4. SIMPLIFICATION

IMPORTANT CONCEPTS

I. **'BODMAS' Rule :** This rule depicts the correct sequence in which the operations are to be executed, so as to find out the value of a given expression.

Here, 'B' stands for '***Bracket***', 'O' for '***of***', 'D' for '***Division***', 'M' for '***Multiplication***', 'A' for '***Addition***' and 'S' for '***Subtraction***'.

Thus, in simplifying an expression, first of all the brackets must be removed, strictly in the order (), {} and [].

After removing the brackets, we must use the following operations strictly in the order :

(*i*) of (*ii*) Division (*iii*) Multiplication (*iv*) Addition (*v*) Subtraction.

II. **Modulus of a Real Number :** Modulus of a real number a is defined as

$$|a| = \begin{cases} a, \text{ if } a > 0 \\ -a, \text{ if } a < 0. \end{cases}$$

Thus, $|5| = 5$ and $|-5| = -(-5) = 5$.

III. **Virnaculum** (or Bar) : When an expression contains Virnaculum, before applying the 'BODMAS' rule, we simplify the expression under the Virnaculum.

SOLVED EXAMPLES

Ex. 1. ***Simplify : (i) 5005 − 5000 + 10 (ii) 18800 + 470 + 20.***

Sol. (*i*) $5005 - 5000 + 10 = 5005 - \frac{5000}{10} = 5005 - 500 = 4505.$

(*ii*) $18800 + 470 + 20 = \frac{18800}{470} + 20 = 40 + 20 = 2.$

Ex. 2. ***Simplify :*** $b - [b - (a + b) - \{b - (b - \overline{a - b})\} + 2a]$. **(Hotel Management, 2002)**

Sol. Given expression $= b - [b - (a + b) - \{b - (b - a + b)\} + 2a]$

$= b - [b - a - b - \{b - 2b + a\} + 2a]$

$= b - [-a - \{b - 2b + a + 2a\}]$

$= b - [-a - \{-b + 3a\}] = b - [-a + b - 3a]$

$= b - [-4a + b] = b + 4a - b = 4a.$

Ex. 3. ***What value will replace the question mark in the following equation ?***

$$4\frac{1}{2} + 3\frac{1}{6} + ? + 2\frac{1}{3} = 13\frac{2}{5}.$$

Sol. Let $\frac{9}{2} + \frac{19}{6} + x + \frac{7}{3} = \frac{67}{5}$.

Then, $x = \frac{67}{5} - \left(\frac{9}{2} + \frac{19}{6} + \frac{7}{3}\right) \Leftrightarrow x = \frac{67}{5} - \left(\frac{27 + 19 + 14}{6}\right) = \left(\frac{67}{5} - \frac{60}{6}\right)$

$\Leftrightarrow x = \left(\frac{67}{5} - 10\right) = \frac{17}{5} = 3\frac{2}{5}.$

Hence, missing fraction $= 3\frac{2}{5}$.

Ex. 4. $\frac{4}{15}$ *of* $\frac{5}{7}$ *of a number is greater than* $\frac{4}{9}$ *of* $\frac{2}{5}$ *of the same number by 8. What is half of that number ?* (S.B.I.P.O. 2000)

Sol. Let the number be x. Then, $\frac{4}{15}$ of $\frac{5}{7}$ of $x - \frac{4}{9}$ of $\frac{2}{5}$ of $x = 8 \Leftrightarrow \frac{4}{21}x - \frac{8}{45}x = 8$

$\Leftrightarrow \left(\frac{4}{21} - \frac{8}{45}\right)x = 8 \Leftrightarrow \left(\frac{60-56}{315}\right)x = 8 \Leftrightarrow \frac{4}{315}x = 8$

$\Leftrightarrow x = \left(\frac{8 \times 315}{4}\right) = 630 \Leftrightarrow \frac{1}{2}x = 315.$

Hence, required number = 315.

Ex. 5. *Simplify :* $\left[3\frac{1}{4} \div \left\{1\frac{1}{4} - \frac{1}{2}\left(2\frac{1}{2} - \frac{1}{4} - \frac{1}{6}\right)\right\}\right]$.

Sol. Given exp. $= \left[\frac{13}{4} \div \left\{\frac{5}{4} - \frac{1}{2}\left(\frac{5}{2} - \frac{3-2}{12}\right)\right\}\right] = \left[\frac{13}{4} \div \left\{\frac{5}{4} - \frac{1}{2}\left(\frac{5}{2} - \frac{1}{12}\right)\right\}\right]$

$= \left[\frac{13}{4} \div \left\{\frac{5}{4} - \frac{1}{2}\left(\frac{30-1}{12}\right)\right\}\right] = \left[\frac{13}{4} \div \left\{\frac{5}{4} - \frac{29}{24}\right\}\right]$

$= \left[\frac{13}{4} \div \left\{\frac{30-29}{24}\right\}\right] = \left[\frac{13}{4} \div \frac{1}{24}\right] = \left[\frac{13}{4} \times 24\right] = 78.$

Ex. 6. *Simplify :* $108 \div 36$ *of* $\frac{1}{4} + \frac{2}{5} \times 3\frac{1}{4}$.

Sol. Given exp. $= 108 \div 9 + \frac{2}{5} \times \frac{13}{4} = \frac{108}{9} + \frac{13}{10} = \left(12 + \frac{13}{10}\right) = \frac{133}{10} = 13\frac{3}{10}$.

Ex. 7. *Simplify :* $\dfrac{\frac{7}{2} \div \frac{5}{2} \times \frac{3}{2}}{\frac{7}{2} + \frac{5}{2} \text{ of } \frac{3}{2}} \div 5.25.$ (S.S.C. 1999)

Sol. Given exp. $= \dfrac{\frac{7}{2} \times \frac{2}{5} \times \frac{3}{2}}{\frac{7}{2} \div \frac{15}{4}} \div 5.25 = \dfrac{\frac{21}{10}}{\frac{7}{2} \times \frac{4}{15}} \div \frac{525}{100} = \frac{21}{10} \times \frac{15}{14} \times \frac{100}{525} = \frac{6}{14} = \frac{3}{7}$.

Ex. 8. *Simplify :* (*i*) $12.05 \times 5.4 \div 0.6$ (*ii*) $.6 \times .6 + .6 \div 6$. (Bank P.O. 2003)

Sol. (*i*) Given exp. $= 12.05 \times \frac{5.4}{0.6} = 12.05 \times 9 = 108.45$.

(*ii*) Given exp. $= .6 \times .6 \div \frac{.6}{6} = .36 \div .1 = .46$.

Ex. 9. *Find the value of x in each of the following equations :*

(*i*) $\dfrac{17.28 \div x}{3.6 \times 0.2} = 2$ (*ii*) $3648.24 + 364.824 \div x - 36.4824 = 3794.1696$

(*iii*) $8.5 - \left\{5\frac{1}{2} - \left(7\frac{1}{2} \div 2.8 \div x\right)\right\} \times 4.25 \div (0.2)^2 = 306.$ (Hotel Management, 1997)

Sol. (*i*) $\frac{17.28}{x} = 2 \times 3.6 \times 0.2 \Leftrightarrow x = \frac{17.28}{1.44} = \frac{1728}{144} = 12.$

(*ii*) $\frac{364.824}{x} = (3794.1696 + 36.4824) - 3648.24 - 3830.652 - 3648.24 - 182.412$

$\Leftrightarrow \quad x = \frac{364.824}{182.412} = 2.$

(*iii*) $8.5 - \left\{5.5 - \left(7.5 + \frac{2.8}{x}\right)\right\} \times \frac{4.25}{0.04} = 306 \Leftrightarrow 8.5 - \left\{5.5 - \left(\frac{7.5x + 2.8}{x}\right)\right\} \times \frac{425}{4} = 306$

$\Leftrightarrow \quad 8.5 - \left\{\frac{5.5x - 7.5x - 2.8}{x}\right\} \times \frac{425}{4} = 306 \Leftrightarrow 8.5 - \left\{\frac{-2x - 2.8}{x}\right\} \times 106.25 = 306$

$\Leftrightarrow \quad 8.5 - \left\{\frac{-212.5x - 297.5}{x}\right\} = 306 \Leftrightarrow \frac{8.5x + 212.5x + 297.5}{x} = 306$

$\Leftrightarrow \quad (306 - 221)\,x = 297.5 \Leftrightarrow x = \frac{297.5}{85} = 3.5.$

Ex. 10. ***If*** $\frac{x}{y} = \frac{6}{5}$, ***find the value of*** $\frac{x^2 + y^2}{x^2 - y^2}$.

Sol. $\frac{x^2 + y^2}{x^2 - y^2} = \frac{\frac{x^2}{y^2} + 1}{\frac{x^2}{y^2} - 1} = \frac{\left(\frac{x}{y}\right)^2 + 1}{\left(\frac{x}{y}\right)^2 - 1} = \frac{\left(\frac{6}{5}\right)^2 + 1}{\left(\frac{6}{5}\right)^2 - 1} = \frac{\frac{36}{25} + 1}{\frac{36}{25} - 1} = \frac{61}{25} \times \frac{25}{11} = \frac{61}{11}.$

Ex. 11. ***Find the value of*** $4 - \cfrac{5}{1 + \cfrac{1}{3 + \cfrac{1}{2 + \frac{1}{4}}}}$.

Sol. Given exp. $= 4 - \cfrac{5}{1 + \cfrac{1}{3 + \cfrac{1}{(9/4)}}} = 4 - \cfrac{5}{1 + \cfrac{1}{3 + \frac{4}{9}}} = 4 - \cfrac{5}{1 + \cfrac{1}{(31/9)}}$

$= 4 - \cfrac{5}{1 + \frac{9}{31}} = 4 - \frac{5}{(40/31)} = 4 - \frac{5 \times 31}{40} = 4 - \frac{31}{8} = \frac{1}{8}.$

Ex. 12. ***If*** $\cfrac{2x}{1 + \cfrac{1}{1 + \cfrac{x}{1 - x}}} = 1$, ***then find the value of*** x. (M.A.T. 1998)

Sol. We have : $\cfrac{2x}{1 + \cfrac{1}{\cfrac{(1 - x) + x}{1 - x}}} = 1 \Leftrightarrow \cfrac{2x}{1 + \cfrac{1}{[1/(1 - x)]}} = 1 \Leftrightarrow \frac{2x}{1 + (1 - x)} = 1$

$\Leftrightarrow \quad 2x = 2 - x \Leftrightarrow 3x = 2 \Leftrightarrow x = \frac{2}{3}.$

Ex. 13. (*i*) ***If*** $\frac{a}{b} = \frac{3}{4}$ ***and*** $8a + 5b = 22$, ***then find the value of*** a. (R.R.B. 2002)

(*ii*) ***If*** $\frac{x}{4} - \frac{x - 3}{6} = 1$, ***then find the value of*** x. (R.R.B. 2000)

Sol. (*i*) $\frac{a}{b} = \frac{3}{4} \Leftrightarrow b = \frac{4}{3}a.$

$\therefore \quad 8a + 5b = 22 \Rightarrow 8a + 5 \times \frac{4}{3}a = 22 \Rightarrow 8a + \frac{20}{3}a = 22$

$\Rightarrow 44a = 66 \Rightarrow a = \frac{66}{44} = \frac{3}{2}.$

(*ii*) $\frac{x}{4} - \frac{x-3}{6} = 1 \Leftrightarrow \frac{3x - 2(x-3)}{12} = 1 \Leftrightarrow 3x - 2x + 6 = 12 \Leftrightarrow x = 6.$

Ex. 14. ***If $2x + 3y = 34$ and $\frac{x+y}{y} = \frac{13}{8}$, then find the value of $5y + 7x$.***

(S.B.I.P.O. 2001)

Sol. The given equations are :

$2x + 3y = 34 \quad ...(i)$ and, $\frac{x+y}{y} = \frac{13}{8} \Rightarrow 8x + 8y = 13y \Rightarrow 8x - 5y = 0 \quad ...(ii)$

Multiplying (*i*) by 5, (*ii*) by 3 and adding, we get : $34x = 170$ or $x = 5$.

Putting $x = 5$ in (*i*), we get : $y = 8$.

$\therefore \quad 5y + 7x = (5 \times 8 + 7 \times 5) = 40 + 35 = 75.$

Ex. 15. ***If $2x + 3y + z = 55$, $x + z - y = 4$ and $y - x + z = 12$, then what are the values of x, y and z ?*** **(Bank P.O. 2003)**

Sol. The given equations are :

$2x + 3y + z = 55 \quad ...(i)$; $x + z - y = 4 \quad ...(ii)$; $y - x + z = 12 \quad ...(iii)$

Subtracting (*ii*) from (*i*), we get : $x + 4y = 51 \quad ...(iv)$

Subtracting (*iii*) from (*i*), we get : $3x + 2y = 43 \quad ...(v)$

Multiplying (*v*) by 2 and subtracting (*iv*) from it, we get : $5x = 35$ or $x = 7$.

Putting $x = 7$ in (*iv*), we get : $4y = 44$ or $y = 11$.

Putting $x = 7$, $y = 11$ in (*i*), we get : $z = 8$.

Ex. 16. ***Find the value of $\left(1 - \frac{1}{3}\right)\left(1 - \frac{1}{4}\right)\left(1 - \frac{1}{5}\right).....\left(1 - \frac{1}{100}\right)$.*** **(S.S.C. 2003)**

Sol. Given expression $= \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times ..... \times \frac{99}{100} = \frac{2}{100} = \frac{1}{50}.$

Ex. 17. ***Find the value of $\frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \frac{1}{4 \times 5} + \frac{1}{5 \times 6} + ... + \frac{1}{9 \times 10}$.***

Sol. Given expression $= \left(\frac{1}{2} - \frac{1}{3}\right) + \left(\frac{1}{3} - \frac{1}{4}\right) + \left(\frac{1}{4} - \frac{1}{5}\right) + \left(\frac{1}{5} - \frac{1}{6}\right) + ... + \left(\frac{1}{9} - \frac{1}{10}\right)$

$= \left(\frac{1}{2} - \frac{1}{10}\right) = \frac{4}{10} = \frac{2}{5}.$

Ex. 18. ***Simplify : $99\frac{48}{49} \times 245$.*** **(R.R.B. 2000)**

Sol. Given expression $= \left(100 - \frac{1}{49}\right) \times 245 = \frac{4899}{49} \times 245 = 4899 \times 5 = 24495.$

Ex. 19. ***A board 7 ft. 9 inches long is divided into 3 equal parts. What is the length of each part ?*** **(Hotel Management, 2003)**

Sol. Length of board = 7 ft. 9 inches = $(7 \times 12 + 9)$ inches = 93 inches.

$\therefore$ Length of each part $= \left(\frac{93}{3}\right)$ inches = 31 inches = 2 ft. 7 inches.

Ex. 20. *A man divides Rs. 8600 among 5 sons, 4 daughters and 2 nephews. If each daughter receives four times as much as each nephew, and each son receives five times as much as each nephew, how much does each daughter receive?* (S.S.C. 2000)

Sol. Let the share of each nephew be Rs. x.

Then, share of each daughter = Rs. $(4x)$; share of each son = Rs. $(5x)$.

So, $5 \times 5x + 4 \times 4x + 2 \times x = 8600 \Leftrightarrow 25x + 16x + 2x = 8600$

$\Leftrightarrow 43x = 8600 \Leftrightarrow x = 200.$

$\therefore$ Share of each daughter = Rs. (4×200) = Rs. 800.

Ex. 21. *A man spends $\frac{2}{5}$ of his salary on house rent, $\frac{3}{10}$ of his salary on food and $\frac{1}{8}$ of his salary on conveyance. If he has Rs. 1400 left with him, find his expenditure on food and conveyance.*

Sol. Part of the salary left $= 1 - \left(\frac{2}{5} + \frac{3}{10} + \frac{1}{8}\right) = 1 - \frac{33}{40} = \frac{7}{40}$.

Let the monthly salary be Rs. x.

Then, $\frac{7}{40}$ of $x = 1400 \Leftrightarrow x = \left(\frac{1400 \times 40}{7}\right) = 8000.$

$\therefore$ Expenditure on food = Rs. $\left(\frac{3}{10} \times 8000\right)$ = Rs. 2400.

Expenditure on conveyance = Rs. $\left(\frac{1}{8} \times 8000\right)$ = Rs. 1000.

Ex. 22. *A third of Arun's marks in Mathematics exceeds a half of his marks in English by 30. If he got 240 marks in the two subjects together, how many marks did he get in English?*

Sol. Let Arun's marks in Mathematics and English be x and y respectively.

Then, $\frac{1}{3}x - \frac{1}{2}y = 30 \Leftrightarrow 2x - 3y = 180$ ...(*i*) and $x + y = 240$ ...(*ii*)

Solving (*i*) and (*ii*), we get : $x = 180$ and $y = 60$.

Ex. 23. *A tin of oil was $\frac{4}{5}$ full. When 6 bottles of oil were taken out and four bottles of oil were poured into it, it was $\frac{3}{4}$ full. How many bottles of oil can the tin contain?* (Section Officers', 2001)

Sol. Suppose x bottles can fill the tin completely.

Then, $\frac{4}{5}x - \frac{3}{4}x = (6 - 4) \Leftrightarrow \frac{x}{20} = 2 \Leftrightarrow x = 40.$

$\therefore$ Required number of bottles = 40.

Ex. 24. *If $\frac{1}{8}$ of a pencil is black, $\frac{1}{2}$ of the remaining is white and the remaining $3\frac{1}{2}$ cm is blue, find the total length of the pencil.*

Sol. Let the total length of the pencil be x cm. Then,

Black part = $\left(\frac{x}{8}\right)$ cm. Remaining part = $\left(x - \frac{x}{8}\right)$ cm = $\left(\frac{7x}{8}\right)$ cm.

White part = $\left(\frac{1}{2} \times \frac{7x}{8}\right)$ cm = $\left(\frac{7x}{16}\right)$ cm. Remaining part = $\left(\frac{7x}{8} - \frac{7x}{16}\right)$ cm = $\frac{7x}{16}$ cm.

$\therefore$ $\frac{7x}{16} = \frac{7}{2}$ or $x = \frac{16}{2} = 8$ cm.

Hence, total length of the pencil = 8 cm.

Ex. 25. ***In a certain office, $\frac{1}{3}$ of the workers are women, $\frac{1}{2}$ of the women are married and $\frac{1}{3}$ of the married women have children. If $\frac{3}{4}$ of the men are married and $\frac{2}{3}$ of the married men have children, what part of workers are without children ?***

Sol. Let the total number of workers be x. Then,

Number of women = $\frac{x}{3}$ and number of men = $\left(x - \frac{x}{3}\right) = \frac{2x}{3}$.

Number of women having children = $\frac{1}{3}$ of $\frac{1}{2}$ of $\frac{x}{3} = \frac{x}{18}$.

Number of men having children = $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{2x}{3} = \frac{x}{3}$.

Number of workers having children = $\left(\frac{x}{18} + \frac{x}{3}\right) = \frac{7x}{18}$.

$\therefore$ Workers having no children = $\left(x - \frac{7x}{18}\right) = \frac{11x}{18} = \frac{11}{18}$ of all workers.

Ex. 26. ***A crate of mangoes contains one bruised mango for every 30 mangoes in the crate. If 3 out of every 4 bruised mangoes are considered unsalable, and there are 12 unsalable mangoes in the crate, then how many mangoes are there in the crate ?***

Sol. Let the total number of mangoes in the crate be x. Then,

Number of bruised mangoes = $\frac{1}{30}x$.

Number of unsalable mangoes = $\left(\frac{3}{4} \times \frac{1}{30}x\right) = \frac{1}{40}x$.

$\therefore$ $\frac{1}{40}x = 12$ or $x = (12 \times 40) = 480$.

Hence, total number of mangoes in the crate = 480.

Ex. 27. ***A train starts full of passengers. At the first station, it drops one-third of the passengers and takes 280 more. At the second station, it drops one-half of the new total and takes 12 more. On arriving at the third station, it is found to have 248 passengers. Find the number of passengers in the beginning.***

Sol. Let the number of passengers in the beginning be x.

After 1st station, number of passengers = $\left(x - \frac{x}{3}\right) + 280 = \left(\frac{2x}{3} + 280\right)$.

After 2nd station, number of passengers = $\frac{1}{2}\left(\frac{2x}{3} + 280\right) + 12$.

$\therefore$ $\frac{1}{2}\left(\frac{2x}{3} + 280\right) + 12 = 248 \Leftrightarrow \frac{2x}{3} + 280 = 2 \times 236 \Leftrightarrow \frac{2x}{3} = 192$

$\Leftrightarrow x = \left(192 \times \frac{3}{2}\right) = 288.$

Ex. 28. *If $a^2 + b^2 = 117$ and $ab = 54$, then find the value of $\frac{a+b}{a-b}$.*

Sol. $(a + b)^2 = a^2 + b^2 + 2ab = 117 + 2 \times 54 = 225 \Rightarrow a + b = 15.$

$(a - b)^2 = a^2 + b^2 - 2ab = 117 - 2 \times 54 = 9 \Rightarrow a - b = 3.$

$\therefore \quad \frac{a+b}{a-b} = \frac{15}{3} = 5.$

Ex. 29. *Find the value of* $\left(\frac{75983 \times 75983 - 45983 \times 45983}{30000}\right)$.

Sol. Given expression $= \frac{(75983)^2 - (45983)^2}{(75983 - 45983)} = \frac{(a^2 - b^2)}{(a - b)}$, where $a = 75983$, $b = 45983$

$= \frac{(a+b)(a-b)}{(a-b)} = (a + b) = (75983 + 45983) = 121966.$

Ex. 30. *Find the value of* $\left(\frac{343 \times 343 \times 343 - 113 \times 113 \times 113}{343 \times 343 + 343 \times 113 + 113 \times 113}\right)$.

Sol. Given expression $= \frac{(a^3 - b^3)}{(a^2 + ab + b^2)}$, where $a = 343$, $b = 113$

$= (a - b) = (343 - 113) = 230.$

Ex. 31. *Village X has a population of 68000, which is decreasing at the rate of 1200 per year. Village Y has a population of 42000, which is increasing at the rate of 800 per year. In how many years will the population of the two villages be equal ?*

Sol. Let the population of villages X and Y be equal after p years.

