Answer & Solutions

Level-I

1. (d) Given Exp. = $a^2 + b^2 - 2ab$, where $a = 287$ and $b = 269 = (a - b)^2 = (287 - 269)^2 = (18)^2 = 324$.

2. (d) $20 \times x = (64 + 36)(64 - 36) = 100 \times 28$

$$\Rightarrow x = \frac{100\times 28}{20} = 140.$$

3. (c) $$\frac{1}{\sqrt{3}+\sqrt{2}} = \frac{1}{(\sqrt{3}+\sqrt{2})}\times\frac{(\sqrt{3}-\sqrt{2})}{(\sqrt{3}+\sqrt{2})} = \left(\frac{\sqrt{3}-\sqrt{2}}{3-2}\right)$$

$$= (\sqrt{3}-\sqrt{2}) = (1.732 - 1.414) = 0.318$$

4. (a) Given expression $= \sqrt{0.01+0.08} = \sqrt{0.09} = 0.3$

5. (a) $356\times 936 - 356\times 836 = 356\times(936-836)$
$= 356\times 100 = 35600$

6. (a) $$\frac{\frac{1}{2}\div\frac{1}{2}\times\frac{1}{2}}{\frac{1}{2}+\frac{1}{2}\times\frac{1}{2}} = \frac{\frac{1}{2}\times 2\times\frac{1}{2}}{\frac{3}{4}} = \frac{1}{2}\times\frac{4}{3} = \frac{2}{3}$$

7. (b) Given exp.

$$= \frac{a^2-b^2}{a+b} = a - b = \left(1+\frac{1}{1+\frac{1}{100}}\right) - \left(1-\frac{1}{1+\frac{1}{100}}\right)$$

$$= 2\times\frac{1}{(101/100)} = 2\times\frac{100}{101} = \frac{200}{101}$$

8. (a) $5^a = 3125 \Rightarrow 5^a = 5^5 \Rightarrow a = 5$
$\Rightarrow 5^{(a-3)} = 5^{(5-3)} = 5^2 = 25$

9. (d) Let the number of buffaloes be x and the number of ducks be y.
Then, $4x + 2y = 2(x + y) + 24 \Leftrightarrow 2x = 24 \Leftrightarrow x = 12$.

10. (b) $$\sqrt[3]{4\frac{12}{125}} = \sqrt[3]{\frac{512}{125}} = \left(\frac{8\times 8\times 8}{5\times 5\times 5}\right)^{1/3} = \frac{8}{5} = 1\frac{3}{5}$$

11. (c) $729 = 9^3 = 3^6$, Now $4X - 2 = 6$ or $X = 2$.

12. (a) $16a^2 - 12a = (4a)^2 - 2(4a)(3/2)$
$\therefore$ The number is $(3/2)^2 = (9/4)$.

13. (b) By rationalization we have

$$\left[\frac{1}{\sqrt{9}-\sqrt{8}}\right] = \left[\frac{1}{\sqrt{9}-\sqrt{8}}\right]\times\frac{\sqrt{9}+\sqrt{8}}{\sqrt{9}+\sqrt{8}} = \frac{\sqrt{9}+\sqrt{8}}{9-8}$$

$$= \sqrt{9}+\sqrt{8}$$

Similarly, $\left[\frac{1}{\sqrt{8}-\sqrt{7}}\right] = \sqrt{8}+\sqrt{7}$ and $\frac{1}{\sqrt{7}-\sqrt{6}} = \sqrt{7}+\sqrt{6}$

and so on. The given expression
$= (\sqrt{9}+\sqrt{8}) - (\sqrt{8}+\sqrt{7}) + (\sqrt{7}+\sqrt{6}) - (\sqrt{6}+\sqrt{5}) + (\sqrt{5}+\sqrt{4})$
$= \sqrt{9}+\sqrt{4} = 3 + 2 = 5.$

14. (b) $5\sqrt[3]{250} + 7\sqrt[3]{16} - 14\sqrt[3]{54}$

$= 5\sqrt[3]{125\times 2} + 7\sqrt[3]{8\times 2} - 14\sqrt[3]{27\times 2}$

$= 5\times 5\sqrt[3]{2} + 7\times 2\sqrt[3]{2} - 14\times 3\times\sqrt[3]{2}$

$= (25 + 14 - 42)\sqrt[3]{2} = -3\sqrt[3]{2}$

15. (a) Work from the choices: only 169 when reversed becomes 961 and both numbers are squares.

16. (b) $1*2 = 1 + 2\times 6 = 13$
$13*3 = 13 + 3\times 6 = 31$

17. (a) $a^b = 125 \Rightarrow a^b = 5^3$
$\therefore a = 5, b = 3$
$(a - b)^{a+b-4} = (5 - 3)^{5+3-4} = 2^4 = 16$

18. (c) $p\times q = p + q + \frac{p}{q} \Rightarrow 8\times 2 = 8 + 2 + \frac{8}{2} = 14$

19. (b) $x*y = x^2 + y^2 = xy$
$9*11 = 9^2 + 11^2 - 9\times 11$
$= 81 + 121 - 99 = 103$

20. (d) Since the factors of 11760 are $\underline{2\times 2}\times\underline{2\times 2}\times 3\times 5\times\underline{7\times 7}$ so we need to multiply it with 3×5 because all the factos are paired but 3 and 5 are unpaired, hence (d) is the correct choice.

