SSC CGL (Tier – II) Mathematics Practice Set

Answers with Explanation

1. (c) Expression

$$=1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{\frac{3+2}{3}}}}}$$

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

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

$$=1+\cfrac{1}{1+\cfrac{1}{1+\frac{5}{8}}}$$

$$=1+\cfrac{1}{1+\cfrac{1}{\frac{8+5}{8}}}$$

$$=1+\cfrac{1}{1+\frac{8}{13}} \qquad =1+\cfrac{1}{\frac{13+8}{13}}$$

$$=1+\frac{13}{21} \qquad =\frac{21+13}{21}=\frac{34}{21}$$

2. (a) $\frac{1}{9}+\frac{1}{6}+\frac{1}{12}+\frac{1}{20}+\frac{1}{30}+\frac{1}{42}+\frac{1}{56}+\frac{1}{72}$

$$=\frac{1}{9}+\frac{1}{2\times3}+\frac{1}{3\times4}+\frac{1}{4\times5}+\frac{1}{5\times6}+....\frac{1}{8\times9}$$

$$=\frac{1}{9}+\frac{1}{2}-\frac{1}{3}+\frac{1}{3}-\frac{1}{4}+...+\frac{1}{8}-\frac{1}{9}=\frac{1}{2}$$

3. (c) Expression

$$=\frac{3\left(2-\sqrt{3}\right)-2\left(2+\sqrt{3}\right)}{\frac{\left(2+\sqrt{3}\right)\left(2-\sqrt{3}\right)}{2-\sqrt{3}}}$$

$$=\frac{6-3\sqrt{3}-4-2\sqrt{3}}{\left(2+\sqrt{3}\right)\left(2-\sqrt{3}\right)\left(2-5\sqrt{3}\right)}$$

$$=\frac{2-5\sqrt{3}}{2-5\sqrt{3}}=1$$

4. (c) $\frac{1}{\sqrt{2}+\sqrt{3}-\sqrt{5}}$

$$=\left[\frac{\sqrt{2}+\sqrt{3}+\sqrt{5}}{\sqrt{2}+\sqrt{3}+\sqrt{5}}\right]\times\frac{1}{\sqrt{2}+\sqrt{3}-\sqrt{5}}$$

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

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

Similalry, $\frac{1}{\sqrt{2}-\sqrt{3}-\sqrt{5}}$

$$=\frac{\sqrt{2}-\sqrt{3}+\sqrt{5}}{\left[\left(\sqrt{2}-\sqrt{3}\right)-\sqrt{5}\right]\left[\left(\sqrt{2}-\sqrt{3}\right)+\sqrt{5}\right]}$$

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

$\therefore$ Expression

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

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

$$=\frac{\sqrt{3}}{\sqrt{6}}=\frac{1}{\sqrt{2}}$$

5. (c) In coloured picture,

Blue part $=\frac{4}{7}$

Yellow part $= \frac{3}{7}$

In upper half,

Blue part $= \frac{2}{5\times 2} = \frac{1}{5}$

Yellow part $= \frac{3}{5\times 2} = \frac{3}{10}$

In lower half,

Blue part $= \frac{4}{7} - \frac{1}{5} = \frac{20-7}{35} = \frac{13}{35}$

Yellow part $= \frac{3}{7} - \frac{3}{10} = \frac{30-21}{70} = \frac{9}{70}$

$\therefore$ Required ratio $= \frac{13}{35} : \frac{9}{70} = 26 : 9$

6. (a) $(A+B)\times\frac{40}{100} = (A-B)\times\frac{60}{100}$

$\Rightarrow 2(A+B) = 3(A-B)$

$\Rightarrow 2A + 2B = 3A - 3B$

$\Rightarrow A = 5B$

$\therefore \frac{2A-3B}{A+B} = \frac{10B-3B}{5B+B}$

$= \frac{7B}{6B} = \frac{7}{6}$

7. (b) C.P of article

$= \frac{100}{100-20}\times 450$

$= \frac{100\times 450}{80} = ₹562.5$

$\therefore$ To gain 20%

S.P. $= \frac{562.5\times 120}{100} = ₹675$

8. (d) Let the CP of 1 apple = ₹1

$\therefore$ CP of 18 apples = ₹ 18

SP of 18 apples = ₹ 24

$\therefore$ Gain percent $= \frac{6}{18}\times 100$

$= \frac{100}{3} = 33\frac{1}{3}\%$

9. (b) Principal $= \frac{\text{S.I.}\times 100}{\text{Time}\times\text{Rate}}$

$= \frac{1\times 100}{\frac{1}{365}\times 5} = \frac{365\times 100}{5}$

$= ₹7300$

10. (c) Rate of interest

= 12% per annum

= 6% per half–year

Time = 2 half years

$\therefore$ C.I. $= P\left[\left(1+\frac{R}{100}\right)^{T} - 1\right]$

$= 12500\left[\left(1+\frac{6}{100}\right)^{2} - 1\right]$

$= 12500\left[\left(1+\frac{3}{50}\right)^{2} - 1\right]$

$= 12500\left[\left(\frac{53}{50}\right)^{2} - 1\right]$

$= 12500\left(\frac{2809}{2500} - 1\right)$

$= ₹\left(\frac{12500\times 309}{2500}\right) = ₹1545$

11. (b) $7^{x} = \frac{1}{343}$

$\Rightarrow 7^{x} = \frac{1}{7^{3}} = 7^{-3}$

$\Rightarrow x = -3$

12. (a) $\frac{a}{3} = \frac{b}{2} \Rightarrow \frac{a}{b} = \frac{3}{2}$

$\therefore \frac{2a+3b}{3a-2b} = \frac{2\times\frac{a}{b}+3}{3\times\frac{a}{b}-2}$

$= \frac{2\times\frac{3}{2}+3}{3\times\frac{3}{2}-2} = \frac{6}{\frac{9-4}{2}} = \frac{12}{5}$

