

Rationalization (परिमेयकरण) $\div \rightarrow$

$$\frac{1}{3+2\sqrt{2}} = \frac{1}{3+2\sqrt{2}} \times \frac{3-2\sqrt{2}}{3-2\sqrt{2}} = \frac{3-2\sqrt{2}}{3^2-(2\sqrt{2})^2} = \frac{3-2\sqrt{2}}{9-8} = 3-2\sqrt{2}$$



1

$$\frac{1}{7+4\sqrt{3}} = 7-4\sqrt{3}$$

$49-16=1$

2

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

$5-4=1$

3

$$\frac{1}{5-2\sqrt{6}} = 5+2\sqrt{6}$$

$25-24=1$

4

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

$49-50=-1$



39. If $x^8 - 32x^4 + 256 = 0$, then positive value of $\left(x^2 + \frac{1}{x^2}\right)$ is:

यदि $x^8 - 32x^4 + 256 = 0$ है तो $\left(x^2 + \frac{1}{x^2}\right)$ का धनात्मक मान क्या होगा?

[A] 3.75

[B] 5.75

[C] 2.25

[D] 4.25

$$4 + \frac{1}{4} = 4.25$$

$$(x^4)^2 - 2 \times x^4 \times 16 + (16)^2 = 0$$

$$(x^4 - 16)^2 = 0$$

$$x^4 - 16 = 0$$

$$x^4 = 16 \Rightarrow x = 2$$

40. If $x + \frac{81}{x} = 18$ where $x > 0$, then the value of $x^2 + \frac{162}{x^2}$ is:

यदि $x + \frac{81}{x} = 18$ है, जहाँ $x > 0$ है, तो $x^2 + \frac{162}{x^2}$ का मान ज्ञात करें।

[A] 78

[C] 85

✓ [B] 83 = 81 + 2 = 83

[D] 81

$$x + \frac{81}{x} = 18$$

$$\Rightarrow x = 9$$

$$\frac{x^2 + 81}{x} = 18$$

$$x^2 + 81 = 18x$$

$$x^2 - 18x + 81 = 0 \Rightarrow (x - 9)^2 = 0 \Rightarrow x = 9$$

41. If $a - \frac{24}{a} = 5$, where $a > 0$, then the value of $a^2 + \frac{64}{a^2}$ is:

यदि $a - \frac{24}{a} = 5$, है, जहाँ $a > 0$, है, तो $a^2 + \frac{64}{a^2}$ का मान ज्ञात करें।

[A] 45

[C] 60

[B] 56

[D] 65

$a = 8$

$64 + 1 = 65$

$8 - \frac{24}{8} = 5$

42. If $x + \frac{49}{x+48} = -34$, then find $(2x + 83)^3 + \frac{1}{(2x+83)^3}$?

यदि $x + \frac{49}{x+48} = -34$ है, तो $(2x + 83)^3 + \frac{1}{(2x+83)^3}$ ज्ञात कीजिये?

[A] 7

[C] -2

[B] 2

[D] 1

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

$$(x+48) + \frac{49}{(x+48)} = 14$$

$$a + \frac{49}{a} = 14 \Rightarrow a = 7$$

$$x+48=7$$

$$x = -41$$

$$x \pm \frac{1}{x} = k \text{ (given)}$$

$$x^2 \pm \frac{1}{x^2}, x^3 \pm \frac{1}{x^3}, \dots, x^8 \pm \frac{1}{x^8} \text{ પૂછેગા}$$



