16 ALGEBRA

YEAR : 1999

1. If a * b = 2a – 3b +ab, then 3 *5 +5*3 is equal to:
यदि a * b = 2a – 3b +ab है, तो 3 *5 +5*3 किसके बराबर होगा ?
(a) 22 (b) 24 (c) 26 (d) 28

2. If $p \times q = p+q+\frac{p}{q}$, the value of 8×2 is:
यदि $p \times q = p+q+\frac{p}{q}$ है, तो 8×2 का मान क्या होगा?
(a) 6 (b) 10 (c) 14 (d) 16

3. Two numberes x and y $(x > y)$ such that their sum is equal to three times their difference. Then value of $\frac{3xy}{2\left(x^2-y^2\right)}$ will be;
दो संख्याएँ x और y $(x > y)$ इस प्रकार है कि उनका योग उनके अंतर का तीन गुना है, तो $\frac{3xy}{2\left(x^2-y^2\right)}$ का मान ज्ञात करें।
(a) $\frac{2}{3}$ (b) 1
(c) $1\frac{1}{2}$ (d) $1\frac{1}{3}$

4. The value of $\left(1+\frac{1}{x}\right)\left(1+\frac{1}{x+1}\right)\left(1+\frac{1}{x+2}\right)\left(1+\frac{1}{x+3}\right)$ is:
का मान क्या होगा ?
(a) $1+\frac{1}{x+4}$ (b) $x+4$
(c) $\frac{1}{x}$ (d) $x+4$

5. If $x = 7-4\sqrt{3}$, then the value of $\left(x+\frac{1}{x}\right)$ is :
यदि $x = 7-4\sqrt{3}$ है, $\left(x+\frac{1}{x}\right)$ का मान क्या होगा ?
(a) $3\sqrt{3}$ (b) $8\sqrt{3}$
(c) $14+8\sqrt{3}$ (d) 14

6. If $\frac{a}{b}=\frac{2}{3}$ and $\frac{b}{c}=\frac{4}{5}$, then the ratio $\frac{a+b}{b+c}$ equal to :
यदि $\frac{a}{b}=\frac{2}{3}$ और $\frac{b}{c}=\frac{4}{5}$ है, तो $\frac{a+b}{b+c}$ का अनुपात किसके बराबर होगा ?
(a) $\frac{20}{27}$ (b) $\frac{27}{20}$
(c) $\frac{6}{8}$ (d) $\frac{8}{6}$

YEAR : 2002

7. If a*b =2(a + b), then 5*2 is equal to:
यदि a*b =2(a + b) है, तो 5*2 किसके बराबर है?
(a) 3 (b) 10 (c) 14 (d) 20

8. If $\frac{2a+b}{a+4b}=3$, then find the value of $\frac{a+b}{a+2b}$
यदि $\frac{2a+b}{a+4b}=3$ है, तो $\frac{a+b}{a+2b}$ का मान ज्ञात करें।
(a) $\frac{1}{2}$ (b) $\frac{2}{7}$
(c) $\frac{10}{9}$ (d) $\frac{10}{7}$

9. If a * b = a + b + ab, then 3 * 4 –2 * 3 is equal to
यदि a * b = a + b + ab है, तो 3 * 4 –2 * 3 किसके बराबर है?
(a) 6 (b) 8 (c) 10 (d) 12

10. If $x \otimes y = 3x+2y$. Then $2 \otimes 3+3 \otimes 4$ is equal to
यदि $x \otimes y = 3x+2y$ है, तो $2 \otimes 3+3 \otimes 4$ किसके बराबर है?
(a) 18 (b) 29 (c) 32 (d) 38

11. If a : b = 2 :3 and b : c = 4 : 5, find $a^2 : b^2 : bc$
यदि a : b = 2 :3 और b : c = 4 : 5 है, तो $a^2 : b^2 : bc$ ज्ञात करें।
(a) 4 : 9 : 45 (b) 16 : 36 : 45
(c) 16 : 36 : 20 (d) 4 : 36 : 40

12. If A : B = $\frac{1}{2}:\frac{3}{8}$ B : C = $\frac{1}{3}:\frac{5}{9}$ and C : D = $\frac{5}{6}:\frac{3}{4}$ then find the ratio of A : B : C : D
यदि A : B = $\frac{1}{2}:\frac{3}{8}$, B : C = $\frac{1}{3}:\frac{5}{9}$ और C: D = $\frac{5}{6}:\frac{3}{4}$ तो A : B : C : D का अनुपात ज्ञात करें।
(a) 6 : 4 : 8 : 10 (b) 6 : 8 : 9 : 10
(c) 8 : 6 : 10 : 9 (d) 4 : 6 : 8 : 10

13. If A : B : C = 2 : 3 : 4, then $\frac{A}{B}:\frac{B}{C}:\frac{C}{A}$ is equal to
यदि A : B : C = 2 : 3 : 4 है, तो $\frac{A}{B}:\frac{B}{C}:\frac{C}{A}$ किसके बराबर है?
(a) 8 : 9 : 16 (d) 8 : 9 : 12
(c) 8 : 9 : 24 (d) 4 : 9 : 16

14. If A : B = 1 : 2 , B : C = 3 : 4 and C : D = 5 : 6, find D : C : B : A
यदि A : B = 1 : 2 , B : C = 3 : 4 और C : D = 5 : 6 है, तो D : C : B : A का मान ज्ञात करें।
(a) 6 : 5 : 4 : 2 (b) 6 : 3 : 2 : 1
(c) 6 : 4 : 2 : 1 (d) 48:40:30:15

15. If $\frac{2a-5b}{3a+6b}=\frac{4}{7}$, then a : b is equal to
यदि $\frac{2a-5b}{3a+6b}=\frac{4}{7}$ है, तो a:b किसके बराबर है?
(a) 21 : 36 (b) 2 : 59
(c) 59 : 2 (d) 36 : 21

YEAR : 2003

16. If $\frac{a}{3}=\frac{b}{4}=\frac{c}{7}$ then $\frac{a+b+c}{c}$ is equal to
यदि $\frac{a}{3}=\frac{b}{4}=\frac{c}{7}$ है, तो $\frac{a+b+c}{c}$ किसके बराबर है?
(a) 0 (b) 1 (c) 2 (d) 3

17. If $\frac{144}{0.144}=\frac{14.4}{x}$, then the value of x is
यदि $\frac{144}{0.144}=\frac{14.4}{x}$ है, तो x का मान ज्ञात करें?
(a) 144 (b) 14.4
(c)1.44 (d) 0.0144

18. If $1 < x < 2$, then the value of $\sqrt{(x-1)^2} + \sqrt{(x-3)^2}$ is

यदि $1 < x < 2$ है, तो

$\sqrt{(x-1)^2} + \sqrt{(x-3)^2}$ का मान क्या होगा?

(a) 1 (b) 2
(c) 3 (d) $2x - 4$

19. If $a \oplus b = (a \times b) + b$, then $5 \oplus 7$ equals to

यदि $a \oplus b = (a \times b) + b$ है, तो $5 \oplus 7$ किसके बराबर है?

(a) 12 (b) 35 (c) 42 (d) 50

20. Given that $10^{0.48} = x$, $10^{0.70} = y$ and $x^z = y^2$, then the value of z is close to

$10^{0.48} = x$, $10^{0.70} = y$ और $x^z = y^2$ दिया गया है, तो z किसके निकटतम है?

(a) 1.45 (b) 1.88
(c) 2.9 (d) 3.7

21. If $47.2506 = 4A + 7B + 2C + \frac{5}{D} + 6E$, then the value of $5A + 3B + 6C + D + 3E$ is

यदि $47.2506 = 4A + 7B + 2C + \frac{5}{D} + 6E$ है, तो

$5A + 3B + 6C + D + 3E$ का मान क्या होगा ?

(a) 53.6003 (b) 53.603
(c) 153.6003 (d) 213.0003

22. If $x * y = x^2 + y^2 - xy$, then the value of $9 * 11$ is

यदि $x * y = x^2 + y^2 - xy$ है, तो $9 * 11$ का मान क्या होगा?

(a) 93 (b) 103
(c) 113 (d) 121

23. If $5^{5x+5} = 1$, then x equals

यदि $5^{5x+5} = 1$ है, तो x किसके बराबर है?

(a) 0 (b) -1 (c) 1 (d) $-\frac{4}{5}$

24. If $3^{x+3} + 7 = 250$, then x is equal to

यदि $3^{x+3} + 7 = 250$ है, तो x किसके बराबर है?

(a) 5 (b) 3 (c) 2 (d) 1

25. If $\frac{1}{4} \times \frac{2}{6} \times \frac{3}{8} \times \frac{4}{10} \times \frac{5}{12} \times \ldots\ldots \times \frac{31}{64} = \frac{1}{2^x}$ the value of x is

यदि $\frac{1}{4} \times \frac{2}{6} \times \frac{3}{8} \times \frac{4}{10} \times \frac{5}{12} \times \ldots\ldots \times \frac{31}{64} = \frac{1}{2^x}$ है, तो x का मान क्या होगा ?

(a) 31 (b) 32 (c) 36 (d) 37

26. If $x = \frac{\sqrt{3}+1}{\sqrt{3}-1}$ & $y = \frac{\sqrt{3}-1}{\sqrt{3}+1}$, then value of $x^2 + y^2$ is :

यदि $x = \frac{\sqrt{3}+1}{\sqrt{3}-1}$ और $y = \frac{\sqrt{3}-1}{\sqrt{3}+1}$ है, तो

$x^2 + y^2$ का मान क्या होगा?

(a) 14 (b) 13 (c) 15 (d) 10

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

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

(a) 1 (b) 2
(c) $2\sqrt{2}$ (d) $3\sqrt{3}$

28. If $p = 999$, then the value of $\sqrt[3]{p\left(p^2 + 3p + 3\right) + 1}$ is

यदि $p = 999$ है,

तो $\sqrt[3]{p\left(p^2 + 3p + 3\right) + 1}$ का मान क्या होगा?

(a) 1000 (b) 999
(c) 998 (d) 1002

29. If $\frac{a}{b} = \frac{7}{9}, \frac{b}{c} = \frac{3}{5}$, then the value of $a:b:c$ is

यदि $\frac{a}{b} = \frac{7}{9}, \frac{b}{c} = \frac{3}{5}$ है, तो $a:b:c$ मान क्या होगा?

(a) 7 : 9 :15 (b) 7 : 9 : 5
(c) 21 : 35 : 45 (d) 7 : 3 : 15

30. If $x : y = 7 : 3$ then the value of $\frac{xy + y^2}{x^2 - y^2}$ is

यदि $x : y = 7 : 3$ है, तो $\frac{xy + y^2}{x^2 - y^2}$ का मान क्या होगा?

(a) $\frac{3}{4}$ (b) $\frac{4}{3}$

(c) $\frac{3}{7}$ (d) $\frac{7}{3}$

31. If [p] means the greatest positive integer less than or equal to p, then $\left[-\frac{1}{4}\right] + \left[4 - \frac{1}{4}\right] + [3]$ is equal to

यदि [p] का मतलब अधिकतम धनात्मक पूर्णांक है जो p से कम या बराबर है, तो

$\left[-\frac{1}{4}\right] + \left[4 - \frac{1}{4}\right] + [3]$ किसके बराबर है?

(a) 4 (b) 5 (c) 6 (d) 7

YEAR : 2004

32. The value of $\frac{(243)^{\frac{n}{5}} \cdot 3^{2n+1}}{9^n \cdot 3^{n-1}}$ is

$\frac{(243)^{\frac{n}{5}} \cdot 3^{2n+1}}{9^n \cdot 3^{n-1}}$ का मान क्या होगा?

(a) 1 (b) 9 (c) 3 (d) 3^n

33. If $x = 0.5$ and $y = 0.2$ then value of $\sqrt{0.6} \times (3y)^x$ is equal to

यदि $x = 0.5$ और $y = 0.2$ है,

तो $\sqrt{0.6} \times (3y)^x$ का मान किसके बराबर होगा ?

(a) 1.0 (b) 0.5 (c) 0.6 (d) 1.1

34. If $x^{x\sqrt{x}} = \left(x\sqrt{x}\right)^x$, then x equals

यदि $x^{x\sqrt{x}} = \left(x\sqrt{x}\right)^x$ है, तो x किसके बराबर है?

(a) $\frac{4}{9}$ (b) $\frac{2}{3}$

(c) $\frac{9}{4}$ (d) $\frac{3}{2}$

35. If $a = 7$, $b = 5$ and $c = 3$, then the value of $a^2 + b^2 + c^2 - ab - bc - ca$ is

यदि $a = 7$, $b = 5$ और $c = 3$ है, तो $a^2 + b^2 + c^2 - ab - bc - ca$ का मान क्या होगा?

(a) 12 (b) -12 (c) 0 (d) 8

36. If $7^x = \frac{1}{343}$, then the value of x is

यदि $7^x = \frac{1}{343}$ है, तो x का मान क्या होगा ?

(a) 3 (b) -3

(c) $\frac{1}{3}$ (d) $\frac{1}{7}$

37. $\frac{\frac{1}{3}.\frac{1}{3}.\frac{1}{3} + \frac{1}{4}.\frac{1}{4}.\frac{1}{4} - 3\frac{1}{3}.\frac{1}{4}.\frac{1}{5} + \frac{1}{5}.\frac{1}{5}.\frac{1}{5}}{\frac{1}{3}.\frac{1}{3} + \frac{1}{4}.\frac{1}{4} + \frac{1}{5}.\frac{1}{5} - \left(\frac{1}{3}.\frac{1}{4} + \frac{1}{4}.\frac{1}{5} + \frac{1}{5}.\frac{1}{3}\right)}$

is equal to किसके बराबर है?

(a) $\frac{2}{3}$ (b) $\frac{3}{4}$

(c) $\frac{47}{60}$ (d) $\frac{49}{60}$

YEAR 2005

38. If $0.13 \times p^2 = 13$, then p is equal to
यदि $0.13 \times p^2 = 13$ है, तो p किसके बराबर है?
(a) 10 (b) 0.01
(c) 0.1 (d) 100

39. If $\frac{x}{y} = \frac{3}{4}$, the value of $\frac{6}{7} + \frac{y-x}{y+x}$ is :
यदि $\frac{x}{y} = \frac{3}{4}$ है, तो $\frac{6}{7} + \frac{y-x}{y+x}$ का मान क्या है?
(a) 1 (b) $\frac{2}{7}$
(c) $\frac{3}{7}$ (d) $1\frac{3}{7}$

40. If $x = 7 - 4\sqrt{3}$, then $\sqrt{x} + \frac{1}{\sqrt{x}}$ is equal to:
यदि $x = 7 - 4\sqrt{3}$ है, तो $\sqrt{x} + \frac{1}{\sqrt{x}}$ किसके बराबर है?
(a) 1 (b) 2 (c) 3 (d) 4

41. If $a = \frac{\sqrt{5}+1}{\sqrt{5}-1}$ & $b = \frac{\sqrt{5}-1}{\sqrt{5}+1}$, then the value of $\frac{a^2+ab+b^2}{a^2-ab+b^2}$ is
यदि $a = \frac{\sqrt{5}+1}{\sqrt{5}-1}$ और $b = \frac{\sqrt{5}-1}{\sqrt{5}+1}$ है, तो $\frac{a^2+ab+b^2}{a^2-ab+b^2}$ का मान ज्ञात करें?
(a) $\frac{3}{4}$ (b) $\frac{4}{3}$
(c) $\frac{3}{5}$ (d) $\frac{5}{3}$

42. If $a = 4.36$, $b = 2.39$ and $c = 1.97$, then the value of $a^3 - b^3 - c^3 - 3abc$ is
यदि $a = 4.36$, $b = 2.39$ और $c = 1.97$ है, तो $a^3 - b^3 - c^3 - 3abc$ का मान क्या होगा ?
(a) 3.94 (b) 2.39 (c) 0 (d) 1

43. If $\frac{3a+5b}{3a-5b} = 5$, then a : b is equal to
यदि $\frac{3a+5b}{3a-5b} = 5$ है, तो a : b किसके बराबर है?
(a) 2:1 (b) 2:3 (c) 1:3 (d) 5:2

44. If $p : q = r : s = t : u = 2 : 3$, then $(mp + nr + ot) : (mq + ns + ou)$ equals :
यदि $p : q = r : s = t : u = 2 : 3$ है, तो $(mp + nr + ot) : (mq + ns + ou)$ किसके बराबर है?
(a) 3:2 (b) 2:3
(c) 1:3 (d) 1:2

45. If $x : y = 3 : 4$, then $(7x + 3y) : (7x - 3y)$ is equal to :
यदि $x : y = 3 : 4$ है, तो $(7x + 3y) : (7x - 3y)$ किसके बराबर है
(a) 5 : 2 (b) 4 : 3
(c) 11 : 3 (d) 37 : 19

YEAR : 2006

46. For what value(s) of a is $x + \frac{1}{4}\sqrt{x} + a^2$ a perfect square ?
a के किस मान के लिए $x + \frac{1}{4}\sqrt{x} + a^2$ एक पूर्ण वर्ग होगा?
(a) $\pm\frac{1}{18}$ (b) $\frac{1}{8}$
(c) $-\frac{1}{5}$ (d) $\frac{1}{4}$

47. If $a \neq b$, then which of the following statements is true?
यदि $a \neq b$ है, तो निम्न में से कौन सा कथन सत्य है?
(a) $\frac{a+b}{2} = \sqrt{ab}$ (b) $\frac{a+b}{2} < \sqrt{ab}$
(c) $\frac{a+b}{2} > \sqrt{ab}$ (d) All of the above

48. If x, y are two positive real number and $x^{1/3} = y^{1/4}$, then which of the following relations is true?
यदि x, y धनात्मक वास्तविक संख्याऐं है और $x^{1/3} = y^{1/4}$ है, तो निम्न से कौन सा संबंध सत्य है?
(a) $x^3 = y^4$ (b) $x^3 = y$
(c) $x = y^4$ (d) $x^{20} = y^{15}$

49. If $x = \frac{\sqrt{3}}{2}$, then $\frac{\sqrt{1+x}}{1+\sqrt{1+x}} + \frac{\sqrt{1-x}}{1-\sqrt{1-x}}$ is equal to
यदि $x = \frac{\sqrt{3}}{2}$ है, तो $\frac{\sqrt{1+x}}{1+\sqrt{1+x}} + \frac{\sqrt{1-x}}{1-\sqrt{1-x}}$ किसके बराबर होगा?
(a) 1 (b) $2/\sqrt{3}$
(c) $2-\sqrt{3}$ (d) 2

50. If for non-zero, x, $x^2 - 4x - 1 = 0$, the value of $x^2 + \frac{1}{x^2}$ is
यदि $x^2 - 4x - 1 = 0$ के लिए x एक वास्तविक संख्या है, तो $x^2 + \frac{1}{x^2}$ का मान क्या होगा?
(a) 4 (b) 10 (c) 12 (d) 18

51. $\left(x+\frac{1}{x}\right)\left(x-\frac{1}{x}\right)\left(x^2+\frac{1}{x^2}-1\right)\left(x^2+\frac{1}{x^2}+1\right)$ is equal to किसके बराबर है?
(a) $x^6 + \frac{1}{x^6}$ (b) $x^8 + \frac{1}{x^8}$
(c) $x^8 - \frac{1}{x^8}$ (d) $x^6 - \frac{1}{x^6}$

YEAR : 2007

52. If $a^{2x+2} = 1$, where a is a positive real number other than 1, then x is equal to
यदि $a^{2x+2} = 1$ है, जहाँ a, 1 के अतिरिक्त एक धनात्मक वास्तविक संख्या है, तो x किसके बराबर है?
(a) – 2 (b) – 1 (c) 0 (d) 1

53. If x is real then the minimum value of $(x^2 - x - 1)$ is
यदि x एक वास्तविक संख्या है, तो $(x^2 - x - 1)$ का न्यूनतम मान क्या होगा?
(a) $\frac{3}{4}$ (b) 0 (c) 1 (d) $-\frac{5}{4}$

54. If $\frac{\sqrt{7}-2}{\sqrt{7}+2} = a\sqrt{7} + b$, then the value of a is
यदि $\frac{\sqrt{7}-2}{\sqrt{7}+2} = a\sqrt{7} + b$ है, तो a का मान ज्ञात करें?
(a) $\frac{11}{3}$ (b) $-\frac{4}{3}$
(c) $\frac{4}{3}$ (d) $\frac{-4\sqrt{7}}{3}$

55. If $a + \frac{1}{b} = 1$ and $b + \frac{1}{c} = 1$ then $c + \frac{1}{a}$ is equal to
यदि $a + \frac{1}{b} = 1$ और $b + \frac{1}{c} = 1$ है, तो $c + \frac{1}{a}$ किसके बराबर है?
(a) 0 (b) $\frac{1}{2}$ (c) 1 (d) 2

56. If $x = \sqrt{3} + \sqrt{2}$, then the value of $\left(x^3 + \frac{1}{x^3}\right)$ is
यदि $x = \sqrt{3} + \sqrt{2}$ है, तो $\left(x^3 + \frac{1}{x^3}\right)$ का मान ज्ञात करें।
(a) $6\sqrt{3}$ (b) $12\sqrt{3}$
(c) $18\sqrt{3}$ (d) $24\sqrt{3}$

57. If $x + y = 7$, then the value of $x^3 + y^3 + 21xy$ is
यदि $x + y = 7$ है, तो $x^3 + y^3 + 21xy$ का मान क्या होगा?
(a) 243 (b) 143
(c) 343 (d) 443

58. If $x^{\frac{1}{3}} + y^{\frac{1}{3}} = z^{\frac{1}{3}}$, then $\{(x + y - z)^3 + 27\ xyz\}$ equals :
यदि $x^{\frac{1}{3}} + y^{\frac{1}{3}} = z^{\frac{1}{3}}$ है, तो $\{(x + y - z)^3 + 27\ xyz\}$ किसके बराबर है?
(a) –1 (b) 1 (c) 0 (d) 27

59. If $\frac{a}{b} + \frac{b}{a} = 1$, $a \neq 0, b \neq 0$ the value of $a^3 + b^3$ is
यदि $\frac{a}{b} + \frac{b}{a} = 1$ है और $a \neq 0, b \neq 0$ है, तो $a^3 + b^3$ का मान ज्ञात करें?
(a) 0 (b) 1 (c) – 1 (d) 2

60. If p = 99, then value of $p(p^2 + 3p + 3)$ is
यदि p = 99 है, तो $p(p^2 + 3p + 3)$ का मान क्या होगा?
(a) 999 (b) 9999
(c) 99999 (d) 999999

61. If ⊗ is an operation such that $a \otimes b = 2a$ when $a > b$, $a + b$ when $a < b$, a^2 when $a = b$,
than $\left[\frac{(5 \otimes 7) + (4 \otimes 4)}{3(5 \otimes 5) - (15 \otimes 11) - 3}\right]$ is equal to :
यदि ⊗ एक इस प्रकार का संबंध दर्शाता है कि $a \otimes b = 2a$ है, जबकि $a > b$, $a + b$ है जहाँ $a < b$, a^2 है जबकि $a = b$ है, तो $\left[\frac{(5 \otimes 7) + (4 \otimes 4)}{3(5 \otimes 5) - (15 \otimes 11) - 3}\right]$ किसके बराबर है?
(a) $\frac{1}{3}$ (b) $\frac{14}{23}$
(c) $\frac{2}{3}$ (d) $\frac{14}{13}$

YEAR 2008

62. If $\frac{a}{2} = \frac{b}{3} = \frac{c}{5}$, then $\frac{a+b+c}{c}$ is equal to
यदि $\frac{a}{2} = \frac{b}{3} = \frac{c}{5}$ है, तो $\frac{a+b+c}{c}$ किसके बराबर है?
(a) 2 (b) 3 (c) 5 (d) 6

63. If $(125)^x = 3125$, then the value of x is
यदि $(125)^x = 3125$ है, तो x का मान ज्ञात करें?
(a) $\frac{1}{5}$ (b) $\frac{3}{5}$
(c) $\frac{5}{3}$ (d) $\frac{5}{7}$

64. If $5^{\sqrt{x}} + 12^{\sqrt{x}} = 13^{\sqrt{x}}$, then x is equal to
यदि $5^{\sqrt{x}} + 12^{\sqrt{x}} = 13^{\sqrt{x}}$ है, तो x किसके बराबर है?
(a) $\frac{25}{4}$ (b) 4 (c) 9 (d) 16

65. If $n + \frac{2}{3}n + \frac{1}{2}n + \frac{1}{7}n = 97$ then the value of n is
यदि $n + \frac{2}{3}n + \frac{1}{2}n + \frac{1}{7}n = 97$ है, तो n का मान ज्ञात करें?
(a) 40 (b) 42 (c) 44 (d) 46

66. If x, y and z are real number such that $(x - 3)^2 + (y - 4)^2 + (z - 5)^2 = 0$ then $(x + y + z)$ is equal to
यदि x, y और z वास्तविक संख्याएँ इस प्रकार है $(x - 3)^2 + (y - 4)^2 + (z - 5)^2 = 0$ तो $(x + y + z)$ किसके बराबर है?
(a) – 12 (b) 0 (c) 8 (d) 12

67. If $x = 3 + \sqrt{8}$, then $x^2 + \frac{1}{x^2}$ is equal to
यदि $x = 3 + \sqrt{8}$ है, तो $x^2 + \frac{1}{x^2}$ किसके बराबर है?
(a) 38 (b) 36 (c) 34 (d) 30

68. If $x - \frac{1}{x} = 4$, then $\left(x + \frac{1}{x}\right)$ is equal to
यदि $x - \frac{1}{x} = 4$ है, तो $\left(x + \frac{1}{x}\right)$ किसके बराबर है?
(a) $5\sqrt{2}$ (b) $2\sqrt{5}$
(c) $4\sqrt{2}$ (d) $4\sqrt{5}$

69. If $4b^2 + \frac{1}{b^2} = 2$, then the value of $8b^3 + \frac{1}{b^3}$ is
यदि $4b^2 + \frac{1}{b^2} = 2$ है, तो $8b^3 + \frac{1}{b^3}$ का मान क्या है?
(a) 0 (b) 1 (c) 2 (d) 5

YEAR : 2009

70. If $2^{2x-y} = 16$ and $2^{x+y} = 32$, the value of xy is
यदि $2^{2x-y} = 16$ और $2^{x+y} = 32$ है, xy का मान ज्ञात करें?
(a) 2 (b) 4 (c) 6 (d) 8

YEAR : 2010

71. If $\left(\frac{3}{5}\right)^3 \left(\frac{3}{5}\right)^{-6} = \left(\frac{3}{5}\right)^{2x-1}$, then x is equal to
यदि $\left(\frac{3}{5}\right)^3 \left(\frac{3}{5}\right)^{-6} = \left(\frac{3}{5}\right)^{2x-1}$ है, तो x किसके बराबर है?
(a) –2 (b) 2 (c) – 1 (d) 1

72. If a and b be positive integers such that $a^2 - b^2 = 19$, then the value of a is
यदि a और b धनात्मक पूर्णांक इस प्रकार है $a^2 - b^2 = 19$ है, तो a का मान ज्ञात करें।
(a) 19 (b) 20 (c) 9 (d) 10

73. $\frac{\sqrt{3+x} + \sqrt{3-x}}{\sqrt{3+x} - \sqrt{3-x}} = 2$ then x is equal to
तो x का मान क्या होगा?
(a) $\frac{5}{12}$ (b) $\frac{12}{5}$
(c) $\frac{5}{7}$ (d) $\frac{7}{5}$

74. If $x = \frac{\sqrt{3}}{2}$, then the value of $\left(\frac{\sqrt{1+x} + \sqrt{1-x}}{\sqrt{1+x} - \sqrt{1-x}}\right)$ is
यदि $x = \frac{\sqrt{3}}{2}$ है, तो $\left(\frac{\sqrt{1+x} + \sqrt{1-x}}{\sqrt{1+x} - \sqrt{1-x}}\right)$ का मान क्या होगा?
(a) $-\sqrt{3}$ (b) – 1 (c) 1 (d) $\sqrt{3}$

75. If $4^{4x+1} = \frac{1}{64}$, then the value of x is
यदि $4^{4x+1} = \frac{1}{64}$ है, तो x का मान ज्ञात करें?
(a) $\frac{1}{2}$ (b) – 1
(c) $-\frac{1}{2}$ (d) $-\frac{1}{6}$

76. If $\frac{\sqrt{x+4} + \sqrt{x-4}}{\sqrt{x+4} - \sqrt{x-4}} = 2$ then x is equal to
तो x किसके बराबर है?
(a) 2.4 (b) 3.2 (c) 4 (d) 5

77. If $\sqrt{2^x} = 256$, then the value of x is
यदि $\sqrt{2^x} = 256$ है, तो x का मान ज्ञात करें?
(a) 14 (b) 16 (c) 18 (d) 20

78. If $\left(\sqrt{5}\right)^7 \div \left(\sqrt{5}\right)^5 = 5^p$, then the value of p is

यदि $\left(\sqrt{5}\right)^7 \div \left(\sqrt{5}\right)^5 = 5^p$ है, तो p का मान ज्ञात करें?

(a) 5 (b) 2 (c) $\frac{3}{2}$ (d) 1

79. If 1.5 a =0.04 b then $\frac{b-a}{b+a}$ is equal to

यदि 1.5 a =0.04 b है, तो $\frac{b-a}{b+a}$ किसके बराबर है?

(a) $\frac{73}{77}$ (b) $\frac{77}{33}$

(c) $\frac{2}{75}$ (d) $\frac{75}{2}$

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

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

(a) 0 (b) $-\sqrt{2}$ (c) + 2 (d) $3\sqrt{2}$

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

का मान क्या होगा?

(a) 4 (b) – 5 (c) 6 (d) 8

82. If $x = 3+\sqrt{8}$, then $x^2 + \frac{1}{x^2}$ is equal to

यदि $x = 3+\sqrt{8}$ है, तो $x^2 + \frac{1}{x^2}$ किसके बराबर होगा?

(a) 38 (b) 36 (c) 34 (d) 32

83. If $x = 5+2\sqrt{6}$, then the value of $\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)$ is

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

(a) $2\sqrt{2}$ (b) $3\sqrt{2}$

(c) $2\sqrt{3}$ (d) $3\sqrt{3}$

84. For $a > b$. If $a + b = 5$ and $ab = 6$, then the value of $(a^2 - b^2)$ is

$a > b$ के लिए, यदि $a + b = 5$ और $ab = 6$ है, तो $(a^2 - b^2)$ का मान ज्ञात करें?

(a) 1 (b) 3 (c) 5 (d) 7

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

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

(a) 4 (b) 6 (c) 9 (d) 10

86. If $x + \frac{9}{x} = 6$, then the value of $\left(x^2 + \frac{9}{x^2}\right)$ is

यदि $x + \frac{9}{x} = 6$ है, तो $\left(x^2 + \frac{9}{x^2}\right)$ का मान ज्ञात करें?

(a) 8 (b) 9 (c) 10 (d) 12

87. If $2p + \frac{1}{p} = 4$, then value of $8p^3 + \frac{1}{8p^3}$ is

यदि $2p + \frac{1}{p} = 4$ है, तो $8p^3 + \frac{1}{8p^3}$ का मान ज्ञात करें?

(a) 4 (b) 5 (c) 8 (d) 15

88. If $a^4 + b^4 = a^2b^2$, then $(a^6 + b^6)$ equals

यदि $a^4 + b^4 = a^2b^2$ है, तो $(a^6 + b^6)$ किसके बराबर है?

(a) 0 (b) 1

(c) $a^2 + b^2$ (d) $a^2b^2 + a^4b^2$

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

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

(a) $\frac{3}{2}$ (b) $\frac{5}{2}$

(c) $\frac{7}{2}$ (d) $\frac{11}{2}$

90. If $a + \frac{1}{a} + 1 = 0 (a \neq 0)$ then the value of $(a^4 - a)$ is:

यदि $a + \frac{1}{a} + 1 = 0 (a \neq 0)$ है, तो $(a^4 - a)$ का मान क्या होगा?

(a) 0 (b) 1 (c) 2 (d) – 1

91. If $x = a + \frac{1}{a}$ and $y = a - \frac{1}{a}$, then the value of $x^4 + y^4 - 2x^2y^2$ is

यदि $x = a + \frac{1}{a}$ और $y = a - \frac{1}{a}$ है, तो $x^4 + y^4 - 2x^2y^2$ का मान ज्ञात करें?

(a) 24 (b) 18 (c) 16 (d) 12

92. If a = 11 and b = 9, then the value of $\left(\frac{a^2 + b^2 + ab}{a^3 - b^3}\right)$ is

यदि a = 11 और b = 9 है, तो $\left(\frac{a^2 + b^2 + ab}{a^3 - b^3}\right)$ का मान ज्ञात करें?

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

(c) $\frac{1}{20}$ (d) 20

93. If p = 101, then the value of $\sqrt[3]{p\left(p^2 - 3p + 3\right) - 1}$ is

यदि p = 101 है, तो $\sqrt[3]{p\left(p^2 - 3p + 3\right) - 1}$ का मान ज्ञात करें?

(a) 100 (b) 101

(c) 102 (d) 1000

94. If x = 19 and y = 18, then the value of $\frac{x^2 + y^2 + xy}{x^3 - y^3}$ is

यदि x = 19 और y = 18 है, तो $\frac{x^2 + y^2 + xy}{x^3 - y^3}$ का मान ज्ञात करें?

(a) 1 (b) 37

(c) 324 (d) 361

95. If 50% of $(p - q)$ = 30% of $(p + q)$, then $p : q$ is equal to

यदि $(p - q)$ का 50% = $(p + q)$ का 30% है, तो $p : q$ किसके बराबर है?

(a) 5 : 3 (b) 4 : 1

(c) 3 : 5 (d) 1 : 4

96. If $x : y = 2 : 1$, then $(5x^2 - 13xy + 6y^2)$ is equal to

यदि $x : y = 2 : 1$ है, तो $(5x^2 - 13xy + 6y^2)$ किसके बराबर होगा?

(a) $\frac{3}{4}$ (b) $\frac{4}{3}$ (c) 0 (b) $\frac{55}{4}$

YEAR : 2011

97. If $\frac{a}{3}=\frac{b}{2}$, then value of $\frac{2a+3b}{3a-2b}$ is

यदि $\frac{a}{3}=\frac{b}{2}$ है, तो $\frac{2a+3b}{3a-2b}$ का मान क्या होगा?

(a) $\frac{12}{5}$ (b) $\frac{5}{12}$

(c) 1 (d) $\frac{12}{7}$

98. If $\frac{a}{1-a}+\frac{b}{1-b}+\frac{c}{1-c}=1$, then the value of

$\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}$ is

का मान ज्ञात करें?

(a) 1 (b) 2 (c) 3 (d) 4

99. If $\frac{2x-y}{x+2y}=\frac{1}{2}$, then value of $\frac{3x-y}{3x+y}$ is :

यदि $\frac{2x-y}{x+2y}=\frac{1}{2}$ है, तो $\frac{3x-y}{3x+y}$ का मान ज्ञात करें?

(a) $\frac{1}{5}$ (b) $\frac{3}{5}$

(c) $\frac{4}{5}$ (b) 1

100. If $x+\frac{1}{x}=5$, then $\frac{2x}{3x^2-5x+3}$ is equal to

यदि $x+\frac{1}{x}=5$ है, तो $\frac{2x}{3x^2-5x+3}$ किसके बराबर है?

(a) 5 (b) $\frac{1}{5}$

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

101. If $\sqrt{1-\frac{x^3}{100}}=\frac{3}{5}$, then x equals

यदि $\sqrt{1-\frac{x^3}{100}}=\frac{3}{5}$ है, तो x = ?

(a) 2 (b) 4
(c) 16 (d) $(136)^{1/3}$

102. If a * b = 2a + 3b – ab, then the value of (3 * 5 + 5* 3) is

यदि a * b = 2a + 3b – ab है, तो (3 * 5 + 5* 3) का मान ज्ञात करें?

(a) 10 (b) 6 (c) 4 (d) 2

103. If $\sqrt{1+\frac{x}{9}}=\frac{13}{3}$, then the value of x is

यदि $\sqrt{1+\frac{x}{9}}=\frac{13}{3}$ है, तो x का मान ज्ञात करें?

(a) $\frac{1439}{9}$ (b) 160

(c) $\frac{1443}{9}$ (d) 169

104. If $\frac{4\sqrt{3}+5\sqrt{2}}{\sqrt{48}+\sqrt{18}}=a+b\sqrt{6}$, then the values of a and b are respectively

यदि $\frac{4\sqrt{3}+5\sqrt{2}}{\sqrt{48}+\sqrt{18}}=a+b\sqrt{6}$ है, तो a और b का मान क्रमशः क्या होगा?

(a) $\frac{9}{15},-\frac{4}{15}$ (b) $\frac{3}{11},\frac{4}{33}$

(c) $\frac{9}{10},\frac{2}{5}$ (d) $\frac{3}{5},\frac{4}{15}$

105. If $a * b = ab$, then the value of 5 *3 is

यदि $a * b = ab$ है, तो 5 *3 का मान क्या होगा?

(a) 125 (b) 24 (c) 53 (d) 15

106. If $\sqrt{0.03\times 0.3a}=0.3\times 0.3\times\sqrt{b}$, value of $\frac{a}{b}$ is

यदि $\sqrt{0.03\times 0.3a}=0.3\times 0.3\times\sqrt{b}$ है, तो $\frac{a}{b}$ का मान क्या होगा?

(a) 0.009 (b) 0.03
(c) 0.9 (d) 0.08

107. If $x * y = (x+3)^2 (y-1)$, then the value of 5 * 4 is

यदि $x * y = (x+3)^2 (y-1)$ है, तो 5 * 4 का मान ज्ञात करें?

(a) 192 (b) 182
(c) 180 (d) 172

108. If $9\sqrt{x}=\sqrt{12}+\sqrt{147}$, then x = ?

यदि $9\sqrt{x}=\sqrt{12}+\sqrt{147}$ है, तो x = ?

(a) 2 (b) 3 (c) 4 (d) 5

109. If X * Y = X^2+Y^2-XY then 11 * 13 is

यदि X*Y = X^2+Y^2-XY है, तो 11*13 =?

(a) 117 (b) 147
(c) 290 (d) 433

110. If $\sqrt{1+\frac{x}{961}}=\frac{32}{31}$, then the value of x is

यदि $\sqrt{1+\frac{x}{961}}=\frac{32}{31}$ है, तो x का मान ज्ञात करें?

(a) 63 (b) 61 (c) 65 (d) 64

111. If $\sqrt{0.04\times 0.4\times a}=0.004\times 0.4\times\sqrt{b}$, then the value of $\frac{a}{b}$ is

यदि $\sqrt{0.04\times 0.4\times a}=0.004\times 0.4\times\sqrt{b}$ है, तो $\frac{a}{b}$ का मान ज्ञात करें?

(a) 16×10^{-3} (b) 16×10^{-4}
(c) 16×10^{-5} (d) 16×10^{-6}

112. If $\frac{a}{b}=\frac{c}{d}=\frac{e}{f}=3$

then $\frac{2a^2+3c^2+4e^2}{2b^2+3d^2+4f^2}$=?

यदि $\frac{a}{b}=\frac{c}{d}=\frac{e}{f}=3$ है, तो $\frac{2a^2+3c^2+4e^2}{2b^2+3d^2+4f^2}$=?

(a) 2 (b) 3 (c) 4 (d) 9

113. If $2x+\frac{1}{3x}=5$. Find the value of $\frac{5x}{6x^2+20x+1}$.

का मान ज्ञात करें?

(a) $\frac{1}{4}$ (b) $\frac{1}{6}$

(c) $\frac{1}{5}$ (d) $\frac{1}{7}$

114. If x varies inversely as (y^2-1) and x is equal to 24 when y = 10, then the value of x when y =5 is

यदि x, (y^2-1)का व्युत्क्रमानुपाती है। x = 24 जब y = 10 है। यदि y= 5 है, तो x का मान ज्ञात करें।

(a) 99 (b) 12 (c) 24 (d) 100

115. If $x^2+y^2+2x+1=0$, then the value of $x^{31}+y^{35}$ is

यदि $x^2+y^2+2x+1=0$ है, तो $x^{31}+y^{35}$ का मान क्या होगा?

(a) – 1 (b) 0 (c) 1 (d) 2

116. If $\frac{x}{2x^2+5x+2}=\frac{1}{6}$, then value of $\left(x+\frac{1}{x}\right)$ is:

तो $\left(x+\frac{1}{x}\right)$ का मान क्या होगा?

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

(c) $-\frac{1}{2}$ (d) – 2

117. If a, b, c are real and $a^2+b^2+c^2 = 2(a-b-c)-3$ then the value of $2a-3b+4c$ is

यदि a, b, c वास्तविक संख्याएं है और $a^2+b^2+c^2 = 2(a-b-c)-3$ है, तो $2a-3b+4c$ का मान क्या होगा?

(a) – 1 (b) 0 (c) 1 (d) 2

118. If $(3a+1)^2+(b-1)^2+(2c-3)^2 = 0$, then the value of $(3a+b+2c)$ is equal to;

यदि $(3a+1)^2+(b-1)^2+(2c-3)^2 = 0$ है, तो $(3a+b+2c)$ का मान क्या होगा?

(a) 3 (b) – 1 (c) 2 (d) 5

119. The value of the expression

$$\frac{(a-b)^2}{(b-c)(c-a)}+\frac{(b-c)^2}{(a-b)(c-a)}+\frac{(c-a)^2}{(a-b)(b-a)}$$ का मान क्या होगा

(a) 0 (b) 3

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

120. If $(a-3)^2+(b-4)^2+(c-9)^2=0$, then the value of $\sqrt{a+b+c}$ is :

यदि $(a-3)^2+(b-4)^2+(c-9)^2=0$ है, तो $\sqrt{a+b+c}$ का मान क्या होगा?

(a) –4 (b) 4 (c) ± 4 (d) ± 2

121. If $1.5x = 0.04y$, then the value of $\frac{y^2-x^2}{y^2+2xy+x^2}$ is

यदि $1.5x = 0.04y$ है, तो $\frac{y^2-x^2}{y^2+2xy+x^2}$ का मान क्या होगा?

(a) $\frac{730}{77}$ (b) $\frac{73}{77}$

(c) $\frac{73}{770}$ (d) $\frac{74}{77}$

122. If $a^{\frac{1}{3}}=11$, then the value of a^2-331a is

यदि $a^{\frac{1}{3}}=11$ है, तो a^2-331a का मान क्या होगा?

(a) 1331331 (b) 1331000

(c) 1334331 (d) 1330030

123. If $x^2+y^2+\frac{1}{x^2}+\frac{1}{y^2}=4$, then the value of x^2+y^2 is

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

(a) 2 (b) 4 (c) 8 (d) 16

124. If $x^2 = y+z$, $y^2 = z+x$, $z^2 = x+y$, then the value of

$$\frac{1}{x+1}+\frac{1}{y+1}+\frac{1}{z+1}$$ is

यदि $x^2 = y+z$, $y^2 = z+x$, $z^2 = x+y$ है,

तो $\frac{1}{x+1}+\frac{1}{y+1}+\frac{1}{z+1}$ का मान क्या होगा?

(a) – 1 (b) 1 (c) 2 (d) 4

125. If $a^2+b^2 = 2$ and $c^2+d^2 = 1$ then the value of $(ad-bc)^2+(ac+bd)^2$ is

यदि $a^2+b^2 = 2$ और $c^2+d^2 = 1$ है, तो $(ad-bc)^2+(ac+bd)^2$ का मान क्या होगा ?

(a) $\frac{4}{9}$ (b) $\frac{1}{2}$

(c) 1 (d) 2

126. If $x = \frac{4ab}{a+b}$ $a \neq b$, the value of

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

यदि $x = \frac{4ab}{a+b}$ $a \neq b$ है,

तो $\frac{x+2a}{x-2a}+\frac{x+2b}{x-2b}$ का मान ज्ञात करें?

(a) a (b) b (c) 2 ab (d) 2

127. If $m+\frac{1}{m-2}=4$, find the value of $m-2^2+\frac{1}{m-2^2}$

यदि $m+\frac{1}{m-2}=4$ है,

तो $(m-2)^2+\frac{1}{(m-2)^2}$ का मान ज्ञात करें?

(a) – 2 (b) 0 (c) 2 (d) 4

128. If $a^2+b^2+2b+4a+5=0$, then the value of

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

यदि $a^2+b^2+2b+4a+5=0$ है, तो

$\frac{a-b}{a+b}$ का मान ज्ञात करें।

(a) 3 (b) – 3 (c) $\frac{1}{3}$ (b) $-\frac{1}{3}$

129. If $x-y=\frac{x+y}{7}=\frac{xy}{4}$, the numerical value of xy is

यदि $x-y=\frac{x+y}{7}=\frac{xy}{4}$ है, तो xy का आंकिक मान ज्ञात करें?

(a) $\frac{4}{3}$ (b) $\frac{3}{4}$

(c) $\frac{1}{4}$ (d) $\frac{1}{3}$

130. If $x+y+z=0$, then $\frac{x^2}{yz}+\frac{y^2}{zx}+\frac{z^2}{xy}=?$

यदि $x+y+z=0$ है, तो $\frac{x^2}{yz}+\frac{y^2}{zx}+\frac{z^2}{xy}=?$

(a) $(x+y+z)^2$ (b) $x^2+y^2+z^2$

(c) 9 (d) 3

131. If $a+b+c = 0$, then the value of

$$\frac{1}{(a+b)(b+c)}+\frac{1}{(a+c)(b+a)}+\frac{1}{(c+a)(c+b)}$$ का मान ज्ञात करें?

(a) 1 (b) 0 (c) – 1 (d) – 2

132. If $a+b+c = 0$, then the value of

$$\frac{a^2+b^2+c^2}{a^2-bc}$$ is

यदि $a+b+c = 0$ है, तो $\frac{a^2+b^2+c^2}{a^2-bc}$ का मान क्या होगा?

(a) 0 (b) 1 (c) 2 (d) 3

133. If $x^2+y^2-4x-4y+8 = 0$, then the value of $x-y$ is

यदि $x^2+y^2-4x-4y+8 = 0$ है, तो $x-y$ का मान क्या होगा?

(a) 4 (b) – 4 (c) 0 (d) 8

134. If $x = b+c-2a$, $y = c+a-2b$, $z = a+b-2c$, then the value of $x^2+y^2-z^2+2xy$ is

यदि $x = b+c-2a$, $y = c+a-2b$, $z = a+b-2c$ है, तो $x^2+y^2-z^2+2xy$ का मान क्या होगा?

(a) 0 (b) a +b +c

(c) a – b + c (d) a + b – c

135. For real a, b, c if $a^2+b^2+c^2 = ab+bc+ca$, then value of $\frac{a+c}{b}$ is:

a, b, c वास्तविक संख्याओं के लिए यदि $a^2+b^2+c^2 = ab+bc+ca$ है, तो $\frac{a+c}{b}$ का मान ज्ञात करें?

