MAINS SPECIAL

Class-2

Algebra

If $x^2 y^{-2} + x^{-2} y^2 + 1 = 18x^{-2} y^{-2}$ and $x^2 - xy + y^2 = 6$ then the value of $\left(\frac{x}{y} + \frac{y}{x}\right)^3$ =?

(a) 18 (b) −27

(c) −9 (d) −18

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

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

$x^2 + y^2 - xy = 6$

$x^2 + y^2 + xy = 3$

$\left(\frac{x^2+y^2}{xy}\right)^3 \rightarrow \left(\frac{9}{-3}\right)^3$

B

$= -27$

② If $x = 12\frac{8}{16}$, $y = 12.6$, $z = 12\frac{4}{5}$ then find the value of $x^3 + y^3 + z^3 - 3xyz$

12.5 12.8

(a) 2.643 (b) 2.62

(c) 2.653 (d) 2.67

$= \frac{37.9}{2}\left[(.1)^2 + (0.2)^2 + (0.3)^2\right]$

$= \frac{37.9}{2 \times 10}\left[\frac{7}{14}\right]$

0.37 3

(3) If $a + b = \sqrt{10}$, $ab = 3$ then find the value of $\left[\frac{1}{a^{-3}} + \frac{1}{b^{-3}}\right]^{-3}$ =?

$[a^3+b^3]^{-3}$

(a) $\sqrt{10}$ (b) $10\sqrt{10}$

(c) $3\sqrt{3}$ (d) None

$[10\sqrt{10} - 9(\sqrt{10})]^{-3}$

(D)

$(\sqrt{10})^{-3} = \frac{1}{10\sqrt{10}}$

(4) If $A^2 - \sqrt{3}A + 2 = 1$ then find the value of $A^4(A^{80} + A^{92}) + A^{96} + A^{102} + 2$.

(a) 1 (b) −2

(c) 0 (d) 4

$A^2 - \sqrt{3}A + 1 = 0$

$A + \frac{1}{A} = \sqrt{3}$ ↳ P.D → 6 → Odd. Ans 0

↳ $A^3 + \frac{1}{A^3} = 0$

↳ $A^6 = -1$, odd mult. -1, even $+1$

$1 + 1 + 2$

Ans. 0

(D)

(5) If $x^2 - \sqrt{7}x + 4 = 3$ then find the value of $\dfrac{x \times (x^4 + x^{-6})}{x \times (x^2 + x^{-4})}$

(a) 4.75 (b) 3.65

(c) 4.60 (d) 3.60

$x^2 - \sqrt{7}x + 1 = 0$

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

$$\frac{x^5 + \frac{1}{x^5}}{x^3 + \frac{1}{x^3}} = \frac{(5)(4\sqrt{7}) - \sqrt{7}}{4\sqrt{7}}$$

$$= \frac{19\sqrt{7}}{4\sqrt{7}} = 4.75$$

(A)

6 If $x^3 + \frac{2}{x^3} = 4$ then find the value of

$x^{18} - 40x^9 + 54 = ?$

(a) 54 (b) 56

(c) 46 (d) 42

$x^9 + \frac{8}{x^9} = 64 - 24$

$= 40$

$x^{18} + 8 = 40x^9$

$x^{18} - 40x^9 = -8$

$54 - 8$

46

$y^3 - 3nxy$

$y^3 - 3 \times 4 \times 2$

(7) If $\left(3x^2 + \frac{2}{x^4}\right) = 3$ then find the value of

$27x^{18} - 27x^{12} + 27x^{10} + 8 = ?$

(a) $10x^6$ (b) $-27x^{10}$

(c) $27x^{10}$ (d) $26x^6$

$3x^6 - 3x^4 = -2$

$27x^{18} - 27x^{12} - 27x^{10}(-2) = -8$

$27x^{18} - 27x^{12} + 8 = 54x^{10}$

$-54x^{10} + 27x^{10}$

$= -27x^{10}$

(B)