if, $x + \frac{1}{x} = k$ तो $x^2 + \frac{1}{x^2} = k^2 - 2$

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

$$x^2 + \frac{1}{x^2} + \cancel{2x} \times \cancel{\frac{1}{x}} = k^2$$

$$x^2 + \frac{1}{x^2} = k^2 - 2$$



If, $x + \frac{1}{x} = k$ तो $x^2 + \frac{1}{x^2} = k^2 - 2$ ✓

If, $x - \frac{1}{x} = k$ तो $x^2 + \frac{1}{x^2} = k^2 + 2$ ✓



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

$$x^2 + \frac{1}{x^2} - \cancel{2 \times x \times \frac{1}{x}} = k^2$$

$$x^2 + \frac{1}{x^2} = k^2 + 2$$



If, $x + \frac{1}{x} = k$ तो $x^2 + \frac{1}{x^2} = k^2 - 2$

If, $x - \frac{1}{x} = k$ तो $x^2 + \frac{1}{x^2} = k^2 + 2$



If, $x + \frac{1}{x} = 9$

$x^2 + \frac{1}{x^2} = 9^2 - 2 = 79$

Hi, $y + \frac{1}{y} = 16$

तो $y^2 + \frac{1}{y^2} = 16^2 - 2 = 254$



If, $x + \frac{1}{x} = k$ तो $x^2 + \frac{1}{x^2} = k^2 - 2$

If, $x - \frac{1}{x} = k$ तो $x^2 + \frac{1}{x^2} = k^2 + 2$



If, $z^7 + \frac{1}{z^7} = 25$

$z^{14} + \frac{1}{z^{14}} = 25^2 - 2 = 623$

a $\frac{1}{a}$

$\frac{a^3}{5} + \frac{5}{a^3} = 12$

तो $\frac{a^6}{25} + \frac{25}{a^6} = 12^2 - 2 = 142$



If, $x + \frac{1}{x} = k$ तो $x^2 + \frac{1}{x^2} = k^2 - 2$

If, $x - \frac{1}{x} = k$ तो $x^2 + \frac{1}{x^2} = k^2 + 2$



If, $y^3 + \frac{1}{y^3} = 10$

$y^6 + \frac{1}{y^6} = 10^2 - 2 = 98$

$x^{.34} + \frac{1}{x^{.34}} = 15$

तो $x^{.68} + \frac{1}{x^{.68}} = 15^2 - 2 = 223$

$$\text{if, } \begin{aligned} x &= 11 + 2\sqrt{30} \\ + \quad \frac{1}{x} &= 11 - 2\sqrt{30} \end{aligned}$$

$$x + \frac{1}{x} = 22$$

$$\text{तो } x^2 + \frac{1}{x^2} = 22^2 - 2 \\ = 482$$

$$\text{if, } \frac{x^8}{n} + \frac{n}{x^8} = 8$$

$$\text{तो } \frac{x^{16}}{n^2} + \frac{n^2}{x^{16}} = 8^2 - 2 = 62$$

If, $x + \frac{1}{x} = k$ तो $x^2 + \frac{1}{x^2} = k^2 - 2$

If, $x - \frac{1}{x} = k$ तो $x^2 + \frac{1}{x^2} = k^2 + 2$

if, $2z + \frac{1}{(2z+5)} = 9$

$(2z+5) + \frac{1}{(2z+5)} = 14$

तो $(2z+5)^2 + \frac{1}{(2z+5)^2} = 14^2 - 2 = 194$



$\frac{y^5}{\sqrt{3}} + \frac{\sqrt{3}}{y^5} = 7\sqrt{6}$

तो $\frac{y^{10}}{3} + \frac{3}{y^{10}} = (7\sqrt{6})^2 - 2$
 $= 292$



$$\text{If, } x \oplus \frac{1}{x} = \sqrt{7}$$

$$x^2 + \frac{1}{x^2} = \sqrt{7}^2 - 2 = 5$$

$$x^4 + \frac{1}{x^4} = 5^2 - 2 = 23$$

$$x^8 + \frac{1}{x^8} = 23^2 - 2 = 527$$

$$\text{If, } x \ominus \frac{1}{x} = 4$$

$$x^2 \oplus \frac{1}{x^2} = 4^2 + 2 = 18$$

$$\text{तो, } x^4 \oplus \frac{1}{x^4} = 18^2 - 2 = 322 \checkmark$$

43. If $x + \frac{1}{x} = 13$, then what is the value of $x^2 + \frac{1}{x^2}$?

यदि $x + \frac{1}{x} = 13$ है, तो $\left(x^2 + \frac{1}{x^2}\right)$ का मान कितना है?

RRB Group-D 2024

[A] 171

[C] 163

☒ [B] 167

[D] 169

$13^2 - 2$

44. If $x + \frac{1}{x} = 17$, then what is the value of $x^2 + \frac{1}{x^2}$?

यदि $x + \frac{1}{x} = 17$ है, तो $\left(x^2 + \frac{1}{x^2}\right)$ का मान कितना है?

RRB Group-D 2024

[A] 289

[C] 283

[B] 291

☒ [D] 287

$\rightarrow 17^2 - 2$

45. If $\left(x + \frac{1}{x}\right) = 8.5$, what is the value of $\left(x^2 + \frac{1}{x^2}\right)$?

यदि $\left(x + \frac{1}{x}\right) = 8.5$ है, तो $\left(x^2 + \frac{1}{x^2}\right)$ का मान ज्ञात करें।

[A] 70.25

[C] 72.25

[B] 74.25

[D] 75.25

$$\rightarrow 8.5^2 - 2$$

$$= 72.25 - 2$$

$$8.5^2 = 72.25$$

$$3.5^2 = 12.25$$

अथ

46. If the sum of a number and its reciprocal is 15. What is the sum of the square of the number and the square of its reciprocal?