21. (b) $5\sqrt{5}\times 5^3 \div 5^{-3/2} = 5^{(a+2)}$

$5^1\times 5^{\frac{1}{2}}\times 5^3\times 5^{3/2} = 5^{a+2}$

$5^{1+\frac{1}{2}+3+\frac{3}{2}} = 5^{a+2}$, $5^{\frac{12}{2}} = 5^{a+2}$, $a + 2 = 6$
$\therefore a = 4$

22. (b) Let number be x

$$x\times\frac{4}{5}\times\frac{3}{4} - x\times\frac{2}{5}\times\frac{1}{6} = 648$$

$$\frac{3x}{5} - \frac{x}{15} = 648$$

$$\frac{9x - x}{15} = 648$$

$$8x = 648\times 15 \Rightarrow x = \frac{648\times 15}{8} = 81\times 15 = 1215$$

23. (b) If sum of two is even, their difference is always even, So (b) is right answer.

24. (a) Number of decimal places in the given expression = 8
Number of decimal places in (a) = 8
Number of decimal places in (b) = 9
Number of decimal places in (c) = 7.
Clearly, the expression in (a) is the same as the given expression.

25. (c) 26. (b)

27. **(c)** $\frac{a+b}{b+c}=\frac{c+d}{d+a}$

$\Rightarrow ad+a^2+bd+ab=bc+c^2+bd+cd$

$\Rightarrow (a^2-c^2)+(ad-cd)+(ab-bc)=0$

$\Rightarrow (a-c)(a+c+d+b)=0$

$\Rightarrow a=c$ or $a+b+c+d=0$ or both

28. **(d)** Sum is 888 $\Rightarrow$ unit's digit should add up to 8. This is possible only for 4th option as "3" + "5" = "8".

29. **(b)** The numbers that can be formed are xy and yx. Hence $(10x+y)+(10y+x)=11(x+y)$. If this is a perfect square then $x+y=11$.

30. **(a)** Comparing $4^{1/3}$ and $5^{1/4}$
$(4^{1/3})^{12}$ and $(5^{1/4})^{12}$ *i.e.,* 4^4 and 5^3
$=256>125$
$\therefore\ 4^{1/3}>5^{1/4}$
Similarly, comparing $5^{1/4}$ and $6^{1/5}$
$(5^{1/4})^{20}$ and $(6^{1/5})^{20}$ *i.e.,* 5^5 and $6^4=3125>1296$
$\therefore\ 5^{1/4}>6^{1/5}$

31. **(b)** $(a+b+c)^2=a^2+b^2+c^2+2(ab+bc+ca)$
$\Rightarrow\ 2(ab+bc+ca)=(a+b+c)^2-(a^2+b^2+c^2)$
$=169-69=100$
$ab+bc+ca=50$

32. **(b)** $|a-b|=|8|=8 \Rightarrow |b-a|=|-8|=8$

$\Rightarrow |a-b|-|b-a|=8-8=0$

33. **(d)** At a value of $x=0$ we can see that the expression $x^2+|x-1|=1\rightarrow 0+1=1$. Hence, $x=0$ satisfies the given expression. Also at $x=1$, we get $1+0=1$.

34. **(d)** $3.6+36.6+3.66+0.36+3.0=47.22$

35. **(a)** $23\times 45\div 15=69$

36. **(b)** $4\frac{5}{6}+7\frac{1}{2}-5\frac{8}{11}=\frac{29}{6}+\frac{15}{2}-\frac{63}{11}$

$=\frac{319+495-378}{66}=\frac{436}{66}=\frac{218}{33}=6\frac{20}{33}$

37. **(e)** $\frac{210}{14}\times\frac{17}{15}\times ?=4046$

$?=\frac{4046\times 15\times 14}{210\times 17}=238$

38. **(b)** 83% of 2350 = ?

$?=\frac{83\times 2350}{100}=1950.50$

39. **(b)** $\sqrt{1089}+3=(?)^2$

$33+3=(6)^2$

40. **(b)** $96+32\times 5-31=225$

41. **(d)** $?\div 36=(7)^2-8$

$\frac{?}{36}=49-8$

$\therefore\ ?=36\times 41$
$=1476$

42. **(d)** $\sqrt{8281}=?=91$

43. **(d)** $(63)^2-(12)^2=3825$

44. **(e)** $\frac{9}{4}+\frac{18}{5}=?-\frac{43}{10}$

$?=\frac{9}{4}+\frac{18}{5}+\frac{43}{10}$

$=\frac{45+72+86}{20}=\frac{203}{20}=10\frac{3}{20}$

45. **(a)** $17\times 19\times 4\div ?=161.5$

$\frac{1}{?}=\frac{1615}{10\times 17\times 19\times 4}$

$?=8$

46. **(b)** $1798\div 31\times ?=348$

$?=\frac{348\times 31}{1798}=6$

47. **(d)** $(9.8\times 2.3+4.46)\div 3=3^?$
$27\div 3=3^?\quad 3^2=3^?$
$\therefore\ ?=2$

48. **(d)** 43% of 600 + ?% of 300 = 399
$43\times 6+3x=399$
$3x=141$
$x=47$

49. **(e)** $x+(x+1)+(x+2)=1383$
$\Rightarrow 3x+3=1383$
$\Rightarrow 3x=1380$

$\Rightarrow x=\frac{1380}{3}=460$

Largest number $=x+2=462$

50. **(e)** $1504\times 5.865-24.091=?$
$\therefore\ ?=8796.869\approx 8800$

51. **(c)** $16.928+(24.7582\div 5.015)=?$
$16.928+(4.93)=?$
$\therefore\ ?=21.86\approx 22$

52. **(a)** $?=\sqrt[3]{7.938}\times(6.120)^2-4.9256$
$=(2\times 37.4)-4.9256$
$=74.8-4.9256$
$\approx 70\quad \therefore\ ?\approx 70$

53. **(a)** $16.046\div 2.8\times 0.599=?$
$(5.73)\times 0.599=?$
$\therefore\ ?=3.43\approx 3.5$

54. **(d)** $\sqrt{963}+(4.895)^2-9.24=?$
$31+23.9-9.24=?$
$54.91-9.24=?$
$\therefore\ ?=45.6\approx 45$