8

$\frac{x}{a} + \frac{x}{b} = 2$ then find the value of

$(x+a)(x-a)^{-1} + (x+b)(x-b)^{-1}$

(a) 1 (b) 0

(c) −2 (d) 2

$\frac{bx+ax}{ab} = 2$

$x = \frac{2ab}{a+b}$

$\frac{x+a}{x-a} + \frac{x+b}{x-b}$ → 2

D

$$x = \frac{2ab}{a+b}$$

$$\frac{x+a}{x-a} + \frac{x+b}{x-b}$$

$$\frac{3b+a}{b-a} - \frac{3a-b}{b-a}$$

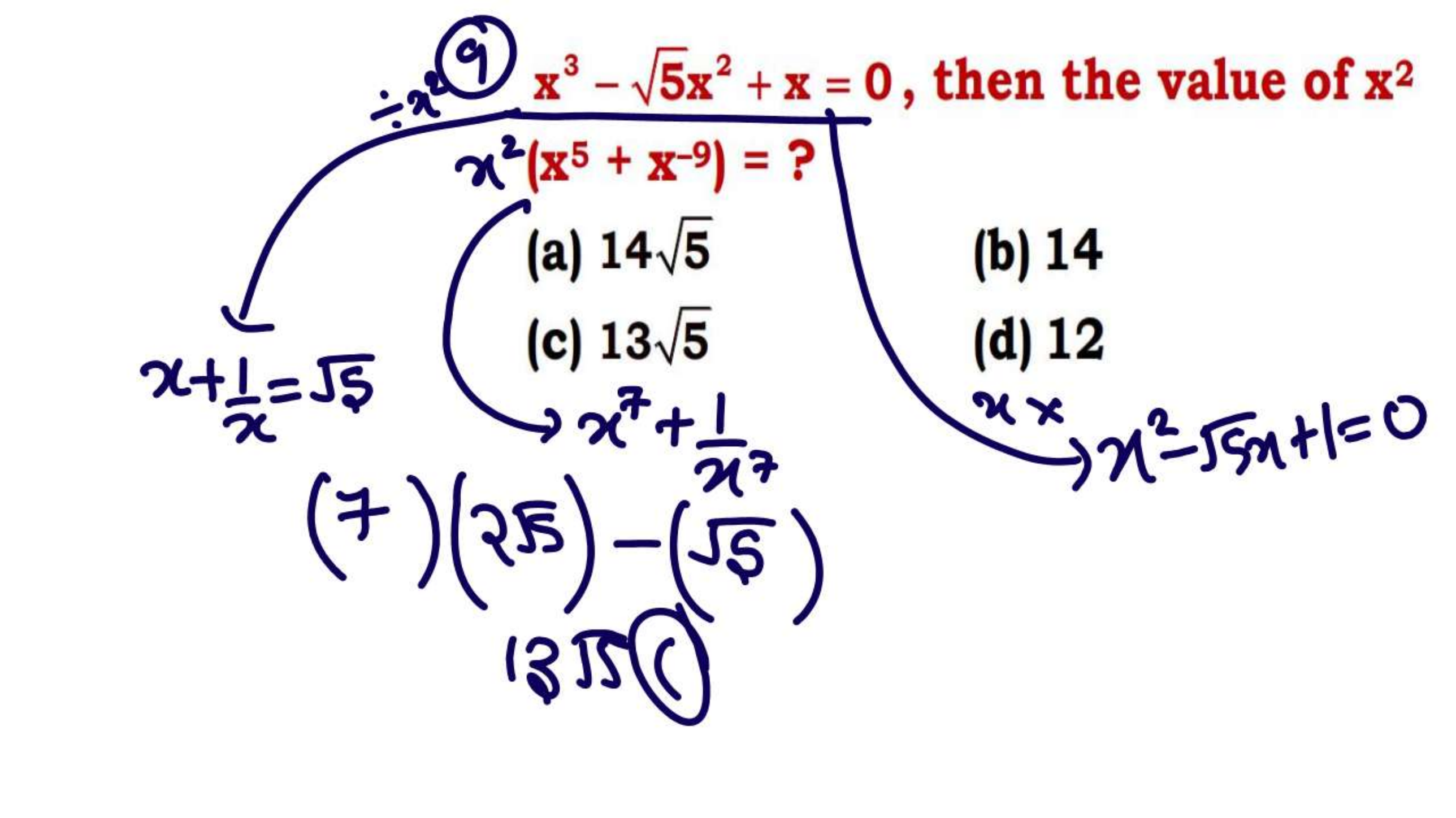
$$\frac{2(b-a)}{b-a}$$

$$= 2$$

$$\frac{x}{a} = \frac{2b}{a+b}$$

$$\frac{x+a}{x-a} = \frac{3b+a}{b-a}$$

$$\frac{x+b}{x-b} = \frac{3a+b}{a-b}$$


÷x² (9)
$x^3 - \sqrt{5}x^2 + x = 0$, then the value of x^2
$x^2(x^5 + x^{-9}) = ?$
(a) $14\sqrt{5}$
(b) 14
(c) $13\sqrt{5}$
(d) 12
$x + \frac{1}{x} = \sqrt{5}$
$x^7 + \frac{1}{x^7}$
$(7)(2\sqrt{5}) - (\sqrt{5})$
$13\sqrt{5}$ (c)
× x
$x^2 - \sqrt{5}x + 1 = 0$