अगर किसी संख्या और उसके व्युत्क्रम का योग 15 है। संख्या के वर्ग और उसके व्युत्क्रम के वर्ग का योग क्या है?

[A] $111 \times 2 + 1$

[B] $111 \times 2 + 2$

[C] $111 \times 2 + 3$

[D] $111 \times 2 + 4$

$$x + \frac{1}{x} = 15$$

$$x^2 + \frac{1}{x^2} = 15^2 - 2 = 223$$

47. If $x^2 + \frac{1}{x^2} = 10$, then what is the value of $x^4 + \frac{1}{x^4}$?

यदि $x^2 + \frac{1}{x^2} = 10$, तो $x^4 + \frac{1}{x^4}$ का मान क्या है?

(IB ACIO Grade-2 2023) $\rightarrow 10^2 - 2$ RRB Technician Grade-3 2025

☒ [A] 98

[B] 100

[C] 96

[D] 102

48. **If** $x^{12.5} + \frac{1}{x^{12.5}} = 16$, **then** $x^{25} + \frac{1}{x^{25}} = ?$

यदि $x^{12.5} + \frac{1}{x^{12.5}} = 16$ हो तो, $x^{25} + \frac{1}{x^{25}} = ?$

[A] 254

[B] 258

[C] 260

[D] 256

$\rightarrow 16^2 - 2$

49. If $\frac{x^{42}+1}{x^{21}} = 7$, then $\frac{x^{84}+1}{x^{42}} = ?$

यदि $\frac{x^{42}+1}{x^{21}} = 7$ हो तो, $\frac{x^{84}+1}{x^{42}} = ?$

[A] 51

[C] 53

[B] 49

☒ [D] 47

$$x^{\cancel{42}^{21}} + \frac{1}{x^{\cancel{42}^{21}}} = 7$$

$$x^{\cancel{42}^{42}} + \frac{1}{x^{\cancel{42}^{42}}} = 7^{\cancel{2}^2}$$

50. If $\frac{x^{200}}{y^{200}} + \frac{y^{200}}{x^{200}} = 8$, then find $\frac{x^{400}}{y^{400}} + \frac{y^{400}}{x^{400}}$?

यदि $\frac{x^{200}}{y^{200}} + \frac{y^{200}}{x^{200}} = 8$ है, तो $\frac{x^{400}}{y^{400}} + \frac{y^{400}}{x^{400}}$ ज्ञात कीजिये?

[A] $\frac{a}{60} + \frac{1}{a} = 8$

[C] 64

[B] 62

[D] 66

$\rightarrow 8^2 = 64$

51. If $\frac{1}{(x-2)} + x = 8$, then what is the value of $\frac{1}{(x-2)^2} + (x-2)^2$?

यदि $\frac{1}{(x-2)} + (x-2) = 8$, तो $\frac{1}{(x-2)^2} + (x-2)^2$ का मान क्या है?

SSC CHSL TIER – I 2022

[A] 38

[C] 40

[B] 36

[D] 34

$\rightarrow 6^2 - 2$

52. If $\left(x - \frac{1}{x}\right) = 7.5$, what is the value of $\left(x^2 + \frac{1}{x^2}\right)$?

यदि $\left(x - \frac{1}{x}\right) = 7.5$ तो $\left(x^2 + \frac{1}{x^2}\right)$ का मान ज्ञात कीजिए।

[A] 54.25

[B] 58.25

[C] 60.25

[D] 56.25

$$\begin{aligned} &\rightarrow 7.5^2 + 2 \\ &= 58.25 \end{aligned}$$

53. If $x - \frac{1}{x} = 0.4$ & $x > 0$, then find $x^2 + \frac{1}{x^2}$?

यदि $x - \frac{1}{x} = 0.4$ & $x > 0$, तो $x^2 + \frac{1}{x^2}$ ज्ञात करें?