55. **(b)** $(12\times 19)+(13\times 8)=(15\times 14)+?$
$228+104=210+?$
$\therefore\ ?=122$

56. **(c)** $\sqrt{65\times 12-50+54}=?$
$\Rightarrow \sqrt{780-50+54}=?$
$\therefore\ ?=28$

57. **(c)** 15% of $524 - 2\%$ of $985 + ? = 20\%$ of 423

$\frac{15\times 524}{100}-\frac{2\times 985}{100}+?=\frac{20\times 423}{100}$

$78.6-19.7-84.6=-?$

$\therefore\quad ?=25.7.$

58. **(e)** $151\times 8+(228\div 19)^2=?$

$1208+(12)^2=?$

$1208+144=?$

$\therefore\quad ?=1352$

59. **(c)** $\sqrt{1521}+\sqrt{225}\ =?$

$39+15=?$

$\therefore\quad ?=54$

60. **(d)** $38.734+8.638-5.19=?$

$47.372-5.19=?$

$\therefore\quad ?=42.182$

61. **(a)** $7^{8.9}\div(343)^{1.7}\times(49)^{4.8}=7^{?}$

$\frac{7^{8.9}}{7^{3\times 1.7}}\times 7^{2\times 4.8}=7^{?},$

$\frac{7^{8.9}}{7^{5.1}}\times 7^{9.6}=7^{?}$

$7^{8.9-5.1+9.6}=7^{?},$

$\therefore\quad ?=13.4$

62. **(e)** $\sqrt[3]{512}\div\sqrt[4]{16}+\sqrt{576}\ =?$

$(8\div 2)+24=?$

$4+24=?$

$\therefore\quad ?=28$

63. **(b)** $(42\times 3.2)\div(16\times 1.5)=?$

$134.4\div 24=?$

$\therefore\quad ?=5.6$

64. **(e)** $(199+((5^3\div 4)\times 4^2))=?$

$(199+(31.25\times 4^2)=?$

$(199+500)=?$

$\therefore\quad ?=699$

65. **(e)** $(342\div 6)\times 28=1099+?$

$57\times 28=1099+?$

$1596-1099=?$

$\therefore\quad ?=497$

66. **(d)** $\frac{9.8\times 2.5\times 7.6}{0.5}=?$

$=\frac{186.2}{0.5}=?$

$\therefore\quad ?=372.4$

67. **(d)** $\frac{3}{5}$ of $\frac{2}{7}$ of $?=426$

$?=\frac{5}{3}$ of $\frac{7}{2}$ of 426

$?=\frac{5}{3}$ of 1491

$\therefore\quad ?=2485$

68. **(a)** $3\frac{2}{5}+1\frac{2}{9}=4\frac{4}{5}-?$

$\frac{17}{5}+\frac{11}{9}=\frac{24}{5}-?$

$\frac{17}{5}+\frac{11}{9}-\frac{24}{5}=-?$

$\frac{153+55-216}{45}=-?$

$\therefore\quad ?=\frac{8}{45}$

69. **(b)** $\left(\frac{13}{63}\div\frac{104}{14}\right)\times\frac{52}{19}=?$

$\left(\frac{13}{63}\times\frac{14}{104}\right)\times\frac{52}{19}=?$

$\therefore\quad ?=13/171$

70. **(a)** $\sqrt[3]{13824}\times\sqrt{?}\ =864$

$\sqrt[3]{24\times 24\times 24}\times\sqrt{?}\ =864$

$\Rightarrow 24\times\sqrt{?}\ =864$

$\Rightarrow\ \sqrt{?}=\frac{864}{24}$

$\therefore\ ?=36\times 36=1296$

71. **(b)** $(91)^2+(41)^2-\sqrt{?}=9858$

$\Rightarrow 8281+\ 1681-\sqrt{?}\ =9858$

$\Rightarrow\ \sqrt{?}=9962-9858=104$

$\therefore ?=104\times 104=10816$

72. **(b)** $?=4900\div 28\times 444\div 12$

$\Rightarrow ?=175\times 37$

$\Rightarrow\ ?=6475$

73. **(e)** 125% of $260+?\%$ of $700=500$

$\Rightarrow\quad ?\%$ of $700=500-125\%$ of 260

$\Rightarrow\quad ?\%$ of $700=175$

$\therefore\quad ?=\frac{175\times 100}{700}=25$

74. **(b)** $3\frac{7}{11}+7\frac{3}{11}\times 1\frac{1}{2}\ =\frac{40}{11}+\frac{80}{11}\times\frac{3}{2}=\frac{160}{11}=14\frac{6}{11}$

75. **(c)** Given Expression $=\frac{0.207}{\frac{0.0023}{23}}=\frac{0.207}{0.0001}=\frac{0.2070}{0.0001}=2070.$

76. **(b)** $?=1.05\%$ of $2500+2.5\%$ of 440

$\Rightarrow\ ?=\frac{1.05}{100}\times 2500+\frac{2.5}{100}\times 440$

$\Rightarrow\ ?=\frac{2625}{100}+\frac{1100}{100}$

$\Rightarrow\ ?=\frac{3725}{100}=37.25$

77. **(a)** $? = \dfrac{17 \times 4 + 4^2 \times 2}{90 \div 5 \times 12}$

$\Rightarrow ? = \dfrac{68 + 16 \times 2}{18 \times 12}$

$\Rightarrow ? = \dfrac{68 + 32}{216}$

$\Rightarrow ? = \dfrac{100}{216} = \dfrac{25}{54}$

78. **(b)** $\dfrac{87}{5} \times \dfrac{37}{8} - ? = \dfrac{375}{8}$

$\Rightarrow ? = \dfrac{3219}{40} - \dfrac{375}{8}$

$= \dfrac{3219 - 1875}{40} = \dfrac{1344}{40}$

$= \dfrac{168}{5} = 33\dfrac{3}{5}$

79. **(e)** $\dfrac{250 \times 136}{100} + \dfrac{550 \times ?}{100} = 670$

$\Rightarrow 340 + 5.5 \times ? = 670$

$\Rightarrow 5.5 \times ? = 670 - 340 = 330$

$\Rightarrow ? = \dfrac{330}{5.5} = 60$

80. **(a)** $3889 + 12.952 - ? = 3854.002$

or $? = 3889 + 12.952 - 3854.002 = 47.95$

81. **(b)** $(25)^? = (5 \times 5 \times 5 \times 5 \times 5 \times 5)^4 \times (5 \times 5)^6 \div (5)^2$

$= (25 \times 25 \times 25)^4 \times (25)^6 \div (25)^1$

$= (25^3)^4 \times (25)^6 \div 25^1 = (25)^{12} \times (25)^6 \div (25)^1$

$= (25)^{12+6-1} = (25)^{17}$

$\therefore \quad ? = 17$

82. **(c)** $? = \dfrac{28 \times 5 - 15 \times 6}{7^2 + \sqrt{256} + (13)^2}$

$\Rightarrow ? = \dfrac{140 - 90}{49 + 16 + 169}$

$\Rightarrow ? = \dfrac{50}{234} = \dfrac{25}{117}$

83. **(c)** $1.5 \times 0.025 + (?)^2 = 0.1 \Rightarrow (?)^2 = 0.1 - 1.5 \times 0.025$

$\Rightarrow (?)^2 = 0.1 - 0.0375 \Rightarrow ? = \sqrt{.0625} = 0.25$

84. **(d)** Given Expression $= \dfrac{(a-b)^2 + (a+b)^2}{(a^2+b^2)} = \dfrac{2(a^2+b^2)}{(a^2+b^2)} = 2$

85. **(b)** $? = \dfrac{(10008.99)^2}{10009.001} \times \sqrt{3589} \times 0.4987$

$= (10009) \times \sqrt{3600} \times 0.50$

$= 10009 \times 60 \times 0.50 \approx 300000$

86. **(a)** $196.1 \times 196.1 \times 196.1 \times 4.01 \times 4.01 \times 4.001 \times 4.999 \times 4.999$

$= (196.1)^3 \times 4 \times ?$

or $4 \times ? = 4.01 \times 4.001 \times 4.999 \times 4.999$ or $? = 4 \times 5 \times 5 = 100$

87. **(d)** $\because 12.25 \times ? \times 21.6 = 3545.64$

$\because ? = \dfrac{3545.64}{264.6} = 13.4 \approx 13$

88. **(c)** Let x be there in place of question mark so, x% of $45.999 \times 16\%$ of $83.006 = 116.073$.

We get, $\dfrac{x}{100} \times 46 \times \dfrac{16}{100} \times 83 = 116$

$x \times 0.46 \times 13.28 = 116$

or $\quad x \times 6.11 = 116$

$\Rightarrow \quad x = 18.98 \approx 19.$

89. **(d)** $? = \dfrac{1.69 \times 17.64}{2.7} = 11.04 \approx 11$

90. **(c)** $3 \xrightarrow{+20} 23 \xrightarrow{+20} 43 \xrightarrow{+20} \boxed{63} \xrightarrow{+20} 83 \xrightarrow{+20} 103$

91. **(d)**

1	9	25	49	81	$\boxed{121}$	169
↑	↑	↑	↑	↑	↑	↑
1^2	3^2	5^2	7^2	9^2	11^2	13^2

92. **(e)** Pattern of the series would be as follows

$5 \times 1 + 1 = 6$

$6 \times 2 + 2 = 14$

$14 \times 3 + 3 = 45$

$\therefore \quad 45 \times 4 + 4 = 184$

93. **(e)** The pattern of the number series is:

$7 \times 1 + 1 = 8$

$8 \times 2 + 2 = 18$

$18 \times 3 + 3 = 57$

$57 \times 4 + 4 = \boxed{232}$

94. **(b)** Can you see that the pattern is

$1^2, 2^3, 3^2, 4^3, 5^2, 6^3, 7^2$

95. **(c)** By going options, 26 years is the present age. Present age be 26, then last year age was 25 which represents a perfect square and next year age would be 27 which represents a cubic number.

96. **(a)** Expression is $(2.1)^2 \times \sqrt{0.0441} = 4.41 \times 0.21 = 0.9261$

97. **(b)** $\sqrt[3]{1372} \times \sqrt[3]{1458}$

$= 7\sqrt[3]{4} \times 9\sqrt[3]{2} = 63 \times \sqrt[3]{4 \times 2} = 63 \times 2 = 126$

98. **(a)** Amounts of water in two jars are equal; the jar with the greater capacity is $\dfrac{1}{4}$ full, and the Jar with lesser capacity is $\dfrac{1}{3}$ full.

$\therefore$ When the water in smaller jar is poured into the larger Jar, the addition of an equal amount of water will double the amount in the larger jar, which will then be $2\times\frac{1}{4}=\frac{1}{2}$ full.

99. (c) $\frac{5x-3}{x}+\frac{5y-3}{y}+\frac{5z-3}{z}=0$

$\frac{5x}{x}-\frac{3}{x}+\frac{5y}{y}-\frac{3}{y}+\frac{5z}{z}-\frac{3}{z}=0$

$5-\frac{3}{x}+5-\frac{3}{y}+5-\frac{3}{z}=0$

$-3\left[\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right]+15=0$

$-3\left[\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right]=-15$

$\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=\frac{-15}{-3}=5$

100. (b) $x^2+\frac{1}{x^2+1}-3$

is minimum when $x=0$

$0+\frac{1}{0+1}-3=-2$

101. (c) $a+b=5$

Squaring on both sides

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

$a^2+b^2+2ab=25$

$13+2ab=25$

$2ab=25-13=12$ ... (1)

Again, $a^2+b^2=13$

Subtracting $(-2ab)$ from both sides

$a^2+b^2-2ab=13-2ab$

$(a-b)^2=13-12$ from equation (1)

$(a-b)^2=1$

TRICK $\Rightarrow a=3$

$b=2\ (a>b)$

$a-b=1$

102. (a) $\frac{3x-y}{x+5y}=\frac{5}{7}\Rightarrow 21x-7y=5x+25y$

$\Rightarrow 16x=32y$

$\Rightarrow x=2y$ or $\frac{x}{y}=\frac{2}{1}$, ... (1)

Now, to calculate value of $\frac{x+y}{x-y}$, divide numerator & denominator by y.

$\Rightarrow \frac{\frac{x}{y}+1}{\frac{x}{y}-1}$

Putting value of $\frac{x}{y}$ from equation (1)

$\frac{\frac{2}{1}+1}{\frac{2}{1}-1}=\frac{3}{1}$ or 3:1

103. (c) $1+\frac{1}{1+\frac{2}{\frac{15+4}{5}}}=1+\frac{1}{1+\frac{2\times5}{19}}$

$=1+\frac{1}{\frac{19+10}{19}}=1+\frac{19}{29}=\frac{29+19}{29}=\frac{48}{29}$

104. (c) $\sqrt{19.36}+\sqrt{0.1936}+\sqrt{0.001936}+\sqrt{0.00001936}$

$=4.4+0.44+0.044+0.0044=4.8884$

105. (c) Let the number be x and y.

According to question,

$(x+y)^2=4xy$

$\Rightarrow x^2+y^2+2xy-4xy=0$

$\Rightarrow (x-y)^2=0$

$\Rightarrow x=y$

106. (c) $a^2+b^2=5ab$

$\Rightarrow \frac{a^2+b^2}{ab}=5$

$\Rightarrow \frac{a}{b}+\frac{b}{a}=5$

On squaring both sides.

$\therefore \left(\frac{a}{b}+\frac{b}{a}\right)^2=25$

$\Rightarrow \frac{a^2}{b^2}+\frac{b^2}{a^2}+2=25$

$\Rightarrow \frac{a^2}{b^2}+\frac{b^2}{a^2}=25-2=23$

107. (d) $x=\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}=\frac{(\sqrt{3}-\sqrt{2})(\sqrt{3}-\sqrt{2})}{(\sqrt{3}+\sqrt{2})(\sqrt{3}-\sqrt{2})}$

$=\frac{(\sqrt{3}-\sqrt{2})^2}{3-2}=3+2-2\sqrt{3}.\sqrt{2}=5-2\sqrt{6}$

$\therefore y=\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}=5+2\sqrt{6}$

$\therefore x+y=5-2\sqrt{6}+5+2\sqrt{6}=10$

$xy=(5-2\sqrt{6})\cdot(5+2\sqrt{6})$

$=25-24=1$

$\therefore x^3+y^3=(x+y)^3-3xy\,(x+y)$

$=(10)^3-3(10)=1000-30=970$

108. (d) LCM of 3, 2 and 6 = 6

$\therefore (3)^{\frac{1}{3}} = (3^2)^{\frac{1}{6}} = (9)^{\frac{1}{6}}$

$2^{\frac{1}{2}} = (2^3)^{\frac{1}{6}} = (8)^{\frac{1}{6}}$

$(1)^{\frac{1}{6}} = 1(6)^{\frac{1}{6}} = (6)^{\frac{1}{6}}$

109. (b) $\frac{\sqrt{24}+\sqrt{6}}{\sqrt{24}-\sqrt{6}} = \frac{2\sqrt{6}+\sqrt{6}}{2\sqrt{6}-\sqrt{6}} = \frac{3\sqrt{6}}{\sqrt{6}} = 3$

110. (b) $3 \div \left[3 \div \left\{2 \div \frac{34}{13}\right\}\right]$

$3 \div \left[3 \div 2 \times \frac{13}{34}\right]$

$3 \div \left[3 \times \frac{34}{2 \times 13}\right]$

$\frac{3 \times 2 \times 13}{3 \times 34} = \frac{13}{17}$

111. (d) $9 + 3 \div 4 - 8 \times 2 = ?$

Applying rules

$9 \div 3 \times 4 + 8 - 2 = ?$

$3 \times 4 + 8 - 2 = ?$

$20 - 2 = ?$

$? = 18$

112. (a) Next term will be

$\left(1+\frac{1}{2}\right)\left(1+\frac{1}{3}\right)\left(1+\frac{1}{4}\right)\left(1+\frac{1}{5}\right)$

$= \frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \frac{6}{5} = 3$

113. (b) $2a^2 - 5ab + 2b^2$

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

$2\,(a - b)^2 - ab$

$2\left[\sqrt{6}+\sqrt{5}-\sqrt{6}+\sqrt{5}\right]^2 - \left(\sqrt{6}+\sqrt{5}\right)\left(\sqrt{6}-\sqrt{5}\right)$

$2 \times 4 \times 5 - 1 = 39$

114. (c) $27P^3 - \frac{1}{216} - \frac{9}{2}P^2 + \frac{1}{4}P$

$= (3P)^3 - \left(\frac{1}{6}\right)^3 - 3.(3P)^2.\frac{1}{6} + 3.3P.\left(\frac{1}{6}\right)^2$

$= \left(3P - \frac{1}{6}\right)^3$

$= \left(3 \times \frac{5}{18} - \frac{1}{6}\right)^3 = \frac{8}{27}$

115. (d) $x + \frac{1}{x} = 2$

$x^2 - 2x + 1 = 0;\ (x-1)^2 = 0;\ x = 1$

$x^{2013} + \frac{1}{x^{2014}} = 1 + 1 = 2$

116. (d) Here, $a + b + c = 0$

$\therefore a^3 + b^3 + c^3 - 3abc = 0$

117. (d)