(a) 1 (b) 2 (c) 3 (d) 0

136. If $x+\frac{1}{x}=\sqrt{3}$ then the value of $x^{18}+x^{12}+x^6+1$ is

यदि $x+\frac{1}{x}=\sqrt{3}$ है, तो $x^{18}+x^{12}+x^6+1$ का मान ज्ञात करें।

(a) 0 (b) 1 (c) 2 (d) 3

137. If for two real constants a and b the expression ax^3+3x^2-8x+b is exactly divisible by $(x+2)$ and $(x-2)$, then

यदि दो वास्तविक अचरों a और b के लिए, व्यंजक ax^3+3x^2-8x+b, $(x+2)$ और $(x-2)$ से पूर्णतः विभाजित है,तो

(a) $a=2, b=12$ (b) $a=12, b=2$
(c) $a=2, b=-12$ (d) $a=-2, b=12$

138. If $x^2-3x+1=0$, then the value of $x^3+\frac{1}{x^3}$ is

यदि $x^2-3x+1=0$ है, तो $x^3+\frac{1}{x^3}$ का मान क्या होगा ?

(a) 9 (b) 18 (c) 27 (d) 1

139. If $x+\frac{1}{4x}=\frac{3}{2}$, find the value of $8x^3+\frac{1}{8x^3}$.

यदि $x+\frac{1}{4x}=\frac{3}{2}$ है, तो $8x^3+\frac{1}{8x^3}$ का मान ज्ञात करें।

(a) 18 (b) 36 (c) 24 (d) 16

140. If $\frac{1}{x+y}=\frac{1}{x}+\frac{1}{y}$ $(x\neq0, y\neq0, x\neq y)$ then the value of x^3-y^3 is

यदि $\frac{1}{x+y}=\frac{1}{x}+\frac{1}{y}$ $(x\neq0, y\neq0, x\neq y)$ है, तो x^3-y^3 का मान क्या है?

(a) 0 (b) 1
(c) – 1 (d) 2

141. If $x=a(b-c)$, $y=b(c-a)$ and $z=c(a-b)$, then $\left(\frac{x}{a}\right)^3+\left(\frac{y}{b}\right)^3+\left(\frac{z}{c}\right)^3=?$

यदि $x=a(b-c)$, $y=b(c-a)$ और $z=c(a-b)$ है, तो $\left(\frac{x}{a}\right)^3+\left(\frac{y}{b}\right)^3+\left(\frac{z}{c}\right)^3=?$

(a) $\frac{xyz}{3abc}$ (b) $3\,xyzabc$

(c) $\frac{3xyz}{abc}$ (d) $\frac{xyz}{abc}$

142. If $xy(x+y)=1$, then the value of $\frac{1}{x^3y^3}-x^3-y^3$ is: यदि $xy(x+y)=1$ है, तो $\frac{1}{x^3y^3}-x^3-y^3$ का मान ज्ञात करें।

(a) 0 (b) 1
(c) 3 (d) –2

143. If $x^4+\frac{1}{x^4}=119$ and $x>1$, then the value of $x^3+\frac{1}{x^3}$ is

यदि $x^4+\frac{1}{x^4}=119$ और $x>1$ है, तो $x^3+\frac{1}{x^3}$ का मान ज्ञात करें।

(a) $6\sqrt{13}$ (b) $8\sqrt{13}$
(c) $13\sqrt{13}$ (d) $10\sqrt{13}$

144. If $3x+\frac{1}{2x}=5$, then the value of $8x^3+\frac{1}{27x^3}$ is:

यदि $3x+\frac{1}{2x}=5$ है, तो $8x^3+\frac{1}{27x^3}$ का मान ज्ञात करें।

(a) $118\frac{1}{2}$ (b) $30\frac{10}{27}$
(c) (d) 1

145. If $x+y=z$, then the expression $x^3+y^3-z^3+3xyz$ wil be equal to :

यदि $x+y=z$ है, तो व्यंजक $x^3+y^3-z^3+3xyz$ किसके बराबर है?

(a) 0 (b) $3xyz$
(c) $-3xyz$ (d) z3

146. If the sum of $\frac{a}{b}$ and its reciprocal is 1 and $a\neq0$, $b\neq0$, then the value of a^3+b^3 is

यदि $\frac{a}{b}$ और इसके व्युत्क्रम का योग 1 है और $a\neq0$, $b\neq0$ है, तो a^3+b^3 का मान ज्ञात करें।

(a) 2 (b) –1 (c) 0 (d) 1

147. If $x=2-2^{1/3}+2^{2/3}$ then the value of $x^3-6x^2+18x+18$ is

यदि $x=2-2^{1/3}+2^{2/3}$ है, तो $x^3-6x^2+18x+18$ का मान ज्ञात करें।

(a) 22 (b) 33 (c) 40 (d) 45

148. If $a^3-b^3-c^3-3abc=0$, then

यदि $a^3-b^3-c^3-3abc=0$ है, तो :

(a) a = b = c (b) $a+b+c=0$
(c) $a+c=b$ (d) $a=b+c$

149. If a = 2.361, b = 3.263 and c =5.624, then the value of $a^3+b^3-c^3+3abc$ is

If a = 2.361, b = 3.263 and c =5.624, then the value of $a^3+b^3-c^3+3abc$ is

(a) $(p-q)(q-r)^3+(r-p)^3$
(b) 3 (p – q) (q–r) (r–p)
(c) 0
(d) 1

150. If p = 124, $\sqrt[3]{p\left(p^2+3p+3\right)+1}=?$

यदि p = 124 है, तो $\sqrt[3]{p\left(p^2+3p+3\right)+1}=?$

(a) 5 (b) 7
(c) 123 (d) 125

151. If $x+\frac{1}{x}=2$ and x is real, then the value of $x^{17}+\frac{1}{x^{19}}$ is

यदि $x+\frac{1}{x}=2$ और x वास्तविक संख्याएँ हैं, तो $x^{17}+\frac{1}{x^{19}}$ का मान क्या होगा?

(a) 1 (b) 0 (c) 2 (d) –2

152. If $x:y=3:4$, then the value of $\frac{5x-2y}{7x+2y}=?$

यदि $x:y=3:4$ है, तो $\frac{5x-2y}{7x+2y}=?$

(a) $\frac{7}{25}$ (b) $\frac{7}{23}$

(c) $\frac{7}{29}$ (d) $\frac{7}{17}$

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153. If $\frac{2p}{p^2-2p+1}=\frac{1}{4}, p\neq0$ then the value of $p+\frac{1}{p}$ is

यदि $\frac{2p}{p^2-2p+1}=\frac{1}{4}, p\neq0$ है,

तो $p+\frac{1}{p}$ का मान ज्ञात करें।

(a) 4 (b) 5 (c) 10 (d) 12

154. If x +y = 2z then the value of $\frac{x}{x-z}+\frac{z}{y-z}$ is

यदि $x+y=2z$ है, तो $\frac{x}{x-z}+\frac{z}{y-z}$ का मान ज्ञात करें।

(a) 1 (b) 3

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

155. If $a^3b = abc = 180$, a, b, c are positive integers, then the value of c is
यदि $a^3b = abc = 180$ है और a, b, c धनात्मक पूर्णांक है तो c का मान ज्ञात करें।
(a) 110 (b) 180 (c) 4 (d) 25

156. If a, b are rational number and $(a-1)\sqrt{2}+3=b\sqrt{2}+a$, the value of $(a+b)$ is
यदि a, b परिमेय संख्याएं है और $(a-1)\sqrt{2}+3=b\sqrt{2}+a$ है, तो $(a+b)$ का मान क्या होगा?
(a) – 5 (b) 3 (c) – 3 (d) 5

157. If $64^{x-1}=\frac{64}{4^x}$, then the value of x is
यदि $64^{x-1}=\frac{64}{4^x}$ है, तो x का मान ज्ञात करें।
(a) 1 (b) 0
(c) $\frac{1}{2}$ (d) 2

158. If $ax^2+bx+c=a(x-p)^2$, then the relation among a, b, c would be
यदि $ax^2+bx+c=a(x-p)^2$ है, तो a, b, c का संबंध क्या होगा?
(a) $abc = 1$ (b) $b^2 = ac$
(c) $b^2 = 4ac$ (d) $2b = a + c$

159. If $a+b+c+d=1$, then the maximum value of
$(1+a)(1+b)(1+c)(1+d)$ is
यदि $a+b+c+d=1$ है, तो $(1+a)(1+b)(1+c)(1+d)$ का अधिकतम मान क्या होगा?
(a) 1 (b) $\left(\frac{1}{2}\right)^4$
(c) $\left(\frac{3}{4}\right)^3$ (d) $\left(\frac{5}{4}\right)^4$

160. If $a^2+b^2+c^2+3=2(a+b+c)$ then the value of $(a+b+c)$ is
यदि $a^2+b^2+c^2+3=2(a+b+c)$ है, तो $(a+b+c)$ का मान ज्ञात करें।
(a) 2 (b) 3 (c) 4 (d) 5

161. If $x-\frac{1}{x}=5$, then $x^2+\frac{1}{x^2}$ is :

यदि $x-\frac{1}{x}=5$ है, तो $x^2+\frac{1}{x^2}=?$

(a) 5 (b) 25 (c) 27 (d) 23

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

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

(a) 1 (b) 2
(c) $2\sqrt{2}$ (d) $3\sqrt{3}$

163. If a +b +c = 0, then the value of $\frac{a^2+b^2+c^2}{a^2-bc}$ is

यदि a +b +c = 0 है, तो $\frac{a^2+b^2+c^2}{a^2-bc}$ का मान ज्ञात करें।

(a) 0 (b) 1 (c) 2 (d) 3

164. If $n=7+4\sqrt{3}$, then the value of $\left(\sqrt{n}+\frac{1}{\sqrt{n}}\right)$ is:

यदि $n=7+4\sqrt{3}$ है, तो $\left(\sqrt{n}+\frac{1}{\sqrt{n}}\right)$ का मान ज्ञात करें।

(a) $2\sqrt{3}$ (b) 4
(c) -4 (d) $-2\sqrt{3}$

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

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

(a) $2\sqrt{2}$ (b) $2\sqrt{3}$
(c) 2 (d) 3

166. If p + q =10 and pq = 5, then the numerical value of $\frac{p}{q}+\frac{q}{p}$ will be

यदि p + q =10 और pq = 5 है, तो $\frac{p}{q}+\frac{q}{p}$ का मान क्या होगा?

(a) 16 (b) 20 (c) 22 (d) 18

167. If $x=3+2\sqrt{2}$ and xy = 1, then the value of $\frac{x^2+3xy+y^2}{x^2-3xy+y^2}$ is

यदि $x=3+2\sqrt{2}$ और $xy=1$ है, तो $\frac{x^2+3xy+y^2}{x^2-3xy+y^2}$ का मान ज्ञात करें।

(a) $\frac{30}{31}$ (b) $\frac{70}{31}$
(c) $\frac{35}{31}$ (d) $\frac{37}{31}$

168. If $\frac{x}{b+c}=\frac{y}{c+a}=\frac{z}{a+b}$, then

यदि $\frac{x}{b+c}=\frac{y}{c+a}=\frac{z}{a+b}$ है, तो :

(a) $\frac{x-y}{b-a}=\frac{y-z}{c-b}=\frac{z-x}{a-c}$

(b) $\frac{x}{a}=\frac{y}{b}=\frac{z}{c}$

(c) $\frac{x-y}{c}=\frac{y-z}{b}=\frac{z-x}{c}$

(d) None of the above is true

169. If $x-y = 2$, $xy = 24$, then the value of (x^2+y^2) is
यदि $x-y = 2$, $xy = 24$ है, तो (x^2+y^2) का मान ज्ञात करें।
(a) 25 (b) 36 (c) 63 (d) 52

170. If the expression $\frac{x^2}{y^2}+tx+\frac{y^2}{4}$ is a perfect square, then the values of t is

यदि, व्यंजक $\frac{x^2}{y^2}+tx+\frac{y^2}{4}$ एक पूर्ण वर्ग है, तो t का मान क्या होगा ?

(a) ±1 (b) ±2 (c) 0 (d) ±3

171. If $a = x+y$, $b = x-y$, $c = x+2y$, then $a^2+b^2+c^2-ab-bc-ca$ is
यदि $a = x+y$, $b = x-y$, $c = x+2y$ है, तो $a^2+b^2+c^2-ab-bc-ca = ?$
(a) $4y^2$ (b) $5y^2$
(c) $6y^2$ (d) $7y^2$

172. If $a^2+b^2+c^2=ab+bc+ca$, where a, b, c are non zero real numbers, then the value of $\frac{a+b}{c}$ is

यदि $a^2+b^2+c^2=ab+bc+ca$ है, जहाँ a, b, c अशून्य वास्तविक संख्याऐं हैं, तो $\frac{a+b}{c}$ का मान क्या होगा ?

(a) 2 (b) 1 (c) 0 (d) – 1

173. If $x+\frac{1}{x}=2, x\neq 0$ then value of $x^2+\frac{1}{x^3}$ is equal to

यदि $x+\frac{1}{x}=2, x\neq 0$ है, तो $x^2+\frac{1}{x^3}$ का मान किसके बराबर है?

(a) 1 (b) 2 (c) 3 (d) 4

174. If $\frac{a}{b}+\frac{b}{a}=1,\ a\neq 0, b\neq 0$ the value of a^3+b^3 is

यदि $\frac{a}{b}+\frac{b}{a}=1,\ a\neq 0, b\neq 0$ है, तो a^3+b^3 का मान क्या होगा?

(a) 0 (b) 1 (c) – 1 (d) 2

175. If $\left(x+\frac{1}{x}\right)^2=3$ then the value of $(x^{72}+x^{66}+x^{54}+x^{24}+x^6+1)$ का मान क्या होगा?

(a) 0 (b) 1 (c) 84 (d) 206

176. If $a+\frac{1}{a}=\sqrt{3}$, then the value of $a^6-\frac{1}{a^6}+2$ will be

यदि $a+\frac{1}{a}=\sqrt{3}$ है, तो $a^6-\frac{1}{a^6}+2$ का मान क्या होगा?

(a) 1 (b) 2

(c) $3\sqrt{3}$ (d) 5

177. If $x^3+y^3=35$ and $x+y=5$, then the value of $\frac{1}{x}+\frac{1}{y}$ will be :

यदि $x^3+y^3=35$ और $x+y=5$ है, तो $\frac{1}{x}+\frac{1}{y}$ का मान क्या होगा?

(a) $\frac{1}{3}$ (b) $\frac{5}{6}$

(c) 6 (d) $\frac{2}{3}$

178. If $a^3-b^3=56$ and $a-b=2$ then value of a^2+b^2 will be :

यदि $a^3-b^3=56$ और $a-b=2$ है, तो a^2+b^2 का मान क्या होगा?

(a) 48 (b) 20 (c) 32 (d) 5

179. यदि $(a^2+b^2)^3=(a^3+b^3)^2$ है, तो $\frac{a}{b}+\frac{b}{a}=?$

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

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

180. If $x+\frac{1}{x}=5$, then the value of $\frac{x^4+3x^3+5x^2+3x+1}{x^4+1}$ का मान ज्ञात करें।

(a) $\frac{43}{23}$ (b) $\frac{47}{21}$

(c) $\frac{41}{23}$ (d) $\frac{45}{21}$

181. If x is real, $x+\frac{1}{x}\neq 0$ and $x^3+\frac{1}{x^3}=0$, then the value of $\left(x+\frac{1}{x}\right)^4$ is

यदि x वास्तविक संख्या है तथा $x+\frac{1}{x}\neq 0$ और $x^3+\frac{1}{x^3}=0$ है, तो $\left(x+\frac{1}{x}\right)^4$ का मान ज्ञात करें।

(a) 4 (b) 9 (c) 16 (d) 25

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

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

(a) 342 (b) 126

(c) 123 (d) 113

183. If $x-\frac{1}{x}=3$, then value of $x^3-\frac{1}{x^3}$ is

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

(a) 32 (b) 36 (c) 40 (d) 49

184. If $m^4+\frac{1}{m^4}=119$, then $m-\frac{1}{m}=?$

यदि $m^4+\frac{1}{m^4}=119$ है, तो $m-\frac{1}{m}=?$

(a) ±3 (b) 4 (c) ±2 (d) ±1

185. If $x+y+z=6$, then the value of $(x-1)^3+(y-2)^3+(z-3)^3$ is

यदि $x+y+z=6$ है, तो $(x-1)^3+(y-2)^3+(z-3)^3$ का मान ज्ञात करें।

(a) $3(x-1)(y+2)(z-3)$

(b) $3(x+1)(y-2)(z-3)$

(c) $3(x-1)(y-2)(z+3)$

(d) $3(x-1)(y-2)(z-3)$

186. If $a+b+c=6$, $a^2+b^2+c^2=14$ and $a^3+b^3+c^3=36$, then the value of abc is

यदि $a+b+c=6$, $a^2+b^2+c^2=14$ और $a^3+b^3+c^3=36$ है, तो abc का मान क्या होगा?

(a) 3 (b) 6 (c) 9 (d) 12

187. If $a+b=1$ and $a^3+b^3+3ab=k$, then the value of k is

यदि $a+b=1$ और $a^3+b^3+3ab=k$ है, तो k का मान ज्ञात करें।

(a) 1 (b) 3 (c) 5 (d) 7

188. If $a=34$, $b=c=33$, then the value of $a^3+b^3+c^3-3abc$ is

यदि $a=34$, $b=c=33$ है, तो $a^3+b^3+c^3-3abc$ का मान ज्ञात करें।

(a) 0 (b) 111 (c) 50 (d) 100

189. If $(2^x)(2^y)=8$ and $(9^x)(3^y)=81$, then (x, y) is :

यदि $(2^x)(2^y)=8$ और $(9^x)(3^y)=81$ है, तो $(x, y)=?$

(a) (1,2) (b) (2,1)

(c) (1,1) (d) (2,2)

190. The lines $2x+y=5$ and $x+2y=4$ intersect at the point :

$2x+y=5$ और $x+2y=4$, दो रेखाएं एक दूसरे को किस बिन्दु पर काटेंगी

(a) (1,2) (b) (2,1)

(c) $\left(\frac{5}{2},0\right)$ (d) (0,2)

191. If $y:x=4:15$, then the value of $\left(\frac{x-y}{x+y}\right)$ is

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

(a) $\frac{11}{19}$ (b) $\frac{19}{11}$

(c) $\frac{4}{11}$ (d) $\frac{15}{19}$

192. The expression x^4-2x^2+k will be a perfect square when the value of k is

व्यंजक x^4-2x^2+k एक पूर्ण वर्ग होगा जब k का मान होगा –

(a) 2 (b) 1 (c) – 1 (d) – 2

193. $\dfrac{\frac{1}{3}\cdot\frac{1}{3}\cdot\frac{1}{3}+\frac{1}{4}\cdot\frac{1}{4}\cdot\frac{1}{4}-3\cdot\frac{1}{3}\cdot\frac{1}{4}\cdot\frac{1}{5}+\frac{1}{5}\cdot\frac{1}{5}\cdot\frac{1}{5}}{\frac{1}{3}\cdot\frac{1}{3}+\frac{1}{4}\cdot\frac{1}{4}+\frac{1}{5}\cdot\frac{1}{5}-\left(\frac{1}{3}\cdot\frac{1}{4}+\frac{1}{4}\cdot\frac{1}{5}+\frac{1}{5}\cdot\frac{1}{3}\right)}$ is equal to किसके बराबर है?

(a) $\frac{2}{3}$ (b) $\frac{3}{4}$

(c) $\frac{47}{60}$ (d) $\frac{49}{60}$

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194. If $\frac{a}{1-a}+\frac{b}{1-b}+\frac{c}{1-c}=1$, then the value of $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}$ is

यदि $\frac{a}{1-a}+\frac{b}{1-b}+\frac{c}{1-c}=1$ है, तो $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}$ का मान ज्ञात करें।

(a) 1 (b) 2 (c) 3 (d) 4

195. If a, b, c are real numbers and $a^2+b^2+c^2=2(a-b-c)-3$ then the value of $2a-3b+4c$ is

यदि a, b, c वास्तविक संख्याएँ है और $a^2+b^2+c^2=2(a-b-c)-3$ है, तो $2a-3b+4c$ का मान क्या होगा?

(a) – 1 (b) 9 (c) 1 (d) 2

196. The value of the expression $\frac{(a-b)^2}{(b-c)(c-a)}+\frac{(b-c)^2}{(a-b)(c-a)}+\frac{(c-a)^2}{(a-b)(b-a)}$ का मान क्या होगा?

(a) 0 (b) 3 (c) $\frac{1}{3}$ (d) 2

197. If $(x-3)^2+(y-5)^2+(z-4)^2=0$ then the value of $\frac{x^2}{9}+\frac{y^2}{25}+\frac{z^2}{16}$ is

यदि $(x-3)^2+(y-5)^2+(z-4)^2=0$ है, तो $\frac{x^2}{9}+\frac{y^2}{25}+\frac{z^2}{16}$ का मान क्या होगा?

(a) 12 (b) 9 (c) 3 (d) 1

198. x varies inversely as square of y. Given that $y=2$ for $x=1$, the value of x for $y=6$ will be equal to

x, y के वर्ग के व्युत्क्रमानुपाती है। जब $y=2$ है तब $x=1$ है, तो जब $y=6$ है तब x का मान ज्ञात करें।

(a) 3 (b) 9

(c) $\frac{1}{3}$ (d) $\frac{1}{9}$

199. If $a^2+b^2+c^2+3=2(a-b-c)$ then the vlaue of $2a-b+c$ is :

यदि $a^2+b^2+c^2+3=2(a-b-c)$ है, तो $2a-b+c$ का मान ज्ञात करें।

(a) 3 (b) 4 (c) 0 (d) 2

200. If $x^2-y^2=80$ and $x-y=8$, then the average of x and y is

यदि $x^2-y^2=80$ और $x-y=8$ है, तो x और y का औसत ज्ञात करें।

(a) 2 (b) 3 (c) 4 (d) 5

201. The third proportional to $\left(\frac{x}{y}+\frac{y}{x}\right)$ and $\sqrt{x^2+y^2}$ is

$\left(\frac{x}{y}+\frac{y}{x}\right)$ और $\sqrt{x^2+y^2}$ का तृतीयानुपाती क्या है?

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

(c) $\sqrt[3]{xy}$ (d) $\sqrt[4]{xy}$

202. If $\frac{4x}{3}+2P=12$ for what value of P $x=6$?

यदि $\frac{4x}{3}+2P=12$ है, तो $x=6$, P के किस मान के लिए होगा?

(a) 6 (b) 4 (c) 2 (d) 1

203. The value of $\frac{4+3\sqrt{3}}{7+4\sqrt{3}}$ is

$\frac{4+3\sqrt{3}}{7+4\sqrt{3}}$ का मान क्या होगा?

(a) $5\sqrt{3}-8$ (b) $5\sqrt{3}+8$

(c) $8\sqrt{3}+5$ (d) $8\sqrt{3}-5$

204. Let $a=\sqrt{6}-\sqrt{5}$,

$b=\sqrt{5}-2, c=2-\sqrt{3}$ Then point out the correct alternative among the four alternatives given below.

मान लिया कि $a=\sqrt{6}-\sqrt{5}$,

$b=\sqrt{5}-2, c=2-\sqrt{3}$ है, तो निम्न विकल्पों में से कौन सा विकल्प सही है?

(a) $b<a<c$ (b) $a<c<b$

(c) $b<c<a$ (d) $a<b<c$

205. If $x=\frac{4\sqrt{15}}{\sqrt{5}+\sqrt{3}}$, the value of $\frac{x+\sqrt{20}}{x-\sqrt{20}}+\frac{x+\sqrt{12}}{x-\sqrt{12}}$ is

यदि $x=\frac{4\sqrt{15}}{\sqrt{5}+\sqrt{3}}$ है,

तो $\frac{x+\sqrt{20}}{x-\sqrt{20}}+\frac{x+\sqrt{12}}{x-\sqrt{12}}$ का मान ज्ञात करें।

(a) 1 (b) 2

(c) $\sqrt{3}$ (d) $\sqrt{5}$

206. If $x=5-\sqrt{21}$, then the value of $\frac{\sqrt{x}}{\sqrt{32-2x-\sqrt{21}}}$ is

यदि $x=5-\sqrt{21}$ है, तो $\frac{\sqrt{x}}{\sqrt{32-2x-\sqrt{21}}}$ का मान क्या होगा?

(a) $\frac{1}{\sqrt{2}}(\sqrt{3}-\sqrt{7})$

(b) $\frac{1}{\sqrt{2}}(\sqrt{7}-\sqrt{3})$

(b) $\frac{1}{\sqrt{2}}(\sqrt{7}+\sqrt{3})$

(d) $\frac{1}{\sqrt{2}}(7+\sqrt{3})$

207. If $6x-5y=13, 7x+2y=23$ then $11x+18y=$?

यदि $6x-5y=13, 7x+2y=23$ है, तो $11x+18y=$?

(a) – 15 (b) 51 (c) 33 (d) 15

208. The value of $\left(x^{b+c}\right)^{b-c}\left(x^{c+a}\right)^{c-a}\left(x^{a+b}\right)^{a-b}(x\neq 0)$ का मान क्या होगा?

(a) 1 (b) 2 (c) – 1 (d) 0

209. If $\frac{x}{a}=\frac{1}{a}-\frac{1}{x}$, then the value of $x-x^2$ is :

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

(a) $-a$ (b) $\frac{1}{a}$

(c) a (d) $-\frac{1}{a}$

210. If $x+\frac{1}{x}=99$, find the value of $\frac{100x}{2x^2+102x+2}$ का मान क्या होगा?

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$

(c) $\frac{1}{3}$ (d) $\frac{1}{4}$

211. If $\frac{4x-3}{x}+\frac{4y-3}{y}+\frac{4z-3}{z}=0$ then the value of $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}$ is

यदि $\frac{4x-3}{x}+\frac{4y-3}{y}+\frac{4z-3}{z}=0$ है, तो $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}$ का मान क्या होगा?

(a) 9 (b) 3 (c) 4 (d) 6

212. If $\frac{xy}{x+y}=a, \frac{xz}{x+z}=b$ and $\frac{yz}{y+z}=c$, where a, b, c are all non -zero numbers, then x equals to

यदि $\frac{xy}{x+y}=a, \frac{xz}{x+z}=b$ और $\frac{yz}{y+z}=c$ है, जहाँ a, b, c सभी अशून्य संख्याएँ है, तो x का मान किसके बराबर है?

(a) $\frac{2abc}{ab+bc-ac}$ (b) $\frac{2abc}{ab+ac-bc}$

(c) $\frac{2abc}{ac+bc-ab}$ (d) $\frac{2abc}{ab+bc-ac}$

213. If x and y are positive real numbers and xy =8, then the minimum value of $2x+y$ is

यदि x और y धनात्मक वास्तविक संख्याएँ है और xy =8 है, तो $2x+y$ का न्यूनतम मान क्या होगा?

(a) 9 (b) 17 (c) 10 (d) 8

214. If the expression x^2+x+1 is written in the form $\left(x+\frac{1}{2}\right)^2+q^2$, then the possible value of q are

यदि व्यंजक x^2+x+1, $\left(x+\frac{1}{2}\right)^2+q^2$, के रुप में लिखा गया है, तो q का संभावित मान क्या होगा?

(a) $\pm\frac{1}{3}$ (b) $\pm\frac{\sqrt{3}}{2}$

(c) $\pm\frac{2}{\sqrt{3}}$ (d) $\pm\frac{1}{2}$

215. If $a^2-4a-1=0$, then value of $a^2+\frac{1}{a^2}+3a-\frac{3}{a}$ is

यदि $a^2-4a-1=0$ है, तो $a^2+\frac{1}{a^2}+3a-\frac{3}{a}$ का मान क्या होगा?

(a) 25 (b) 30 (c) 35 (d) 40

216. The minimum value of $(x-2)(x-9)$ is

$(x-2)(x-9)$ का न्यूनतम मान क्या होगा?

(a) $-\frac{11}{4}$ (b) $\frac{49}{4}$

(c) 0 (d) $-\frac{49}{4}$

217. One of the factors of the expression $4\sqrt{3}x^2+5x-2\sqrt{3}$ is :

व्यंजक $4\sqrt{3}x^2+5x-2\sqrt{3}$ का एक गुणज है?

(a) $4x+\sqrt{3}$ (b) $4x+3$

(c) $4x-3$ (d) $4x-\sqrt{3}$

218. If $\sqrt{x}=\sqrt{3}-\sqrt{5}$, then the value of $x^2-16x+6$ is

यदि $\sqrt{x}=\sqrt{3}-\sqrt{5}$ है, तो $x^2-16x+6$ का मान क्या होगा?

(a) 0 (b) 2 (c) 3 (d) 4

219. If $x^2=y+z, y^2=z+x, z^2=x+y$, then the value of $\frac{1}{x+1}+\frac{1}{y+1}+\frac{1}{z+1}$

यदि $x^2=y+z, y^2=z+x, z^2=x+y$ है, तो $\frac{1}{x+1}+\frac{1}{y+1}+\frac{1}{z+1}$ का मान क्या होगा?

(a) – 1 (b) 1 (c) 2 (d) 41

220. If $m+\frac{1}{m-2}=4$, find the value of $(m-2)^2+\frac{1}{(m-2)^2}$

यदि $m+\frac{1}{m-2}=4$ है, तो $(m-2)^2+\frac{1}{(m-2)^2}$ का मान ज्ञात करें।

(a) – 2 (b) 0 (c) 2 (d) 4

221. If यदि $x+y+z=0$, then तो $\frac{x^2}{yz}+\frac{y^2}{zx}+\frac{z^2}{xy}=?$

(a) $(xyz)^2$ (b) $x^2+y^2z^2$

(c) 9 (d) 3

222. If यदि a +b +c = 0, then the value of तो $\left(\frac{a+b}{c}+\frac{b+c}{a}+\frac{c+a}{b}\right)\left(\frac{a}{b+c}+\frac{b}{c+a}+\frac{c}{a+b}\right)$ का मान ज्ञात करे

(a) 8 (b) – 3 (c) 9 (d) 0

223. If a, b, c are non - zero $a+\frac{1}{b}=1$ and $b+\frac{1}{c}=1$, then the value of abc is

यदि a, b, c अशून्य संख्याएँ है तथा $a+\frac{1}{b}=1$ और $b+\frac{1}{c}=1$ है, तो abc का मान ज्ञात करें।

(a) – 1 (b) 3 (c) – 3 (d) 1

224. If यदि $a+b+c=2s$, then तो $\frac{(s-a)^2+(s-b)^2+(s-c)^2+s^2}{a^2+b^2+c^2}$ किसके बराबर है?

(a) $a^2+b^2+c^2$ (b) 0

(c) 1 (d) 2

225. If $x=3+2\sqrt{2}$, the value of $x^2+\frac{1}{x^2}$ is

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

(a) 36 (b) 30 (c) 32 (d) 34

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

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

(a) $2\frac{1}{9}$ (b) $2\frac{4}{9}$

(c) $3\frac{1}{9}$ (d) $3\frac{4}{9}$

227. If $x^2 - 3x + 1 = 0$, then the value of $x^2 + x + \frac{1}{x} + \frac{1}{x^2}$ is

यदि $x^2 - 3x + 1 = 0$ है, तो $x^2 + x + \frac{1}{x} + \frac{1}{x^2}$ का मान ज्ञात करें।

(a) 10 (b) 2 (c) 6 (d) 8

228. If $a^2 + b^2 = 5ab$, the value of $\left(\frac{a^2}{b^2} + \frac{b^2}{a^2}\right)$ is :

यदि $a^2 + b^2 = 5ab$ है, तो $\left(\frac{a^2}{b^2} + \frac{b^2}{a^2}\right)$ का मान ज्ञात करें।

(a) 32 (b) 16 (c) 23 (d) – 23

229. If यदि $xy + yz + zx = 0$, then तो $\left(\frac{1}{x^2 - yz} + \frac{1}{y^2 - zx} + \frac{1}{z^2 - xy}\right)$ $(x, y, z \neq 0)$ किसके बराबर है?

(a) 3 (b) 1

(c) $x + y + z$ (d) 0

230. If $a + b + c = 9$ (where a, b, c are real numbers), then the minimum value of $a^2 + b^2 + c^2$ is

यदि $a + b + c = 9$ है (जहाँ a, b, c वास्तविक संख्याएँ है), तो $a^2 + b^2 + c^2$ का न्यूनतम मान क्या होगा?

(a) 100 (b) 9 (c) 27 (d) 81

231. If $a^2 + b^2 + 4c^2 = 2(a + b - 2c) - 3$ and a, b, c are real, then the value of $(a^2 + b^2 + c^2)$ is

यदि $a^2 + b^2 + 4c^2 = 2(a + b - 2c) - 3$ और a, b, c वास्तविक संख्याएँ है, तो $(a^2 + b^2 + c^2)$ का मान क्या होगा?

(a) 3 (b) $3\frac{1}{4}$

(c) 2 (d) $2\frac{1}{4}$

232. If यदि $\frac{x - a^2}{b + c} + \frac{x - b^2}{c + a} + \frac{x - c^2}{a + b} = 4$ $(a + b + c)$, then x किसके बराबर है?

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

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

(c) $ab + bc + ca$

(d) $a^2 + b^2 + c^2 - ab - bc - ca$

233. Number of solutions of the two equations $4x^2 - y = 2$ and $2x - 8y + 4 = 0$ is

दो समीकरण $4x^2 - y = 2$ और $2x - 8y + 4 = 0$ के कितने हल हो सकते है?

(a) zero

(b) one

(c) two

(d) infinitely many

234. If $\frac{a}{b} = \frac{4}{5}$ and $\frac{b}{c} = \frac{15}{16}$, then $\frac{18c^2 - 7a^2}{45c^2 + 20a^2}$ is equal to

यदि $\frac{a}{b} = \frac{4}{5}$ और $\frac{b}{c} = \frac{15}{16}$ है, तो $\frac{18c^2 - 7a^2}{45c^2 + 20a^2}$ किसके बराबर है?

(a) $\frac{1}{3}$ (b) $\frac{2}{5}$ (c) $\frac{3}{4}$ (d) $\frac{1}{4}$

235. If $x \neq 0, y \neq 0$ and $z \neq 0$ and $\frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2} = \frac{1}{xy} + \frac{1}{yz} + \frac{1}{zx}$ then the relation among x, y, z is

यदि $x \neq 0, y \neq 0$ और $z \neq 0$ और $\frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2} = \frac{1}{xy} + \frac{1}{yz} + \frac{1}{zx}$ तो x, y, z के बीच का संबंध क्या है?

(a) $x + y + z = 0$

(b) $x + y = z$

(c) $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 0$

(d) $x = y = z$

236. If $a + b = 1, c + d = 1$ and $a - b = \frac{d}{c}$, then the value of $c^2 - d^2$

यदि $a + b = 1, c + d = 1$ और $a - b = \frac{d}{c}$ है, तो $c^2 - d^2$ का मान क्या होगा?

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

(c) 1 (d) – 1

237. If $x = 3t$, $y = \frac{1}{2}(t + 1)$, then the value of t for which $x = 2y$ is

यदि $x = 3t$, $y = \frac{1}{2}(t + 1)$ है, तो t का मान क्या होगा, जिसके लिए $x = 2y$ है?

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

(c) – 1 (d) $\frac{2}{3}$

238. If $x^2 + \frac{1}{5}x + a^2$ is a perfect square, then a is

यदि $x^2 + \frac{1}{5}x + a^2$ एक पूर्ण वर्ग है, तो a =?

(a) $\frac{1}{100}$ (b) $\pm\frac{1}{10}$

(c) $\frac{1}{10}$ (d) $-\frac{1}{10}$

239. Find the value of x for which the expression $2 - 3x - 4x^2$ has the greatest value.

x का मान ज्ञात करें जिसके लिए व्यंजक $2 - 3x - 4x^2$ का अधिकतम मान है?

(a) $-\frac{41}{16}$ (b) $\frac{3}{8}$

(c) $-\frac{3}{8}$ (d) $\frac{41}{16}$

240. The expression $x^4 - 2x^2 + k$ will be a perfect square if the value of k is

व्यंजक $x^4 - 2x^2 + k$ एक पूर्ण वर्ग होगा यदि k का मान :

(a) 1 (b) 0

(c) $\frac{1}{4}$ (d) $\frac{1}{2}$

241. If $(x - 1)$and $(x+3)$ are the factors of $x^2 + k_1x + k_2$ then

यदि $(x - 1)$ और $(x+3)$, $x^2 + k_1x + k_2$ के गुणज है, तो:

(a) $k_1 = -2, k_2 = -3$

(b) $k_1 = 2, k_2 = -3$

(c) $k_1 = -2, k_2 = 3$

(d) $k_1 = -2, k_2 = 3$

242. If यदि $\frac{5x}{2x^2 + 5x + 1} = \frac{1}{3}$, then the value of $\left(x + \frac{1}{2x}\right)$ का मान ज्ञात करें।

(a) 15 (b) 10 (c) 20 (d) 5

243. If $\frac{a}{b} + \frac{b}{a} = 1$, $a \neq 0, b \neq 0$ the value of $a^3 + b^3$ is

यदि $\frac{a}{b} + \frac{b}{a} = 1$, $a \neq 0, b \neq 0$ है, तो $a^3 + b^3$ का मान ज्ञात करें।

(a) 0 (b) 1 (c) – 1 (d) 2

244. If $xy(x + y) = 1$, then the value of $\frac{1}{x^3y^3} - x^3 - y^3$ is:

यदि $xy(x + y) = 1$ है, तो $\frac{1}{x^3y^3} - x^3 - y^3$ का मान क्या होगा?

(a) 0 (b) 1 (c) 3 (d) – 2

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

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

(a) 322 (b) 126
(c) 123 (d) 113

246. If $x>1$ and $x^2+\frac{1}{x^2}=83$ then $x^3-\frac{1}{x^3}$ is

यदि $x>1$ और $x^2+\frac{1}{x^2}=83$ है, तो $x^3-\frac{1}{x^3}=?$

(a) 764 (b) 750
(c) 756 (d) 760

247. If $\left(a+\frac{1}{a}\right)^2=3$, then $a^3+\frac{1}{a^3}=?$

यदि $\left(a+\frac{1}{a}\right)^2=3$ है, तो $a^3+\frac{1}{a^3}=?$

(a) $2\sqrt{3}$ (b) 2
(c) $3\sqrt{3}$ (d) 0

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

यदि $\frac{x}{x^2-2x+1}=\frac{1}{3}$ है, तो $x^3+\frac{1}{x^3}$ का मान ज्ञात करें।

(a) 64 (b) 110 (c) 81 (d) 124

249. If $\left(x+\frac{1}{x}\right)=4$, then the value of $x^4+\frac{1}{x^4}$ is :

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

(a) 64 (b) 194 (c) 81 (d) 124

250. If $x+y+z=6$ and $x^2+y^2+z^2=20$ then the value of $x^3+y^3+z^3-3xyz$ is
यदि $x+y+z=6$ और $x^2+y^2+z^2=20$ है, तो $x^3+y^3+z^3-3xyz$ का मान ज्ञात करें।

(a) 64 (b) 70 (c) 72 (d) 76

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

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

(a) – 8 (b) 8
(c) $2\sqrt{2}$ (b) 1

252. If $x=a-b$, $y=b-c$, $z=c-a$, then the numerical value of the algebraic expression $x^3+y^3+z^3-3xyz$ will be
यदि $x=a-b$, $y=b-c$, $z=c-a$ है, तो बीजगणितीय व्यंजक $x^3+y^3+z^3-3xyz$ का आंकिक मान ज्ञात करें।

(a) $a+b+c$ (b) 0
(c) $4(a+b+c)$ (d) $3abc$

253. If $x=\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ and $y=\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$, then the value of x^3+y^3 is :
यदि $x=\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ और $y=\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ है, तो x^3+y^3 का मान ज्ञात करें।

(a) 950 (b) 930
(c) 650 (d) 970

254. If $(x-a)(x-b)=1$ and $a-b+5=0$, then the value of $(x-a)^3-\frac{1}{(x-a)^3}$ is
यदि $(x-a)(x-b)=1$ और $a-b+5=0$ है, तो $(x-a)^3-\frac{1}{(x-a)^3}$ का मान ज्ञात करें।

(a) – 125 (b) 1
(c) 125 (d) 140

255. If $a^2+b^2+c^2=2(a-b-c)-3$ then the value of $4a-3b+5c$ is
यदि $a^2+b^2+c^2=2(a-b-c)-3$ है, तो $4a-3b+5c$ का मान ज्ञात करें।

(a) 2 (b) 3 (c) 5 (d) 6

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

यदि $2x+\frac{2}{x}=3$ है,तो $x^3+\frac{1}{x^3}+2$ का मान ज्ञात करें।

(a) $-\frac{9}{8}$ (b) $-\frac{25}{8}$
(c) $\frac{7}{8}$ (d) 11

257. If $a+b+c=15$ and $a^2+b^2+c^2=83$ then the value of $a^3+b^3+c^3-3abc$
यदि $a+b+c=15$ और $a^2+b^2+c^2=83$है, तो $a^3+b^3+c^3-3abc$ का मान ज्ञात करें।

(a) 200 (b) 180
(c) 190 (d) 210

258. If $a-b=3$ and $a^3-b^3=27$ then $|a+b|$ is equal to
यदि $a-b=3$ और $a^3-b^3=27$ है, तो $|a+b|$ किसके बराबर है?

(a) 3 (b) 5 (c) 7 (d) 9

259. If $x+\frac{1}{x+1}=1$, then $(x+1)^5+\frac{1}{(x+1)^5}$ equals

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

(a) 1 (b) 2 (c) 4 (d) 8

260. If $\frac{1}{a}+\frac{1}{b}=\frac{1}{a+b}$, then the value of a^3-b^3 is

यदि $\frac{1}{a}+\frac{1}{b}=\frac{1}{a+b}$ है, तो a^3-b^3 का मान क्या होगा?

(a) 0 (b) – 1 (c) 1 (d) 2

261. If $a+b+c=0$, then $a^3+b^3+c^3$ is equal to
यदि $a+b+c=0$ है, तो $a^3+b^3+c^3$ किसके बराबर है?

(a) $a+b+c$ (d) abc
(c) $2abc$ (d) $3abc$

262. If $x=y=333$ and $z=334$, then the value of $x^3+y^3+z^3-3xyz$ is
यदि $x=y=333$ और $z=334$ है,तो $x^3+y^3+z^3-3xyz$ का मान क्या होगा?

(a) 0 (b) 667
(c) 1000 (d) 2334

263. Out of the given responses one of the factors of $(a^2-b^2)^3+(b^2-c^2)^3+(c^2-a^2)^3$ is
दिए गए उत्तरों में से $(a^2-b^2)^3+(b^2-c^2)^3+(c^2-a^2)^3$ का एक गुणज होगा :

(a) (a + b)(a–b) (b) (a + b)(a+b)
(c) (a – b)(a–b) (d) (b – c)(b–c)

264. If $a=\frac{b^2}{b-a}$ then the value of a^3+b^3 is

यदि $a=\frac{b^2}{b-a}$ है, तो a^3+b^3 का मान ज्ञात करें।

(a) 6 ab (b) 0 (c) 1 (d) 2

265. If $p-2q=4$, then the value of $p^3-8q^3-24pq-64$ is
यदि $p-2q=4$ है,तो $p^3-8q^3-24pq-64$ का मान ज्ञात करें।
(a) 2 (b) 0 (c) 3 (d) – 1

266. If यदि $x=-1$, then the value of
$\frac{1}{x^{99}}+\frac{1}{x^{98}}+\frac{1}{x^{97}}+\frac{1}{x^{96}}+\frac{1}{x^{95}}+\frac{1}{x^{94}}+\frac{1}{x}-1$
का मान क्या होगा?
(a) 1 (b) 0 (c) – 2 (d) – 1

267. If $\frac{1}{\sqrt[3]{4}+\sqrt[3]{2}+1}=a\sqrt[3]{4}+b\sqrt[3]{2}+c$ and a, b, c are rational numbers then a + b + c is equal to
यदि $\frac{1}{\sqrt[3]{4}+\sqrt[3]{2}+1}=a\sqrt[3]{4}+b\sqrt[3]{2}+c$ और a, b, c परिमेय संख्याएँ है, तो a +b +c किसके बराबर है
(a) 0 (b) 1 (c) 2 (d) 3

268. If $x=\sqrt[3]{2+\sqrt{3}}$, then the value of $x^3+\frac{1}{x^3}$ is
यदि $x=\sqrt[3]{2+\sqrt{3}}$ है, तो $x^3+\frac{1}{x^3}$ का मान ज्ञात करें।
(a) 8 (b) 9 (c) 2 (d) 4

269. If $x=\sqrt[3]{5}+2$, then the value of $x^3-6x^2+12x-13$
यदि $x=\sqrt[3]{5}+2$ है, तो $x^3-6x^2+12x-13$ का मान ज्ञात करें।
(a) – 1 (b) 1 (c) 2 (d) 0

270. The simplest form of the expression
$\frac{p^2-p}{2p^3+p^2}+\frac{p^2-1}{p^2+3p}+\frac{p^2}{p+1}$
का साधारणीकृत मान क्या है?
(a) $2p^2$ (b) $\frac{1}{2p^2}$
(c) p +3 (d) $\frac{1}{p+3}$

271. If $x+\frac{1}{x}=2$, then the value of $\left(x^2+\frac{1}{x^2}\right)\left(x^3+\frac{1}{x^3}\right)$ is
यदि $x+\frac{1}{x}=2$ है, तो
$\left(x^2+\frac{1}{x^2}\right)\left(x^3+\frac{1}{x^3}\right)$ का मान ज्ञात करें।
(a) 20 (b) 4 (c) 8 (d) 16

272. If a,b,c be all positive integers then the least positive value of $a^3+b^3+c^3-3abc$ is.
यदि a,b,c सभी धनात्मक पूर्णांक है, तो $a^3+b^3+c^3-3abc$ का न्यूनतम मान क्या होगा?
(a) 0 (b) 2 (c) 4 (d) 3

273. When $f(x)=12x^3-13x^2-5x+7$ is divided by $(3x+2)$, then the remainder is
जब $f(x)=12x^3-13x^2-5x+7$ में $(3x+2)$से भाग दिया जाता है, तो शेषफल क्या होगा?
(a) 2 (b) 0 (c) – 1 (d) 1

274. If ab +bc +ca = 0, then the value of
$\frac{1}{a^2-bc}+\frac{1}{b^2-ac}+\frac{1}{c^2-ab}$ is
यदि ab +bc +ca = 0है, तो
$\frac{1}{a^2-bc}+\frac{1}{b^2-ac}+\frac{1}{c^2-ab}$ का मान क्या होगा?
(a) 2 (b) – 1 (c) 0 (d) 1

275. If the equation $2x^2-7x+12=0$ has two roots α and β, then the value of $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$ is
यदि समीकरण $2x^2-7x+12=0$ के दो मूल α और β हैं, तो $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$ का मान क्या होगा?
(a) $\frac{7}{2}$ (b) $\frac{1}{24}$
(c) $\frac{7}{24}$ (d) $\frac{97}{24}$

276. If $x^3+\frac{3}{x}=4$ (a^3+b^3) and $3x+\frac{1}{x^3}=4$ (a^3-b^3), then a^2-b^2 is equal to
यदि $x^3+\frac{3}{x}=4$ (a^3+b^3) और $3x+\frac{1}{x^3}=4$ (a^3-b^3) है, तो a^2-b^2 किसके बराबर है?
(a) 4 (b) 0 (c) 1 (d) 2

277. If $x=6+\frac{1}{x}$, then the value of $x^4+\frac{1}{x^4}+2$ is
यदि $x=6+\frac{1}{x}$ है, तो $x^4+\frac{1}{x^4}+2$ का मान ज्ञात करें।
(a) 1448 (b) 1442
(c) 1444 (d) 1446

278. The graph of $2x+1=0$ and $3y-9=0$ intersect at the point
ग्राफ $2x+1=0$ तथा $3y-9=0$ का प्रतिछेदी बिन्दु होगा?
(a) $\left(-\frac{1}{2},-3\right)$ (b) $\left(-\frac{1}{2},3\right)$
(c) $\left(\frac{1}{2},-3\right)$ (d) None of these

279. If $x^2+9y^2=6xy$, then $x:y$ is
यदि $x^2+9y^2=6xy$ हो, तो $x:y$ होगा
(a) 1:3 (b) 3:2
(c) 3:1 (d) 2:3

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280. The term to be added to $121a^2+64b^2$ to make a perfect square is
$121a^2+64b^2$ में कौन-सा पद जोड़ा जाए कि परिणाम पूर्ण वर्ग हो जाए।
(a) $176\ ab$ (b) $276\ a^2b$
(c) $176\ ab$ (d) $188\ b^2a$

281. If $a=2+\sqrt{3}$, then the value of $\left(a^2+\frac{1}{a^2}\right)$
यदि $a=2+\sqrt{3}$ है, तो $\left(a^2+\frac{1}{a^2}\right)$ का मान ज्ञात करें।
(a) 12 (b) 14 (c) 16 (d) 10

282. For what value(s) of k the expression $p+\frac{1}{4}+\sqrt{p}+k^2$ is perfect square ?
k के किस मान के लिए व्यंजक $p+\frac{1}{4}+\sqrt{p}+k^2$ एक पूर्ण वर्ग होगा?
(a) 0 (b) $\pm\frac{1}{4}$
(c) $\pm\frac{1}{8}$ (d) $\pm\frac{1}{2}$

283. If $\frac{b-c}{a}+\frac{a+c}{b}+\frac{a-b}{c}=1$ and $a-b+c\neq 0$ then which one of the following relations is true?
यदि $\frac{b-c}{a}+\frac{a+c}{b}+\frac{a-b}{c}=1$ और $a-b+c\neq 0$ है, तो निम्न में से कौन सा संबंध सही है?
(a) $\frac{1}{c}=\frac{1}{a}+\frac{1}{b}$ (b) $\frac{1}{a}=\frac{1}{b}+\frac{1}{c}$
(c) $\frac{1}{b}=\frac{1}{a}-\frac{1}{c}$ (d) $\frac{1}{b}=\frac{1}{a}+\frac{1}{c}$

284. The reciprocal of $x+\frac{1}{x}$ is

$x+\frac{1}{x}$ का व्युत्क्रम क्या होगा?

