

यदि,

$$7x + \frac{5}{4x} = 12$$

$$\begin{aligned}\text{तो } 343x^3 + \frac{125}{64x^3} &= 12^3 - 3 \times 12 \times 7 \times \frac{5}{4} \\ &= 1728 - 315 \\ &= 1413 \checkmark\end{aligned}$$

$$\text{यदि, } x + \frac{1}{x} = k$$

$$\text{तो } x^3 + \frac{1}{x^3} = k^3 - 3k$$



95. If $3x + \frac{1}{2x} = 5$, then $8x^3 + \frac{1}{27x^3} = ?$

यदि $3x + \frac{1}{2x} = 5$ हो तो $8x^3 + \frac{1}{27x^3} = ?$

[A] $\frac{946}{27}$

[B] $\frac{820}{27}$

[C] $\frac{730}{27}$

[D] $\frac{973}{27}$

$$2x + \frac{1}{2x} = \frac{10}{3}$$

$$\begin{aligned} (2x)^3 + \left(\frac{1}{2x}\right)^3 &= \frac{1000}{27} - 3 \times \frac{10}{3} \times 2x \times \frac{1}{2x} \\ &= \frac{1000 - 180}{27} \\ &= \frac{820}{27} \end{aligned}$$

96. If $\left(3x^2 + \frac{1}{2x^2}\right) = 2.5$, what is the value of $\left(27x^6 + \frac{1}{8x^6}\right)$?

यदि $\left(3x^2 + \frac{1}{2x^2}\right) = 2.5$ है, तो $\left(27x^6 + \frac{1}{8x^6}\right)$ का मान क्या होगा?

[A] ~~5.125~~

[B] ~~6.275~~

[C] ~~3.325~~

☒ [D] 4.375

$$2.5^3 - 3 \times 2.5 \times 3 \times \frac{1}{2}$$

$$= 2.5 \times (6.25 - 4.5)$$

$$= 2.5 \times 1.75$$

97. If $x + \frac{1}{17x} = 3$, then the value of $17x^3 + \frac{1}{289x^3}$ is:

यदि $x + \frac{1}{17x} = 3$ तो $17x^3 + \frac{1}{289x^3}$ का मान ज्ञात कीजिए।

(RRB GROUP - D 2025) (RRB NTPC GRADUATE LEVEL CBT-1 2026) RRB JE 2025

[A] 450

[B] 345

[C] 435

[D] 534

$$17 \times \left[x^3 + \frac{1}{(17x)^3} \right] = \left[3^3 - 3 \times 3 \times \frac{1}{17} \right]$$

$$27 \times 17$$

$$= 459 - 9$$

$$= 450$$



98. If $\frac{x^2-1}{x} = 8$, then what is the value of $\frac{x^6-1}{x^3} = ?$

यदि $\frac{x^2-1}{x} = 8$, तो $\frac{x^6-1}{x^3}$ का मान क्या है?

SSC CHSL TIER – I 2022

[A] 496

[C] 512

[B] 536

[D] 488

$$x - \frac{1}{x} = 8$$

$$x^3 - \frac{1}{x^3} = 8^3 + 3 \times 8$$



99. If $y + \frac{1}{y} = 11$, then the value of $y^3 - \frac{1}{y^3}$ is:

यदि $y \oplus \frac{1}{y} = 11$ है, तो $y^3 - \frac{1}{y^3}$ का मान ज्ञात करें।

(SSC CGL PRE 2022)

[A] $345\sqrt{13}$

[C] $352\sqrt{13}$

[B] $360\sqrt{13}$

[D] $368\sqrt{13}$

$\sqrt{117} = 120 \times 3\sqrt{13}$

$$y - \frac{1}{y} = \sqrt{11^2 - 4} = \sqrt{117}$$

100. If $a - \frac{1}{a-5} = 18$, then the value of $(a-5)^3 - \frac{1}{(a-5)^3}$ is:

यदि $a - \frac{1}{a-5} = 18$ है, तो $(a-5)^3 - \frac{1}{(a-5)^3}$ का मान क्या होगा?