$\left[\left(\sqrt{6}-\sqrt{35}\right)+\left(\sqrt{10}-\sqrt{21}\right)\right]\left[\left(\sqrt{6}-\sqrt{35}\right)-\left(\sqrt{10}-\sqrt{21}\right)\right]$

$= \left(\sqrt{6}-\sqrt{35}\right)^2 - \left(\sqrt{10}-\sqrt{21}\right)^2$

$= 6 + 35 - 2\sqrt{6}.\sqrt{35} - 10 - 21 + 2\sqrt{10}.\sqrt{21}$

$= 10 - 2\sqrt{210} + 2\sqrt{210}$

$= 10$

118. (b) $x + y + z = a - b + b - c + c - a = 0$

$\therefore x^3 + y^3 + z^3 - 3xyz = 0$

119. (c) $\frac{\sqrt{32}+\sqrt{48}}{\sqrt{8}+\sqrt{12}} = \frac{\sqrt{2\times2\times2\times2\times2}+\sqrt{2\times2\times2\times2\times3}}{\sqrt{2\times2\times2}+\sqrt{2\times2\times3}}$

$\Rightarrow \frac{4\sqrt{2}+4\sqrt{3}}{2\sqrt{2}+2\sqrt{3}} = \frac{2(2\sqrt{2}+2\sqrt{3})}{(2\sqrt{2}+2\sqrt{3})} = 2$

120. (b) $\sqrt{\frac{9.5 \times 0.085}{0.0017 \times 0.19}} = \sqrt{\frac{95}{10} \times \frac{85}{1000} \times \frac{10000}{17} \times \frac{100}{19}}$

$\Rightarrow \sqrt{5 \times 5 \times 100} = 50$

121. (a) $\frac{x}{b+c} = \frac{y}{c+a} = \frac{z}{a+b} = k(\text{say})$

So, $x = k\,(b + c)$

$\Rightarrow\ x - y = k\,(b + c) - k\,(c + a)$

$= k\,(b - a)$

$y = k\,(c + a)$

$\Rightarrow\ y - z = k\,(c + a) - k\,(a + b)$

$= k\,(c - b)$

$z = k\,(a + b) \Rightarrow z - x = k\,(a + b) - k\,(b + c) = k\,(a - c)$

So,check option (a)

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

$\frac{k(b-a)}{b-a} = \frac{k(c-b)}{c-b} = \frac{k(a-c)}{a-c}$

$k = k = k$

option (a) is true.

122. (d) $\frac{547.527}{0.0082} = x \Rightarrow \frac{547527}{1000} \times \frac{10000}{82} = x$

$\Rightarrow \frac{547527}{82} = \frac{x \times 1000}{10000} \Rightarrow \frac{x}{10}$

123. (a) $\left[3^n\right]^{\frac{1}{3}} = 27$

$\Rightarrow \quad 3^{\frac{n}{3}} = 3^3$

Comparing, $\frac{n}{3} = 3$

$x = 9$

124. (b) Time difference between 9.00 A.M & 2.00 P.M = 5 hours

Temperature difference between 21°C & 36°C

$= 36 - 21 = 15°C$

Now, Time difference between 9.00 A.M & 12.00 Noon = 3 hrs.

In 5 hours $\xrightarrow[\text{difference}]{\text{temperature}} 15°C$

So, In 3 hours $\xrightarrow[\text{difference}]{\text{temperature}} \left(\frac{15}{5} \times 3\right) = 9°C$

So, temperature at noon = 21 + 9 = 30°C

125. (b) $\frac{3x+5}{5x-2} = \frac{2}{3}$

$\Rightarrow \quad 9x + 15 = 10x - 4$

$\Rightarrow \quad 15 + 4 = 10x - 9x$

$\Rightarrow \quad x = 19$

126. (d) Let the numbers are x, y.

$x - y = 3 \quad \ldots(1)$

$x^2 - y^2 = 39$

$\Rightarrow \quad (x-y)(x+y) = 39$

$\Rightarrow \quad x + y = 13 \quad \ldots(2)$

Adding eqn (1) and (2)

$x + y + x - y = 16$

$\Rightarrow \quad x = 8$

$\therefore \quad y = 3$

Hence, 8 is the larger number.

127. (c) $x = \sqrt{3} + \sqrt{2}$

$\frac{1}{x} = \frac{1}{\sqrt{3}+\sqrt{2}} \times \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}-\sqrt{2}} = \frac{\sqrt{3}-\sqrt{2}}{3-2} = \sqrt{3} - \sqrt{2}$

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

$= (a+b)^3 - (a-b)^3$ [Let $\sqrt{3} = a$ and $\sqrt{2} = b$]

$= a^3 + b^3 + 3a^2b + 3b^2a - (a^3 - b^3 - 3a^2b + 3b^2a)$

$= a^3 + b^3 + 3a^2b + 3b^2a - a^3 + b^3 + 3a^2b - 3b^2a$

$= 2b^3 + 6a^2b = 2\left(\sqrt{2}\right)^3 + 6\left(\sqrt{3}\right)^2\left(\sqrt{2}\right)$