Then, $68000 - 1200p = 42000 + 800p \Rightarrow 2000p = 26000 \Rightarrow p = 13.$

So, their population will be equal after 13 years.

Ex. 32. *From a group of boys and girls, 15 girls leave. There are then left 2 boys for each girl. After this, 45 boys leave. There are then 5 girls for each boy. Find the number of girls in the beginning.*

Sol. Let at present there be x boys. Then, number of girls at present $= 5x$.

Before the boys had left : Number of boys $= x + 45$ and number of girls $= 5x$.

$\therefore \quad x + 45 = 2 \times 5x \Leftrightarrow 9x = 45 \Leftrightarrow x = 5.$

Hence, number of girls in the beginning $= 5x + 15 = 25 + 15 = 40.$

Ex. 33. *An employer pays Rs. 20 for each day a worker works, and forfeits Rs. 3 for each day he is idle. At the end of 60 days, a worker gets Rs. 280. For how many days did the worker remain idle ?*

Sol. Suppose the worker remained idle for x days. Then, he worked for $(60 - x)$ days.

$\therefore \quad 20(60 - x) - 3x = 280 \Leftrightarrow 1200 - 23x = 280 \Leftrightarrow 23x = 920 \Leftrightarrow x = 40.$

So, the worker remained idle for 40 days.

Ex. 34. *Kiran had 85 currency notes in all, some of which were of Rs. 100 denomination and the remaining of Rs. 50 denomination. The total amount of all these currency notes was Rs. 5000. How much amount did she have in the denomination of Rs. 50 ?* (R.B.I. 2000)

Sol. Let the number of 50-rupee notes be x.

Then, the number of 100-rupee notes $= (85 - x)$.

$\therefore \quad 50x + 100(85 - x) = 5000 \Leftrightarrow x + 2(85 - x) = 100 \Leftrightarrow x = 70.$

So, required amount $=$ Rs. $(50 \times 70) =$ Rs. 3500.

Ex. 35. ***When an amount was distributed among 14 boys, each of them got Rs. 80 more than the amount received by each boy when the same amount is distributed equally among 18 boys. What was the amount ?*** (S.B.I.P.O. 1998)

Sol. Let the total amount be Rs. x. Then,

$$\frac{x}{14} - \frac{x}{18} = 80 \Leftrightarrow \frac{2x}{126} = 80 \Leftrightarrow \frac{x}{63} = 80 \Leftrightarrow x = 63 \times 80 = 5040.$$

Hence, total amount = Rs. 5040.

Ex. 36. ***Mr. Bhaskar is on tour and he has Rs. 360 for his expenses. If he exceeds his tour by 4 days, he must cut down his daily expenses by Rs. 3. For how many days is Mr. Bhaskar on tour ?***

Sol. Suppose Mr. Bhaskar is on tour for x days. Then,

$$\frac{360}{x} - \frac{360}{x+4} = 3 \Leftrightarrow \frac{1}{x} - \frac{1}{x+4} = \frac{1}{120} \Leftrightarrow x(x+4) = 4 \times 120 = 480$$

$$\Leftrightarrow x^2 + 4x - 480 = 0 \Leftrightarrow (x + 24)(x - 20) = 0 \Leftrightarrow x = 20.$$

Hence, Mr. Bhaskar is on tour for 20 days.

Ex. 37. ***Two pens and three pencils cost Rs. 86. Four pens and a pencil cost Rs. 112. Find the cost of a pen and that of a pencil.*** (Bank P.O. 2002)

Sol. Let the cost of a pen and a pencil be Rs. x and Rs. y respectively.

Then, $2x + 3y = 86$ ...(*i*) and $4x + y = 112$ ...(*ii*)

Solving (*i*) and (*ii*), we get : $x = 25$ and $y = 12$.

$\therefore$ Cost of a pen = Rs. 25 and cost of a pencil = Rs. 12.

Ex. 38. ***Arun and Sajal are friends. Each has some money. If Arun gives Rs. 30 to Sajal, then Sajal will have twice the money left with Arun. But, if Sajal gives Rs. 10 to Arun, then Arun will have thrice as much as is left with Sajal. How much money does each have ?***

Sol. Suppose Arun has Rs. x and Sajal has Rs. y. Then,

$2(x - 30) = y + 30 \Rightarrow 2x - y = 90$ ...(*i*)

and $x + 10 = 3(y - 10) \Rightarrow x - 3y = -40$ ...(*ii*)

Solving (*i*) and (*ii*), we get : $x = 62$ and $y = 34$.

$\therefore$ Arun has Rs. 62 and Sajal has Rs. 34.

Ex. 39. ***In a caravan, in addition to 50 hens there are 45 goats and 8 camels with some keepers. If the total number of feet be 224 more than the number of heads, find the number of keepers.***

Sol. Let the number of keepers be x. Then,

Total number of heads = $(50 + 45 + 8 + x) = (103 + x)$.

Total number of feet = $(45 + 8) \times 4 + (50 + x) \times 2 = (312 + 2x)$.

$\therefore$ $(312 + 2x) - (103 + x) = 224 \Leftrightarrow x = 15$.

Hence, number of keepers = 15.

EXERCISE 4

(OBJECTIVE TYPE QUESTIONS)

Directions : ***Mark (✓) against the correct answer :***

1. $100 + 50 \times 2 = ?$ (Bank P.O. 2003)

   (*a*) 75 (*b*) 150 (*c*) 200 (*d*) 300 (*e*) None of these

2. $(3080 + 6160) \div 28 = ?$ (B.S.R.B. 1998)

   (*a*) 320 (*b*) 440 (*c*) 3320 (*d*) 3350 (*e*) None of these

3. $5004 \div 139 - 6 = ?$ (R.B.I. 2003)

   (*a*) 24 (*b*) 30 (*c*) 36 (*d*) 42 (*e*) None of these

4. $7500 \div (1250 \div 50) = ?$
(a) 175 (b) 300 (c) 6575 (d) 7525 (e) None of these
(S.S.C. 2000)

5. $(8 \div 88) \times 8888088 = ?$
(a) 808008 (b) 808080 (c) 808088 (d) 8008008
(S.S.C. 1998)

6. The value of $1001 \div 11$ of 13 is :
(a) 7 (b) 91 (c) 143 (d) 169

7. $1260 \div 15 \div 7 = ?$
(a) 12 (b) 58 (c) 122 (d) 588 (e) None of these

8. $(-5)(4)(2)\left(-\frac{1}{2}\right)\left(\frac{3}{4}\right) = ?$
(IGNOU, 2003)
(a) -30 (b) -15 (c) 15 (d) 30

9. $\frac{11}{4} = \frac{77}{?}$
(Hotel Management, 2003)
(a) 28 (b) $\frac{77}{28}$ (c) 44 (d) 308

10. A boy was asked to write the value of $(2)^5 \times (9)^2$. He wrote it as 2592. The difference between the obtained and the actual value is :
(a) zero (b) 2×9^2 (c) $2^2 \times 9^2$ (d) $2^3 \times 9^4$

11. $2 - [2 - \{2 - 2(2 + 2)\}] = ?$
(Hotel Management, 2001)
(a) -4 (b) 4 (c) 6 (d) None of these

12. The value of $25 - 5[2 + 3\{2 - 2(5 - 3) + 5\} - 10] \div 4$ is :
(S.S.C. 2000)
(a) 5 (b) 23.25 (c) 23.75 (d) 25

13. $3640 \div 14 \times 16 \div 340 = ?$
(B.S.R.B. 1998)
(a) 0.70 (b) 3525 (c) 4480 (d) 9600 (e) None of these

14. $100 \times 10 - 100 + 2000 \div 100 = ?$
(R.R.B. 1998)
(a) 29 (b) 780 (c) 920 (d) 979

15. What mathematical operation should come at the place of '?' in the equation : $2 \; ? \; 6 - 12 \div 4 + 2 = 11$.
(R.R.B. 2003)
(a) + (b) − (c) × (d) ÷

16. If $45 - [28 - \{37 - (15 - *)\}] = 58$, then * is equal to :
(a) -29 (b) -19 (c) 19 (d) 29

17. The value of $\frac{(6+6+6+6) \div 6}{4+4+4+4 \div 4}$ is equal to :
(a) 1 (b) $\frac{3}{2}$ (c) $\frac{4}{13}$ (d) $3\frac{6}{13}$

18. $\frac{4+4\times18-6-8}{123\times6-146\times5} = ?$
(L.I.C. 2003)
(a) 1 (b) 2 (c) 6.65 (d) 7.75

19. $\frac{180\times15-12\times20}{140\times8+2\times55} = ?$
(B.S.R.B. 1998)
(a) $\frac{1}{7}$ (b) $\frac{4}{5}$ (c) 2 (d) 4 (e) None of these

20. Which of the following will come in place of both the question marks in the following equation ?
$$\frac{128 \div 16 \times ? - 7 \times 2}{7^2 - 8 \times 6 + ?^2} = 1$$
(S.B.I.P.O. 2001)
(a) 3 (b) 14 (c) 16 (d) 17 (e) 18

21. Simplify : $18 - [5 - (6 + 2(7 - \overline{8 - 5})\}]$. (R.R.B. 2003)

(a) 13 (b) 15 (c) 27 (d) 32

22. The value of $1 \div [1 + 1 \div \{1 + 1 \div (1 + 1 \div 2)\}]$ is : (S.S.C. 2003)

(a) $\frac{1}{2}$ (b) $\frac{5}{8}$ (c) 1 (d) 2

23. Evaluate : $\frac{8 - [5 - (-3 + 2)] \div 2}{|5 - 3| - |5 - 8| + 3}$. (S.S.C. 1999)

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

24. Which of the following pairs of fractions adds up to a number greater than 5 ? (Hotel Management, 2000)

(a) $\frac{5}{3}, \frac{3}{4}$ (b) $\frac{7}{3}, \frac{11}{5}$ (c) $\frac{11}{4}, \frac{8}{3}$ (d) $\frac{13}{5}, \frac{11}{6}$

25. $1 \div \frac{1}{2} \div \frac{1}{4} \div \frac{1}{7} \div \frac{1}{14} \div \frac{1}{28}$ is equal to : (S.S.C. 1999)

(a) 2 (b) 2.5 (c) 3 (d) 3.5

26. $1\frac{3}{4} \div 5\frac{1}{3} \div 3\frac{2}{5} = ?$ (Bank P.O. 2003)

(a) $9\frac{2}{5}$ (b) $9\frac{29}{60}$ (c) $10\frac{2}{5}$ (d) $10\frac{29}{60}$

27. $20\frac{1}{2} + 30\frac{1}{3} - 15\frac{1}{6} = ?$

(a) $34\frac{1}{6}$ (b) $35\frac{2}{3}$ (c) $35\frac{5}{6}$ (d) $45\frac{1}{3}$

28. If $[p]$ means the greatest integer less than or equal to p, then $\left[-\frac{1}{4}\right] + \left[4\frac{1}{4}\right] + [3]$ is equal to : (Section Officers', 2003)

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

29. $\frac{1}{\left(2\frac{1}{3}\right)} + \frac{1}{\left(1\frac{3}{4}\right)}$ is equal to : (R.R.B. 1998)

(a) $\frac{7}{14}$ (b) $\frac{12}{49}$ (c) $4\frac{1}{12}$ (d) None of these

30. $5\frac{5}{6} - 3\frac{8}{9} - ? = 1$

(a) $\frac{2}{3}$ (b) $\frac{3}{2}$ (c) $\frac{17}{18}$ (d) 3

31. If $\frac{1}{3} + \frac{1}{2} + \frac{1}{x} = 4$, then $x = ?$ (M.B.A. 2002)

(a) $\frac{5}{18}$ (b) $\frac{6}{19}$ (c) $\frac{18}{5}$ (d) $\frac{24}{11}$

32. $\frac{-\frac{1}{2} - \frac{2}{3} + \frac{4}{5} - \frac{1}{3} + \frac{1}{5} + \frac{3}{4}}{\frac{1}{2} + \frac{2}{3} - \frac{4}{3} + \frac{1}{3} - \frac{1}{5} - \frac{4}{5}}$ is simplified to : (S.S.C. 2004)

(a) $-\frac{3}{10}$ (b) $\frac{-10}{3}$ (c) -2 (d) 1

33. $5-\left[\frac{3}{4}+\left\{2\frac{1}{2}-\left(0.5+\overline{\frac{1}{6}-\frac{1}{7}}\right)\right\}\right]$ is equal to :

(a) $1\frac{19}{84}$ (b) $2\frac{61}{84}$ (c) $2\frac{23}{84}$ (d) $2\frac{47}{84}$

34. When $\left(\frac{1}{2}-\frac{1}{4}+\frac{1}{5}-\frac{1}{6}\right)$ is divided by $\left(\frac{2}{5}-\frac{5}{9}+\frac{3}{5}-\frac{7}{18}\right)$, the result is : **(S.S.C. 2000)**

(a) $2\frac{1}{18}$ (b) $3\frac{1}{6}$ (c) $3\frac{3}{10}$ (d) $5\frac{1}{10}$

35. Which of the following can be used to compute $\left(34\times4\frac{1}{2}\right)$?

(a) $(30\times4)+\left(4\times4\frac{1}{2}\right)$ (b) $(34\times40)+\left(34\times\frac{1}{2}\right)$

(c) $\left(30\times4\frac{1}{2}\right)+(4\times4)$ (d) $\left(34\times\frac{1}{2}\right)+(30\times4)+(4\times4)$

36. $\frac{3}{5}$ of $\frac{4}{7}$ of $\frac{5}{9}$ of $\frac{21}{24}$ of 504 = ? **(Bank P.O. 2003)**

(a) 63 (b) 69 (c) 96 (d) 109 (e) None of these

37. $6\frac{5}{6}\times5\frac{1}{3}+17\frac{2}{3}\times4\frac{1}{2}=?$ **(Bank P.O. 2003)**

(a) $112\frac{1}{3}$ (b) $116\frac{2}{3}$ (c) 240 (d) 663 (e) None of these

38. $\frac{3}{8}$ of $168\times15\div5+?=549\div9+235$ **(S.B.I.P.O. 2000)**

(a) 107 (b) 174 (c) 189 (d) 296 (e) None of these

39. Find the value of * in the following : **(S.S.C. 2002)**

$$1\frac{2}{3}+\frac{2}{7}\times\frac{*}{7}=1\frac{1}{4}\times\frac{2}{3}+\frac{1}{6}$$

(a) 0.006 (b) $\frac{1}{6}$ (c) 0.6 (d) 6

40. $5\frac{2}{3}\div?\frac{5}{6}=2$ **(Hotel Management, 1998)**

(a) 2 (b) 3 (c) 4 (d) None of these

41. Supply the two missing figures in order indicated by x and y in the given equation, the fractions being in their lowest terms. **(IGNOU, 2003)**

$$5\frac{1}{x}\times y\frac{3}{4}=20$$

(a) 3, 1 (b) 3, 3 (c) 4, 1 (d) 5, 3

42. The difference of $1\frac{3}{16}$ and its reciprocal is equal to : **(M.A.T. 2002)**

(a) $1\frac{1}{8}$ (b) $\frac{4}{3}$ (c) $\frac{15}{16}$ (d) None of these

43. How many $\frac{1}{8}$s are there in $37\frac{1}{2}$?

(a) 300 (b) 400 (c) 500 (d) Cannot be determined

44. $\frac{3}{8}$ is what part of $\frac{1}{12}$?

(a) $\frac{3}{7}$ (b) $\frac{1}{12}$ (c) $\frac{4}{3}$ (d) None of these

45. The smallest fraction which should be subtracted from the sum of $1\frac{3}{4}$, $2\frac{1}{2}$, $5\frac{7}{12}$, $3\frac{1}{3}$ and $2\frac{1}{4}$ to make the result a whole number is :

(a) $\frac{5}{12}$ (b) $\frac{7}{12}$ (c) $\frac{1}{2}$ (d) 7

46. If x is a positive number, then which of the following fractions has the greatest value ?

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

47. By how much is three-fifth of 350 greater than four-seventh of 210 ?

(a) 95 (b) 110 (c) 120 (d) 210 (e) None of these

(S.B.I.P.O. 2003)

48. By how much does $\frac{6}{7/8}$ exceed $\frac{6/7}{8}$? **(Section Officers', 2003)**

(a) $6\frac{1}{8}$ (b) $6\frac{3}{4}$ (c) $7\frac{3}{4}$ (d) $7\frac{5}{6}$

49. If $\frac{4}{5}$ of an estate be worth Rs. 16,800, then the value of $\frac{3}{7}$ of the estate is :

(a) Rs. 9000 (b) Rs. 21,000 (c) Rs. 72,000 (d) Rs. 90,000

(S.S.C. 2002)

50. Two-fifth of one-fourth of three-seventh of a number is 15. What is half of that number ?

(a) 94 (b) 96 (c) 188 (d) 196 (e) None of these

(Bank P.O. 1999)

51. One-fifth of a number exceeds one-seventh of the same by 10. The number is :

(a) 125 (b) 150 (c) 175 (d) 200

52. If $x * y = x^2 + y^2 - xy$, then the value of $9 * 11$ is : **(S.S.C. 2003)**

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

53. If $a * b = \frac{ab}{a+b}$, find the value of $3 * (3 * -1)$. **(M.B.A. 2002)**

(a) -3 (b) -1.5 (c) -1 (d) $\frac{2}{3}$

54. If $a * b = 2a - 3b + ab$, then $3 * 5 + 5 * 3$ is equal to : **(S.S.C. 1999)**

(a) 22 (b) 24 (c) 26 (d) 28

55. If $x \oplus y = x^2 + 2y$, what is the value of p if $4 \oplus (3 \oplus p) = 50$? **(N.I.F.T. 1997)**

(a) 4 (b) 7 (c) 8 (d) 12.5

56. If $a * b * c$ means $\frac{a+b}{c}$ for all numbers except 0, then $(a * b * c) * a * b$ is equal to :

(a) 0 (b) 1 (c) $\frac{a+b+c}{ab}$ (d) $\frac{a+b+ac}{bc}$ (e) $\frac{ab+bc+ca}{a+b+c}$

57. 7 is added to a certain number; the sum is multiplied by 5; the product is divided by 9 and 3 is subtracted from the quotient. The remainder left is 12. The number is :

(a) 20 (b) 30 (c) 40 (d) 60

(S.S.C. 2000)

58. The value of $\left(\frac{5}{7} \text{ of } 1\frac{6}{13}\right) \div \left(2\frac{5}{7} \div 3\frac{1}{4}\right)$ is : **(R.R.B. 2001)**

(a) $\frac{20}{169}$ (b) 1 (c) $\frac{5}{4}$ (d) $1\frac{119}{180}$

59. $2\frac{3}{4} \div 2\frac{2}{3} \div 1\frac{1}{12} = ?$ **(Hotel Management, 2001)**

(a) $\frac{39}{48}$ (b) $1\frac{1}{4}$ (c) $\frac{169}{144}$ (d) None of these

60. $4\frac{1}{2} \times 4\frac{1}{3} - 8\frac{1}{3} \div 5\frac{2}{3} = ?$ **(Bank P.O. 1999)**

(a) $\frac{7}{17}$ (b) $1\frac{33}{34}$ (c) 8 (d) $18\frac{1}{34}$

61. $\frac{4335}{4(?)24} \div 1\frac{7}{8} = \frac{289}{528}$ **(Hotel Management, 2000)**

(a) 1 (b) 2 (c) 8 (d) None of these

62. $5\frac{1}{3} - 3\frac{2}{3} \div 1\frac{1}{3} \div ? + 3\frac{1}{5} \div 1\frac{1}{5} = 7$

(a) $1\frac{1}{2}$ (b) $2\frac{1}{3}$ (c) $3\frac{1}{4}$ (d) None of these

63. $9 - 1\frac{2}{9} \text{ of } 3\frac{3}{11} \div 5\frac{1}{7} \text{ of } \frac{7}{9} = ?$ **(S.S.C. 2002)**

(a) $\frac{5}{4}$ (b) 8 (c) $8\frac{32}{81}$ (d) 9

64. $\frac{5}{6} \div \frac{6}{7} \times ? - \frac{8}{9} \div 1\frac{3}{5} \div \frac{3}{4} \times 3\frac{1}{3} = 2\frac{7}{9}$

(a) $\frac{7}{6}$ (b) $\frac{6}{7}$ (c) 1 (d) None of these

65. $\frac{3}{4} \div 2\frac{1}{4} \text{ of } \frac{2}{3} - \frac{\frac{1}{2} - \frac{1}{3}}{\frac{1}{2} + \frac{1}{3}} \times 3\frac{1}{3} \div \frac{5}{6} = ?$

(a) $\frac{7}{18}$ (b) $\frac{49}{54}$ (c) $\frac{2}{3}$ (d) $\frac{1}{6}$

66. A student was asked to solve the fraction $\frac{\frac{7}{3} \div 1\frac{1}{2} \text{ of } \frac{5}{3}}{2 \div 1\frac{2}{3}}$ and his answer was $\frac{1}{4}$. By how much was his answer wrong ? **(N.I.F.T. 1997)**

(a) 1 (b) $\frac{1}{55}$ (c) $\frac{1}{220}$ (d) None of these

67. Simplify : $\frac{\frac{1}{3} + \frac{3}{4}\left(\frac{2}{5} - \frac{1}{3}\right)}{1\frac{2}{3} \text{ of } \frac{3}{4} - \frac{1}{4} \text{ of } \frac{4}{5}}$. **(C.B.I. 1998)**

(a) $\frac{1}{63}$ (b) $\frac{23}{40}$ (c) $\frac{23}{55}$ (d) $\frac{23}{63}$

68. The simplified value of $\dfrac{\frac{1}{3}+\frac{1}{3}\times\frac{1}{3}}{\frac{1}{3}+\frac{1}{3}\text{ of }\frac{1}{3}}-\frac{1}{9}$ is : (S.S.C. 2003)

(a) 0 (b) $\frac{1}{9}$ (c) $\frac{1}{3}$ (d) 1

69. The value of $\dfrac{\frac{1}{2}+\frac{1}{2}\text{ of }\frac{1}{2}}{\frac{1}{2}+\frac{1}{2}\text{ of }\frac{1}{2}}$ is :

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

70. $\dfrac{3\frac{1}{4}-\frac{4}{5}\text{ of }\frac{5}{6}}{4\frac{1}{3}+\frac{1}{5}-\left(\frac{3}{10}+21\frac{1}{5}\right)}$ is equal to :

(a) $\frac{1}{6}$ (b) $2\frac{7}{12}$ (c) $15\frac{1}{2}$ (d) $21\frac{1}{2}$

71. $\dfrac{7\frac{1}{2}-5\frac{3}{4}}{3\frac{1}{2}+?}+\dfrac{\frac{1}{2}+1\frac{1}{4}}{1\frac{1}{5}+3\frac{1}{2}}=0.6$

(a) $4\frac{1}{3}$ (b) $4\frac{1}{2}$ (c) $4\frac{2}{3}$ (d) None of these

72. On simplification, 3034 − (1002 ÷ 20.04) is equal to : (S.S.C. 2000)

(a) 2543 (b) 2984 (c) 2993 (d) 3029

73. 52.416 ÷ 18.72 ÷ 6.28 = ?