10 If $ab^2 + b^3 - b^2 c = 0$ then find the value of $\frac{(a+b)^2}{c^2} + \frac{(b-c)^2}{a^2} + \frac{(a-c)^2}{b^2}$

(a) 0 (b) −3

(c) 3 (d) 1

$b^2 \times a+b-c=0$

$\frac{c^2}{c^2} + \frac{a^2}{a^2} + \frac{b^2}{b^2}$

C 3

(11) $z = \sqrt[3]{4} + \sqrt[3]{2} + 1, \left(1 + \frac{1}{z}\right)^3 = ?$

(a) 1 (b) 4

(c) 2 (d) None

$(\sqrt[3]{2})^3 - (1)^3$

$\frac{1}{\sqrt[3]{4} + \sqrt[3]{2} + 1} = \sqrt[3]{2} - 1$

$(\sqrt[3]{2})^2 + \sqrt[3]{2} \times 1 + 1^2$

$\frac{a^3 - b^3}{a^2 + ab + b^2} = a - b$

$(1 + \sqrt[3]{2} - 1)^3$

2^3

12

$$x = \frac{1+\sqrt{2021}}{2}, \quad (x^3 - 506x - 502)^7 = ?$$

(a) 2187 (b) 128

(c) −2187 (d) None

$2x-1=\sqrt{2021}$

$4x^2+1-4x=2021$

$4x^2-4x=2020$

$x^2-x=505$

$\times x$

$x^3-x^2=505x$

$x^3=x^2+505x$

$(x^2+505x-506x-502)^7$

Rearrange. Eqn Mult.

$(505-502)^7$

$3^7=2187$ (A)

(13) $101^a = 2020$ & $20^b = 2020$,

$$M = \sqrt{\frac{12a + 24ab + 12b}{10ab - a - b}}$$

(a) 2 (b) 4

(c) 6 (d) 3

(A)

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

$a+b = ab$

$101 = 2020^{\frac{1}{a}}$

$20 = 2020^{\frac{1}{b}}$

$2020^1 = 2020^{\left(\frac{1}{a}+\frac{1}{b}\right)}$

$M = \sqrt{\frac{12(a+b)+24ab}{10ab-(a+b)}}$

$M = \sqrt{\frac{36}{9}} = 2$

14

$x + y = 6\sqrt{xy}$, $\frac{x}{y} = ?$

(a) $15 \pm 2\sqrt{3}$ (b) $17 \pm 12\sqrt{2}$

(c) $17 \pm \sqrt{2}$ (d) None

$x - 6\sqrt{x}\sqrt{y} + y = 0$

$(\sqrt{x})^2 - 6\sqrt{x}\sqrt{y} + y = 0$

$a^2 - 6\sqrt{y}a + y = 0$

$$\sqrt{x} = \frac{6\sqrt{y} \pm \sqrt{36y - 4y}}{2}$$

$$= \frac{6\sqrt{y} \pm 4\sqrt{2}\sqrt{y}}{2} = (3 \pm 2\sqrt{2})\sqrt{y}$$

$$\frac{\sqrt{x}}{\sqrt{y}} = 3 \pm 2\sqrt{2}$$

$$\frac{x}{y} = 17 \pm 12\sqrt{2}$$

(B)

$ax^3+bx^2+cx+d=0$

$\alpha+\beta+\gamma=\frac{-b}{a}$

$\alpha\beta\gamma=\frac{-d}{a}$

$\alpha\beta+\beta\gamma+\gamma\alpha=\frac{c}{a}$

(15)

$3x^3 - 35x^2 + 500 = 0$

a,b,c are roots मूल

$$\frac{500^2}{(ab)^2}+\frac{500^2}{(ac)^2}+\frac{500^2}{(bc)^2}=?$$

(a) 1125 ~~(b) 1225~~

(c) 1315 (d) 1522

$abc=\frac{-500}{3} \Rightarrow 3abc=-500$

$a+b+c=\frac{35}{3}$

$ab+bc+ca=0$

$\frac{9(abc)^2}{(ab)^2}+\frac{9(abc)^2}{(ac)^2}+\frac{9(abc)^2}{(bc)^2}$

$9(a^2+b^2+c^2)$

$9(a^2+b^2+c^2)$

$a+b+c = \frac{35}{3}$

$ab+bc+ca = 0$

$9\left(\frac{35}{3}\right)^2$

1225

16

$3^x + 3^y = 10,\ 3^{x+y} = 5$

$3^{y-x} + 3^{x-y} = ?$

(a) 9 (b) 18

(c) 12 (d) 6

$3^{2x} + 3^{2y} + 2 \times 3^{x+y} = 100$

10

$3^{2x} + 3^{2y} = 90$

$\frac{3^{2y}}{3^x} + \frac{3^x}{3^y}$

$\frac{3^{2y} + 3^{2x}}{3^{x+y}} = \frac{90}{5}$ (B)