$= 4\sqrt{2} + 18\sqrt{2} = 22\sqrt{2}$

128. (a) $a^2 + b^2 + c^2 = 2(a-b-c) - 3$

$\Rightarrow \quad a^2 + b^2 + c^2 - 2(a-b-c) + 3 = 0$

$\Rightarrow \quad a^2 + b^2 + c^2 - 2a + 2b + 2c + 3 = 0$

$\Rightarrow \quad (a^2 + 1 - 2a) + (b^2 + 1 + 2b) + (c^2 + 1 + 2c) = 0$

$\Rightarrow \quad (a-1)^2 + (b+1)^2 + (c+1)^2 = 0$

This is possible when $(a-1)^2 = 0, (b+1)^2 = 0$ and $(c+1)^2 = 0.$

$\Rightarrow \quad a = 1, b = -1, c = -1$

Thus, $2a - 3b + 4c = 2(1) - 3(-1) + 4(-1)$

$= 2 + 3 - 4 = 1.$

129. (a) $\sqrt{6} = 2.44, \sqrt{5} = 2.23, \sqrt{3} = 1.73$

$a = \sqrt{6} - \sqrt{5} = 0.21$

$b = \sqrt{5} - 2 = 0.23$

$c = 2 - \sqrt{3} = 0.27$

130. (c) Given $a = \frac{b^2}{b-a}$ or $ab - a^2 = b^2$ or $ab = b^2 + a^2$

We know, $a^3 + b^3 = (a+b)(a^2 + b^2 - ab)$

$\therefore$ (a + b) (ab – ab) $\Rightarrow$ 0 (using given)

131. (a) $\frac{1}{x^2 + xy + xz} + \frac{1}{y^2 + xy + zy} + \frac{1}{z^2 + yz + zx}$

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

$\frac{xy + yz + zx}{xyz(x+y+z)} = 0 \quad (\because xy + yz + zx = 0)$

132. (d) $\sqrt{40 + \sqrt{9 \times 9}} = \sqrt{49} = 7$

133. (d) $\sqrt[3]{2} = 2^{1/3}$ or $2^{\frac{1}{3} \times \frac{2}{2}} = 2^{\frac{2}{6}} = \sqrt[6]{4}$

$\sqrt{3} = 3^{\frac{1}{2}}$ or $3^{\frac{1}{2} \times \frac{3}{3}} = 3^{\frac{3}{6}} = \sqrt[6]{27}$

$\sqrt{3} > \sqrt{2}$

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

$= 9^2 - 2(ab + bc + ca)$

$a^2 + b^2 + c^2$ will be minimum if ab + bc + ca is maximum.

$ab + bc + ca$ is maximum when $a = 3$, $b = 3$, and $c = 3$.

$[\because a + b + c = 9]$

$\therefore$ minimum value of $a^2 + b^2 + c^2$

$= 81 - 2(3 \times 3 + 3 \times 3 + 3 \times 3)$

$= 81 - 54 = 27$

135. (b) $3+\frac{1}{\sqrt{3}}+\frac{1}{3+\sqrt{3}}+\frac{1}{\sqrt{3}-3}$

$\Rightarrow 3+\frac{1}{\sqrt{3}}\times\frac{\sqrt{3}}{\sqrt{3}}+\frac{1}{3+\sqrt{3}}\times\frac{3-\sqrt{3}}{3-\sqrt{3}}+\frac{1}{\sqrt{3}-3}\times\frac{\sqrt{3}+3}{\sqrt{3}+3}$

$\Rightarrow \frac{3}{1}+\frac{\sqrt{3}}{3}+\frac{3-\sqrt{3}}{6}+\frac{\sqrt{3}+3}{-6}$

$\Rightarrow \frac{18+2\sqrt{3}+3-\sqrt{3}-\sqrt{3}-3}{6}$

$\Rightarrow \frac{18+2\sqrt{3}-2\sqrt{3}}{6} \quad \Rightarrow \quad 3$

136. (b) 228 – 18 = 210 is exactly divisible biggest two digit no. 70

137. (a) If they are equal number of rows and columns then,
$\sqrt{1369}=37$

138. (a) $\sqrt{5}+\sqrt{3}>\sqrt{6}+\sqrt{2}$
Squaring both sides
$5+3+2\sqrt{15}>6+2+2\sqrt{12}$
$\sqrt{15}>\sqrt{12}$ which is true

139. (d) Given expression implies $?=\frac{3325}{25}\times\frac{152}{16}$
$=133\times 9.5=1263.5$

140. (e) $\sqrt{3136}-\sqrt{1764}=\sqrt{?}$
$\Rightarrow 56-42=\sqrt{?}$
$\Rightarrow \sqrt{?}=14$
On squaring both the side
$\therefore\ ?=14\times 14=196$

141. (e) $?=5+\frac{1}{5}+2+\frac{2}{15}+3+\frac{2}{3}$
$=10+\frac{1}{5}+\frac{2}{15}+\frac{2}{3}$
$=10+\frac{3+2+10}{15}=10+\frac{15}{15}$
$=10+1=11$

142. (c) $?=-15-27-88-63+255$
$=-193+255=62$

143. (b) Given expression can be written as
$?=\frac{2525\times 0.25\times 7}{5}=883.75$

144. (b) $?=\frac{14}{19}\times\frac{57}{70}\times\frac{20}{21}=\frac{2}{1}\times\frac{3}{10}\times\frac{20}{21}=\frac{2}{1}\times\frac{1}{1}\times\frac{2}{7}=\frac{4}{7}$

145. (e) $?=\frac{500\times 32}{100}+\frac{50\times 162}{100}$
$=160+81=241$

146. (d) $45316+52131-65229$
$=?+15151$
$\Rightarrow 32218=?+15151$
$\therefore\ ?=32218-15151=17067$

147. (a) $?=\sqrt{25-12+155+1}$
$=\sqrt{169}=13$

148. (c) $?=\frac{184\times 4}{\frac{400\times 23}{100}}=\frac{184\times 4}{4\times 23}=8$

149. (a) $?^{4/3}\times ?^{5/3}=32\times 128$
$\Rightarrow ?^3=2^5\times 2^7=2^{12}$
$\therefore\ ?=(2^{12})^{1/3}=2^4=16$