(a) 2.09664 (b) 8.36 (c) 9.08 (d) 9.80

74. $8\frac{2}{7}$ of 1568 + 265.75 = ? + 2455.60 : (S.B.I.P.O. 1998)

(a) 10354.15 (b) 10578.15 (c) 10802.15 (d) 11250.15

75. 5.8 × 2.5 ÷ 0.6 × 6.75 + 139.25 = ? (Bank P.O. 1998)

(a) 157.30 (b) 157.80 (c) 158.40 (d) 160.30

76. $8\frac{1}{4}-4\frac{1}{5}+2.8\div\frac{4}{?}-2.32=5.33$

(a) .05 (b) .5 (c) 5 (d) None of these

77. The value of 0.008 × 0.01 × 0.0072 ÷ (0.12 × 0.0004) is : (S.S.C. 2002)

(a) 0.012 (b) 0.12 (c) 1.02 (d) 1.2

78. 2.375 × 5.22 ÷ 0.87 − 1.425 × 0.02 = ?

(a) 0.142215 (b) 1.42215 (c) 14.2215 (d) None of these

79. 0.2 ÷ 0.2 − 0.2 ÷ 0.2 × (0.2 × 0.2), on simplification, gives :

(a) 0.04 (b) 0.2 (c) 0.36 (d) 1

80. 11.6 ÷ 9.28 ÷ 0.464 − 0.2828 ÷ 0.07 = ? (R.R.B. 1998)

(a) 9.2 (b) 9.56 (c) 27.2 (d) 27.56

81. $4.59\times1.8\div3.6+5.4\text{ of }\frac{1}{9}-\frac{1}{5}=?$

(a) 2.695 (b) 2.705 (c) 3.105 (d) None of these

82. $\dfrac{64\frac{2}{5} - 34.7125}{6.25 \text{ of } ?} = 1$:

(a) $2\frac{2}{3}$ (b) 2.75 (c) $4\frac{3}{4}$ (d) None of these

83. $2.002 + 7.9\ \{2.8 - 6.3\ (3.6 - 1.5) + 15.6\} = ?$ (S.S.C. 1997)

(a) 2.002 (b) 4.2845 (c) 40.843 (d) 42.845

84. $24 - [2.4 - \{.24 \times 2 - (.024 - ?)\}] = 22.0584$

(a) 0.0024 (b) 0.024 (c) 0.24 (d) None of these

85. $3 - [1.6 - \{3.2 - (3.2 + 2.25 \div x)\}] = 0.65$. The value of x is : (R.R.B. 2002)

(a) 0.3 (b) 0.7 (c) 3 (d) 7

86. $587.4 + 58.74 \times 2 - 5.874 \div 2\frac{?}{4} = 702744$

(a) 1 (b) 2 (c) 3 (d) None of these

87. $54.27 - [12.84 - \{(?).87 - (3.41 \times 2 - 1.85)\}] = 38.33$

(a) 2 (b) 3 (c) 4 (d) None of these

88. $6\frac{2}{3}$ of $7.26 \div 0.45$ of $? = 8\frac{32}{117}$

(a) $\frac{1}{13}$ (b) 13 (c) $13\frac{1}{9}$ (d) None of these

89. What is the value of $\dfrac{(P+Q)}{(P-Q)}$ if $\dfrac{P}{Q} = 7$? (Hotel Management, 2000)

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{4}{3}$ (d) $\frac{7}{8}$

90. If $\dfrac{x}{y} = \dfrac{4}{5}$, then the value of $\left(\dfrac{4}{7} + \dfrac{2y - x}{2y + x}\right)$ is : (R.R.B. 2003)

(a) $\frac{3}{7}$ (b) 1 (c) $1\frac{1}{7}$ (d) 2

91. If $\dfrac{a}{b} = \dfrac{4}{3}$, then the value of $\dfrac{6a + 4b}{6a - 5b}$ is :

(a) -1 (b) 3 (c) 4 (d) 5

92. If $\dfrac{x}{2y} = \dfrac{6}{7}$, the value of $\dfrac{x - y}{x + y} + \dfrac{14}{19}$ is :

(a) $\frac{13}{19}$ (b) $\frac{15}{19}$ (c) 1 (d) $1\frac{1}{19}$

93. If $\dfrac{a}{b} = \dfrac{4}{5}$ and $\dfrac{b}{c} = \dfrac{15}{16}$, then $\dfrac{c^2 - a^2}{c^2 + a^2}$ is :

(a) $\frac{1}{7}$ (b) $\frac{7}{25}$ (c) $\frac{3}{4}$ (d) None of these

94. If $(a - b)$ is 6 more than $(c + d)$ and $(a + b)$ is 3 less than $(c - d)$, then $(a - c)$ is :

(a) 0.5 (b) 1 (c) 1.5 (d) None of these

95. If $x = \dfrac{a}{a - 1}$ and $y = \dfrac{1}{a - 1}$, then : (Bank P.O. 2003)

(a) x is equal to y
(b) x is equal to y only if $a < 1$
(c) x is greater than y
(d) x is greater than y only if $a < 1$
(e) y is greater than x only if $a < 1$

96. If $0 < a < 1$, then the value of $a + \frac{1}{a}$ is : (S.S.C. 1997)

(a) less than 2 (b) greater than 2 (c) less than 4 (d) greater than 4

97. If $\frac{a}{x} + \frac{y}{b} = 1$ and $\frac{b}{y} + \frac{z}{c} = 1$, then $\frac{x}{a} + \frac{c}{z}$ will be equal to : (C.D.S. 2003)

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

98. If a, b, c are integers; $a^2 + b^2 = 45$ and $b^2 + c^2 = 40$, then the values of a, b and c respectively are :

(a) 2, 6, 3 (b) 3, 2, 6 (c) 5, 4, 3 (d) None of these.

99. If $\frac{a}{3} = \frac{b}{4} = \frac{c}{7}$, then the value of $\frac{a+b+c}{c}$ is : (C.B.I. 2003)

(a) $\frac{1}{\sqrt{7}}$ (b) $\sqrt{2}$ (c) 2 (d) 7

100. If $3x + 7 = x^2 + P = 7x + 5$, what is the value of P ? (S.B.I.P.O. 2000)

(a) $\frac{1}{2}$ (b) $8\frac{1}{4}$ (c) $8\frac{1}{2}$ (d) Cannot be determined

101. If $\frac{2a+b}{a+4b} = 3$, then find the value of $\frac{a+b}{a+2b}$. (S.S.C. 2002)

(a) $\frac{2}{7}$ (b) $\frac{5}{9}$ (c) $\frac{10}{7}$ (d) $\frac{10}{9}$

102. If $(2a + 3b)(2c - 3d) = (2a - 3b)(2c + 3d)$, then :

(a) $\frac{a}{b} = \frac{c}{d}$ (b) $\frac{a}{d} = \frac{c}{b}$ (c) $\frac{a}{b} = \frac{d}{c}$ (d) $\frac{b}{a} = \frac{c}{d}$

103. If $(a + b + 2c + 3d)(a - b - 2c + 3d) = (a - b + 2c - 3d)(a + b - 2c - 3d)$, then $2bc$ is equal to : (M.A.T. 2003)

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

104. The value of $\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{2-\frac{1}{2}}}}$ is : (S.S.C. 1999)

(a) $\frac{3}{8}$ (b) $\frac{19}{8}$ (c) $\frac{8}{3}$ (d) $\frac{8}{19}$

105. If $2 = x + \cfrac{1}{1+\cfrac{1}{3+\frac{1}{4}}}$, then the value of x is : (S.S.C. 2003)

(a) $\frac{12}{17}$ (b) $\frac{13}{17}$ (c) $\frac{18}{17}$ (d) $\frac{21}{17}$

106. If $\dfrac{2+\dfrac{1}{3\frac{4}{5}}}{2+\dfrac{1}{3+\dfrac{1}{1+\frac{1}{4}}}} = x$, then the value of x is : (C.B.I. 1998)

(a) $\frac{1}{7}$ (b) $\frac{3}{7}$ (c) 1 (d) $\frac{8}{7}$

107. $8-8\times\dfrac{2\frac{1}{5}-1\frac{2}{7}}{2-\dfrac{1}{6-\frac{1}{6}}}$ is equal to : (S.S.C. 2002)

(a) 2 (b) 4 (c) 6 (d) 8

108. $\dfrac{2}{2+\dfrac{2}{3+\dfrac{2}{3+\frac{2}{3}}}\times 0.39}$ is simplified to : (S.S.C. 2004)

(a) $\frac{1}{3}$ (b) 2 (c) 6 (d) None of these

109. Simplify : $\dfrac{1}{1+\dfrac{\frac{2}{3}}{1+\frac{2}{3}+\dfrac{\frac{8}{9}}{1-\frac{2}{3}}}}$. (S.S.C. 2003)

(a) $\frac{11}{13}$ (b) $\frac{13}{15}$ (c) $\frac{13}{11}$ (d) $\frac{15}{13}$

110. If $\frac{37}{13} = 2+\dfrac{1}{x+\dfrac{1}{y+\frac{1}{z}}}$, where x, y, z are natural numbers, then x, y, z are :

(a) 1, 2, 5 (b) 1, 5, 2 (c) 5, 2, 11 (d) 11, 2, 5

(Assistant Grade, 1998)

111. If $x = 1 - q$ and $y = 2q + 1$, then for what value of q, x is equal to y ?

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

112. Find x if $\frac{x}{5}-\frac{x}{6}=4$. (B.S.F. 2001)

(a) -120 (b) -100 (c) 100 (d) 120

113. If $4x+5y = 83$ and $\frac{3x}{2y}=\frac{21}{22}$, then $y - x$ = ? (Bank P.O. 2002)

(a) 3 (b) 4 (c) 7 (d) 11

114. Which of the following values of x and y satisfy the following equations I and II ? (B.S.R.B. 2003)

I. $3x + y = 19$ II. $x - y = 9$

(a) $-7, -2$ (b) $-7, 2$ (c) $7, -2$ (d) 7, 2

115. If $a + b = 5$ and $3a + 2b = 20$, then $(3a + b)$ will be : **(M.B.A. 1998)**
(a) 10 (b) 15 (c) 20 (d) 25

116. If $2p + 3q = 18$ and $2p - q = 2$, then $2p + q = ?$
(a) 6 (b) 7 (c) 10 (d) 20

117. If $2x + y = 5$ and $3x - 4y = 2$, then the value of $2xy$ is :
(a) 4 (b) 6 (c) 8 (d) 10

118. If $3x - 5y = 5$ and $\frac{x}{x+y} = \frac{5}{7}$, then what is the value of $x - y$? **(Bank P.O. 2002)**
(a) 3 (b) 4 (c) 6 (d) 9 (e) None of these

119. If $4x + 3y = 18xy$ and $2x - 5y + 4xy = 0$, then the values of x and y will be respectively :
(a) $-\frac{1}{2}$ and $-\frac{1}{3}$ (b) -1 and -3 (c) $\frac{1}{2}$ and $\frac{1}{3}$ (d) $\frac{1}{4}$ and $\frac{1}{3}$

120. If $2x + y = 17$; $y + 2z = 15$ and $x + y = 9$, then what is the value of $4x + 3y + z$?
(a) 41 (b) 43 (c) 45 (d) 55 (e) None of these

(S.B.I.P.O. 1999)

121. If $3x - 4y + z = 7$; $2x - z + 3y = 19$; $x + 2y + 2z = 24$, then what is the value of z ?
(a) 4 (b) 5 (c) 6 (d) 8

122. If $2x + y = 15$, $2y + z = 25$ and $2z + x = 26$, what is the value of z ?
(a) 4 (b) 7 (c) 9 (d) 11

123. If $2x + 3y = 31$, $y - z = 4$ and $x + 2z = 11$, then what is the value of $x + y + z$?
(a) 12 (b) 13 (c) 15 (d) 16

(Bank P.O. 2003)

124. $\frac{3}{4}\left(1+\frac{1}{3}\right)\left(1+\frac{2}{3}\right)\left(1-\frac{2}{5}\right)\left(1+\frac{6}{7}\right)\left(1-\frac{12}{13}\right) = ?$ **(Hotel Management, 2001)**
(a) $\frac{1}{5}$ (b) $\frac{1}{6}$ (c) $\frac{1}{7}$ (d) None of these

125. When simplified, the product $\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\ldots\ldots\left(1-\frac{1}{n}\right)$ gives **(S.S.C. 2004)**
(a) $\frac{1}{n}$ (b) $\frac{2}{n}$ (c) $\frac{2(n-1)}{n}$ (d) $\frac{2}{n(n+1)}$

126. The value of $\left(1+\frac{1}{2}\right)\left(1+\frac{1}{3}\right)\left(1+\frac{1}{4}\right)\ldots\ldots\left(1+\frac{1}{120}\right)$ is : **(S.S.C. 2003)**
(a) 30 (b) 40.5 (c) 60.5 (d) 121

127. When simplified, the product $\left(2-\frac{1}{3}\right)\left(2-\frac{3}{5}\right)\left(2-\frac{5}{7}\right)\ldots\ldots\left(2-\frac{999}{1001}\right)$ is equal to :
(a) $\frac{991}{1001}$ (b) $\frac{1001}{13}$ (c) $\frac{1003}{13}$ (d) None of these

128. Find the sum : $\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\frac{1}{20}+\frac{1}{30}+\frac{1}{42}+\frac{1}{56}+\frac{1}{72}+\frac{1}{90}+\frac{1}{110}+\frac{1}{132}$.
(a) $\frac{7}{8}$ (b) $\frac{11}{12}$ (c) $\frac{15}{16}$ (d) $\frac{17}{18}$

129. The sum of the first 35 terms of the series $\frac{1}{2}+\frac{1}{3}-\frac{1}{4}-\frac{1}{2}-\frac{1}{3}+\frac{1}{4}+\frac{1}{2}+\frac{1}{3}-\frac{1}{4}\ldots\ldots$ is :
(a) $-\frac{1}{2}$ (b) $-\frac{1}{4}$ (c) $\frac{1}{4}$ (d) None of these

130. The value of $999\frac{995}{999} \times 999$ is : **(S.S.C. 2003)**

(a) 990809 (b) 998996 (c) 998999 (d) 999824

131. $\left(999\frac{1}{7} + 999\frac{2}{7} + 999\frac{3}{7} + 999\frac{4}{7} + 999\frac{5}{7} + 999\frac{6}{7}\right)$ is simplified to : **(S.S.C. 2004)**

(a) 2997 (b) 5979 (c) 5994 (d) 5997

132. The value of $1 + \frac{1}{4 \times 3} + \frac{1}{4 \times 3^2} + \frac{1}{4 \times 3^3}$ is :

(a) $\frac{121}{108}$ (b) $\frac{3}{2}$ (c) $\frac{31}{2}$ (d) None of these

133. $\frac{1}{1 \cdot 2 \cdot 3} + \frac{1}{2 \cdot 3 \cdot 4} + \frac{1}{3 \cdot 4 \cdot 5} + \frac{1}{4 \cdot 5 \cdot 6}$ is equal to :

(a) $\frac{7}{30}$ (b) $\frac{11}{30}$ (c) $\frac{13}{30}$ (d) $\frac{17}{30}$

134. The value of $\frac{3}{1^2 \cdot 2^2} + \frac{5}{2^2 \cdot 3^2} + \frac{7}{3^2 \cdot 4^2} + \frac{9}{4^2 \cdot 5^2} + \frac{11}{5^2 \cdot 6^2} + \frac{13}{6^2 \cdot 7^2} + \frac{15}{7^2 \cdot 8^2} + \frac{17}{8^2 \cdot 9^2} + \frac{19}{9^2 \cdot 10^2}$ is:

(a) $\frac{1}{100}$ (b) $\frac{99}{100}$ (c) 1 (d) $\frac{101}{100}$

(S.S.C. 2004)

135. How may pieces of 85 cm length can be cut from a rod 42.5 metres long ?

(a) 30 (b) 40 (c) 60 (d) None of these

136. Income of a company doubles after every one year. If the initial income was Rs. 4 lakhs, what would be the income after 5 years ? **(Bank P.O. 2003)**

(a) Rs. 1.24 crores (b) Rs. 1.28 crores (c) Rs. 2.52 crores
(d) Rs. 2.56 crores (e) None of these

137. On sports day, if 30 children were made to stand in a column, then 16 columns could be formed. If 24 children were made to stand in a column, then how many columns could be formed ? **(Hotel Management, 2002)**

(a) 20 (b) 22 (c) 29 (d) 45

138. The number of students in each section of a school is 24. After admitting new students, three new sections were started. Now, the total number of sections is 16 and there are 21 students in each section. The number of new students admitted is :

(a) 14 (b) 24 (c) 48 (d) 114

139. A class starts at 10 a.m. and lasts till 1.27 p.m. Four periods are held during this interval. After every period, 5 minutes are given free to the students. The exact duration of each period is :

(a) 42 minutes (b) 48 minutes (c) 51 minutes (d) 53 minutes

140. A light was seen at intervals of 13 seconds. It was seen for the first time at 1 hr. 54 min. 50 secs. a.m. and the last time at 3 hrs. 17 min. 49 secs. a.m. How many times was the light seen ? **(A.A.O. Exam, 2003)**

(a) 360 (b) 375 (c) 378 (d) 384

141. A man earns Rs. 20 on the first day and spends Rs. 15 on the next day. He again earns Rs. 20 on the third day and spends Rs. 15 on the fourth day. If he continues to save like this, how soon will he have Rs. 60 in hand ? **(IGNOU, 2003)**

(a) On 17th day (b) On 27th day (c) On 30th day (d) On 40th day

142. It costs Rs. x each to make the first thousand copies of a compact disc and Rs. y to make each subsequent copy. If z is greater than 1000, how much will it cost to make z copies of the compact disc ? **(R.R.B. 2001)**

(*a*) $zx - xy$ (*b*) $1000x + yz$

(*c*) $1000 (x - y) + yz$ (*d*) $1000 (z - y) + xz$

143. Along a yard 225 metres long, 26 trees are planted at equal distances, one tree being at each end of the yard. What is the distance between two consecutive trees ?

(*a*) 8 metres (*b*) 9 metres (*c*) 10 metres (*d*) 15 metres

(R.R.B. 2002)

144. A boy was asked to multiply a number by 25. He instead multiplied the number by 52 and got the answer 324 more than the correct answer. The number to be multiplied was :

(*a*) 12 (*b*) 15 (*c*) 25 (*d*) 32

145. A boy multiplied 423 by a number and obtained 65589 as his answer. If both the fives in the answer are wrong and all other figures are correct, the correct answer is :

(*a*) 60489 (*b*) 61189 (*c*) 62189 (*d*) 62389

146. The total monthly salary of 4 men and 2 women is Rs. 46,000. If a woman earns Rs. 500 more than a man, what is the monthly salary of a woman ?

(*a*) Rs. 6500 (*b*) Rs. 7500 (*c*) Rs. 8000 (*d*) Rs. 9000

(Bank P.O. 1999)

147. David got two and a half times as many marks in English as in History. If his total marks in the two subjects are 140, the marks obtained by him in English are :

(*a*) 40 (*b*) 75 (*c*) 90 (*d*) 100

(Assistant Grade, 1998)

148. A pineapple costs Rs. 7 each. A watermelon costs Rs. 5 each. X spends Rs. 38 on these fruits. The number of pineapples purchased is : **(M.B.A. 1998)**

(*a*) 2 (*b*) 3 (*c*) 4 (*d*) Data inadequate

149. The number of girls in a class is 5 times the number of boys. Which of the following cannot be the total number of children in the class ? **(R.R.B. 2002)**

(*a*) 24 (*b*) 30 (*c*) 35 (*d*) 42 (*e*) 54

150. Water boils at 212°F or 100°C and melts at 32°F or 0°C. If the temperature of a particular day is 35°C, it is equivalent to : **(R.R.B. 2000)**

(*a*) 85°F (*b*) 90°F (*c*) 95°F (*d*) 99°F

151. A sum of Rs. 750 is distributed among A, B, C and D in such a manner that A gets as much as B and C together, B gets Rs. 125 more than C and D gets as much as C. What is A's share ?

(*a*) Rs. 100 (*b*) Rs. 225 (*c*) Rs. 275 (*d*) Rs. 325

152. A bonus of Rs. 1000 is to be divided among three people so that Rohit receives twice as much as Sachin, who receives one-fifth as much as Gagan. How much money should Gagan receive ?

