

$$\text{If, } x + \frac{1}{x} = k$$

$$\text{तो } x^5 + \frac{1}{x^5} = ?$$

Concept:

$$\left(x^3 + \frac{1}{x^3}\right) \times \left(x^2 + \frac{1}{x^2}\right) = \left(x^5 + \frac{1}{x^5}\right) + x + \frac{1}{x}$$

$$\left(x^3 + \frac{1}{x^3}\right) \cdot \left(x^2 + \frac{1}{x^2}\right) - \left(x + \frac{1}{x}\right) = x^5 + \frac{1}{x^5}$$

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

Concept:

तो $x^5 + \frac{1}{x^5} = \left(x^2 + \frac{1}{x^2}\right) \cdot \left(x^3 + \frac{1}{x^3}\right) - \left(x + \frac{1}{x}\right)$

$\downarrow \quad \quad \downarrow$
 $23 \times 110 - 5$

$= 2530 - 5$
 $= 2525 \checkmark$



4. If $\left(a + \frac{1}{a}\right) = 7$, then what is the value of $\left(a^5 + \frac{1}{a^5}\right)$?

यदि $\left(a + \frac{1}{a}\right) = 7$ है, तो $\left(a^5 + \frac{1}{a^5}\right)$ का मान ज्ञात कीजिए।

(RRB NTPC GRADUATE LEVEL CBT-1 2026)

[A] 15712

[B] 15127

[C] 15721

[D] 15271

$$7^3 - 3 \times 7$$

$$\begin{aligned} & \left(a^2 + \frac{1}{a^2}\right) \left(a^3 + \frac{1}{a^3}\right) - \left(a + \frac{1}{a}\right) \\ & \quad \downarrow \quad \quad \downarrow \\ & = 47 \times 329 - 7 \\ & = \end{aligned}$$

5. If $x^2 - 2\sqrt{5}x + 1 = 0$, then what is the value of $x^5 + \frac{1}{x^5}$?

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

(RRB NTPC GRADUATE LEVEL CBT-1 2025)

[A] $408\sqrt{5}$

[C] $406\sqrt{5}$

[B] $610\sqrt{5}$

[D] $612\sqrt{5}$

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

$$(2\sqrt{5})^2 - 2$$

$$(2\sqrt{5})^3 - 3 \times 2\sqrt{5}$$

$$\left(x^2 + \frac{1}{x^2}\right) \cdot \left(x^3 + \frac{1}{x^3}\right) - \left(x + \frac{1}{x}\right)$$

$$18 \times 34\sqrt{5} - 2\sqrt{5}$$

$$= 612\sqrt{5} - 2\sqrt{5}$$

$$= 610\sqrt{5}$$

If, $x \pm \frac{1}{x} = k$ तो $x^5 - \frac{1}{x^5} = ?$

$$\left(x^2 + \frac{1}{x^2}\right) \cdot \left(x^3 - \frac{1}{x^3}\right) = \left(x^5 - \frac{1}{x^5}\right) + \underline{x - \frac{1}{x}}$$

$$\left(x^2 + \frac{1}{x^2}\right) \cdot \left(x^3 - \frac{1}{x^3}\right) - \left(x - \frac{1}{x}\right) = x^5 - \frac{1}{x^5}$$

If, $x - \frac{1}{x} = 4$

तो $x^5 - \frac{1}{x^5} = \left(x^2 + \frac{1}{x^2}\right) \cdot \left(x^3 - \frac{1}{x^3}\right) - \left(x - \frac{1}{x}\right)$

$\downarrow \quad \downarrow$
18 × 76 - 4

= 1368 - 4

= 1364

$4^2 + 2$

$4^3 + 3 \times 4$



$$\text{If, } x + \frac{1}{x} = 5 \Rightarrow x^3 + \frac{1}{x^3} = 5^3 - 3 \times 5 = 110$$

$$\text{तो } x^6 + \frac{1}{x^6} = 110^2 - 2 = 12100 - 2 = 12098$$

#

$$(x^3)^2 = (x^2)^3 = x^6$$



Concept:

$$\text{If, } x - \frac{1}{x} = \sqrt{10}$$

$$\Rightarrow x^3 - \frac{1}{x^3} = \sqrt{10}^3 + 3\sqrt{10} = 13\sqrt{10}$$

$$\begin{aligned}\text{तो } x^6 + \frac{1}{x^6} &= (13\sqrt{10})^2 + 2 \\ &= 1690 + 2 = 1692\end{aligned}$$



6. $x^2 - 4x + 1 = 0$, then what is the value of $(x^6 + x^{-6})$?

