



Foundation Batch

MATHS

Algebra

(बीजगणित)

Part -4

LIVE

19-12-2024

07:00PM





Foundation Batch

MATHS



TYPE-V

Put
 $a=x$
 $b=\frac{1}{x}$

$$(a+b)^2 = a^2 + b^2 + 2ab$$

$$a^2 + b^2 = (a+b)^2 - 2ab$$

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

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

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

then $x^2 + \frac{1}{x^2} = (k^2 - 2) = p$

$x^4 + \frac{1}{x^4} = (p^2 - 2) = q$

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

$$(a-b)^2 = a^2 + b^2 - 2ab$$

$$a^2 + b^2 = (a-b)^2 + 2ab$$

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

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

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

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

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



If $x + \frac{1}{x} = a$, then, $x^2 + \frac{1}{x^2} = a^2 - 2$

If $x - \frac{1}{x} = a$, then, $x^2 + \frac{1}{x^2} = a^2 + 2$



60. If $x + \frac{1}{x} = 15$, then find the value of $\left(x^2 + \frac{1}{x^2}\right)$.

यदि $x + \frac{1}{x} = 15$ है, तो $\left(x^2 + \frac{1}{x^2}\right)$ का मान ज्ञात कीजिए।

(a) 13

(b) 17

(c) 225

(d) 223

$$\begin{aligned} & 15^2 - 2 \\ & 225 - 2 \\ & = \underline{223} \end{aligned}$$

(SSC Selection post Phase XII 26/06/2024)



61. If $\left(a + \frac{1}{a}\right) = 6$, then what is the value of $\frac{3}{4}\left(a^2 + \frac{1}{a^2}\right)$?

यदि $\left(a + \frac{1}{a}\right) = 6$ है, तब $\frac{3}{4}\left(a^2 + \frac{1}{a^2}\right)$ का मान क्या है?

~~(a) 25.5~~

(b) 34

(c) 22.5

(d) 36

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

$$= 36 - 2$$

$$= 34$$

$$\frac{3}{4} \times 34 = \frac{51}{2} = 25.5$$

(SSC CHSL Pre 02/08/2023)

62. If $\left(x - \frac{1}{x-1}\right) = 3$, then find the value of $(x-1)^2 + \frac{1}{(x-1)^2}$

यदि $\left(x - \frac{1}{x-1}\right) = 3$, तो $(x-1)^2 + \frac{1}{(x-1)^2}$ का मान ज्ञात करें

(a) 3

☒ (b) 6

(c) 4

(d) 5

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

$$a^2 + \frac{1}{a^2}$$

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

$$a - \frac{1}{a} = 2$$

(SSC Selection Post Phase XII 20/06/2024)

$$a^2 + \frac{1}{a^2} = 2^2 + 2 = 6$$

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

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

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

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



63. If $x + \frac{16}{x} = 8$, then find the value of $x^2 + \frac{32}{x^2}$.

यदि $x + \frac{16}{x} = 8$ है, तो $x^2 + \frac{32}{x^2}$ का मान ज्ञात कीजिए।

$$\begin{aligned} x^2 + 16 &= 8x \\ x^2 - 8x + 16 &= 0 \\ (x-4)^2 &= 0 \\ x &= 4 \end{aligned}$$

(a) 18

(b) 20

(c) 16

(d) 24

$$4 + \frac{16}{4}$$

(8)

$$\underline{x=4}$$

$$4^2 + \frac{32}{4^2}$$

$$16 + 2 = 18$$

(SSC CGL Mains 18/11/2020)

64. If $x - \frac{2}{x} = 15$, then the value of $\left(x^2 + \frac{4}{x^2}\right)$ is.

यदि $x - \frac{2}{x} = 15$ है, तो $\left(x^2 + \frac{4}{x^2}\right)$ का मान ज्ञात करें।

$$\downarrow$$
$$15 + 2 \times 2$$

$$225 + 4$$

$$= 229$$

(a) 221

(b) 223

(c) 229

(d) 227

(SSC CGL Pre 24/08/2021)

$$\textcircled{2}x + \frac{\textcircled{3}}{x} = 8$$

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

$$8^2 - 2 \times 2 \times 3$$

$$64 - 12$$

$$\underline{\underline{52}}$$



65. If $\left(5y + \frac{5}{y}\right) = 11$, find the value of $\left(y^2 + \frac{1}{y^2}\right)$.

यदि $\left(5y + \frac{5}{y}\right) = 11$ है, $\left(y^2 + \frac{1}{y^2}\right)$ का मान ज्ञात कीजिए।

(a) $3\frac{21}{25}$
(b) $4\frac{21}{25}$
(c) $1\frac{21}{25}$
(d) $2\frac{21}{25}$

$$5\left(y + \frac{1}{y}\right) = 11$$
$$y + \frac{1}{y} = \frac{11}{5}$$
$$y^2 + \frac{1}{y^2} = \left(\frac{11}{5}\right)^2 - 2$$

(SSC CGL Pre 20/07/2023)

$$\frac{121}{25} - 2 = \frac{121 - 50}{25} = \left(\frac{71}{25}\right) = 2\frac{21}{25}$$

66. If $7b - \frac{1}{4b} = 7$, then what is the value of $16b^2 + \frac{1}{49b^2}$?

यदि $7b - \frac{1}{4b} = 7$ है, तो $16b^2 + \frac{1}{49b^2}$ का मान क्या है?

(a) $\frac{7}{2}$

(b) $\frac{120}{7}$

(c) $\frac{104}{7}$

(d) $\frac{80}{49}$

$$\frac{4}{7} \left(7b - \frac{1}{4b} = 7 \right)$$

$$4b - \frac{1}{7b} = 7 \times \frac{4}{7} = 4$$

(SSC CGL Pre 14/07/2023)

$$16b^2 + \frac{1}{49b^2} = 4^2 + 2 \times 4 \times \frac{1}{7}$$
$$16 + \frac{8}{7} = \frac{120}{7}$$

67. If $(a - 2) + \frac{1}{(a+2)} = -1$, then find the value of $(a + 2)^2 + \frac{1}{(a+2)^2}$.

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

(a) 11

(b) 7

(c) 23

(d) 27

$$4 + (a-2) + \frac{1}{(a+2)} = -1 + 4$$

$$(a+2) + \frac{1}{(a+2)} = 3$$

$$(\underline{a+2})^2 + \frac{1}{(\underline{a+2})^2} = 3^2 - 2$$

(7)



68. If $\left(3y - \frac{3}{y}\right) = 5$, find the value of $\left(y^2 + \frac{1}{y^2}\right)$.

यदि $\left(3y - \frac{3}{y}\right) = 5$ है, तो $\left(y^2 + \frac{1}{y^2}\right)$ का मान ज्ञात कीजिए।

(a) $\frac{43}{9}$

(b) $\frac{49}{9}$

(c) $\frac{47}{9}$

(d) $\frac{41}{9}$

$$3\left(y - \frac{1}{y}\right) = 5$$

$$y - \frac{1}{y} = \frac{5}{3}$$

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

(SSC CGL 19/07/2023)

$$\frac{25}{9} + 2 = \frac{43}{9}$$

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

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

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

$$x - \frac{1}{x} = \sqrt{K-2}$$

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

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

$$\sqrt{49} = 7$$

$$x + \frac{1}{x} = ? = \sqrt{7+2} = \sqrt{9} = \textcircled{3}$$

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

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

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

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

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

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

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

69. If $x^2 - 7x + 1 = 0$ and $0 < x < 1$, what is the value of $x^2 - \frac{1}{x^2}$?

यदि $\frac{x^2 - 7x + 1}{x} = 0$ और $0 < x < 1$, $x^2 - \frac{1}{x^2}$ का मान क्या है?

(a) $28\sqrt{5}$ $x - 7 + \frac{1}{x} = 0$

(b) $21\sqrt{5}$

(c) $-21\sqrt{5}$

(d) $-28\sqrt{5}$

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

(SSC CGL Pre 19/07/2023)

$$\begin{aligned} & \downarrow \\ & \left(x - \frac{1}{x}\right) \left(x + \frac{1}{x}\right) \\ & \downarrow \qquad \qquad \downarrow \\ & \sqrt{7^2 - 4} \qquad \qquad 7 \\ & \sqrt{49 - 4} \end{aligned}$$

$$= \sqrt{45}$$

9×5

$$7 \times 3 \sqrt{5}$$

$21\sqrt{5}$



70. If $3x^2 - 5x + 1 = 0$, then the value of $\left(x^2 + \frac{1}{9x^2}\right)$ is.

यदि $\frac{3x^2 - 5x + 1}{x} = \frac{0}{x}$ है, तो $\left(x^2 + \frac{1}{9x^2}\right)$ का मान ज्ञात कीजिए।

(a) $1\frac{1}{3}$ $\frac{1}{3}\left(3x + \frac{1}{x} = +5\right)$

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

(c) $2\frac{1}{9}$

(d) $1\frac{2}{3}$

$$x + \frac{1}{3x} = \frac{5}{3}$$

$$x^2 + \frac{1}{9x^2} = \left(\frac{5}{3}\right)^2 - 2 \times \frac{1}{3}$$

(SSC CGL Mains 15/11/2020)

$$\frac{25}{9} - \frac{2}{3} = \frac{25-6}{9} = \frac{19}{9} = 2\frac{1}{9}$$

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

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

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

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



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If $x + \frac{1}{x} = a$, then, $x^3 + \frac{1}{x^3} = a^3 - 3a$

If $x - \frac{1}{x} = a$, then, $x^3 - \frac{1}{x^3} = a^3 + 3a$

71. If $x + \frac{1}{x} = 7$, then find the value of $\left(x^3 + \frac{1}{x^3}\right)$.

यदि $x + \frac{1}{x} = 7$ है, तो $\left(x^3 + \frac{1}{x^3}\right)$ का मान ज्ञात कीजिए।

(a) 343

(b) 340

(c) 322

(d) 332

$$\begin{aligned} & 7^3 - 3 \times 7 \\ & 343 - 21 \\ & \underline{322} \end{aligned}$$

(SSC Selection Post Phase XII 25/06/2024)



72. If $\left(x + \frac{1}{x}\right)^2 = 3$, then the value of $\left(x^3 + \frac{1}{x^3}\right)$ is.

यदि $\left(x + \frac{1}{x}\right)^2 = 3$ हो, तो $\left(x^3 + \frac{1}{x^3}\right)$ का मान है।

~~(a) 0~~

(b) 2

(c) 3

(d) 1

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

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

$$3\sqrt{3} - 3\sqrt{3}$$

$$= 0$$



Standard Result
if, $x + \frac{1}{x} = \sqrt{3}$

then $\downarrow$
 $x^3 + \frac{1}{x^3} = 0$

or, $\downarrow$
 $\boxed{x^6 = -1}$



73. If $x + \frac{1}{16x} = 1$, then the value of $64x^3 + \frac{1}{64x^3}$ is.

यदि $\left(x + \frac{1}{16x} = 1\right)$ तो $64x^3 + \frac{1}{64x^3}$ का मान है।

(a) 76

(b) 52

(c) 64

(d) 4

$$(4x)^3 + \frac{1}{(4x)^3}$$

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

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

$$64 - 12 = 52$$



74. If $x - \frac{1}{x} = 11$, then the value of $x^3 - \frac{1}{x^3}$.

यदि $x - \frac{1}{x} = 11$ हो, तो $x^3 - \frac{1}{x^3}$ का मान है।

(a) 1364

(b) 1366

(c) 1

(d) N.O.T.

$$11^3 + 3 \times 11$$

$$1331 + 33$$

$$= \underline{\underline{1364}}$$

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

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

75. If $x \left(3 - \frac{2}{x} \right) = \frac{3}{x}$, then find the value of $x^3 - \frac{1}{x^3}$.

यदि $x \left(3 - \frac{2}{x} \right) = \frac{3}{x}$ है, तो $x^3 - \frac{1}{x^3}$ का मान ज्ञात कीजिए।

(a) $\frac{61}{27}$ $3x - 2 = \frac{3}{x}$

(b) $\frac{8}{27}$ $3 \left(x - \frac{1}{x} \right) = 2$

(c) $\frac{52}{27}$ $\boxed{x - \frac{1}{x} = \frac{2}{3}}$

(d) $\frac{62}{27}$

$$x^3 - \frac{1}{x^3} = \left(\frac{2}{3} \right)^3 + 3 \times \frac{2}{3}$$
$$\frac{8}{27} + 2$$

$$\Rightarrow \frac{62}{27}$$

(SSC CGL Mains 18/11/2020)

76. If $x - \frac{1}{x} = \sqrt{77}$, then one of the values of $x^3 - \frac{1}{x^3}$ is.

यदि $x - \frac{1}{x} = \sqrt{77}$ है, तो $x^3 - \frac{1}{x^3}$ के मानों में से एक मान है।

$$(\sqrt{a})^3 = a\sqrt{a}$$

(a) $77\sqrt{77}$

(b) -702

(c) $3\sqrt{77}$

(d) $80\sqrt{77}$

$$(\sqrt{77})^3 + 3\sqrt{77}$$

$$77\sqrt{77} + 3\sqrt{77}$$

$$= 80\sqrt{77}$$

(SSC CGL Pre 18/08/2021)



77. If $x + \frac{1}{15x} = 3$, then the value of $9x^3 + \frac{1}{375x^3}$ is.

यदि $\left(x + \frac{1}{15x} = 3\right)$ है, तो $\left(9x^3 + \frac{1}{375x^3}\right)$ का मान है।

$$3x + \frac{1}{5x} = 9$$

$$\frac{1}{3} \times 3 \left(9x^3 + \frac{1}{375x^3}\right)$$

(a) 273.6

(b) 367.2

(c) 376.2

(d) 237.6

$$\left(\frac{1}{3}\right) \left[27x^3 + \frac{1}{125x^3}\right]$$

$$27x^3 + \frac{1}{125x^3} = 9^3 - 3 \times 9 \times 3 \times \frac{1}{5}$$

$$729 - \frac{81}{5}$$

$$\frac{1}{3} \times 712.8$$

$$237.6$$

(SSC CHSL Pre 10/08/2021)

$$729 - 16.2$$

$$= 712.8$$

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

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

(a) 2

(b) 5

(c) 7

(d) 14

$$a - \frac{1}{a-3} = 5$$

$$(a-3) - \frac{1}{(a-3)} = 2$$

$$(a-3)^3 - \frac{1}{(a-3)^3} = 2^3 + 3 \times 2$$

$$8 + 6 = 14$$

79. If $x^2 - 5\sqrt{5}x + 1 = 0$, and $x > 0$, what is the value of $\left(x^3 - \frac{1}{x^3}\right)$?

यदि $\frac{x^2 - 5\sqrt{5}x + 1}{x} = \frac{0}{x}$ और $x > 0$ है, तो $\left(x^3 - \frac{1}{x^3}\right)$ का मान क्या है?

(a) 1296

(b) 1331

(c) 1244

(d) 1364

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

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

$$\sqrt{125 - 4} = \sqrt{121}$$

(SSC CHSL Pre 08/08/2023) = 11

$$\begin{array}{r} \downarrow \\ 3 \\ 11 + 3 \times 11 \\ 1331 + 33 \\ \hline 1364 \end{array}$$

80. If $x^2 + \frac{1}{x^2} = 98$, then the value of $x + \frac{1}{x}$ is.

यदि $x^2 + \frac{1}{x^2} = 98$ है, तो $x + \frac{1}{x}$ का मान ज्ञात कीजिए।

(a) 8

(b) 9

(c) 7

(d) 10

$$x + \frac{1}{x} = \sqrt{98+2}$$

$$\sqrt{100}$$

$$= 10$$

(SSC CPO Pre 11/11/2022)

81. If $x^2 + \frac{1}{x^2} = 14$, then what is the value of $x^3 + \frac{1}{x^3}$? ($x > 0$)

यदि $x^2 + \frac{1}{x^2} = 14$ है, तो $x^3 + \frac{1}{x^3}$ का मान क्या है?
($x > 0$)

(a) 50

(b) 42

~~(c) 52~~

(d) 48

$$x + \frac{1}{x} = \sqrt{14 + 2} \\ = 4$$

$$4^3 - 3 \times 4 \\ 64 - 12 \\ 52$$

(IB ACIO Grade 2, 18/01/2024)

82. If $\left(x^2 + \frac{1}{x^2}\right) = 18$ and $x > 1$, what is the value of $\left(x^3 - \frac{1}{x^3}\right)$?

यदि $\left(x^2 + \frac{1}{x^2}\right) = 18$ और $x > 1$, तो $\left(x^3 - \frac{1}{x^3}\right)$ का मान क्या है?

(SSC Selection Post XI 2023)

(a) 64

(c) 76

(b) 80

(d) 52

$$x - \frac{1}{x} = \sqrt{18 - 2}$$

(4)

$$\begin{aligned} &4^3 + 3 \times 4 \\ &64 + 12 \\ &76 \end{aligned}$$

Q. 83

83. If $\left(x^2 - \frac{1}{x^2}\right) = 4\sqrt{6}$ and $x > 1$, what is the value of $\left(x^3 - \frac{1}{x^3}\right)$?

यदि $\left(x^2 - \frac{1}{x^2}\right) = 4\sqrt{6}$ और $x > 1$, $\left(x^3 - \frac{1}{x^3}\right)$ का मान क्या है

(SSC CGL Pre 21/07/2023)

(a) $18\sqrt{2}$

(b) $24\sqrt{2}$

(c) $22\sqrt{2}$

(d) $20\sqrt{2}$