(*a*) Rs. 100 (*b*) Rs. 250 (*c*) Rs. 375 (*d*) Rs. 625

153. The total number of digits used in numbering the pages of a book having 366 pages, is : **(S.C.R.A. 1998)**

(*a*) 732 (*b*) 990 (*c*) 1098 (*d*) 1305

154. A printer numbers the pages of a book starting with 1 and uses 3189 digits in all. How many pages does the book have ? **(M.A.T. 2002)**

(*a*) 1000 (*b*) 1074 (*c*) 1075 (*d*) 1080

155. In a garden, there are 10 rows and 12 columns of mango trees. The distance between the two trees is 2 metres and a distance of one metre is left from all sides of the boundary of the garden. The length of the garden is :

(*a*) 20 m (*b*) 22 m (*c*) 24 m (*d*) 26 m

156. What fraction of an hour is a second ?

(a) $\frac{1}{24}$ (b) $\frac{1}{60}$ (c) $\frac{1}{120}$ (d) $\frac{1}{3600}$

157. When a ball bounces, it rises to $\frac{3}{4}$ of the height from which it fell. If the ball is dropped from a height of 32 m, how high will it rise at the third bounce ? **(S.S.C. 2000)**

(a) 13 m (b) $13\frac{1}{2}$ m (c) $14\frac{1}{2}$ m (d) None of these

158. Sanket earns twice as much in the month of March as in each of the other months of the year. What part of his entire annual earnings was earned in March ?

(a) $\frac{1}{7}$ (b) $\frac{1}{6}$ (c) $\frac{2}{11}$ (d) $\frac{2}{13}$

159. If one-third of a tank holds 80 litres of water, then the quantity of water that half of the tank holds is : **(S.S.C. 1999)**

(a) $\frac{80}{3}$ litres (b) 100 litres (c) 120 litres (d) 240 litres

160. A person travels 3.5 km from place A to place B. Out of this distance, he travels $1\frac{2}{3}$ km on bicycle, $1\frac{1}{6}$ km on scooter and the rest on foot. What portion of the whole distance does he cover on foot ? **(S.S.C. 2003)**

(a) $\frac{3}{19}$ (b) $\frac{4}{11}$ (c) $\frac{1}{21}$ (d) $\frac{5}{6}$

161. What fraction of $\frac{4}{7}$ must be added to itself to make the sum $1\frac{1}{14}$? **(S.S.C. 2002)**

(a) $\frac{1}{2}$ (b) $\frac{4}{7}$ (c) $\frac{7}{8}$ (d) $\frac{15}{14}$

162. Express $\frac{2}{3}$ of $\frac{1}{4}$ of Rs. 25.20 as a fraction of $1\frac{1}{2}$ of Rs. 36.

(a) $\frac{5}{8}$ (b) $\frac{5}{42}$ (c) $\frac{7}{90}$ (d) $\frac{11}{90}$

163. A 70 cm long wire is to be cut into two pieces such that one piece will be $\frac{2}{5}$ as long as the other. How many centimetres will the shorter piece be ?

(a) 10 (b) 14 (c) 20 (d) 28

164. A certain amount is distributed among A, B and C. A gets $\frac{3}{16}$ and B gets $\frac{1}{4}$ of the whole amount. If C gets Rs. 81, then B gets :

(a) Rs. 30 (b) Rs. 32 (c) Rs. 36 (d) Rs. 40

165. $\frac{1}{10}$ of a pole is coloured red, $\frac{1}{20}$ white, $\frac{1}{30}$ blue, $\frac{1}{40}$ black, $\frac{1}{50}$ violet, $\frac{1}{60}$ yellow and the rest is green. If the length of the green portion of the pole is 12.08 metres, then the length of the pole is : **(S.S.C. 2004)**

(a) 16 m (b) 18 m (c) 20 m (d) 30 m

166. In an examination, a student was asked to find $\frac{3}{14}$ of a certain number. By mistake, he found $\frac{3}{4}$ of that number. His answer was 150 more than the correct answer. The number is : **(R.R.B. 2003)**

(a) 180 (b) 240 (c) 280 (d) 290

167. A student was asked to find the value of $\frac{3}{8}$ of a sum of money. The student made a mistake by dividing the sum by $\frac{3}{8}$ and thus got an answer which exceeded the correct answer by Rs. 55. The correct answer was :
(a) Rs. 9 (b) Rs. 18 (c) Rs. 24 (d) Rs. 64

168. If we multiply a fraction by itself and divide the product by its reciprocal, the fraction thus obtained is $18\frac{26}{27}$. The original fraction is :
(a) $\frac{8}{27}$ (b) $1\frac{1}{3}$ (c) $2\frac{2}{3}$ (d) None of these

169. The marks scored in an examination are converted from 50 to 10 for the purpose of internal assessment. The highest marks were 47 and the lowest were 14. The difference between the maximum and the minimum internal assessment scores is :
(a) 3.3 (b) 4.8 (c) 6.6 (d) 7.4
(S.S.C. 2000)

170. One-third of Rahul's savings in National Savings Certificate is equal to one-half of his savings in Public Provident Fund. If he has Rs. 1,50,000 as total savings, how much has he saved in Public Provident Fund ? **(Bank P.O. 2002)**
(a) Rs. 30,000 (b) Rs. 50,000 (c) Rs. 60,000 (d) Rs. 90,000

171. In a family, the father took $\frac{1}{4}$ of the cake and he had 3 times as much as each of the other members had. The total number of family members is :
(a) 3 (b) 7 (c) 10 (d) 12

172. A waiter's salary consists of his salary and tips. During one week his tips were $\frac{5}{4}$ of his salary. What fraction of his income came from tips ?
(a) $\frac{4}{9}$ (b) $\frac{5}{4}$ (c) $\frac{5}{8}$ (d) $\frac{5}{9}$

173. A sum of Rs. 1360 has been divided among A, B and C such that A gets $\frac{2}{3}$ of what B gets and B gets $\frac{1}{4}$ of what C gets. B's share is : **(M.A.T. 2002)**
(a) Rs. 120 (b) Rs. 160 (c) Rs. 240 (d) Rs. 300

174. Three friends had dinner at a restaurant. When the bill was received, Amita paid $\frac{2}{3}$ as much as Veena paid and Veena paid $\frac{1}{2}$ as much as Tanya paid. What fraction of the bill did Veena pay ?
(a) $\frac{1}{3}$ (b) $\frac{3}{11}$ (c) $\frac{12}{31}$ (d) $\frac{5}{8}$

175. $\frac{1}{4}$ of a tank holds 135 litres of water. What part of the tank is full if it contains 180 litres of water ? **(S.S.C. 1999)**
(a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{2}{3}$ (d) $\frac{2}{5}$

176. A tank is $\frac{2}{5}$ full. If 16 litres of water is added to the tank, it becomes $\frac{6}{7}$ full. The capacity of the tank is :
(a) 28 litres (b) 32 litres (c) 35 litres (d) 42 litres

177. The fluid contained in a bucket can fill four large bottles or seven small bottles. A full large bottle is used to fill an empty small bottle. What fraction of the fluid is left over in the large bottle when the small one is full ? (D.M.R.C. 2003)

(a) $\frac{2}{7}$ (b) $\frac{3}{7}$ (c) $\frac{4}{7}$ (d) $\frac{5}{7}$

178. To fill a tank, 25 buckets of water is required. How many buckets of water will be required to fill the same tank if the capacity of the bucket is reduced to two-fifth of its present ? (R.B.I. 2003)

(a) 10 (b) 35 (c) $62\frac{1}{2}$

(d) Cannot be determined (e) None of these

179. Peter gave one-fourth of the amount he had to Michael. Michael in turn gave half of what he received from Peter to Sam. If the difference between the remaining amount with Peter and the amount received by Sam is Rs. 500, how much money did Michael receive from Peter ? (S.B.I.P.O. 1999)

(a) Rs. 100 (b) Rs. 200 (c) Rs. 400

(d) Data inadequate (e) None of these

180. Four children A, B, C and D divide a bag of sweets. A takes $\frac{1}{3}$ of them, B $\frac{2}{5}$ th of the remainder and the rest is equally shared between C and D. What fraction of the sweets did C or D get ?

(a) $\frac{1}{4}$ (b) $\frac{1}{5}$ (c) $\frac{1}{6}$ (d) $\frac{1}{17}$

181. A boy read $\frac{3}{8}$ th of a book on one day and $\frac{4}{5}$ th of the remainder on another day. If there were 30 pages unread, how many pages did the book contain ? (I.M.T. 2002)

(a) 240 (b) 300 (c) 600 (d) None of these

182. A man has divided his total money in his will in such a way that half of it goes to his wife, $\frac{2}{3}$ rd of the remaining among his three sons equally and the rest among his four daughters equally. If each daughter gets Rs. 20,000, how much money will each son get ? (S.B.I.P.O. 2000)

(a) Rs. 48,233.33 (b) Rs. 50,333.33 (c) Rs. 53,333.33

(d) Data inadequate (e) None of these

183. An institute organised a fete and $\frac{1}{5}$ of the girls and $\frac{1}{8}$ of the boys participated in the same. What fraction of the total number of students took part in the fete ?

(a) $\frac{2}{13}$ (b) $\frac{13}{40}$ (c) Data inadequate (d) None of these

(N.I.F.T. 2000)

184. At an International Dinner, $\frac{1}{5}$ of the people attending were French men. If the number of French women at the dinner was $\frac{2}{3}$ greater than the number of French men, and there were no other French people at the dinner, then what fraction of the people at the dinner were not French ? (M.B.A. 2003)

(a) $\frac{1}{5}$ (b) $\frac{2}{5}$ (c) $\frac{2}{3}$ (d) $\frac{7}{15}$

185. In a class, $\frac{3}{5}$ of the students are girls and rest are boys. If $\frac{2}{9}$ of the girls and $\frac{1}{4}$ of the boys are absent, what part of the total number of students is present ?

(*a*) $\frac{17}{25}$ (*b*) $\frac{18}{49}$ (*c*) $\frac{23}{30}$ (*d*) $\frac{23}{36}$

186. One-third of the boys and one-half of the girls of a college participated in a social work project. If the number of participating students is 300 out of which 100 are boys, what is the total number of students in the college ? **(Bank P.O. 2000)**

(*a*) 500 (*b*) 600 (*c*) 700 (*d*) 800

187. To win an election, a candidate needs $\frac{3}{4}$ of the votes cast. If after $\frac{2}{3}$ of the votes have been counted, a candidate has $\frac{5}{6}$ of what he needs, then what part of the remaining votes does he still need ?

(*a*) $\frac{1}{8}$ (*b*) $\frac{3}{8}$ (*c*) $\frac{1}{10}$ (*d*) $\frac{1}{4}$

188. In an office, $\frac{3}{4}$ of the staff can neither type nor take shorthand. However, $\frac{1}{5}$th can type and $\frac{1}{3}$rd can take shorthand. What part of the whole staff can do both ?

(*a*) $\frac{1}{5}$ (*b*) $\frac{3}{40}$ (*c*) $\frac{13}{40}$ (*d*) $\frac{17}{60}$

189. The charges of hired car are Rs. 4 per km for the first 60 km, Rs. 5 per km for the next 60 km and Rs. 8 for every 5 km for further journey. If the balance amount left over with Rohit is one-fourth of what he paid towards the charges of the hired car for travelling 320 km, how much money did he have initially with him ?

(*a*) Rs. 1075 (*b*) Rs. 1255 (*c*) Rs. 1540 (*d*) None of these

190. A fires 5 shots to B's 3 but A kills only once in 3 shots while B kills once in 2 shots. When B has missed 27 times, A has killed : **(C.B.I. 1997)**

(*a*) 30 birds (*b*) 60 birds (*c*) 72 birds (*d*) 90 birds

191. If every 2 out of 3 readymade shirts need alterations in the collar, every 3 out of 4 need alterations in the sleeves, and every 4 out of 5 need it in the body, how many alterations will be required for 60 shirts ?

(*a*) 24 (*b*) 123 (*c*) 133 (*d*) 143

192. The sum of three fractions is $2\frac{11}{24}$. When the largest fraction is divided by the smallest, the fraction thus obtained is $\frac{7}{6}$ which is $\frac{1}{3}$ more than the middle one. The fractions are :

(*a*) $\frac{3}{5}, \frac{4}{7}, \frac{2}{3}$ (*b*) $\frac{7}{8}, \frac{5}{6}, \frac{3}{4}$ (*c*) $\frac{7}{9}, \frac{2}{3}, \frac{3}{5}$ (*d*) None of these

193. One test tube contains some acid and another test tube contains an equal quantity of water. To prepare a solution, 20 grams of the acid is poured into the second test tube. Then, two-thirds of the so-formed solution is poured from the second tube into the first. If the fluid in first test tube is four times that in the second, what quantity of water was taken initially ?

(*a*) 40 grams (*b*) 60 grams (*c*) 80 grams (*d*) 100 grams

194. From a number of apples, a man sells half the number of existing apples plus 1 to the first customer, sells $\frac{1}{3}$rd of the remaining apples plus 1 to the second customer and $\frac{1}{5}$th of the remaining apples plus 1 to the third customer. He then finds that he has 3 apples left. How many apples did he have originally ?

(*a*) 15 (*b*) 18 (*c*) 20 (*d*) 25

195. $\frac{(856+167)^2+(856-167)^2}{856\times856+167\times167} = ?$

(*a*) 1 (*b*) 2 (*c*) 689 (*d*) 1023

196. $\frac{(469+174)^2-(469-174)^2}{469\times174} = ?$ **(M.B.A. 2002)**

(*a*) 2 (*b*) 4 (*c*) 295 (*d*) 643

197. If $a - b = 3$ and $a^2 + b^2 = 29$, find the value of ab. **(R.R.B. 2003)**

(*a*) 10 (*b*) 12 (*c*) 15 (*d*) 18

198. If $\frac{x^2-1}{x+1} = 4$, $x = ?$ **(Bank P.O. 2000)**

(*a*) 0 (*b*) 1 (*c*) 5

(*d*) Cannot be determined (*e*) None of these

199. $\frac{\left(3\frac{2}{3}\right)^2-\left(2\frac{1}{2}\right)^2}{\left(4\frac{3}{4}\right)^2-\left(3\frac{1}{3}\right)^2}+\frac{3\frac{2}{3}-2\frac{1}{2}}{4\frac{3}{4}-3\frac{1}{3}} = ?$ **(Hotel Management, 2001)**

(*a*) $\frac{37}{97}$ (*b*) $\frac{74}{97}$ (*c*) $1\frac{23}{74}$ (*d*) None of these

200. The simplified value of $\frac{\left(1+\frac{1}{1+\frac{1}{100}}\right)\left(1+\frac{1}{1+\frac{1}{100}}\right)-\left(1-\frac{1}{1+\frac{1}{100}}\right)\left(1-\frac{1}{1+\frac{1}{100}}\right)}{\left(1+\frac{1}{1+\frac{1}{100}}\right)+\left(1-\frac{1}{1+\frac{1}{100}}\right)}$ is :

(*a*) 100 (*b*) $\frac{200}{101}$ (*c*) 200 (*d*) $\frac{202}{100}$

(S.S.C. 2003)

201. If $a + b + c = 13$, $a^2 + b^2 + c^2 = 69$, then find $ab + bc + ca$. **(B.S.F. 2001)**

(*a*) − 50 (*b*) 50 (*c*) 69 (*d*) 75

202. If $\frac{x^2+y^2+z^2-64}{xy-yz-zx} = -2$ and $x + y = 3z$, then the value of z is :

(*a*) 2 (*b*) 3 (*c*) 4 (*d*) None of these

(Hotel Management, 1999)

203. $\left(\frac{785\times785\times785+435\times435\times435}{785\times785+435\times435-785\times435}\right)$ simplifies to : **(S.S.C. 2000)**

(*a*) 350 (*b*) 785 (*c*) 1220 (*d*) 1320

204. $\left(\frac{147\times147+147\times143+143\times143}{147\times147\times147-143\times143\times143}\right) = ?$ **(A.A.O. Exam, 2003)**

(a) $\frac{1}{4}$ (b) 290 (c) $\frac{1}{290}$ (d) 4

205. $\frac{(13)^3+7^3}{(13)^2+7^2-?} = 20$

(a) 6 (b) 20 (c) 91 (d) None of these

206. The value of $\frac{\left(\frac{3}{5}\right)^3-\left(\frac{2}{5}\right)^3}{\left(\frac{3}{5}\right)^2-\left(\frac{2}{5}\right)^2}$ is : **(S.S.C. 2003)**

(a) $\frac{1}{5}$ (b) $\frac{19}{25}$ (c) $\frac{21}{25}$ (d) 1

207. $\frac{38\times38\times38+34\times34\times34+28\times28\times28-38\times34\times84}{38\times38+34\times34+28\times28-38\times34-34\times28-38\times28}$ is equal to :

(a) 24 (b) 32 (c) 44 (d) 100

208. The value of $\frac{(x-y)^3+(y-z)^3+(z-x)^3}{9(x-y)(y-z)(z-x)}$ is equal to :

(a) 0 (b) $\frac{1}{9}$ (c) $\frac{1}{3}$ (d) 1

209. The highest score in an inning was $\frac{3}{11}$ of the total and the next highest was $\frac{3}{11}$ of the remainder. If the scores differed by 9, the total score was :

(a) 110 (b) 121 (c) 132 (d) 143

210. Rahul owes Rs. X and gives a Rs. 50 note in payment. He receives the following change : 3X fifty-paise coins, 14 ten-paise coins and 4X five-paise coins. X is equal to :

(a) 12 (b) 16 (c) 18 (d) 22

211. David gets on the elevator at the 11th floor of a building and rides up at the rate of 57 floors per minute. At the same time, Albert gets on an elevator at the 51st floor of the same building and rides down at the rate of 63 floors per minute. If they continue travelling at these rates, then at which floor will their paths cross ?

(a) 19 (b) 28 (c) 30 (d) 37

(M.B.A. 2003)

212. N number of persons decided to raise Rs. 3 lakhs by equal contributions from each. Had they contributed Rs. 50 each extra, the contribution would have been Rs. 3.25 lakhs. How many persons are there ? **(Bank P.O. 2003)**

(a) 400 (b) 450 (c) 600

(d) Cannot be determined (e) None of these

213. Free notebooks were distributed equally among children of a class. The number of notebooks each child got was one-eighth of the number of children. Had the number of children been half, each child would have got 16 notebooks. Total how many notebooks were distributed ? **(Bank P.O. 2003)**

(a) 256 (b) 432 (c) 512 (d) 640 (e) None of these

214. A classroom has equal number of boys and girls. Eight girls left to play kho-kho, leaving twice as many boys as girls in the classroom. What was the total number of girls and boys present initially ? **(S.B.I.P.O. 2000)**

(a) 16 (b) 24 (c) 32

(d) Cannot be determined (e) None of these

215. After distributing the sweets equally among 25 children, 8 sweets remain. Had the number of children been 28, 22 sweets would have been left after equally distributing. What was the total number of sweets ?

(*a*) 328 (*b*) 348 (*c*) 358 (*d*) Data inadequate

216. In a regular week, there are 5 working days and for each day, the working hours are 8. A man gets Rs. 2.40 per hour for regular work and Rs. 3.20 per hours for overtime. If he earns Rs. 432 in 4 weeks, then how many hours does he work for ?

(*a*) 160 (*b*) 175 (*c*) 180 (*d*) 195

(Bank P.O. 2003)

217. A sum of Rs. 312 was divided among 100 boys and girls in such a way that each boy gets Rs. 3.60 and each girl Rs. 2.40. The number of girls is :

(*a*) 35 (*b*) 40 (*c*) 60 (*d*) 65

(A.A.O. Exam, 2003)

218. Each boy contributed rupees equal to the number of girls and each girl contributed rupees equal to the number of boys in a class of 60 students. If the total contribution thus collected is Rs. 1600, how many boys are there in the class ?

(*a*) 25 (*b*) 30 (*c*) 50 (*d*) Data inadequate

219. A worker may claim Rs. 1.50 for each km which he travels by taxi and 50 p for each km he drives his own car. If in one week he claimed Rs. 50 for travelling 80 km, how many kms did he travel by taxi ?

(*a*) 10 (*b*) 20 (*c*) 30 (*d*) 40

220. In an examination, a student scores 4 marks for every correct answer and loses 1 mark for every wrong answer. If he attempts in all 60 questions and secures 130 marks, the number of questions he attempts correctly, is : **(L.I.C. A.A.O. 2003)**

(*a*) 35 (*b*) 38 (*c*) 40 (*d*) 42

221. A cricket team won 3 matches more than they lost. If a win gives them 2 points and loss (– 1) point, how many matches, in all, have they played if their score is 23 ?

(S.S.C. 2000)

(*a*) 17 (*b*) 20 (*c*) 37 (*d*) 40.

222. A total of 324 coins of 20 paise and 25 paise make a sum of Rs. 71. The number of 25-paise coins is : **(N.I.F.T. 2003)**

(a) 120 (*b*) 124 (*c*) 144 (*d*) 200

223. A man has Rs. 480 in the denominations of one-rupee notes, five-rupee notes and ten-rupee notes. The number of notes of each denomination is equal. What is the total number of notes that he has ? **(M.A.T. 2002)**

(a) 45 (*b*) 60 (*c*) 75 (*d*) 90

224. Eight people are planning to share equally the cost of a rental car. If one person withdraws from the arrangement and the others share equally the entire cost of the car, then the share of each of the remaining persons increased by : **(M.B.A. 2002)**

(*a*) $\frac{1}{7}$ (*b*) $\frac{1}{8}$ (*c*) $\frac{1}{9}$ (*d*) $\frac{7}{8}$

225. On Children's Day, sweets were to be equally distributed among 175 children in a school. Actually on the Children's Day, 35 children were absent and therefore each child got 4 sweets extra. Total how many sweets were available for distribution ?

(*a*) 2400 (*b*) 2480 (*c*) 2680 (*d*) 2750 (*e*) None of these

(Bank P.O. 2003)

226. A number of friends decided to go on a picnic and planned to spend Rs. 96 on eatables. Four of them, however, did not turn up. As a consequence, the remaining ones had to contribute Rs. 4 each extra. The number of those who attended the picnic was :

(*a*) 8 (*b*) 12 (*c*) 16 (*d*) 24

227. A certain number of tennis balls were purchased for Rs. 450. Five more balls could have been purchased in the same amount if each ball was cheaper by Rs. 15. The number of balls purchased was : **(Bank P.O. 1999)**

(*a*) 10 (*b*) 15 (*c*) 20 (*d*) 25

228. A piece of cloth costs Rs. 35. If the length of the piece would have been 4 m longer and each metre costs Re. 1 less, the cost would have remained unchanged. How long is the piece ?