13. (d) $\frac{a}{1-a} + \frac{b}{1-b} + \frac{c}{1-c} = 1$

$\Rightarrow \left(\frac{a}{1-a}+1\right) + \left(\frac{b}{1-b}+1\right) + \left(\frac{c}{1-c}+1\right)$

$= 3 + 1 = 4$

$\Rightarrow \frac{a+1-a}{1-a} + \frac{b+1-b}{1-b} + \frac{c+1-c}{1-c} = 4$

$\Rightarrow \frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c} = 4$

14. (b) $\sin 17^o = \frac{x}{y}$

$\cos 17^o = \sqrt{1-\sin^2 17^o}$

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

$\therefore \sec 17^o = \frac{y}{\sqrt{y^2-x^2}}$

$\sin 73° = \sin(90° - 17°)$

$= \cos 17°$

$\therefore \sec 17° - \sin 73°$

$= \frac{y}{\sqrt{y^2-x^2}} - \frac{\sqrt{y^2-x^2}}{y}$

$= \frac{y^2-y^2+x^2}{y\sqrt{y^2-x^2}} = \frac{x^2}{y\sqrt{y^2-x^2}}$

15. (b) $\sqrt{\frac{(0.1)^2+(0.01)^2+(0.009)^2}{(0.01)^2+(0.001)^2+(0.0009)^2}}$

$= \sqrt{\frac{0.01+0.0001+0.000081}{0.0001+0.000001+0.00000081}}$

$= \sqrt{\frac{0.010181}{0.00010181}} = \sqrt{100} = 10$

16. (b) $\frac{4-\sqrt{0.04}}{4+\sqrt{0.4}} = \frac{4-0.2}{4+\sqrt{0.4}}$

$= \frac{3.8}{4+0.632} = \frac{3.8}{4.632} = 0.8$

17. (d) Let 5.71 = a and 2.79 = b

$\therefore$ Expression

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

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

= a – b = 5.71 – 2.79 = 2.92

18. (d) LCM of 2, 4, 5 and 10 = 20

$\therefore \sqrt[2]{8} = \sqrt[20]{8^{10}}$; $\sqrt[4]{13} = \sqrt[20]{13^5}$

$\sqrt[5]{16} = \sqrt[20]{16^4}$; $\sqrt[10]{41} = \sqrt[20]{41^2}$

Clearly, $\sqrt[2]{8}$ is the largest.

19. (a) Gold : Copper = 3 : 2

Sum of the terms of ratio = 3 + 2 = 5

$\therefore$ Percentage of gold $= \frac{3}{5} \times 100 = 60\%$

20. (d) Let the ages of boys be 3x and 4x years respectively.

According to the question,

After 3 years

$\frac{3x+3}{4x+3} = \frac{4}{5}$

$\Rightarrow$ 16x + 12 = 15x + 15

$\Rightarrow$ 16x – 15x = 15 – 12

$\Rightarrow$ x = 3

$\therefore$ Required ratio after 21 years

$= \frac{3x+21}{4x+21}$

$= \frac{3\times3+21}{4\times3+21} = \frac{9+21}{12+21}$

$= \frac{30}{33} = \frac{10}{11}$

21. (d) Suppose number be x

20% of x = 120

$x \times \frac{20}{100} = 120$

$x = \frac{120\times100}{20} = 600$

$600 \times 120\% = 600 \times \frac{120}{100} = 720$

22. (c) If the number be x, then

$x \times \frac{75}{100} + 75 = x$

$\Rightarrow \frac{3x}{4} + 75 = x$

$\Rightarrow x - \frac{3x}{4} = 75$

$\Rightarrow \frac{x}{4} = 75$

$\Rightarrow$ x = 4 × 75 = 300

$\therefore$ 40% of 300

$= \frac{300\times40}{100} = 120$

23. (b) C.P. = 12

S.P. = 12 × 1.25 = 15

Total Profit = 15 – 12 = 3

% gain $= \frac{3}{12} \times 100 = 25\%$

24. (a) Let the man buys 24 (LCM of 8 and 12) oranges.

$\therefore$ C.P. of 24 oranges $= \frac{34}{8} \times 24 =$ ₹102

S.P. of 24 oranges $= \frac{57}{12} \times 24 =$ ₹ 114

Gain = 114 – 102 = ₹ 12

$\because$ ₹ 12 ≡ 24 oranges

$\therefore$ ₹ 45 $\equiv \frac{24}{12} \times 45 = 90$ oranges

25. (a) Rate $= \frac{\text{SI} \times 100}{\text{Principal} \times \text{Time}}$

$= \frac{9}{25} \times \frac{100}{6} = 6\%$ per annum

26. (d) $x = \frac{\sqrt{3}}{2} \Rightarrow \frac{1}{x} = \frac{2}{\sqrt{3}}$

By componendo and dividendo,

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

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

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

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

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

By componendo and dividendo

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

$= \frac{3+\sqrt{3}}{\sqrt{3}+1} = \frac{\sqrt{3}\left(\sqrt{3}+1\right)}{\sqrt{3}+1} = \sqrt{3}$

27. (b) $\sqrt{1-\frac{x^3}{100}} = \frac{3}{5}$ [Squaring both sides],

$\Rightarrow 1 - \frac{x^3}{100} = \frac{9}{25}$

$\Rightarrow \frac{x^3}{100} = 1 - \frac{9}{25} = \frac{25-9}{25} = \frac{16}{25}$