(a) $\frac{x}{x^2+1}$ (b) $\frac{x}{x+1}$

(c) $x-\frac{1}{x}$ (d) $\frac{1}{x}+x$

285. If a, b, c are positive and a+b+c =1, then the least value of $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}$ is

यदि a, b, c धनात्मक है और a+b+c =1 है, तो $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}$ का मान ज्ञात करें।

(a) 9 (b) 5 (c) 3 (d) 1

286. If $a\left(2+\sqrt{3}\right)=b\left(2-\sqrt{3}\right)=1$, then the value of $\frac{1}{a^2+1}+\frac{1}{b^2+1}$

यदि $a\left(2+\sqrt{3}\right)=b\left(2-\sqrt{3}\right)=1$ है, तो $\frac{1}{a^2+1}+\frac{1}{b^2+1}$ का मान ज्ञात करें।

(a) – 1 (b) 1 (c) 4 (d) 9

287. If $\left(2+\sqrt{3}\right)a=\left(2-\sqrt{3}\right)b=1$ then the value of $\frac{1}{a}+\frac{1}{b}$ is

यदि $\left(2+\sqrt{3}\right)a=\left(2-\sqrt{3}\right)b=1$ है, तो $\frac{1}{a}+\frac{1}{b}$ का मान ज्ञात करें।

(a) 1 (b) 2 (c) $2\sqrt{3}$ (d) 4

288. If $a+\frac{1}{b}=b+\frac{1}{c}=c+\frac{1}{a}$ $(a\neq b\neq c)$, then the value of abc is

यदि $a+\frac{1}{b}=b+\frac{1}{c}=c+\frac{1}{a}$ $(a\neq b\neq c)$ है, तो abc का मान क्या है?

(a) ±1 (b) ± 2

(c) 0 (d) $\pm\frac{1}{2}$

289. If $\frac{x}{y}=\frac{4}{5}$, then the value of $\left(\frac{4}{7}+\frac{2y-x}{2y+x}\right)$ is

यदि $\frac{x}{y}=\frac{4}{5}$ है, तो $\left(\frac{4}{7}+\frac{2y-x}{2y+x}\right)$ का मान ज्ञात करें।

(a) $\frac{3}{7}$ (b) $1\frac{1}{7}$

(c) 1 (d) 2

290. If $(x-2)$ is a factor of $x^2+3Qx-2Q$, then the value of Q is

$x^2+3Qx-2Q$ का गुणज $(x-2)$ है, तो Q का मान क्या होगा?

(a) 2 (b) – 2 (c) 1 (d) – 1

291. If $a+b=12$, $ab=22$, then (a^2+b^2) is equal to

यदि $a+b=12$, $ab=22$ है, तो (a^2+b^2) किसके बराबर है?

(a) 188 (b) 144 (c) 34 (d) 100

292. If $x=\sqrt{3}-\frac{1}{\sqrt{3}}$ and $y=\sqrt{3}+\frac{1}{\sqrt{3}}$ then the value of $\frac{x^2}{y}+\frac{y^2}{x}$ is

यदि $x=\sqrt{3}-\frac{1}{\sqrt{3}}$ और $y=\sqrt{3}+\frac{1}{\sqrt{3}}$ है, तो $\frac{x^2}{y}+\frac{y^2}{x}$ का मान क्या होगा?

(a) 5 (b) $3\sqrt{3}$

(c) $1\sqrt{3}$ (d) $2\sqrt{3}$

293. If x^2+ax+b is a perfect square, then which one of the following relations between a and b is true

यदि x^2+ax+b एक पूर्ण वर्ग है, तो a और b के बीच कौन-सा संबंध सही है?

(a) $a^2=b$ (b) $a^2=4b$

(c) $b=4a$ (d) $b^2=a$

294. If यदि a + b + c +d =4, then find the value of $\frac{1}{(1-a)(1-b)(1-c)}+\frac{1}{(1-b)(1-c)(1-d)}+\frac{1}{(1-c)(1-d)(1-a)}+\frac{1}{(1-d)(1-a)(1-b)}$ का मान ज्ञात करें।

(a) 0 (b) 5 (c) 1 (d) 4

295. If $a^{\frac{1}{3}}+b^{\frac{1}{3}}+c^{\frac{1}{3}}=0$, then a relation among a, b, c is

यदि $a^{\frac{1}{3}}+b^{\frac{1}{3}}+c^{\frac{1}{3}}=0$ है, तो निम्न में से a, b, c के बीच कौन-सा संबंध सही है?

(a) a + b + c = 0

(b) $(a+b+c)^3=27abc$

(c) a +b +c = 3abc

(d) $a^3+b^3+c^3=0$

296. If यदि $x-\frac{1}{x}=1$, then the value of $\frac{x^4-\frac{1}{x^2}}{3x^2+5x-3}$ का मान ज्ञात करें।

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$

(c) $\frac{3}{4}$ (d) 0

297. If $x+y=15$, then $(x-10)^3+(y-5)^3$ is

यदि $x+y=15$ है,तो $(x-10)^3+(y-5)^3$ का मान क्या है?

(a) 25 (b) 125

(c) 625 (d) 0

298. If यदि $x^2+\frac{1}{x^2}=66$, then the value of $\frac{x^2-1+2x}{x}=?$

(a) ±8 (b) 10, – 6

(c) 6, – 10 (d) ±4

299. If $a^2+a+1=0$, then the value of a^9 is

यदि $a^2+a+1=0$ है, तो a^9 का मान क्या होगा?

(a) 2 (b) 3 (c) 1 (d) 0

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

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

(a) 1 (b) – 1 (d) 2 (d) – 2

301. If $x=-2k$ and $y=1-3k$, then for what value of k, will be $x=y$?

यदि $x=-2k$ और $y=1-3k$ है, तो k के किस मान के लिए $x=y$ है?

(a) 0 (b) 1 (c) – 1 (d) 2

302. Find the value of

$\sqrt{(x^2+y^2+z)(x+y-3z)} + \sqrt[3]{xy^3z^2}$ when $x = +1$, $y = -3$, $z = -1$,

$\sqrt{(x^2+y^2+z)(x+y-3z)} + \sqrt[3]{xy^3z^2}$ का मान ज्ञात करें जब $x = +1, y = -3, z = -1$ है

(a) 1 (b) 0 (c) – 1 (d) $\frac{1}{2}$

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

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

(a) 20 (b) 4 (c) 8 (d) 16

304. If $x+\frac{1}{x}=5$, then $x^6+\frac{1}{x^6}$ is

यदि $x+\frac{1}{x}=5$ है, तो $x^6+\frac{1}{x^6}$ = ?

(a) 12098 (b) 12048
(c) 14062 (d) 12092

305. If $x^2-3x+1=0$, then the value of $\frac{x^6+x^4+x^2+1}{x^3}$ will be

यदि $x^2-3x+1=0$ है, तो $\frac{x^6+x^4+x^2+1}{x^3}$ का मान क्या होगा?

(a) 18 (b) 15 (c) 21 (d) 30

306. If $\frac{p}{a}+\frac{q}{b}+\frac{r}{c}=1$ & $\frac{a}{p}+\frac{b}{q}+\frac{c}{r}=0$, where p,q,r and a, b, c are non-zero, then the value of $\frac{p^2}{a^2}+\frac{q^2}{b^2}+\frac{r^2}{c^2}$

यदि $\frac{p}{a}+\frac{q}{b}+\frac{r}{c}=1$ और $\frac{a}{p}+\frac{b}{q}+\frac{c}{r}=0$ है, जहाँ p,q,r और a, b, c अशून्य संख्याएँ है, तो $\frac{p^2}{a^2}+\frac{q^2}{b^2}+\frac{r^2}{c^2}$ का मान क्या होगा?

(a) – 1 (b) 0 (c) 1 (d) 2

307. If x is a rational number and $\frac{(x+1)^3-(x-1)^3}{(x+1)^2-(x-1)^2}=2$, then the sum of numerator and denominator of x is:

यदि x एक परिमेय संख्या है और $\frac{(x+1)^3-(x-1)^3}{(x+1)^2-(x-1)^2}=2$ है, तो x के अंश तथा हर का योग ज्ञात करें।

(a) 3 (b) 4 (c) 5 (d) 7

308. If $x=\sqrt{5}+2$, then the value $\frac{2x^2-3x-2}{3x^2-4x-3}$ is equal to

यदि $x=\sqrt{5}+2$ है, तो $\frac{2x^2-3x-2}{3x^2-4x-3}$ का मान ज्ञात करें।

(a) 0.1785 (b) 0.525
(c) 0.625 (d) 0.785

309. If a = 2.234, b= 3.121 and c = – 5.355, then the value of $a^3+b^3+c^3-3abc$ is

यदि a = 2.234, b= 3.121 और c = –5.355 है, तो $a^3+b^3+c^3-3abc$ का मान ज्ञात करें।

(a)– 1 (b) 0 (c) 1 (d) 2

310. If $x^2+y^2+1=2x$, then the value of x^3+y^5 is

यदि $x^2+y^2+1=2x$ है, तो x^3+y^5 का मान ज्ञात करें।

(a) 2 (b) 0 (c) – 1 (d) 1

311. If $3(a^2+b^2+c^2)=(a+b+c)^2$ then the relation between a, b and c is

यदि $3(a^2+b^2+c^2)=(a+b+c)^2$ है, तो a, b और c के बीच का संबंध है?

(a) a = b = c (b) a = b ≠ c
(c) a < b < c (d) a > b > c

312. If $x(x-3)=-1$, then the value of $x^3(x^3-18)$ is

यदि $x(x-3)=-1$ है, तो $x^3(x^3-18)$ का मान ज्ञात करें।

(a) – 1 (b) 2 (c) 1 (d) 0

313. The factors of $(a^2+4b^2+4b-4ab-2a-8)$ are

$(a^2+4b^2+4b-4ab-2a-8)$ के गुणज है?

(a) (a –2b–4) (a –2b+2)
(b) (a –b–2) (a + 2b +2)
(c) (a +2b–4) (a +2b+2)
(d) (a +2b–4) (a –2b+2)

314. The value of

$\frac{1}{a^2+ax+x^2}-\frac{1}{a^2-ax+x^2}+\frac{2ax}{a^4+a^2x^2+x^4}$ is

$\frac{1}{a^2+ax+x^2}-\frac{1}{a^2-ax+x^2}+\frac{2ax}{a^4+a^2x^2+x^4}$ का मान ज्ञात करें।

(a) 2 (b) 1 (c) – 1 (d) 0

315. If $x=11$, then the value of $x^5-12x^4+12x^3-12x^2+12x-1$ is

यदि $x=11$ है, तो $x^5-12x^4+12x^3-12x^2+12x-1$ का मान क्या है?

(a) 5 (b) 10 (c) 15 (d) 20

316. If $p=99$, then the value of $p(p^2+3p+3)$ is

यदि p = 99 है, तो $p(p^2+3p+3)$ का मान ज्ञात करें।

(a) 10000000 (b) 999000
(c) 999999 (d) 990000

317. Which one is not an example of an equality relation of two expressions in x :

निम्न में से कौन-सा संबंध सही नही है :

(a) $(x+3)^2=x^2+6x+9$
(b) $(x+2y)^3=x^3+8y^3+6xy(x+2y)$
(c) $(x+1)^2=x^2+2x+4$
(d) $(x+3)(x-3)=x^2-9$

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

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

(a) 0 (b) 1 (c) 2 (d) 6

319. If $a+\frac{1}{a}=\sqrt{3}$, then the value of $a^{18}+a^{12}+a^6+1$ is

यदि $a+\frac{1}{a}=\sqrt{3}$ है, तो $a^{18}+a^{12}+a^6+1$ का मान क्या होगा?

(a) 0 (b) 1 (c) 2 (d) 6

320. If $x=997$, $y=998$ and $z=999$ then the value of $x^2+y^2+z^2-xy-yz-zx$ is

यदि $x=997$, $y=998$ और $z=999$ है, तो $x^2+y^2+z^2-xy-yz-zx$ का मान ज्ञात करें।

(a) 0 (b) 1 (c) – 1 (d) 3

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

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

(a) $\frac{4}{3}$ (b) $\frac{3}{2}$
(c) $\frac{5}{2}$ (d) $\frac{5}{3}$

322. If $x = 3 + 2\sqrt{2}$,

then $\frac{x^6 + x^4 + x^2 + 1}{x^3}$ is equal to

यदि $x = 3 + 2\sqrt{2}$

है, तो $\frac{x^6 + x^4 + x^2 + 1}{x^3}$ किसके बराबर है?

(a) 216 (b) 192
(c) 198 (d) 204

323. If $x = p + \frac{1}{p}$ and $y = p - \frac{1}{p}$ then the value of $x^4 - 2x^2y^2 + y^4$

यदि $x = p + \frac{1}{p}$ और $y = p - \frac{1}{p}$ है, तो $x^4 - 2x^2y^2 + y^4$ का मान ज्ञात करें।

(a) 24 (b) 4 (c) 16 (d) 8

324. If a +b +c = 0, then the value of $(a+b-c)^2 + (b+c-a)^2 + (c+a-b)^2$ is

यदि a +b +c = 0 है, तो $(a+b-c)^2 + (b+c-a)^2 + (c+a-b)^2$ का मान ज्ञात करें।

(a) 0 (b) 8abc
(c) $4(a^2 + b^2 + c^2)$ (d) $4(ab + bc + ca)$

325. If $p^3 + 3p^2 + 3p = 7$, then the value of $p^2 + 2p$ is

यदि $p^3 + 3p^2 + 3p = 7$ है, तो $p^2 + 2p$ का मान ज्ञात करें।

(a) 4 (b) 3 (c) 5 (d) 6

326. If $x = 2015$, $y = 2014$ and $z = 2013$, then value of $x^2 + y^2 + z^2 - xy - yz - zx$ is

यदि $x = 2015$, $y = 2014$ और $z = 2013$ है, तो $x^2 + y^2 + z^2 - xy - yz - zx$ का मान क्या है?

(a) 3 (b) 4 (c) 6 (d) 2

327. If $3a^2 = b^2 \neq 0$, then the value of $\frac{(a+b)^3 - (a-b)^3}{(a+b)^2 + (a-b)^2}$ is

यदि $3a^2 = b^2 \neq 0$

है, तो $\frac{(a+b)^3 - (a-b)^3}{(a+b)^2 + (a-b)^2}$ का मान क्या है?

(a) $\frac{3b}{2}$ (b) b
(c) $\frac{b}{2}$ (d) $\frac{2b}{3}$

328. If $x > 1$ and $x + \frac{1}{x} = 2\frac{1}{12}$, then the value of $x^4 - \frac{1}{x^4}$ is

यदि $x > 1$ और $x + \frac{1}{x} = 2\frac{1}{12}$ है, तो $x^4 - \frac{1}{x^4}$ का मान ज्ञात करें।

(a) $\frac{58975}{20736}$ (b) $\frac{59825}{20736}$
(c) $\frac{57985}{20736}$ (d) $\frac{57895}{20736}$

329. The value of $\frac{4x^3 - x}{(2x+1)(6x-3)}$ when $x = 9999$ is

$\frac{4x^3 - x}{(2x+1)(6x-3)}$ का मान क्या होगा, जब $x = 9999$ है?

(a) 1111 (b) 2222
(c) 3333 (d) 6666

330. If $a^3 + b^3 = 9$ and $a + b = 3$, then the value of $\frac{1}{a} + \frac{1}{b}$ is

यदि $a^3 + b^3 = 9$ और $a + b = 3$ है, तो $\frac{1}{a} + \frac{1}{b}$ का मान ज्ञात करें।

(a) $\frac{1}{2}$ (b) $\frac{3}{2}$
(c) $\frac{5}{2}$ (d) – 1

331. If $t^2 - 4t + 1 = 0$, then the value of $t^3 + \frac{1}{t^3}$ is:

यदि $t^2 - 4t + 1 = 0$ है, तो $t^3 + \frac{1}{t^3}$ का मान ज्ञात करें।

(a) 44 (b) 48 (c) 52 (d) 64

332. If $\sqrt[3]{a} + \sqrt[3]{b} = \sqrt[3]{c}$, then the simplest value of $(a+b-c)^3 + 27abc$ is

यदि $\sqrt[3]{a} + \sqrt[3]{b} = \sqrt[3]{c}$ है, तो $(a+b-c)^3 + 27abc$ का साधारणीकृत मान क्या होगा

(a) – 1 (b) 3 (c) – 3 (d) 0

333. If 4x+5y =83 and 3x : 2y =21 : 22, then (y –x) equals

यदि 4x+5y =83 और 3x : 2y =21 : 22 है, तो (y –x) किसके बराबर है?

(a) 3 (b) 4 (c) 7 (d) 11

334. If $x = \sqrt[3]{a + \sqrt{a^2 + b^3}} + \sqrt[3]{a - \sqrt{a^2 + b^3}}$, then $x^3 + 3bx$ is equal to

यदि $x = \sqrt[3]{a + \sqrt{a^2 + b^3}} + \sqrt[3]{a - \sqrt{a^2 + b^3}}$

है, तो $x^3 + 3bx$ किसके बराबर है?

(a) 0 (b) a (c) 2a (d) 1

335. If $\frac{x^{24} + 1}{x^{12}} = 7$, then the value of $\frac{x^{72} + 1}{x^{36}}$

यदि $\frac{x^{24} + 1}{x^{12}} = 7$ है, तो $\frac{x^{72} + 1}{x^{36}}$ का मान ज्ञात करें।

(a)343 (b) 433
(c) 432 (d) 322

(SSS CGL 16-08-2015,Morning)

336. If P = 99 then the value of $P(P^2 + 3P + 3)$

यदि P = 99 है, तो $P(P^2 + 3p + 3)$ का मान क्या होगा।

(a) 989898 (b) 998889
(c) 988899 (d) 999999

(SSS CGL 16-08-2015,Morning)

337. If $x = 2$ then the value of $x^3 + 27x^2 + 243x + 631$

यदि $x = 2$ है, तो $x^3 + 27x^2 + 243x + 631$ का मान ज्ञात करें।

(a) 1321 (b) 1233
(c) 1231 (d) 1211

(SSS CGL 16-08-2015,Morning)

338. If $5x + 9y = 5$ and $125x^3 + 729y^3 = 120$, then the value of the product of x and y is

यदि $5x + 9y = 5$ और $125x^3 + 729y^3 = 120$ है, तो x तथा y के गुणनफल का मान क्या होगा।

(a) 45 (b) 1/9 (c) 1/135 (d)135

(SSS CGL 16-08-2015,Morning)

339. If $x^2 + y^2 + z^2 = 2(x + z - 1)$, then the value of; $x^3 + y^3 + z^3 = ?$

यदि $x^2 + y^2 + z^2 = 2(x + z - 1)$ है, तो $x^3 + y^3 + z^3 = ?$

(a) – 1 (b) 2 (c) 0 (d) 1

(SSS CGL 16-08-2015,Evening)

340. If $x+\frac{1}{x}=1$, then the value of $\frac{2}{x^2-x+2}=?$

यदि $x+\frac{1}{x}=1$ है, तो $\frac{2}{x^2-x+2}=?$

(a) 2/3 (b) 2 (c) 1 (d) 4

(SSS CGL 16-08-2015,Evening)

341. If $x=\frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$ and $y=\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$, then the value of $\frac{x^2+xy+y^2}{x^2-xy+y^2}=?$

यदि $x=\frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$ और $y=\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$ है, तो $\frac{x^2+xy+y^2}{x^2-xy+y^2}=?$

(a) $\frac{65}{63}$ (b) $\frac{67}{65}$

(c) $\frac{69}{67}$ (d) $\frac{63}{61}$

(SSS CGL 16-08-2015, Evening)

342. If $4a-\frac{4}{a}+3=0$, then the value of $a^3-\frac{1}{a^3}+3=?$

यदि $4a-\frac{4}{a}+3=0$ है, तो $a^3-\frac{1}{a^3}+3=?$

(a) $\frac{7}{16}$ (b) $\frac{3}{16}$

(c) $\frac{21}{64}$ (d) $\frac{21}{16}$

(SSS CGL 16-08-2015,Evening)

343. Simplified value of

$$\left[\left(1+\frac{1}{10+\frac{1}{10}}\right)\left(1+\frac{1}{10+\frac{1}{10}}\right)-\left(1-\frac{1}{10+\frac{1}{10}}\right)\left(1-\frac{1}{10+\frac{1}{10}}\right)\right]+\left[\left(1+\frac{1}{10+\frac{1}{10}}\right)\left(1-\frac{1}{10+\frac{1}{10}}\right)\right]$$

का सरलीकृत मान होगा?

(a) $\frac{20}{101}$ (b) $\frac{100}{101}$

(c) 2 (d) $\frac{90}{101}$

(SSS CGL 16-08-2015,Evening)

344. If $x = z = 225$ and $y = 226$ then the value of: $x^3 + y^3 + z^3 - 3xyz$

यदि $x = z = 225$ और $y = 226$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान ज्ञात करें।

(a) 765 (b) 676

(c) 674 (d) 576

(SSS CGL 16-08-2015,Evening)

345. If $a + b - c = 14$ then the value of: $2b^2c^2 + 2c^2a^2 + 2a^2b^2 - a^4 - b^4 - c^4$

यदि $a + b - c = 14$ है, तो $2b^2c^2 + 2c^2a^2 + 2a^2b^2 - a^4 - b^4 - c^4$ का मान ज्ञात करें।

(a) 28 (b) 0 (c) 14 (d) 7

(SSS CGL 16-08-2015,Evening)

346. If $x^2+x=5$ then the value of:

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

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

(a) 140 (b) 110

(c) 130 (d) 120

(SSS CGL 16-08-2015,Evening)

347. If $m = -4$, $n = -2$, then the value of $m^3 - 3m^2 + 3m + 3n + 3n^2 + n^3$ is

यदि $m = -4$, $n = -2$ है, तो $m^3 - 3m^2+3m+3n+3n^2+n^3$ का मान क्या होगा?

(a) 124 (b) –124

(c) 126 (d) – 126

(SSS CGL 09-08-2015,Morning)

348. $2x - ky + 7 = 0$ and $6x - 12y + 15 = 0$ has no solution for

$2x - ky + 7 = 0$ और $6x - 12y + 15 = 0$ का कोई हल किसके लिए नहीं है?

(a) $k = -4$ (b) $k = 4$

(c) $k = 1$ (d) $k = -1$

(SSS CGL 09-08-2015,Morning)

349. If $x = 332$, $y = 333$, $z = 335$, then the value of $x^3 + y^3 + z^3 - 3xyz$ is

यदि $x = 332$, $y = 333$ तथा $z = 335$, तब $x^3 + y^3 + z^3 - 3xyz$ का मान ज्ञात करें?

(a) 7000 (b) 8000

(c) 9000 (d) 10000

(SSS CGL 09-08-2015,Morning)

350. If $2+x\sqrt{3}=\frac{1}{2+\sqrt{3}}$, then the simplest value of x is:

$2+x\sqrt{3}=\frac{1}{2+\sqrt{3}}$ है, तो x का मान क्या होगा?

(a) 1 (b) –2 (c) 2 (d) –1

(SSS CGL 09-08-2015, Morning)

351. $\frac{m-a^2}{b^2+c^2}+\frac{m-b^2}{c^2+a^2}+\frac{m-c^2}{a^2+b^2}=3$, then the value of m is:

यदि $\frac{m-a^2}{b^2+c^2}+\frac{m-b^2}{c^2+a^2}+\frac{m-c^2}{a^2+b^2}=3$ है, तो m का मान ज्ञात करें?

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

(c) $a^2 - b^2 - c^2$ (d) $a^2 + b^2 - c^2$

(SSS CGL 09-08-2015,Morning)

352. If $m - 5n = 2$, then the value of $(m^3 - 125n^3 - 30mn)$ is :

यदि $m - 5n = 2$ है, तो $(m^3 - 125n^3 - 30mn)$ का मान क्या होगा?

(a) 6 (b) 7 (c) 8 (d) 9

353. Given that $x^3 + y^3 = 72$ and $xy = 8$ with $x > y$, then the value of $x - y$ is:

$x^3 + y^3 = 72$ और $xy = 8$ दिया गया, जहाँ $x > y$, $x - y$ का मान क्या होगा?

(a) 4 (b) 2 (c) – 2 (d) – 4

(SSS CGL 09-08-2015,Evening)

354. If $x=\sqrt{a\sqrt[3]{b\sqrt{a\sqrt[3]{b}}}}\ldots\infty$, then the value of x is:

यदि $x=\sqrt{a\sqrt[3]{b\sqrt{a\sqrt[3]{b}}}}\ldots\infty$ है, तो x का मान ज्ञात करें।

(a) $\sqrt[5]{ab^3}$ (b) $\sqrt[3]{a^5b}$

(c) $\sqrt[3]{a^3b}$ (d) $\sqrt[5]{a^3b}$

(SSS CGL 09-08-2015, Evening)

355. If $x+\frac{1}{x}=2$, then the value of $x^{12}-\frac{1}{x^{12}}$ is:

यदि $x+\frac{1}{x}=2$ है, तो $x^{12}-\frac{1}{x^{12}}$ का मान ज्ञात करें।

(a) – 4 (b) 4 (c) 2 (d 0

(SSS CGL 09-08-2015,Evening)

356. If $x+\frac{1}{x}=1$, then the value of $\frac{x^2+3x+1}{x^2+7x+1}$ is:

यदि $x+\frac{1}{x}=1$ है, तो $\frac{x^2+3x+1}{x^2+7x+1}$ का मान ज्ञात करें।

(a) 1/2 (b) 3/7

(c) 2 (d) 3

(SSS CGL 09-08-2015,Evening)

357. If $x + (1/x) = 2$, then the value of $x^7 + (1/x^5)$ is:

यदि $x + (1/x) = 2$ है, तो $x^7 + (1/x^5)$ का मान ज्ञात करें।

(a) 2^5 (b) 2^{12}

(c) 2 (d) 2^7

(SSS CPO 21-06-2015 MORNING)

358. The term, that should be added to $(4x^2 + 8x)$ so that resulting expression be a perfect square, is:
$(4x^2 + 8x)$ में क्या जोड़ा जाए कि परिणाम पूर्ण वर्ग हो जाए।
(a) $2x$ (b) 2 (c) 1 (d) 4
(SSS CPO 21-06-2015 MORNING)

359. If $999x + 888y = 1332$ and $888x + 999y = 555$
Then the value of $x + y$ is?
यदि $999x + 888y = 1332$ है और $888x + 999y = 555$ है, तो $x + y$ का मान ज्ञात करें।
(a) 888 (b) 1
(c) 555 (d) 999
(SSS CPO 21-06-2015 MORNING)

360. If $a^2 + b^2 + c^2 = ab + bc + ca$, then the value of $\frac{a+c}{b}$ is
यदि $a^2 + b^2 + c^2 = ab+bc+ca$ है, तो $\frac{a+c}{b}$ का मान क्या होगा ?
(a) 0 (b) 2 (c) 1 (d) 3
(SSS CPO 21-06-2015 EVENING)

361. If $x = \frac{1}{2+\sqrt{3}}$, $y = \frac{1}{2-\sqrt{3}}$, then the value of $8xy(x^2 + y^2)$ is
यदि $x = \frac{1}{2+\sqrt{3}}$, $y = \frac{1}{2-\sqrt{3}}$ है, तो $8xy(x^2+y^2)$ का मान क्या होगा ?
(a) 112 (b) 194
(c) 290 (d) 196
(sss cpo 21-06-2015 Evening)

362. If $a = \frac{\sqrt{x+2}+\sqrt{x-2}}{\sqrt{x+2}-\sqrt{x-2}}$, then the value of $a^2 - ax$ is
यदि $a = \frac{\sqrt{x+2}+\sqrt{x-2}}{\sqrt{x+2}-\sqrt{x-2}}$ है, तो $a^2 - ax$ का मान क्या होगा ?
(a) 2 (b) 1 (c) 0 (d) – 1
(SSS CPO 21-06-2015 EVENING) MAINS 2015

363. If $a + b = 1$, find the value of $a^3 + b^3 - ab - (a^2 - b^2)^2$
यदि $a + b = 1$, तो $a^3 + b^3 - ab - (a^2 - b^2)^2$ मान ज्ञात कीजिए।
(a)0 (b)1 (c) – 1 (d)2
(CGL mains 25-10-2015)

364. If $a - \frac{1}{a-3} = 5$, then the value of $(a-3)^3 - \frac{1}{(a-3)^3}$
यदि $a - \frac{1}{a-3} = 5$ तो $(a-3)^3 - \frac{1}{(a-3)^3}$ का मान क्या होगा?
(a) 7 (b) 14 (c) 2 (d) 5
(CGL mains 25-10-2015)

365. $(3x-2y) : (2x+3y) = 5 : 6$, then one of the value of $\left(\frac{\sqrt[3]{x}+\sqrt[3]{y}}{\sqrt[3]{x}-\sqrt[3]{y}}\right)^2$ is
यदि $(3x-2y) : (2x+3y) = 5 : 6$ तो $\left(\frac{\sqrt[3]{x}+\sqrt[3]{y}}{\sqrt[3]{x}-\sqrt[3]{y}}\right)^2$ का एक मान क्या होगा?
(a) $\frac{1}{25}$ (b) 5
(c) $\frac{1}{5}$ (d) 25
(CGL mains 25-10-2015)

366. If $x-\sqrt{3}-\sqrt{2}=0$ and $y-\sqrt{3}+\sqrt{2}=0$, then value of $\left(x^3-20\sqrt{2}\right) - \left(y^3+2\sqrt{2}\right)$
यदि $x-\sqrt{3}-\sqrt{2}=0$ और $y-\sqrt{3}+\sqrt{2}=0$ है, तो $\left(x^3-20\sqrt{2}\right) - \left(y^3+2\sqrt{2}\right)$ का मान क्या होगा?
(a) 2 (b) 3 (c) 1 (d) 0
(CGL mains 25-10-2015)

367. $3(a^2+b^2+c^2) = (a+b+c)^2$, then the relation between a, b and c is
यदि $3(a^2+b^2+c^2) = (a+b+c)^2$ है, तो a, b और c के बीच क्या संबंध है?
(a) $a = b \neq c$ (b) $a \neq b \neq c$
(c) $a \neq b = c$ (d) $a = b = c$
(CGL mains 25-10-2015)

368. $x = a^{\frac{1}{2}} + a^{-\frac{1}{2}}$, $y = a^{\frac{1}{2}} - a^{-\frac{1}{2}}$, then value of $(x^4 - x^2y^2 - 1) + (y^4 - x^2y^2 + 1)$
यदि $x = a^{\frac{1}{2}} + a^{-\frac{1}{2}}$, $y = a^{\frac{1}{2}} - a^{-\frac{1}{2}}$ है, तो $(x^4 - x^2y^2 - 1) + (y^4 - x^2y^2 + 1)$ का मान है
(a) 13 (b) 12 (c) 14 (d) 16
(CGL mains 25-10-2015)

369. If $m = \sqrt{5+\sqrt{5+\sqrt{5+\ldots\ldots}}}$
$n = \sqrt{5-\sqrt{5-\sqrt{5-\ldots\ldots}}}$
then among the following the relation between m & n holds is
यदि $m = \sqrt{5+\sqrt{5+\sqrt{5\ldots\ldots}}}$ और $n = \sqrt{5-\sqrt{5-\sqrt{5-\ldots\ldots}}}$
हो तो m और n होल्ड के बीच निम्नलिखित में से क्या संबंध है?
(a) m–n+1=0 (b) m+n+1=0
(c) m+n–1=0 (d) m–n–1=0
(CGL mains 25-10-2014)

370. If $\frac{3-5x}{2x} + \frac{3-5y}{2y} + \frac{3-5z}{2z} = 0$, then the value of $\frac{2}{x} + \frac{2}{y} + \frac{2}{x}$ is
यदि $\frac{3-5x}{2x} + \frac{3-5y}{2y} + \frac{3-5z}{2z} = 0$, तो $\frac{2}{x} + \frac{2}{y} + \frac{2}{x}$ का मान क्या है?
(a) 20 (b) 10 (c) 5 (d) 15
(CGL mains 25-10-2014)

371. If $2s = a + b + c$, then the value of $s(s - c) + (s - a)(s - b)$ is
यदि $2s = a + b + c$, तो $s(s - c) + (s - a)(s - b)$ का मान क्या है?
(a) ab (b) 0
(c) abc (d) $\frac{a+b+c}{2}$
(CGL mains 25-10-2014)

372. If $p + m = 6$ and $p^3 + m^3 = 72$, then the value of pm is
यदि $p + m = 6$ और $p^3 + m^3 = 72$, तो pm का मान क्या है?
(a) 6 (b) 9 (c) 12 (d) 8
(CGL mains 25-10-2014)

373. When x^m is multiplied by x^n, product is 1. The relation between m and n is
यदि x^m को x^n से गुणा किया जाए तो गुणनफल 1 आता है। m और n के बीच क्या संबंध है?
(a) mn = 1 (b) m + n = 1
(c) m = n (d) m = – n
(CGL mains 25-10-2014)

374. The area (in sq. unit) of the triangle formed by the graphs of the equations $x = 4$, $y = 3$ and $3x + 4y = 12$; is
समीकरण $x = 4$, $y = 3$ और $3x + 4y = 12$ के ग्राफ से बने त्रिभुज का क्षेत्रफल (वर्ग यूनिट में) क्या होगा?
(a) 24 (b) 6 (c) 12 (d) 3
(CGL mains 25-10-2014)

375. If $\frac{2p}{P^2-2P+1}=\frac{1}{4}$, then the value of $\left(p+\frac{1}{p}\right)$ is
यदि $\frac{2p}{P^2-2P+1}=\frac{1}{4}$, है तो $\left(p+\frac{1}{p}\right)$ का मान क्या है?
(a) 7 (b) 1
(c) $\frac{2}{5}$ (d) 10
(CGL mains 25-10-2014)

376. If the coordinate and abscissa of the point $(K^r, 2K-1)$ be equal, then the value of K is
यदि बिंदु $(K^r, 2K-1)$ का कोटिमान और भुजमान बराबर हैं, तो K का मान क्या है?
(a) 0 (b) 1
(c) – 1 (d) $\frac{1}{2}$

377. If $x = 5$, then the value of the expression $x^2-2+\frac{1}{x^2}$ is
यदि $x = 5$ है, तो व्यंजक $x^2-2+\frac{1}{x^2}$ का मान है?
(a) $\frac{576}{25}$ (b) $\frac{24}{25}$
(c) $\frac{24}{5}$ (d) $\frac{625}{24}$
(LDC 01-11-2015 MORNING)

378. If $x = 2$, $y = 1$ and $z = -3$, then $x^3 + y^3 + z^3 - 3xyz$ is equal to
यदि $x = 2$, $y = 1$ और $z = -3$ है, तो $x^3 + y^3 + z^3 - 3xyz$ किसके बराबर है?
(a) 6 (b) 0 (c) 2 (d) 8
(LDC 01-11-2015 MORNING)

379. If $a+\frac{1}{a}=-1$, then the value of $(1-a+a^2)(1+a-a^2)$ is
यदि $a+\frac{1}{a}=-1$ है, तो $(1-a+a^2)(1+a-a^2)$ का मान है?
(a) 1 (b) 0 (c) – 4 (d) 4
(LDC 01-11-2015 MORNING)

380. $(x^3+y^6)(x^3-y^6)$ is equal to
$(x^3+y^6)(x^3-y^6)$ किसके बराबर है?
(a) $x^6 - y^{12}$ (b) $x^9 - y^{16}$
(c) $x^6 + y^{12}$ (d) $x^9 + y^{36}$
(LDC 01-11-2015 MORNING)

381. The sum of $\frac{1}{x+y}$ and $\frac{1}{x-y}$ is
$\frac{1}{x+y}$ और $\frac{1}{x-y}$ का योग है
(a) $\frac{2y}{x^2-y^2}$ (b) $\frac{2x}{x^2-y^2}$
(c) $\frac{-2y}{x^2-y^2}$ (d) $\frac{2x}{y^2-x^2}$
(LDC 01-11-2015 MORNING)

382. If $x + y = 2a$, then the value of $\frac{a}{x-a}+\frac{a}{y-a}$ is
$x + y = 2a$ है $\frac{a}{x-a}+\frac{a}{y-a}$ का मान है
(a) 0 (b) – 1 (c) 1 (d) 2
(LDC 01-11-2015 EVENING)

383. For real a, b, c if $a^2 + b^2 + c^2 = ab + bc + ca$, the value of $\frac{a+c}{b}$ is :
वास्तविक a, b, c के लिए यदि $a^2 + b^2 + c^2 = ab + bc + ca$ है तो $\frac{a+c}{b}$ का मान है
(a) 2 (b) 1 (c) 0 (d) 3
(LDC 01-11-2015 EVENING)

384. If $p^3 - q^3 = (p - q)\{(p - q)^2 - xpq\}$, then find the value of x is:
यदि $p^3 - q^3 = (p - q)\{(p - q)^2 - xpq\}$ है तो x का मान है
(a) – 1 (b) 3 (c) 1 (d) – 3
(LDC 01-11-2015 EVENING)

385. If $x + y + z = 6$ and $xy + yz + zx = 10$, then the value of $x^3 + y^3 + z^3 - 3xyz$ is:
यदि $x + y + z = 6$ और $xy + yz + zx = 10$ तो $x^3 + y^3 + z^3 - 3xyz$ का मान क्या होगा?
(a) 36 (b) 40 (c) 42 (d) 48
(LDC 15-11-2015 MORNING)

386. If $\frac{x+1}{x-1}=\frac{a}{b}$ and $\frac{1-y}{1+y}=\frac{b}{a}$, then the value of $\frac{x-y}{1+xy}$ is:
यदि $\frac{x+1}{x-1}=\frac{a}{b}$ और $\frac{1-y}{1+y}=\frac{b}{a}$, तो $\frac{x-y}{1+xy}$ का मान क्या होगा?
(a) $\frac{a^2-b^2}{ab}$ (b) $\frac{a^2+b^2}{2ab}$
(c) $\frac{a^2-b^2}{2ab}$ (d) $\frac{2ab}{a^2-b^2}$
(LDC 15-11-2015 MORNING)

387. If $a^2 + a + 1 = 0$, then the value of $a^5 + a^4 + 1$ is:
यदि $a^2 + a + 1 = 0$, तो $a^5 + a^4 + 1$ का मान क्या होगा?
(a) 1 (b) 0 (c) a + 1 (d) a^2
(LDC 15-11-2015 MORNING)

388. If $a^2 + b^2 + c^2 - ab - bc - ca = 0$ then a : b : c is:
यदि $a^2 + b^2 + c^2 - ab - bc - ca = 0$ तो a : b : c क्या होगा?
(a) 1 : 2 : 1 (b) 2 : 1 : 1
(c) 1 : 1 : 2 (d) 1 : 1 : 1
(LDC 15-11-2015 MORNING)

389. If/यदि $x-\frac{1}{x}=2$, then the value of the following is :- तो निम्नलिखित का मान क्या होगा- $x^3-\frac{1}{x^3}=?$
(a) 2 (b) 11 (c) 15 (d) 14
(LDC 15-11-2015 MORNING)

390. If $x = a(b - c)$, $y = b(c - a)$, $z = c(a - b)$ then the value of $\left(\frac{x}{a}\right)^3+\left(\frac{y}{b}\right)^3+\left(\frac{z}{c}\right)^3$ is:
यदि $x = a(b - c)$, $y = b(c - a)$, $z = c(a - b)$ हैं, तो $\left(\frac{x}{a}\right)^3+\left(\frac{y}{b}\right)^3+\left(\frac{z}{c}\right)^3$ का मान है:
(a) $\frac{xyz}{abc}$ (b) 0
(c) $\frac{3xyz}{abc}$ (d) $\frac{2xyz}{abc}$
(LDC 15-11-2015 EVENING)

391. If $\sqrt{y}=4x$, then $\frac{x^2}{y}$ is:

यदि $\sqrt{y}=4x$, है, तो $\frac{x^2}{y}$ है:

(a) $\frac{1}{16}$ (b) $\frac{1}{4}$

(c) 4 (d) 2

(LDC 15-11-2015 EVENING)

392. If यदि $\frac{x}{y}=\frac{a+2}{a-2}$, then the value of $\frac{x^2-y^2}{x^2+y^2}$ का मान है:

(a) $\frac{2a}{a^2+2}$ (b) $\frac{4a}{a^2+4}$

(c) $\frac{2a}{a^2+4}$ (d) $\frac{4a}{a^2+2}$

(LDC 15-11-2015 EVENING)

393. If $x = y = z$, then $\frac{(x+y+z)^2}{x^2+y^2+z^2}$ is:

यदि $x = y = z$ हैं, तो $\frac{(x+y+z)^2}{x^2+y^2+z^2}$ है:

(a) 2 (b) 3

(c) 1 (d) 4

(LDC 15-11-2015 EVENING)

394 If $\frac{a}{b}+\frac{b}{a}=2$, then the value of a – b is:

यदि $\frac{a}{b}+\frac{b}{a}=2$ है, तो a – b का मान है:

(a) 2 (b) –1

(c) 0 (d) 1

(LDC 15-11-2015 EVENING)

395. If x(x+y+z)=20, y(x+y+z)=30, & z(x+y+z)=50, then the value of 2(x+y+z) is:

यदि x(x+y+z)=20, y(x+y+z)=30, और z(x+y+z)=50, तो 2(x+y+z) का मान क्या होगा?

(a) 20 (b) 10

(c) 15 (d) 18

(LDC 6-12-2015 MORNING)

396. If $a^2+b^2+c^2=2(a-b-c)-3$, then the value of a+b+c is:

यदि $a^2+b^2+c^2=2(a-b-c)-3$, तो a+b+c का मान क्या होगा?

(a) –2 (b) 1 (c) 2 (d) –1

(LDC 6-12-2015 MORNING)

397. If x+y=4, $x^2+y^2=14$ and x > y. Then the correct value of x and y is:

यदि x+y=4, $x^2+y^2=14$ और x > y, तो x और y का सही मान क्या होगा?

(a) $2-\sqrt{2}, \sqrt{3}$

(b) 3, 1

(c) $2+\sqrt{3}, 2-\sqrt{3}$

(d) $2+\sqrt{3}, 2\sqrt{2}$

(LDC 6-12-2015 MORNING)

398. If for non-zero x, $x^2 - 4x - 1 = 0$ the value of is $x^2+\frac{1}{x^2}$:

यदि x शून्येतर के लिए, $x^2 - 4x - 1 = 0$, तो $x^2+\frac{1}{x^2}$ = ?

(a) 4 (b) 10 (c) 12 (d) 18

(LDC 6-12-2015 EVENING)

399. The simplified value of following is:

(निम्नलिखित का सरलीकृत मान क्या है?)

$$\left(\frac{3}{15}a^5 b^6 c^3 \times \frac{5}{9}a b^5 b^4\right) \div \frac{10}{17}a^2 b c^3$$

(a) $\frac{3}{10}a b^8 c^8$ (b) $\frac{9}{10}a^2 b c^4$

(c) $\frac{3}{10}a^4 b^{10} c^4$ (d) $\frac{1}{10}a^4 b^4 c^{10}$

(LDC 6-12-2015 EVENING)

400. If $a=\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ and $b=\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$, then $\frac{a^2}{b}+\frac{b^2}{a}$ value of :

यदि $a=\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ और $b=\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$, तो $\frac{a^2}{b}+\frac{b^2}{a}$ का मान क्या होगा?

(a) 1030 (b) 970

(c) 1025 (d) 930

(LDC 6-12-2015 EVENING)

401. If $a+\frac{1}{b}=1$ and $b+\frac{1}{c}=1$, then $c+\frac{1}{a}$ is equal to:

यदि $a+\frac{1}{b}=1$ और $b+\frac{1}{c}=1$, तो $c+\frac{1}{a}$ किसके बराबर होगा?