(*a*) 9 m (*b*) 10 m (*c*) 12 m (*d*) 14 m

229. The price of 10 chairs is equal to that of 4 tables. The price of 15 chairs and 2 tables together is Rs. 4000. The total price of 12 chairs and 3 tables is : **(S.S.C. 2002)**

(*a*) Rs. 3500 (*b*) Rs. 3750 (*c*) Rs. 3840 (*d*) Rs. 3900

230. In a certain shop, 9 oranges cost as much as 5 apples, 5 apples cost as much as 3 mangoes and 4 mangoes cost as much as 9 lemons. If 3 lemons cost Rs. 4.80, the price of an orange is :

(*a*) Rs. 1.20 (*b*) Rs. 1.30 (*c*) Rs. 1.40 (*d*) Rs. 1.50

231. The price of 2 sarees and 4 shirts is Rs. 1600. With the same money one can buy 1 saree and 6 shirts. If one wants to buy 12 shirts, how much shall he have to pay ?

(*a*) Rs. 1200 (*b*) Rs. 2400 (*c*) Rs. 4800

(*d*) Cannot be determined (*e*) None of these **(Bank P.O. 2002)**

232. If 2 tables and 3 chairs cost Rs. 3500 and 3 tables and 2 chairs cost Rs. 4000, then how much does a table cost ? **(Hotel Management, 2003)**

(*a*) Rs. 500 (*b*) Rs. 750 (*c*) Rs. 1000 (*d*) Rs. 1500

233. The taxi charges in a city comprise of a fixed charge, together with the charge of the distance covered. For a journey of 16 km, the charges paid are Rs. 156 and for a journey of 24 km, the charges paid are Rs. 204. What will a person have to pay for travelling a distance of 30 km ?

(*a*) Rs. 226 (*b*) Rs. 240 (*c*) Rs. 248 (*d*) Rs. 252

234. In a classroom, if 6 students per bench are assigned to accommodate all students, one more bench will be required. However, if 7 students are accommodated per bench, there would be a space left for 5 students. What is the number of students in the class ?

(*a*) 30 (*b*) 42 (*c*) 72 (*d*) None of these **(S.S.C. 2000)**

235. There are two examination rooms A and B. If 10 students are sent from A to B, then the number of students in each room is the same. If 20 candidates are sent from B to A, then the number of students in A is double the number of students in B. The number of students in room A is : **(M.A.T. 2002)**

(*a*) 20 (*b*) 80 (*c*) 100 (*d*) 200

236. In a group of buffaloes and ducks, the number of legs are 24 more than twice the number of heads. What is the number of buffaloes in the group ? **(R.R.B. 2002)**

(*a*) 6 (*b*) 8 (*c*) 10 (*d*) 12

237. A man has some hens and cows. If the number of heads be 48 and the number of feet equals 140, then the number of hens will be : **(R.R.B. 2003)**

(*a*) 22 (*b*) 23 (*c*) 24 (*d*) 26

238. Vidushi and Sanya distribute Rs. 100 each in charity. Vidushi distributes money to 5 more people than Sanya and Sanya gives each Re. 1 more than Vidushi. How many people are recipients of the charity ?

(*a*) 45 (*b*) 60 (*c*) 90 (*d*) None of these

ANSWERS

1. (c)	2. (e)	3. (b)	4. (d)	5. (a)	6. (a)	7. (a)	8. (c)
9. (a)	10. (a)	11. (d)	12. (c)	13. (e)	14. (c)	15. (c)	16. (c)
17. (c)	18. (d)	19. (c)	20. (a)	21. (c)	22. (b)	23. (d)	24. (c)
25. (a)	26. (d)	27. (b)	28. (c)	29. (d)	30. (c)	31. (b)	32. (a)
33. (c)	34. (d)	35. (d)	36. (e)	37. (e)	38. (a)	39. (d)	40. (a)
41. (b)	42. (d)	43. (a)	44. (d)	45. (a)	46. (c)	47. (e)	48. (b)
49. (a)	50. (e)	51. (c)	52. (b)	53. (a)	54. (a)	55. (a)	56. (d)
57. (a)	58. (c)	59. (d)	60. (d)	61. (b)	62. (d)	63. (b)	64. (b)
65. (c)	66. (d)	67. (d)	68. (a)	69. (c)	70. (c)	71. (a)	72. (b)
73. (c)	74. (c)	75. (b)	76. (c)	77. (a)	78. (c)	79. (c)	80. (d)
81. (a)	82. (c)	83. (d)	84. (a)	85. (c)	86. (c)	87. (d)	88. (b)
89. (c)	90. (b)	91. (c)	92. (c)	93. (b)	94. (c)	95. (c)	96. (b)
97. (c)	98. (b)	99. (c)	100. (b)	101. (d)	102. (a)	103. (c)	104. (d)
105. (d)	106. (c)	107. (b)	108. (d)	109. (b)	110. (b)	111. (b)	112. (d)
113. (b)	114. (c)	115. (d)	116. (c)	117. (a)	118. (a)	119. (c)	120. (e)
121. (b)	122. (d)	123. (c)	124. (c)	125. (a)	126. (c)	127. (d)	128. (b)
129. (b)	130. (b)	131. (d)	132. (a)	133. (a)	134. (b)	135. (d)	136. (b)
137. (a)	138. (b)	139. (b)	140. (d)	141. (a)	142. (c)	143. (b)	144. (a)
145. (a)	146. (c)	147. (d)	148. (c)	149. (c)	150. (c)	151. (d)	152. (d)
153. (b)	154. (b)	155. (b)	156. (d)	157. (b)	158. (d)	159. (c)	160. (c)
161. (c)	162. (c)	163. (c)	164. (c)	165. (a)	166. (c)	167. (a)	168. (c)
169. (c)	170. (c)	171. (c)	172. (d)	173. (c)	174. (b)	175. (b)	176. (c)
177. (b)	178. (c)	179. (b)	180. (b)	181. (a)	182. (c)	183. (a)	184. (d)
185. (c)	186. (c)	187. (b)	188. (d)	189. (a)	190. (a)	191. (c)	192. (b)
193. (a)	194. (c)	195. (b)	196. (b)	197. (a)	198. (c)	199. (b)	200. (b)
201. (b)	202. (c)	203. (c)	204. (a)	205. (c)	206. (b)	207. (d)	208. (c)
209. (b)	210. (c)	211. (c)	212. (e)	213. (c)	214. (c)	215. (c)	216. (b)
217. (b)	218. (d)	219. (a)	220. (b)	221. (c)	222. (b)	223. (d)	224. (a)
225. (e)	226. (b)	227. (a)	228. (b)	229. (d)	230. (a)	231. (b)	232. (c)
233. (b)	234. (c)	235. (c)	236. (d)	237. (d)	238. (a)		

SOLUTIONS

1. Given expression = 100 + 100 = 200.
2. Given expression = 9240 ÷ 28 = 330.
3. Given expression = $\frac{5004}{139} - 6 = 36 - 6 = 30$.
4. Given expression = 7500 ÷ 25 = 7525.
5. Given expression = $\frac{8}{88} \times 8888088 = \frac{1}{11} \times 8888088 = 808008$.
6. Given expression = 1001 ÷ 143 = 7.
7. Given expression = $\frac{1260}{15} \div 7 = 84 \div 7 = 12$.
8. Given expression = $\left(5 \times 4 \times 2 \times \frac{1}{2} \times \frac{3}{4}\right) = 15$.

9. Let $\frac{11}{4} = \frac{77}{x}$. Then, $11x = 77 \times 4$ or $x = \left(\frac{77 \times 4}{11}\right) = 28$.

10. $2^5 \times 9^2 = 32 \times 81 = 2592$.

11. Given exp. $= 2 - [2 - \{2 - 2 \times 4\}] = 2 - [2 - \{2 - 8\}] = 2 - [2 - (-6)]$
$= 2 - [2 + 6] = 2 - 8 = -6$.

12. Given exp. $= 25 - 5\ [2 + 3\ \{2 - 2 \times 2 + 5\} - 10] \div 4$
$= 25 - 5\ [2 + 3\ \{2 - 4 + 5\} - 10] \div 4 = 25 - 5\ [2 + 3 \times 3 - 10] \div 4$
$= 25 - 5\ [2 + 9 - 10] \div 4 = 25 - 5 \div 4 = 25 - 1.25 = 23.75$.

13. Given exp. $= 260 \times 16 + 340 = 4160 + 340 = 4500$.

14. Given exp. $= 100 \times 10 - 100 + 20 = 1000 - 100 + 20 = 1020 - 100 = 920$.

15. Let $2\ x\ 6 - 12 \div 4 + 2 = 11$. Then, $2\ x\ 6 - 3 + 2 = 11 \Leftrightarrow 2\ x\ 6 = 11 + 3 - 2 = 12$.
So, x must be replaced by '$\times$'.

16. Let $45 - [28 - \{37 - (15 - x)\}] = 58$.
Then, $45 - [28 - \{37 - 15 + x\}] = 58 \Leftrightarrow 45 - [28 - \{22 + x\}] = 58$
$\Leftrightarrow 45 - [28 - 22 - x] = 58 \Leftrightarrow 45 - [6 - x] = 58 \Leftrightarrow 45 - 6 + x = 58$
$\Leftrightarrow 39 + x = 58 \Leftrightarrow x = 58 - 39 = 19$.

17. Given exp. $= \frac{24 \div 6}{4 + 4 + 4 + 1} = \frac{4}{13}$.

18. Given exp. $= \frac{4 + 72 - 6 - 8}{738 - 730} = \frac{76 - 14}{8} = \frac{62}{8} = 7.75$.

19. Given exp. $= \frac{2700 - 240}{1120 + 110} = \frac{2460}{1230} = 2$.

20. Let $\frac{128 \div 16 \times x - 7 \times 2}{7^2 - 8 \times 6 + x^2} = 1$.
Then, $8x - 7 \times 2 = 49 - 48 + x^2 \Leftrightarrow 8x - 14 = 1 + x^2 \Leftrightarrow x^2 - 8x + 15 = 0$
$\Leftrightarrow (x - 3)(x - 5) = 0 \Leftrightarrow x = 3$ or $x = 5$.

21. Given exp. $= 18 - [5 - \{6 + 2\ (7 - 3)\}] = 18 - [5 - \{6 + 2 \times 4\}]$
$= 18 - [5 - \{6 + 8\}] = 18 - [5 - 14] = 18 - [-9] = 18 + 9 = 27$.

22. Given exp. $= 1 \div \left[1 + 1 \div \left\{1 + 1 + \left(1 + \frac{1}{2}\right)\right\}\right] = 1 \div \left[1 + 1 \div \left\{1 + 1 + \frac{3}{2}\right\}\right]$
$= 1 \div \left[1 + 1 \div \left\{1 + 1 \times \frac{2}{3}\right\}\right] = 1 \div \left[1 + 1 \div \left\{1 + \frac{2}{3}\right\}\right]$
$= 1 \div \left[1 + 1 \div \frac{5}{3}\right] = 1 \div \left[1 + 1 \times \frac{3}{5}\right] = 1 \div \left[1 + \frac{3}{5}\right] = 1 \div \frac{8}{5} = 1 \times \frac{5}{8} = \frac{5}{8}$.

23. Given exp. $= \frac{8 - |5 - (-1)| \div 2}{|2| - |-3| \div 3} = \frac{8 - |5 + 1| \div 2}{2 - 3 \div 3} = \frac{8 - 6 \div 2}{2 - 1} = 8 - 3 = 5$.

24. $\frac{5}{3} + \frac{3}{4} = \frac{20 + 9}{12} = \frac{29}{12} = 2\frac{5}{12} < 5$; $\frac{7}{3} + \frac{11}{5} = \frac{35 + 33}{15} = \frac{68}{15} = 4\frac{8}{15} < 5$;
$\frac{11}{4} + \frac{8}{3} = \frac{33 + 32}{12} = \frac{65}{12} = 5\frac{5}{12} > 5$; $\frac{13}{5} + \frac{11}{6} = \frac{78 + 55}{30} = \frac{133}{30} = 4\frac{13}{30} < 5$.

25. Given exp. $= \frac{28 + 14 + 7 + 4 + 2 + 1}{28} = \frac{56}{28} = 2$.

26. Given exp. $= \frac{7}{4} + \frac{16}{3} + \frac{17}{5} = \frac{105 + 320 + 204}{60} = \frac{629}{60} = 10\frac{29}{60}$.

27. Given exp. $= \frac{41}{2} + \frac{91}{3} - \frac{91}{6} = \left(\frac{123 + 182}{6}\right) - \frac{91}{6} = \frac{305}{6} - \frac{91}{6} = \frac{214}{6} = \frac{107}{3} = 35\frac{2}{3}$.

28. Given exp. $= -1 + 4 + 3 = 6.$

29. Given exp. $= \frac{1}{(7/3)} + \frac{1}{(7/4)} = \frac{3}{7} + \frac{4}{7} = \frac{7}{7} = 1.$

30. Let $\frac{35}{6} - \frac{35}{9} - x = 1.$

Then, $x = \frac{35}{6} - \frac{35}{9} - 1 = \frac{35}{6} - \left(\frac{35}{9} + 1\right) = \frac{35}{6} - \frac{44}{9} = \frac{105 - 88}{18} = \frac{17}{18}.$

31. $\frac{1}{x} = 4 - \left(\frac{1}{3} + \frac{1}{2}\right) = 4 - \left(\frac{2+3}{6}\right) = 4 - \frac{5}{6} = \frac{24-5}{6} = \frac{19}{6} \Rightarrow x = \frac{6}{19}.$

32. Given exp. $= \dfrac{\left(-\frac{2}{3} - \frac{1}{3}\right) + \left(\frac{4}{5} + \frac{1}{5}\right) + \left(\frac{3}{4} - \frac{1}{2}\right)}{\left(\frac{2}{3} - \frac{4}{3} + \frac{1}{3}\right) - \left(\frac{1}{5} + \frac{4}{5}\right) + \frac{1}{2}}$

$= \dfrac{-1 + 1 + \frac{1}{4}}{-\frac{1}{3} - 1 + \frac{1}{2}} = \dfrac{\frac{1}{4}}{\frac{-2-6+3}{6}} = \dfrac{\frac{1}{4}}{-\frac{5}{6}} = \frac{1}{4} \times \left(-\frac{6}{5}\right) = \frac{-3}{10}.$

33. Given exp. $= 5 - \left[\frac{3}{4} + \left\{\frac{5}{2} - \left(\frac{1}{2} + \frac{7-6}{42}\right)\right\}\right] = 5 - \left[\frac{3}{4} + \left\{\frac{5}{2} - \left(\frac{1}{2} + \frac{1}{42}\right)\right\}\right]$

$= 5 - \left[\frac{3}{4} + \left\{\frac{5}{2} - \frac{22}{42}\right\}\right] = 5 - \left[\frac{3}{4} + \frac{83}{42}\right] = 5 - \frac{229}{84}$

$= \left(\frac{420 - 229}{84}\right) = \frac{191}{84} = 2\frac{23}{84}.$

34. $\dfrac{\left(\frac{1}{2} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6}\right)}{\left(\frac{2}{5} - \frac{5}{9} + \frac{3}{5} - \frac{7}{18}\right)} = \dfrac{\left(\frac{30 - 15 + 12 - 10}{60}\right)}{\left(\frac{2}{5} + \frac{3}{5}\right) - \left(\frac{5}{9} + \frac{7}{18}\right)} = \dfrac{\left(\frac{17}{60}\right)}{1 - \frac{17}{18}} = \left(\frac{17}{60} \times 18\right) = \frac{51}{10} = 5\frac{1}{10}.$

35. $\left(34 \times 4\frac{1}{2}\right) = 34 \times \left(4 + \frac{1}{2}\right) = (34 \times 4) + \left(34 \times \frac{1}{2}\right)$

$= (30 + 4) \times 4 + \left(34 \times \frac{1}{2}\right) = (30 \times 4) + (4 \times 4) + \left(34 \times \frac{1}{2}\right).$

36. Given exp. $= \left(\frac{3}{5} \times \frac{4}{7} \times \frac{5}{9} \times \frac{21}{24} \times 504\right) = 84.$

37. Given exp. $= \left(\frac{41}{6} \times \frac{16}{3} + \frac{53}{3} \times \frac{9}{2}\right) = \left(\frac{328}{9} + \frac{159}{2}\right) = \frac{656 + 1431}{18} = \frac{2087}{18} = 115\frac{17}{18}.$

38. Let $\frac{3}{8}$ of $168 \times 15 \div 5 + x = 549 \div 9 + 235.$

Then, $63 \times 15 \div 5 + x = 61 + 235 \Leftrightarrow 63 \times 3 + x = 296$

$\Leftrightarrow 189 + x = 296 \Leftrightarrow x = 107.$

39. Let $\frac{5}{3} \div \frac{2}{7} \times \frac{x}{7} = \frac{5}{4} \times \frac{2}{3} \div \frac{1}{6}$. Then,

$\frac{5}{3} \times \frac{7}{2} \times \frac{x}{7} = \frac{5}{4} \times \frac{2}{3} \times 6 \Leftrightarrow \frac{5}{6}x = 5 \Leftrightarrow x = \left(\frac{5 \times 6}{5}\right) = 6.$

40. Let $5\frac{2}{3} \div x\frac{5}{6} = 2$. Then, $\frac{17}{3} \div x\frac{5}{6} = 2 \Leftrightarrow x\frac{5}{6} = \frac{17}{3} \times \frac{1}{2} = \frac{17}{6} \Leftrightarrow x\frac{5}{6} = 2\frac{5}{6}$.
$\therefore \quad x = 2$.

41. Given equation is : $\frac{(5x+1)}{x} \times \frac{(4y+3)}{4} = 20 \Leftrightarrow (5x+1)(4y+3) = 80x \quad ...(i)$
Clearly, $x = 3$ and $y = 3$ satisfy (i).

42. Required difference $= \frac{19}{16} - \frac{16}{19} = \frac{19^2 - 16^2}{304} = \frac{(19+16)(19-16)}{304} = \frac{35 \times 3}{301} = \frac{105}{304}$.

43. Required number $= \frac{37\frac{1}{2}}{1/8} = \frac{75/2}{1/8} = \frac{75}{2} \times 8 = 300$.

44. Let x of $\frac{1}{12} = \frac{3}{8}$. Then, $\frac{x}{12} = \frac{3}{8} \Leftrightarrow x = \left(\frac{3}{8} \times 12\right) = \frac{9}{2}$.

45. Sum of given fractions $= \frac{7}{4} + \frac{5}{2} + \frac{67}{12} + \frac{10}{3} + \frac{9}{4} = \left(\frac{21+30+67+40+27}{12}\right) = \frac{185}{12}$.
The whole number just less than $\frac{185}{12}$ is 15.
Let $\frac{185}{12} - x = 15$. Then, $x = \left(\frac{185}{12} - 15\right) = \frac{5}{12}$.

46. Clearly, $\frac{x+1}{x}$ is the only fraction in which the numerator is greater than the denominator. So, it is the greatest fraction.

47. $\frac{3}{5}$ of $350 - \frac{4}{7}$ of $210 = 210 - 120 = 90$.

48. $\frac{6}{7/8} - \frac{6/7}{8} = 6 \times \frac{8}{7} - \frac{6}{7} \times \frac{1}{8} = \frac{48}{7} - \frac{6}{56} = \frac{384-6}{56} = \frac{378}{56} = \frac{27}{4} = 6\frac{3}{4}$.

49. Let the value of the estate be Rs. x.
Then, $\frac{4}{5}$ of $x = 16800 \Leftrightarrow x = \left(\frac{16800 \times 5}{4}\right) = 21000 \Leftrightarrow \frac{3}{7}x = \left(\frac{3}{7} \times 21000\right) = 9000$.

50. Let the number be x. Then,
$\frac{2}{5}$ of $\frac{1}{4}$ of $\frac{3}{7}$ of $x = 15 \Leftrightarrow x = \left(15 \times \frac{7}{3} \times 4 \times \frac{5}{2}\right) = 350 \Leftrightarrow \frac{1}{2}x = 175$.

51. Let the number be x. Then,
$\frac{1}{5}x - \frac{1}{7}x = 10 \Leftrightarrow \frac{7x-5x}{35} = 10 \Leftrightarrow \frac{2x}{35} = 10 \Leftrightarrow x = \left(\frac{10 \times 35}{2}\right) = 175$.

52. $9 * 11 = 9^2 + (11)^2 - 9 \times 11 = 81 + 121 - 99 = 103$.

53. $(3 * -1) = \frac{3 \times (-1)}{3 + (-1)} = \frac{-3}{2}$. So, $3 * (3 * -1) = 3 * \left(\frac{-3}{2}\right) = \frac{3 \times \left(\frac{-3}{2}\right)}{3 + \left(\frac{-3}{2}\right)} = \frac{-9}{2} \times \frac{2}{3} = -3$.

54. $3 * 5 + 5 * 3 = (2 \times 3 - 3 \times 5 + 3 \times 5) + (2 \times 5 - 3 \times 3 + 5 \times 3)$
$= (6 + 10 - 9 + 15) = 22$.

55. $4 \oplus (3 \oplus p) = 4 \oplus (3^2 + 2p) = 4 \oplus (9 + 2p) = 4^2 + 2(9 + 2p) = 34 + 4p$.
$\therefore \quad 34 + 4p = 50 \Rightarrow 4p = 50 - 34 = 16 \Rightarrow p = 4$.

56. $(a * b * c) * a * b = \left(\frac{a+b}{c}\right) * a * b = \frac{\left(\frac{a+b}{c}\right)+a}{b} = \frac{a+b+ac}{bc}$.

57. Let the number be x. Then,

$\frac{5(x+7)}{9} - 3 = 12 \Leftrightarrow 5(x+7) - 27 = 108 \Leftrightarrow 5x + 35 = 135 \Leftrightarrow 5x = 100 \Leftrightarrow x = 20$.