[A] **2236**

[B] **2168**

[C] **2239**

[D] **2201**

$$\begin{aligned} & \checkmark 13^3 + 3 \times 13 \\ & = 2197 + 39 \end{aligned}$$

$$(a-5) - \frac{1}{(a-5)} = 13$$



101. If $x^2 - 5x + 1 = 0$, then the value of $\left(x^4 + \frac{1}{x^2}\right) \div (x^2 + 1)$ is:

यदि $x^2 - 5x + 1 = 0$ है, तो $\left(x^4 + \frac{1}{x^2}\right) \div (x^2 + 1)$ का मान ज्ञात करें।

[A] 21

[B] 22

[C] 25

[D] 24

$$x + \frac{1}{x} = 5$$

$$\frac{x^4 + \frac{1}{x^2}}{x^2 + 1} = \frac{x^3 + \frac{1}{x^3}}{x + \frac{1}{x}} = \frac{110}{5} = 22$$

102. If $x^2 - 4x - 3 = 0$, then what is the value of $\frac{(x^4 - \frac{27}{x^2})}{(x^2 + 4x - 3)}$?

यदि $x^2 - 4x - 3 = 0$ है, तो $\frac{(x^4 - \frac{27}{x^2})}{(x^2 + 4x - 3)}$ का मान क्या है?

[A] $9\frac{1}{4}$
[C] $9\frac{1}{8}$

[B] $10\frac{1}{2}$
[D] $12\frac{1}{2}$

$$\frac{x^3 - \frac{27}{x}}{x + 4 - \frac{3}{x}} = \frac{4^3 - \frac{27}{4}}{4 + 3 \times 4 - \frac{3}{4}} = \frac{64 - 6.75}{16 - 0.75} = \frac{57.25}{15.25} = 3.75$$

$$x - \frac{3}{x} = 4$$

103. If $x^2 - 3x - 1 = 0$, then the value of $(x^2 + 8x - 1)(x^3 + x^{-1})^{-1}$ is:

यदि $x^2 - 3x - 1 = 0$ है, तो $(x^2 + 8x - 1)(x^3 + x^{-1})^{-1}$ का मान है:

[A] $\frac{3}{8}$

[B] 8

[C] 1

[D] 3 = $\frac{11x \cdot x}{x^4 + 1}$

$$\left(x^3 + \frac{1}{x}\right)^{-1} = \left(\frac{x^4 + 1}{x}\right)^{-1} = \frac{x}{x^4 + 1}$$

$$\Rightarrow x^3 - 1 = 3x$$

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

$$= \frac{11x^2}{x^4 + 1} = \frac{11}{x^2 + \frac{1}{x^2}} = \frac{11}{3+2} = \frac{11}{5}$$



104. If $x^2 - 4x + 1 = 0$ then find $(x^3 - 26)^2 = ?$

यदि $x^2 - 4x + 1 = 0$ तो $(x^3 - 26)^2$ ज्ञात कीजिये

[A] 545

[C] 625

[B] 675

[D] 91.125

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

$$\Rightarrow x^3 + \frac{1}{x^3} = 52$$

$$x^3 + \frac{1}{x^3} = 52$$

$$(x^6 - 52x^3 + 676)$$

$$= x^3(x^3 - 52) + 676$$

$$= 675$$

105. If $x^2 + x = 5$, then $(x + 3)^3 + \frac{1}{(x+3)^3} = ?$

यदि $x^2 + x = 5$ है, तो $(x + 3)^3 + \frac{1}{(x+3)^3}$ का मान क्या है?

(RRB NTPC GRADUATE LEVEL CBT-1 2026)

[A] 110

[C] 140

[B] 125

[D] 0

$$y^3 + \frac{1}{y^3} = 5^3 - 3 \times 5 = 110$$

माना $x+3=y$

$\Rightarrow x=y-3$

$$y^2 - 6y + 9 + y - 3 = 5$$

$$y^2 - 5y + 6 = 0$$

$$y + \frac{1}{y} = 5$$

Algebra-③



Concept:

$$\text{If, } x - \frac{1}{x} = 4 \quad (x > 0)$$

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

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

$$= (4+2) \cdot \sqrt{4+4} \cdot 4$$

$$= 18 \times 2\sqrt{5} \times 4$$

$$= 144\sqrt{5} \checkmark$$



Concept:

If, $x + \frac{1}{x} = 6$

$$x^2 + \frac{1}{x^2} = 6^2 - 2 = 34$$

$$x^4 + \frac{1}{x^4} = 34^2 - 2 = 1154$$

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

$$= 34 \times 6 \times \sqrt{6^2 - 4}$$

$$= 204 \times 4\sqrt{2}$$

$$= 816\sqrt{2}$$



1. If $a = 7 + 4\sqrt{3}$, then evaluate $(a^3 + \frac{1}{a^3})$.

यदि $a = 7 + 4\sqrt{3}$, है, तो $(a^3 + \frac{1}{a^3})$. का मान ज्ञात कीजिए।

(RRB NTPC GRADUATE LEVEL CBT-1 2026)

[A] ~~$1560\sqrt{3}$~~

[B] ~~-2702~~

[C] ~~$-1560\sqrt{3}$~~

☒ [D] 2702

$$a + \frac{1}{a} = 14$$

$$14^3 - 3 \times 14$$

2. If $\frac{x}{x^2-4x+1} = \frac{1}{9}$, then the value of $x^3 + \frac{1}{x^3}$ is:

यदि $\frac{x}{x^2-4x+1} = \frac{1}{9}$ तो $x^3 + \frac{1}{x^3}$ का मान ज्ञात कीजिए।

(RRB NTPC GRADUATE LEVEL CBT-1 2026)

[A] 729

[B] 1256

[C] 1839

[D] 2158

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

$$x^2 + 1 = 13x$$

$$x + \frac{1}{x} = 13$$

$$13^3 - 3 \times 13$$

3. If $x^2 - \sqrt{8}x + 1 = 0$, then the value of $\left(x^4 - \frac{1}{x^4}\right)$ is:

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

[A] $24\sqrt{6}$

[C] $20\sqrt{2}$

[B] $24\sqrt{2}$

[D] $20\sqrt{6}$

$$x + \frac{1}{x} = \sqrt{8}$$

$$\left(x^2 + \frac{1}{x^2}\right) \cdot \left(x + \frac{1}{x}\right) \cdot \left(x - \frac{1}{x}\right)$$

$\downarrow$ $\downarrow$ $\downarrow$
 $6 \times \sqrt{8} \times 2$

$$= 12 \times \sqrt{8}$$

$$= 24\sqrt{2}$$

$$x + \frac{1}{x} = 3$$

$$x^2 + \frac{1}{x^2} = 3^2 - 2 = 7$$

$$x^4 + \frac{1}{x^4} = 7^2 - 2 = 47$$

$$x^8 + \frac{1}{x^8} = 47^2 - 2 = 2207$$

14. If $x + \frac{1}{x} = 3$, then, $x^8 + \frac{1}{x^8} = ?$

यदि $x + \frac{1}{x} = 3$ है, तो $x^8 + \frac{1}{x^8} = ?$

[A] 2425

[C] 2329

[B] 2207

[D] 3234

15. If $\left(x - \frac{1}{x}\right) = \sqrt{6}$ & $x > 1$, then what is the value of $\left(x^8 - \frac{1}{x^8}\right)$?

यदि $\left(x - \frac{1}{x}\right) = \sqrt{6}$ & $x > 1$, तो $\left(x^8 - \frac{1}{x^8}\right)$ का मान क्या है?

(RRB NTPC GRADUATE LEVEL CBT-1 2026)

[A] $1024\sqrt{15}$

~~[B] $992\sqrt{15}$~~

[C] $998\sqrt{15}$

[D] $1012\sqrt{15}$

$$x^8 - \frac{1}{x^8} = \left(x^4 + \frac{1}{x^4}\right) \cdot \left(x^2 + \frac{1}{x^2}\right) \cdot \left(x + \frac{1}{x}\right) \cdot \left(x - \frac{1}{x}\right)$$

$\downarrow$ $\downarrow$ $\downarrow$ $\downarrow$
 $\sqrt{15} \times 2$ 8 $\sqrt{10}$ $\sqrt{6}$

$$= 496 \times 2\sqrt{15}$$

$$= 992\sqrt{15}$$