$\Rightarrow x^3 = \frac{16}{25} \times 100 = 64$

$\therefore x = \sqrt[3]{64} = \sqrt[3]{4 \times 4 \times 4} = 4$

28. (d) $2x + \frac{1}{3x} = 5$

$\Rightarrow 6x^2 + 1 = 15x$

$\Rightarrow 6x^2 + 20x + 1 = 15x + 20x = 35x$

$\Rightarrow \frac{5x}{6x^2+20x+1} = \frac{5x}{35x} = \frac{1}{7}$

29. (c) Principal (P) = Rs. S

Rate (R) = 2r% per annum

$\therefore$ Amount $= P\left(1+\frac{R}{100}\right)^T$

$= S\left(1+\frac{2r}{100}\right)^3 = S\left(1+\frac{r}{50}\right)^3$

30. (d) $1 + \frac{1}{\cot^2 63^\circ} - \sec^2 27^\circ + \frac{1}{\sin^2 63^\circ} - \operatorname{cosec}^2 27^\circ$

$= 1 + \tan^2 63^\circ - \sec^2 27^\circ + \operatorname{cosec}^2 63^\circ - \operatorname{cosec}^2 27^\circ$

$= 1 + \tan^2 (90^\circ - 27^\circ) - \sec^2 27^\circ + \operatorname{cosec}^2 (90^\circ - 27^\circ) - \operatorname{cosec}^2 27^\circ$

$= 1 + \cot^2 27^\circ - \sec^2 27^\circ + \sec^2 27^\circ - \operatorname{cosec}^2 27^\circ$

$= 1 + \cot^2 27^\circ - \operatorname{cosec}^2 27^\circ$

$= 1 - 1 = 0$

[$\because \operatorname{cosec}^2\theta - \cot^2\theta = 1$]

31. (a) C.P. of article = Rs. x (let).

According to the question,

$\frac{94x}{100} + 64 = \frac{x \times 110}{100}$

$\Rightarrow \frac{110x}{100} - \frac{94x}{100} = 64$

$\Rightarrow \frac{16x}{100} = 64 \Rightarrow x = \frac{64 \times 100}{16} =$ ₹ 400

32. (b) Let the C.P. be x

$\therefore$ (6 – 4)% of x = 3

$\Rightarrow$ 2% of x = 3

$\Rightarrow x = \frac{300}{2} = 150$

$\therefore$ S.P. at 4% gain

$= \frac{150 \times 104}{100} =$ ₹ 156

and S.P. at 6% gain

$= \frac{150 \times 106}{100} =$ ₹ 159

$\therefore$ The required ratio

= 156 : 159 = 52 : 53

33. (b) $\sqrt{0.05 \times 0.5 \times a}$

$= 0.5 \times 0.05 \times \sqrt{b}$

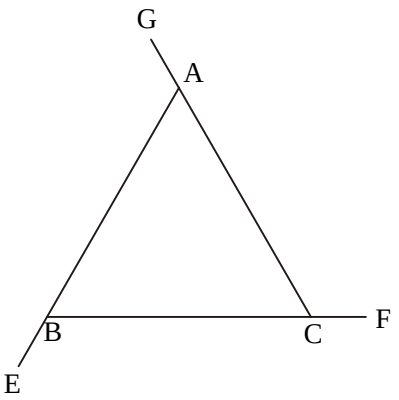
On squaring both sides,

$0.05 \times 0.5 \times a = 0.5 \times 0.5 \times 0.05 \times 0.05 \times b$

$\Rightarrow a = 0.5 \times 0.05b$

$\Rightarrow \frac{a}{b} = 0.5 \times 0.05 = 0.025$

34. (a)



$\angle CBE = 130°$

$\therefore \angle ABC = 180° - 130° = 50°$

$\angle ACF = 130°$

$\therefore \angle ACB = 180° - 130° = 50°$

$\therefore \angle BAC = 180° - 50° - 50° = 80°$

$\therefore \angle GAB = 180° - 80° = 100°$

35. (a) Required answer

$= \frac{10}{(100+10)} \times 100$

$= \frac{10}{110} \times 100 = \frac{100}{11}\% = 9\frac{1}{11}\%$

36. (d) S.I. on ₹12000

$= \frac{12000 \times 8 \times 1}{100} = ₹960$

Desired gain on ₹20000

$= 20000 \times \frac{10}{100} = ₹\ 2000$

$\therefore$ S.I. on ₹8000 = 2000 – 960 = ₹1040

$\therefore \text{Rate} = \frac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \frac{1040 \times 100}{8000}$ = 13% per annum

37. (c) $\frac{x}{y} = \frac{4}{5}$ (Given)

Expression $= \frac{4}{7} + \frac{2y - x}{2y + x}$

$= \frac{4}{7} + \frac{\frac{2y}{y} - \frac{x}{y}}{\frac{2y}{y} + \frac{x}{y}}$

$= \frac{4}{7} + \frac{2 - \frac{x}{y}}{2 + \frac{x}{y}} = \frac{4}{7} + \frac{2 - \frac{4}{5}}{2 + \frac{4}{5}}$

$= \frac{4}{7} + \frac{\frac{10-4}{5}}{\frac{10+4}{5}} = \frac{4}{7} + \frac{6}{14}$

$= \frac{4}{7} + \frac{3}{7} = \frac{7}{7} = 1$

38. (d) $\frac{2p}{p^2 - 2p + 1} = \frac{1}{4}$

On dividing numerator and denominator by p, we get,

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

$\Rightarrow p + \frac{1}{p} - 2 = 8$

$\Rightarrow p + \frac{1}{p} = 8 + 2 = 10$

39. (a) $\frac{x}{1} = \frac{a-b}{a+b}$

By componendo and dividendo,

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

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

Similarly,

$\frac{1-y}{1+y} = \frac{c}{b}; \frac{1-z}{1+z} = \frac{a}{c}$

$\therefore \text{Expression} = \frac{(1-x)(1-y)(1-z)}{(1+x)(1+y)(1+z)}$

$= \frac{b}{a} \times \frac{c}{b} \times \frac{a}{c} = 1$

40. (d) Expression

$$= \sqrt{\frac{1+\sin\theta}{1-\sin\theta}} + \sqrt{\frac{1-\sin\theta}{1+\sin\theta}}$$

$$= \sqrt{\frac{(1+\sin\theta)(1+\sin\theta)}{(1-\sin\theta)(1+\sin\theta)}} + \sqrt{\frac{(1-\sin\theta)(1-\sin\theta)}{(1+\sin\theta)(1-\sin\theta)}}$$

$$= \sqrt{\frac{(1+\sin\theta)^2}{1-\sin^2\theta}} + \sqrt{\frac{(1-\sin\theta)^2}{1-\sin^2\theta}}$$

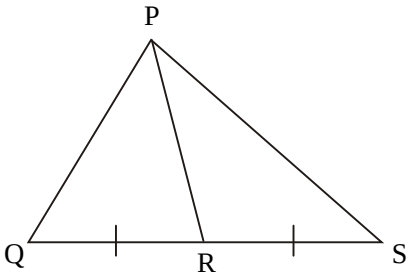
$$= \sqrt{\frac{(1+\sin\theta)^2}{\cos^2\theta}} + \sqrt{\frac{(1-\sin\theta)^2}{\cos^2\theta}}$$

$$= \frac{1+\sin\theta}{\cos\theta} + \frac{1-\sin\theta}{\cos\theta}$$

$$= \frac{1+\sin\theta+1-\sin\theta}{\cos\theta} = \frac{2}{\cos\theta}$$

$$= 2\sec\theta$$

41. (a)



$\angle PRQ = 60°$

$\angle PRS = 180° - 60° = 120°$;

$\Rightarrow \angle PSR + \angle RPS = 60°$

As RS = PR

$\therefore \angle PSR = \angle RPS$

$\therefore \angle PSR = \frac{60^o}{2} = 30^o$

42. (b) Expression

$$= \sqrt[3]{15612 + \sqrt{154 + \sqrt{225}}}$$

$$= \sqrt[3]{15612 + \sqrt{154 + 15}}$$

$$= \sqrt[3]{15612 + 13}$$

$$= \sqrt[3]{15625} = 25$$

43. (d) Expression $= \frac{5+\sqrt{11}}{3-2\sqrt{11}}$

$$= \frac{(5+\sqrt{11})(3+2\sqrt{11})}{(3-2\sqrt{11})(3+2\sqrt{11})}$$

(On rationalising the denominator)

$$= \frac{15+22+10\sqrt{11}+3\sqrt{11}}{9-4\times 11}$$

$$= \frac{37+13\sqrt{11}}{-35}$$

$$\therefore x + y\sqrt{11} = \frac{-37}{35} - \frac{13}{25}\sqrt{11}$$

$$\therefore x = \frac{-37}{35},\ y = -\frac{13}{35}$$

44. (d) 30% of A = 25% of B

$\Rightarrow$ 30 A = 25 B

$\Rightarrow$ A : B = 25 : 30 = 5 : 6

Again,

25% of B = 20% of C

$\Rightarrow$ 25 B = 20C

$\Rightarrow$ 5B = 4C

$\Rightarrow$ B : C = 4 : 5

$\therefore$ A : B : C = 5 × 4 : 4 × 6 : 6 × 5

= 20 : 24 : 30 = 10 : 12 : 15

45. (d) Profit per cent

$$= \frac{26-25}{25}\times 100 = \frac{100}{25} = 4\%$$

46. (a) C.P. of first buyer

₹(840 + 10% of 840)

= ₹(840 + 84) = ₹924

Now, this item is sold to the second buyer at 5% loss.

$\therefore$ Final selling price

$$= ₹\left(\frac{95}{100}\times 924\right) = ₹877.80$$

47. (d) Let the sum lent at the rate of interest 5% per annum is x and at the rate of interest 8% per annum is (1550 – x)

According to the question,

$$\frac{x\times 5\times 3}{100} + \frac{(1550-x)\times 8\times 3}{100} = 300$$

$$\Rightarrow \frac{15x}{100} + \frac{37200-24x}{100} = 300$$

$\Rightarrow$ 15x + 37200 – 24x = 300 × 100

$\Rightarrow$ 9x = 7200

$\therefore$ x = 800 and,

1550 – x = 1550 – 800 = 750

$\therefore$ Ratio of money lent at 5% to that at 8% = 800 : 750 = 16 : 15

48. (c) If SI on a certain sum for two years is x and CI is y, then

$$y = x\left(1+\frac{r}{200}\right)$$

$\Rightarrow 282.15 = 270\left(1+\frac{r}{100}\right)$

$\Rightarrow 1+\frac{r}{200} = \frac{282.15}{270}$

$\Rightarrow \frac{r}{200} = \frac{282.15}{270} - 1$

$\Rightarrow \frac{r}{200} = \frac{12.15}{270}$

$\Rightarrow r = \frac{12.15 \times 200}{270} = 9\%$

49. (c) $x + \frac{1}{x} = 99$

$\therefore \frac{100x}{2x^2 + 102x + 2}$

$= \frac{100x}{2x^2 + 2 + 102x}$

On dividing by x,

$= \frac{100}{2x + \frac{2}{x} + 102}$

$= \frac{100}{2\left(x + \frac{1}{x}\right) + 102}$

$= \frac{100}{2 \times 99 + 102} = \frac{100}{300} = \frac{1}{3}$

50. (c) $x = 5 + 2\sqrt{6}$

$\therefore \frac{1}{x} = \frac{1}{5+2\sqrt{6}} = \frac{5-2\sqrt{6}}{\left(5+2\sqrt{6}\right)\left(5-2\sqrt{6}\right)}$