58. Given exp. $= \left(\frac{5}{7} \times \frac{19}{13}\right) \div \left(\frac{19}{7} \times \frac{4}{13}\right) = \frac{5 \times 19}{7 \times 13} \times \frac{7 \times 13}{19 \times 4} = \frac{5}{4}$.

59. Given exp. $= \frac{11}{4} \div \frac{8}{3} \div \frac{13}{12} = \frac{11}{4} \times \frac{3}{8} \times \frac{12}{13} = \frac{99}{104}$.

60. Given exp. $= \frac{9}{2} \times \frac{13}{3} - \frac{25}{3} \div \frac{17}{3} = \frac{9}{2} \times \frac{13}{3} - \frac{25}{3} \times \frac{3}{17}$

$= \frac{39}{2} - \frac{25}{17} = \frac{663 - 50}{34} = \frac{613}{34} = 18\frac{1}{34}$.

61. Let $\frac{4335}{x} \div \frac{15}{8} = \frac{289}{528}$. Then,

$\frac{4335}{x} \div \frac{289}{528} \times \frac{15}{8} \Leftrightarrow \frac{4335}{x} = \frac{289 \times 5}{176 \times 8} \Leftrightarrow x = \left(\frac{4335 \times 176 \times 8}{289 \times 5}\right) = 4224$.

$\therefore$ Missing digit = 2.

62. Let $\frac{16}{3} - \frac{11}{3} \times \frac{3}{4} \times \frac{1}{x} + \frac{16}{5} \times \frac{5}{6} = 7$. Then,

$\frac{16}{3} - \frac{11}{3} \times \frac{3}{4} \times \frac{1}{x} + \frac{16}{5} \times \frac{5}{6} = 7 \Leftrightarrow \frac{16}{3} - \frac{11}{4x} + \frac{8}{3} = 7 \Leftrightarrow \frac{24}{3} - \frac{11}{4x} = 7$

$\Leftrightarrow \frac{11}{4x} = 8 - 7 = 1 \Leftrightarrow 4x = 11 \Leftrightarrow x = \frac{11}{4} = 2\frac{3}{4}$.

63. Given exp. $= 9 - \frac{11}{9}$ of $\frac{36}{11} \div \frac{36}{7}$ of $\frac{7}{9} = 9 - 4 \div 4 = 9 - 1 = 8$.

64. Let $\frac{5}{6} \div \frac{6}{7} \times x - \frac{8}{9} \div \frac{8}{5} + \frac{3}{4} \times \frac{10}{3} = \frac{25}{9}$. Then,

$\frac{5}{6} \times \frac{7}{6} \times x - \frac{8}{9} \times \frac{5}{8} + \frac{3}{4} \times \frac{10}{3} = \frac{25}{9} \Leftrightarrow \frac{35}{36}x - \frac{5}{9} + \frac{5}{2} = \frac{25}{9}$

$\Leftrightarrow \frac{35}{36}x = \frac{25}{9} + \frac{5}{9} - \frac{5}{2} = \frac{10}{3} - \frac{5}{2} \Leftrightarrow \frac{35}{36}x = \frac{5}{6} \Leftrightarrow x = \left(\frac{5}{6} \times \frac{36}{35}\right) = \frac{6}{7}$.

65. Given exp. $= \frac{3}{4} \div \frac{9}{4}$ of $\frac{2}{3} - \frac{\left(\frac{3-2}{6}\right)}{\left(\frac{3+2}{6}\right)} \times \frac{10}{3} + \frac{5}{6} = \frac{3}{4} \div \frac{3}{2} - \frac{1}{6} \times \frac{6}{5} \times \frac{10}{3} + \frac{5}{6}$

$= \frac{3}{4} \times \frac{2}{3} - \frac{2}{3} + \frac{5}{6} = \left(\frac{1}{2} - \frac{2}{3} + \frac{5}{6}\right) = \left(\frac{3-4+5}{6}\right) = \frac{4}{6} = \frac{2}{3}$.

66. $\frac{\frac{7}{3} + 1\frac{1}{2} \text{ of } \frac{5}{3}}{2 + 1\frac{2}{3}} = \frac{\frac{7}{3} + \frac{3}{2} \text{ of } \frac{5}{3}}{2 + \frac{5}{3}} = \frac{\frac{7}{3} + \frac{5}{2}}{\frac{11}{3}} = \frac{29}{6} \times \frac{3}{11} = \frac{29}{22}$.

$\therefore$ Required answer $= \frac{29}{22} - \frac{1}{4} = \frac{58 - 11}{44} = \frac{47}{44} = 1\frac{3}{44}$.

67. Given exp. $= \dfrac{\dfrac{1}{3}+\dfrac{3}{4}\left(\dfrac{6-5}{15}\right)}{\dfrac{5}{3}\text{ of }\dfrac{3}{4}-\dfrac{1}{5}} = \dfrac{\dfrac{1}{3}+\dfrac{3}{4}\times\dfrac{1}{15}}{\dfrac{5}{4}-\dfrac{1}{5}} = \dfrac{\dfrac{1}{3}+\dfrac{1}{20}}{\dfrac{25-4}{20}} = \dfrac{23}{60}\times\dfrac{20}{21} = \dfrac{23}{63}.$

68. Given exp. $= \dfrac{\dfrac{1}{3}\times 3\times\dfrac{1}{3}}{\dfrac{1}{3}+\dfrac{1}{9}} - \dfrac{1}{9} = \dfrac{\dfrac{1}{3}}{\dfrac{1}{3}\times 9} - \dfrac{1}{9} = \dfrac{1}{3}\times\dfrac{1}{3} - \dfrac{1}{9} = \dfrac{1}{9} - \dfrac{1}{9} = 0.$

69. Given exp. $= \dfrac{\dfrac{1}{2}+\dfrac{1}{4}}{\dfrac{1}{2}+\dfrac{1}{4}} - \dfrac{\dfrac{1}{2}\times 4}{\dfrac{2+1}{4}} = 2\times\dfrac{4}{3} = \dfrac{8}{3} = 2\dfrac{2}{3}.$

70. Given exp. $= \dfrac{\dfrac{13}{4}-\dfrac{4}{5}\text{ of }\dfrac{5}{6}}{\dfrac{13}{3}\div\dfrac{1}{5}-\left(\dfrac{3}{10}+\dfrac{106}{5}\right)} - \dfrac{\dfrac{13}{4}-\dfrac{2}{3}}{\dfrac{13}{3}\times 5-\dfrac{215}{10}} = \dfrac{\dfrac{31}{12}}{\dfrac{65}{3}-\dfrac{43}{2}} = \left(\dfrac{31}{12}\times 6\right) = \dfrac{31}{2} = 15\dfrac{1}{2}.$

71. Let $\dfrac{\dfrac{15}{2}-\dfrac{23}{4}}{\dfrac{7}{2}+x} \div \dfrac{\dfrac{1}{2}+\dfrac{5}{4}}{\dfrac{6}{5}+\dfrac{7}{2}} = \dfrac{6}{10}$. Then, $\left[\dfrac{7}{4}\times\dfrac{2}{(7+2x)}\right]\div\left[\dfrac{7}{4}\times\dfrac{10}{47}\right] = \dfrac{3}{5}$

$\Leftrightarrow \dfrac{7}{2(7+2x)} = \dfrac{3}{5}\times\dfrac{7}{4}\times\dfrac{10}{47} = \dfrac{21}{94} \Leftrightarrow 7+2x = \left(\dfrac{7}{2}\times\dfrac{94}{21}\right) = \dfrac{47}{3}$

$\Leftrightarrow 2x = \dfrac{47}{3} - 7 = \dfrac{26}{3} \Leftrightarrow x = \left(\dfrac{26}{3}\times\dfrac{1}{2}\right) = \dfrac{13}{3} = 4\dfrac{1}{3}.$

72. Given exp. $= 3034 - \left(\dfrac{1002}{2004}\times 100\right) = 3034 - 50 = 2984.$

73. Given exp. $= \dfrac{5241.6}{1872} + 6.28 = 2.8 + 6.28 = 9.08.$

74. Let $\dfrac{58}{7}$ of $1568 + 265.75 = x + 2455.60$.

Then, $12992 + 265.75 = x + 2455.60$

$\Leftrightarrow \quad x = 12992 + 265.75 - 2455.60 = 13257.75 - 2455.60 = 10802.15.$

75. Given exp. $= 14.5 + 4.05 + 139.25 = 157.80.$

76. Let $8.25 - 4.20 + 2.8 + \dfrac{4}{x} - 2.32 = 5.33.$

Then, $\dfrac{4}{x} = (5.33 + 4.20 + 2.32) - (8.25 + 2.8) = 11.85 - 11.05 = 0.80 \Leftrightarrow x = \dfrac{4}{0.80} = \dfrac{40}{8} = 5.$

77. Given exp. $= 0.008 \times 0.01 \times 0.0072 \div 0.000048$

$= 0.00008 \times \dfrac{0.0072}{0.000048} = \dfrac{8}{48}\times\dfrac{72}{1000} = 0.012.$

78. Given exp. $= 2.375 \times \dfrac{522}{87} - 0.0285 = 2.375 \times 6 - 0.0285 = 14.25 - 0.0285 = 14.2215.$

79. Given exp. $= 0.2 + 0.2 - 1 \times 0.04 = 0.4 - 0.04 = 0.36.$

80. Given exp. $= 11.6 + \dfrac{9280}{464} - \dfrac{28.28}{7} = 11.6 + 20 - 4.04 = 27.56.$

81. Given exp. $= 4.59 \times \dfrac{18}{36} + 0.6 - 0.2 = \dfrac{4.59}{2} + 0.6 - 0.2 = 2.295 + 0.6 - 0.2 = 2.695.$

82. Let $\frac{64.4 - 34.7125}{6.25 \text{ of } x} = 1$. Then, $6.25 \text{ of } x = 29.6875$.

$\therefore \quad x = \frac{29.6875}{6.25} = \frac{2968.75}{625} = 4.75 = 4\frac{3}{4}$.

83. Given exp. $= 2.002 + 7.9\ \{2.8 - 6.3 \times 2.1 + 15.6\}$

$= 2.002 + 7.9\ \{2.8 - 13.23 + 15.6\} = 2.002 + 7.9 \times 5.17$

$= 2.002 + 40.843 = 42.845$.

84. Let $24 - [2.4 - \{.24 \times 2 - (.024 - x)\}] = 22.0584$.

Then, $24 - [2.4 - \{.48 - .024 + x\}] = 22.0584 \Leftrightarrow 24 - [2.4 - 0.456 - x] = 22.0584$

$\Leftrightarrow \quad 24 - 1.944 + x = 22.0584 \Leftrightarrow x = 22.0584 - 22.056 = 0.0024$.

85. Let $3 - \left[1.6 - \left\{3.2 - \left(3.2 + \frac{2.25}{x}\right)\right\}\right] = 0.65$.

Then, $3 - \left[1.6 - \left\{3.2 - 3.2 - \frac{2.25}{x}\right\}\right] = 0.65 \Leftrightarrow 3 - \left[1.6 + \frac{2.25}{x}\right] = 0.65$

$\Leftrightarrow \quad 3 - 1.6 - \frac{2.25}{x} = 0.65 \Leftrightarrow \frac{2.25}{x} = 1.4 - 0.65 \Leftrightarrow x = \frac{2.25}{0.75} = 3$.

86. Let $587.4 + 58.74 \times 2 - \frac{5.874}{x} = 702.744$.

Then, $\frac{5.874}{x} = 587.4 + 117.48 - 702.744 = 2.136 \Leftrightarrow x = \frac{5.874}{2.136} = \frac{5874}{2136} = \frac{11}{4} = 2\frac{3}{4}$.

$\therefore$ Missing digit $= 3$.

87. Let $54.27 - [12.84 - \{x - (6.82 - 1.85)\}] = 38.33$.

Then, $54.27 - [12.84 - \{x - 4.97\}] = 38.33$

$\Leftrightarrow \quad 54.27 - [12.84 - x + 4.97] = 38.33 \Leftrightarrow 54.27 - [17.81 - x] = 38.33$

$\Leftrightarrow \quad 54.27 - 17.81 + x = 38.33 \Leftrightarrow x = 38.33 - 36.46 = 1.87$.

88. Let $\frac{20}{3} \text{ of } \frac{726}{100} \div \frac{45}{100} \text{ of } x = \frac{968}{117}$.

Then, $\frac{242}{5} \div \frac{45x}{100} = \frac{968}{117} \Leftrightarrow \frac{242}{5} \times \frac{100}{45x} = \frac{968}{117} \Leftrightarrow x = \frac{242}{5} \times \frac{100}{45} \times \frac{117}{968} = 13$.

89. $\frac{P+Q}{P-Q} = \frac{\frac{P}{Q}+1}{\frac{P}{Q}-1} = \frac{7+1}{7-1} = \frac{8}{6} = \frac{4}{3}$.

90. $\left(\frac{4}{7} + \frac{2y-x}{2y+x}\right) = \left(\frac{4}{7} + \frac{2-\frac{x}{y}}{2+\frac{x}{y}}\right) = \frac{4}{7} + \frac{2-\frac{4}{5}}{2+\frac{4}{5}} = \frac{4}{7} + \frac{(6/5)}{(14/5)} = \frac{4}{7} + \left(\frac{6}{5} \times \frac{5}{14}\right) = \frac{4}{7} + \frac{3}{7} = \frac{7}{7} = 1$.

91. $\frac{6a+4b}{6a-5b} = \frac{6\left(\frac{a}{b}\right)+4}{6\left(\frac{a}{b}\right)-5} = \frac{6 \times \frac{4}{3}+4}{6 \times \frac{4}{3}-5} = \frac{8+4}{8-5} = \frac{12}{3} = 4$.

92. $\frac{x}{2y} = \frac{6}{7} \Rightarrow \frac{x}{y} = \left(2 \times \frac{6}{7}\right) = \frac{12}{7}$.

$$\therefore \quad \frac{x-y}{x+y}+\frac{14}{19}=\frac{\frac{x}{y}-1}{\frac{x}{y}+1}+\frac{14}{19}=\frac{\frac{12}{7}-1}{\frac{12}{7}+1}+\frac{14}{19}=\frac{(5/7)}{(19/7)}+\frac{14}{19}$$

$$=\left(\frac{5}{7}\times\frac{7}{19}\right)+\frac{14}{19}=\frac{5}{19}+\frac{14}{19}=\frac{19}{19}=1.$$

93. $\frac{a}{b}=\frac{4}{5}$ and $\frac{b}{c}=\frac{15}{16} \Rightarrow \left(\frac{a}{b}\times\frac{b}{c}\right)=\left(\frac{4}{5}\times\frac{15}{16}\right) \Rightarrow \frac{a}{c}=\frac{3}{4}$.

$$\therefore \quad \frac{c^2-a^2}{c^2+a^2}=\frac{1-\left(\frac{a^2}{c^2}\right)}{1+\left(\frac{a^2}{c^2}\right)}=\frac{1-\left(\frac{a}{c}\right)^2}{1+\left(\frac{a}{c}\right)^2}=\frac{1-\frac{9}{16}}{1+\frac{9}{16}}=\frac{(7/16)}{(25/16)}=\frac{7}{25}.$$

94. $(a-b)-(c+d)=6$ and $(c-d)-(a+b)=3$

$\Rightarrow (a-c)-(b+d)=6$ and $(c-a)-(b+d)=3$

$\Rightarrow (b+d)=(a-c)-6$ and $(b+d)=(c-a)-3$

$\Rightarrow (a-c)-6=(c-a)-3 \Rightarrow 2(a-c)=3 \Rightarrow (a-c)=\frac{3}{2}=1.5.$

95. $x=\frac{a}{a-1}=1+\frac{1}{a-1}=1+y.$ $\quad\therefore x>y.$

96. a is positive and $a<1 \Rightarrow \frac{1}{a}>1.$ $\quad\therefore \left(a+\frac{1}{a}\right)>2.$

97. $\frac{a}{x}+\frac{y}{b}=1 \Rightarrow \frac{a}{x}=1-\frac{y}{b}=\frac{b-y}{b} \Rightarrow \frac{x}{a}=\frac{b}{b-y}.$

$\frac{b}{y}+\frac{z}{c}=1 \Rightarrow \frac{z}{c}=1-\frac{b}{y}=\frac{y-b}{y} \Rightarrow \frac{c}{z}=\frac{y}{y-b}=\frac{-y}{(b-y)}.$

$$\therefore \quad \frac{x}{a}+\frac{c}{z}=\frac{b}{(b-y)}-\frac{y}{(b-y)}=\frac{(b-y)}{(b-y)}=1.$$

98. $a^2+b^2=45$ ...(*i*) and $b^2+c^2=40$ ...(*ii*)

Subtracting, we get : $a^2-c^2=5 \Rightarrow (a+c)(a-c)=5.$

$\therefore (a+c)=5$ and $(a-c)=1.$

Solving, we get : $a=3$, $c=2$. Putting $c=2$ in (*ii*), we get $b=6$.

99. $\frac{a}{3}=\frac{b}{4}=\frac{c}{7}=k$ (say). Then, $a=3k$, $b=4k$, $c=7k$.

$$\therefore \quad \frac{a+b+c}{c}=\frac{3k+4k+7k}{7k}=\frac{14k}{7k}=2.$$

100. $3x+7=7x+5 \Rightarrow 7x-3x=2 \Rightarrow 4x=2 \Rightarrow x=\frac{1}{2}.$

Now, $3x+7=x^2+\mathrm{P} \Rightarrow \frac{3}{2}+7=\frac{1}{4}+\mathrm{P} \Rightarrow \mathrm{P}=\frac{17}{2}-\frac{1}{4}=\frac{33}{4}=8\frac{1}{4}.$

101. $\frac{2a+b}{a+4b}=3 \Rightarrow 2a+b=3(a+4b) \Rightarrow a=-11b.$

$$\therefore \quad \frac{a+b}{a+2b}=\frac{-11b+b}{-11b+2b}=\frac{-10b}{-9b}=\frac{10}{9}.$$

102. $(2a + 3b)(2c - 3d) = (2a - 3b)(2c + 3d)$

$$\Rightarrow \frac{(2a+3b)}{(2a-3b)} = \frac{(2c+3d)}{(2c-3d)} \Rightarrow \frac{2\left(\frac{a}{b}\right)+1}{2\left(\frac{a}{b}\right)-1} = \frac{2\left(\frac{c}{d}\right)+1}{2\left(\frac{c}{d}\right)-1} \Rightarrow \frac{a}{b} = \frac{c}{d}.$$

103. $(a + b + 2c + 3d)(a - b - 2c + 3d) = (a - b + 2c - 3d)(a + b - 2c - 3d)$

$\Rightarrow [(a + b) + (2c + 3d)][(a - b) - (2c - 3d)]$

$= [(a - b) + (2c - 3d)][(a + b) - (2c + 3d)]$

$\Rightarrow (a + b)(a - b) - (a + b)(2c - 3d) + (a - b)(2c + 3d) - (2c + 3d)(2c - 3d)$

$= (a - b)(a + b) - (a - b)(2c + 3d) + (a + b)(2c - 3d) - (2c + 3d)(2c - 3d)$

$\Rightarrow (a + b)(2c - 3d) = (a - b)(2c + 3d)$

$\Rightarrow 2ac - 3ad + 2bc - 3bd = 2ac + 3ad - 2bc - 3bd$

$\Rightarrow 4bc = 6ad \Rightarrow 2bc = 3ad.$

104. Given exp. $= \dfrac{1}{2+\dfrac{1}{2+\dfrac{1}{(3/2)}}} = \dfrac{1}{2+\dfrac{1}{2+\dfrac{2}{3}}} = \dfrac{1}{2+\dfrac{1}{(8/3)}} = \dfrac{1}{2+\dfrac{3}{8}} = \dfrac{1}{(19/8)} = \dfrac{8}{19}.$

105. $x = 2 - \dfrac{1}{1+\dfrac{1}{(13/4)}} = 2 - \dfrac{1}{1+\dfrac{4}{13}} = 2 - \dfrac{1}{(17/13)} = 2 - \dfrac{13}{17} = \dfrac{21}{17}.$

106. $x = \dfrac{2+\dfrac{1}{(19/5)}}{2+\dfrac{1}{3+\dfrac{1}{(5/4)}}} = \dfrac{2+\dfrac{5}{19}}{2+\dfrac{1}{3+\dfrac{4}{5}}} = \dfrac{2+\dfrac{5}{19}}{2+\dfrac{1}{(19/5)}} = \dfrac{2+\dfrac{5}{19}}{2+\dfrac{5}{19}} = 1.$

107. Given exp. $= 8 - 8 \times \dfrac{\dfrac{11}{5} - \dfrac{9}{7}}{2 - \dfrac{1}{(35/6)}} = 8 - 8 \times \dfrac{\dfrac{32}{35}}{2 - \dfrac{6}{35}} = 8 - 8 \times \dfrac{32}{35} \times \dfrac{35}{64} = 8 - 4 = 4.$

108. Given exp. $= \dfrac{2}{2+\dfrac{2}{3+\dfrac{2}{(11/3)}} \times 0.39} = \dfrac{2}{2+\dfrac{2}{3+\dfrac{6}{11}} \times 0.39} = \dfrac{2}{2+\dfrac{2}{(39/11)} \times 0.39}$

$= \dfrac{2}{2+\dfrac{22}{39} \times \dfrac{39}{100}} = \dfrac{2}{2+\dfrac{22}{100}} = \dfrac{2}{2+\dfrac{11}{50}} = \dfrac{2}{(111/50)} = \dfrac{100}{111}.$

109. Given exp. $= \dfrac{1}{1+\dfrac{\dfrac{2}{3}}{\dfrac{5}{3}+\dfrac{\dfrac{8}{9}}{(1/3)}}} = \dfrac{1}{1+\dfrac{2/3}{\dfrac{5}{3}+\dfrac{8}{9} \times 3}} = \dfrac{1}{1+\dfrac{2/3}{(13/3)}} = \dfrac{1}{1+\dfrac{2}{13}} = \dfrac{13}{15}.$

110. $2 + \dfrac{1}{x+\dfrac{1}{y+\dfrac{1}{z}}} = \dfrac{37}{13} = 2\dfrac{11}{13} = 2 + \dfrac{11}{13} \Rightarrow \dfrac{1}{x+\dfrac{1}{y+\dfrac{1}{z}}} = \dfrac{11}{13} \Rightarrow x + \dfrac{1}{y+\dfrac{1}{z}} = \dfrac{13}{11}$

$\Rightarrow x + \dfrac{1}{y+\dfrac{1}{z}} = 1 + \dfrac{2}{11} \Rightarrow x = 1,\ y + \dfrac{1}{z} = \dfrac{11}{2} = 5\dfrac{1}{2} = 5 + \dfrac{1}{2} \Rightarrow x = 1,\ y = 5,\ z =$

111. $x = y \Leftrightarrow 1 - q = 2q + 1 \Leftrightarrow 3q = 0 \Leftrightarrow q = 0.$

112. $\frac{x}{5} - \frac{x}{6} = 4 \Leftrightarrow \frac{6x - 5x}{30} = 4 \Leftrightarrow x = 120.$

113. $\frac{3x}{2y} = \frac{21}{22} \Rightarrow \frac{x}{y} = \left(\frac{21}{22} \times \frac{2}{3}\right) = \frac{7}{11} \Rightarrow x = \frac{7}{11}y.$

$4x + 5y = 83 \Rightarrow 4 \times \frac{7}{11}y + 5y = 83 \Rightarrow \frac{28}{11}y + 5y = 83 \Rightarrow 83y = 83 \times 11 \Rightarrow y = 11.$

$\therefore \quad x = \frac{7}{11}y = \left(\frac{7}{11} \times 11\right) = 7.$

So, $y - x = 11 - 7 = 4.$

114. $3x + y = 19$ ...(*i*) and $x - y = 9$ ...(*ii*)

Adding (*i*) and (*ii*), we get : $4x = 28$ or $x = 7$. Putting $x = 7$ in (*i*), we get : $y = -2$.