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

(c) 2 (d) 0

(LDC 6-12-2015 EVENING)

402. If $(2a - 1)^2 + (4b - 3)^2 + (4c + 5)^2 = 0$ then the value of $\frac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2}$ is:

यदि $(2a - 1)^2 + (4b - 3)^2 + (4c + 5)^2 = 0$ तो $\frac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2}$ का मान क्या होगा?

(a) $3\frac{3}{8}$ (b) $2\frac{3}{8}$

(c) 0 (d) $1\frac{3}{8}$

(LDC 6-12-2015 EVENING)

403. If $\frac{a}{b}=\frac{25}{6}$, then the value of $\frac{a^2-b^2}{a^2+b^2}$ is

यदि $\frac{a}{b}=\frac{25}{6}$ तो $\frac{a^2-b^2}{a^2+b^2}$ का मान बताइए।

(a) $\frac{589}{651}$ (b) $\frac{589}{661}$

(c) $\frac{661}{589}$ (d) $\frac{625}{36}$

(LDC 20-12-2015 MORNING)

404. If (2, 0) is a solution of the linear equation 2x + 3y = K, then the value of K is

यदि रैखिक समीकरण 2x + 3y = K का हल (2, 0) है, तो K का मान बताइए।

(a) 4 (b) 6

(c) 5 (d) 2

(LDC 20-12-2015 MORNING)

405. If $x+\frac{1}{x}=3$ then the value of $x^5+\frac{1}{x^5}$ is

यदि $x+\frac{1}{x}=3$ तो $x^5+\frac{1}{x^5}$ का मान बताइए-

(a) 123 (b) 110
(c) 132 (d) 122

(LDC 20-12-2015 MORNING)

406. The graph of linear equation $y = x$ passes throughout the point
रैखिक समीकरण $y = x$ का लेखाचित्र (ग्राफ) किस बिन्दु से गुजरता है?

(a) $\left(\frac{3}{2},-\frac{3}{2}\right)$ (b) $\left(0,-\frac{3}{2}\right)$
(c) (1, 1) (d) $\left(-\frac{1}{2},\frac{1}{2}\right)$

(LDC 20-12-2015 MORNING)

407. If यदि $\left(a+\frac{1}{a}\right)^2=3$, then find the value of $a^{30}+a^{24}+a^{18}+a^{12}+a^6+1$ का मान ज्ञात कीजिए।

(a) 0 (b) 27
(c) 1 (d) –1

(LDC 20-12-2015 EVENING)

408. If $\frac{1}{a+b}=\frac{1}{a}+\frac{1}{b}$, then the value of a^3-b^3 is:

यदि $\frac{1}{a+b}=\frac{1}{a}+\frac{1}{b}$, तो a^3-b^3 का मान क्या होगा?

(a) 3 (b) 2 (c) 1 (d) 0

(LDC 20-12-2015 EVENING)

409. If $x:y=3:5$ and $x-y=-2$, then the value of $x+y$ is:
यदि $x:y=3:5$ और $x-y=-2$, तो $x+y$ का मान क्या होगा?

(a) 8 (b) 2 (c) 3 (d) 5

(LDC 20-12-2015 EVENING)

410. If $x+1=\sqrt{y}+3$, $y>0$, then the value of $\frac{1}{2}\left(\frac{x^3-6x^2+12x-8}{\sqrt{y}}-y\right)$ is.

यदि $x+1=\sqrt{y}+3$, $y>0$, तो $\frac{1}{2}\left(\frac{x^3-6x^2+12x-8}{\sqrt{y}}-y\right)$ का मान क्या होगा?

(a) $\frac{1}{2}$ (b) –1
(c) 1 (d) 0

(SSC CPO 20-03-2016, Morning)

411. If $x=1+\sqrt{2}+\sqrt{3}$ and $y=1+\sqrt{2}-\sqrt{3}$, then the value of $\frac{x^2+4xy+y^2}{x+y}$ is

यदि $x=1+\sqrt{2}+\sqrt{3}$ और $y=1+\sqrt{2}-\sqrt{3}$, तो $\frac{x^2+4xy+y^2}{x+y}$ का मान क्या होगा?

(a) $2\sqrt{2}$ (b) $2(2+\sqrt{2})$
(c) 1 (d) 6

(SSC CPO 20-03-2016, Morning)

412. If $x+\frac{1}{x}=3$, where $x\neq 0$, then the value of $\frac{x^4+3x^3+5x^2+3x+1}{x^4+1}$

यदि $x+\frac{1}{x}=3$, यहाँ $x\neq 0$ है, तो $\frac{x^4+3x^3+5x^2+3x+1}{x^4+1}$ का मान क्या होगा?

(a) 3 (b) 5
(c) 7 (d) 2

(SSC CPO 20-03-2016, Morning)

413. If $x+\frac{1}{x}=-2$, then the value of x^p+x^q is
(where p is an even number and q is an odd number)

यदि $x+\frac{1}{x}=-2$ है, तो x^p+x^q का मान क्या होगा?
(यहाँ P समसंख्या और q विषम संख्या है)

(a) – 2 (b) 1
(c) 0 (d) 2

(SSC CPO 20-03-2016, Evening)

414. If $P(x+y)^2=5$ and $q(x-y)^2=3$ then the simplified value of $p^2(x+y)^2+4pq\,xy-q^2(x-y)^2$ is:
यदि $P(x+y)^2=5$ और $q(x-y)^2=3$ तो $p^2(x+y)^2+4pq\,xy-q^2(x-y)^2$ का सरलीकृत मान क्या होगा?

(a) 2 (p +q) (b) – (p + q)
(c) – 2(p +q) (d) p + q

(SSC CPO 20-03-2016, Evening)

415. If p,q, r are all real numbers, then $(p-q)^3+(q-r)^3+(r-p)^3$ is equal to
यदि p, q, r सभी वास्तविक संख्याएँ है, तो $(p-q)^3+(q-r)^3+(r-p)^3$ किसके बराबर होगा?

(a) $3(p-q)(q-r)(r-P)$
(b) 1
(c) 0
(d) $(p-q)(q-r)(r-p)$

(SSC CPO 20-03-2016, Morning)

416. If $a+\frac{1}{a}=\sqrt{3}$ then the value of $a^{52}+\frac{1}{a^{52}}$

यदि $a+\frac{1}{a}=\sqrt{3}$ है तो $a^{52}+\frac{1}{a^{52}}$ का मान क्या होगा?

(a) –1 (b) 0
(c) 1 (d) 2

(SSC CPO(Re) 04-06-2016, Morning)

417. If σ and β are the roots of equation $x^2+\sigma x+\beta=0$ then find $\sigma^3+\beta^3$

यदि σ और β समीकरण $x^2+\sigma x+\beta=0$ के मूल हैं तो $\sigma^3+\beta^3$ का मान ज्ञात करें।

(a) –7 (b) 8
(c) –8 (d) 7

(SSC CPO(Re) 04-06-2016, Morning)

418. If $x^2+\frac{1}{x^2}=1$ then the value of $x^{102}+x^{96}+x^{90}+x^{84}+x^{78}+x^{72}+5$ is

यदि $x^2+\frac{1}{x^2}=1$ है तो $x^{102}+x^{96}+x^{90}+x^{84}+x^{78}+x^{72}+5$ का मान क्या होगा?

(a) 0 (b) 5
(c) 3 (d) 1

(SSC CPO(Re) 04-06-2016, Morning)

419. Find the value of a and b if $(x-1)$ and $(x+1)$ are factors of $x^4+ax^3-3x^2+2x+b$
a और b का मान ज्ञात करें यदि $(x-1)$ और $(x+1)$ $x^4+ax^3-3x^2+2x+b$ के गुणनखंड हैं।

(a) 2, –1 (b) –2, 1
(c) –2, 2 (d) 1, –1

(SSC CPO(Re) 04-06-2016, Morning)

420. Find the minimum value of x which the expression
$x^3 - 7x^2 + 11x - 5 \geq 0$.
x का न्यूनतम मान ज्ञात करें जो समीकरण $x^3 - 7x^2 + 11x - 5 \geq 0$ को संतुष्ट करें।
(a) 0 (b) 5
(c) 1 (d) –3
(SSC CPO(Re) 04-06-2016, Evening)

421. If a + b + c = 26 and ab + bc + ca = 109, find the value of $a^2 + b^2 + c^2$
यदि a + b + c = 26 और ab + bc + ca = 109, तो of $a^2 + b^2 + c^2$ का मान ज्ञात करें?
(a) 458 (b) 472
(c) 452 (d) 476
(SSC CPO(Re) 04-06-2016, Evening)

422. If $x^2 + \frac{1}{x^2} = 1$, then the value of $x^{18} + x^{12} + x^6 + 1$ is:
यदि $x^2 + \frac{1}{x^2} = 1$, तो $x^{18} + x^{12} + x^6 + 1$ का मान कितना होगा?
(a) 1 (b) 2
(c) 0 (d) –1
(SSC CPO(Re) 04-06-2016, Evening)

423. a + b + c = 0 then the value of $\frac{a^2+b^2+c^2}{ab+bc+ca}$ is
यदि a + b + c = 0 तो $\frac{a^2+b^2+c^2}{ab+bc+ca}$ का मान कितना होगा?
(a) 2 (b) – 2
(c) 0 (c) 4
(SSC CPO(Re) 05-06-2016, Morning)

424. If a + b + c = m and $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$ then average of a^2, b^2, c^2 is
यदि a + b + c = m और $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$ तो a^2, b^2, c^2 का औसत कितना है?
(a) m^2 (b) $m^2/3$
(c) $m^2/9$ (d) $m^2/27$
(SSC CPO(Re) 05-06-2016, Morning)

425. The value of $(2a + b)^2 - (2a - b)^2$ is:
$(2a + b)^2 - (2a - b)^2$ का मान कितना है?
(a) 8ab (b) – 8ab
(c) $8a^2 + 2b^2$ (d) $8a^2 - 2b^2$
(SSC CPO(Re) 05-06-2016, Morning)

426. If $x = \frac{8ab}{a+b}(a \neq b)$ then the value of $\frac{x+4a}{x-4a} + \frac{x+4b}{x-4b}$ is:
यदि $x = \frac{8ab}{a+b}(a \neq b)$ तो $\frac{x+4a}{x-4a} + \frac{x+4b}{x-4b}$ का मान कितना है?
(a) 0 (b) 1
(c) 2 (d) 4
(SSC CPO(Re) 05-06-2016, Evening)

427. If $\left(\sqrt{a}+\sqrt{b}\right) = 15$ and $\left(\sqrt{a}-\sqrt{b}\right) = 3$ then the value of $\sqrt{ab}/4$ is
यदि $\left(\sqrt{a}+\sqrt{b}\right) = 15$ और $\left(\sqrt{a}-\sqrt{b}\right) = 3$ तो $\sqrt{ab}/4$ का मान कितना हैं? यदि
(a) 6 (b) 7
(c) 27/2 (d) 5
(SSC CPO(Re) 05-06-2016, Evening)

428. If $a + \frac{1}{a} = 3$ then the value of $a^3 + \frac{1}{a^3}$ is
यदि $a + \frac{1}{a} = 3$ तो $a^3 + \frac{1}{a^3}$ का मान है-
(a) 27 (b) 24
(c) 19 (d) 18
(SSC CPO(Re) 05-06-2016, Evening)

429. If a – 6b = 3 then the value of $a^3 - 216b^3 - 54ab$ is
यदि a – 6b = 3 है, तो $a^3 - 216b^3 - 54ab$ का मान होगा?
(a) 9 (b) 1
(c) 27 (d) 64
(SSC CPO(Re) 06-06-2016, Morning)

430. If $x = (10 + 3\sqrt{11})$, What is the value of $\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)$?
यदि $x = (10 + 3\sqrt{11})$, तो $\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)$ का मान क्या होगा?
(a) $2\sqrt{3}$ (b) $\sqrt{22}$
(c) 18 (d) $3\sqrt{2}$
(SSC CPO(Re) 06-06-2016, Morning)

431. If $x = \sqrt{a\sqrt[3]{ab}\sqrt{a\sqrt[3]{ab}}}$ .....∞, then the value of x is:
यदि $x = \sqrt{a\sqrt[3]{ab}\sqrt{a\sqrt[3]{ab}}}$ .....∞, है तो x का मान होगा?
(a) $\sqrt[5]{a^2b}$ (b) $\sqrt[5]{a^4b^4}$
(c) $\sqrt[6]{a^5b}$ (d) $\sqrt[5]{a^4b}$
(SSC CPO(Re) 06-06-2016, Morning)

432. If $\frac{m-3a^3}{b^3+c^3} + \frac{m-3b^3}{c^3+a^3} + \frac{m-3c^3}{a^3+b^3} = 9$, then the value of m is:
यदि $\frac{m-3a^3}{b^3+c^3} + \frac{m-3b^3}{c^3+a^3} + \frac{m-3c^3}{a^3+b^3} = 9$, तो m का मान कितना है?
(a) $a^3 + b^3 + c^3$
(b) $2a^3 + 2b^3 + 2c^3$
(c) $3a^3 + 3b^3 + 3c^3$
(d) 2
(SSC CPO(Re) 06-06-2016, Evening)

433. If the polynomial $ax^3 + 4x^2 + 3x - 4$ and $x^3 - 4x + a$ leave the same remainder when divided by $(x - 3)$, Find the value of a.
यदि बहुपद $ax^3 + 4x^2 + 3x - 4$ एवं $x^3 - 4x + a$ को $(x - 3)$ से भाग करने पर शेषफल समान प्राप्त होता है। a का मान ज्ञात कीजिए
(a) 1 (b) –1
(c) 2 (d) –2
(SSC CPO(Re) 06-06-2016, Evening)

434. If $(2a - 3)^2 + (3b + 4)^2 + (6c + 1)^2 = 0$, then the value of $\frac{a^3+b^3+c^3-3abc}{a^3+b^3+c^3} + 3$ is:

यदि $(2a-3)^2+(3b+4)^2+(6c+1)^2 = 0$, तो $\frac{a^3+b^3+c^3-3abc}{a^3+b^3+c^3}+3$ का मान है:

(a) abc + 3 (b) 6
(c) 0 (d) 3

(SSC CPO(Re) 06-06-2016, Evening)

435. If $a^2 = b + c$, $b^2 = a + c$, $c^2 = b + a$, then what will be the value of $\frac{1}{a+1}+\frac{1}{b+1}+\frac{1}{c+1}$?

यदि $a^2 = b + c$, $b^2 = a + c$, $c^2 = b + a$ है, तो $\frac{1}{a+1}+\frac{1}{b+1}+\frac{1}{c+1}$ का मान क्या होगा?

(SSC CPO(Re) 07-06-2016, Morning)

(a) −1 (b) 2
(c) 1 (d) 0

436. If a + b = 2c, find $\frac{a}{a-c}+\frac{c}{b-c}$

यदि a + b = 2c है, तो $\frac{a}{a-c}+\frac{c}{b-c}$ का मान ज्ञात करें?

(a) 0 (b) 1
(c) 2 (d) −1

(SSC CPO(Re) 07-06-2016, Morning)

437. What will be the value of $x^3 + y^3 + z^3 - 3xyz$ when $x + y + z = 9$ and $x^2 + y^2 + z^2 = 31$?

यदि $x + y + z = 9$ एवं $x^2 + y^2 + z^2 = 31$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान क्या होगा?

(a) 27 (b) 3
(c) 54 (d) 9

(SSC CPO(Re) 07-06-2016, Morning)

438. If a + b + c = 1, ab + bc + ca = −1 and abc = −1, then the value of $a^3 + b^3 + c^3$ is:

यदि a + b + c = 1, ab + bc + ca = −1 और abc = −1 तो $a^3 + b^3 + c^3$ का मान होगा:

(a) 1 (b) −1
(c) 2 (d) −2

(SSC CPO(Re) 08-06-2016, Morning)

439. If $\frac{a}{b} = \frac{1}{2}$, find the value of the expression $\frac{(2a-5b)}{(5a+3b)}$

यदि $\frac{a}{b} = \frac{1}{2}$, तो समीकरण $\frac{(2a-5b)}{(5a+3b)}$ का मान ज्ञात करें।

(a) −32 (b) 11
(c) $\frac{-8}{11}$ (d) 17

(SSC CPO(Re) 08-06-2016, Evening)

440. If for a non-zero x, $3x^2 + 5x + 3 = 0$, then the value of $x^3 + \frac{1}{x^3}$ is:

यदि किसी अशून्य x हेतु $3x^2 + 5x + 3 = 0$, है तो $x^3 + \frac{1}{x^3}$ का मान होगा:

(a) $\frac{10}{27}$ (b) $-\left(\frac{10}{27}\right)$
(c) $\frac{2}{3}$ (d) $-\left(\frac{2}{3}\right)$

(SSC CPO(Re) 08-06-2016, Evening)

ANSWER KEY

1. (a)	29. (a)	57. (c)	85. (d)	113. (d)	141. (c)	169. (d)	197. (c)	225. (d)	254. (d)
2. (c)	30. (a)	58. (c)	86. (c)	114. (a)	142. (c)	170. (a)	198. (d)	226. (b)	255. (a)
3. (b)	31. (d)	59. (a)	87. (b)	115. (a)	143. (d)	171. (d)	199. (d)	227. (a)	256. (c)
4. (d)	32. (b)	60. (d)	88. (a)	116. (b)	144. (b)	172. (a)	200. (d)	228. (c)	257. (b)
5. (d)	33. (c)	61. (c)	89. (c)	117. (c)	145. (a)	173. (b)	201. (a)	229. (d)	258. (a)
6. (a)	34. (c)	62. (a)	90. (a)	118. (a)	146. (c)	174. (a)	202. (c)	230. (c)	259. (b)
7. (c)	35. (a)	63. (c)	91. (c)	119. (b)	147. (c)	175. (a)	203. (a)	231. (d)	260. (a)
8. (c)	36. (b)	64. (b)	92. (a)	120. (c)	148. (d)	176. (b)	204. (d)	232. (a)	261. (d)
9. (b)	37. (c)	65. (b)	93. (a)	121. (b)	149. (c)	177. (b)	205. (b)	233. (b)	262. (c)
10. (b)	38. (a)	66. (d)	94. (a)	122. (b)	150. (d)	178. (b)	206. (b)	234. (d)	263. (a)
11. (b)	39. (a)	67. (c)	95. (b)	123. (a)	151. (c)	179. (b)	207. (b)	235. (d)	264. (b)
12. (c)	40. (d)	68. (b)	96. (c)	124. (b)	152. (c)	180. (a)	208. (a)	236. (b)	265. (b)
13. (c)	41. (b)	69. (a)	97. (a)	125. (d)	153. (c)	181. (b)	209. (c)	237. (b)	266. (c)
14. (d)	42. (c)	70. (c)	98. (d)	126. (d)	154. (a)	182. (c)	210. (c)	238. (c)	267. (a)
15. (c)	43. (d)	71. (c)	99. (b)	127. (c)	155. (b)	183. (b)	211. (c)	239. (d)	268. (d)
16. (c)	44. (b)	72. (d)	100. (b)	128. (c)	156. (d)	184. (a)	212. (c)	240. (a)	269. (d)
17. (d)	45. (c)	73. (b)	101. (b)	129. (a)	157. (b)	185. (d)	213. (d)	241. (b)	270. (b)
18. (d)	46. (b)	74. (d)	102. (a)	130. (d)	158. (c)	186. (b)	214. (b)	242. (d)	271. (b)
19. (c)	47. (c)	75. (b)	103. (b)	131. (b)	159. (d)	187. (a)	215. (b)	243. (a)	272. (a)
20. (c)	48. (d)	76. (d)	104. (d)	132. (c)	160. (b)	188. (d)	216. (d)	244. (c)	273. (d)
21. (c)	49. (b)	77. (b)	105. (d)	133. (c)	161. (c)	189. (a)	217. (d)	245. (c)	274. (c)
22. (b)	50. (d)	78. (d)	106. (c)	134. (a)	162. (b)	190. (b)	218. (c)	246. (c)	275. (b)
23. (b)	51. (d)	79. (a)	107. (a)	135. (b)	163. (c)	191. (a)	219. (b)	247. (d)	276. (c)
24. (c)	52. (b)	80. (c)	108. (b)	136. (a)	164. (b)	192. (b)	220. (c)	248. (b)	277. (b)
25. (c)	53. (d)	81. (b)	109. (b)	137. (c)	165. (b)	193. (c)	221. (d)	249. (b)	278. (b)
26. (a)	54. (b)	82. (c)	110. (a)	138. (b)	166. (d)	194. (d)	222. (c)	250. (c)	279. (c)
27. (b)	55. (c)	83. (c)	111. (c)	139. (a)	167. (d)	195. (c)	223. (a)	251. (b)	280. (a)
28. (a)	56. (c)	84. (c)	112. (d)	140. (a)	168. (a)	196. (b)	224. (c)	252. (b)	281. (b)
								253. (d)	282. (a)

283. (b)	299. (c)	315. (b)	331. (c)	347. (d)	363. (a)	379. (d)	395. (a)	411. (d)	427. (c)
284. (a)	300. (a)	316. (c)	332. (d)	348. (b)	364. (b)	380. (a)	396. (d)	412. (a)	428. (d)
285. (a)	301. (b)	317. (c)	333. (b)	349. (a)	365. (d)	381. (b)	397. (c)	413. (c)	429. (c)
286. (b)	302. (b)	318. (a)	334. (c)	350. (d)	366. (d)	382. (a)	398. (d)	414. (a)	430. (d)
287. (d)	303. (b)	319. (a)	335. (d)	351. (b)	367. (d)	383. (a)	399. (c)	415. (a)	431. (d)
288. (a)	304. (a)	320. (d)	336. (d)	352. (c)	368. (d)	384. (d)	400. (b)	416. (a)	432. (c)
289. (c)	305. (c)	321. (c)	337. (b)	353. (b)	369. (d)	385. (a)	401. (a)	417. (a)	433. (b)
290. (d)	306. (c)	322. (d)	338. (c)	354. (d)	370. (b)	386. (d)	402. (c)	418. (b)	434. (c)
291. (d)	307. (b)	323. (c)	339. (b)	355. (d)	371. (a)	387. (b)	403. (b)	419. (c)	435. (c)
292. (b)	308. (c)	324. (c)	340. (b)	356. (a)	372. (d)	388. (d)	404. (a)	420. (c)	436. (b)
293. (b)	309. (b)	325. (b)	341. (d)	357. (c)	373. (d)	389. (d)	405. (a)	421. (a)	437. (c)
294. (a)	310. (d)	326. (a)	342. (c)	358. (d)	374. (b)	390. (c)	406. (c)	422. (c)	438. (a)
295. (b)	311. (a)	327. (a)	343. (a)	359. (b)	375. (d)	391. (a)	407. (a)	423. (b)	439. (c)
296. (b)	312. (a)	328. (a)	344. (b)	360. (b)	376. (b)	392. (b)	408. (d)	424. (b)	440. (a)
297. (d)	313. (a)	329. (c)	345. (b)	361. (a)	377. (a)	393. (b)	409. (a)	425. (a)	
298. (b)	314. (d)	330. (b)	346. (b)	362. (d)	378. (b)	394. (c)	410. (d)	426. (c)	

SOLUTION

1. (a) $3 * 5 + 5 * 3$

$\Rightarrow 3 * 5 = 2 \times 3 - 3 \times 5 + 3 \times 5 = 6 - 15 + 15 = 6$

$\Rightarrow 5 * 3 = 2 \times 5 - 3 \times 3 + 3 \times 5 = 10 - 9 + 15 = 16$

$\therefore 3 * 5 + 5 * 3 \Rightarrow 6 + 16 = 22$

2. (c) $8 \times 2 = 8 + 2 + \frac{8}{2}$

$\Rightarrow 10 + 4 = 14$

3. (b) $x > y$

given :-

$x + y = 3(x - y)$

$\Rightarrow x + y = 3x - 3y$

$\Rightarrow x - 3x = -3y - y$

$\Rightarrow -2x = -4y \Rightarrow x = 2y$

$$\therefore \frac{3xy}{2(x^2 - y^2)} = \frac{3 \times 2y \times y}{2((2y)^2 - y^2)}$$

$$= \frac{6y^2}{2 \times (4y^2 - y^2)} = \frac{6y^2}{6y^2} = 1$$

4. (d)

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

Taking L.C.M of each term.

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

$$\Rightarrow \frac{1}{x} \times (x+4) \Rightarrow \frac{x+4}{x}$$

5. (d) $x = 7 - 4\sqrt{3}$

$$\frac{1}{x} \Rightarrow \frac{1}{7 - 4\sqrt{3}}$$

By rationalisation

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

$$= \frac{7 + 4\sqrt{3}}{49 - 48} = 7 + 4\sqrt{3}$$

$$\therefore x + \frac{1}{x} = 7 - 4\sqrt{3} + 7 + 4\sqrt{3} = 14$$

6. (a) $\frac{a}{b} = \frac{2}{3}$ and $\frac{b}{c} = \frac{4}{5}$ (given)

or $\frac{c}{b} = \frac{5}{4}$

$$\therefore \frac{a+b}{b+c} = \frac{b\left(\frac{a}{b} + 1\right)}{b\left(\frac{c}{b} + 1\right)} = \frac{\frac{a}{b} + 1}{\frac{c}{b} + 1}$$

$$= \frac{\left(\frac{2}{3} + 1\right)}{\left(\frac{5}{4} + 1\right)} = \frac{\frac{5}{3}}{\frac{5+4}{4}}$$

$$= \frac{5 \times 4}{3 \times 9} = \frac{20}{27}$$

$$\therefore \frac{a+b}{b+c} = \frac{20}{27}$$

ALTERNATE :

a	b	c
$2_{\times(4)}$	$3_{\times(4)}$	
$4_{\times(3)}$	$6_{\times(3)}$	$5_{\times(3)}$
8	12	15

$$\frac{a+b}{b+c} = \frac{8+12}{12+15} = \frac{20}{27}$$

7. (c) $a * b = 2(a + b)$

$5 * 2 = 2(5 + 2) = 14$

8. (c) $\frac{2a+b}{a+4b} = 3$ (given)

$2a + b = 3(a + 4b)$

$2a + b = 3a + 12b$

$\Rightarrow -a = 11b$

$a = -11b$

$$\therefore \frac{a+b}{a+2b}$$

$$\Rightarrow \frac{-11b+b}{-11b+2b} = \frac{-10b}{-9b} = \frac{10}{9}$$

9. (b) $a * b = a + b + ab$

$3 * 4 = 3 + 4 + 3 \times 4 = 19$

$2 * 3 = 2 + 3 + 2 \times 3 = 5 + 6 = 11$

$\therefore 3 * 4 - 2 * 3 = 19 - 11 = 8$

10. (b) $x \otimes y = 3x + 2y$

$(2 \otimes 3) = 3 \times 2 + 2 \times 3 = 6 + 6 = 12$

$(3 \otimes 4) = 3 \times 3 + 2 \times 4 = 9 + 8 = 17$

$\therefore (2 \otimes 3) + (3 \otimes 4) = 12 + 17 = 29$

11. (b) $a : b = 2 : 3$, $b : c = 4 : 5$ (given)

a	b	c
$2_{\times(4)}$	$3_{\times(4)}$	
$4_{\times(3)}$	$6_{\times(3)}$	$5_{\times(3)}$
8	12	15

$\therefore a^2 : b^2 : bc$

$\Rightarrow (8)^2 : (12)^2 : (12 \times 15)$

$\Rightarrow 64 : 144 : 180$

$\Rightarrow 16 : 36 : 45$

12. (c) $A : B = \frac{1}{2} : \frac{3}{8}$

$\Rightarrow 8 : 6$

$\Rightarrow 4 : 3$

$\Rightarrow B : C \Rightarrow \frac{1}{3} : \frac{5}{9}$

$\Rightarrow 9 : 15 \Rightarrow 3 : 5$

$\Rightarrow C : D \Rightarrow \frac{5}{6} : \frac{3}{4}$

$\Rightarrow 20 : 18 \Rightarrow 10 : 9$

A	:	B	:	C	:	D
4	:	3				
		3	:	5		
				10	:	9
8	:	6	:	10	:	9

13. (c)

$A : B : C$

$2 : 3 : 4$

$$\therefore \frac{A}{B} : \frac{B}{C} : \frac{C}{A}$$

(Multiply with ABC)

$$\therefore \frac{A \times ABC}{B} : \frac{B \times ABC}{C} : \frac{C \times ABC}{A}$$

$A^2C : B^2A : BC^2$

$\Rightarrow (2)^2 \times 4 : (3)^2 \times 2 : 3 \times (4)^2$

$\Rightarrow 16 : 18 : 48$

$\Rightarrow 8 : 9 : 24$

ALTERNATE:

$$\frac{A}{B} : \frac{B}{C} : \frac{C}{A} = \frac{2}{3} : \frac{3}{4} : \frac{4}{2}$$

$$\Rightarrow \frac{8, 9, 24}{12} \Rightarrow 8 : 9 : 24$$

14. (d) A : B B : C C : D
1 : 2 3 : 4 5 : 6

A	B	C	
$1_{\times 3}$	$2_{\times 3}$		
	$3_{\times 2}$	$4_{\times 2}$	
3	6	8	
A	B	C	D
$3_{\times 5}$	$6_{\times 5}$	$8_{\times 5}$	
		$5_{\times 8}$	$6_{\times 8}$
15	30	40	48

$\therefore$ D : C : B : A
48 : 40 : 30 : 15

15. (c) $\frac{2a-5b}{3a+6b} = \frac{4}{7}$

$\Rightarrow 7(2a - 5b) = 4(3a + 6b)$

$\Rightarrow 14a - 35b = 12a + 24b$

$\Rightarrow 2a = 59b$

$\frac{a}{b} = \frac{59}{2}$

$\therefore$ a : b = 59 : 2

16. (c) $\frac{a}{3} = \frac{b}{4} = \frac{c}{7} = k$

$\therefore$ a = 3k
b = 4k
c = 7k

$\therefore \frac{a+b+c}{c}$

$= \frac{3k+4k+7k}{7k} = 2$

17. (d) $\frac{144}{0.144} = \frac{14.4}{x}$

$\Rightarrow \frac{144 \times 1000}{144} = \frac{144}{x \times 10}$

$\Rightarrow 1000 = \frac{144}{10x}$

$\Rightarrow x = \frac{144}{1000 \times 10}$

$x = \frac{144}{10000} = 0.0144$

18. (d) $1 < x < 2$

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

(square root cancel with square)

$\therefore x - 1 + x - 3 = 2x - 4$

19. (c) $a \oplus b = (a \times b) + b$

$5 \oplus 7 = (5 \times 7) + 7$
$= 35 + 7 = 42$

20. (c) $10^{0.48} = x$
$10^{0.70} = y$
and $x^z = y^2$

$\therefore \left(10^{0.48}\right)^z = \left(10^{0.70}\right)^2$

$\Rightarrow 10^{0.48z} = 10^{1.40}$ (If $a^x = a^y$, if base equal power are equal: $(x = y)$

$\therefore 0.48z = 1.40$

$z = \frac{140}{48} = \frac{35}{12} = 2.9$

21. (c) $47.2506 = 4A + 7B + 2C + \frac{5}{D} + 6E$

$47.2506 = 4 \times 10 + 7 \times 1 + 2 \times 0.1000 + 5 \times 0.0100 + 0 + 6 \times 0.0001$

$\therefore$ A = 10 B = 1 C = 0.1000

$D = \frac{1}{\frac{1}{100}} = 100$, E = 0.0001

$\therefore 5A + 3B + 6C + D + 3E$
$= 5 \times 10 + 3 \times 1 + 6 \times 0.1 + 100 + 3 \times 0.0001$
$= 50 + 3 + 0.6 + 100 + 0.0003$
$= 153.6003$

22. (b) $x * y = x^2 + y^2 - xy$
$9 * 11 = (9)^2 + (11)^2 - 9 \times 11$
$81 + 121 - 99 = 103$

23. (b) $5^{5x+5} = 1$
$5^{5x+5} = 5^0$ ($a^0 = 1$) [If bases are same then power are equal]
$5x + 5 = 0$
$5x = -5$
$x = -1$

24. (c) $3^{x+3} + 7 = 250$
$3^{x+3} = 250 - 7$
$3^{x+3} = 243$
$3^{x+3} = 3^5$
$x + 3 = 5$
$x = 2$

25. (c) $\frac{1}{4} \times \frac{2}{6} \times \frac{3}{8} \times \frac{4}{10} \times \frac{5}{12} \times \ldots\ldots \times$

$\frac{31}{64} = \frac{1}{2^x}$

$\Rightarrow \left(\frac{1}{2}\right)^{31} \times \left(\frac{1}{2}\right)^5$

$= \left(\frac{1}{2}\right)^{31+5} = \frac{1}{2^x}$

or $\frac{1}{2^{36}} = \frac{1}{2^x}$

$\therefore x = 36$

26. (a) $x = \frac{\sqrt{3}+1}{\sqrt{3}-1}$ and $y = \frac{\sqrt{3}-1}{\sqrt{3}+1}$

$\Rightarrow \therefore x = \frac{1}{y}$

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

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

$= \frac{3+1+2\sqrt{3}}{2} \quad \frac{4+2\sqrt{3}}{2}$

$= \left(2+\sqrt{3}\right)$

$x^2 = \left(2+\sqrt{3}\right)^2 = 4 + 3 + 4\sqrt{3}$

$= 7 + 4\sqrt{3}$

$y^2 = \frac{1}{7+4\sqrt{3}} \times \frac{7-4\sqrt{3}}{7-4\sqrt{3}}$

$y^2 = \frac{7-4\sqrt{3}}{49-48} = \frac{7-4\sqrt{3}}{1} =$

$7 - 4\sqrt{3}$

$\therefore x^2 + y^2 = 7 + 4\sqrt{3} + 7 - 4\sqrt{3}$
$= 14$

ALTERNATE:

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

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

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

$= \left[\frac{\left(\sqrt{3}+1\right)^2 + \left(\sqrt{3}-1\right)^2}{3-1}\right]^2 - 2$

$\therefore (a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$

$= \left[\frac{2\left(\left(\sqrt{3}\right)^2 + (1)^2\right)}{2}\right]^2 - 2$

$= (3 + 1)^2 - 2$
$= 16 - 2 = 14$

27. (b) $x = 3 + 2\sqrt{2}$

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

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

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

$\Rightarrow \frac{1}{\sqrt{x}} = \frac{1}{\sqrt{2}+1} \times \frac{\sqrt{2}-1}{\sqrt{2}-1}$

(हर का परिमेयकरण करने पर)

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

$\therefore \sqrt{x} - \frac{1}{\sqrt{x}}$

$= \sqrt{2}+1-\left(\sqrt{2}-1\right)$

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

28. (a) P = 999

$\sqrt[3]{p\left(p^2+3p+3\right)+1}$

$\Rightarrow \sqrt[3]{p^3+3p^2+3p+1}$

$\therefore \sqrt[3]{(p+1)^3}$

$= \sqrt[3]{(999+1)^3}$

$= \sqrt[3]{(1000)^3} = 1000$

29. (a) $\frac{a}{b} = \frac{7}{9}, \quad \frac{b}{c} = \frac{3}{5}$

$\therefore$ a : b : c

7 : 9

$3_{\times 3} : 5_{\times 3}$

7 : 9 : 15

30. (a) $x : y$

7 : 3

$\therefore \frac{xy+y^2}{x^2-y^2} = \frac{21+9}{49-9} = \frac{30}{40} = \frac{3}{4}$

31. (d) Given [p] greatest positive integer less than or means equal to p,

$\Rightarrow [p] = p$

$\Rightarrow [-p] = p$

$\Rightarrow \left[-\frac{1}{4}\right] + \left[4-\frac{1}{4}\right] + [3]$

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

32. (b) $\frac{(243)^{\frac{n}{5}} \cdot 3^{2n+1}}{9^n \cdot 3^{n-1}} = \frac{\left(3^5\right)^{\frac{n}{5}} \cdot 3^{2n+1}}{3^{2n} \cdot 3^{n-1}}$

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

$= 3^2 = 9$

33. (c) $x = 0.5$

$y = 0.2$

$\sqrt{0.6} \times (3y)^x = \sqrt{0.6} \times (3 \times 0.2)^{0.5}$

$= \sqrt{0.6} \times \sqrt{0.6} = 0.6$

34. (c) $x^{x\sqrt{x}} = \left(x\sqrt{x}\right)^x$

$x^{x\sqrt{x}} = \left(x^{\frac{3}{2}}\right)^x$

$x^{x\sqrt{x}} = x^{\frac{3}{2}x}$

(If bases are same then their power is also same)

$\therefore x\sqrt{x} = \frac{3}{2}x$ or $\sqrt{x} = \frac{3}{2}$

$x = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$

35. (a) $a^2 + b^2 + c^2 - ab - bc - ca$

$= \frac{1}{2}\left[(a-b)^2 + (b-c)^2 + (c-a)^2\right]$

$= \frac{1}{2}\left[(7-5)^2 + (5-3)^2 + (3-7)^2\right]$

$= \frac{1}{2}(4+4+16) = \frac{24}{2} = 12$

36. (b) $7^x = \frac{1}{343} = \frac{1}{7^3}$

$7^x = \frac{1}{7^3}$

$7^x = 7^{-3}$

$x = -3$ (If bases are equal then their power are also equal)

37. (c)

$\frac{\frac{1}{3}\times\frac{1}{3}\times\frac{1}{3}+\frac{1}{4}\times\frac{1}{4}\times\frac{1}{4}-3\times\frac{1}{3}\times\frac{1}{4}\times\frac{1}{5}+\frac{1}{5}\times\frac{1}{5}\times\frac{1}{5}}{\frac{1}{3}\times\frac{1}{3}+\frac{1}{4}\times\frac{1}{4}+\frac{1}{5}\times\frac{1}{5}-\left(\frac{1}{3}\times\frac{1}{4}+\frac{1}{4}\times\frac{1}{5}+\frac{1}{5}\times\frac{1}{3}\right)}$

$A^3 + B^3 + C^3 - 3ABC = (A + B + C)(A^2 + B^2 + C^2 - AB - BC - CA)$

$\therefore \frac{\left(\frac{1}{3}\right)^3+\left(\frac{1}{4}\right)^3-3\times\frac{1}{3}\times\frac{1}{4}\times\frac{1}{5}+\left(\frac{1}{5}\right)^3}{\left(\frac{1}{3}\right)^2+\left(\frac{1}{4}\right)^2+\left(\frac{1}{5}\right)^2-\frac{1}{3}\times\frac{1}{4}-\frac{1}{4}\times\frac{1}{5}-\frac{1}{5}\times\frac{1}{3}}$

$= \frac{\left(\frac{1}{3}+\frac{1}{5}+\frac{1}{4}\right)\left[\left(\frac{1}{3}\right)^2+\left(\frac{1}{4}\right)^2+\left(\frac{1}{5}\right)^2-\frac{1}{3}\times\frac{1}{4}-\frac{1}{4}\times\frac{1}{5}-\frac{1}{5}\times\frac{1}{3}\right]}{\left[\left(\frac{1}{3}\right)^2+\left(\frac{1}{4}\right)^2+\left(\frac{1}{5}\right)^2-\frac{1}{3}\times\frac{1}{4}-\frac{1}{4}\times\frac{1}{5}-\frac{1}{5}\times\frac{1}{3}\right]}$

$= \frac{20+15+12}{60} = \frac{47}{60}$

38. (a) $0.13 \times p^2 = 13$

$p^2 = \frac{13}{0.13} = \frac{13}{13} \times 100$

$p = 10$

39. (a) $\frac{x}{y} = \frac{3}{4}, \quad \frac{6}{7} + \frac{y-x}{y+x} = ?$

$= \frac{6}{7} + \frac{\left(1-\frac{x}{y}\right)}{\left(1+\frac{x}{y}\right)}$

$= \frac{6}{7} + \frac{\left(1-\frac{3}{4}\right)}{\left(1+\frac{3}{4}\right)}$

$= \frac{6}{7} + \left[\frac{4-3}{4} \times \frac{4}{(4+3)}\right]$

$= \frac{6}{7} + \frac{1}{7} = \frac{7}{7} = 1$

Alternate :

$\frac{6}{7} + \frac{y-x}{y+x} = \frac{6}{7} + \frac{4-3}{4+3}$

$= \frac{6}{7} + \frac{1}{7} = \frac{7}{7} = 1$

40. (d) $x = 7 - 4\sqrt{3}$

$= 4 + 3 - 4\sqrt{3}$

$= (2)^2 + \left(\sqrt{3}\right)^2 - 2 \times 2\sqrt{3}$

$= \left(2-\sqrt{3}\right)^2$

$\therefore [(a^2 + b^2 - 2ab = (a-b)^2]$

$\Rightarrow x = \left(2-\sqrt{3}\right)^2$

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

$\frac{1}{\sqrt{x}} = \frac{1}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}}$

$= 2 + \sqrt{3}$

$\therefore \sqrt{x} + \frac{1}{\sqrt{x}}$

$= 2 - \sqrt{3} + 2 + \sqrt{3} = 4$

41. (b) $a = \frac{\sqrt{5}+1}{\sqrt{5}-1}$ $b = \frac{\sqrt{5}-1}{\sqrt{5}+1}$

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

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

$\Rightarrow \frac{\sqrt{5}+1}{\sqrt{5}-1} + \frac{\sqrt{5}-1}{\sqrt{5}+1}$

$\Rightarrow \frac{5+1+2\sqrt{5}+5+1-2\sqrt{5}}{(\sqrt{5})^2-(1)^2}$

$\Rightarrow \frac{6+2\sqrt{5}+6-2\sqrt{5}}{5-1} = \frac{12}{4} = 3$

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

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

$\Rightarrow a + \frac{1}{a} = 3$

$a^2 + \frac{1}{a^2} = 9 - 2 = 7$ $(ab = 1)$

$\therefore \frac{a^2+\frac{1}{a^2}+ab}{a^2+\frac{1}{a^2}-ab} = \frac{7+1}{7-1} = \frac{8}{6} = \frac{4}{3}$

42. (c) $a = 4.36$
$b = 2.39$
$c = 1.97$
$a - b - c$
$= 4.36 - 2.39 - 1.97$
$= 0$
$a^3 - b^3 - c^3 - 3abc$

$= \frac{1}{2}(a-b-c)[(a-b)^2+(b-c)^2+(c-a)^2]$

$= 0$

43. (d) $\frac{3a+5b}{3a-5b} = 5$

$\Rightarrow 3a + 5b = 15a - 25b$

$\Rightarrow 12a = 30b$

$\Rightarrow 2a = 5b$

$a : b$
$5 : 2$

44. (b) $p : q = r : s = t : u = 2 : 3$

$\therefore \frac{mp+nr+ot}{mq+ns+ou}$

$\Rightarrow \frac{m\times 2x + n\times 2x + o\times 2x}{m\times 3x + n\times 3x + o\times 3x}$

$\Rightarrow \frac{2x(m+n+o)}{3x(m+n+o)} = \frac{2}{3}$

$\therefore mp + nr + ot : mq + ns + ou$

$\boxed{2:3}$

45. (c) $x : y = 3 : 4$

$\frac{7x+3y}{7x-3y} = \frac{y}{y}\left(\frac{7\frac{x}{y}+3}{7\frac{x}{y}-3}\right) = \frac{7\times\frac{3}{4}+3}{7\times\frac{3}{4}-3}$

$= \frac{\frac{21}{4}+3}{\frac{21}{4}-3} = \frac{\frac{21+12}{4}}{\frac{21-12}{4}} = \frac{11}{3}$

46. (b) $x + \frac{1}{4}\sqrt{x} + a^2$

$= (\sqrt{x})^2 + 2\times\frac{1}{8}\times\sqrt{x} + a^2$

$[(A^2 + 2BA + B^2) = (A + B)^2]$

Here, $A = \sqrt{x}$ and $B = a$

$B = \frac{1}{8}$ $\therefore a = \frac{1}{8}$

47. (c) Given that $a \neq b$ Let $a = 16$, $b = 4$

by options

So, $\frac{a+b}{2} = \frac{16+4}{2} = 10$

and $\sqrt{ab} = \sqrt{16\times4} = 8$

$\therefore \frac{a+b}{2} > \sqrt{ab}$

$\therefore$ option (c) is correct.