$= \frac{5-2\sqrt{6}}{25-24} = 5 - 2\sqrt{6}$

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

$= 5 + 2\sqrt{6} + 5 - 2\sqrt{6} + 2 = 12$

$\therefore \sqrt{x} + \frac{1}{\sqrt{x}} = \sqrt{12} = 2\sqrt{3}$

51. (a) $x - y = \frac{x+y}{7} = \frac{xy}{4} = k$

$\Rightarrow x - y = k$

$x + y = 7k$

$\therefore (x + y)^2 - (x - y)^2 = 49k^2 - k^2$

$\Rightarrow 4xy = 48k^2$

$\Rightarrow 16k = 48k^2$

$\Rightarrow k = \frac{1}{3}$

$\therefore xy = 4k = 4 \times \frac{1}{3} = \frac{4}{3}$

52. (c) $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = 3$

$\Rightarrow \sin\theta + \cos\theta = 3\sin\theta - 3\cos\theta$

$\Rightarrow 4\cos\theta = 2\sin\theta \Rightarrow \tan\theta = 2$

$\therefore \sin^4\theta - \cos^4\theta$

$= (\sin^2\theta + \cos^2\theta)(\sin^2\theta - \cos^2\theta)$

$= \sin^2\theta - \cos^2\theta$

$= \cos^2\theta\ (\tan^2\theta - 1)$

$= \frac{\tan^2\theta - 1}{\sec^2\theta}$

$= \frac{\tan^2\theta - 1}{1 + \tan^2\theta} = \frac{4-1}{1+4} = \frac{3}{5}$

53. (d) Expression

$= \left(2 - \frac{1}{3}\right)\left(2 - \frac{3}{5}\right)\left(2 - \frac{5}{7}\right)....\left(2 - \frac{997}{999}\right)$

$= \left(\frac{6-1}{3}\right)\left(\frac{10-3}{5}\right)\left(\frac{14-5}{7}\right)...\left(\frac{1998-997}{999}\right)$

$= \frac{5}{3} \times \frac{7}{5} \times \frac{9}{7} \times .... \times \frac{1001}{999} = \frac{1001}{3}$

54. (a) $x = \sqrt{2\sqrt[3]{4\sqrt{2\sqrt[3]{4}}}}$.....

On squaring

$x^2 = 2\sqrt[3]{4\sqrt{2\sqrt[3]{4}}}$ .....

On cubing,

$x^6 = 8 \times 4x$

$\Rightarrow x^5 = 32 = 2^5 \Rightarrow x = 2$

55. (c) Let the present age of two brothers be x and 2x years.

Now, $\frac{x-5}{2x-5} = \frac{1}{3}$

$\Rightarrow 3x - 15 = 2x - 5$

$\Rightarrow 3x - 2x = 15 - 5$

$\Rightarrow x = 10$

$\therefore$ Their present age

= 10 and 20 years

After 5 years their required ratio

$= \frac{15}{25} = \frac{3}{5} = 3:5$

56. (d) 50% of x = 30% of y

$\Rightarrow \frac{x \times 50}{100} = \frac{y \times 30}{100}$

$\Rightarrow \frac{x}{y} = \frac{30}{50} = \frac{3}{5} = 3:5$

57. (d) C.P. of mixture

$= \frac{320 \times 100}{120} = ₹\ \frac{800}{3}$ per kg.

By rule of alligation,

Variety I ₹ 180 | Variety II ₹ 280

$\frac{800}{3}$

$280 - \frac{800}{3}$ | $\frac{800}{3} - 180$

$= \frac{840-800}{3}$ | $= \frac{800-540}{3}$

$= \frac{40}{3}$ | $= \frac{260}{3}$

$\therefore$ Required ratio $= \frac{40}{3} : \frac{260}{3} = 2:13$

58. (b) SP of article = 69

Loss % = 8%

$\therefore CP = ₹\ \frac{100 \times 69}{92} = ₹\ 75$

New SP = ₹78

$\therefore$ Gain %

$= \frac{78-75}{75} \times 100 = 4\%$

59. (c) If the sum of money be x, then

$\frac{x \times 6 \times 3}{100} + \frac{x \times 5 \times 9}{100} + \frac{x \times 3 \times 13}{100} = 8160$

$\Rightarrow 18x + 45x + 39x = 816000$

$\Rightarrow 102x = 816000$

$\Rightarrow x = \frac{816000}{102} = ₹\ 8000$

60. (d) $\frac{p}{q} + \frac{q}{p} = \frac{p^2+q^2}{pq}$

$= \frac{(p+q)^2 - 2pq}{pq}$

$= \frac{100 - 2 \times 5}{5} = \frac{90}{5} = 18$

61. (a) Check through option

When $x = (a + b + c)^2$,

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

$= \frac{(a+b+c)^2 - a^2}{b+c} + \frac{(a+b+c)^2 - b^2}{c+a} + \frac{(a+b+c)^2 - c^2}{a+b}$

$= \frac{(2a+b+c)(b+c)}{b+c} + \frac{(a+2b+c)(c+a)}{c+a} + \frac{(a+b+2c)(a+b)}{a+b}$

$= 2a + b + c + a + 2b + c + a + b + 2c$

$= 4a + 4b + 4c = 4(a + b + c) =$ RHS.