115. $a + b = 5$ ...(*i*) and $3a + 2b = 20$ ...(*ii*)

Multiplying (*i*) by 2 and subtracting from (*ii*), we get : $a = 10$.

Putting $a = 10$ in (*i*), we get : $b = -5$.

$\therefore \quad (3a + b) = 3 \times 10 + (-5) = 30 - 5 = 25.$

116. $(2p + 3q) + (2p - q) = 18 + 2 \Rightarrow 4p + 2q = 20 \Rightarrow 2(2p + q) = 20$

$\Rightarrow 2p + q = 10.$

117. $2x + y = 5$ ...(*i*) and $3x - 4y = 2$ ...(*ii*)

Multiplying (*i*) by 4 and adding (*ii*) to it, we get : $11x = 22$ or $x = 2$.

Putting $x = 2$ in (*i*), we get : $y = 1$. So, $2xy = 2 \times 2 \times 1 = 4$.

118. $3x - 5y = 5$ ...(*i*) and $\frac{x}{x + y} = \frac{5}{7} \Rightarrow 7x = 5x + 5y \Rightarrow 2x - 5y = 0$ ...(*ii*)

Subtracting (*ii*) from (*i*), we get : $x = 5$.

Putting $x = 5$ in (*i*), we get : $y = 2$. So, $x - y = 5 - 2 = 3$.

119. $4x + 3y = 18xy$ ...(*i*) and $2x - 5y = -4xy$ ...(*ii*)

Dividing (*i*) and (*ii*) by xy, we get : $\frac{3}{x} + \frac{4}{y} = 18$ ...(*iii*) and $\frac{5}{x} - \frac{2}{y} = 4$ ...(*iv*)

Multiplying (*iv*) by 2 and adding (*iii*) to it, we get : $\frac{13}{x} = 26$ or $x = \frac{1}{2}$.

Putting $x = \frac{1}{2}$ in (*iii*), we get : $y = \frac{1}{3}$.

120. $2x + y = 17$ ...(*i*) ; $y + 2z = 15$ ...(*ii*) and $x + y = 9$ ...(*iii*)

Subtracting (*iii*) from (*i*), we get : $x = 8$.

Putting $x = 8$ in (*i*), we get : $y = 1$. Putting $y = 1$ in (*ii*), we get : $2z = 14$ or $z = 7$.

$\therefore \quad 4x + 3y + z = 4 \times 8 + 3 \times 1 + 7 = 42.$

121. $3x - 4y + z = 7$ ...(*i*) ; $2x + 3y - z = 19$ ...(*ii*) and $x + 2y + 2z = 24$ ...(*iii*)

Adding (*i*) and (*ii*), we get : $5x - y = 26$ ...(*iv*)

Subtracting (*i*) from (*ii*) and adding to (*iii*), we get : $9y = 36$ or $y = 4$.

Putting $y = 4$ in (*iv*), we get : $5x = 30$ or $x = 6$.

Putting $x = 6$, $y = 4$ in (*iii*), we get : $2z = 10$ or $z = 5$.

122. $2x + y = 15$ ...(*i*) ; $2y + z = 25$ ...(*ii*) and $2z + x = 26$ ...(*iii*)

Adding (*i*), (*ii*) and (*iii*), we get : $3(x + y + z) = 66$ or $x + y + z = 22$ ...(*iv*)

From (*ii*), we have : $y = \frac{25 - z}{2}$. From (*iii*), we have : $x = 26 - 2z$.

$\therefore \quad (26 - 2z) + \left(\frac{25 - z}{2}\right) + z = 22 \Leftrightarrow 77 - 3z = 44 \Leftrightarrow 3z = 33 \Leftrightarrow z = 11.$

123. $2x + 3y = 31$ ...(*i*); $y - z = 4$ ...(*ii*) and $x + 2z = 11$ ...(*iii*)
Multiplying (*iii*) by 2 and subtracting from (*i*), we get : $3y - 4z = 9$ ...(*iv*)
Solving (*ii*) and (*iv*), we get : $y = 7$, $z = 3$. Putting $y = 7$ in (*i*), we get : $x = 5$.
$\therefore \quad x + y + z = (5 + 7 + 3) = 15.$

124. Given exp. $= \left(\frac{3}{4} \times \frac{4}{3} \times \frac{5}{3} \times \frac{3}{5} \times \frac{13}{7} \times \frac{1}{13}\right) = \frac{1}{7}.$

125. Given exp. $= \frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \ldots\ldots \times \frac{(n-1)}{n} = \frac{1}{n}.$

126. Given exp. $= \frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \ldots\ldots \times \frac{121}{120} = \frac{121}{2} = 60.5.$

127. Given exp. $= \frac{5}{3} \times \frac{7}{5} \times \frac{9}{7} \times \ldots\ldots \times \frac{1003}{1001} = \frac{1003}{3}.$

128. Given exp. $= \left(1 - \frac{1}{2}\right) + \left(\frac{1}{2} - \frac{1}{3}\right) + \left(\frac{1}{3} - \frac{1}{4}\right) + \left(\frac{1}{4} - \frac{1}{5}\right) + \ldots\ldots + \left(\frac{1}{11} - \frac{1}{12}\right) = \left(1 - \frac{1}{12}\right) = \frac{11}{12}.$

129. Clearly, sum of first 6 terms is zero. So, sum of first 30 terms = 0.
$\therefore$ Required sum $= \left(\frac{1}{2} + \frac{1}{3} - \frac{1}{4} - \frac{1}{2} - \frac{1}{3}\right) = -\frac{1}{4}.$

130. Given exp. $= \left(1000 - \frac{4}{999}\right) \times 999 = 999000 - 4 = 998996.$

131. Given exp.

$$= \left(1000 - \frac{6}{7}\right) + \left(1000 - \frac{5}{7}\right) + \left(1000 - \frac{4}{7}\right) + \left(1000 - \frac{3}{7}\right) + \left(1000 - \frac{2}{7}\right) + \left(1000 - \frac{1}{7}\right)$$

$$= 6000 - \left(\frac{6}{7} + \frac{5}{7} + \frac{4}{7} + \frac{3}{7} + \frac{2}{7} + \frac{1}{7}\right) = 6000 - \frac{21}{7} = 6000 - 3 = 5997.$$

132. Given exp. $= \frac{4 \times 3^3 + 3^2 + 3 + 1}{4 \times 3^3} = \frac{108 + 9 + 3 + 1}{108} = \frac{121}{108}.$

133. Given exp. $= \frac{4 \cdot 5 \cdot 6 + 5 \cdot 6 + 2 \cdot 6 + 2 \cdot 3}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6} = \frac{120 + 30 + 12 + 6}{720} = \frac{168}{720} = \frac{7}{30}.$

134. Given exp. $= \left(\frac{1}{1^2} - \frac{1}{2^2}\right) + \left(\frac{1}{2^2} - \frac{1}{3^2}\right) + \left(\frac{1}{3^2} - \frac{1}{4^2}\right) + \left(\frac{1}{4^2} - \frac{1}{5^2}\right) + \ldots\ldots + \left(\frac{1}{9^2} - \frac{1}{10^2}\right)$

$$= \left(\frac{1}{1^2} - \frac{1}{10^2}\right) = \left(1 - \frac{1}{100}\right) = \frac{99}{100}.$$

135. Number of pieces $= \left(\frac{42.5 \times 100}{85}\right) = \frac{4250}{85} = 50.$

136. Income after 1 year = Rs. (4×2^1) lakhs.
Income after 2 years = Rs. $(4 \times 2 \times 2)$ lakhs = Rs. (4×2^2) lakhs
$\therefore$ Income after 5 years = Rs. (4×2^5) lakhs = Rs. 128 lakhs = Rs. 1.28 crores.

137. Total number of children $= (30 \times 16) = 480.$
$\therefore$ Number of columns of 24 children each $= \left(\frac{480}{24}\right) = 20.$

138. Original number of sections $= (16 - 3) = 13.$
Original number of students $= (24 \times 13) = 312.$
Present number of students $= (21 \times 16) = 336.$
Number of new students admitted $= (336 - 312) = 24.$

139. Time between 10 a.m. and 13.27 hours = 3 hrs. 27 min. = 207 min.
For three periods in between free time = 15 min.
Remaining time = (207 − 15) min. = 192 min.

$\therefore$ Duration of each of the 4 periods = $\left(\frac{192}{4}\right)$ min. = 48 min.

140.

Hrs.	Min.	Sec.
3	17	49
(−) 1	54	50
1	22	59

Total time = (1 × 60 + 22) min. + 59 sec. = (82 × 60 + 59) sec. = 4979 sec.

$\therefore$ Number of times the light is seen = $\left(\frac{4979}{13}+1\right)$ = 384.

141. Money earned in 2 days = Rs. (20 − 15) = Rs. 5.

Money earned in 16 days = Rs. $\left(\frac{5}{2}\times 16\right)$ = Rs. 40.

On 17th day, money in hand = Rs. (40 + 20) = Rs. 60.

142. Required cost = Rs. $[1000 \times x + (z - 1000) \times y]$ = Rs. $(1000x + zy - 1000y)$
= Rs. $[1000\ (x - y) + yz]$.

143. 26 trees have 25 gaps between them. Hence, required distance = $\left(\frac{225}{25}\right)$ m = 9 m.

144. Let the number be x. Then, $52x - 25x = 324 \Leftrightarrow 27x = 324 \Leftrightarrow x = 12$.

145. Among the given numbers, only 60489 is a multiple of 423.

146. Let the monthly salary of a man be Rs. x.
Then, monthly salary of a woman = Rs. $(x + 500)$.
$\therefore\ 4x + 2\ (x + 500) = 46000 \Leftrightarrow 6x = 45000 \Leftrightarrow x = 7500$.
Monthly salary of a woman = $x + 500$ = Rs. 8000.

147. Let marks in History = x. Then, marks in English = $\frac{5}{2}x$.

$\therefore\ x + \frac{5}{2}x = 140 \Leftrightarrow \frac{7}{2}x = 140 \Leftrightarrow x = \left(\frac{140\times 2}{7}\right) = 40$.

Hence, marks in English = $\frac{5}{2}x = \left(\frac{5}{2}\times 40\right) = 100$.

148. Let the number of pineapples and watermelons be x and y respectively.

Then, $7x + 5y = 38$ or $5y = (38 - 7x)$ or $y = \frac{38 - 7x}{5}$.

Clearly, y is a whole number, only when $(38 - 7x)$ is divisible by 5. This happens when $x = 4$.

149. Let number of boys = x. Then, number of girls = $5x$.
Total number of children = $(x + 5x) = 6x$.
Thus, the total number of children must be a multiple of 6.

150. Let F and C denote the temperatures in Fahrenheit and Celsius respectively.

Then, $\frac{F - 32}{212 - 32} = \frac{C - 0}{100 - 0} \Leftrightarrow \frac{F - 32}{180} = \frac{C}{100}$.

If C = 35, then F = $\left(\frac{35}{100}\times 180\right) + 32 = 63 + 32 = 95$.

151. Let D's share = Rs. x. Then, C's share = Rs. x.
B's share = Rs. $(x + 125)$. A's share = Rs. $(x + x + 125)$ = Rs. $(2x + 125)$
$\therefore$ $(2x + 125) + (x + 125) + x + x = 750 \Leftrightarrow 5x = 500 \Leftrightarrow x = 100$.
Hence, A's share = $2x + 125$ = Rs. $(2 \times 100 + 125)$ = Rs. 325.

152. Let Gagan's share = Rs. x.
Then, Sachin's share = Rs. $\left(\frac{x}{5}\right)$ and Rohit's share = Rs. $\left(\frac{2x}{5}\right)$.
$\therefore$ $\frac{2x}{5} + \frac{x}{5} + x = 1000 \Leftrightarrow 8x = 5000 \Leftrightarrow x = 625$.

153. Total number of digits = (No. of digits in 1-digit page nos. + No. of digits in 2-digit page nos. + No. of digits in 3-digit page nos.)
$= (1 \times 9 + 2 \times 90 + 3 \times 267) = (9 + 180 + 801) = 990$.

154. No. of digits in 1-digit page nos. = $1 \times 9 = 9$.
No. of digits in 2-digit page nos. = $2 \times 90 = 180$.
No. of digits in 3-digit page nos. = $3 \times 900 = 2700$.
No. of digits in 4-digit page nos. = $3189 - (9 + 180 + 2700) = 3189 - 2889 = 300$.
$\therefore$ No. of pages with 4-digit page nos. = $\left(\frac{300}{4}\right) = 75$.
Hence, total number of pages = $(999 + 75) = 1074$.

155. Each row contains 12 plants.
Leaving 2 corner plants, 10 plants in between have (10×2) metres and 1 metre on each side is left.
$\therefore$ Length = $(20 + 2)$ m = 22 m.

156. Required fraction = $\frac{1 \text{ sec.}}{1 \text{ hr.}} = \frac{1 \text{ sec.}}{(1 \times 60 \times 60) \text{ sec.}} = \frac{1}{3600}$.

157. Height at the third bounce = $\left[32 \times \left(\frac{3}{4}\right)^3\right]$ m = $\left(32 \times \frac{27}{64}\right)$ m = $\frac{27}{2}$ m = $13\frac{1}{2}$ m.

158. Suppose Sanket earns Rs. x in each of the other eleven months.
Then, Sanket's earning in March = Rs. $(2x)$.
Sanket's annual earning = Rs. $(11x + 2x)$ = Rs. $(13x)$.
$\therefore$ Required fraction = $\frac{2x}{13x} = \frac{2}{13}$.

159. Let the capacity of the tank be x litres. Then, $\frac{1}{3}x = 80 \Leftrightarrow x = 240 \Leftrightarrow \frac{1}{2}x = 120$.

160. Distance travelled on foot = $\left[\frac{7}{2} - \left(\frac{5}{3} + \frac{7}{6}\right)\right]$ km = $\left(\frac{7}{2} - \frac{17}{6}\right)$ km = $\frac{2}{3}$ km.
$\therefore$ Required fraction = $\frac{(2/3)}{(7/2)} = \left(\frac{2}{3} \times \frac{2}{7}\right) = \frac{4}{21}$.

161. Let the required fraction be x. Then,
$\frac{4}{7}x + \frac{4}{7} = \frac{15}{14} \Leftrightarrow \frac{4}{7}x = \left(\frac{15}{14} - \frac{4}{7}\right) = \frac{7}{14} = \frac{1}{2} \Leftrightarrow x = \left(\frac{1}{2} \times \frac{7}{4}\right) = \frac{7}{8}$.

162. Required fraction = $\frac{\frac{2}{3} \text{ of } \frac{1}{4} \text{ of Rs. } 25.20}{\frac{3}{2} \text{ of Rs. } 36} = \frac{\text{Rs. } 4.20}{\text{Rs. } 54} = \frac{42}{540} = \frac{7}{90}$.

163. Let the length of longer piece be x cm. Then, length of shorter piece $= \left(\frac{2}{5}x\right)$ cm.

$\therefore \quad x + \frac{2}{5}x = 70 \Leftrightarrow \frac{7x}{5} = 70 \Leftrightarrow x = \left(\frac{70 \times 5}{7}\right) = 50.$

Hence, length of shorter piece $= \frac{2}{5}x = \left(\frac{2}{5} \times 50\right)$ cm $= 20$ cm.

164. Let the whole amount be Rs. x. Then, A's share $=$ Rs. $\left(\frac{3}{16}x\right)$; B's share $=$ Rs. $\left(\frac{x}{4}\right)$;

and C's share $=$ Rs. $\left[x - \left(\frac{3x}{16} + \frac{x}{4}\right)\right] =$ Rs. $\left(\frac{9x}{16}\right)$.

$\therefore \quad \frac{9x}{16} = 81 \Leftrightarrow x = \left(\frac{81 \times 16}{9}\right) = 144.$

Hence, B's share $=$ Rs. $\left(\frac{144}{4}\right) =$ Rs. 36.

165. Green portion $= \left[1 - \left(\frac{1}{10} + \frac{1}{20} + \frac{1}{30} + \frac{1}{40} + \frac{1}{50} + \frac{1}{60}\right)\right]$

$= \left[1 - \frac{1}{10}\left(1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6}\right)\right] = 1 - \frac{1}{10} \times \frac{147}{60} = 1 - \frac{147}{600} = \frac{453}{600}.$

Let the length of the pole be x metres.

Then, $\frac{453}{600}x = 12.08 \Leftrightarrow x = \left(\frac{12.08 \times 600}{453}\right) = 16.$

166. Let the number be x. Then,

$\frac{3}{4}x - \frac{3}{14}x = 150 \Leftrightarrow 21x - 6x = 150 \times 28 \Leftrightarrow 15x = 150 \times 28 \Leftrightarrow x = 280.$

167. Let the sum be Rs. x. Then,

$\frac{8}{3}x - \frac{3}{8}x = 55 \Leftrightarrow 64x - 9x = 55 \times 24 \Leftrightarrow x = \left(\frac{55 \times 24}{55}\right) = 24.$

$\therefore$ Correct answer $=$ Rs. $\left(\frac{3}{8} \times 24\right) =$ Rs. 9.

168. Let the fraction be $\frac{a}{b}$. Then,

$\left(\frac{a}{b} \times \frac{a}{b}\right) \div \frac{b}{a} = \frac{512}{27} \Leftrightarrow \frac{a}{b} \times \frac{a}{b} \times \frac{a}{b} = \frac{512}{27} \Leftrightarrow \left(\frac{a}{b}\right)^3 = \left(\frac{8}{3}\right)^3 \Leftrightarrow \frac{a}{b} = \frac{8}{3} = 2\frac{2}{3}.$

169. Maximum internal assessment score $= \left(\frac{47}{50} \times 10\right) = 9.4.$

Minimum internal assessment score $= \left(\frac{14}{50} \times 10\right) = 2.8.$

$\therefore$ Required difference $= (9.4 - 2.8) = 6.6.$

170. Let savings in N.S.C. and P.P.F. be Rs. x and Rs. $(150000 - x)$ respectively. Then,

$\frac{1}{3}x = \frac{1}{2}(150000 - x) \Leftrightarrow \frac{x}{3} + \frac{x}{2} = 75000 \Leftrightarrow \frac{5x}{6} = 75000 \Leftrightarrow x = \left(\frac{75000 \times 6}{5}\right) = 90000.$

$\therefore$ Savings in Public Provident Fund $=$ Rs. $(150000 - 90000) =$ Rs. 60000.

171. Let there be $(x + 1)$ members. Then,

Father's share $= \frac{1}{4}$, share of each other member $= \frac{3}{4x}$.

$\therefore \quad 3\left(\frac{3}{4x}\right) = \frac{1}{4} \Leftrightarrow 4x = 36 \Leftrightarrow x = 9.$

Hence, total number of family members = 10.

172. Let salary = Rs. x. Then, tips = Rs. $\left(\frac{5}{4}x\right)$.

Total income = Rs. $\left(x + \frac{5}{4}x\right)$ = Rs. $\left(\frac{9x}{4}\right)$.

$\therefore$ Required fraction $= \left(\frac{5x}{4} \times \frac{4}{9x}\right) = \frac{5}{9}$.

173. Let C's share = Rs. x. Then, B's share = Rs. $\left(\frac{x}{4}\right)$. A's share = Rs. $\left(\frac{2}{3} \times \frac{x}{4}\right)$ = Rs. $\frac{x}{6}$.

$\therefore \quad \frac{x}{6} + \frac{x}{4} + x = 1360 \Leftrightarrow \frac{17x}{12} = 1360 \Leftrightarrow x = \left(\frac{1360 \times 12}{17}\right)$ = Rs. 960.

Hence, B's share = Rs. $\left(\frac{960}{4}\right)$ = Rs. 240.

174. Let Tanya's share = Rs. x. Then, Veena's share = Rs. $\left(\frac{x}{2}\right)$.

Amita's share = Rs. $\left(\frac{2}{3} \times \frac{x}{2}\right)$ = Rs. $\left(\frac{x}{3}\right)$. Total bill = Rs. $\left(x + \frac{x}{2} + \frac{x}{3}\right)$ = Rs. $\left(\frac{11x}{6}\right)$.

$\therefore$ Required fraction $= \left(\frac{x}{2} \times \frac{6}{11x}\right) = \frac{3}{11}$.

175. Let the capacity of the tank be x litres. Then, $\frac{1}{4}x = 135 \Leftrightarrow x = 135 \times 4 = 540$.

$\therefore$ Required fraction $= \left(\frac{180}{540}\right) = \frac{1}{3}$.