48. (d) $x^{1/3} = y^{1/4}$

$\Rightarrow$ LCM of 3, 4 = 12

$\therefore (x^{1/3})^{12} \Rightarrow (y^{1/4})^{12}$

$x^4 = y^3$

take power '5' on both sides

$\Rightarrow (x^4)^5 = (y^3)^5$

$\Rightarrow x^{20} = y^{15}$

49. (b) $x = \frac{\sqrt{3}}{2}$

or $1 + x = 1 + \frac{\sqrt{3}}{2} = \frac{2+\sqrt{3}}{2}$

$= \frac{2(2+\sqrt{3})}{2\times2}$

(divides and multiply by 2)

$\Rightarrow 1 + x = \frac{4+2\sqrt{3}}{4}$

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

$= \frac{(1)^2 + (\sqrt{3})^2 + 2\times1\times\sqrt{3}}{4}$

$1 + x \Rightarrow \frac{(1+\sqrt{3})^2}{4}$

$\therefore \sqrt{1+x} = \frac{1+\sqrt{3}}{2}$

Similarly,

$\sqrt{1-x} \Rightarrow \frac{\sqrt{3}-1}{2}$

$\therefore \frac{\sqrt{1+x}}{1+\sqrt{1+x}} + \frac{\sqrt{1-x}}{1-\sqrt{1-x}}$

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

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

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

$= \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{3}} = \frac{2}{\sqrt{3}}$

50. (d) $x^2 - 4x - 1 = 0$
$x^2 - 1 = 4x$ (divide x both sides)

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

$x^2 + \frac{1}{x^2} - 2 = 16$

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

51. (d) $\left(x+\frac{1}{x}\right)\left(x-\frac{1}{x}\right)\left(x^2+\frac{1}{x^2}-1\right)\left(x^2+\frac{1}{x^2}+1\right)$

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

$\because$

$\boxed{(A+B)(A^2-AB+B^2)=A^3+B^3}$
$\boxed{(A-B)(A^2+AB+B^2)=A^3-B^3}$

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

52. (b) $a^{2x+2}=1$
$a^{2x+2}=a^0$
$2x+2=0$

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

53. (d) x^2-x-1
$\Rightarrow$ if $ax^2+bx+c=0$
Then minimum value of equation is $\left(\frac{4ac-b^2}{4a}\right)$
$\because$ in the given equation,
$a=1$
$b=-1$
$c=-1$
$\therefore$ minimum value

$\Rightarrow \frac{(4\times1\times(-1))-(-1)^2}{4\cdot1}$

$=\frac{-4-1}{4}=-\frac{5}{4}$

54. (b) $\frac{\sqrt{7}-2}{\sqrt{7}+2}=a\sqrt{7}+b$

L.H.S $=\frac{\sqrt{7}-2}{\sqrt{7}+2}\times\frac{\sqrt{7}-2}{\sqrt{7}-2}$
(Rationalisation)

$=\frac{(\sqrt{7}-2)^2}{(\sqrt{7})^2-(4)}=\frac{7+4-4\sqrt{7}}{7-4}$

$=\frac{11-4\sqrt{7}}{3}$

$\frac{11}{3}-\frac{4}{3}\sqrt{7}=-\frac{4}{3}\sqrt{7}+\frac{11}{3}$

$=a\sqrt{7}+b$ = R.H.S
Compare the cofficients of $\sqrt{7}$ and constant term

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

$b=\frac{11}{3}$

55. (c) $a+\frac{1}{b}=1$, $b+\frac{1}{c}=1$, $c+\frac{1}{a}=?$
Put values,

$a=\frac{1}{2}$ $\quad b=2$ $\quad c=-1$

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

Alternate:

$\Rightarrow a+\frac{1}{b}=1$ ..... (i)

$\Rightarrow a=1-\frac{1}{b}=\boxed{\frac{b-1}{b}}$

$\frac{1}{a}=\frac{b}{b-1}\Rightarrow b+\frac{1}{c}=1$

$\frac{1}{c}=1-b$, $\boxed{c=\frac{1}{1-b}}$

$\therefore c+\frac{1}{a}=\frac{1}{1-b}+\frac{b}{b-1}$

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

56. (c) $x=\sqrt{3}+\sqrt{2}$

$\therefore \frac{1}{x}=\sqrt{3}-\sqrt{2}$

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

$\therefore x^3=\left(\sqrt{3}+\sqrt{2}\right)^3$

$=\left(\sqrt{3}\right)^3+\left(\sqrt{2}\right)^3+3\sqrt{3}\times\sqrt{2}\left(\sqrt{3}+\sqrt{2}\right)$

$=3\sqrt{3}+2\sqrt{2}+3\sqrt{6}\left(\sqrt{3}+\sqrt{2}\right)$

$=3\sqrt{3}+2\sqrt{2}+9\sqrt{2}+6\sqrt{3}$

$x^3=9\sqrt{3}+11\sqrt{2}$

$\frac{1}{x^3}=9\sqrt{3}-11\sqrt{2}$

$x^3+\frac{1}{x^3}=9\sqrt{3}+11\sqrt{2}+9\sqrt{3}-11\sqrt{2}$

$=18\sqrt{3}$

Alternate:

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

$\frac{1}{x}=\sqrt{3}-\sqrt{2}$

and $x+\frac{1}{x}=\sqrt{3}+\sqrt{2}+\sqrt{3}-\sqrt{2}$

$=2\sqrt{3}$

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

$=\left(2\sqrt{3}\right)^3-3\left(2\sqrt{3}\right)$

$=24\sqrt{3}-6\sqrt{3}=18\sqrt{3}$

57. (c) $x+y=7$ (cubing both sides)
$(x+y)^3=(7)^3$
$x^3+y^3+3(x+y)xy=343$
$x^3+y^3+21xy=343$

58. (c) $x^{1/3}+y^{1/3}=z^{1/3}$
(cubing both sides)

$\left(x^{1/3}+y^{1/3}\right)^3=\left(z^{1/3}\right)^3$

$\Rightarrow x+y+3x^{1/3}.y^{1/3}.(x^{1/3}+y^{1/3})=z$

$\Rightarrow x+y-z+3x^{1/3}.y^{1/3}.z^{1/3}=0$

$\Rightarrow x+y-z=-3x^{1/3}y^{1/3}z^{1/3}$
(cubing again both sides)
$(x+y-z)^3=-27xyz$
$(x+y-z)^3+27xyz=0$

59. (a) $\frac{a}{b}+\frac{b}{a}=1$
$a\neq0$, $b\neq0$
$a^2+b^2=ab$
$a^2+b^2-ab=0$
$(a+b)(a^2+b^2-ab)=(a+b)\times0$
[multiply both sides by $(a+b)$]
$a^3+b^3=0$

60. (d) $p=99$
$p(p^2+3p+3)$
$=p^3+3p^2+3p+1-1$
$=(p+1)^3-1$
$=(100)^3-1=1000000-1$
$=999999$

61. (c) given $a\otimes b=2a$
where $a>b$
$a\otimes b=a+b$
where $a<b$
$a\otimes b=a^2$
where $a=b$

$=\frac{(5+7)+(4)^2}{3(5)^2-(2\times15)-3}=\frac{12+16}{75-30-3}$

$=\frac{28}{42}=\frac{2}{3}$

62. (a) $\frac{a}{2}=\frac{b}{3}=\frac{c}{5}$
$\therefore a=2$
$b=3$
$c=5$

$\frac{a+b+c}{c}=\frac{2+3+5}{5}=\frac{10}{5}=2$

63. (c) $(125)^x=3125$
$(5^3)^x=5^5$
$5^{3x}=5^5$
$\therefore 3x=5$

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

64. (b) $5^{\sqrt{x}}+12^{\sqrt{x}}=13^{\sqrt{x}}$
By option put $x=4$

$\Rightarrow 5^{\sqrt{4}}+12^{\sqrt{4}}=13^{\sqrt{4}}$

$\Rightarrow 5^2+12^2=13^2$

$\Rightarrow 169=169$
hence, $x=4$

65. (b) $n + \frac{2}{3}n + \frac{1}{2}n + \frac{1}{7}n = 97$

$\Rightarrow \frac{42n+28n+21n+6n}{42} = 97$

$\Rightarrow \frac{97n}{42} = 97$

$\Rightarrow n = 42$

66. (d) $(x-3)^2 + (y-4)^2 + (z-5)^2 = 0$

$\therefore (x-3)^2 = 0 \quad x = 3$

$(y-4)^2 = 0 \quad y = 4$

$(z-5)^2 = 0 \quad z = 5$

$(x + y + z) \Rightarrow 4 + 3 + 5 \Rightarrow 12$

67. (c) $x = 3 + \sqrt{8}$

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

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

$= \frac{3-\sqrt{8}}{9-8} = 3 - \sqrt{8}$

$x + \frac{1}{x} = 3 + \sqrt{8} + 3 - \sqrt{8} = 6$

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

squaring both sides

$x^2 + \frac{1}{x^2} + 2 = 36$

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

68. (b) $x - \frac{1}{x} = 4$

$x^2 + \frac{1}{x^2} - 2 = 16$

(On Squaring)

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

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

$x^2 + \frac{1}{x^2} + 2 = 20$

$\left(x + \frac{1}{x}\right)^2 = 20$

$x + \frac{1}{x} = \sqrt{20} = \sqrt{4 \times 5} = 2\sqrt{5}$

69. (a) $4b^2 + \frac{1}{b^2} = 2$

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

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

$\left(2b + \frac{1}{b}\right)^2 = 6$

$2b + \frac{1}{b} = \sqrt{6}$

Take cube both sides

$\left(2b + \frac{1}{b}\right)^3 = (\sqrt{6})^3$

$8b^3 + \frac{1}{b^3} + 3 \times 2b \times \frac{1}{b}\left(2b + \frac{1}{b}\right) = 6\sqrt{6}$

$8b^3 + \frac{1}{b^3} + 6\sqrt{6} = 6\sqrt{6}$

$8b^3 + \frac{1}{b^3} = 0$

70. (c) $2^{2x-y} = 16$ (given)

$\Rightarrow 2^{2x-y} = 2^4$

$\therefore 2x - y = 4$ (I)

$2^{x+y} = 32$ (given)

$2^{x+y} = 2^5$

and $x + y = 5$ (II)

by equation I and II

$2x - y = 4$

$x + y = 5$

$3x = 9$

$x = 3$

$y = 2 \qquad xy = 3 \times 2 = 6$

71. (c) $\left(\frac{3}{5}\right)^3 \left(\frac{3}{5}\right)^{-6} = \left(\frac{3}{5}\right)^{2x-1}$

$\Rightarrow \left(\frac{3}{5}\right)^{+3-6} = \left(\frac{3}{5}\right)^{2x-1}$

$\Rightarrow -3 = 2x - 1$

$\Rightarrow 2x = -2$

$\Rightarrow x = -1$

72. (d) $a^2 - b^2 = 19$

$(a - b)(a + b) = 19 \times 1$

$a + b = 19 \longrightarrow$ (I)

$a - b = 1 \longrightarrow$ (II)

$2a = 20$

$\boxed{a = 10}$

(Adding equation (i) and (ii))

73. (b) $\frac{\sqrt{3+x} + \sqrt{3-x}}{\sqrt{3+x} - \sqrt{3-x}} = \frac{2}{1}$

(by c-d rule)

$\Rightarrow \frac{\sqrt{3+x}}{\sqrt{3-x}} = \frac{2+1}{2-1} = \frac{3}{1}$

$\left(\frac{A}{B} = \frac{C}{D} \atop \frac{A+B}{A-B} = \frac{C+D}{C-D}\right)$

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

Squaring both sides

$\frac{3+x}{3-x} = 9$

$3 + x = 27 - 9x$

$10x = 24$

$x = \frac{24}{10} = \frac{12}{5}$

74. (d) $x = \frac{\sqrt{3}}{2}$

$\frac{\sqrt{1+x} + \sqrt{1-x}}{\sqrt{1+x} - \sqrt{1-x}} \times \frac{\sqrt{1+x} + \sqrt{1-x}}{\sqrt{1+x} + \sqrt{1-x}}$

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

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

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

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

$= \frac{\left(1+\frac{1}{2}\right)}{\sqrt{3}} \times 2 = \frac{\frac{3}{2} \times 2}{\sqrt{3}} = \sqrt{3}$

75. (b) $4^{4x+1} = \frac{1}{64}$

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

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

$\Rightarrow 4x + 1 = -3$

$\Rightarrow 4x = -4$

$\Rightarrow x = -1$

76. (d) $\frac{\sqrt{x+4}+\sqrt{x-4}}{\sqrt{x+4}-\sqrt{x-4}} = \frac{2}{1}$

by C – D rule

$\Rightarrow \frac{\sqrt{x+4}}{\sqrt{x-4}} = \frac{2+1}{2-1} = \frac{3}{1}$

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

$\Rightarrow \frac{x+4}{x-4}$ = 9again C & D rule

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

$\Rightarrow \frac{x}{4} = \frac{10}{8}$

$\Rightarrow x = \frac{10}{8} \times 4 = 5$

77. (b) $\sqrt{2^x} = 256$

$\sqrt{2^x} = 2^8$

$2^x = (2^8)^2$

$= 2^x = 2^{16}$

$\boxed{x = 16}$

78. (d) $\left(\sqrt{5}\right)^7 \div \left(\sqrt{5}\right)^5 = 5^p$

$\Rightarrow \frac{\left(\sqrt{5}\right)^7}{\left(\sqrt{5}\right)^5} = 5^p$

$= \left(\sqrt{5}\right)^2 = 5^p$

$= 5^1 = 5^p$

$\boxed{p = 1}$

79. (a) $1.5a = 0.04b$

$\frac{a}{b} = \frac{0.04}{1.5} = \frac{4}{100} \times \frac{10}{15} = \frac{2}{75}$

Let $a = 2x$, $b = 75x$

$\therefore \frac{b-a}{b+a} = \frac{75x-2x}{75x+2x} = \frac{73}{77}$

Alternate:-

$\frac{a}{b} = \frac{0.04}{1.5}$

$\frac{b-a}{b+a} = \frac{1.5-0.04}{1.5+0.04} = \frac{1.46}{1.54} = \frac{73}{77}$

80. (c) $x = \left(\sqrt{2}+1\right)^{1/3}$

Take cube on both sides

$\Rightarrow x^3 = \sqrt{2} + 1$

(हर का परिमेयकरण)

$\Rightarrow \frac{1}{x^3} = \frac{1}{\sqrt{2}+1} \times \frac{\sqrt{2}-1}{\sqrt{2}-1}$

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

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

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

81. (b) $\frac{x^2-x+1}{x^2+x+1} = \frac{3}{2}$ Given

$\Rightarrow \frac{x\left\{\left(x+\frac{1}{x}\right)-1\right\}}{x\left\{\left(x+\frac{1}{x}\right)+1\right\}} = \frac{3}{2}$ Let

$\left(x+\frac{1}{x} = y\right)$

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

$\frac{y-1}{y+1} = \frac{3}{2}$

$\Rightarrow 2(y-1) = 3(y+1)$

$2y - 2 = 3y + 3$

$y = -2 - 3 = -5$

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

82. (c) $x = 3 + \sqrt{8}$

$x^2 = 9 + 8 + 2 \times 3\sqrt{8}$

$x^2 = 17 + 6\sqrt{8}$

$\frac{1}{x^2} = 17 - 6\sqrt{8}$

$x^2 + \frac{1}{x^2} = 17 + 6\sqrt{8} + 17 -$

$6\sqrt{8} = 34$

83. (c) $x = 5 + 2\sqrt{6}$

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

$x = \left(\sqrt{3}\right)^2 + \left(\sqrt{2}\right)^2 + 2\sqrt{3} \times \sqrt{2}$

$x = \left(\sqrt{3}+\sqrt{2}\right)^2$

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

Similarly

$\Rightarrow \frac{1}{\sqrt{x}} = \sqrt{3} - \sqrt{2}$

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

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

84. (c) $a > b$

$a + b = 5$

$a \times b = 6$ Assume $a = 3$

$a^2 - b^2$ Values $b = 2$

$= 9 - 4 = 5$

Alternate :

$a + b = 5$ given

Squaring both sides

$\Rightarrow (a+b)^2 = (5)^2$

$a^2 + b^2 + 2ab = 25$

$ab = 6$ given

$= a^2 + b^2 + 2 \times 6 = 25$

$= a^2 + b^2 = 13$

$\Rightarrow a^2 + b^2 + 2ab - 2ab = 13$

$a^2 + b^2 - 2ab = 13 - 2ab$

$(a-b)^2 = 13 - 2 \times 6$

$a - b = 1$

$\therefore (a+b)(a-b)$

$= 5 \times 1$

$a^2 - b^2 = 5$

85. (d) $x = \sqrt{3} + \sqrt{2}$

$x^2 = 3 + 2 + 2\sqrt{6}$

$x^2 = 5 + 2\sqrt{6}$

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

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

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

$= 10$

86. (c) $x + \frac{9}{x} = 6$

Take values of x

Let $x = 3$

$3 + \frac{9}{3} = 6$

Prove So, $x = 3$

$\therefore \quad x^2 + \frac{9}{x^2} = 9 + \frac{9}{9} = 10$

Alternate:

$x + \frac{9}{x} = 6$

On squaring

$\left(x + \frac{9}{x}\right)^2 = 36$

$x^2 + \frac{81}{x^2} + 2 \times \frac{9}{x} \times x = 36$

$x^2 + \frac{81}{x^2} - 18 = 0$

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

$x = \frac{9}{x}$

$x^2 = 9$

Hence $x^2 + \frac{9}{x^2} = 9 + \frac{9}{9} = 10$

87. (b) $2p + \frac{1}{p} = 4$

Divide by 2

$\frac{2p}{2} + \frac{1}{2p} = \frac{4}{2}$

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

Take cube on both sides

$\Rightarrow \left(p + \frac{1}{2p}\right)^3 = (2)^3$

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

$p^3 + \frac{1}{8p^3} + \frac{3}{2} \times 2 = 8$

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

88. (a) $a^6 + b^6 = (a^2)^3 + (b^2)^3$

$= (a^2 + b^2)(a^4 - a^2b^2 + b^4)$

$\therefore \quad a^6 + b^6 = (a^2 + b^2) \times 0 = 0$

89. (c) $x + \frac{1}{x} = 3$ (Given)

$\frac{x^3 + \frac{1}{x}}{x^2 - x + 1}$ (divide by x)

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

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

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

$\therefore \quad x^2 + \frac{1}{x^2} = 9 - 2 = 7$

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

90. (a) $a + \frac{1}{a} + 1 = 0$

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

Squaring both sides

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

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

$\Rightarrow a^2 + 1 = \frac{-1}{a^2}$ .....(i)

$\Rightarrow a + \frac{1}{a} = -1$ (Given)

$\therefore \quad a^2 + 1 = -a$ .....(ii)

$\Rightarrow -a = \frac{-1}{a^2}$ from equation (i) and (ii)

$a^3 = 1$

$\therefore \quad a^3 - 1 = 0$

$\Rightarrow a^4 - a = 0 \times a = 0$(Multiply a both sides)

91. (c) $x = a + \frac{1}{a}$

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

$\therefore (x + y) = a + \frac{1}{a} + a - \frac{1}{a} = 2a$

$\therefore (x - y) = a + \frac{1}{a} - a + \frac{1}{a} = \frac{2}{a}$

$\therefore \quad x^4 + y^4 - 2x^2y^2 = (x^2 - y^2)^2$

$\Rightarrow ((x + y) \times (x - y))^2$

$\Rightarrow \left(2a \times \frac{2}{a}\right)^2$

$= (4)^2 = 16$

92. (a) $a = 11$

$b = 9$

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

$\Rightarrow (a^3 - b^3) = ((a - b)(a^2 + ab + b^2))$

$\therefore \quad \frac{a^2 + b^2 + ab}{(a - b)(a^2 + ab + b^2)}$

$= \frac{1}{a - b} = \frac{1}{11 - 9}$

$= \frac{1}{2}$

93. (a) $p = 101$

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

$= \sqrt[3]{p^3 - 3p^2 + 3p - 1}$

$\therefore [(p - 1)^3 = p^3 - (1)^3 - 3p(p - 1)]$

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

$= p - 1$

$= 101 - 1 = 100$

94. (a) $x = 19 \quad y = 18$

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

$= \frac{x^2 + y^2 + xy}{(x - y)(x^2 + y^2 + xy)}$

$= \frac{1}{x - y} = \frac{1}{19 - 18} = 1$

95. (b) $50\%\ (p-q) = 30\%\ (p+q)$

$\frac{p-q}{2} = \frac{3}{10}(p+q)$

$\left[50\% = \frac{1}{2}\right]$

$\Rightarrow 5(p-q) = 3(p+q)$

$\Rightarrow 5p - 5q = 3p + 3q$

$\Rightarrow 2p = 8q$

$\Rightarrow 1p = 4q$

$\Rightarrow p : q$

$\Rightarrow 4 : 1$

96. (c) $x : y$

$2 : 1$

then, $5x^2 - 13xy + 6y^2$

$\Rightarrow 5 \times 4 - 13 \times 2 \times 1 + 6 \times 1^2$

$\Rightarrow 20 - 26 + 6 = 0$

97. (a) $\frac{a}{3} = \frac{b}{2} \Rightarrow \frac{a}{b} = \frac{3}{2}$

$\frac{2a+3b}{3a-2b} = \frac{2\times3+3\times2}{3\times3-2\times2}$

$= \frac{6+6}{9-4} = \frac{12}{5}$

98. (d) $\frac{a}{1-a} + \frac{b}{1-b} + \frac{c}{1-c} = 1$

Add 3 both sides

$\Rightarrow \frac{a}{1-a} + \frac{b}{1-b} + \frac{c}{1-c} + 3 = 1 + 3$

$\Rightarrow \left(\frac{a}{1-a}+1\right) + \left(\frac{b}{1-b}+1\right) + \left(\frac{c}{1-c}+1\right) = 4$

$\Rightarrow \left(\frac{a+1-a}{1-a}\right) + \left(\frac{b+1-b}{1-b}\right) + \left(\frac{c+1-c}{1-c}\right) = 4$

$\Rightarrow \frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c} = 4$

99. (b)

$\frac{2x-y}{x+2y} = \frac{1}{1}$ (Cross Multiply)

$\Rightarrow 4x - 2y = x + 2y$

$3x = 4y$

$x : y = 4 : 3$

$\Rightarrow \frac{3x-y}{3x+y} = \frac{3\times4-3}{3\times4+3}$

$= \frac{12-3}{12+3} = \frac{9}{15} = \frac{3}{5}$

100. (b) $x + \frac{1}{x} = 5$

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

(Divide by x)

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

$= \frac{2}{3\left(x+\frac{1}{x}\right) - 5} = \frac{2}{3\times5-5}$

$= \frac{2}{10} = \frac{1}{5}$

101. (b) $\sqrt{1 - \frac{x^3}{100}} = \frac{3}{5}$

$\Rightarrow 1 - \frac{x^3}{100} = \left(\frac{3}{5}\right)^2$

$\Rightarrow 1 - \frac{9}{25} = \frac{x^3}{100}$

$\Rightarrow \frac{16}{25} = \frac{x^3}{100}$

$\Rightarrow \frac{16\times100}{25} = x^3$

$\Rightarrow 16 \times 4 = x^3$

$\Rightarrow 4 = x$

102. (a) $a * b = 2a + 3b - ab$

$\Rightarrow 3 * 5 = 2 \times 3 + 3 \times 5 - 3 \times 5$

$= 6 + 15 - 15 = \mathbf{6}$

$\Rightarrow 5 * 3 = 2 \times 5 + 3 \times 3 - 5 \times 3$

$= 10 + 9 - 15 = \mathbf{4}$

$\therefore 3 * 5 + 5 * 3 = 6 + 4 = 10$

103. (b) $\sqrt{1 + \frac{x}{9}} = \frac{13}{3}$

By option

Put $x = 160$

$\sqrt{1 + \frac{160}{9}} = \sqrt{\frac{169}{9}} = \frac{13}{3}$

Alternate:

Squaring both sides

$\left(\sqrt{1+\frac{x}{9}}\right)^2 = \left(\frac{13}{3}\right)^2$

$\Rightarrow 1 + \frac{x}{9} = \frac{169}{9}$

$\Rightarrow \frac{9+x}{9} = \frac{169}{9}$

$9 + x = 169$

$\boxed{x = 160}$

104. (d) $\frac{4\sqrt{3}+5\sqrt{2}}{\sqrt{48}+\sqrt{18}} = a + b\sqrt{6}$

$\Rightarrow \frac{4\sqrt{3}+5\sqrt{2}}{\sqrt{16\times3}+\sqrt{9\times2}}$

$= \frac{4\sqrt{3}+5\sqrt{2}}{4\sqrt{3}+3\sqrt{2}}$

$\Rightarrow \frac{4\sqrt{3}+5\sqrt{2}}{4\sqrt{3}+3\sqrt{2}} \times \frac{4\sqrt{3}-3\sqrt{2}}{4\sqrt{3}-3\sqrt{2}}$

$= \frac{\left(4\sqrt{3}+5\sqrt{2}\right)\left(4\sqrt{3}-3\sqrt{2}\right)}{48-18}$

$= \frac{8\sqrt{6}+18}{30} = \frac{8\sqrt{6}}{30} + \frac{18}{30}$

$= \frac{4}{15}\sqrt{6} + \frac{3}{5}$

$= \frac{3}{5} + \frac{4}{15}\sqrt{6}$

$\therefore \frac{3}{5} + \frac{4}{15}\sqrt{6} = a + b\sqrt{6}$

By comparing cofficients of rational and irrational parts.

$\Rightarrow a = \frac{3}{5} \quad b = \frac{4}{15}$

$\left(\frac{3}{5}, \frac{4}{15}\right)$

105. (d) $a * b = ab$

$5 * 3 = 5 \times 3 = 15$

106. (c) $\sqrt{0.03\times0.3a} = 0.3 \times 0.3\sqrt{b}$

Squaring both sides

$0.03\times0.3\ a = (0.3)^2\times(0.3)^2\ b$

$\frac{3}{100}\times\frac{3}{10}a = \frac{9}{100}\times\frac{9}{100}\times b$

$9a = \frac{81}{10}b \Rightarrow 10a = 9b$

$\frac{a}{b} = \frac{9}{10} = 0.9$

107. (a) $x * y = (x+3)^2 (y-1)$

$5 * 4 = (5+3)^2 (4-1)$

$= 64 \times 3 = 192$

108. (b) $9\sqrt{x} = \sqrt{12} + \sqrt{147}$

$9\sqrt{x} = \sqrt{4\times3} + \sqrt{49\times3}$

$9\sqrt{x} = 9\sqrt{3}$

$x = 3$

109. (b) $X * Y = X^2 + Y^2 - XY$

$11 * 13 = (11)^2 + (13)^2 - 11 \times 13$

$= 121 + 169 - 143 = 147$

110. (a) $\sqrt{1+\frac{x}{961}} = \frac{32}{31}$

(Squaring both sides)

$\Rightarrow 1+\frac{x}{961} = \frac{1024}{961}$

$\Rightarrow \frac{961+x}{961} = \frac{1024}{961}$

$x = 1024 - 961 = 63$

111. (c) $\sqrt{0.04\times0.4\times a} = 0.004\times0.4\times\sqrt{b}$

$\Rightarrow \sqrt{\frac{4}{100}\times\frac{4}{10}\times a} = \frac{4}{1000}\times\frac{4}{10}\sqrt{b}$

$\Rightarrow \frac{4}{10}\sqrt{\frac{a}{10}} = \frac{4}{10}\times\frac{4}{1000}\sqrt{b}$

$\frac{a}{10} = \frac{16}{1000000}b$

$\Rightarrow \frac{a}{b} = \frac{16\times10}{1000000} = \frac{16}{100000}$

$\frac{a}{b} = 16\times10^{-5}$

112. (d) $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{3}{1}$

$\Rightarrow \frac{2\times9+3\times9+4\times9}{2\times1+3\times1+4\times1}$

$= \frac{18+27+36}{2+3+4} = \frac{81}{9} = 9$

113. (d) $2x + \frac{1}{3x} = 5$

$\Rightarrow 6x^2 + 1 = 15x$

$\therefore \frac{5x}{6x^2+20x+1}$

$= \frac{5x}{15x+20x} = \frac{5x}{35x} = \frac{1}{7}$

114. (a) $x \propto \frac{1}{y^2-1}$ (Given)

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

(k is constant)

Now $x = 24$ when $y = 10$ given

$\Rightarrow 24 = k \times \frac{1}{(10)^2-1}$

$\Rightarrow 24 = \frac{k}{99}$

$k = 24 \times 99$

$\Rightarrow x = ?$

$y = 5$

$x = 24\times99\times\frac{1}{25-1}$

$= 24\times99\times\frac{1}{24}$ $x = 99$

115. (a) $x^2 + y^2 + 2x + 1 = 0$

$\Rightarrow x^2 + 2x + 1 + y^2 = 0$

$(x+1)^2 + y^2 = 0$

Hence both terms are squares and there addition is zero so, it can be possible only when both terms are zeros.

$\therefore x + 1 = 0$

$\Rightarrow x = -1$

$y = 0$

$\therefore x^{31} + y^{5}$

$= (-1)^{31} + (0) = -1$

116. (b) $\frac{x}{2x^2+5x+2} = \frac{1}{6}$

$\frac{x}{x}$

$\frac{x}{\frac{2x^2}{x}+\frac{5x}{x}+\frac{2}{x}} = \frac{1}{6}$

$\Rightarrow \frac{1}{2x+\frac{2}{x}+5} = \frac{1}{6}$

$\Rightarrow 2\left(x+\frac{1}{x}\right)+5 = 6$

$\Rightarrow 6 - 5 = 2\left(x+\frac{1}{x}\right)$

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

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

117. (c) $a^2 + b^2 + c^2 = 2(a - b - c) - 3$

$\Rightarrow a^2 + b^2 + c^2 = 2a - 2b - 2c - 3$

$\Rightarrow a^2 + b^2 + c^2 - 2a + 2b + 2c + 1 + 1 + 1 = 0$

$\Rightarrow (a^2 - 2a + 1) + (b^2 + 2b + 1) + (c^2 + 2c + 1) = 0$

$\Rightarrow (a-1)^2 + (b+1)^2 + (c+1)^2 = 0$

$a = 1$

$b = -1$

$c = -1$

$\therefore$ $2a - 3b + 4c$

$= 2\times1 - 3\times(-1) + 4\times(-1)$

$= 2 + 3 - 4 = 1$

118. (a) $(3a+1)^2 + (b-1)^2 + (2c-3)^2 = 0$

$\Rightarrow (3a+1)^2 = 0$

$\Rightarrow 3a = -1$

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

$(b-1)^2 = 0 \Rightarrow b - 1 = 0 \Rightarrow b = 1$

$(2c-3)^2 = 0$

$\Rightarrow c = \frac{3}{2}$

$\therefore 3a+b+2c = 3\times\frac{-1}{3} + 1 + \frac{3}{2}\times2$

$= -1 + 1 + 3 = 3$

119. (b) $\frac{(a-b)^2}{(b-c)(c-a)} + \frac{(b-c)^2}{(a-b)(c-a)} + \frac{(c-a)^2}{(a-b)(b-c)}$

Now

$\Rightarrow \frac{(a-b)^2}{(b-c)(c-a)} \times \frac{(a-b)}{a-b}$

Multiply divide by (a - b) in Ist term

$\Rightarrow$ (b - c) in IInd term

$\Rightarrow$ (c - a) in IIIrd term

$\Rightarrow \frac{(a-b)^2(a-b)}{(b-c)(c-a)(a-b)} + \frac{(b-c)^2(b-c)}{(a-b)(b-c)(c-a)} + \frac{(c-a)^2(c-a)}{(a-b)(b-c)(c-a)}$

$\Rightarrow$ Let $a - b = x$

$b - c = y$

$c - a = z$

$\therefore x + y + z = 0$

$\therefore x^3 + y^3 + z^3 = 3xyz$

$\therefore (a-b)^3 + (b-c)^3 + (c-a)^3 = 3(a-b)(b-c)(c-a)$

$\therefore \frac{3(a-b)(b-c)(c-a)}{(a-b)(b-c)(c-a)} = 3$

120. (c) $(a-3)^2 + (b-4)^2 + (c-9)^2 = 0$

$a - 3 = 0 \quad a = 3$

$b - 4 = 0 \quad b = 4$

$c - 9 = 0 \quad c = 9$

$\therefore \sqrt{a+b+c} = \sqrt{3+4+9}$

$= \sqrt{16} = \pm 4$

121. (b) $1.5x = 0.04y$

$\Rightarrow \frac{x}{y} = \frac{0.04}{1.5} = \frac{4}{100} \times \frac{10}{15} = \frac{2}{75}$

$\therefore \frac{y^2 - x^2}{y^2 + x^2 + 2xy} = \frac{(y-x)(y+x)}{(y+x)^2}$

$\Rightarrow \frac{y-x}{y+x} = \frac{75-2}{75+2} = \frac{73}{77}$

122. (b) $a^{1/3} = 11$, $a = 11^3 = 1331$

$a^2 - 331a = a(a - 331)$

$= 1331(1331 - 331)$

$= 1331 \times 1000 = 1331000$

123. (a) $x^2 + y^2 + \frac{1}{x^2} + \frac{1}{y^2} = 4$

Take $x = y = 1$

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

Hence

$x^2 + y^2 = 1 + 1 = 2$

124. (b) $x^2 = y + z$ .....(I)

$x^2 + x = y + z + x$

add x on both sides

$x(x + 1) = x + y + z$

$\Rightarrow y^2 = x + z$ .....(II)

$y^2 + y = x + y + z$

add y on both sides

$y(y + 1) = (x + y + z)$

$\Rightarrow z^2 = y + x$ .....(II)

$z^2 + z = x + z + y$

add z on both sides

$z(z + 1) = x + y + z$

$\therefore x(x + 1) = x + y + z$

$\frac{x}{x+y+z} = \frac{1}{x+1}$

$\frac{y}{x+y+z} = \frac{1}{y+1}$

$\frac{z}{x+y+z} = \frac{1}{z+1}$

By adding them

$= \frac{x}{x+y+z} + \frac{y}{x+y+z} + \frac{z}{x+y+z} = \frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1}$

$= \frac{x+y+z}{x+y+z} = \frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1} = 1$

Alternate:

$x = y = z = 2$

$\therefore \frac{1}{2+1} + \frac{1}{2+1} + \frac{1}{2+1} = \frac{1}{3} +$

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

125. (d) $a^2 + b^2 = 2$

$c^2 + d^2 = 1$

Put values of a, b, c, d

Take $a = b = 1$

$c = 1$

$d = 0$

$\Rightarrow (ad - bc)^2 + (ac + bd)^2$

$\Rightarrow (0-1)^2 + (1+0)^2$

$\Rightarrow (-1)^2 + (1)^2 = 2$

126. (d) $x = \frac{4ab}{a+b}$

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

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

(By C – D rule)

$\Rightarrow$ again

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

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

$\Rightarrow \frac{x+2a}{x-2a} + \frac{x+2b}{x-2b} = \frac{3b+a}{b-a} + \frac{3a+b}{a-b}$

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

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

127. (c) $m + \frac{1}{m-2} = 4$

$\Rightarrow (m-2) + \frac{1}{(m-2)} = 2$

$\Rightarrow$ Squaring both sides

$(m-2)^2 + \frac{1}{(m-2)^2} + 2 \times (m-2) \times \frac{1}{(m-2)} = 4$

$(m-2)^2 + \frac{1}{(m-2)^2} = 2$

128. (c) $a^2 + b^2 + 2b + 4a + 5 = 0$

$a^2 + b^2 + 2b + 4a + 4 + 1 = 0$

$a^2 + 4a + 4 + b^2 + 2b + 1 = 0$

$(a+2)^2 + (b+1)^2 = 0$

$a + 2 = 0 \quad a = -2$

$b + 1 = 0 \quad b = -1$

$\frac{a-b}{a+b} \Rightarrow \frac{-2+1}{-2-1}$

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

129. (a) $x - y = \frac{x+y}{7} = \frac{xy}{4} = k$ (let)

$x - y = k$ .....(i)

$x + y = 7k$ .....(ii)

$xy = 4k$.....(iii)

$\therefore x - y = k$ .....(i)

$x + y = 7k$ ...(ii)

$x = 4k$

$y = 3k$

$\therefore xy \Rightarrow 4k \times 3k = 12k^2$

$12k^2 = 4k$

$k = \frac{1}{3} \quad \therefore xy = 4k = \frac{4}{3}$

130. (d) $\frac{x^2}{yz} + \frac{y^2}{zx} + \frac{z^2}{xy}$

$= \frac{x^2}{yz} \times \frac{x}{x} + \frac{y^2 \times y}{zx \times y} + \frac{z^2}{xy} \times \frac{z}{z}$

$= \frac{x^3 + y^3 + z^3}{xyz}$

($\because$ If $x + y + z = 0$

then, $x^3 + y^3 + z^3$

$\Rightarrow 3xyz$)

$\therefore \frac{3xyz}{xyz} = 3$

131. (b) $a + b + c = 0$

$\frac{1}{(a+b)(b+c)} + \frac{1}{(a+c)(b+a)} + \frac{1}{(c+a)(c+b)}$

$\Rightarrow \frac{(a+c)+(b+c)+(a+b)}{(a+b)(a+c)(b+c)}$

$\Rightarrow \frac{2(a+b+c)}{(a+b)(a+c)(b+c)} = 0$

($\because a + b + c = 0$)

132. (c) a + b + c = 0
Assume values a = 2 b = –2 c = 0
a+ b + c = 2 – 2 + 0 = 0(satisfy)

$$\therefore \frac{a^2+b^2+c^2}{a^2-bc}$$

$$\Rightarrow \frac{4+4+0}{4-0} \Rightarrow \frac{8}{4} = 2$$

Alternate:
a + b + c = 0
b + c = – a
Squaring both sides
$(b + c)^2 = a^2$
$b^2 + c^2 + 2bc = a^2$
$b^2 + c^2 = a^2 - 2bc$

$$\therefore \frac{a^2+b^2+c^2}{a^2-bc}$$

$$\Rightarrow \frac{a^2+a^2-2bc}{a^2-bc}$$

$$\Rightarrow \frac{2a^2-2bc}{a^2-bc} \Rightarrow \frac{2(a^2-bc)}{a^2-bc} = 2$$

133. (c) $x^2 + y^2 - 4x - 4y + 8 = 0$
$x^2 + 4 - 4x + y^2 + 4 - 4y = 0$
$(x - 2)^2 + (y - 2)^2 = 0$
$x - 2 = 0, \quad y - 2 = 0$
$x = 2, \quad y = 2$
$\therefore x - y = 2 - 2 = 0$

134. (a) $x = b + c - 2a$
$y = c + a - 2b$
$z = a + b - 2c$
$\Rightarrow x + y + z = (b + c - 2a) + (c + a - 2b) + (a + b - 2c)$
$\therefore$ Now
$= x^2 + y^2 + 2xy - z^2$
$= (x+ y)^2 - z^2$ ($A^2 - B^2 = (A + B)(A - B)$)
$(x + y - z)(x + y + z)$
= As we know $(x + y + z) = 0$
$\therefore x^2 + y^2 - z^2 + 2xy = 0 \times (x + y - z) = 0$

135. (b) $a^2 + b^2 + c^2 = ab + bc + ca$
take value a = b = c = 2

$$\Rightarrow \frac{a+c}{b} = \frac{2+2}{2} = 2$$

136. (a) $x + \frac{1}{x} = \sqrt{3}$ (take cube on both sides)

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

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

$$\Rightarrow x^3 + \frac{1}{x^3} + 3\left(\sqrt{3}\right) = 3\sqrt{3}$$

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

$\therefore x^6 = -1$
$\therefore x^{18} + x^{12} + x^6 + 1$
$= (-1)^3 + (-1)^2 + (-1) + 1$
$= -1 + 1 - 1 + 1 = 0$

137. (c) $ax^3 + 3x^2 - 8x + b$ is divisible by $(x + 2)$ and $(x - 2)$
$\therefore (x + 2)$ and $(x - 2)$ are factors
$\therefore x + 2 = 0 \Rightarrow x = -2$
$x - 2 = 0 \Rightarrow x = 2$
Put $x = -2$
$\therefore a(-2)^3 + 3(-2)^2 - 8(-2) + b = 0$
$= -8a + 12 + 16 + b = 0$
$-8a + b + 28 = 0$
$-8a + b = -28$ ..... (I)
and
Put $x = 2$
$\Rightarrow a(2)^3 + 3(2)^2 - 8 \times 2 + b = 0$
$\Rightarrow 8a + 12 - 16 + b = 0$
$8a + b - 4 = 0$
$8a + b = 4$ ..... (II)
From equation (I) & (II)
$\therefore -8a + b = -28$
$8a + b = 4$
$2b = -24$
$b = -12$
$a = 2$

138. (b) $x^2 - 3x + 1 = 0$
$x^2 + 1 = 3x$
Divide by x

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

$$\Rightarrow \frac{3x}{x}$$

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

Cubing both sides

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

$$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times 3 = 27$$

$$x^3 + \frac{1}{x^3} = 18$$

139. (a) $x + \frac{1}{4x} = \frac{3}{2}$
Multiply by 2 both sides

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

Take cube both sides

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

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

$= 27$

$$= 8x^3 + \frac{1}{8x^3} + 3 \times 3 = 27$$

$$8x^3 + \frac{1}{8x^3} = 27 - 9 = 18$$

140. (a) $\frac{1}{x+y} = \frac{1}{x} + \frac{1}{y}$

$$\Rightarrow \frac{1}{x+y}$$

$$= \frac{x+y}{xy}$$

$xy = (x + y)^2$
$x^2 + y^2 + 2xy = xy$
$x^2 + y^2 + xy = 0$
$\therefore x^3 - y^3 = (x - y)(x^2 + y^2 + xy)$
$(x^3 - y^3) = (x - y) \times 0 = 0$

141. (c) $x = a(b - c)$
$y = b(c - a)$
$z = c(a - b)$

Let $\frac{x}{a} = b - c$ $\quad \frac{x}{a} = A$

$\frac{y}{b} = c - a$ $\quad \frac{y}{b} = B$

$\frac{z}{c} = a - b$ $\quad \frac{z}{c} = C$

$\therefore A+B+C = b-c+c-a+a-b = 0$
$\therefore A^3 + B^3 + C^3 = 3ABC$

$$\therefore \left(\frac{x}{a}\right)^3 + \left(\frac{y}{b}\right)^3 + \left(\frac{z}{c}\right)^3$$

$$= 3 \times \frac{x}{a} \times \frac{y}{b} \times \frac{z}{c}$$

$$= \frac{3xyz}{abc}$$

142. (c) $xy\ (x + y) = 1$

$x + y = \frac{1}{xy}$

Cubing both sides

$\Rightarrow (x + y)^3 = \frac{1}{x^3y^3}$

$x^3 + y^3 + 3xy\ (x + y) = \frac{1}{x^3y^3}$

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

$\because \left(x + y = \frac{1}{xy}\right)$

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

143. (d) $x^4 + \frac{1}{x^4} = 119 \qquad x > 1$

$\therefore x^4 + \frac{1}{x^4} + 2 = 119 + 2 = 121$

$\left(x^2 + \frac{1}{x^2}\right)^2 = (11)^2$

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

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

$\left(x + \frac{1}{x}\right)^2 = 13$

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

$\Rightarrow$ Taking cube both sides

$x^3 + \frac{1}{x^3} + 3\sqrt{13} = \left(\sqrt{13}\right)^3$

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

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

144. (b) $3x + \frac{1}{2x} = 5$

$\Rightarrow$ Multiply both sides by $\frac{2}{3}$

$\therefore 3x \times \frac{2}{3} + \frac{1}{2}x \times \frac{2}{3} = 5 \times \frac{2}{3}$

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

$\therefore$ Taking cube on both side

$8x^3 + \frac{1}{27x^3} + 3 \times 2x \times \frac{1}{3x}\left(2x + \frac{1}{3x}\right) = \left(\frac{10}{3}\right)^3$

$8x^3 + \frac{1}{27x^3} + 2 \times \frac{10}{3} = \frac{1000}{27}$

$8x^3 + \frac{1}{27x^3} = \frac{1000}{27} - \frac{20}{3}$

$= \frac{1000 - 180}{27} = \frac{820}{27} = 30\frac{10}{27}$

145. (a) $x + y = z$

$x + y - z = 0$

If $a + b + c = 0$ then $a^3 + b^3 + c^3 - 3abc = 0$

$\therefore x^3 + y^3 - z^3 = -3xyz$

$\therefore x^3 + y^3 - z^3 + 3xyz = 0$

$3xyz - 3xyz = 0$

146. (c) $\frac{a}{b} + \frac{b}{a} = 1$

$\therefore a^2 + b^2 = ab$

$\therefore a^2 + b^2 - ab = 0$

$\therefore a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

$= (a + b) \times 0 = 0$

147. (c) $x = 2 - 2^{1/3} + 2^{2/3}$

$x - 2 = 2^{2/3} - 2^{1/3}$ ..... (I)

Take cube both sides

$(x - 2)^3 = (2^{2/3} - 2^{1/3})^3$

$x^3 - 8 - 6x^2 + 12x = (2^{2/3})^3 - (2^{1/3})^3 - 3 \times 2^{2/3} \cdot 2^{1/3}(2^{2/3} - 2^{1/3})$

$x^3 - 8 - 6x^2 + 12x = 2^2 - 2 - 3 \times 2(x - 2)$

From equation (I)

$x^3 - 8 - 6x^2 + 12x = 4 - 2 - 3 \times 2(x - 2)$

$x^3 - 8 - 6x^2 + 12x = 2 - 6x + 12$

$x^3 + 18x - 6x^2 - 8 - 14 = 0$

$x^3 + 18x - 6x^2 - 22 = 0$

$\therefore x^3 - 6x^2 + 18x + 18 = 22 + 18 = 40$

148. (d) $a^3 - b^3 - c^3 - 3abc = 0$

$\therefore a - b - c = 0$

$a = b + c$

149. (c) $a = 2.361$

$b = 3.263$

$c = 5.624$

$a + b - c = 0$

$2.361 + 3.263 - 5.624 = 0$

$\therefore a^3 + b^3 - c^3 + 3abc \Rightarrow 0$

150. (d) $p = 124$

$\sqrt[3]{p\left(p^2 + 3p + 3\right) + 1}$

$= \sqrt[3]{p^3 + 3p^2 + 3p + 1}$

$= \sqrt[3]{(p+1)^3} = \sqrt[3]{(125)^3} = 125$

151. (c) $x + \frac{1}{x} = 2$

(assume $x = 1$, so, $1 + 1 = 2$)

$x^{17} + \frac{1}{x^{19}} = (1)^{17} + \frac{1}{(1)^{19}}$

$= 1 + 1 = 2$

152. (c) $x : y = 3 : 4$

$\therefore \frac{5x - 2y}{7x + 2y} = \frac{5 \times 3 - 2 \times 4}{7 \times 3 + 2 \times 4}$

$= \frac{15 - 8}{21 + 8} = \frac{7}{29}$

153. (c) $\frac{2p}{p^2 - 2p + 1} = \frac{1}{4}$

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

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

$p + \frac{1}{p} - 2 = 8$

$p + \frac{1}{p} = 10$

154. (a) $x + y = 2z$

$x - z = z - y$

$x - z \Rightarrow -(y - z)$ .....(i)

$\frac{x}{x - z} + \frac{z}{y - z} = \frac{x}{x - z} - \frac{z}{x - z}$

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

155. (b) $a^2b = abc = 180$

or $a^2 = c = 180$

$\therefore c = 180$

156. (d) $(a - 1)\sqrt{2} + 3 = b\sqrt{2} + a$

Comparing Cofficient of $\sqrt{2}$ & constant terms.