[A] 4.16

[C] 1.84

[B] 3.32

[D] 2.16

$\rightarrow .4^2 + 2$

54. If $x \left(5 - \frac{2}{x} \right) = \frac{5}{x}$, then the value of $x^2 + \frac{1}{x^2}$ is equal to:

यदि $x \cdot \left(5 - \frac{2}{x} \right) = \frac{5}{x}$ है, तो $x^2 + \frac{1}{x^2}$ का मान बराबर है:

[A] $2\frac{4}{25}$

[C] $3\frac{4}{25}$

[B] $2\frac{1}{25}$

[D] $2\frac{3}{25}$

$\frac{4}{25} + 2$

$$5x - 2 = \frac{5}{x}$$

$$5x - \frac{5}{x} = 2$$

$$\left(x - \frac{1}{x}\right) = \frac{2}{5}$$

if, $x + \frac{1}{x} = k$

$$x - k = -\frac{1}{x}$$

$$x \cdot (x - k) = -1$$

$$x^2 - kx = -1$$

$$x^2 - kx + 1 = 0$$

if, $x - \frac{1}{x} = k$

$$x - k = \frac{1}{x}$$

$$x \cdot (x - k) = +1$$

$$x^2 - kx = +1$$

$$x^2 - kx - 1 = 0$$



if, $x^2 - 11x + 1 = 0$
 $x + \frac{1}{x} = 11$

तो $x^2 + \frac{1}{x^2} = 11^2 - 2 = 119$

यदि $y^{14} - 19y^7 + 1 = 0$

$(y^7)^2 - 19y^7 + 1 = 0$

$\Rightarrow y^7 + \frac{1}{y^7} = 19$

तो $y^{14} + \frac{1}{y^{14}} = 19^2 - 2 = 359$


$$x^2 - \sqrt{15}x - 1 = 0$$

$$x - \frac{1}{x} = \sqrt{15}$$

$$\text{तो } x^2 + \frac{1}{x^2} = \sqrt{15}^2 + 2 \\ = 17$$

55. If $a^2 - 13a - 1 = 0$, then find the value of $a^2 + \frac{1}{a^2} - 6$?

यदि $\underline{a^2 - 13a - 1 = 0}$ हो, तो $\boxed{a^2 + \frac{1}{a^2} - 6}$ का मान ज्ञात कीजिए।

[RRB Group D-2022]

[A] 165 ✓

[C] 167

$$= 13^2 + 2 - 6 = 165$$

[B] 169

[D] 171

$$a - 13 - \frac{1}{a} = 0$$

$$a - \frac{1}{a} = 13$$

56. If $x - 5\sqrt{x} - 1 = 0$, then $x^2 + \frac{1}{x^2}$ is equal to:

यदि $\underline{x - 5\sqrt{x} - 1 = 0}$ हो तो $x^2 + \frac{1}{x^2}$ का मान होगा?

[A] 625

[C] 729

[B] 731

[D] 727

$$\sqrt{x} - 5 - \frac{1}{\sqrt{x}} = 0$$

$$\sqrt{x} - \frac{1}{\sqrt{x}} = 5$$

$$x + \frac{1}{x} = 5^2 + 2 = 27$$

$$27^2 - 2$$

57. If $x^2 + (4 - \sqrt{3})x - 1 = 0$, then what is the value of $x^2 + \frac{1}{x^2}$?

यदि $x^2 + (4 - \sqrt{3})x - 1 = 0$ हो तो $x^2 + \frac{1}{x^2}$ का मान ज्ञात कीजिए।

[A] $9 - 8\sqrt{3}$

[B] $21 - 12\sqrt{3}$

[C] $21 - 8\sqrt{3}$

[D] $17 - 8\sqrt{3}$

$\rightarrow [- (4 - \sqrt{3})]^2 + 2$

$x - \frac{1}{x} = -(4 - \sqrt{3})$

$= (16 + 3 - 8\sqrt{3}) - 2$

58. If $4x^{\frac{9}{4}} - 9x^{\frac{9}{8}} + 4 = 0$, then $x^{\frac{9}{4}} + x^{-\frac{9}{4}} = ?$

यदि $4x^{\frac{9}{4}} - 9x^{\frac{9}{8}} + 4 = 0$ है, तो $x^{\frac{9}{4}} + x^{-\frac{9}{4}} = ?$

[A] $\frac{49}{16}$

[B] $\frac{53}{20}$

[C] $\frac{67}{32} \div 4$

[D] $\frac{9}{4}$

$$x^{\frac{9}{4}} + \frac{1}{x^{\frac{9}{4}}} = \frac{81}{16} - 2 = \frac{49}{16}$$

$$(x^{\frac{9}{4}})^2 - \left(\frac{9}{4}\right)x^{\frac{9}{4}} + 1 = 0$$

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

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