176. Let the capacity of the tank be x litres.

Then, $\frac{6}{7}x - \frac{2}{5}x = 16 \Leftrightarrow 30x - 14x = 16 \times 35 \Leftrightarrow 16x = 560 \Leftrightarrow x = 35$.

177. Let the capacity of the bucket be x litres. Then,

Capacity of 1 large bottle $= \frac{x}{4}$; Capacity of 1 small bottle $= \frac{x}{7}$.

Fluid left in large bottle $= \left(\frac{x}{4} - \frac{x}{7}\right) = \frac{3x}{28}$.

$\therefore$ Required fraction $= \left(\frac{3x/28}{x/4}\right) = \left(\frac{3x}{28} \times \frac{4}{x}\right) = \frac{3}{7}$.

178. Let the capacity of 1 bucket = x. Then, capacity of tank = $25x$.

New capacity of bucket $= \frac{2}{5}x$.

$\therefore$ Required number of buckets $= \frac{25x}{(2x/5)} = \left(25x \times \frac{5}{2x}\right) = \frac{125}{2} = 62\frac{1}{2}$.

179. Suppose initially Peter had Rs. x. Then,

Amount received by Michael = Rs. $\left(\frac{x}{4}\right)$.

Amount remaining with Peter = Rs. $\left(x - \frac{x}{4}\right)$ = Rs. $\left(\frac{3x}{4}\right)$.

Amount received by Sam = Rs. $\left(\frac{1}{2} \times \frac{x}{4}\right)$ = Rs. $\left(\frac{x}{8}\right)$.

$\therefore \quad \frac{3x}{4} - \frac{x}{8} = 500 \Leftrightarrow 5x = 4000 \Leftrightarrow x = 800.$

Hence, amount received by Michael = $(x/4)$ = Rs. 200.

180. A's share = $\frac{1}{3}$. Remainder = $\left(1 - \frac{1}{3}\right) = \frac{2}{3}$.

B's share = $\frac{2}{5}$ of $\frac{2}{3} = \frac{4}{15}$. Rest = $\left(\frac{2}{3} - \frac{4}{15}\right) = \frac{6}{15} = \frac{2}{5}$.

C's share = D's share = $\frac{1}{2}$ of $\frac{2}{5} = \frac{1}{5}$.

181. Part read on first day = $\frac{3}{8}$. Remaining part = $\left(1 - \frac{3}{8}\right) = \frac{5}{8}$.

Part read on second day = $\frac{4}{5}$ of $\frac{5}{8} = \frac{1}{2}$. Unread part = $\left[1 - \left(\frac{3}{8} + \frac{1}{2}\right)\right] = \frac{1}{8}$.

Let the number of pages be x. Then, $\frac{1}{8}x = 30$ or $x = 30 \times 8 = 240$.

182. Wife's share = $\frac{1}{2}$. Remaining part = $\left(1 - \frac{1}{2}\right) = \frac{1}{2}$.

Share of 3 sons = $\left(\frac{2}{3} \text{ of } \frac{1}{2}\right) = \frac{1}{3}$. Remaining part = $\left(\frac{1}{2} - \frac{1}{3}\right) = \frac{1}{6}$.

Each daughter's share = $\frac{1}{4} \times \frac{1}{6} = \frac{1}{24}$.

Let the total money be Rs. x. Then, $\frac{1}{24}x = 20000 \Leftrightarrow x = 20000 \times 24 = 480000$.

$\therefore$ Each son's share = Rs. $\left[\frac{1}{3} \times \left(\frac{1}{3} \times 480000\right)\right]$ = Rs. 53,333.33.

183. Out of 5 girls, 1 took part in fete. Out of 8 boys, 1 took part in fete.

$\therefore$ Out of 13 students, 2 took part in fete.

Hence, $\frac{2}{13}$ of the total number took part in fete.

184. French men = $\frac{1}{5}$; French women = $\left(\frac{1}{5} + \frac{2}{3} \times \frac{1}{5}\right) = \frac{5}{15} = \frac{1}{3}$.

French people = $\left(\frac{1}{5} + \frac{1}{3}\right) = \frac{8}{15}$. $\therefore$ Not-French = $\left(1 - \frac{8}{15}\right) = \frac{7}{15}$.

185. Girls = $\frac{3}{5}$; Boys = $\left(1-\frac{3}{5}\right)=\frac{2}{5}$.

Fraction of students absent = $\frac{2}{9}$ of $\frac{3}{5}+\frac{1}{4}$ of $\frac{2}{5}=\frac{6}{45}+\frac{1}{10}=\frac{21}{90}=\frac{7}{30}$.

$\therefore$ Fraction of students present = $\left(1-\frac{7}{30}\right)=\frac{23}{30}$.

186. Number of boys who participate = 100.

$\therefore$ $\frac{1}{3}$ of boys = 100 or total number of boys = 300.

Number of girls who participate = 200.

$\therefore$ $\frac{1}{2}$ of girls = 200 or total number of girls = 400.

Hence, total number of students = (300 + 400) = 700.

187. Let the number of votes cast be x. Then, number of votes required = $\frac{3x}{4}$.

Counted votes = $\frac{2x}{3}$. Uncounted votes = $\left(x-\frac{2x}{3}\right)=\frac{x}{3}$.

Votes won by the candidate = $\frac{5}{6}$ of $\frac{3x}{4}=\frac{5x}{8}$.

Remaining votes required = $\left(\frac{3x}{4}-\frac{5x}{8}\right)=\frac{x}{8}$.

$\therefore$ Required fraction = $\frac{(x/8)}{(x/3)}=\left(\frac{x}{8}\times\frac{3}{x}\right)=\frac{3}{8}$.

188. Let the total number of staff members be x.

Then, the number who can type or take shorthand = $\left(x-\frac{3x}{4}\right)=\frac{x}{4}$.

Let A and B represent the sets of persons who can type and take shorthand respectively.

Then, $n(A\cup B)=\frac{x}{4}$, $n(A)=\frac{x}{5}$ and $n(B)=\frac{x}{3}$.

$n(A\cap B)=n(A)+n(B)-n(A\cup B)=\left(\frac{x}{5}+\frac{x}{3}-\frac{x}{4}\right)=\left(\frac{12x+20x-15x}{60}\right)=\frac{17x}{60}$.

189. Hire charges = Rs. $\left(60\times4+60\times5+\frac{8}{5}\times200\right)$ = Rs. 860.

Suppose Rohit had Rs. x with him initially. Then, $x-860=\frac{1}{4}\times860 \Leftrightarrow x=1075$.

190. Let the total number of shots be x. Then,

Shots fired by A = $\frac{5}{8}x$; Shots fired by B = $\frac{3}{8}x$.

Killing shots by A = $\frac{1}{3}$ of $\frac{5}{8}x=\frac{5x}{24}$; Shots missed by B = $\frac{1}{2}$ of $\frac{3}{8}x=\frac{3}{16}x$.

$\therefore$ $\frac{3x}{16}=27$ or $x=\left(\frac{27\times16}{3}\right)=144$. Birds killed by A = $\frac{5x}{24}=\left(\frac{5}{24}\times144\right)=30$.

191. Number of alterations required in 1 shirt = $\left(\frac{2}{3}+\frac{3}{4}+\frac{4}{5}\right)=\frac{133}{60}$.

$\therefore$ Number of alterations required in 60 shirts = $\left(\frac{133}{60}\times60\right)=133$.

192. Let the largest fraction be x and the smallest be y. Then, $\frac{x}{y} = \frac{7}{6}$ or $y = \frac{6}{7}x$.

Let the middle one be z. Then, $x + \frac{6}{7}x + z = \frac{59}{24}$ or $z = \left(\frac{59}{24} - \frac{13x}{7}\right)$.

$\therefore \quad \frac{59}{24} - \frac{13x}{7} + \frac{1}{3} = \frac{7}{6} \Leftrightarrow \frac{13x}{7} = \frac{59}{24} + \frac{1}{3} - \frac{7}{6} = \frac{39}{24} \Leftrightarrow x = \left(\frac{39}{24} \times \frac{7}{13}\right) = \frac{7}{8}$.

So, $x = \frac{7}{8}$, $y = \frac{6}{7} \times \frac{7}{8} = \frac{3}{4}$ and $z = \frac{59}{24} - \frac{13}{7} \times \frac{7}{8} = \frac{20}{24} = \frac{5}{6}$.

Hence, the fractions are $\frac{7}{8}$, $\frac{5}{6}$ and $\frac{3}{4}$.

193. Suppose each tube contains x grams initially. Then,

$$4\left[\frac{1}{3}(x+20)\right] = x + \frac{2}{3}(x+20) \Leftrightarrow \frac{2}{3}(x+20) = x \Leftrightarrow \frac{x}{3} = \frac{40}{3} \Leftrightarrow x = 40.$$

194. Let the total number of apples be x. Then,

Apples sold to 1st customer $= \left(\frac{x}{2} + 1\right)$. Remaining apples $= x - \left(\frac{x}{2} + 1\right) = \left(\frac{x}{2} - 1\right)$.

Apples sold to 2nd customer $= \frac{1}{3}\left(\frac{x}{2} - 1\right) + 1 = \frac{x}{6} - \frac{1}{3} + 1 = \left(\frac{x}{6} + \frac{2}{3}\right)$.

Remaining apples $= \left(\frac{x}{2} - 1\right) - \left(\frac{x}{6} + \frac{2}{3}\right) = \left(\frac{x}{2} - \frac{x}{6}\right) - \left(1 + \frac{2}{3}\right) = \left(\frac{x}{3} - \frac{5}{3}\right)$.

Apples sold to 3rd customer $= \frac{1}{5}\left(\frac{x}{3} - \frac{5}{3}\right) + 1 = \left(\frac{x}{15} + \frac{2}{3}\right)$.

Remaining apples $= \left(\frac{x}{3} - \frac{5}{3}\right) - \left(\frac{x}{15} + \frac{2}{3}\right) = \left(\frac{x}{3} - \frac{x}{15}\right) - \left(\frac{5}{3} + \frac{2}{3}\right) = \left(\frac{4x}{15} - \frac{7}{3}\right)$.

$\therefore \quad \frac{4x}{15} - \frac{7}{3} = 3 \Leftrightarrow \frac{4x}{15} = \frac{16}{3} \Leftrightarrow x = \left(\frac{16}{3} \times \frac{15}{4}\right) = 20.$

195. Given exp. $= \frac{(a+b)^2 + (a-b)^2}{a^2 + b^2}$, where $a = 856$, $b = 167$

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

196. Given exp. $= \frac{(a+b)^2 - (a-b)^2}{ab} = \frac{4ab}{ab} = 4$ (where $a = 469$, $b = 174$).

197. $2ab = (a^2 + b^2) - (a - b)^2 = 29 - 9 = 20 \Rightarrow ab = 10$.

198. $\frac{x^2 - 1}{x + 1} = 4 \Leftrightarrow \frac{(x+1)(x-1)}{x+1} = 4 \Leftrightarrow x - 1 = 4 \Leftrightarrow x = 5$.

199. If $a = 3\frac{2}{3}$, $b = 2\frac{1}{2}$, $c = 4\frac{3}{4}$, $d = 3\frac{1}{3}$, then

$$\text{Given exp.} = \frac{(a^2 - b^2)}{(c^2 - d^2)} + \frac{(a-b)}{(c-d)} - \frac{(a^2 - b^2)}{(c^2 - d^2)} \times \frac{(c-d)}{(a-b)} - \frac{(a+b)}{(c+d)}$$

$$= \frac{3\frac{2}{3} + 2\frac{1}{2}}{4\frac{3}{4} + 3\frac{1}{3}} = \frac{\frac{11}{3} + \frac{5}{2}}{\frac{19}{4} + \frac{10}{3}} = \frac{37}{6} \times \frac{12}{97} = \frac{74}{97}.$$

200. Given exp. $= \dfrac{a^2-b^2}{a+b} = a-b = \left(1+\dfrac{1}{1+\dfrac{1}{100}}\right)-\left(1-\dfrac{1}{1+\dfrac{1}{100}}\right)$

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

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

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

$\Rightarrow\ ab+bc+ca = 50.$

202. Given : $x^2+y^2+z^2-64 = -2(xy-yz-zx)$ ...(*i*)

Now, $[x+y+(-z)]^2 = x^2+y^2+z^2+2(xy-yz-zx)$

$\Rightarrow\quad (3z-z)^2 = x^2+y^2+z^2+2(xy-yz-zx)$

$\Rightarrow\quad -2(xy-yz-zx) = (x^2+y^2+z^2)-(2z)^2$ ...(*ii*)

From (*i*) and (*ii*), we get : $(2z)^2 = 64 \Leftrightarrow 4z^2 = 64 \Leftrightarrow z^2 = 16 \Leftrightarrow z = 4.$

203. Given exp. $= \left(\dfrac{a^3+b^3}{a^2+b^2-ab}\right) = (a+b)$, where $a = 785$, $b = 435$

$= (785+435) = 1220.$

204. Given exp. $= \left(\dfrac{a^2+ab+b^2}{a^3-b^3}\right) = \left(\dfrac{1}{a-b}\right)$, where $a = 147$, $b = 143$

$= \left(\dfrac{1}{147-143}\right) = \dfrac{1}{4}.$

205. Let $\dfrac{13^3+7^3}{13^2+7^2-x} = 20$. Then,

$\dfrac{13^3+7^3}{13+7} = 13^2+7^2-x \Leftrightarrow 13^2+7^2-13\times 7 = 13^2+7^2-x \Leftrightarrow x = 13\times 7 = 91.$

206. Given exp. $= \dfrac{a^3-b^3}{a^2-b^2} = \dfrac{(a-b)(a^2+ab+b^2)}{(a-b)(a+b)} = \dfrac{(a^2+ab+b^2)}{(a+b)}$

$= \dfrac{\left(\dfrac{3}{5}\right)^2+\left(\dfrac{3}{5}\times\dfrac{2}{5}\right)+\left(\dfrac{2}{5}\right)^2}{\left(\dfrac{3}{5}+\dfrac{2}{5}\right)} = \dfrac{9}{25}+\dfrac{6}{25}+\dfrac{4}{25} = \dfrac{19}{25}.$

207. Given exp. $= \dfrac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2-ab-bc-ca} = a+b+c = (38+34+28) = 100.$

208. Since $(x-y)+(y-z)+(z-x) = 0$, so $(x-y)^3+(y-z)^3+(z-x)^3$

$= 3(x-y)(y-z)(z-x).$

$\therefore$ Given exp. $= \dfrac{3(x-y)(y-z)(z-x)}{9(x-y)(y-z)(z-x)} = \dfrac{1}{3}.$

209. Let total score be x. Then, highest score $= \dfrac{3x}{11}$.

Remainder $= \left(x-\dfrac{3x}{11}\right) = \dfrac{8x}{11}$. Next highest score $= \dfrac{3}{11}$ of $\dfrac{8x}{11} = \dfrac{24x}{121}$.

$\therefore\ \dfrac{3x}{11}-\dfrac{24x}{121} = 9 \Leftrightarrow 33x-24x = 9\times 121 \Leftrightarrow 9x = 9\times 121 \Leftrightarrow x = 121.$

210. $X + 3X \times 0.50 + 14 \times 0.10 + 4X \times 0.05 = 50$

$\Leftrightarrow \quad X + 1.5X + 1.40 + 0.2X = 50 \quad \Leftrightarrow \quad 2.7X = 48.60 \quad \Leftrightarrow \quad X = 18.$

211. Suppose their paths cross after x minutes.

Then, $11 + 57x = 51 - 63x \quad \Leftrightarrow \quad 120x = 40 \quad \Leftrightarrow \quad x = \frac{1}{3}.$

Number of floors covered by David in $(1/3)$ min. $= \left(\frac{1}{3} \times 57\right) = 19.$

So, their paths cross at $(11 + 19)$ *i.e.* 30th floor.

212. $N \times 50 = (325000 - 300000) = 25000 \quad \Leftrightarrow \quad N = 500.$

213. Let total number of children be x. Then, $x \times \frac{1}{8}x = \frac{x}{2} \times 16 \quad \Leftrightarrow \quad x = 64.$

$\therefore$ Number of notebooks $= \frac{1}{8}x^2 = \left(\frac{1}{8} \times 64 \times 64\right) = 512.$

214. Let number of boys $= x$. Then, number of girls $= x$.

Now, $2(x - 8) = x$ or $x = 16$.

$\therefore$ Total number of students $= 2x = (2 \times 16) = 32.$

215. Let the total number of sweets be $(25x + 8)$.

Then, $(25x + 8) - 22$ is divisible by 28

$\Leftrightarrow$ $(25x - 14)$ is divisible by 28 $\Leftrightarrow$ $28x - (3x + 14)$ is divisible by 28

$\Leftrightarrow$ $(3x + 14)$ is divisible by 28 $\Leftrightarrow$ $x = 14$.

$\therefore$ Total number of sweets $= (25 \times 14 + 8) = 358.$

216. Suppose the man works overtime for x hours.

Now, working hours in 4 weeks $= (5 \times 8 \times 4) = 160.$

$\therefore \quad 160 \times 2.40 + x \times 3.20 = 432 \quad \Leftrightarrow \quad 3.20x = 432 - 384 = 48 \quad \Leftrightarrow \quad x = 15.$

Hence, total hours of work $= (160 + 15) = 175.$

217. Let number of boys $= x$. Then, number of girls $= (100 - x)$.

$\therefore \quad 3.60x + 2.40(100 - x) = 312 \quad \Leftrightarrow \quad 1.20x = 312 - 240 = 72 \quad \Leftrightarrow \quad x = 60.$

Hence, number of girls $= (100 - x) = 40.$

218. Let number of boys $= x$. Then, number of girls $= (60 - x)$.

$\therefore \quad x(60 - x) + (60 - x)x = 1600 \quad \Leftrightarrow \quad 60x - x^2 + 60x - x^2 = 1600$

$\Leftrightarrow \quad 2x^2 - 120x + 1600 = 0 \quad \Leftrightarrow \quad x^2 - 60x + 800 = 0$

$\Leftrightarrow \quad (x - 40)(x - 20) = 0 \quad \Leftrightarrow \quad x = 40$ or $x = 20.$

So, we are not definite. Hence, data is inadequate.

219. Let the distance covered by taxi be x km. Then, distance covered by car $= (80 - x)$ km.

$\therefore \quad 1.5x + 0.5(80 - x) = 50 \quad \Leftrightarrow \quad x = 50 - 40 = 10$ km.

220. Let the number of correct answers be x. Number of incorrect answers $= (60 - x)$.

$\therefore \quad 4x - (60 - x) = 130 \quad \Leftrightarrow \quad 5x = 190 \quad \Leftrightarrow \quad x = 38.$

221. Let number of matches lost $= x$. Then, number of matches won $= x + 3$.

$\therefore \quad 2(x + 3) - x = 23 \quad \Leftrightarrow \quad x = 17.$

Hence, total number of matches played $= x + (x + 3) = 2x + 3 = 37.$

222. Let the number of 20-paise coins be x. Then, number of 25-paise coins $= (324 - x)$.

$\therefore \quad 0.20 \times x + 0.25(324 - x) = 71 \quad \Leftrightarrow \quad 20x + 25(324 - x) = 7100$

$\Leftrightarrow \quad 5x = 1000 \quad \Leftrightarrow \quad x = 200.$

Hence, number of 25-paise coins $= (324 - x) = 124.$

223. Let number of notes of each denomination be x.

Then, $x + 5x + 10x = 480 \quad \Leftrightarrow \quad 16x = 480 \quad \Leftrightarrow \quad x = 30.$

Hence, total number of notes $= 3x = 90.$

224. Original share of 1 person = $\frac{1}{8}$. New share of 1 person = $\frac{1}{7}$.

Increase = $\left(\frac{1}{7}-\frac{1}{8}\right)=\frac{1}{56}$.

$\therefore$ Required fraction = $\frac{(1/56)}{(1/8)}=\left(\frac{1}{56}\times 8\right)=\frac{1}{7}$.

225. Let total number of sweets be x. Then,

$\frac{x}{140}-\frac{x}{175}=4 \Leftrightarrow 5x-4x=4\times 700 \Leftrightarrow x=2800.$

226. Let the number of persons be x. Then,

$\frac{96}{x-4}-\frac{96}{x}=4 \Leftrightarrow \frac{1}{x-4}-\frac{1}{x}=\frac{4}{96} \Leftrightarrow \frac{x-(x-4)}{x(x-4)}=\frac{1}{24}$

$\Leftrightarrow x^2-4x-96=0 \Leftrightarrow (x-12)(x+8)=0 \Leftrightarrow x=12.$

227. Let the number of balls purchased be x.

Then, $\frac{450}{x}-\frac{450}{x+5}=15 \Leftrightarrow \frac{1}{x}-\frac{1}{x+5}=\frac{15}{450} \Leftrightarrow \frac{x+5-x}{x(x+5)}=\frac{1}{30}$

$\Leftrightarrow x^2+5x-150=0 \Leftrightarrow (x+15)(x-10)=0 \Leftrightarrow x=10.$

228. Let the length of the piece be x metres. Then, cost of 1 m of piece = Rs. $\left(\frac{35}{x}\right)$.

$\therefore (x+4)\left(\frac{35}{x}-1\right)=35 \Leftrightarrow 35-x+\frac{140}{x}-4=35 \Leftrightarrow \frac{140}{x}-x=4$

$\Leftrightarrow x^2+4x-140=0 \Leftrightarrow (x+14)(x-10)=0 \Leftrightarrow x=10.$

229. Let the cost of a chair and that of a table be Rs. x and Rs. y respectively.

Then, $10x=4y$ or $y=\frac{5}{2}x$.

$\therefore 15x+2y=4000 \Leftrightarrow 15x+2\times\frac{5}{2}x=4000 \Leftrightarrow 20x=4000 \Leftrightarrow x=200.$

So, $y=\left(\frac{5}{2}\times 200\right)=500.$

Hence, cost of 12 chairs and 3 tables = $12x+3y$ = Rs. (2400 + 1500) = