36, 24 = 12

So, $\Rightarrow 2^5, 3^4, 4^3, 5^2$

$\Rightarrow 32, 81, 64, 25$

Greatest = 81 $\Rightarrow 3^{48}$

37. (d)

$\sqrt{(12.1)^2-(8.1)^2 \div \left[(0.25)^2+(0.25)(19.95)\right]}$

$\Rightarrow \sqrt{20.2 \times 4 \div \left[0.25(0.25+19.95)\right]}$

$\Rightarrow \sqrt{\frac{20.2 \times 4}{(0.25) \times 20.2}}$

$= 4$

38. (c)

$\frac{0.75^3}{1-0.75} + \left[(0.75)+(0.75)^2+1\right]$

$\Rightarrow \frac{\frac{27}{64}}{\frac{1}{4}} + \left[\frac{3}{4}+\frac{9}{16}+1\right]$

$\Rightarrow \frac{27}{16}+\frac{3}{4}+\frac{9}{16}+1$

$\Rightarrow \sqrt{\frac{64}{16}} = 2$

39. (b)

$0.16,\ \sqrt{0.16}\ ,\ (0.16)^2\ ,\ 0.04$

$\Rightarrow 0.16,\ 0.4,\ 0.0256,\ 0.04$

Largest = 0.4

$= \sqrt{0.16}$

40. (b)

$(4)^{\frac{1}{3}}, (6)^{\frac{1}{4}}, (15)^{\frac{1}{6}}, (245)^{\frac{1}{12}}$

LCM of 3, 4, 6, 12 = 12

$\Rightarrow (4)^4, (6)^3, (15)^2, (245)^1$

$\Rightarrow 256, 216, 225, 245$

Largest = 256 $= (4)^{\frac{1}{3}} = \sqrt[3]{4}$

41. (d)

$\left(\sqrt{19}-\sqrt{17}\right), \left(\sqrt{13}-\sqrt{11}\right), \left(\sqrt{7}-\sqrt{5}\right), \left(\sqrt{5}-\sqrt{3}\right)$

$\Rightarrow \frac{2}{\sqrt{19}+\sqrt{17}}, \frac{2}{\sqrt{13}+\sqrt{11}}, \frac{2}{\sqrt{7}+\sqrt{5}}, \frac{2}{\sqrt{5}+\sqrt{3}}$

$= \text{Largest} = \frac{2}{\sqrt{5}+\sqrt{3}}$

$= \sqrt{5}-\sqrt{3}$

42. (a)

$\frac{1}{\sqrt{3.25}+\sqrt{2.25}} + \frac{1}{\sqrt{4.25}+\sqrt{3.25}} + \frac{1}{\sqrt{5.25}+\sqrt{4.25}}$

$+ \frac{1}{\sqrt{6.25}+\sqrt{5.25}}$

$\Rightarrow \sqrt{3.25}-\sqrt{2.25}+\sqrt{4.25}-\sqrt{3.25}+\sqrt{5.25}$

$-\sqrt{4.25}+\sqrt{6.25}-\sqrt{5.25}$

$= \sqrt{6.25}-\sqrt{2.25}$

$= 2.5 - 1.5 = 1.00$

43. (a)

ATQ,

$\Rightarrow \frac{1}{\sqrt{7}-\sqrt{5}} - \frac{1}{\sqrt{5}-\sqrt{3}} - \frac{2}{\sqrt{7}+\sqrt{3}}$

$\Rightarrow \frac{\sqrt{7}+\sqrt{5}}{2} - \frac{\sqrt{5}+\sqrt{3}}{2} - \frac{\sqrt{7}-\sqrt{3}}{2}$

$\frac{\sqrt{7}+\sqrt{5}-\sqrt{5}-\sqrt{3}-\sqrt{7}+\sqrt{3}}{2} = 0$

44. (d)

$\sqrt{10+\sqrt{24}+\sqrt{40}+\sqrt{60}} = \sqrt{p}+\sqrt{q}+\sqrt{r}$

$\Rightarrow \sqrt{2}+\sqrt{3}+\sqrt{5} = \sqrt{p}+\sqrt{q}+\sqrt{r}$

$\Rightarrow (p+q+r) = 10$

45. (d)

$\frac{1}{\left(\sqrt{2}-\sqrt{5}\right)+\sqrt{3}} + \frac{1}{\left(\sqrt{2}-\sqrt{5}\right)-\sqrt{3}}$

$\frac{\left(\sqrt{2}-\sqrt{5}\right)-\sqrt{3}+\left(\sqrt{2}-\sqrt{5}\right)+\sqrt{3}}{\left(\sqrt{2}-\sqrt{5}\right)^2-3}$

$\frac{2\left(\sqrt{2}-\sqrt{5}\right)}{4-2\sqrt{10}} = \frac{2\left(\sqrt{2}-\sqrt{5}\right)}{2\sqrt{2}\left(\sqrt{2}-\sqrt{5}\right)} = \frac{1}{\sqrt{2}}$

46. (a)

$x^{\left(b^2-c^2\right)} \times x^{\left(c^2-a^2\right)} \times x^{\left(a^2-b^2\right)}$

$\Rightarrow x^{b^2-c^2+c^2-a^2+a^2-b^2}$

$\Rightarrow x^0 = 1$

47. (b)

$\left(\frac{p^{-1}q^2}{p^3q^{-2}}\right)^{\frac{1}{3}} \div \left(\frac{p^6q^{-3}}{p^{-2}q^3}\right)^{\frac{1}{3}} = p^aq^b$

$\Rightarrow \left(\frac{q^4}{p^4}\right)^{\frac{1}{3}} \div \left(\frac{p^8}{q^6}\right)^{\frac{1}{3}}$

$\Rightarrow \frac{\frac{q^{\frac{4}{3}}}{p^{\frac{4}{3}}}}{\frac{p^{\frac{8}{3}}}{q^{\frac{6}{3}}}} = p^aq^b$

$\Rightarrow \frac{q^{\frac{10}{3}}}{p^4} = p^aq^b$

$\Rightarrow q^{\frac{10}{3}}p^{-4} = p^aq^b$

$\Rightarrow a = -4 \qquad b = \frac{10}{3}$

$a + b = -4 + \frac{10}{3}$

$\Rightarrow -\frac{2}{3}$

48. (a)

$\sqrt{5+\sqrt{35-26}+\sqrt{448\div 7}}$

$\Rightarrow \sqrt{5+3+8}$

$= 4$

49. (c)

$\sqrt[3]{50+\sqrt[3]{216}+\sqrt[3]{512}}$

$\Rightarrow 3\sqrt{50+6+8}$

$= 4$

50. (b)

$(14)^{\frac{1}{3}}(12)^{\frac{1}{2}}(16)^{\frac{1}{6}}(25)^{\frac{1}{12}}$

LCM of 3, 2, 6, 12, = 12

$\Rightarrow 14^4, 12^6, 16^2, (25)^1$

$\Rightarrow$ Smallest = $(25)^1$

$=(25)^{\frac{1}{12}}$

51. (b)

We know that $2 \times 3 = 6$

$\Rightarrow \frac{1}{z}+\frac{1}{y}=\frac{1}{x}$

$\Rightarrow \frac{1}{y}+\frac{1}{z}-\frac{1}{x}=0$

52. (b)

$x=\sqrt{4+\sqrt{10+2\sqrt{5}}}+\sqrt{4-\sqrt{10+2\sqrt{5}}}$

$\sqrt{5} = 2.2$

$\Rightarrow x^2=4+\sqrt{10+2\sqrt{5}}+4-\sqrt{10+2\sqrt{5}}+2\sqrt{16-10-2\sqrt{5}}$

$x^2 = 8+2\sqrt{6-2\sqrt{5}}$

$x^2 = 8+2\sqrt{6-4.4}$

$= 8 + 2 \times 1.6 = 11.6$

x = more than 3.4

53. (c)

$3^x = 9^y = 27^z \Rightarrow 3^x = 3^{2y} = 3^{3z}$

$\Rightarrow x = 2y = 3z$

$\frac{1}{3x}+\frac{1}{6y}+\frac{1}{9z}=\frac{32}{3}$

$=\frac{1}{9z}+\frac{1}{9z}+\frac{1}{9z}=\frac{32}{3}$

$=\frac{1}{3z}=\frac{32}{3}$

$z = \frac{1}{32}$

54. (c)

By option put option (c) value of $x = -1, 2$ option stisfies.