62. (c) $\frac{b-c}{a} + \frac{a+c}{b} + \frac{a-b}{c} = 1$

$\Rightarrow \frac{b-c}{a} + \frac{a-b}{c} + \frac{a+c}{b} - 1 = 0$

$\Rightarrow \frac{b-c}{a} + \frac{a-b}{c} + \frac{a+c-b}{b} = 0$

$\Rightarrow \frac{c-b}{a} + \frac{b-a}{c} = \frac{a+c-b}{b}$

$\Rightarrow \frac{c^2 - bc + ab - a^2}{ac} = \frac{a+c-b}{b}$

$\Rightarrow \frac{(c^2 - a^2) - (bc - ab)}{ac} = \frac{a+c-b}{b}$

$\Rightarrow \frac{(c-a)(c+a) - b(c-a)}{ac}$

$= \frac{a+c-b}{b}$

$\Rightarrow \frac{(c-a)(c+a-b)}{ac} = \frac{a+c-b}{b}$

$\Rightarrow \frac{c-a}{ac} = \frac{1}{b}$

$$\Rightarrow \frac{c}{ac} - \frac{a}{ac} = \frac{1}{b}$$

$$\Rightarrow \frac{1}{a} - \frac{1}{c} = \frac{1}{b}$$

63. (b) $a + \frac{1}{a} = 1$

$$\Rightarrow a = 1 - \frac{1}{b} = \frac{b-1}{b}$$

Again,

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

$$\Rightarrow b = 1 - \frac{1}{c} = \frac{c-1}{c}$$

$$\therefore a = \frac{b-1}{b} = \frac{\frac{c-1}{c} - 1}{\frac{c-1}{c}}$$

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

$$\therefore abc = \frac{-1}{c-1} \times \frac{c-1}{c} \times c = -1$$

64. (d) $\sec\theta + \tan\theta = 5$

$\therefore \sec^2\theta - \tan^2\theta q = 1$

$\Rightarrow (\sec\theta - \tan\theta)(\sec\theta + \tan\theta) = 1$

$$\Rightarrow \sec\theta - \tan\theta = \frac{1}{5}$$

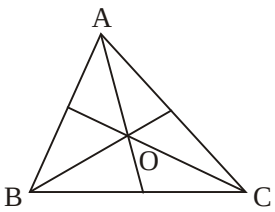
$\therefore (\sec\theta + \tan\theta) - (\sec\theta - \tan\theta)$

$$= 5 - \frac{1}{5} = \frac{25-1}{5}$$

$$\Rightarrow 2\tan\theta = \frac{24}{5} \Rightarrow \tan\theta = \frac{12}{5}$$

$$\therefore \frac{\tan\theta + 1}{\tan\theta - 1} = \frac{\frac{12}{5} + 1}{\frac{12}{5} - 1} = \frac{12+5}{12-5} = \frac{17}{7}$$

65. (d)



The point of intersection of internal bisectors of a triangle is called in-centre.

$$\angle BOC = 90^\circ + \frac{\angle A}{2}$$

$$\Rightarrow 116^\circ = 90^\circ + \frac{\angle A}{2}$$

$$\Rightarrow \frac{\angle A}{2} = 116 - 90^\circ = 26^\circ$$

$$\therefore \angle A = 26 \times 2 = 52^\circ$$

66. (c) ? =

$$\frac{(0.0539 - 0.002) \times 0.4 + 0.56 \times 0.07}{0.04 \times 0.25}$$

$$= \frac{0.0519 \times 0.4 + 0.0392}{0.01}$$

$$= \frac{0.02076 + 0.0392}{0.01}$$

$$= \frac{0.05996}{0.01} = 5.996$$

67. (a) $3a = 4b = 6c$

$$\Rightarrow \frac{3a}{12} = \frac{4b}{12} = \frac{6c}{12}$$

$$\Rightarrow \frac{a}{4} = \frac{b}{3} = \frac{c}{2} = k$$

$\Rightarrow a = 4k;\ b = 3k;\ c = 2k$

$\therefore a + b + c = 27\sqrt{29}$

$\Rightarrow 4k + 3k + 2k = 27\sqrt{29}$

$\Rightarrow 9k = 27\sqrt{29}$

$\Rightarrow k = 3\sqrt{29}$

$\therefore \sqrt{a^2 + b^2 + c^2}$

$= \sqrt{16k^2 + 9k^2 + 4k^2}$

$= \sqrt{29k^2} = \sqrt{29}\,k$

$= \sqrt{29} \times 3\sqrt{29} = 29 \times 3 = 87$

68. (a) Using Rule 1,

$$\left(2b + \frac{1}{b}\right)^2$$

$$= 4b^2 + \frac{1}{b^2} + 2 \times 2b \times \frac{1}{b} = 2 + 4 = 6$$

$\Rightarrow 2b+\frac{1}{b}=\sqrt{6}$

$\therefore 8b^3+\frac{1}{b^3}$

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

$=\left(\sqrt{6}\right)^3-6\left(\sqrt{6}\right)$

$=6\sqrt{6}-6\sqrt{6}=0$

69. (b) $x+\frac{1}{x}=2$

$\Rightarrow x^2+1=2x \Rightarrow x^2-2x+1=0$

$\Rightarrow (x-1)^2=0$

$\Rightarrow x=1$

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

70. (b) Using Rule 8,

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

On multiplying both sides by $\frac{2}{3}$,

$2x+\frac{1}{3x}=\frac{10}{3}$

Cubing both sides,

$8x^3+\frac{1}{27x^3}+3\times 2x\times\frac{1}{3x}$

$\left(2x+\frac{1}{3x}\right)=\frac{1000}{27}$

$\Rightarrow 8x^3+\frac{1}{27x^3}+2\times\frac{10}{3}=\frac{1000}{27}$

$\Rightarrow 8x^3+\frac{1}{27x^3}=\frac{1000}{27}-\frac{20}{3}$

$=\frac{1000-180}{27}=\frac{820}{27}=30\frac{10}{27}$

71. (b) $\sin\theta+\sin^2\theta=1$

$\Rightarrow \sin\theta=1-\sin^2\theta=\cos^2\theta$

$\therefore \cos^2\theta+\cos^4\theta$

$=\cos^2\theta+(\cos^2\theta)^2$

$=\cos^2\theta+\sin^2\theta=1$

72. (a) Weight of zinc $=200\times\frac{5}{8}=125$ gram

Weight of copper $=200\times\frac{3}{8}=75$ gram

Let the ratio of 125 gram zinc and x gram copper be 3 : 5

$\therefore \frac{125}{x}=\frac{3}{5}$

$\therefore x=\frac{125\times 5}{3}=\frac{625}{3}$ gram

$\therefore$ Addition of copper in mixture

$=\frac{625}{3}-75=\frac{625-225}{3}$

$=\frac{400}{3}=133\frac{1}{3}$ gram.

73. (c) Let the maximum marks be x.