$\therefore a = 3$

$\therefore a - 1 = b$

$3 - 1 = b$

$b = 2$

$a + b = 3 + 2 = 5$

157. (b) $64^{x+1} = \frac{64}{4^x}$

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

$4^{3x+3} = 4^{3-x}$

$\therefore 3x + 3 = 3 - x$

$4x = 0$

$x = 0$

158. (c) $ax^2 + bx + c = a(x - p)^2$

$ax^2 + bx + c = a(x^2 + p^2 - 2px)$

$\Rightarrow ax^2 + bx + c = ax^2 + ap^2 - 2apx$

Comparing cofficients of x^2 and x

$\Rightarrow b = -2ap$

$\Rightarrow p = \frac{-b}{2a}$ .....(i)

and $c = ap^2$

$\Rightarrow c = a \times \frac{b^2}{4a^2}$ (From (i))

$\boxed{4ac = b^2}$

159. (d) $a + b + c + d = 1$

$(1 + a)(1 + b)(1 + c)(1 + d)$

$\Rightarrow$ For maximum value a, b, c, d

$a = b = c = d = \frac{1}{4}$

$= \left(1+\frac{1}{4}\right)\left(1+\frac{1}{4}\right)\left(1+\frac{1}{4}\right)\left(1+\frac{1}{4}\right) = \left(\frac{5}{4}\right)^4$

160. (b) $a^2 + b^2 + c^2 + 3 = 2(a + b + c)$

$a^2 + b^2 + c^2 + 3 = 2a + 2b + 2c$

$a^2 - 2a + 1 + b^2 - 2b + 1 + c^2 - 2c + 1 = 0$

$(a - 1)^2 + (b - 1)^2 + (c - 1)^2 = 0$

$a = 1$

$b = 1$

$c = 1$

$(a + b + c) \Rightarrow 1 + 1 + 1 = 3$

161. (c) $x - \frac{1}{x} = 5$

$x^2 + \frac{1}{x^2} - 2 = 25$

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

162. (b) $x = 3 + 2\sqrt{2}$

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

$\left(\sqrt{2}\right)^2 + (1)^2 + 2 \times 1 \times \sqrt{2}$

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

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

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

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

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

163. (c) Put $a = b = 1$ and $c = -2$

we get $a + b + c = 1 + 1 - 2 = 0$

$0 = 0$

(satisfy)

$\therefore \frac{a^2+b^2+c^2}{a^2-bc}$

$= \frac{(1)^2+(1)^2+(-2)^2}{(1)^2-(1)(-2)} = \frac{6}{3} = 2$

164. (b) $n = 7 + 4\sqrt{3}$

$n = 4 + 3 + 4\sqrt{3}$

$n = (2)^2 + \left(\sqrt{3}\right)^2 + 2 \times 2 \times \sqrt{3}$

$n = \left(2+\sqrt{3}\right)^2$

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

$\therefore \frac{1}{\sqrt{n}} = 2 - \sqrt{3}$

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

165. (b) $x = \sqrt{3} + \sqrt{2}$

$\frac{1}{x} = \frac{1}{\sqrt{3}+\sqrt{2}} \times \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}-\sqrt{2}} = \sqrt{3} - \sqrt{2}$

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

166. (d) $p + q = 10$ .... (i)

and $pq = 5$

Squaring both sides of equation (i)

$(p + q)^2 = (10)^2$

$p^2 + q^2 + 2pq = 100$

$p^2 + q^2 + 2 \times 5 = 100$

$p^2 + q^2 = 90$

Now,

$\therefore \frac{p}{q} + \frac{q}{p} = \frac{p^2+q^2}{pq} = \frac{90}{5} = 18$

167. (d) $x = 3 + 2\sqrt{2}$, $xy = 1$, $y = \frac{1}{x^2}$

$y = \frac{1}{x} = \frac{1}{3+2\sqrt{2}} = 3 - 2\sqrt{2}$

$\therefore x + \frac{1}{x} = 3 + 2\sqrt{2} + 3 - 2\sqrt{2} = 6$

$\therefore x^2 + \frac{1}{x^2} = 36 - 2 = 34$

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

$= \frac{34+3}{34-3} = \frac{37}{31}$

168. (a) $\frac{x}{b+c} = \frac{y}{c+a} = \frac{z}{a+b}$ (given)

$\therefore \frac{x}{b+c} = \frac{y}{c+a}$

$\Rightarrow \frac{x}{b+c} = \frac{x-y}{(b+c)-(c+a)} = \frac{x-y}{b-a}$

Similarly

$\frac{y}{c+a} = \frac{z}{a+b}$

$\therefore \frac{y}{c+a} = \frac{y-z}{(c+a)-(a+b)} = \frac{y-z}{c-b}$ again

$\Rightarrow \frac{z}{a+b} = \frac{x}{b+c}$

$\Rightarrow \frac{z}{a+b} = \frac{z-x}{(a+b)-(b+c)} = \frac{z-x}{a-c}$

$\therefore \frac{x-y}{b-a} = \frac{y-z}{c-b} = \frac{z-x}{a-c}$

169. (d) $x - y = 2$, $xy = 24$ (given)

$x^2 + y^2 - 2xy = 4$

$x^2 + y^2 - 2 \times 24 = 4$

$x^2 + y^2 = 4 + 48 = 52$

170. (a) $\frac{x^2}{y^2} + tx + \frac{y^2}{4}$ (given)

To make it a perfect square it should be in the form

$A^2 + 2AB + B^2 = (A + B)^2$

$= \left(\frac{x}{y}\right)^2 + tx + \left(\frac{y}{2}\right)^2$

$= A^2 + 2AB + B^2$

$A = \frac{x}{y}$, $B = \frac{y}{2}$ & $2AB = tx$

So, $tx = 2 \times \frac{x}{y} \times \frac{y}{2}$

$tx = x$

$t = 1$

171. (d) $a = x + y$

$b = x - y$

$c = x + 2y$

$a^2 + b^2 + c^2 - ab - bc - ca = \frac{1}{2}((a - b)^2 + (b - c)^2 + (c - a)^2)$

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

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

$= \frac{1}{2}(4y^2 + 9y^2 + y^2)$

$= \frac{1}{2}(14y^2) = 7y^2$

172. (a) $a^2 + b^2 + c^2 = ab + bc + ca$
Here take $a = b = c = 2$ (assume)
$4 + 4 + 4 = 4 + 4 + 4$
(proceed)

Hence, $\frac{a+b}{c} = \frac{2+2}{2} = 2$

173. (b) $x + \frac{1}{x} = 2, \quad x \neq 0$

put $x = 1$
$1 + 1 = 2$

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

174. (a) $\frac{a}{b} + \frac{b}{a} = 1$

$\frac{a^2+b^2}{ab} = 1$

$a^2 + b^2 - ab = 0$
$\therefore a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
$= (a + b) \times 0 = 0$

175. (a) $\left(x + \frac{1}{x}\right)^2 = 3$

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

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

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

$\Rightarrow x^6 + 1 = 0$
$\Rightarrow x^6 = -1$
$\Rightarrow x^{72} + x^{66} + x^{54} + x^{24} + x^6 + 1$
$\Rightarrow (x^6)^{12} + (x^6)^{11} + (x^6)^9 + (x^6)^4 + x^6 + 1$
$\Rightarrow (-1)^{12} + (-1)^{11} + (-1)^9 + (-1)^4 + -1 + 1$
$\Rightarrow 1 - 1 - 1 + 1 - 1 + 1 = 0$

176. (b) $a + \frac{1}{a} = \sqrt{3}$

$a^6 = -1$

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

177. (b) $x^3 + y^3 = 35$
$\Rightarrow x + y = 5$
Take cube on both sides,
$(x + y)^3 = (5)^3$
$x^3 + y^3 + 3xy(x + y) = 125$
$35 + 3xy(5) = 125$
$15xy = 125 - 35$
$15xy = 90$
$xy = 6$

$\therefore \frac{1}{x} + \frac{1}{y} = \frac{x+y}{xy} = \frac{5}{6}$

178. (b) $a^3 - b^3 = 56$
$\Rightarrow a - b = 2$
$\Rightarrow a^3 - b^3 - 3ab(a - b) = (2)^3$
(By cubing)
$56 - 3ab \times 2 = 8$
$-6ab = 8 - 56$
$6ab = 48$
$\Rightarrow ab = 8$
$(a - b) = 2$
$(a - b)^2 = a^2 + b^2 - 2ab = 4$
$= a^2 + b^2 = 4 + 2ab$
$a^2 + b^2 = 4 + 2 \times 8 = 20$

179. (b) $(a^2 + b^2)^3 = (a^3 + b^3)^2$
$\Rightarrow a^6 + b^6 + 3a^2b^2(a^2 + b^2) = a^6 + b^6 + 2a^3b^3$
$\Rightarrow a^6 + b^6 + 3a^4b^2 + 3a^2b^4 = a^6 + b^6 + 2a^3b^3$
$\Rightarrow 3a^4b^2 + 3a^2b^4 = 2a^3b^3$
$\Rightarrow a^2b^2(3a^2 + 3b^2) = 2a^3b^3$
$3a^2 + 3b^2 = 2ab$
$3(a^2 + b^2) = 2ab$
$\Rightarrow \frac{a^2+b^2}{ab} = \frac{2}{3}$
$\Rightarrow \frac{b}{a} + \frac{a}{b} = \frac{2}{3}$

180. (a) $x + \frac{1}{x} = 5 \quad x^2 + \frac{1}{x^2} + 2 = 25$

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

now, $\frac{x^4+3x^3+5x^2+3x+1}{x^4+1}$

divided by x^2,

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

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

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

$= \frac{23 + 3(5) + 5}{23} = \frac{43}{23}$

181. (b) $x^3 + \frac{1}{x^3} = 0$

$\left(x + \frac{1}{x}\right)^3 - 3x \times \frac{1}{x}\left(x + \frac{1}{x}\right) = 0$

$\left(x + \frac{1}{x}\right)^3 - 3\left(x + \frac{1}{x}\right) = 0$

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

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

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

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

182. (c) $x + \frac{1}{x} = 3$

(Squaring both sides)

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

On cubing both sides

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

$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times 3 = 27$

$x^3 + \frac{1}{x^3} = 18$

$\therefore \left(x^3 + \frac{1}{x^3}\right)\left(x^2 + \frac{1}{x^2}\right) = 18 \times 7$

$\left(x^5 + \frac{1}{x^5}\right) + \left(x + \frac{1}{x}\right) = 126$

$\left(x^5 + \frac{1}{x^5}\right) + 3 = 126$

$\left(x^5 + \frac{1}{x^5}\right) = 123$

183. (b) $x - \frac{1}{x} = 3$

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

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

$= 27 + 9 = 36$

184. (a) $m^4 + \frac{1}{m^4} = 119$

$m^4 + \frac{1}{m^4} + 2 = 119 + 2$

$\left(m^2 + \frac{1}{m^2}\right)^2 = 121$

$m^2 + \frac{1}{m^2} = 11$

$m^2 + \frac{1}{m^2} - 2 = 11 - 2$

$\left(m - \frac{1}{m}\right)^2 = 9$

$m - \frac{1}{m} = \pm 3$

185. (d) $x + y + z = 6$

$(x-1)^3 + (y-2)^3 + (z-3)^3$

$\therefore$ as $x + y + z = 6$

Take values

$x = 1,\ y = 2,\ z = 3$

$(1 + 2 + 3) = 6$

$\therefore (1-1)^3 + (2-2)^3 + (3-3)^2 = 0$

Now assume values in options.

option 'd' satisfies the given relation.

Hence 'd' is correct.

186. (b) $a + b + c = 6$

$= a^2 + b^2 + c^2 = 14$

$a^3 + b^3 + c^3 = 36$

Put values as

$a = 1,\ b = 2,\ c = 3$

$1 + 2 + 3 = 6$

$1 + 4 + 9 = 14$

$1 + 8 + 27 = 36$

$\therefore$ $abc = 1 \times 2 \times 3 = 6$

Alternate:

$\therefore (a + b + c)^2 = a^2 + b^2 + c^2 +$

$2(ab + bc + ca)$

$36 = 14 + 2(ab + bc + ca)$

$(ab + bc + ca) = 11$

$\Rightarrow a^3 + b^3 + c^3 - 3abc = (a + b + c)$

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

$\Rightarrow 36 - 3abc = 6(14 - 11)$

$\Rightarrow 36 - 3abc = 6 \times 3$

$-3abc = 18 - 36$

$3abc = 18$

$abc = 6$

187. (a) $a + b = 1$

By cubing

$a^3 + b^3 + 3ab(a + b) = 1^3$

$a^3 + b^3 + 3ab = 1\ (a + b = 1)$

$a^3 + b^3 + 3ab = k$

From above both equations

$k = 1$

188. (d) $a = 34,\ b = 33,\ c = 33$

$\because a^3 + b^3 + c^3 - 3abc = (a + b +$

$c) \times \frac{1}{2}\left[(a-b)^2 + (b-c)^2 + (c-a)^2\right]$

$= (34 + 33 + 33) \times \frac{1}{2}$

$\left[(34-33)^2 + (33-33)^2 + (33-34)^2\right]$

$= 100 \times \frac{1}{2}(1 + 0 + 1)$

$= 100 \times 1 = 100$

189. (a) $2^x \cdot 2^y = 8 \Rightarrow 2^{x+y} = 2^3$

$x + y = 3$

.....(i)

$9^x \cdot 3^y = 81$

$3^{2x} \cdot 3^y = 3^4$

$\Rightarrow 2x + y = 4$

.....(ii)

from equation (i) and (ii),

$$\begin{array}{r} x + y = 3 \\ 2x + y = 4 \\ \hline -x = -1 \end{array}$$

$x = 1$

$y = 2$

$\therefore (x, y) = (1, 2)$

190. (b) $2x + y = 3$ ..... (i)

$x + 2y = 4$ ... (ii)

Multiply equation (ii) by 2.

$2x + 4y = 8$

.....(iii)

Now substracting equation (i) from (iii)

$$\begin{array}{r} 2x + 4y = 8 \\ 2x + y = 5 \\ \hline 3y = 3 \end{array}$$

$y = 1$

$x = 2$

$\therefore$ intersection point = (2, 1)

191. (a) $y : x = 4 : 15$

$\therefore \frac{y}{x} = \frac{4}{15}$

$\therefore \frac{x-y}{x+y} \Rightarrow \frac{x\left(1 - \frac{y}{x}\right)}{x\left(1 + \frac{y}{x}\right)}$ taking

x common.

$\Rightarrow \frac{1 - \frac{4}{15}}{1 + \frac{4}{15}} \Rightarrow \frac{11}{15} \times \frac{15}{19} = \frac{11}{19}$

192. (b) $x^4 - 2x^2 + k$

$\Rightarrow (A + B)^2 = A^2 + 2AB + B^2$

$(A - B)^2 = A^2 - 2AB + B^2$

$\Rightarrow (x^2)^2 - 2 \times x^2 + k$

$(A)^2 - 2 \times AB + B^2$

$\therefore$ $A = x^2,\ B = -1$

$B^2 = K$

$(-1)^2 = K$

$K = 1$

193. (c) $\frac{\frac{1}{3}\times\frac{1}{3}\times\frac{1}{3} + \frac{1}{4}\times\frac{1}{4}\times\frac{1}{4} + \frac{1}{5}\times\frac{1}{5}\times\frac{1}{5} - 3\times\frac{1}{3}\times\frac{1}{4}\times\frac{1}{5}}{\frac{1}{3}\times\frac{1}{3} + \frac{1}{4}\times\frac{1}{4} + \frac{1}{5}\times\frac{1}{5} - \left(\frac{1}{3}\times\frac{1}{4} + \frac{1}{4}\times\frac{1}{5} + \frac{1}{5}\times\frac{1}{3}\right)}$

$= \frac{\left(\frac{1}{3}\right)^3 + \left(\frac{1}{4}\right)^3 + \left(\frac{1}{5}\right)^3 - 3\times\frac{1}{3}\times\frac{1}{4}\times\frac{1}{5}}{\left(\frac{1}{3}\right)^2 + \left(\frac{1}{4}\right)^2 + \left(\frac{1}{5}\right)^2 - \left(\frac{1}{3}\times\frac{1}{4} + \frac{1}{4}\times\frac{1}{5} + \frac{1}{5}\times\frac{1}{3}\right)}$

$A^3 + B^3 + C^3 - 3ABC = (A^2 + B^2 + C^2 - AB - BC - CA)(A + B + C)$

Let $\frac{1}{3} = A$

$\frac{1}{4} = B$

$\frac{1}{5} = C$

$\Rightarrow \frac{(A+B+C)(A^2+B^2+C^2-AB-BC-CA)}{(A^2+B^2+C^2-AB-BC-CA)}$

$= A + B + C$

$\therefore A + B + C = \frac{1}{3} + \frac{1}{4} + \frac{1}{5}$

$= \frac{20 + 15 + 12}{60} = \frac{47}{60}$

194. (d) $\frac{a}{1-a} + \frac{b}{1-b} + \frac{c}{1-c} = 1$

Adding 3 on both sides

$\frac{a}{1-a} + \frac{b}{1-b} + \frac{c}{1-c} + 3 = 1 + 3$

$\frac{a}{1-a} + 1 + \frac{b}{1-b} + 1 + \frac{c}{1-c} + 1 = 4$

$\Rightarrow \frac{a + 1 - a}{1-a} + \frac{b+1-b}{1-b} + \frac{c+1-c}{1-c} = 4$

$\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c} = 4$

195. (c) $a^2 + b^2 + c^2 = 2(a - b - c) - 3$

$\Rightarrow a^2 + b^2 + c^2 - 2a + 2b + 2c + 1 + 1 + 1 = 0$

$\Rightarrow a^2 - 2a + 1 + b^2 + 2b + 1 + c^2 + 2c + 1 = 0$

$\Rightarrow (a-1)^2 + (b+1)^2 + (c+1)^2 = 0$

$a = 1, b = -1, c = -1$

$\therefore 2a - 3b + 4c = 2 \times 1 - 3 \times -1 + 4 \times -1$

$= 2 + 3 - 4 = 1$

196. (b) $\dfrac{(a-b)^2}{(b-c)(c-a)} + \dfrac{(b-c)^2}{(a-b)(c-a)} + \dfrac{(c-a)^2}{(a-b)(b-c)}$

$\Rightarrow \dfrac{(a-b)^2}{(b-c)(c-a)} \times \dfrac{(a-b)}{(a-b)} + \dfrac{(b-c)^2}{(a-b)(c-a)} \times \dfrac{(b-c)}{(b-c)} + \dfrac{(c-a)^2}{(a-b)(b-a)} \times \dfrac{(c-a)}{(c-a)}$

$\Rightarrow \dfrac{(a-b)^3}{(b-c)(c-a)(a-b)} + \dfrac{(b-c)^3}{(a-b)(c-a)(b-c)} + \dfrac{(c-a)^3}{(a-b)(b-a)(c-a)}$

$= \dfrac{(a-b)^3 + (b-c)^3 + (c-a)^3}{(b-c)(c-a)(a-b)}$

(If $x + y + z = 0$ then $x^3 + y^3 + z^3 = 3xy$)

$= \dfrac{3(a-b)(b-c)(c-a)}{(b-c)(c-a)(a-b)} = 3$

197. (c) $(x-3)^2 + (y-5)^2 + (z-4)^2 = 0$

$\therefore (x-3)^2 = 0 \quad x = 3$

$(y-5)^2 = 0 \quad y = 5$

$(z-4)^2 = 0 \quad z = 4$

$\therefore \dfrac{x^2}{9} + \dfrac{y^2}{25} + \dfrac{c^2}{16}$

$\Rightarrow \dfrac{9}{9} + \dfrac{25}{25} + \dfrac{16}{16} = 3$

198. (d) $x \propto \dfrac{1}{y^2}$ (Inversely proportional)

$x = \dfrac{k}{y^2}$

$(y = 2)$ for $(x = 1)$ (Given)

$\therefore 1 = \dfrac{k}{(2)^2} \Rightarrow 1 = \dfrac{k}{4}$

$k = 4$

$\therefore$ For $y = 6$

$x = \dfrac{4}{(6)^2} = \dfrac{1}{9} = \dfrac{1}{9}$

199. (d) $a^2 + b^2 + c^2 + 3 = 2(a - b - c)$

$a^2 + b^2 + c^2 + 3 - 2a + 2b + 2c = 0$

$a^2 - 2a + 1 + b^2 + 2b + 1 + c^2 + 2c + 1 = 0$

$(a-1)^2 + (b+1)^2 + (c+1)^2 = 0$

$a = 1, b = -1, c = -1$

$\therefore 2a - b + c = 2 + 1 - 1 = 2$

200. (d) $x^2 - y^2 = 80$

$\Rightarrow (x - y)(x + y) = 80$

$x - y = 8$ .....(I)

$\therefore (x + y) \times 8 = 80$

$(x + y) = 10$ .....(II)

Now average of x and y

$= \dfrac{x+y}{2} = \dfrac{10}{2} = 5$

201. (a) Third proportional of a and b $= \dfrac{b^2}{a}$

Third proportion of $\left(\dfrac{x}{y} + \dfrac{y}{x}\right)$ and $\sqrt{x^2 + y^2}$

$\dfrac{\left(\sqrt{x^2+y^2}\right)^2}{\frac{x}{y} + \frac{y}{x}} = \dfrac{x^2+y^2}{\frac{x^2+y^2}{xy}} = xy$

202. (c) $\dfrac{4x}{3} + 2P = 12 \quad x = 6$ (Given)

$\dfrac{4 \times 6}{3} + 2P = 12$

$2P = 12 - 8$

$P = \dfrac{4}{2}$

$P = 2$

203. (a) $\dfrac{4+3\sqrt{3}}{7+4\sqrt{3}}$

(By Rationalization of denominator)

$\dfrac{4+3\sqrt{3}}{7+4\sqrt{3}} \times \dfrac{7-4\sqrt{3}}{7-4\sqrt{3}}$

$= \dfrac{(4+3\sqrt{3})(7-4\sqrt{3})}{49-48}$

$4 + 3\sqrt{3}$

$\times 7 - 4\sqrt{3}$

$-16\sqrt{3} - 12 \times 3$

$28 + 21\sqrt{3}$

$28 - 36 + 5\sqrt{3} = 5\sqrt{3} - 8$

204. (d) $a = \sqrt{6} - \sqrt{5}$

$b = \sqrt{5} - 2$

$c = 2 - \sqrt{3}$

Rationalize all the terms

$a = \dfrac{\sqrt{6}-\sqrt{5}}{\sqrt{6}+\sqrt{5}} \times \sqrt{6}+\sqrt{5}$

$= \dfrac{1}{\sqrt{6}+\sqrt{5}}$

$b = \dfrac{\sqrt{5}-2}{\sqrt{5}+2} \times \sqrt{5}+2 = \dfrac{1}{\sqrt{5}+2}$

$= \dfrac{1}{\sqrt{5}+\sqrt{4}}$

$c = \dfrac{2-\sqrt{3}}{2+\sqrt{3}} \times 2+\sqrt{3}$

$\dfrac{1}{2+\sqrt{3}} = \dfrac{1}{\sqrt{4}+\sqrt{3}}$

Now, $a = \dfrac{1}{\sqrt{6}+\sqrt{5}}$

$b = \dfrac{1}{\sqrt{5}+\sqrt{4}}$

$c = \dfrac{1}{\sqrt{4}+\sqrt{3}}$

Now the term whose denominator is largest is the smallest term.

So, $a < b < c$.

205. (b) $x = \dfrac{4\sqrt{15}}{\sqrt{5}+\sqrt{3}}$

$\dfrac{x+\sqrt{20}}{x-\sqrt{20}} + \dfrac{x+\sqrt{12}}{x-\sqrt{12}} = ?$

$\therefore x = \dfrac{4 \times \sqrt{5} \times \sqrt{3}}{\sqrt{5}+\sqrt{3}} = \dfrac{2 \times \sqrt{5} \times \sqrt{12}}{\sqrt{5}+\sqrt{3}}$

or $\dfrac{2 \times \sqrt{20} \times \sqrt{3}}{\sqrt{5}+\sqrt{3}}$

$\dfrac{x}{\sqrt{12}} = \dfrac{2\sqrt{5}}{\sqrt{5}+\sqrt{3}}$

by C - D rule

$\dfrac{x+\sqrt{12}}{x-\sqrt{12}} = \dfrac{2\sqrt{5}+\sqrt{5}+\sqrt{3}}{2\sqrt{5}-\sqrt{5}-\sqrt{3}}$

$= \dfrac{3\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$

$$\frac{x}{\sqrt{20}} = \frac{2\sqrt{3}}{\sqrt{5}+\sqrt{3}}$$

$$\frac{x+\sqrt{20}}{x-\sqrt{20}} = \frac{2\sqrt{3}+\sqrt{5}+\sqrt{3}}{2\sqrt{3}-\sqrt{5}-\sqrt{3}}$$

$$= \frac{3\sqrt{3}+\sqrt{5}}{\sqrt{3}-\sqrt{5}}$$

$$\therefore \frac{x+\sqrt{12}}{x-\sqrt{12}} + \frac{x+\sqrt{20}}{x-\sqrt{20}}$$

$$= \frac{3\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} + \frac{3\sqrt{3}+\sqrt{5}}{\sqrt{3}-\sqrt{5}}$$

$$= \frac{3\sqrt{5}+\sqrt{3}-3\sqrt{3}-\sqrt{5}}{\sqrt{5}-\sqrt{3}}$$

$$= \frac{2\sqrt{5}-2\sqrt{3}}{\sqrt{5}-\sqrt{3}} = 2$$

206. (b) $x = 5 - \sqrt{21}$

$2x = 10 - 2\sqrt{21}$ .....(i)

$$\Rightarrow 2x = (\sqrt{7})^2 + (\sqrt{3})^2 - 2(\sqrt{7})(\sqrt{3})$$

$$\Rightarrow 2x = (\sqrt{7}-\sqrt{3})^2$$

$$\Rightarrow x = \frac{1}{2}(\sqrt{7}-\sqrt{3})^2$$

$$\Rightarrow \sqrt{x} = \frac{1}{\sqrt{2}}\sqrt{(\sqrt{7}-\sqrt{3})^2}$$

$$= \frac{1}{\sqrt{2}}(\sqrt{7}-\sqrt{3})$$

$$\therefore \frac{\sqrt{x}}{\sqrt{32-2x}-\sqrt{21}}$$

$$= \frac{\sqrt{7}-\sqrt{3}}{\sqrt{2}\left(\sqrt{32-\left(10-2\sqrt{21}\right)}-\sqrt{21}\right)}$$

$$= \frac{\sqrt{7}-\sqrt{3}}{\sqrt{2}\left(\sqrt{22+2\sqrt{21}}-\sqrt{21}\right)}$$

$$= \frac{\sqrt{7}-\sqrt{3}}{\sqrt{2}\left(\sqrt{(\sqrt{21}+1)^2}-\sqrt{21}\right)}$$

$$= \frac{\sqrt{7}-\sqrt{3}}{\sqrt{2}(\sqrt{21}+1-\sqrt{21})}$$

$$= \frac{(\sqrt{7}-\sqrt{3})}{\sqrt{2}}$$

207. (b) $6x - 5y = 13$.....(I)

$7x + 2y = 23$.....(II)

Multiply equation (I) with 7 and (II) with 6

$\therefore$ $7(6x - 5y = 13)$

$42x - 35y = 91$.....(III)

$42x + 12y = 138$.....(IV)

Subtract (IV) from (III)

$$\begin{array}{r} 42x - 35y = 91 \\ 42x + 12y = 138 \\ \hline -47y = -47 \end{array}$$

$y = 1$

$\therefore$ $x = 3$

$\therefore$ $11x + 18y$

$= 11 \times 3 + 18 \times 1 = 33 + 18 = 51$

208. (a) $(x^{b+c})^{b-c}\,(x^{c+a})^{c-a}\,(x^{a+b})^{a-b}$ $(x \neq 0)$

$$= x^{b^2-c^2} \cdot x^{c^2-a^2} \cdot x^{a^2-b^2}$$

$$x^{b^2-c^2+c^2-a^2+a^2-b^2} = x^0 = 1$$

209. (c) $$\frac{x}{a} = \frac{1}{a} - \frac{1}{x}$$

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

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

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

$x(1 - x) = a$

$x - x^2 = a$

210. (c) $x + \frac{1}{x} = 99$

$\therefore$ $x^2 + 1 = 99x$

$x^2 + 1 = 2 \times 99x$

$x^2 + 1 = 198x$

$$= \frac{100x}{2x^2+2+102x}$$

$$= \frac{100x}{198x+102x} = \frac{100x}{300x} = \frac{1}{3}$$

211. (c) $$\frac{4x-3}{x} + \frac{4y-3}{y} + \frac{4z-3}{z} = 0$$

$$\Rightarrow \frac{4x}{x} - \frac{3}{x} + \frac{4y}{y} - \frac{3}{y} + \frac{4z}{z} - \frac{3}{z} = 0$$

$$= 4 - \frac{3}{x} + 4 - \frac{3}{y} + 4 - \frac{3}{z} = 0$$

$$12 - 3\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right) = 0$$

$$-3\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right) = -12$$

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

212. (c) $\frac{xy}{x+y} = a$, $\frac{xz}{x+z} = b$, $\frac{yz}{y+z} = c$

Now

$$\Rightarrow \frac{x+y}{xy} = \frac{1}{a}, \quad \frac{x+z}{xz} = \frac{1}{b},$$

$$\frac{y+z}{yz} = \frac{1}{c}$$

$$\Rightarrow \frac{1}{y} + \frac{1}{x} = \frac{1}{a}, \frac{1}{z} + \frac{1}{x} = \frac{1}{b},$$

$$\frac{1}{z} + \frac{1}{y} = \frac{1}{c}$$

Now we have to find the value of x

$$\therefore \frac{1}{a} + \frac{1}{b} - \frac{1}{c} = \frac{1}{y} + \frac{1}{x} + \frac{1}{z}$$

$$\frac{1}{x} - \frac{1}{y} - \frac{1}{z}$$

$$\therefore \frac{1}{a} + \frac{1}{b} - \frac{1}{c} = \frac{2}{x}$$

$$\frac{bc+ac-ab}{abc} = \frac{2}{x}$$

$$x = \frac{2abc}{bc+ac-ab}$$

213. (d) $xy = 8$ Given

So, $(x, y) = (1, 8)$

We have to Questions the options and check them

(8, 1)

(2, 4)

(4, 2)

$\therefore$ $2x + y = 2 \times 1 + 8 = 10$

$2 \times 8 + 1 = 11$

$2 \times 2 + 4 = 8$ minimum

$2 \times 4 + 2 = 10$

Hence in this question we have all the options. So, take all positive factor otherwise we should have to take –ve values also.

$(x, y) = (1, 8)$

(8, 1)

(2, 4)

(4, 2)

(–1, –8)

(–8, –1)

(–2, –4)

(–4, –2)

214. (b) $x^2 + x + 1 = 0$ .....(i)

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

$$\Rightarrow x^2 + \frac{1}{4} + 2 \times \frac{1}{2} \times x + q^2$$

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

.....(ii)

Comparing constant term of equation (i) and (ii)

$$\therefore \quad q^2 + \frac{1}{4} = 1$$

$$= q^2 = 1 - \frac{1}{4} = \frac{3}{4}$$

$$q = \pm\sqrt{\frac{3}{4}} = \pm\frac{\sqrt{3}}{2}$$

215. (b) $a^2 - 4a - 1 = 0$

$a^2 - 1 = 4a$

$$a - \frac{1}{a} = 4$$

Squaring both sides

$$a^2 + \frac{1}{a^2} - 2 = 16$$

$$a^2 + \frac{1}{a^2} = 18$$

$$\therefore \quad a^2 + \frac{1}{a^2} + 3\left(a-\frac{1}{a}\right)$$

$= 18 + 3 \times 4 = 18 + 12 = 30$

216. (d) $(x - 2)(x - 9)$

$= x^2 - 9x - 2x + 18$

$= x^2 - 11x + 18$

$= ax^2 + bx + c = 0$

for minimum value

$$\frac{4ac-b^2}{4a}$$

$$= \frac{4\times1\times18-(-11)^2}{4\times1} = \frac{72-121}{4} = \frac{-49}{4}$$

217. (d) $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$

$4\sqrt{3}x^2 + 8x - 3x - 2\sqrt{3} = 0$

$4x\left(\sqrt{3}x+2\right) - \sqrt{3}\left(\sqrt{3}x+2\right) = 0$

$\left(4x-\sqrt{3}\right)\left(\sqrt{3}x+2\right) = 0$

218. (c) $\sqrt{x} = \sqrt{3} + \sqrt{5}$

Squaring both sides

$x = 3 + 5 - 2\sqrt{3}\sqrt{5}$

$x = 8 - 2\sqrt{5} \times \sqrt{3}$

$x - 8 = -2\sqrt{15}$

(Squaring both sides)

$x^2 + 64 - 16x = 60$

$x^2 + 4 - 16x = 0$

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

219. (b) $x^2 = y + z$

$y^2 = z + x$

$z^2 = x + y$

$\Rightarrow \quad x^2 + x = x + y + z$

Adding x on both sides

$x(x+1) = x + y + z$

$$\frac{1}{(x+1)} = \frac{x}{x+y+z}$$

Similarly

$$\frac{1}{y+1} = \frac{y}{x+y+z} \text{ and } \frac{1}{z+1}$$

$$= \frac{z}{x+y+z}$$

$$\therefore \quad \frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{1+z}$$

$$= \frac{x}{x+y+z} + \frac{y}{x+y+z} + \frac{z}{x+y+z}$$

$$= \frac{x+y+z}{x+y+z} = 1$$

220. (c) $m + \frac{1}{m-2} = 4$

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

Squaring both sides

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

$(m-2)^2 + \frac{1}{(m-2)^2} = 2$

221. (d) $x + y + z = 0$

$$\frac{x^2}{yz} + \frac{y^2}{zx} + \frac{z^2}{xy} = ?$$

$$\frac{x^3}{xyz} + \frac{y^3}{yxz} + \frac{z^3}{zxy}$$

$$\Rightarrow \frac{x^3+y^3+z^3}{zxy}$$

$x + y + z = 0$

$\Rightarrow \quad x^3 + y^3 + z^3 - 3xyz = 0$

$x^3 + y^3 + z^3 = 3xyz$

$$\therefore \quad \frac{3xyz}{zxy} = 3$$

222. (c) $a + b + c = 0$

have values

$a = 1$

$b = 2$

$c = -3$

$$\Rightarrow \left(\frac{a+b}{c}+\frac{b+c}{a}+\frac{c+a}{b}\right)\left(\frac{a}{b+c}+\frac{b}{c+a}+\frac{c}{a+b}\right)$$

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

$\Rightarrow \quad (-1-1-1)(-1-1-1)$

$\Rightarrow \quad -3 \times -3 = 9$

223. (a) $a + \frac{1}{b} = 1$ $b + \frac{1}{c} = 1$

Values of a, b, c assume

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

$b = 2$

$c = -1$

$$\therefore \quad abc = \frac{1}{2} \times 2 \times -1 = -1$$

224. (c) $a + b + c = 2s$

$\therefore$ let

$a = 2$

$b = 1$

$c = 1$

$s = 2$

$$\therefore \frac{(s-a)^2+(s-b)^2+(s-c)^2+s^2}{a^2+b^2+c^2}$$

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

$$\Rightarrow \frac{0+1+1+4}{4+1+1} = \frac{6}{6} = 1$$

225. (d) $x = 3 + 2\sqrt{2}$

$x^2 = (3 + 2\sqrt{2})^2$

(Squaring both sides)

$= 9 + 8 + 12\sqrt{2}$

$= 17 + 12\sqrt{2}$

$$\frac{1}{x^2} = \frac{1}{17+12\sqrt{2}} \times \frac{17-12\sqrt{2}}{17-12\sqrt{2}}$$

$= 17 - 12\sqrt{2}$

$$\therefore \quad \frac{1}{x^2} + x^2 = 17+12\sqrt{2}+17-$$

$12\sqrt{2} = 34$

226. (b) $x\left(3-\frac{2}{x}\right)=\frac{3}{x}$

$\Rightarrow 3x-2=\frac{3}{x}$

$\Rightarrow 3x-\frac{3}{x}=2$

$\Rightarrow 3\left(x-\frac{1}{x}\right)=2$

$\Rightarrow x-\frac{1}{x}=\frac{2}{3}$

Squaring both sides

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

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

227. (a) $x^2-3x+1=0$

$\Rightarrow x^2+1=3x$

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

Squaring both sides

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

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

$\therefore \quad x^2+\frac{1}{x^2}+x+\frac{1}{x}$

$= 7+3=10$

228. (c) $a^2+b^2=5ab$

$\Rightarrow \frac{a^2}{ab}+\frac{b^2}{ab}=5$

$\Rightarrow \frac{a}{b}+\frac{b}{a}=5$

Squaring both sides

$\left(\frac{a}{b}\right)^2+\left(\frac{b}{a}\right)^2+2\times\frac{a}{b}\times\frac{b}{a}=25$

$\frac{a^2}{b^2}+\frac{b^2}{a^2}=25-2=23$

229. (d) $xy+yz+zx=0$

$\therefore \quad xy+zx=-yz$

$\Rightarrow xy+yz=-zx$

$\Rightarrow yz+zx=-xy$

$\therefore \quad \frac{1}{x^2-yz}+\frac{1}{y^2-zx}+\frac{1}{z^2-xy}$

Puting values of $-yz$, $-zx$, $-xy$ from above

$\Rightarrow \frac{1}{x^2+(xy+zx)}+\frac{1}{y^2+(xy+yx)}+\frac{1}{z^2+(yz+zx)}$

$\Rightarrow \frac{1}{x(x+y+z)}+\frac{1}{y(x+y+z)}+\frac{1}{z(x+y+z)}$

$\Rightarrow \frac{1}{(x+y+z)}\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right)$

$\Rightarrow \frac{1}{(x+y+z)}\left(\frac{zy+xz+xy}{xyz}\right)$

$\Rightarrow \frac{1}{x+y+z}\times 0=0$

230. (c) $a+b+c=9$

For minimum value $a=b=c$

$\Rightarrow 3a=9$

$a=\frac{9}{3}=3$

For minimum value $a=b=c=3$

$a^2+b^2+c^2=3^2+3^2+3^2$

$\Rightarrow 9+9+9 \Rightarrow 27$

231. (d) $a^2+b^2+4c^2=2(a+b+2c)-3$

$\Rightarrow a^2+b^2+4c^2-2a-2b-4c+3=0$

$\Rightarrow a^2-2a+1+b^2-2b+1+4c^2+4c+1=0$

$(a-1)^2+(b-1)^2+(2c+1)^2=0$

$\therefore \quad a-1=0 \qquad a=1$

$b-1=0 \qquad b=1$

$2c+1=0 \qquad c=\frac{-1}{2}$

$\therefore a^2+b^2+c^2=1+1+\frac{1}{4}=2+\frac{1}{4}=\frac{9}{4}=2\frac{1}{4}$

232. (a) $\frac{x-a^2}{b+c}+\frac{x-b^2}{c+a}+\frac{x-c^2}{a+b}=4(a+b+c)$

Note:- In such type of question to save your valuable time assume values as per your need which make your caluclation easier.

assume $a=1$, $b=0$, $c=1$

Make sure there will be no $\left(\frac{0}{0}\right)$ from

$\therefore \quad \frac{x-1}{1+0}+\frac{x-0}{1+1}+\frac{x-1}{1+0}=4$

$(1+0+1)$

$\Rightarrow x-1+\frac{x}{2}+x-1=4\times 2$

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

$\frac{5x}{2}=10$

$x=4$

Now put values in options take option (a), $(a+b+c)^2=(1+0+1)^2=4$

233. (b) $4x-y=2$

$2x-8y+4=0$

Note:-

For two linear equaltions

$a_1x+b_1y+c_1=0$

$a_2x+b_2y+c_2=0$

Where x and y are variable.

(i) $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$ then there will be unique solution.

(ii) $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$, then infinite soultion

(iii) $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$ then no solution.

$\therefore \quad \frac{4}{2}\neq\frac{-1}{-8}$

So, the equations have only one solution

234. (d) $\frac{a}{b}=\frac{4}{5}$ and $\frac{b}{c}=\frac{15}{16}$

$\Rightarrow \frac{a}{b}\times\frac{b}{c}=\frac{4}{5}\times\frac{15}{16}=\frac{3}{4}$

$\therefore \quad \frac{a}{c}=\frac{3}{4}$

$\therefore \quad \frac{18c^2-7a^2}{45c^2+20a^2}$

$=\frac{c^2\left(18-7\frac{a^2}{c^2}\right)}{c^2\left(45+20\frac{a^2}{c^2}\right)}$

$=\frac{18-7\left(\frac{a}{c}\right)^2}{45+20\left(\frac{a}{c}\right)^2}=\frac{18-7\times\frac{9}{16}}{45+20\times\frac{9}{16}}$

$=\frac{18-\frac{63}{16}}{45+\frac{45}{4}}=\frac{225\times 4}{16\times 225}=\frac{1}{4}$

235. (d) $\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=\frac{1}{xy}+\frac{1}{yz}+\frac{1}{zx}$

Go through options 'd'
take $x = y = z$

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

$\therefore$ Option d is right

236. (b) $a + b = 1$
$c + d = 1$

$$a - b = \frac{d}{c}$$

$$\text{or } \frac{1}{a-b} = \frac{c}{d}$$

$$\Rightarrow \frac{a+b}{a-b} = \frac{c}{d} \qquad (\because a + b = 1)$$

by C & D rule

$$\Rightarrow \frac{(a+b)+(a-b)}{(a+b)-(a-b)} = \frac{c+d}{c-d}$$

$$\Rightarrow \frac{2a}{2b} = \frac{c+d}{c-d}$$

$$\Rightarrow \frac{a}{b} = \frac{c+d}{c-d}$$

Now multiply & divide by (c + d)

$$\frac{a}{b} = \frac{(c+d)}{(c-d)} \times \frac{(c+d)}{(c+d)} = \frac{(c+d)^2}{c^2-d^2}$$

$$\Rightarrow \frac{a}{b} = \frac{(c+d)^2}{(c^2-d^2)}$$

$c + d = 1$

$$\frac{a}{b} = \frac{1}{c^2-d^2}$$

$$c^2 - d^2 = \frac{b}{a}$$

237. (b) $x = 3t,$ (I)

$$y = \frac{1}{2}(t + 1)$$

$$x = 2y$$

$$\Rightarrow x = 2\times\frac{1}{2}(t + 1)$$

$$x = t + 1 \qquad \text{(II)}$$

$\therefore$ $3t = t + 1$ (from equation (i) and (ii))

$$2t = 1$$

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

238. (c) $x^2 + \frac{1}{5}x + a^2$

$A^2 + 2 \times AB + B^2 = (A + B)^2$

$$x^2+2\times\frac{1}{10}\times x+a^2=\left(x+\frac{1}{10}\right)^2$$

$A = x$

$$B = \frac{1}{10}$$

$$B = a = \frac{1}{10}$$

239. (d) $2 - 3x - 4x^2 = 0$
$-4x^2 - 3x + 2 = 0$
$ax^2 + bx + c = 0$
In quadratic equation

(i) When $a > 0$

$$\text{Minimum value} = \frac{4ac-b^2}{4a}$$

(ii) When $a < 0$

$$\text{Maximum value} = \frac{4ac-b^2}{4a}$$

$\therefore$ In $-4x^2-3x + 2$
$a < 0$
$\therefore$ Maximum value
= Maximum value

$$\frac{4\times-4\times2-(-3)^2}{4\times-4} = \frac{-32-9}{-16} = \frac{41}{16}$$

240. (a) $x^2 - \ldots + k$

$$\Rightarrow (x)^2 - 2 \times x^2 \times 1 + \left(\sqrt{k}\right)^2$$

$$\Rightarrow A^2 - 2 \times A \times B + \left(\sqrt{k}\right)^2$$

$$\Rightarrow \sqrt{k} = \pm 1$$

$k = 1$

241. (b) If $(x - 1)$ and $(x + 3)$ and factor of $x^2 + k_1x + k_2$

$\therefore$ When $(x - 1) = 0$
$x^2 + k_1x + k_2 = 0$
$1 + k_1 + k_2 = 0$
$k_1 + k_2 = -1$
.....(I)
When $(x + 3) = 0$
$x = -3$
$9 - 3k_1 + k_2 = 0$
$-3k_1 + k_2 = -9$..... (II)
From equation (I) and (II)
$k_1 = 2, K_2 = -3$

242. (d) $\frac{5x}{2x^2+5x+1} = \frac{1}{3}$

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

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

$$\left(2x+\frac{1}{x}+5\right) = 15$$

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

divide by 2 both sides

$$x + \frac{1}{2x} = \frac{10}{2} = 5$$

243. (b) $\frac{a}{b} + \frac{b}{a} = 1$

$$\frac{a^2+b^2}{ab} = 1$$

$a^2 + b^2 = ab$
$a^2 + b^2 - ab = 0$
$\therefore$ $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
$= (a + b) \times 0 = 0$

244. (c) $xy(x + y) = 1$

$$x + y = \frac{1}{xy}$$

Cubing both sides

$$\Rightarrow (x + y)^3 = \frac{1}{x^3y^3}$$

$$x^3 + y^3 + 3xy(x + y) = \frac{1}{x^3y^3}$$

$$x^3 + y^3 + 3 = \frac{1}{x^3y^3} \quad \left(x+y=\frac{1}{xy}\right)$$

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

245. (c) $x + \frac{1}{x} = 3$

Squaring both sides

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

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

again cubing both sides

$$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times 3 = 27$$

$x^3 + \frac{1}{x^3} = 18$

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

$= 7 \times 18 = 126$

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

$= 126 - 3 = 123$

246. (c) $x^2 + \frac{1}{x^2} = 83$

Subtracting 2 from both sides

$\Rightarrow x^2 + \frac{1}{x^2} - 2 = 83 - 2$

$\Rightarrow \left(x - \frac{1}{x}\right)^2 = 81$

$\Rightarrow x - \frac{1}{x} = 9$

Take cube on both sides

$x^3 - \frac{1}{x^3} - 3\left(x - \frac{1}{x}\right) = 729$

$x^3 - \frac{1}{x^3} - 3 \times 9 = 729$

$x^3 - \frac{1}{x^3} = 729 + 27 = 756$

247. (d) $\left(a + \frac{1}{a}\right)^2 = 3$

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

Take cube on both sides

$\left(a + \frac{1}{a}\right)^3 = (\sqrt{3})^3$

$= a^3 + \frac{1}{a^3} + 3a \cdot \frac{1}{a}\left(a + \frac{1}{a}\right) = 3\sqrt{3}$

$= a^3 + \frac{1}{a^3} + 3\sqrt{3} = 3\sqrt{3}$

$= a^3 + \frac{1}{a^3} = 0$

248. (b) $\frac{x}{x^2 - 2x + 1} = \frac{1}{3}$

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

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

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

$\Rightarrow x + \frac{1}{x} = 3 + 2 = 5$

Taking cube on both sides

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

$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times 5 = 125$

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

249. (b) $x + \frac{1}{x} = 4$

Squaring both sides

$x^2 + \frac{1}{x^2} + 2 = 16$

$x^2 + \frac{1}{x^2} = 14$

Squaring again

$x^4 + \frac{1}{x^4} = 196 - 2 = 194$

250. (c) $x + y + z = 6$

$x^2 + y^2 + z^2 = 20$

$\Rightarrow (x + y + z)^2 = (6)^2$

$\Rightarrow x^2 + y^2 + z^2 + 2(xy + yz + zx) = 36$

$\Rightarrow 20 + 2(xy + yz + zx) = 36$

$\Rightarrow 2(xy + yz + zx) = 16$

$xy + yz + zx = 8$

$\Rightarrow x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - zx - yz)$

$\Rightarrow x^3 + y^3 + z^3 - 3xyz = 6(20 - 8)$

$= 6 \times 12 = 72$

251. (b) $x = 1 - \sqrt{2}$

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

(हर का परिमेयकरण)

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

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

Take cube

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

252. (b) $x = a - b$

$y = b - c$

$z = c - a$

$x + y + z = a - b + b - c + c - a = 0$

$\therefore x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx) = 0$

253. (d) $x = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$

$y = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$

$\therefore x = \frac{1}{y}$

$y = \frac{1}{x}$ $\therefore xy = 1$

$\therefore x + y = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}} + \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$

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

$\Rightarrow \frac{3 + 2 - 2\sqrt{6} + 3 + 2 + 2\sqrt{6}}{1} = 10$

$\Rightarrow (x + y)^3 = x^3 + y^3 + 3xy(x + y)$

$\Rightarrow (10)^3 = x^3 + y^3 + 3 \times 1(10)$

$\Rightarrow x^3 + y^3 = 1000 - 30 = 970$

254. (d) $(x - a)(x - b) = 1$

$(x - a) = \frac{1}{(x - b)}$

$\Rightarrow a - b = -5$ (Given)

add and subtract x

$a - b + x - x = -5$

$(a - x) + (x - b) = -5$

$(x - b) - (x - a) = -5$

$(x - a) - (x - b) = -5$

$\therefore (x - a) - \frac{1}{(x - a)} = +5$

Taking cube on both sides

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

$\Rightarrow (x - a)^3 - \frac{1}{(x-a)^3} - 3 \times (5) = 125$

$(x-a)^3 - \frac{1}{(x-a)^3} = 125 + 15 = 140$

255. (a) $a^2 + b^2 + c^2 = 2(a - b - c) - 3$

$\Rightarrow a^2 + b^2 + c^2 - 2a + 2b + 2c + 1 + 1 + 1 = 0$

$\Rightarrow a^2 - 2a + 1 + b^2 + 2b + 1 + c^2 + 2c + 1 = 0$

$\Rightarrow (a-1)^2 + (b+1)^2 + (c+1)^2 = 0$

यह तभी संभव है जब x, y तथा z का मान 0 होगा क्योंकि इनकी घातांक (Power) सम संख्या (Even no.) है जो कभी किसी भी संख्या को -ve नहीं आने देगी अतः x, y व z का मान 0 ही संभव हो।

$\Rightarrow a - 1 = 0 \quad a = 1$

$\Rightarrow b + 1 = 0 \quad b = -1$

$\Rightarrow c + 1 = 0 \quad c = -1$

$= 4 \times 1 - 3 \times -1 + 5 \times -1$

$= 4 + 3 - 5 = 2$

256. (c) $2x + \frac{2}{x} = 3$

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

Taking cube on both sides

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

$\left|\begin{array}{l} x + \frac{1}{x} = a \\ x^3 + \frac{1}{x^3} = a^3 - 3a \end{array}\right.$

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

$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times \frac{3}{2} = \frac{27}{8}$

$\Rightarrow x^3 + \frac{1}{x^3} = \frac{27}{8} - \frac{9}{2}$

$= \frac{27 - 36}{8} = \frac{-9}{8}$

$\therefore x^3 + \frac{1}{x^3} + 2 = \frac{-9}{8} + 2$

$= x^3 + \frac{1}{x^3} + 2 = \frac{-9 + 16}{8} = \frac{7}{8}$

257. (b) $a + b + c = 15$

$a^2 + b^2 + c^2 = 83$

$\therefore (a + b + c)^2 = (15)^2$

$\Rightarrow a^2 + b^2 + c^2 + 2ab + 2bc + 2ca = 225$

$\Rightarrow 83 + 2(ab + bc + ca) = 225$

$\Rightarrow 2(ab + bc + ca) = 225 - 83 = 142$

$ab + bc + ca = 71$

$\Rightarrow a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

$\Rightarrow a^3 + b^3 + c^3 - 3abc = 15(83 - 71)$

$= 15 \times 12 = 180$

258. (a) $a - b = 3$

$a^3 - b^3 = 27$

For exams assume the values of a>b

Let $a = 3, b = 0$

$a - b = 3 - 0 = 3$

and $(3)^3 - 0 = 27$

Hence, $a + b = 3 + 0 = 3$

259. (b) $x + \frac{1}{x+1} = 1$

adding (1) both sides

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

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

Put $x + 1 = 1$

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

$\therefore (x+1)^5 + \frac{1}{(x+1)^5}$

$= 1 + 1 = 2$

260. (a) $\frac{1}{a} + \frac{1}{b} = \frac{1}{a+b}$

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

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

$\Rightarrow a^2 + b^2 + 2ab = ab$

$a^2 + b^2 + ab = 0$

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

$a^3 - b^3 = 0$

261. (d) If $a + b + c = 0$

then, $a^3 + b^3 + c^3 = 3abc$

$a^3 + b^3 + c^3 - 3abc = 0$

262. (c) $x = y = 333, z = 334$

$\Rightarrow x^3 + y^3 + z^3 - 3xyz = \frac{1}{2}(x + y + z)((x - y)^2 + (y - z)^2) + (z - x)^2$

$\Rightarrow \frac{1}{2}(333 + 333 + 334)[(333 + 333)^2 + (333 - 334)^2 + (334 - 333)^2]$

$\Rightarrow \frac{1}{2}(1000)(0 + 1 + 1) = 1000$

263. (a) $(a^2 - b^2)^3 + (b^2 - c^2)^3 + (c^2 - a^2)^3$

Let $a^2 - b^2 = A$

$b^2 - c^2 = B$

$A + B + C = (a^2 - b^2) + (b^2 - c^2) + (c^2 - a^2) = 0$

$\therefore A^3 + B^3 + C^3 - 3ABC$

$= \frac{1}{2}(A + B + C)[(A - B)^2 + (B - C)^2 + (C - A)^2]$

$A^3 + B^3 + C^3 - 3ABC = 0$

$A^3 + B^3 + C^3 = 3ABC$

Where $A = a^2 - b^2$ etc.