150. (e) Given fractions can be written in decimal forms as
$\frac{4}{9}=0.44;\quad \frac{6}{13}=0.46;\quad \frac{5}{11}=0.45;\quad \frac{13}{16}=0.8125$
$\frac{7}{12}=0.583$
$\therefore$ Clearly,
$\frac{13}{16}>\frac{7}{12}>\frac{6}{13}>\frac{5}{11}>\frac{4}{9}$

151. (d) Number of items produced in 3 days = 1515
Number of items produced in 1 day = $\frac{1515}{3}$
Required number of items
$=\frac{1515\times 7}{3}=3535$

152. (e) $4800<4900$
$\sqrt{4900}=70$
$\therefore$ Required least number
$=4900-4800=100$

153. (b) Required remainder
$=(46)^2-(11)^3$
$=2116-1331=785$

154. (d) $(\text{Larger number})^2=11570-5329=6241$
$\therefore$ Larger number $=\sqrt{6241}=79$

155. (e) Smallest number $=\frac{5685-3}{3}=1894$

156. (e) $27\times 29\times 31=24273$

157. (e) $4\frac{1}{2}+\left(1\div 2\frac{8}{9}\right)-3\frac{1}{13}=?$
$4+\frac{1}{2}+1\times\frac{9}{26}-\left(3+\frac{1}{13}\right)$
$4+\frac{1}{2}+\frac{9}{26}-3-\frac{1}{13}$
$1+\frac{1}{2}-\frac{1}{13}+\frac{9}{26}=\frac{26+13-2+9}{26}=1\frac{10}{13}$

158. (c) $\dfrac{6\times136\div8+132}{628\div16-26.25}$

$=\dfrac{6\times136\times\frac{1}{8}+132}{628\times\frac{1}{16}-26.25}$

$=\dfrac{102+132}{39.25-26.25}=\dfrac{234}{13}=18$

159. (d) $\{(441)^{1/2}\times207\times(343)^{1/3}\}\div\{(14)^2\times(529)^{1/2}\}$

$\{(21^2)^{1/2}\times207\times(7^3)^{1/3}\}\div\{(14)^2\times(23^2)^{1/2}\}$

$(21\times207\times7)\div((14)^2\times23)$

$\dfrac{21\times207\times7}{14\times14\times23}=6\dfrac{3}{4}$

160. (c) $\left\{\sqrt{7744}\times(11)^2\right\}\div(2)^3=(?)^3$

$\left\{88\times(11)^2\right\}\div(2)^3$

$88\times(11)^2\times\dfrac{1}{8}=(11)^3$

$?=11$

161. (e) $(4356)^{½}\div\dfrac{11}{4}=\sqrt{?}\times6$

$(66^2)^{½}\times\dfrac{4}{11}$

$66\times\dfrac{4}{11}=4\times6=\sqrt{16}\times6$

$?=16$

162. (d) $\dfrac{3}{8}\text{of}\left\{4624\div(564-428)\right\}=?$

$\dfrac{3}{8}\times\left\{4624\times\dfrac{1}{136}\right\}$

$\dfrac{3}{8}\times34=12\dfrac{3}{4}$

163. (c) $456\div24\times38-958+364=?$

$=456\times\dfrac{1}{24}\times38-958+364$

$=722-958+364$

$=128$

164. (b) $(43)^2+841=(?)^2+1465$

$1849+841=(?)^2+1465$

$1225=(?)^2$

$?=35$

165. (c) $3\dfrac{3}{8}\times6\dfrac{5}{12}-2\dfrac{3}{16}\times3\dfrac{1}{2}$

$\dfrac{22}{8}\times\dfrac{77}{12}-\dfrac{35}{16}\times\dfrac{7}{2}$

$\dfrac{2079}{96}-\dfrac{245}{32}=\dfrac{2079-7365}{96}=14$

166. (c) $(34.5\times14\times42)\div2.8$

$34.5\times14\times42\times\dfrac{1}{2.8}$

$=7245$

167. (d) $(216)^4\div(36)^4\times(6)^5=(6)^?$

$(6^3)^4\div(6^2)^4\times(6)^5$

$(6^3)^4\times\dfrac{1}{6^8}\times(6)^5$

$6^{12+5-8}=6^9$

$?=9$

168. (c) $\dfrac{\sqrt{4356}\times\sqrt{?}}{\sqrt{6084}}=11$

$\dfrac{\sqrt{66\times66}\times\sqrt{?}}{\sqrt{78\times78}}=11$

$\dfrac{66\times\sqrt{?}}{78}=11$

$\sqrt{?}=\dfrac{11\times78}{66}$

$\sqrt{?}=13$

$?=169$

169. (a) $\left(3\dfrac{6}{17}\div2\dfrac{7}{34}-1\dfrac{9}{25}\right)=(?)^2$

$\dfrac{57}{17}\times\dfrac{34}{75}-\dfrac{34}{25}$

$\dfrac{19\times2}{25}-\dfrac{34}{25}=\dfrac{4}{25}=\left(\dfrac{2}{5}\right)^2$

$?=\dfrac{2}{5}$

170. (b) $(1097.63+2197.36-2607.24)\div3.5$

$(3294.99-2607.24)\times\dfrac{1}{3.5}$

$687.75\times\dfrac{1}{3.5}=196.5$

171. (b) $\dfrac{1}{11}\times\left[(17424)^{½}\times\dfrac{1}{(66)^2}\times3^3\right]$

$\dfrac{1}{11}\times\left[(132^2)^{½}\times\dfrac{1}{(66)^2}\times3^3\right]$

$\dfrac{1}{11}\times\dfrac{132}{(66)^2}\times3^3=\dfrac{\cancel{2}\times\cancel{27}^{9}}{11\times\cancel{66}_{\cancel{33}_{11}}}=\left(\dfrac{3}{11}\right)^2$

$?=11$