यदि $x^2 - 4x + 1 = 0$ है, तो $(x^6 + x^{-6})$ का मान क्या है?

[A] 2786

[B] 2702

[C] 2716

[D] 2744

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

$$x^3 + \frac{1}{x^3} = 4^3 - 3 \times 4 = 52$$

$$x^6 + \frac{1}{x^6} = 52^2 - 2 = 2704 - 2 = 2702$$

7. If $x + \frac{1}{x} = 7$, then the value of $x^6 + \frac{1}{x^6}$ is?

यदि $x + \frac{1}{x} = 7$, तो $x^6 + \frac{1}{x^6}$ का मान क्या है?

[A] ~~113682~~ ✗

[C] ~~103882~~ ✗

✓ [B] ~~103682~~ ○

[D] ~~103862~~ ✗

$$x^3 + \frac{1}{x^3} = 7^3 - 3 \times 7 = 322$$

D.S $48 - 2$
 (2)

8. If $b - \frac{1}{b} = 3$ then calculate the value of $b^6 + \frac{1}{b^6}$?

यदि $b - \frac{1}{b} = 3$ तो $b^6 + \frac{1}{b^6}$ का मान ज्ञात कीजिए?

SSC CHSL TIER – I 2025

[A] 1298

[B] 1345

[C] 1987

[D] 1678

$$b^3 - \frac{1}{b^3} = 3^3 + 3 \times 3 = 36$$

$$b^6 + \frac{1}{b^6} = 36^2 + 2 = 1298$$

9. If $\left(x - \frac{1}{x} = 4\right)$, then what is the value of $\left(x^6 + \frac{1}{x^6}\right)$?

यदि $\left(x - \frac{1}{x} = 4\right)$ है, तो $\left(x^6 + \frac{1}{x^6}\right)$ का मान क्या है?

SSC CHSL TIER – I 2022

[A] 4689

[C] 5832

[B] 4786

[D] 5778

$$\begin{aligned} x^3 - \frac{1}{x^3} &= 4^3 + 3 \times 4 \\ &= 76 \end{aligned}$$

76³ + 2

यदि, $x + \frac{1}{x} = 4$ $\forall (x > 1)$

Concept:

$$x - \frac{1}{x} = \sqrt{4^2 - 4} = \sqrt{12}$$

$$x^6 - \frac{1}{x^6} = \left(x^3\right)^2 - \left(\frac{1}{x^3}\right)^2 = \left(x^3 + \frac{1}{x^3}\right) \cdot \left(x^3 - \frac{1}{x^3}\right)$$

$$= (4^3 - 3 \times 4) (\sqrt{12}^3 + 3\sqrt{12})$$

$$= 52 \times 15\sqrt{3}$$

$$= 780 \times \sqrt{3}$$

$$= 156\sqrt{3}$$



10. If $\left(x + \frac{1}{x}\right) = 5\sqrt{2}$ & $x > 1$, what is the value of $\left(x^6 - \frac{1}{x^6}\right)$?

यदि $\left(x + \frac{1}{x}\right) = 5\sqrt{2}$ & $x > 1$, तो $\left(x^6 - \frac{1}{x^6}\right)$ का मान क्या है?

[A] $22970\sqrt{23}$

[C] $23060\sqrt{23}$

[B] $23030\sqrt{23}$

[D] $22960\sqrt{23}$

$$= (5\sqrt{2})^3 - 3 \times 5\sqrt{2}$$

$$x - \frac{1}{x} = \sqrt{(5\sqrt{2})^2 - 4} = \sqrt{46}$$

$$\begin{aligned} & 235 \times (100 - 2) \\ & 23500 - 470 \end{aligned}$$

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

$$235\sqrt{2} \times 49\sqrt{46}$$

$$= 235 \times 49 \times 2\sqrt{23}$$

$$= 23030\sqrt{23}$$

if, $x + \frac{1}{x} = k$ तो $x^7 + \frac{1}{x^7} = ?$

$$\left(x^4 + \frac{1}{x^4}\right) \cdot \left(x^3 + \frac{1}{x^3}\right) = \left(x^7 + \frac{1}{x^7}\right) + x + \frac{1}{x}$$

$$\left(x^4 + \frac{1}{x^4}\right) \cdot \left(x^3 + \frac{1}{x^3}\right) - \left(x + \frac{1}{x}\right) = x^7 + \frac{1}{x^7}$$