$\therefore A^3 + B^3 + C^3 = 3 \times (a^2 - b^2)(b^2 - c^2)(c^2 - a^2)$

Hence (a + b) (a - b) is a factor

264. (b) $a = \frac{b^2}{b-a}$

$\Rightarrow a(b - a) = b^2$

$ab - a^2 = b^2$

$a^2 + b^2 - ab = 0$

$\Rightarrow a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$

$\therefore a^3 + b^3 = 0$

265. (b) $p - 2q = 4$

Take cube on both sides

$(p - 2q)^3 = (4)^3$

$p^3 - 8q^3 - 3p \times 2q(p - 2q) = 64$

$p^3 - 8q^3 - 6pq \times 4 = 64$

$p^3 - 8q^3 - 24pq = 64$

$p^3 - 8q^3 - 24pq - 64 = 0$

266. (c) $x - 1$

$\frac{1}{x^{99}} + \frac{1}{x^{98}} + \frac{1}{x^{97}} + \frac{1}{x^{96}} + \frac{1}{x^{95}} + \frac{1}{x^{94}} + \frac{1}{x} - 1$

$= \frac{1}{(-1)^{99}} + \frac{1}{(-1)^{98}} + \frac{1}{(-1)^{97}} + \frac{1}{(-1)^{96}} + \frac{1}{(-1)^{95}} + \frac{1}{(-1)^{94}} + \frac{1}{(-1)} - 1$

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

267. (a) $\frac{1}{\sqrt[3]{4} + \sqrt[3]{2} + 1} = a\sqrt[3]{4} + b\sqrt[3]{2} + c$

$\Rightarrow \frac{1}{\sqrt[3]{4} + \sqrt[3]{2} + 1} = \frac{1}{\left(2^{\frac{1}{3}}\right)^2 + 2^{\frac{1}{3}} + (1)^2}$

$\Rightarrow (\because A^3 - B^3 = (A - B)(A^2 + AB + B^2))$

$\therefore$ Put, $A = 2^{\frac{1}{3}}$, $B = 1$

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

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

$2^{\frac{1}{3}} - 1 = a\left(2^{\frac{2}{3}}\right) + b\left(2\right)^{\frac{1}{3}} + c$

(Comparing the terms)

$a = 0$

$b = 1$

$c = -1$

$\therefore a + b + c = 0 + 1 - = 0$

268. (d) $x = \sqrt[3]{2+\sqrt{3}}$

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

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

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$\Rightarrow \frac{2-\sqrt{3}}{4-3} = 2-\sqrt{3}$

$\therefore x^3 + \frac{1}{x^3} = 2 + \sqrt{3} + 2 - \sqrt{3} = 4$

269. (d) $x = \sqrt[3]{5} + 2$

$\Rightarrow x - 2 = \sqrt[3]{5}$

Take cube on both sides

$\Rightarrow (x-2)^3 = \left(\sqrt[3]{5}\right)^3$

$\Rightarrow x^3 - 8 - 3 \times 2 \times x\,[x-2] = 5$

$\Rightarrow x^3 - 8 - 6x^2 + 12x = 5$

$\therefore x^3 - 6x^2 + 12x - 13 = 0$

270. (b) $\frac{p^2-p}{2p^3+p^2} + \frac{p^2-1}{p^2+3p} + \frac{p^2}{p+1}$

In such type of question a ssume values of p.

$\therefore$ Let p = 1

$\therefore \frac{1-1}{2+1} + \frac{1-1}{1+3} + \frac{1}{1+1}$

$= 0 + 0 + \frac{1}{2} = \frac{1}{2}$

Now check options (b)

$\frac{1}{2p^2} = \frac{1}{2}$

Hence option (b) is Answer.

271. (b) $x + \frac{1}{x} = 2$

$\Rightarrow$ Put x = 1

$\therefore 1 + \frac{1}{(1)} = 2$

2 = 2 (satisfy)

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

$= (1 + 1)(1 + 1)$

$= 2 \times 2 = 4$

272. (a) a, b, c, are +ve integers

So, minimum value is $a = b = c = 1$

$\therefore$ Putting the value of x in equation

$a^3 + b^3 + c^3 - 3abc$

$= 1 + 1 + 1 - 3 \times 1 \times 1 \times 1 = 0$

Hence minimum value is 0.

273. (d) $f(x) = 12x^3 - 13x^2 - 5x + 7$

If we divide $f(x)$ by

$\Rightarrow$ $(3x + 2)$ then

$3x + 2 = 0$

$x = -\frac{2}{3}$

$\therefore f\left(\frac{-2}{3}\right) = 12\left(\frac{-2}{3}\right)^3 - 13\left(\frac{-2}{3}\right)^2 - 5\left(\frac{-2}{3}\right) + 7$

$= -12 \times \frac{8}{27} - \frac{52}{9} + \frac{10}{3} + 7$

$= \frac{-96-156+90+189}{27}$

$= \frac{-252+279}{27} = \frac{27}{27} = 1$

274. (c) $ab + bc + ca = 0$

$-bc = (ab + ca)$

$-ac = ab + bc$

$-ab = bc + ca$

$\Rightarrow \frac{1}{a^2-bc} + \frac{1}{b^2-ac} + \frac{1}{c^2-ab}$

$\Rightarrow \frac{1}{a^2+ab+ca} + \frac{1}{b^2+ab+bc} + \frac{1}{c^2+bc+ca}$

$\Rightarrow \frac{1}{a(a+b+c)} + \frac{1}{b(a+b+c)} + \frac{1}{c(a+b+c)}$

$\Rightarrow \frac{1}{a+b+c}\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$

$\Rightarrow \frac{1}{a+b+c}\left(\frac{ab+bc+ca}{abc}\right) = 0$

($\because$ ab + bc + ca = 0 given)

275. (b) $2x^2 - 7x + 12 = 0$

roots are α, β

$\therefore \alpha\beta = +\frac{c}{a}, \alpha + \beta = \frac{-b}{a}$

$\therefore \alpha + \beta = +\frac{7}{2}, \alpha\beta = \frac{12}{2} = 6$

$\therefore \frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{\alpha^2+\beta^2}{\alpha\beta}$

$= \frac{(\alpha+\beta)^2-2\alpha\beta}{\alpha\beta}$

$= \frac{\left(\frac{7}{2}\right)^2-2\times6}{6} = \frac{\frac{49}{4}-12}{6}$

$= \frac{49-48}{6\times4} = \frac{1}{24}$

276. (c) $x^3 + \frac{3}{x} = 4(a^3 + b^3)$ ...(i)

$3x + \frac{1}{x^3} = 4(a^3 - b^3)$ ...(ii)

equation (i) + (ii)

$\left(x+\frac{1}{x}\right)^3 = 8a^3$

$x + \frac{1}{x} = 2a$ ...(iii)

$x - \frac{1}{x} = 2b$ ...(iv)

equation (iii) + (iv)

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

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

$a - b = x$

$a - b^2 = 1$

277. (b) $x = 6 + \frac{1}{x}$

$\Rightarrow x - \frac{1}{x} = 6$

Taking square on both sides

$x^2 + \frac{1}{x^2} - 2 = 36$

$\Rightarrow x^2 + \frac{1}{x^2} = 38$

Again taking square on both sides

$x^4 + \frac{1}{x^4} + 2 = (38)^2$

$\Rightarrow x^4 + \frac{1}{x^4} + 2 = 1444$

$\boxed{x^4+\frac{1}{x^4}+2=1442}$

278. (b) $2x + 1 = 0$ $\quad x = \frac{-1}{2}$

$3y - 9 = 0$ $\quad y = +\frac{9}{3} = 3$

$\therefore (x, y) = \left(\frac{-1}{2}, 3\right)$

Point of intersection

279. (c) $x^2 + 9y^2 = 6xy$

$\Rightarrow x^2 + 9y^2 - 6xy = 0$

$\Rightarrow x^2 + (3y)^2 - 2 \times 3y \times x = 0$

$\Rightarrow (x - 3y)^2 = 0$

$x - 3y = 0$

$\Rightarrow x = 3y$

$\therefore x : y$

3 : 1

280. (a) $121a^2 + 64b^2$

$= (11a)^2 + (8b)^2 + 2 \times 11a \times 8b$

$= (11a + 8b)^2$

$\therefore$ So term added to make perfect square = 176 ab

281. (b) $a = 2 + \sqrt{3}$

$\Rightarrow a^2 = \left(2+\sqrt{3}\right)^2$

$\Rightarrow 4 + 3 + 4\sqrt{3}$

$\Rightarrow 7 + 4\sqrt{3}$

$\Rightarrow \frac{1}{a^2} = \frac{1}{7+4\sqrt{3}}$

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

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

$\therefore a^2 + \frac{1}{a^2} = 7 + 4\sqrt{3} + 7 - 4\sqrt{3} = 14$

282. (a) $p + \frac{1}{4} + \sqrt{p} + k^2$

$\Rightarrow p + \sqrt{p} + \left(k^2+\frac{1}{4}\right)$

$\Rightarrow \left(\sqrt{p}\right)^2 + 2 \times \frac{1}{2} \times \sqrt{p} + \left(k^2+\frac{1}{4}\right)$

$\Rightarrow A^2 + 2 \times A \times B + B^2$

$\Rightarrow A = \sqrt{p}\ \ B^2 = \left(k^2+\frac{1}{4}\right)$

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

$\therefore k^2 + \frac{1}{4} = \left(\frac{1}{2}\right)^2$

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

$k^2 = 0$

$k = 0$

283. (b) $\frac{b-c}{a} + \frac{a-c}{b} + \frac{a-b}{c} = 1$

$a - b + c \neq 0$

Let $b = c$

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

$\Rightarrow 0 + \frac{a}{b} + 1 + \frac{a}{b} - 1 = 1$

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

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

we take $b = c$

$\therefore \boxed{\frac{1}{b} + \frac{1}{c} = \frac{1}{a}}$

284. (a) Reciprocal of $\left(x+\frac{1}{x}\right) = \frac{1}{\left(x+\frac{1}{x}\right)} = \frac{x}{x^2+1}$

285. (a) For minimum value of $\frac{1}{a} + \frac{1}{b} + \frac{1}{c}$

$a = b = c$

$a + b + c = 1$ (given)

$\therefore a = b = c = \frac{1}{3}$

$\frac{1}{a} = \frac{1}{b} = \frac{1}{c} = 3$

$\therefore$ Minimum value of $\frac{1}{a} + \frac{1}{b} + \frac{1}{c}$

$= 3 + 3 + 3 = 9$

286. (b) $a\left(2+\sqrt{3}\right) = b\left(2-\sqrt{3}\right) = 1$

$a = \frac{1}{2+\sqrt{3}}\quad b = \frac{1}{2-\sqrt{3}}$

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

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

$\Rightarrow \frac{1}{\frac{1}{b^2}+1} + \frac{1}{b^2+1}$

$\Rightarrow \frac{1}{\frac{1+b^2}{b^2}} + \frac{1}{b^2+1}$

$\Rightarrow \frac{b^2}{b^2+1} + \frac{1}{b^2+1}$

$\Rightarrow \frac{b^2+1}{b^2+1} = 1$

287. (d) $\left(2+\sqrt{3}\right)a = \left(2-\sqrt{3}\right)b = 1$

$\Rightarrow \frac{1}{a} = \left(2+\sqrt{3}\right)$

by rationals

$\Rightarrow \frac{1}{b} = \left(2-\sqrt{3}\right)$

$\Rightarrow \frac{1}{a} + \frac{1}{b} = 2 - \sqrt{3} + 2 + \sqrt{3} = 4$

288. (a) $a + \frac{1}{b} = b + \frac{1}{c} = c + \frac{1}{a}$

To save your time assume values of a, b, c according to equation.

Let $a = 2$, $b = -1$ & $c = \frac{1}{2}$

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

$1 = 1 = 1$

$\therefore abc = 2 \times -1 \times \frac{1}{2} = -1$

289. (c) $\frac{x}{y} = \frac{4}{5}$

$\Rightarrow \frac{4}{7} + \left(\frac{2y-x}{2y+x}\right) = \frac{4}{7} + \frac{y\left(2-\frac{x}{y}\right)}{y\left(2+\frac{x}{-y}\right)}$

$\Rightarrow \frac{4}{7} + \frac{\left(2-\frac{4}{5}\right)}{2+\frac{4}{5}}$

$\Rightarrow \frac{4}{7} + \left(\frac{10-4}{10+4}\right)$

$\Rightarrow \frac{4}{7} + \frac{6}{14} = \frac{8+6}{14} = \frac{14}{14} = 1$

290. (d) $(x - 2)$ is a factor of $x^2+3Qx-2Q$

for $(x - 2) = 0$

$x^2 + 3Qx - 2Q = 0$

$\Rightarrow 4 + 3 \times Q \times 2 - 2 \times Q = 0$

$\Rightarrow 4 + 6Q - 2Q = 0$

$4Q = -4$

$Q = -1$

291. (d) $a + b = 12$..... (I)

$ab = 22$..... (II)

Squaring both sides of equation (I)

$\Rightarrow a^2 + b^2 + 2ab = 144$

$a^2 + b^2 + 2 \times 22 = 144$

$a^2 + b^2 = 144 - 44 = 100$

292. (b) $x=\sqrt{3}-\frac{1}{\sqrt{3}}$ & $y=\sqrt{3}+\frac{1}{\sqrt{3}}$

$\Rightarrow \frac{x^2}{y}+\frac{y^2}{x}=\frac{x^3+y^3}{xy}$

$=\frac{(x+y)(x^2-xy+y^2)}{xy}$

$\therefore x+y=\sqrt{3}-\frac{1}{\sqrt{3}}+\sqrt{3}+\frac{1}{\sqrt{3}}=2\sqrt{3}$

$\therefore xy=\left(\sqrt{3}-\frac{1}{\sqrt{3}}\right)\left(\sqrt{3}+\frac{1}{\sqrt{3}}\right)$

$=3-\frac{1}{3}=\frac{8}{3}$

$\Rightarrow \frac{(x+y)(x^2+y^2+2xy-2xy-xy)}{xy}$

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

$\Rightarrow \frac{2\sqrt{3}\left(\left(2\sqrt{3}\right)^2-3\times\frac{8}{3}\right)}{\frac{8}{3}}$

$\Rightarrow \frac{2\sqrt{3}(12-8)}{\frac{8}{3}} \Rightarrow \frac{2\times3\sqrt{3}(4)}{8}=3\sqrt{3}$

293. (b) x^2+ax+b

$\Rightarrow x^2+2\times\frac{1}{2}a\times x+\left(\sqrt{b}\right)^2$

$\Rightarrow A^2+2\times A\times B+B^2=(A+B^2)$

$\therefore A=x,\ B=\frac{1}{2}a,\ B^2=\left(\sqrt{b}\right)^2$

$B=\sqrt{b}$

$\Rightarrow \left(x+\frac{1}{2}a\right)^2$ be perfect square

at $\sqrt{b}=\frac{1}{2}a$ $b=\frac{1}{4}a^2$ $\therefore a^2=4b$

294. (a) $a+b+c+d=2$

$\frac{1}{(1-a)(1-b)(1-c)}+\frac{1}{(1-a)(1-b)(1-c)}$

$+\frac{1}{(1-c)(1-d)(1-a)}+\frac{1}{(1-b)(1-c)(1-d)}$

Put $a=0$, $b=0$ and $c=2$ and $d=2$

$a+b+c+d=0+0+2+2=4=4$ (satisify)

$\frac{1}{(1-0)(1-0)(1-2)}+\frac{1}{(1-0)(1-2)(1-2)}$

$+\frac{1}{(1-2)(1-2)(1-0)}+\frac{1}{(1-2)(1-0)(1-0)}$

$\Rightarrow \frac{1}{-1}+\left(\frac{1}{+1}\right)+\frac{1}{-1\times-1}+\frac{1}{-1}$

$\Rightarrow -1+1+1-1=0$

295. (b) $a^{\frac{1}{3}}+b^{\frac{1}{3}}+c^{\frac{1}{3}}=0$

$\Rightarrow a^{\frac{1}{3}}+b^{\frac{1}{3}}=-c^{\frac{1}{3}}$

Take cube on both sides

$\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}\right)^3=\left(-c^{\frac{1}{3}}\right)^3$

$\Rightarrow a+b+3a^{\frac{1}{3}}b^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}\right)=-c$

$\Rightarrow a+b+3a^{\frac{1}{3}}b^{\frac{1}{3}}\times\left(-c^{\frac{1}{3}}\right)=-c$

$\Rightarrow a+b+c=3a^{\frac{1}{3}}b^{\frac{1}{3}}c^{\frac{1}{3}}$

again taking cubs

$(a+b+c)^3=27abc$

296. (b) $x-\frac{1}{x}=1$

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

divide and multiply by x

$\Rightarrow \frac{\frac{x^4}{x}-\frac{1}{x^3}}{\frac{3x^2}{x}+\frac{5x}{x}-\frac{3}{x}}$

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

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

Take cube on both sides

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

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

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

$\Rightarrow x^3-\frac{1}{x^3}=4$

$=\frac{x^3-\frac{1}{x^3}}{3\left(x-\frac{1}{x}\right)+5}=\frac{4}{3\times1+5}=\frac{4}{8}=\frac{1}{2}$

297. (d) $x+y=15$

$\Rightarrow x-10=5-y$

$x-10=-(y-5)$

Take cube on both sides

$\Rightarrow (x-10)^3=(-(y-5))^3$

$\Rightarrow (x-10)^3+(y-5)^3=0$

298. (b) $x^2+\frac{1}{x^2}=66$

$\Rightarrow x^2+\frac{1}{x^2}-2=66-2$

$\left(x-\frac{1}{x}\right)^2=64$

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

$\Rightarrow x-\frac{1}{x}=\pm8$

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

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

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

Then $\left(x-\frac{1}{x}\right)+2=8+2=10$

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

$-8+2=-6$

$\therefore$ (10, – 6)

299. (c) $a^2 + a + 1 = 0$

$\left[a^3+1^3=(a+1)(a^2-a+1)\right.$
$\left.a^3-1=(a-1)(a^2+1+a)\right]$

$\therefore \quad (a^3 - 1) = (a - 1) \times 0$
$a^3 - 1 = 0$
$a^3 = 1$
$(a^3)^3 = 1^3$
$a^9 = 1$

300. (a) $x+\frac{2}{x}=1$

$x^2 + 2 = x$
$x^2 - x = -2$
$x - x^2 = 2$

$\therefore \frac{x^2+x+2}{x^2(1-x)}$ = divide & mulitply by x

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

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

301. (b) $y = 1 - 3k$ and $x = -2k$ (given)

$\therefore$ for $x = y$
$-2k = 1 - 3k$
$k = 1$

302. (b) $\sqrt{(x^2+y^2+z)(x+y-3z)}+\sqrt[3]{xy^3z^2}$

$x = 1$ $y = -3$ $z = -1$ (given)

$\Rightarrow \sqrt{(1+9-1)(1-3+3)}+\sqrt[3]{1\times(-3)^3\times1}$

$= 3 + (-3) = 0$

303. (b) $x+\frac{1}{x}=2$ .....(I)

Squaring both sides

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

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

Cubing equation (I)

$$\Rightarrow x^3+\frac{1}{x^3}+3\left(x+\frac{1}{x}\right)=8$$

$$x^3+\frac{1}{x^3}+6=8$$

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

$$\therefore \left(x^2+\frac{1}{x^2}\right)\left(x^3+\frac{1}{x^3}\right)=2\times2=4$$

304. (a) $x+\frac{1}{x}=5$

$\therefore$ Take cube on both sides

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

$$\Rightarrow x^3+\frac{1}{x^3}+3\times5=125$$

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

$\therefore$ Squaring both sides

$$\left(x^3+\frac{1}{x^3}\right)^2=(110)^2$$

$$\Rightarrow x^6+\frac{1}{x^6}+2=12100$$

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

305. (c) $x^2 - 3x + 1 = 0$

$\Rightarrow x^2 + 1 = 3x$

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

$$\Rightarrow x^3+\frac{1}{x^3}+3\times3=27$$

$$x^3+\frac{1}{x^3}=18$$

$$\Rightarrow \frac{x^6+x^4+x^2+1}{x^3}$$

$$\Rightarrow \frac{x^6}{x^3}+\frac{x^4}{x^3}+\frac{x^2}{x^3}+\frac{1}{x^3}$$

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

$\Rightarrow$ 18 + 3 =21

306. (c) $\frac{p}{a}+\frac{q}{b}+\frac{r}{c}=1$

$$\frac{a}{p}+\frac{b}{q}+\frac{c}{r}=0$$

$$\Rightarrow \frac{p}{a}=x,\ \frac{q}{b}=y,\ \frac{r}{c}=z$$

$\Rightarrow (x + y + z) = 1$

Squaring both sides

$x^2 + y^2 + z^2 + 2(xy + yz + zx) = 1$

and $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=0$

$$\frac{xy+yz+zx}{xyz}=0$$

$xy + yz + zx = 0$

$\therefore \quad x^2 + y^2 + z^2 = 1$

So, $\left(\frac{p}{a}\right)^2+\left(\frac{q}{b}\right)^2+\left(\frac{r}{c}\right)^2=1$

307. (b) $\frac{(x+1)^3-(x-1)^3}{(x+1)^2-(x-1)^2}=2$

$\Rightarrow A^3 - B^3 = (A - B)(A^2 + AB + B^2)$
$A^2 - B^2 = (A - B)(A + B)$

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

$= 2$

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

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

$\Rightarrow 3x^2 + 1 = 4x$
$3x^2 - 4x + 1 = 0$
$3x^2 - 3x - x + 1 = 0$
$3x(x - 1) - 1(x - 1) = 0$
$(3x - 1)(x - 1) = 0$

$\Rightarrow 3x - 1 = 0$

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

$\Rightarrow x - 1 = 0$

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

By adding numinator and denominator
$1 + 1 = 2$
No option is satisfied

$$\therefore \quad x=\frac{1}{3}$$

$1 + 3 = 4$

308. (c) $x = \sqrt{5} + 2$ हर का परिमेयकरण

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

$$\Rightarrow \frac{\sqrt{5}-2}{5-4}=\sqrt{5}-2$$

$$\Rightarrow x-\frac{1}{x}=\sqrt{5}+2-\sqrt{5}+2=4$$

$$\therefore \quad \frac{2x^2-3x-2}{3x^2-4x-3}$$

$$=\frac{\frac{2x^2}{x}-\frac{2}{x}-\frac{3x}{x}}{\frac{3x^2}{x}-\frac{3}{x}-\frac{4x}{x}}\Rightarrow\frac{2x-\frac{2}{x}-3}{3x-\frac{3}{x}-4}$$

$$=\frac{2\left(x-\frac{1}{x}\right)-3}{3\left(x-\frac{1}{x}\right)-4}\Rightarrow\frac{2\times4-3}{3\times4-4}$$

$$=\frac{8-3}{12-4}=\frac{5}{8}=0.625$$

309. (b) $a = 2.234$
$b = 3.121$
$c = -5.355$

$\therefore$ $a + b + c = 0$

$a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca) = 0$

310. (d) $x^2 + y^2 + 1 = 2x$

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

$(x - 1)^2 + y^2 = 0$

If $A^2 + B^2 = 0$

[As powers are even it can possible only when A = 0 & B = 0]

$\therefore$ $x - 1 = 0$

$x = 1$

$y = 0$

$\therefore$ $x^5 + y^5 = 1 + 0 = 1$

311. (a) $3(a^2 + b^2 + c^2) = (a + b + c)^2$

by options $a = b = c$

$3(a^2 + a^2 + a^2) = 9a^2$

$\Rightarrow 9a^2 = 9a^2$

312. (a) $x(x-3) = -1$

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

Taking cube on both sides

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

$\Rightarrow x^3 - 27 - 9x(x - 3) = \frac{-1}{x^3}$

$\Rightarrow x^3 - 27 - 9 \times -1 = \frac{-1}{x^3}$

$\Rightarrow x^3 - 27 + 9 = \frac{-1}{x^3}$

$\Rightarrow x^3 - 18 = \frac{-1}{x^3}$

$\Rightarrow x^3(x^3 - 18) = -1$

313. (a) $a^2 + 4b^2 + 4b - 4ab - 2a - 8$

$= a^2 - 4ab + 4b^2 - 2a + 4b - 8$

$= (a - 2b)^2 - 2(a - 2b) - 8$

Put $t = a - 2b$

$= t^2 - 2t - 8$

$= t^2 - 4t + 2t - 8$

$= t(t - 4) + 2(t - 4)$

$= (t + 2)(t - 4)$

$= (a - 2b - 4)(a - 2b + 2)$

(Put the value of assume t)

314. (d) $\frac{1}{a^2+ax+x^2} - \frac{1}{a^2-ax+x^2} + \frac{2ax}{a^4+a^2x^2+x^4}$

$= \frac{a^2-ax+x^2-a^2-ax-x^2}{(a^2+x^2+ax)(a^2+x^2-ax)} + \frac{2ax}{a^4+a^2x^2+x^4}$

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

$= \frac{-2ax}{a^4+x^4+2x^2a^2-a^2x^2} + \frac{2ax}{a^4+x^4+a^2x^2}$

$= \frac{-2ax}{a^4+x^4+x^2a^2} + \frac{2ax}{a^4+x^4+a^2x^2} = 0$

315. (b) $x = 11$

$x^5 - 12x^4 + 12x^3 - 12x^2 + 12x - 1$

$= x^5 - 11x^4 - x^4 + 11x^3 + x^3 - 11x^2 - x^2 + 11x + x - 1$

$= (11)^5 - 11 \times (11)^4 - (11)^4 + 11 \times (11)^3 + 11^3 - 11 \times (11)^2 - (11 \times 11) + (11 \times 11) + (11) - 1$

$= 0 - 0 + 0 + 0 + 11 - 1 = 10$

316. (c) $p = 99$

$p(p^2 + 3p + 3)$

$\Rightarrow p^3 + 3p^2 + 3p + 1 - 1$

$(p + 1)^3 - 1$

$\Rightarrow (99 + 1)^3 - 1$

$\Rightarrow (100)^3 - 1$

$\Rightarrow 1000000 - 1 = 99999$

317. (c) From option (c) LHS $(x + 2)^2$

$= x^2 + 4x + 4$

RHS $= x^2 + 2x + 4$

$\therefore$ LHS $\neq$ RHS

318. (a) $\left(a+\frac{1}{a}\right)^2 = 3$

$\Rightarrow a + \frac{1}{a} = \sqrt{3}$

Cube on both sides

$\left(a+\frac{1}{a}\right)^3 = \left(\sqrt{3}\right)^3$

$\Rightarrow a^3 + \frac{1}{a^3} + 3\sqrt{3} = 3\sqrt{3}$

$\Rightarrow a^3 + \frac{1}{a^3} = 0$

319. (a) $a + \frac{1}{a} = \sqrt{3}$

Take cube on both sides

$\Rightarrow a^3 + \frac{1}{a^3} + 3a \times \frac{1}{a}\left(a+\frac{1}{a}\right) = \left(\sqrt{3}\right)^3$

$\Rightarrow a^3 + \frac{1}{a^3} + 3 \times \sqrt{3} \Rightarrow 3\sqrt{3}$

$\Rightarrow a^3 + \frac{1}{a^3} = 0$

$\Rightarrow a^6 + 1 = 0$

$\Rightarrow a^6 = -1$

$= a^{18} + a^{12} + a^6 + 1$

$= (-1)^3 + (-1)^2 - 1 + 1$

$= -1 + 1 - 1 + 1 = 0$

320. (d) $x^2 + y^2 + z^2 - xy - xz - yz = \frac{1}{2}[(x - y)^2 + (y - z)^2 + (z - x)^2]$

$= \frac{1}{2}[(997 - 998)^2 + (998 - 999)^2 + (999 - 997)^2]$

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

321. (c) $x + \frac{1}{x} = 3$

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

$= \frac{3 \times 3 - 4}{3 - 1} = \frac{9-4}{3-1} = \frac{5}{2}$

322. (d) $x = 3 + 2\sqrt{2}$

$\therefore$ $\frac{1}{x} = 3 - 2\sqrt{2}$

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

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

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

$x^3 + \frac{1}{x^3} + 3 \times 6 = 216$

$x^3 + \frac{1}{x^3} = 216 - 18 = 198$

$\therefore$ $\frac{x^6 + x^4 + x^2 + 1}{x^3}$

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

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

$= 198 + 6 = 204$

323. (c) $x = p + \frac{1}{p}$, $y = p - \frac{1}{p}$

$\therefore$ $x + y = p + \frac{1}{p} + p - \frac{1}{p} = 2p$

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

$\Rightarrow x^4 + y^4 - 2x^2y^2$

$\Rightarrow \left(x^2 - y^2\right)^2 = [(x + y)(x - y)]^2$

$\Rightarrow \left(2p \times \frac{2}{p}\right)^2 = (4)^2 = 16$

324. (c) $(a + b - c)^2 + (b + c - a)^2 + (c + a - b)^2 = ?$

$\Rightarrow a + b + c = 0$ (given)

$\Rightarrow a + b = -c$

$\Rightarrow b + c = -a$

$\Rightarrow a + c = -b$

$\Rightarrow (a + b - c)^2 + (b + c - a)^2 + (c + a - b)^2$

$\Rightarrow (-c - c)^2 + (-a - a)^2 + (-b - b)^2$

$\Rightarrow (-2c)^2 + (-2a)^2 + (-2b)^2$

$\Rightarrow 4c^2 + 4a^2 + 4b^2$

$\Rightarrow 4(a^2 + b^2 + c^2)$

325. (b) $p^3 + 3p^2 + 3p - 7 = 0$

$p^3 + 3p^2 + 3p + 1 = 7 + 1$

$= (p + 1)^3 = (2)^3$

$= p + 1 = 2$

$\Rightarrow p = 1$

$\therefore p^2 + 2p = 1 + 2 = 3$

326. (a) $x = 2015$

$y = 2014$

$z = 2013$

$= x^2 + y^2 + z^2 - xy - yz - zx =$

$\frac{1}{2}[(x - y)^2 + (y - z)^2 + (z - x)^2]$

$= \frac{1}{2}[(2015 - 2014)^2 + (2014 - 2013)^2 + (2013 - 2015)^2]$

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

327. (a) $3a^2 = b^2$ (given)

$$\frac{(a+b)^3 - (a-b)^3}{(a+b)^2 + (a-b)^2}$$

$$\Rightarrow \frac{a^3 + b^3 + 3ab(a+b) - (a^3 - b^3 - 3ab(a-b))}{a^2 + b^2 + 2ab + a^2 + b^2 - 2ab}$$

$$\Rightarrow \frac{2b^3 + 6a^2b}{2a^2 + 2b^2} \Rightarrow \frac{b^3 + 3a^2b}{a^2 + b^2}$$

$$\Rightarrow \frac{b^3 + 2b^3}{\frac{b^2}{3} + b^2} \Rightarrow \frac{3b^3}{b^2\left(\frac{1}{3} + 1\right)}$$

$$\Rightarrow \frac{2b}{\frac{4}{3}} = \frac{3b}{2}$$

328. (a) $x + \frac{1}{x} = 2\frac{1}{12} = \frac{25}{12}$

$$x^2 + \frac{1}{x^2} + 2 = \frac{675}{144}$$

$$x^2 + \frac{1}{x^2} = \frac{625}{144} - 2$$

$$x^2 + \frac{1}{x^2} = \frac{625 - 288}{144}$$

$$x^2 + \frac{1}{x^2} = \frac{337}{144}$$

$$x^2 + \frac{1}{x^2} - 2 = \frac{337}{144} - 2$$

$$\left(x - \frac{1}{x}\right)^2 = \frac{337 - 288}{144} = \frac{49}{144}$$

$$x - \frac{1}{x} = \frac{7}{12}$$

$$\therefore \left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right) = \frac{25}{12} \times \frac{7}{12} = \frac{175}{144}$$

$$\therefore \left(x^2 - \frac{1}{x^2}\right) = \frac{175}{144}$$

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

$$= \frac{175}{144} \times \frac{337}{144} = \frac{58975}{20736}$$

329. (d) $x = 9999$

$$\frac{4x^3 - x}{(2x+1)(6x-3)} = \frac{x(4x^2 - 1)}{3(2x+1)(2x-1)}$$

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

$$\therefore \frac{9999}{3} = 3333$$

330. (b) $a^3 + b^3 = 9$

$a + b = 3$

Assume values, $a = 2$, $b = 1$

$\therefore (2)^3 + 1 = 9$

$2 + 1 = 3$

$$\therefore \frac{1}{a} + \frac{1}{b} = \frac{1}{2} + 1 = \frac{3}{2}$$

331. (c) $t^2 - 4t + 1 = 0$

$t^2 + 1 = 4t$

$$\frac{t^2 + 1}{t} = \frac{4t}{t}$$

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

[take cube both sides]

$$t + \frac{1}{t} + 3t\,\frac{1}{t}\left(t + \frac{1}{t}\right) = 64$$

$$t^3 + \frac{1}{t^3} = 64 - 12 = 52$$

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

332. (d) $\sqrt[3]{a} + \sqrt[3]{b} = \sqrt[3]{c}$

Take cube both sides

$$\left(\sqrt[3]{a} + \sqrt[3]{b}\right)^3 = \left(\sqrt[3]{c}\right)^3$$

$$\Rightarrow a + b + 3a^{\frac{1}{3}}b^{\frac{1}{3}}\left(\sqrt[3]{a} + \sqrt[3]{b}\right) = c$$

$$\Rightarrow a + b + 3a^{\frac{1}{3}}b^{\frac{1}{3}}c^{\frac{1}{3}} = c$$

$$\Rightarrow a + b - c = -3a^{\frac{1}{3}}b^{\frac{1}{3}}c^{\frac{1}{3}}$$

Again take cube both sides

$\Rightarrow (a + b - c)^3 = -27abc$

$\Rightarrow (a + b - c)^3 + 27abc = 0$

333. (b) $4x + 5y = 83$

$3x : 2y = 21 : 22$

$x : y = 7 : 11$

let $x = 7$ and $y = 11$

$y - x = 11 - 7$

$= 4$

334. (c) $x = \sqrt[3]{a + \sqrt{a^2 + b^3}} + \sqrt[3]{a - \sqrt{a^3 + b^3}}$

Take cube on both sides

$x^3 = (a + \sqrt{a^2 + b^3}) +$

$(a - \sqrt{a^2 + b^3}) + 3\left(\sqrt{a + \sqrt{a^2 + b^3}}\right)^{\frac{1}{3}}$

$\left(\sqrt{a - \sqrt{a^2 + b^3}}\right)^{1/3}$

$\left(\sqrt[3]{a + \sqrt{a^2 + b^3}} + \sqrt[3]{a - \sqrt{a^3 + b^3}}\right)$

$x^3 = 2a + 3\left(\sqrt{a^2 - (a^2 + b^3)}\right)^{\frac{2}{3}}(x)$

$x^3 = 2a + 3\left(\sqrt{-b^3}\right)^{\frac{2}{3}}(x)$

$x^3 = 2a + 3\left(-b^{\frac{3}{2}}\right)^{\frac{2}{3}}(x)$

$x^3 = 2a - 3bx$

$x^3 + 3bx = 2a$

335. (d) Given

$$\frac{x^{24}+1}{x^{12}} = 7$$

$$\frac{x^{24}+1}{x^{12}} \Rightarrow \frac{x^{24}}{x^{12}} + \frac{1}{x^{12}}$$

$\Rightarrow x^{12} + \frac{1}{x^{12}} = 7$

$\Rightarrow$ Cubing both sides

$\Rightarrow \left(x^{12} + \frac{1}{x^{12}}\right)^3 = 7^3$

$\Rightarrow x^{36} + \frac{1}{x^{36}} + \frac{3 \times x^{12} \times 1}{x^{12}} \left(x^{12} + \frac{1}{x^{12}}\right)$

$= 343$

$\Rightarrow x^{36} + \frac{1}{x^{36}} + 3 \times 7 = 343$

$\Rightarrow x^{36} + \frac{1}{x^{36}} = 343 - 21$

$\Rightarrow x^{36} + \frac{1}{x^{36}} = \frac{x^{72}+1}{x^{36}} = \mathbf{322}$

336. (d) given P = 99
find $P(P^2 + 3P + 3)$ = ?
to put value in equation

$\Rightarrow 99\ \{(99)^2 + (3 \times 99) + 3\}$

$\Rightarrow (100 - 1)\ [(100 - 1)^2 + \{3 \times (100 - 1\} + 3)$

$\Rightarrow (100 - 1)\ \{10000 + 1 - 200 + 300 - 3 + 3\}$

$\Rightarrow (100 - 1)\ (10000 + 100 + 1)$

$\Rightarrow (100 - 1)\ (10101)$

$\Rightarrow 99 \times 10101$

$\Rightarrow$ **99 99 99**

337. (b) Given, $x = 2$
Find $x^3 + 27x^2 + 243x + 631$

$\Rightarrow$ to put value $x = 2$

$\Rightarrow 2^3 + 27 \times 2^2 + (243 \times 2) + 631$

$\Rightarrow 8 + 108 + 486 + 631$

$\Rightarrow$ **1233**

338. (c) Given
$5x + 9y = 5$ ..... (i)
$125x^3 + 729y^3 = 125$ ..... (ii)
from equation (i) cubing both sides

$\Rightarrow (5x + 9y)^3 = 5^3$

$\Rightarrow 125x^3 + 729y^3 + 3 \times 5x \times 9y\ (5x + 9y) = 125$

$\Rightarrow 125x^3 + 729y^3 + 135xy \times 5 = 125$

$\Rightarrow 120 + 135xy \times 5 = 125$

$\Rightarrow 135xy \times 5 = 5$

$\Rightarrow xy = \frac{1}{135}$

$\Rightarrow$ therefore product of x & $y = \frac{1}{135}$

339. (b) Given, $x^2 + y^2 + z^2 = 2(x + z - 1)$
Find- $x^3 + y^3 + z^3$ = ?

$\Rightarrow x^2 + y^2 + z^2 = 2(x + z - 1)$

$\Rightarrow x^2 + y^2 + z^2 = 2x + 2z - 2$

$\Rightarrow x^2 + y^2 + z^2 = 2x + 2z - 1 - 1$

$\Rightarrow (x^2 + 1 - 2x) + y^2 + (z^2 + 1 - 2z) = 0$

$\Rightarrow (x-1)^2 + y^2 + (z-1)^2 = 0$

$\Rightarrow (x-1)^2 = 0$

$\Rightarrow x = 1$

$\Rightarrow y^2 = 0$

$\Rightarrow y = 0$

$\Rightarrow (z - 1)^2 = 0$

$\Rightarrow z = 1$

Value substituted in question,

$\Rightarrow x^3 + y^3 + z^3$

$\Rightarrow 1^3 + 0 + 1^3$

$\Rightarrow 2$

340. (b) Given, $x + \frac{1}{x} = 1$

Find: $\frac{2}{x^2 - x + 2}$ = ?

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

$x^2 + 1 = x$

$(x^2 - x) = -1$

Putting value in,

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

$= 2$

341. (d) Given,

$x = \frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}}, \quad y = \frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}}$

Find: $\frac{x^2 + y^2 - xy}{x^2 + y^2 - xy}$ = ?

$\Rightarrow \frac{x^2 + y^2 + 2xy - xy}{x^2 + y^2 - 2xy + xy}$

$\Rightarrow \frac{(x+y)^2 - xy}{(x-y)^2 + xy}$ = ?

Now, $x + y = \frac{(\sqrt{5} - \sqrt{3})}{(\sqrt{5} + \sqrt{3})} + \frac{(\sqrt{5} + \sqrt{3})}{(\sqrt{5} - \sqrt{3})}$

$\Rightarrow x + y = \frac{(\sqrt{5} - \sqrt{3})^2 + (\sqrt{5} + \sqrt{3})^2}{\sqrt{5}^2 - \sqrt{3}^2}$

$\Rightarrow x + y = \frac{2(\sqrt{5}^2 + \sqrt{3}^2)}{2}$

$\Rightarrow x + y = 8$ .....(i)

Again, $x - y = \frac{(\sqrt{5} - \sqrt{3})\ (\sqrt{5} + \sqrt{3})}{(\sqrt{5} + \sqrt{3})\ (\sqrt{5} - \sqrt{3})}$

$= \frac{4 \times \sqrt{5} \times \sqrt{3}}{2}$

$\Rightarrow (x - y) = 2\sqrt{15}$ .....(ii)

And, $xy = \frac{(\sqrt{5} - \sqrt{3})}{(\sqrt{5} + \sqrt{3})} \times \frac{(\sqrt{5} + \sqrt{3})}{(\sqrt{5} - \sqrt{3})}$

$xy = 1$

Substitutes values in the question.

$\Rightarrow \frac{(x+y)^2 - xy}{(x-y)^2 + xy}$

$\Rightarrow \frac{8^2 - 1}{(2\sqrt{15})^2 + 1} \Rightarrow \frac{63}{61}$

342. (c) Given, $4a - \frac{4}{a} + 3 = 0$

Find: $a^3 - \frac{1}{a^3} + 3$ = ?

$\Rightarrow 4a - \frac{4}{a} = -3$

$\Rightarrow a - \frac{1}{a} = \frac{-3}{4}$

$\Rightarrow \left(a - \frac{1}{a}\right)^3 = \left(\frac{-3}{4}\right)^3$ [Cubing both sides]

$\Rightarrow a^3 - \frac{1}{a^3} - 3a \times \frac{1}{a}\left(a - \frac{1}{a}\right) = \frac{-27}{64}$

$\Rightarrow a^3 - \frac{1}{a^3} - 3 \times \left(-\frac{3}{4}\right) = \frac{-27}{64}$

$\Rightarrow a^3 - \frac{1}{a^3} = \frac{-27}{64} \frac{9}{4}$

$\Rightarrow a^3 - \frac{1}{a^3} + 3 = \frac{-27}{64} - \frac{9}{4} + 3$

$\Rightarrow \frac{192 - 171}{64} \Rightarrow a^3 - \frac{1}{a^3} + 3 = \frac{21}{64}$

343. (a) $\left(\left[1 + \frac{1}{10 + \frac{1}{10}}\right]\left[1 + \frac{1}{10 + \frac{1}{10}}\right] - \left[1 - \frac{1}{10 + \frac{1}{10}}\right]\left[1 - \frac{1}{10 + \frac{1}{10}}\right]\right)$

$\div \left(\left[1 + \frac{1}{10 + \frac{1}{10}}\right] + \left[1 - \frac{1}{10 + \frac{1}{10}}\right]\right)$

Let $\left[1 + \frac{1}{10 + \frac{1}{10}}\right] = a, \quad \left[1 - \frac{1}{10 + \frac{1}{10}}\right] = b$

$\Rightarrow (a^2 - b^2) \div (a + b) = a - b$ = ?