According to the question,

40% of x = 90 + 10

$\Rightarrow x=\frac{100\times 100}{40}=250$

74. (d) Let the cost price of the bicycle for A be ₹x

Cost price for B = selling price for A = 1.20x

Cost price for C = selling price for B = (1.25)(1.20x) = 1.5x

But 1.5x = 225

$\therefore x=\frac{225}{1.5}=₹150$

$\therefore$ The cost price of the bicycle for A = ₹150

75. (a) Let his capital be x.

According to the question,

$\frac{x\times 11.5}{100}-\frac{x\times 10}{100}=55.50$

or (11.5 – 10)x = 5550

or 1.5x = 5550

or $x=\frac{5550}{1.5}=₹3700$

76. (a) Let the rate of interest be r% per annum,

According to the question,

$4840=P\left(1+\frac{r}{100}\right)^2$ .... (i)

and $5324=P\left(1+\frac{r}{100}\right)^3$ .... (ii)

On dividing equation (ii) by equation (i), we have,

$1+\frac{r}{100}=\frac{5324}{4840}=1+\frac{484}{4840}$

$\Rightarrow \frac{r}{100}=\frac{484}{4840}$

$\Rightarrow r=10\%$

77. (a) $\frac{a^2}{b+c} = \frac{b^2}{c+a} = \frac{c^2}{a+b} = 1$

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

$\Rightarrow a^2 = b + c$

$\Rightarrow a^2 + a = a + b + c$

$\Rightarrow a(a + 1) = a + b + c$

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

Similarly,

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

$\Rightarrow b^2 + b = a + b + c$

$\Rightarrow b(b + 1) = a + b + c$

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

and $\frac{c^2}{a+b} = 1 \Rightarrow c^2 = a+b$

$\Rightarrow c^2 + c = a + b + c$

$\Rightarrow c(c + 1) = a + b + c$

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

$\therefore \frac{1}{1+a} + \frac{1}{1+b} + \frac{1}{1+c}$

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

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

78. (c) $p^2 + \frac{1}{p^2} = 47$

$\Rightarrow \left(p + \frac{1}{p}\right)^2 - 2 = 47$

$\Rightarrow \left(p + \frac{1}{p}\right)^2 = 47 + 2 = 49$

$\Rightarrow p + \frac{1}{p} = \sqrt{49} = 7$

79. (c) $a + \frac{1}{b} = 1$

$\Rightarrow a = 1 - \frac{1}{b} = \frac{b-1}{b}$

$\Rightarrow \frac{1}{a} = \frac{b}{b-1}$

again, $b + \frac{1}{c} = 1$

$\Rightarrow \frac{1}{c} = 1 - b$

$\Rightarrow c = \frac{1}{1-b}$

$\therefore c + \frac{1}{a} = \frac{1}{1-b} + \frac{b}{b-1}$

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

80. (b) $x^2 + \frac{1}{x^2} = 66$

$\Rightarrow \left(x - \frac{1}{x}\right)^2 + 2 = 66$

$\Rightarrow \left(x - \frac{1}{x}\right)^2 = 66 - 2 = 64$

$\Rightarrow x - \frac{1}{x} = \pm 8$

$\therefore$ Expression $= \frac{x^2 - 1 + 2x}{x}$

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

Putting the value of $x - \frac{1}{x}$

$= 8 + 2$ or $-8 + 2 = 10$ or -6

81. (c) Single equivalent percentage increase in price

$= \left(10 + 10 + \frac{10 \times 10}{100}\right)\% = 21\%$

82. (a) Let the C.P. of A be ₹x, then

$x \times \frac{110}{100} \times \frac{120}{100} = 264$

$\Rightarrow x = \frac{264 \times 100 \times 100}{110 \times 120} =$ ₹200

83. (d) Let the principal be ₹100

Interest = ₹10

Actual principal = ₹90

$\because$ Interest on ₹ 90 = ₹10

$\therefore$ Interest on ₹100

$= \frac{10}{90} \times 100 = \frac{100}{9} = 11\frac{1}{9}\%$

84. (a) Sum = Difference $\left(\frac{100}{r}\right)^2$

$= 4 \times \left(\frac{100}{4}\right)^2 =$ ₹ 2500

85. (a) $m^4 + \frac{1}{m^4} = 119$

$\Rightarrow \left(m^2 + \frac{1}{m^2}\right)^2 - 2 = 119$

$\Rightarrow \left(m^2 + \frac{1}{m^2}\right)^2 = 119 + 2 = 121$

$\Rightarrow m^2 + \frac{1}{m^2} = 11$

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

$\Rightarrow \left(m - \frac{1}{m}\right)^2 = 11 - 2 = 9$

$\Rightarrow m - \frac{1}{m} = \pm 3$

86. (b) $x = 1 - \sqrt{2}$

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

$= -1 - \sqrt{2}$

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

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

$= 2^3 = 8$

87. (a) $\frac{1}{a} - \frac{1}{b} = \frac{1}{a-b}$

$\Rightarrow \frac{b-a}{ab} = \frac{1}{a-b}$

$\Rightarrow (a - b)(a - b) = -ab$

$\Rightarrow a^2 - 2ab + b^2 = -ab$

$\Rightarrow a^2 - ab + b^2 = 0$

$\therefore a^3 + b^3 = (a + b)(a^2 - ab + b) = 0$

88. (d) $\left(x + \frac{1}{x}\right)\left(a - \frac{1}{x}\right)$

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

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

$= \left(x^2 - \frac{1}{x^2}\right)\left(x^4 + \frac{1}{x^4} + 1\right)$

$= x^6 - \frac{1}{x^6}$

89. (d) Here, S.P. is same. Hence there is always a loss.