17

$x = \sqrt{3+\sqrt{8}}$, $x^3 + \frac{1}{x^3} = ?$

(a) $8\sqrt{2}$ (b) $10\sqrt{2}$

(c) $4\sqrt{2}$ (d) $6\sqrt{2}$

$x = \sqrt{3+2\sqrt{2}}$

$= \sqrt{2}+1$

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

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

$2\sqrt{2}(5)$ (B)

(18) a,b,c are root of $x^3 + 3x^2 + 5x + 2 = 0$

then $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = ?$

$\frac{b^2c^2 + c^2a^2 + a^2b^2}{a^2b^2c^2}$

$= \frac{13}{4}$

$abc = -2$

$a+b+c = -3$

$ab+bc+ca = 5$

(a) $\frac{11}{4}$ (b) 13

(c) $\frac{13}{4}$ (d) $\frac{22}{7}$

(C)

$(ab+bc+ca)^2 = a^2b^2 + b^2c^2 + c^2a + 2abc(a+b+c)$

$+2(-2)(-3)$

Unique

25

13

19

$a^4 + b^4 = 63,\ a^2 + b^2 + ab\sqrt{2} = 9$

$ab = ?$

(a) $\frac{1}{\sqrt{2}} = 0.707$ (b) $2\sqrt{2} = 2.828$

(c) $\sqrt{2}$ 1.414 (d) None

$(a^4+b^4) = (a^2+b^2+ab\sqrt{2})(a^2+b^2-ab\sqrt{2})$

63 9 7

$ab\sqrt{2} = \frac{9-7}{2} = 1$

$ab = \frac{1}{\sqrt{2}}$ (A)

$$a^4+b^4=63$$

$$a^2+b^2+1.4ab=9$$

$\sqrt{2}=1.4$

20

$2^{64} = a^a, \left(\sqrt{3}\right)^{54} = (3b)^b$

$3a + 2b = ?$

(a) 66 (b) 60

(c) 54 (d) 52

$2^{4\times16}$

$16^{16} = a^a$

$a = 16$

$3^{27} = 3^{3\times9}$

$= (3\times9)^9$

$b = 9$

$48+18 = 66$ (A)

(21)

$x^2 + x = 1, \dfrac{x^5 + 8}{x + 1} = ?$

$x^2 = 1 - x$

$x^4 = 1 + x^2 - 2x$

$x^4 = 2 - 3x$

$x^5 = 2x - 3x^2$

(a) 15 (b) 5

(c) 4 (d) None

$$\frac{2x - 3x^2 + 8}{x+1} = \frac{2x - 3 + 3x + 8}{x+1} = \frac{5x + 5}{x+1} = 5$$

Leave

(B)

(22)

$$x^2 + \frac{1}{x^2} = 3,\ x^5 - \frac{1}{x^5} = ?$$

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

(a) 7 (b) ±11

(c) –9 (d) 11

(B)

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

$3x \pm 4 \qquad \pm 1$

+ 11
− 11

(23) $x^3 + 4x = 8$, $x^7 + 64x^2 + 2 = ?$

(a) 115 (b) 120

(c) 130 (d) 105

$x^3 = 8 - 4x$

$x^6 = 64 + 16x^2 - 64x$

$x^7 = 64x + 16x^3 - 64x^2 + 64x^2 + 2$

$128 + 2 = 130$ (c)

24

$$x^3 + \frac{1}{x^3} = 18, \quad x^7 + \frac{1}{x^7} - 4 = ?$$

(a) 839
(b) 847
(c) 941
(d) 902

A

$-7 = -9$

$(47)(18) - 3 - 4$

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

25

$$\sqrt{\frac{9-4\sqrt{5}}{18}} = \frac{\sqrt{A}+B\sqrt{C}}{6}, \quad A+B+C = ?$$

$10 - 2 + 2$

(a) 8 (b) 6

(c) 10 (d) 12

C

$$\sqrt{\frac{18-8\sqrt{5}}{18}} = \frac{\sqrt{18-2\sqrt{80}}}{6}$$

$\sqrt{10}-\sqrt{8}$

$\sqrt{10}-2\sqrt{2}$

(26) $a + 1 = 2020^2 + 2021^2$, $\sqrt{2a+1} = ?$

(a) 4040 (b) 4041

(c) 4042 (d) 4054

II nd Unit digit

$a = 0$

$\sqrt{1} = 1$

(B) 1 or 9

1st

$\sqrt{2a+2} = \sqrt{2(2020^2 + 2021^2) - 1}$

$2 \times 2020 + 1$

4041

(B)

$\sqrt{4x^2+4x+1}$

$\sqrt{(2x+1)^2}$

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

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

27

If $a^2 + b^2 = 3ab$, then $\left(\frac{a+b}{a-b}\right)^6 = ?$

(a) 64 (b) 81

(c) 125 (d) 729

$(a+b)^2 = 5ab$

$(a-b)^2 = ab$

$\left(\frac{5ab}{ab}\right)^3$

125

(c)

28

$x^2 = 1 + 2x$, $\sqrt{2}\left(x^5 + \frac{1}{x^5}\right) = ?$

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

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

(a) 116 (b) 120

(c) 58 (d) None

$\sqrt{2}\left[(6)(10\sqrt{2}) - 2\sqrt{2}\right]$

$\sqrt{2}(58\sqrt{2}) = 116$ (A)

29

$x^2 - x - 1 = 0, x^8 + \frac{1}{x^8} + 53 = ?$

(a) 90 (b) 80

(c) 100 (d) 95

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

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

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

7

47

47+53

100

©

30

$$\left(\left(\left(\left(2022^{1-\frac{1}{2}}\right)^{1-\frac{1}{3}}\right)^{1-\frac{1}{4}}\right)^{\cdots}\right)^{1-\frac{1}{2022}} =$$

$2022^{\frac{1}{2022}}$

D

(a) $\sqrt{2022}$ (b) $2022\sqrt{2022}$

(c) $\sqrt{2021}$ (d) $\sqrt[2022]{2022}$

$\frac{1}{2022}$

$\frac{1}{2}\times\frac{2}{3}$

$\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\cdots\left(1-\frac{1}{2022}\right)$

31 $a + b = 9,\ a^3 + b^3 = 99,\ a^2 + b^2 = ?$

(a) $\frac{100}{3}$ (b) $\frac{103}{3}$

(c) $\frac{99}{4}$ (d) $\frac{107}{3}$

$9^2 - 99 = 3ab(9)$

$ab = \frac{70}{3}$

$81 - \frac{140}{3} = \frac{103}{3}$ (B)

(32) $2^{\frac{1}{2}} \times 4^{\frac{1}{8}} \times 8^{\frac{1}{24}} \times 16^{\frac{1}{64}} \times 32^{\frac{1}{160}} \times \ldots$

(a) 4 (b) $\sqrt[4]{2}$

(c) $\sqrt[8]{2}$ (d) 2

$2^1 = 2$ (D)

$2^{\frac{1}{2}} \times 2^{\frac{1}{4}} \times 2^{\frac{1}{8}} \times \ldots\ldots\ldots$

$2^{(\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\ldots\ldots)}$

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

33 $\left(1+\frac{1}{x}\right)^{x+1}=\left(1+\frac{1}{2022}\right)^{2022}$, x = ?

(a) 2022 (b) –2023

(c) 2024 (d) –2022

Option से

$\left(\frac{+2022}{+2023}\right)^{-2022}$ $\left(\frac{2023}{2022}\right)^{2022}$

$\left(\frac{2023}{2022}\right)^{2022}$

(B)

(34) The value of $(3^{\frac{1}{2}}-1)(3^{\frac{1}{2}}+3^{\frac{1}{4}}+1) \times (3^{\frac{1}{2}}-3^{\frac{1}{4}}+1)$ is.

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

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

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

$(3^{\frac{3}{4}})^2$

$3^{\frac{3}{2}}$

(C)

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

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

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

$x-y$ $x+y$

35

If $x + \frac{3}{x} = 5$ then the value of

$$\frac{x^2(5-x)}{x^2+x+3} + \frac{x^2+(x+3)}{x^2(5-x)}$$

$5 - x = \frac{3}{x}$

$x(5-x) = 3$

$\frac{x(5-x)}{x+3+1}$

$\frac{3}{6}$

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

यदि $x + \frac{3}{x} = 5$ तो निम्न $\frac{x^2(5-x)}{x^2+x+3} + \frac{x^2+(x+3)}{x^2(5-x)}$ का मान होगा।

(a) 2

(b) 6

(c) $\frac{5}{2}$ ✓

(d) $\frac{9}{2}$

C