$\Rightarrow a = 1 + \frac{10}{101} \Rightarrow \frac{111}{101}$

$\Rightarrow b = 1 - \frac{10}{101} \Rightarrow \frac{91}{101}$

$a - b = \frac{111}{101} - \frac{91}{101} = \frac{20}{101} \Rightarrow \frac{20}{101}$

344. (b) According to the question,
$\because$ $x = z = 225$
$y = 226$
$\Rightarrow$ $x^3+y^3+z^3-3xyz$ = ?
As we know,

$x^3+y^3+z^3-3xyz = \frac{1}{2}(x+y+z)\ [(x-y)^2+(y-z)^2+(z-x)^2]$

$= \frac{1}{2}[225+225+226][(225-226)^2 + (+226-225)^2+(225-225)^2]$

$= \frac{676}{2}\times[1+1+0] = 676$

345. (b) According to the question,
$\because$ $a+b-c = 14$
Find: $2b^2c^2 + 2c^2a^2 + 2a^2b^2 - a^4-b^4-c^4$ = ?
$\Rightarrow$ $a+b-c = 14$
Let a = 7, b = 7, c = 0
$\therefore$ $2\times7^2\times0+2\times0^2\times7^2+2\times7^2\times7^2-7^4-7^4-0^4 = 0$

346. (b) According to the question,

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

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

$= \left(\frac{x^2+9+6x+1}{x+3}\right)^3 = (x+3)^3+\frac{1}{(x+3)^3}+3\times1\left[\frac{x^2+9+6x+1}{x+3}\right]$

$= \left[\frac{x^2+x-5+5x+15}{(x+3)}\right]^3 = (x+3)^3+\frac{1}{(x+3)^3}+3\left[\frac{(x^2+x-5)+5x+15}{x+3}\right]$

$= \left[\frac{0+5x+15}{x+3}\right]^3 = (x+3)^3+\frac{1}{(x+3)^3}+3\left[\frac{0+5x+15}{x+3}\right]$

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

$= 5^3 = (x+3)^3+\frac{1}{(x+3)^3}+3\times5$

$= 125 = (x+3)^3+\frac{1}{(x+3)^3}+15$

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

347. (d) Given, m = – 4, n = – 2
Find $m^3-3m^2+3m+3n+3n^2+n^3$
Putting value of m and n
$\Rightarrow (-4)^3 - 3(-4)^2 + 3(-4) + 3\times(-2) + 3(-2)^2 + (-2)^3$
$\Rightarrow -64 - 48 - 12 - 6 + 12 - 8$
$\Rightarrow -64 - 60 + 2$
$\Rightarrow -126$

348. (b) $2x - ky + 7 = 0$ . . . . (i)
$6x - 12y + 15 = 0$ . . . . (ii)
There has no solution for

$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$\Rightarrow \frac{2}{6} = \frac{-k}{-12}$

$\frac{1}{3} = \frac{k}{12} \Rightarrow K = 4$

349. (a) Here, $x = 332$, $y = 333$, $z = 335$
Find $x^3 + y^3 + z^3 - 3xyz$ =

$\frac{1}{2}(x+y+z)$

$\left[(x-y)^2+(y-z)^2+(z-x)\right]$

$= \left(\frac{332+333+335}{2}\right)\left[(333-332)^2+(335-333)^2 + (335-332)^2\right]$

$= \frac{1000}{2}(1^2+2^2+3^2)$

$= \frac{1000}{2}(14) = 7000$

350. (d) If $2+x\sqrt{3} = \frac{1}{2+\sqrt{3}}$
Find x = ?

$\Rightarrow 2+\sqrt{3}\,x = \frac{1}{2+\sqrt{3}}$

$\Rightarrow 2+\sqrt{3}\times x = \frac{2-\sqrt{3}}{2^2-(\sqrt{3})^2}$

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

$\Rightarrow x = -1$

351. (b) Given,

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

$\Rightarrow$ m = ?

$\Rightarrow \frac{m-a^2}{b^2+c^2}+\frac{m-b^2}{c^2+a^2}+\frac{m-c^2}{a^2+b^2} = 1+1+1$

Put $m = a^2+b^2+c^2$ from option (b)

LHS. $= \frac{a^2+b^2+c^2-a^2}{b^2+c^2}+$

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

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

= RHS

$\Rightarrow m = a^2+b^2+c^2$

352. (c) Given $m-5n = 2$
find $m^3 - 125n^3 - 30mn$
$\Rightarrow m - 5n = 2$
$\Rightarrow (m-5n)^3 = 2^3$ (cubing both sides)
$\Rightarrow m^3-125n^3-3m\times5n\,(m-5n) = 8$
$\Rightarrow m^3 - 125n^3 - 15mn\times2 = 8$
$\Rightarrow m^3 - 125n^3 - 30mn = 8$

353. (b) Given, $x^3 + y^3 = 72$
$xy = 8$
$(x > y)$
If we take $x = 4$ and $y = 2$
$4^3 + 2^3 = 72$
$(72 = 72)$
and $xy = 8$
$\Rightarrow 4\times2 = 8$
so $x - y$ = ?
$4 - 2 = 2$ Ans.

354. (d) Given

$x = \sqrt{a\sqrt[3]{b\sqrt{a\sqrt[3]{b}}}}$ .....(i)

on squaring both side

$\Rightarrow x^2 = a\sqrt[3]{b\sqrt{a\sqrt[3]{b}}}$....$\infty$

on cubing both sides

$\Rightarrow x^6 = a^3b\sqrt{a\sqrt[3]{b\sqrt{a\sqrt[3]{b}}}}$.....$\infty$

$\Rightarrow x^6 = a^3b\,x$ from equation (i)

$\Rightarrow$ On dividing above eq. by x we get

$\Rightarrow \frac{x^6}{x} = \frac{a^3bx}{x}$

$\Rightarrow x^5 = a^3b$

$\Rightarrow x = \sqrt[5]{a^3b}$

355. (d) **Given:** $x+\frac{1}{x} = 2$ .....(i)

The value of $x^{12}-\frac{1}{x^{12}}$=?

$\Rightarrow$ if $x = 1 \Rightarrow x+\frac{1}{x} = 2$
$1+1=2$

Then, $x^{12}-\frac{1}{x^{12}}$

$\Rightarrow 1^{12}-\frac{1}{1^{12}}$

$\Rightarrow 1 - 1 = 0$

356. (a) Given: $x+\frac{1}{x}=1$ .....(i)

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

From equation (i)

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

$\Rightarrow x^2 + 1 = x$

$\Rightarrow \frac{(x^2+1)+3x}{(x^2+1)+7x}$

$\Rightarrow \frac{x+3x}{x+7x} \Rightarrow \frac{4x}{8x} = \frac{1}{2}$

357. (c) $x+\frac{1}{x}=2$

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

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

$\Rightarrow \downarrow \quad \downarrow \qquad \Rightarrow$ Let $x = 1$

1 1

To, put value in question,

$\Rightarrow x^7+\frac{1}{x^5} \Rightarrow 1^7+\frac{1}{1^5}$

$\Rightarrow 1+1 = 2$

358. (d) Given expression,

$\Rightarrow 4x^2 + 8x$

Let P should be added,

$\Rightarrow 4x^2 + 8x + p$

$\Rightarrow (2x)^2 + 2 \times (2x) \times 2$

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

Term that should be added $= 2^2 = 4$

P = 4

359. (b) $999x + 888y = 1332$

$888x + 999y = 555$

$1887 \quad (x + y) = 1887$

$x + y = 1$

360. (b) According to the question,

$a^2+b^2+c^2 = ab+bc+ca$

Put $a = 1, \quad b = 1, \quad c = 1$

$\therefore 1^2+1^2+1^2 = 1\times1+1\times1+1\times1$

$1+1+1 = 1+1+1$

$3 = 3$ [Satisfy]

$\therefore \frac{a+c}{b}=\frac{1+1}{1}=2$

361. (a) According to the question,

$\Rightarrow x=\frac{1}{2+\sqrt{3}}, \quad y=\frac{1}{2-\sqrt{3}}$

$\Rightarrow x=\frac{1}{2+\sqrt{3}}\times\frac{2-\sqrt{3}}{2-\sqrt{3}},$

$y=\frac{1}{2-\sqrt{3}}\times\frac{2+\sqrt{3}}{2+\sqrt{3}}$

$\Rightarrow x=2-\sqrt{3}, \quad y=2+\sqrt{3}$

$8xy\ (x^2+y^2)$

$=8(2-\sqrt{3})(2+\sqrt{3})\left[(2-\sqrt{3})^2+(2+\sqrt{3})^2\right]$

$\Rightarrow 8\times1\left[7-2\sqrt{3}+7+2\sqrt{3}\right] = 112$

362. (d) According to the question,

$a=\frac{\sqrt{x+2}+\sqrt{x-2}}{\sqrt{x+2}-\sqrt{x-2}}$

Put $x = 2$

$a=\frac{\sqrt{2+2}+\sqrt{2-2}}{\sqrt{2+2}-\sqrt{2-2}}$

$a=\frac{\sqrt{4}}{\sqrt{4}}=1$

$a^2 - ax = 1^2 - 1\times2 = 1 - 2 = -1$

363. (a) Let $a = 0$

$b = 1$

$\Rightarrow a^3+b^3-ab-(a^2-b^2)^2$

$\Rightarrow 0+1-0-(0-1)^2$

$\Rightarrow 1-1 = 0$

364. (b) $a-\frac{1}{(a-3)}=5$

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

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

Cubing both sides

$\left[(a-3)-\frac{1}{(a-3)}\right]^3=2^3$

$(a-3)^3-\frac{1}{(a-3)^3}-3.(a-3)\times\frac{1}{(a-3)}$

$\left[(a-3)-\frac{1}{(a-3)}\right]=8$

$(a-3)^3-\frac{1}{(a-3)^3}-3[2]=8$

$(a-3)^3-\frac{1}{(a-3)^3}=8+6=14$ Ans.

365. (d) $\frac{3x-2y}{2x+3y}=\frac{5}{6}$

$18x-12y=10x+15y$

$8x=27y$

$\frac{x}{y}=\frac{27}{8}$

$\left[\frac{\sqrt[3]{x}+\sqrt[3]{y}}{\sqrt[3]{x}-\sqrt[3]{y}}\right]^2$

$\left(\frac{\sqrt[3]{27}+\sqrt[3]{8}}{\sqrt[3]{27}-\sqrt[3]{8}}\right)^2$

$\Rightarrow\left(\frac{3+2}{3-2}\right)^2=(5)^2=25$

366. (d) According to the Question

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

$y = \sqrt{3} - \sqrt{2}$

$(x^3 - 20\sqrt{2}) - (y^3 + 2\sqrt{2})$

$=[(\sqrt{3}+\sqrt{2})^3 - 20\sqrt{2} - (\sqrt{3} - \sqrt{2})^3 - 2\sqrt{2}]$

$=3\sqrt{3} + 2\sqrt{2} + 9\sqrt{2} + 6\sqrt{3} - 20\sqrt{2} - 3\sqrt{3} + 2\sqrt{2} + 9\sqrt{2} - 6\sqrt{3} - 2\sqrt{2}$

$= 9\sqrt{3} - 9\sqrt{2} - 9\sqrt{3} + 9\sqrt{2} = 0$

367. (d) **SHORTCUT METHOD**

Always do these types of question with the help of

Put $a = b = c = 1$

$3(1^2 + 1^2 + 1^2) = (a + b + c)^2$

$3 = 3$ satified

So this is answer $\rightarrow a = b = c$

368. (d) According to the question,

$x = \sqrt{a}+\frac{1}{\sqrt{a}}$ & $y=\sqrt{a}-\frac{1}{\sqrt{a}}$

$\therefore \quad x^2 - x^2y^2 - 1 + y^4 - x^2y^2 + 1$

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

$= [x^2 - y^2]^2$

$\left[\left(\sqrt{a}+\frac{1}{\sqrt{a}}\right)^2-\left(\sqrt{a}-\frac{1}{\sqrt{a}}\right)^2\right]^2$

$=\left[a+\frac{1}{a}+2-a-\frac{1}{a}+2\right]^2$

$= |4|^2 = 16$

369. (d) Let $m = \sqrt{5+\sqrt{5+\sqrt{5}}}$

Factor = $(a)\times(a+1)$

Here $m = a + 1$

or $m - 1 = a$ .....(i)

Let $n = \sqrt{5-\sqrt{5-\sqrt{5}}}$

Factor = $(a)\times(a+1)$

Here $n = a$ .....(ii)

From (i) & (ii)

$m - 1 = n$

or $m - n - 1 = 0$

370. (b) $\frac{3-5x}{2x}+\frac{3-5y}{2y}+\frac{3-5z}{2z} = 0$

or $\frac{3}{2x}-\frac{5}{2}+\frac{3}{2y}-\frac{5}{2}+\frac{3}{2z}-\frac{5}{2} = 0$

or $\frac{3}{2x}+\frac{3}{2y}+\frac{3}{2z}=\frac{3\times5}{2}$

or $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=\frac{3\times5\times2}{2\times3}$

or $\frac{2}{x}+\frac{2}{y}+\frac{2}{z}=\frac{3\times5\times2\times2}{2\times3}$

$=10$

371. (a) According to the question
If $2S = a + b + c$

$$S = \frac{a+b+c}{2}$$

Let $a = 10, b = 10, c = 10$

$\because$ $$S = \frac{10+10+10}{2}$$

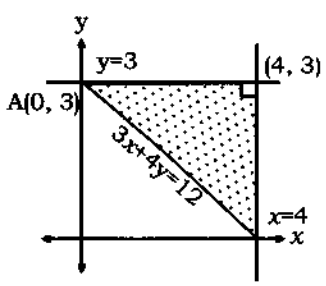
$$S = \frac{30}{2} = 15$$

$\because$ $S(S - C) + (S - a)(S - b)$
$15(15 - 10) + (15 - 10)(15 - 10) = 75 + 25 = 100$
Now check from option.
Option (a) $ab = 10 \times 10 = 100$
(Satisfied)

372. (d) $p + m = 6$ .....(i)
$p^3 + m^3 = 72$
$(p + m)(p^2 + m^2 - pm) = 72$
$(p + m)[(p + m)^2 - 3pm] = 72$
$[\because p^2 + m^2 = (p + m)^2 - 2pm]$
$6[(6)^2 - 3pm] = 72$ from (i)
$36 - 3pm = 12$
$pm = 8$

373. (d) $x^m \times x^n = 1$
$x^{m+n} = x^0$ $(\because x^0 = 1)$
$m + n = 0$
$m = -n$

374. (b) Here,



base = 3unis
height = 4 units

Area of $\Delta = \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 3 \times 4$

= 6 sq. units

375. (d) $\frac{2p}{p^2-2p+1} = \frac{1}{4}$

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

(Divide p both in nu. & de.)

$p + \frac{1}{p} - 2 = 8$

$p + \frac{1}{p} = 10$

376. (b) Here $k^r = 2k - 1$
Let $r = 1$

$$\left[\underset{\text{abscissa}}{x} = \underset{\text{ordinate}}{y}\right]$$

$k = 2k - 1$
$k = 1$

377. (a) According to the question.
If $x = 5$

$\Rightarrow$ $x^2 - 2 + \frac{1}{x^2}$

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

$\Rightarrow$ $\left(\frac{24}{5}\right)^2 \Rightarrow \frac{576}{25}$

378. (b) According to the question,
$x = 2, y = 1, z = -3$
$\therefore$ $x^3 + y^3 + y^3 - 3xyz = ?$
As we know that
$a + b + c = 0$ then $a^3 + b^3 + c^3 - 3abc = 0$
$\therefore$ $2 + 1 - 3 = 0$
$x^3 + y^3 + 3^3 - 3xyz = 0$

379. (d) According to the question,

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

$a^3 = 1$
$(-a - a)(-a - a^2)$
$(-2a)(-2a^2)$
$4a^3 = 4 \times 1$

380. (a) According to the question
$\Rightarrow$ $(x^3 + y^6)(x^3 - y^6)$
$\Rightarrow$ $x^6 - x^3y^6 - x^3y^6 - y^{12}$
$= x^6 - y^{12}$

381. (b) According to the question,

$\Rightarrow$ $\frac{1}{x+y} + \frac{1}{x-y}$

$\Rightarrow$ $\frac{x-y+x+y}{x^2-y^2} \Rightarrow \frac{2x}{x^2-y^2}$

382. (a) Given, $x + y = 2a$ to
Find $\frac{a}{(x-a)} + \frac{a}{(y-a)} = ?$

$\Rightarrow$ $x + y = 2a$
$\downarrow \quad \downarrow \quad \downarrow$
$3 \quad 1 \quad 2$

$\Rightarrow$ Let $x = 3, y = 1, a = 2$

$\Rightarrow$ $\frac{a}{(x-a)} + \frac{a}{y-a}$

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

$\Rightarrow$ $\frac{2}{1} + \frac{2}{-1} = 0$

383. (a) $a^2 + b^2 + c^2 = ab + bc + ca$
Let $a = b = c = 1$

$\Rightarrow$ $a^2 + b^2 + c^2 = ab + bc + ca$

$\Rightarrow$ $1^2 + 1^2 + 1^2 = 1 \times 1 + 1 \times 1 + 1 \times 1$

$\Rightarrow$ $3 = 3$

$\Rightarrow$ to find $\frac{a+c}{b} = ?$

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

384. (d) $p^3 - q^3 = (p - q)((p - q)^2 - xpq)$

$\Rightarrow$ $p^3 - q^3 = (p - q)[p^2 + q^2 - 2pq - xpq]$

$\Rightarrow$ $p^3 - q^3 = (p - q)[p^2 + q^2 - 2pq - (-3)pq]$

$\Rightarrow$ $p^3 - q^3 = (p - q)(p^2 + q^2 + pq)$

$\Rightarrow$ So, $x = -3$

$\Rightarrow$ because $a^3 - b^3 = (a - b)(a^2 + b^2 + ab)$

385. (a) Given

$\Rightarrow$ $x + y + z = 6$

$\Rightarrow$ $xy + yz + zx = 10$

To find $x^3 + y^3 + z^3 - 3xyz = ?$

$\Rightarrow$ Using formula.

$\Rightarrow (x + y + z)^2 = x^2 + y^2 + z^2 + 2(xy + yz + zx)$

$\Rightarrow$ $6^2 = x^2 + y^2 + z^2 + 2 \times 10$

$\Rightarrow$ $36 = x^2 + y^2 + z^2 + 20$

$\Rightarrow$ $x^2 + y^2 + z^2 = 16$

$\Rightarrow$ $x^2 + y^2 + z^2 - 3xyz =$

$(x + y + z)[x^2 + y^2 + z^2 - xy - yz - zx]$

$= 6[16 - (xy + yz + zx)]$
$= 6[16 - 10]$
$= 6 \times 6$
$= 36$

386. (d) Given:

$\Rightarrow$ $\frac{x+1}{x-1} = \frac{a}{b}$

$\Rightarrow$ $\frac{x}{1} = \frac{a+b}{a-b}$

(using componendo & dividendo)

$\Rightarrow$ $x = \frac{a+b}{a-b}$ .....(i)

Again,

$\Rightarrow$ $\frac{1-y}{1+y} = \frac{b}{a}$

$\Rightarrow$ $\frac{1+y}{1-y} = \frac{a}{b}$

$\Rightarrow \frac{1}{y} = \frac{a+b}{a-b}$

$\Rightarrow y = \frac{a-b}{a+b}$ .....(i)

$\Rightarrow$ From question, $\frac{x-y}{1+xy}$

$\Rightarrow \frac{\frac{a+b}{a-b} - \frac{(a-b)}{(a+b)}}{1+\left(\frac{a+b}{a-b}\right)\left(\frac{a-b}{a+b}\right)}$

$\Rightarrow \frac{(a+b)^2-(a-b)^2}{(a^2-b^2)(1+1)}$

$\Rightarrow \frac{4ab}{2(a^2-b^2)} \Rightarrow \frac{2ab}{a^2-b^2}$

387. (b) Given

$\Rightarrow a^2 + a + 1 = 0$ .....(i)

$\Rightarrow$ to find $a^5 + a^4 + 1 = ?$

by formula

$a^3 - b^3 = (a - b)(a^2 + b^2 + ab)$

$\Rightarrow a^3 - 1 = (a - 1)(a^2 + a + 1)$

[b = 1]

$\Rightarrow a^3 - 1 = (a - 1) \times 0$

$\Rightarrow a^3 - 1 = 0$

$\Rightarrow a^3 = 1$

$\Rightarrow a^5 + a^4 + 1$

$\Rightarrow a^3 \times a^2 + a^3 + a + 1$

$\Rightarrow a^2 \times 1 + a \times 1 + 1$

$\Rightarrow a^2 + a + 1 = 0$ from equation..(i)

$\Rightarrow$ Answer will be 0

388. (d) Given

$a^2 + b^2 + c^2 - ab - bc - ca = 0$

to find a : b : c = ?

$\Rightarrow$ According to the question,

$a^2 + b^2 + c^2 - ab - bc - ca = 0$

$\Rightarrow a^2 + b^2 + c^2 = ab + bc + ca$

$\Rightarrow$ Let a = b = c = 1

$\Rightarrow 1^2+1^2+1^2 = 1\times1+(1\times1)+(1\times1)$

$\Rightarrow 3 = 3$

$\Rightarrow$ So ratio of a : b : c = 1 : 1 : 1

389. (d) $x - \frac{1}{x} = 2$ to find $x^3 - \frac{1}{x^3} = ?$

$\Rightarrow x - \frac{1}{x} = 2 \Rightarrow \left(x - \frac{1}{x}\right)^3 = 2^3$ cubing both side

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

$\Rightarrow x^3 - \frac{1}{x^3} - 3\times1\times(2) = 8$

$\Rightarrow x^3 - \frac{1}{x^3} = 14$

390. (c) $\frac{x}{a} = b - c$; $\frac{y}{b} = c - a$; $\frac{z}{c} = a - b$

$\left(\frac{x}{a}\right)^3 + \left(\frac{y}{b}\right)^3 + \left(\frac{z}{c}\right)^3 = 3\left(\frac{x}{a}\right)\left(\frac{y}{b}\right)\left(\frac{z}{c}\right)$

$\left(\because \frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 0\right) = \frac{3x\,yz}{abc}$

391. (a) $\sqrt{y} = 4x$

$\frac{x}{\sqrt{y}} = \frac{1}{4}$

Sq. both sides

$\frac{x^2}{y} = \frac{1}{16}$

392. (b) $\frac{x}{y} = \frac{a+2}{a-2}$

$\frac{x^2}{y^2} = \frac{(a+2)^2}{(a-2)^2}$

Applying Componendo & Dividendo

$\frac{x^2-y^2}{x^2+y^2} = \frac{(a+2)^2-(a-2)^2}{(a+2)^2+(a-2)^2} = \frac{8a}{2a^2+8} = \frac{4a}{a^2+4}$

393. (b) $\frac{(x+y+z)^2}{x^2+y^2+z^2}$

Assume $x = y = z = 1$

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

394. (c) $\frac{a}{b} + \frac{b}{a} = 2$

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

$(a - b)^2 = 0$

$a - b = 0$

395. (a) Put $(x + y + z) = 10$

$x = 2$

$y = 3$

$z = 5$

$x(x + y + z) = 20$

$2(10) = 20$

Similarly other will satisfied

so value of $2(x + y + z)$

$\Rightarrow 2(10) = 20$

396. (d) $a^2 + b^2 + c^2 = 2(a - b - c) - 3$

$\Rightarrow a^2 + b^2 + c^2 = 2a - 2b - 2c - 3$

$\Rightarrow a^2 + b^2 + c^2 - 2a + 2b + 2c + 3 = 0$

$(a - 1)^2 + (b + 1)^2 + (c + 1)^2 = 0$

$a - 1 = 0 \quad b + 1 = 0 \quad c + 1 = 0$

$a = 1 \quad b = -1 \quad c = -1$

$\Rightarrow a + b + c$

$\Rightarrow 1 - 1 - 1 = -1$

397. (c) $x^2 + y^2 = 14$

$x + y = 4$ ..... (i)

squaring both sides

$x^2 + y^2 + 2xy = 16$

$14 + 2xy = 16$

$2xy = 2$

$xy = 1$

$x^2 + y^2 = 14$

subtrance (2xy)from both sides.

$x^2 + y^2 - 2xy = 14 - 2xy$

$(x - y)^2 = 14 - 2 \times 1$

$x - y = \sqrt{12}$

$x - y = 2\sqrt{3}$ .....(2)

solve equation (1) and (2)

$y = 2 - \sqrt{3}$

$x = 2 + \sqrt{3}$

398. (d) $x^2 - 1 = 0$

$\Rightarrow x - \frac{1}{x} = 4$

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

(squaring both sides)

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

399. (c) $\left(\frac{3}{15}a^5b^6c^3 \times \frac{5}{9}ab^5c^4\right) \div \frac{10}{27}a^2bc^3$

$\Rightarrow \frac{1}{9}a^6b^{11}c^7 \div \frac{10}{27}a^2bc^3$

$\Rightarrow \frac{\frac{1}{9}a^6b^{11}c^7}{\frac{10}{27} \times a^2bc^3} \Rightarrow \frac{3}{10}a^4b^{10}c^4$

400. (b) **Given**

$\because a = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$, $b = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$

to find $\frac{a^2}{b} + \frac{b^2}{a} = ?$

$\Rightarrow \frac{a^3+b^3}{ab} = ?$

$\Rightarrow \frac{(a+b)^3 - 3ab(a+b)}{ab} = ?$

$\Rightarrow a + b = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}} + \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$

$\Rightarrow \frac{\left(\sqrt{3}-\sqrt{2}\right)^2 + \left(\sqrt{3}+\sqrt{2}\right)^2}{\sqrt{3}^2 - \sqrt{2}^2}$

$\Rightarrow \frac{2\left(\sqrt{3}^2 + \sqrt{2}^2\right)}{1}$

$\Rightarrow 2 \times (5)$

$\Rightarrow a + b = 10$

Again

$\Rightarrow a \times b = \frac{(\sqrt{3}-\sqrt{2})}{(\sqrt{3}+\sqrt{2})} \times \frac{(\sqrt{3}+\sqrt{2})}{(\sqrt{3}-\sqrt{2})}$

$\Rightarrow ab = 1$

$\Rightarrow \frac{(a+b)^3 - 3ab(a+b)}{ab}$

$\Rightarrow \frac{10^3 - 3\times1\times10}{1}$

$\Rightarrow 1000 - 30 = \mathbf{970}$

401. (a) Given:

$\Rightarrow a+\frac{1}{b} = 1, \quad b+\frac{1}{c} = 1$

to find $c+\frac{1}{a} = ?$

$\Rightarrow$ Let $a = -1$

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

$\Rightarrow -1 + \frac{1}{b} = 1$

$\Rightarrow \frac{1}{b} = 2 \Rightarrow b = \frac{1}{2}$

$\Rightarrow b + \frac{1}{c} = 1$

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

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

$\Rightarrow$ from question,

$\Rightarrow c + \frac{1}{a} \Rightarrow 2 + \frac{1}{-1}$

$\Rightarrow 2 - 1 = \mathbf{1}$

402. (c) $(2a-1)^2+(4b-3)^2+(4c+5)^2 = 0$

to find

$\Rightarrow \frac{a^3 + b^3 + c^3 - 3abc}{a^2 + b^2 + c^2}$

$\Rightarrow \frac{\frac{1}{2}(a+b+c)[(a-b)^2+(b-c)^2+(c-a)^2]}{a^2+b^2+c^2}$

$\Rightarrow$ then, $2a - 1 = 0$

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

$\Rightarrow 4b - 3 = 0$

$\Rightarrow b = \frac{3}{4}$

$\Rightarrow 4c + 5 = 0$

$\Rightarrow c = \frac{-5}{4}$

$\Rightarrow \frac{\frac{1}{2}(a+b+c)[(a-b)^2+(b-c)^2+(c-a)^2]}{a^2+b^2+c^2}$

$\Rightarrow \frac{\frac{1}{2}\left(\frac{1}{2}+\frac{3}{4}-\frac{5}{4}\right)\left[\left(\frac{1}{2}-\frac{3}{4}\right)^2+\left(\frac{3}{4}+\frac{5}{4}\right)^2+\left(\frac{-5}{4}-\frac{1}{2}\right)^2\right]}{\left(\frac{1}{2}\right)^2+\left(\frac{3}{4}\right)^2+\left(\frac{-5}{4}\right)^2}$

$\Rightarrow \frac{\frac{1}{2}\left(\frac{2+3-5}{4}\right)\left[\left(\frac{2-3}{4}\right)^2+\left(\frac{8}{4}\right)^2+\left(\frac{-5-2}{4}\right)^2\right]}{\frac{1}{4}+\frac{9}{16}+\frac{25}{16}}$

$\Rightarrow \frac{1}{2}\times 0 = 0 \qquad (a+b+c=0)$

403. (b) $\frac{a}{b} = \frac{25}{6}$

$\Rightarrow \frac{a^2-b^2}{a^2+b^2} = \frac{(25)^2-6^2}{(25)^2+6^2}$

$\Rightarrow \frac{625-36}{625+36} = \frac{589}{661}$

404. (a) $2x + 3y = K \quad (2=x,\ 0=y)$

$\therefore 2 \times 2 + 3 \times 0 = K$

$K = 4$

405. (a) $x+\frac{1}{x} = 3$

(Cube both sides)

Formula:-

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

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

$x^3 + \frac{1}{x^3} = 18$

$x + \frac{1}{x} = 3$ (squaring both sides)

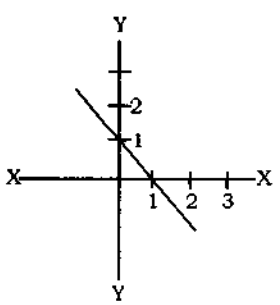
$x^2 + \frac{1}{x^2} + 2\times x\times\frac{1}{x} = 9$

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

Put in formula,

$x^5 + \frac{1}{x^5} = 18\times7-3 = 123$

406. (c)



According to the question,

So, option 'c' is correct. [because $y = x$]

407. (a) $\left(a+\frac{1}{a}\right)^2 = 3$

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

cube both sides

$a^3 + \frac{1}{a^3} + 3\times a\times\frac{1}{a}\left(a+\frac{1}{a}\right) = \left(\sqrt{3}\right)^3$

$a^3 + \frac{1}{a^3} + 3\sqrt{3} = 3\sqrt{3}$

$a^3 + \frac{1}{a^3} = 0$

$a^6 + 1 = 0$

$\Rightarrow a^{30} + a^{24} + a^{18} + a^{12} + a^6 + 1$

$= a^{24}(a^6+1) + a^{12}(a^6+1) + a^6 + 1$

$= a^{24}(0) + a^{12}(0) + 0 = 0$

408. (d) $\frac{1}{a+b} = \frac{1}{a} + \frac{1}{b}$

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

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

$a^2 + b^2 + ab = 0$

$a^3 - b^3 = (a-b)(a^2 + b^2 + ab)$

$= (a-b)(0) = 0$

409. (a) $x : y = 3 : 5$

$x - y = -2$

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

$x - y = 3 - 5 = -2 \rightarrow -2$

$x = 3, y = 5$

$x + y = 3 + 5 = 8$

410. (d) According to the question

$x + 1 = \sqrt{y} + 3, \ y > 0$

$\Rightarrow \frac{1}{2}\left(\frac{x^3 - 6x + 12x - 8}{\sqrt{y}} - y\right) = ?$

Put $x = 4$ & $y = 4$

Now

$\frac{1}{2}\left(\frac{(4)^3 - 6\times(4)^2 + 12\times4 - 8}{\sqrt{4}} - 4\right)$

$\Rightarrow \frac{1}{2}\left(\frac{64 - 96 + 48 - 8}{2} - 4\right)$

$\Rightarrow \frac{1}{2}\left(\frac{112 - 104}{2} - 4\right)$

$\Rightarrow \frac{1}{2}(4 - 4)$

$\Rightarrow 0$

411. (d) According to the question

$x = 1 + \sqrt{2} + \sqrt{3}$

$y = 1 + \sqrt{2} - \sqrt{3}$

$\Rightarrow \frac{x^2 + 4xy + y^2}{x + y}$

$\Rightarrow \frac{(x+y)^2 + 2xy}{x+y}$

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

$xy = \left(1+\sqrt{2}\right)^2 - \left(\sqrt{3}\right)^2$

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

$= 2\sqrt{2}$

$\Rightarrow \frac{\left(2+2\sqrt{2}\right)^2 + 4\sqrt{2}}{2+2\sqrt{2}}$

$\Rightarrow \frac{4+8+8\sqrt{2}+4\sqrt{2}}{2+2\sqrt{2}}$

$\Rightarrow \frac{12+12\sqrt{2}}{2+2\sqrt{2}}$

$= \frac{12\left(1+\sqrt{2}\right)}{2\left(1+\sqrt{2}\right)} = 6$

412. (a) $x + \frac{1}{x} = 3$

$x^2 + 1 = 3x$ .....(i)

$(x^2+1)^2 = 9x^2$

$x^4 + 1 + 2x^2 = 9x^2$

$x^4 + 1 = 7x^2$ ....(i)

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

$\frac{12x^2 + 3x^3 + 3x}{7x^2}$

From equation (i)

$\Rightarrow \frac{12x + 3\left(x^2 + 1\right)}{7x}$

$\Rightarrow \frac{12x + 3 \times 3x}{7x}$

$\Rightarrow \frac{21x}{7x}$

$\Rightarrow 3$

413. (c) $x + \frac{1}{x} = -2$

$x = -1$

$\rightarrow x^p + x^q$

$= (-1)^p + (-1)^q$

[p is even no. & q is odd no.]

$= 1 - 1 = 0$

414. (a) $p(x+y)^2 = 5$ and $q(x-y)^2 = 3$

Put the value of $x = 2$ and $y = 1$

$p(2+1)^2 = 5$ and $q(2-1)^2 = 3$

$p = \frac{5}{9}$ $\quad q = 3$

$\rightarrow p^2(x+y) + 4pqxy - q^2(x-y)^2$

$= \left(\frac{5}{9}\right)^2 (2+1)^2 4 \times \frac{5}{9} \times 3 \times 2 \times 1$

$- (3)^2 (2-1)^2$

$= \frac{25}{81} \times 9 + \frac{40}{3} - 9$

$= \frac{25}{9} + \frac{40}{3} - 9 = \frac{25 + 120 - 81}{9}$

$= \frac{64}{9}$

Put the value of p and q in options3

option A $\rightarrow$ 2 (p + q)

$= 2\left(\frac{5}{9} + 3\right)$

$= 2 \times \frac{32}{9} = \frac{64}{9}$

Option A is Satisfied

So, 2(p + q) is answer

415. (a) According to the question (प्रश्नानुसार),

$(p-q)^3 + (q-r)^3 + (r-p)^3$

put $p = 1$

$q = 2$

$r = 3$

$\Rightarrow (-1)^3 + (-1)^3 + (2)^3$

$\Rightarrow 6$

Now check from option to save your valuable time (समय की बचत के लिए विकल्प से जांच करेगें)

option:- (a) 3(p-q) (q-r) (r-p)

$\Rightarrow 3(-1)(-1)(2)$

$\Rightarrow 6$ (Satisfy)

416. (a) $a + \frac{1}{a} = \sqrt{3}$

$a^3 + \frac{1}{a^3} = \left(\sqrt{3}\right)^3 - 3\sqrt{3}$

$a^6 = -1$

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

then $a^{52} + \frac{1}{a^{52}} = \frac{a^{54}}{a^2} + \frac{a^2}{a^{54}}$

$= \frac{\left(a^6\right)^9}{a^2} + \frac{a^2}{\left(a^6\right)^9}$

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

then $a^{52} + \frac{1}{a^{52}} = -1$ Ans.

417. (a) $x^2 + \sigma x + \beta$

sum of root $\sigma + \beta = \frac{-\sigma}{1}$ ...(i)

$\sigma\beta = \beta$ .... (ii)

From (i) and (ii)

then $\sigma = 1$

Then $\beta = -2$

Then value of

$\sigma^3 + \beta^3 = 1 + (-2)^3 = -7$

418. (b) If $x^2 + \frac{1}{x^2} = 1$

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

$\Rightarrow x^3 + \frac{1}{x^3} = \left(\sqrt{3}\right)^3 - 3\sqrt{3} = 0$

$\Rightarrow x^6 = -1$, or $x^6 + 1 = 0$

then $x^{102} + x^{96} + x^{90} + x^{84} + x^{78} + x^{72} + 5$

$x^{96}(x^6 + 1) + x^{84}(x^6 + 1) + x^{72}(x^6 + 1) + 5$

$= 5$

419. (c) If $x - 1$ & $x + 1$ are the factors y equation, then

$x - 1 = 0$, $x = 1$

$\Rightarrow$ Put $x - 1$, we get

$1 + a - 3 + 2 + b = 0$

$a + b = 0$ .....(i)

$\Rightarrow x + 1 = 0$, $x = -1$

Put $x = -1$, we get

$1 - a - 3 - 2 + b = 0$

$b - a = 4$.....(ii)

after solving (i) & (ii), we get

$a = -2$, $b = 2$

420. (c) $x^3 - 7x^2 + 11x - 5 \geq 0$

$x^3 - 5x^2 - 2x^2 + 10x + x - 5 \geq 0$

$x^2(x-5) - 2x(x-5) + 1(x-5) \geq 0$

$(x-5)(x^2 - 2x + 1) \geq 0$

$(x-5)(x-1)^2 \geq 0$

$(x-5)(x-1)(x-1) \geq 0$

So, $x = 1$ & 5

Equation satisfies at both the values, but the minimum value of these two (दोनों मान समीकरण को संतुष्ट करते है, लेकिन दोनों का न्यूनतम मान)

$x = 1$

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

$676 = a^2 + b^2 + c^2 + 2(109)$

$a^2 + b^2 + c^2 = 458$

422. (c) $x^2 + \frac{1}{x^2} = 1$

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

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

$\Rightarrow x^3 + \frac{1}{x^3} = 0 = x^6 + 1 = 0$

Now,

$x^{18} + x^{12} + x^6 + 1$

$x^{12}(x^6 + 1) + (x^6 + 1) = x^{12} \times 0 + 0 = 0$

423. (b) If $a+b+c = 0$

put $a = 1$ $b = 1$ and $c = -2$

$\frac{a^2+b^2+c^2}{ab+bc+ca} = \frac{1+1+4}{1-2-2} = \frac{6}{-3} = \mathbf{-2}$

424. (b) $a+b+c = m$

$\Rightarrow \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$

$\Rightarrow \frac{ab+bc+ca}{abc} = 0$

$\Rightarrow ab+bc+ca = 0$

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

$m^2 = a^2 + b^2 + c^2$

$\Rightarrow \frac{a^2+b^2+c^2}{3} = \frac{m^2}{3}$

425. (a) $(2a+b)^2 - (2a-b)^2$

$\Rightarrow 4a^2 + b^2 + 4ab - 4a^2 - b^2 + 4ab = 8ab$

426. (c) $x = \frac{8ab}{a+b}$

$\frac{x}{4a} = \frac{2b}{a+b}$

By componendo and dividendo

$\frac{x+4a}{x-4a} = \frac{2b+a+b}{2b-a-b}$

$\frac{x+4a}{x-4a} = \frac{3b+a}{b-a}$ .....(i)

इसी प्रकार

$\frac{x+4b}{x-4b} = \frac{3a+b}{a-b}$ .....(ii)

adding (i) and (ii)

$\left(\frac{x+4a}{x-4a}\right) + \left(\frac{x+4b}{x-4b}\right) = \left(\frac{3b+a}{b-a}\right) + \left(\frac{3a+b}{a-b}\right)$

$\frac{x+4a}{x-4a} + \frac{x+4b}{x-4b} = \frac{-3b-a+3a+b}{a-b}$

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

$= 2$

427. (c) $\left(\sqrt{a} + \sqrt{b}\right) = 15$

square both side

$a + b + 2\sqrt{ab} = 225$

$a + b = 225 - 2\sqrt{ab}$ ...(i)

$\left(\sqrt{a} + \sqrt{b}\right) = 3$

square both side

$a + b - 2\sqrt{ab} = 9$

$a + b = 9 + 2\sqrt{ab}$ ...(ii)

From (i) and (ii)

$225 - 2\sqrt{ab} = 9 + 2\sqrt{ab}$

$216 = 4\sqrt{ab}$

$54 = \sqrt{ab}$

devided by 4 on both side

$\frac{\sqrt{ab}}{4} = \frac{54}{4}$

$\frac{\sqrt{ab}}{4} = \frac{27}{2}$

428. (d) Given $a + \frac{1}{a} = 3$

Cube both sides

$a^3 + \frac{1}{a^3} + 3 \times a \times \frac{1}{a}\left(a + \frac{1}{a}\right) = (3)^3$

$a^3 + \frac{1}{a^3} + 3 \times 3 = 27$

$a^3 + \frac{1}{a^3} = 27 - 3 \times 3 = 18$

429. (c) $a - 6b = 3$

after cubing both sides, we get

(दोनों तरफ के मान का घन करने पर)

$\Rightarrow (a - 6b)^3 = (3)^3$

$\Rightarrow a^3 - 216b^3 - 18ab(3) = 27$

$\Rightarrow a^3 - 216b^3 - 54ab = 27$

430. (d) $x = 10 + 3\sqrt{11}$

By making a perfect square.

(पूर्ण वर्ग बनाने के लिए)

$x = \frac{2 \times (10 + 3\sqrt{11})}{2} = \frac{20 + 2 \times 3\sqrt{11}}{2}$

$x = \frac{(\sqrt{11}+3)^2}{2}$

$\sqrt{x} = \frac{(\sqrt{11}+3)}{\sqrt{2}}$

then so, $\frac{1}{\sqrt{x}} = \frac{\sqrt{2}}{\sqrt{11}+3} = \frac{\sqrt{11}-3}{\sqrt{2}}$

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

$= \frac{1}{\sqrt{2}} \times 6 = 3\sqrt{2}$

431. (d) $x = \sqrt{a\sqrt[3]{ab}\sqrt{a\sqrt[3]{ab}}}$ .....∞

square both side

(दोनों तरफ के मान का वर्ग करने पर)

$x^2 = a\sqrt[3]{abx}$ $\left(\because \sqrt{a\sqrt[3]{ab}}.....\infty\right)$

Again cube both sides

(पुन: घन करने पर)

$x^6 = a^3 ab\, x$

$x^5 = a^4 b$

$x = \sqrt[5]{a^4 b}$

432. (c) Put $a = b = c = 1$

then we have

$\frac{m-3}{2} + \frac{m-3}{2} + \frac{m-3}{2} = 9$

$m = 9$

Now, putting values of a, b & c in option,

(अब a, b और c का मान विकल्प में रखने पर)

only option (c) gives value of m = 9 (केवल विकल्प c, m का मान देता है)

So option (c) is correct.

(इसलिए विकल्प (c) सही है)

433. (b) As both the equations leave the same remainder, then

(जैसा कि दोनों समीकरण समान शेषफल देते है तब)

$x - 3 = 0$

$x = 3$

Put value of $x = 3$ in both the equations & keep them equal

(x का मान दोनों समीकरणों में 3 रखने पर पर और उन्हें बराबर रखने पर)

$a(3)^3 + 4(3)^2 + 3(3) - 4 = (3)^3 - 4(3) + a$

$27a + 36 + 9 - 4 = 27 - 12 + a$

$26a = -26$

$a = -1$

434. (c) If $(2a - 3)^2 + (3b + 4)^2 + (6c + 1)^2 = 0$

the above is possible only when every square term must be zero

then

(उपर्युक्त संभव तभी है जब प्रत्येक वर्ग पद 0 हो)

$2a - 3 = 0$

$3b + 4 = 0$

$6c + 1 = 0$

$a = \frac{3}{2}$, $b = \frac{-4}{3}$, $c = \frac{-1}{6}$

One taking $a + b + c$

$= \frac{3}{2} - \frac{4}{3} - \frac{1}{6} = \frac{9-8-1}{6} = 0$

$\because \frac{a^3+b^3+c^3-3abc}{a^3+b^3+c^3} =$

$\frac{(a+b+c)(a^2+b^2+c^2-ab-bc-ca)}{a^3+b^3+c^3}$

$\therefore \frac{a^3+b^3+c^3-3abc}{a^3+b^3+c^3} = 0$

435. (c) $a^2 = b + c$, $b^2 = a + c$,

$c^2 = b + c$

taking $a = 2$, $b = 2$ and $c = 2$

$(2)^2 = 2 + 2$

$\boxed{4 = 4}$

Now, $\frac{1}{a+1} + \frac{1}{b+1} + \frac{1}{c+1}$

Put $a = 2$, $b = 2$ and $c = 2$

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

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

436. (b) $a + b = 2c$

Taking $a = 2$, $b = 4$ and $c = 3$

$2 + 4 = 2 \times 3$

$\boxed{6 = 6}$

Now, $\frac{a}{a-c} + \frac{c}{b-c}$

$\frac{2}{2-3} + \frac{3}{4-3} = \frac{2}{-1} + \frac{3}{1} = 1$ Ans

437. (c) $x + y + z = 9$

$x^2 + y^2 + z^2 = 31$

$\Rightarrow (x + y + z)^2 = x^2 + y^2 + z^2 + 2(xy + yz + zx)$

$\Rightarrow 81 = 31 + 2(xy + yz + zx)$

$\Rightarrow 2(xy + yz + zx) = 50$

$\Rightarrow xy + yz + zx = 25$

$\because x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zy)$

$= 9(31 - 25)$

$= 9 \times 6 = 54$ Ans

438. (a) $a + b + c = 1$, $ab + bc + ca = -1$ and $abc = -1$

we know $a^2 + b^2 + c^2 = (a + b + c)^2 - 2(ab + bc + ca)$

then value of

$a^2 + b^2 + c^2 = (1)^2 - 2(-1) = 3$

then $a^3 + b^3 + c^3$

$= (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca) + 3abc$

$a^3 + b^3 + c^3 = (1)[3 - (-1)] + 3 \times (-1) = 4 - 3 = 1$

439. (c) $\frac{a}{b} = \frac{1}{2}$ Let $a = x$, $b = 2x$

then $\frac{(2a-5b)}{5a+3b} = \frac{2x-10x}{5x+6x}$

$= \frac{-8x}{11x} = \frac{-8}{11}$

440. (a) $3x^2 + 5x + 3 = 0$

$3x^2 + 3 = 5x$

divide by $3x$ both sides

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

$= \left(\frac{-5}{3}\right)^3 - 3 \times \left(\frac{-5}{3}\right)$

$= \frac{-125}{27} + 5 = \frac{10}{27}$