यदि, $x + \frac{1}{x} = 4$

$\rightarrow 4^2 - 2 = 14$
 $4^3 - 3 \times 4$

$\rightarrow 14^2 - 2 = 194$

$$x^7 + \frac{1}{x^7} = \left(x^4 + \frac{1}{x^4}\right) \cdot \left(x^3 + \frac{1}{x^3}\right) - \left(x + \frac{1}{x}\right)$$

$\downarrow$ $\downarrow$

$194 \times 14 - 4$

$= 10088 - 4 = 10084$

$194(50+2) = 9700 + 388$



11. If $x > 0$ & $x^4 + \frac{1}{x^4} = 142$, what is the value of $x^7 + \frac{1}{x^7}$?

यदि, $x > 0$ & $x^4 + \frac{1}{x^4} = 142$, तो $x^7 + \frac{1}{x^7}$ का मान क्या है?

(RRB NTPC GRADUATE LEVEL CBT-1 2026)

[A] $1561\sqrt{14}$

[C] $1563\sqrt{14}$

[B] $1560\sqrt{14}$

[D] $1562\sqrt{14}$

$$x^2 + \frac{1}{x^2} = \sqrt{144} = 12$$

$$x + \frac{1}{x} = \sqrt{14}$$

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

$$\downarrow \quad \downarrow$$

$$142x \quad 11\sqrt{14} - 1\sqrt{14}$$

$$= 1562\sqrt{14} - \sqrt{14}$$

12. If $x > 0$ & $x^4 + \frac{1}{x^4} = 2207$, then find $x^7 + \frac{1}{x^7}$?

यदि $x > 0$ & $x^4 + \frac{1}{x^4} = 2207$, तो $x^7 + \frac{1}{x^7}$ का मान क्या है?

[A] 710649 ✗

[C] 710654 ✗

[B] 710647 ✓

[D] 710661 ✗

$$x^2 + \frac{1}{x^2} = \sqrt{2209} = 47$$

$$x + \frac{1}{x} = \sqrt{49} = 7$$

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

$$\downarrow \quad \downarrow$$

$$2207 \times 47 - 7$$

$$x^7 - \frac{1}{x^7} = ?$$

$$\left(x^4 + \frac{1}{x^4}\right) \cdot \left(x^3 - \frac{1}{x^3}\right) = \left(x^7 - \frac{1}{x^7}\right) - x + \frac{1}{x}$$

$$\left(x^4 + \frac{1}{x^4}\right) \cdot \left(x^3 - \frac{1}{x^3}\right) + \left(x - \frac{1}{x}\right) = x^7 - \frac{1}{x^7}$$

Concept:

यदि, $x - \frac{1}{x} = 3$

$$x^7 - \frac{1}{x^7} = \left(x^4 + \frac{1}{x^4}\right) \cdot \left(x^3 - \frac{1}{x^3}\right) + \left(x - \frac{1}{x}\right)$$

↓

$$= 119 \times 36 + 3$$
$$= 4287$$

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

$$x^4 + \frac{1}{x^4} = 11^2 - 2 = 119$$



13. If $x^5 - \frac{1}{x^5} = \sqrt{7}$, then find $x^{35} - \frac{1}{x^{35}} = ?$

यदि $x^5 - \frac{1}{x^5} = \sqrt{7}$ है, तो $x^{35} - \frac{1}{x^{35}}$ का मान ज्ञात कीजिए?

[A] $791\sqrt{7}$

[B] $789\sqrt{7}$

[C] $790\sqrt{7}$

[D] $792\sqrt{7}$

$$x - \frac{1}{x} = \sqrt{7}$$

↓

9

↓

79

$$x^7 - \frac{1}{x^7} = \left(x^4 + \frac{1}{x^4}\right) \cdot \left(x^3 - \frac{1}{x^3}\right) + \left(x - \frac{1}{x}\right)$$

↓ ↓

$$79x \quad 10\sqrt{7} + \sqrt{7}$$

$$= 791\sqrt{7}$$

17. If $x\sqrt{x} + \frac{1}{x\sqrt{x}} = 110$, then find $x^2\sqrt{x} + \frac{1}{x^2\sqrt{x}}$?

यदि $x\sqrt{x} + \frac{1}{x\sqrt{x}} = 110$ है, तो $x^2\sqrt{x} + \frac{1}{x^2\sqrt{x}}$ ज्ञात कीजिये?

[A] 2525

[B] 12098

[C] 140

[D] 3645

$$x\sqrt{x} + \frac{1}{x\sqrt{x}} = 110$$

$$\sqrt{x}^5 + \frac{1}{\sqrt{x}^5} = 2525$$

$$\sqrt{x}^3 + \frac{1}{\sqrt{x}^3} = 110$$

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