Loss per cent $= \frac{20 \times 20}{100} = 4\%$

90. (c) Rate = 5%, Time = 4 half years

P = ₹5000

$\therefore$ C.I. $= P\left[\left(1 + \frac{R}{100}\right)^T - 1\right]$

$= 5000\left[\left(1 + \frac{5}{100}\right)^4 - 1\right]$

$= 5000\left(\frac{194481}{160000} - 1\right)$

$= \frac{5000 \times 34481}{160000} =$ ₹ 1077.5

S.I. $= \frac{5000 \times 10 \times 2}{100} =$ ₹ 1000

Difference = 1077.5 – 1000 = ₹ 77.5

91. (d) $a - \frac{1}{(a-3)} = 5$

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

On cubing both sides,

$\left\{(a-3) - \frac{1}{(a-3)}\right\}^3 = 8$

$\Rightarrow (a-3)^3 - \left(\frac{1}{a-3}\right)^3 - 3 \times (a-3)$

$\left(\frac{1}{a-3}\right)\left((a-3) - \frac{1}{(a-3)}\right) = 8$

[$\because (a - b)^3 = a^3 - b^3 - 3ab(a - b)$]

$\Rightarrow (a-3)^3 - \left(\frac{1}{a-3}\right)^3 - 3\times 2 = 8$

$\Rightarrow (a-3)^3 - \left(\frac{1}{a-3}\right)^3 = 8+6 = 14$

92. (c) $x - \frac{1}{x} = 2$

On cubing both sides,

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

$\Rightarrow x^3 - \frac{1}{x^3} - 3\left(x - \frac{1}{x}\right) = 8$

$\Rightarrow x^3 - \frac{1}{x^3} - 3\times 2 = 8$

$\Rightarrow x^3 - \frac{1}{x^3} = 8+6 = 14$

93. (b) $2x + \frac{2}{x} = 3$

On dividing by 2,

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

On cubing both sides,

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

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

$\Rightarrow x^3 + \frac{1}{x^3} + \frac{3\times 3}{2} = \frac{27}{8}$

$\Rightarrow x^3 + \frac{1}{x^3} = \frac{27}{8} - \frac{9}{2}$

$= \frac{27-36}{8}$

$\Rightarrow x^3 + \frac{1}{x^3} = \frac{-9}{8}$

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

$= 2 - \frac{9}{8} = \frac{16-9}{8} = \frac{7}{8}$

94. (b) Let the cost price be x.

$\therefore (100 + x)\%$ of $x = 144$

$\Rightarrow (100 + x)x = 14400$

$\Rightarrow x^2 + 100x - 14400 = 0$

$\Rightarrow x^2 + 180x - 80x - 14400 = 0$

$\Rightarrow x(x + 180) - 80(x + 180) = 0$

$\Rightarrow (x + 180)(x - 80) = 0$

$\Rightarrow x = ₹80$ $[x \neq -180]$

95. (b) $2\left(x^2 + \frac{1}{x^2}\right) - \left(x - \frac{1}{x}\right) - 7 = 0$

$2\left\{\left(x - \frac{1}{x}\right)^2 + 2\right\} - \left(x - \frac{1}{x}\right) - 7 = 0$

$\Rightarrow 2\left(x - \frac{1}{x}\right)^2 + 4 - \left(x - \frac{1}{x}\right) - 7 = 0$

$\Rightarrow 2\left(x - \frac{1}{x}\right)^2 - \left(x - \frac{1}{x}\right) - 3 = 0$

If $x - \frac{1}{x} = y$, then

$2y^2 - y - 3 = 0$

$\Rightarrow 2y^2 - 3y + 2y - 3 = 0$

$\Rightarrow y(2y - 3) + 1(2y - 3) = 0$

$\Rightarrow (y + 1)(2y - 3) = 0$

$\Rightarrow y = -1$ or $\frac{3}{2}$

when $y = -1$

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

$\Rightarrow x^2 + x - 1 = 0$

The value of x will not be real.

Again,

$x - \frac{1}{x} = \frac{3}{2}$

$\Rightarrow \frac{x^2 - 1}{x} = \frac{3}{2}$

$\Rightarrow 2x^2 - 2 = 3x$

$\Rightarrow 2x^2 - 3x - 2 = 0$

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

$\Rightarrow 2x(x - 2) + 1(x - 2) = 0$

$\Rightarrow (2x + 1)(x - 2) = 0$

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

96. (c) On putting $y = -x$ in the equation

$5y + 7x = 24$,

$-5x + 7x = 24$

$\Rightarrow 2x = 24 \Rightarrow x = 12$

& $y = -12$

$\therefore m = x = 12$, $n = y = -12$

$\Rightarrow m + n = 12 - 12 = 0$

97. (a) $\frac{a}{b} = \frac{2}{3} = \frac{8}{12}$

$\frac{b}{c} = \frac{4}{5} = \frac{12}{15}$ [Making B equal]

$\therefore$ Required ratio $= \frac{8+12}{12+15} = \frac{20}{27}$

98. (c) $A : B = \frac{1}{2} : \frac{3}{8}$

$= \frac{8}{2} : \frac{8 \times 3}{8} = 4 : 3$

$B : C = \frac{1}{3} : \frac{5}{9}$

$= \frac{9}{3} : \frac{9 \times 5}{9} = 3 : 5$

$C : D = \frac{5}{6} : \frac{3}{4}$

$= \frac{5 \times 6}{6} : \frac{3 \times 6}{4} = 5 : \frac{9}{2}$

$\therefore A : B : C : D = 4 : 3 : 5 : \frac{9}{2}$

$= 8 : 6 : 10 : 9$

99. (d) $\frac{3a+5b}{3a-5b} = \frac{5}{1}$

By componendo and dividendo,

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

$\Rightarrow \frac{6a}{10b} = \frac{6}{4} \Rightarrow \frac{a}{b} = \frac{6}{4} \times \frac{10}{6} = \frac{5}{2}$

$\Rightarrow 5 : 2 = a : b$

100. (d) Let the C.P. be ₹4x.

Its S.P. = ₹5x.

Profit = ₹(5x – 4x) = ₹x.

$\therefore$ Profit per cent $= \frac{x}{4x} \times 100 = 25\%$

★★★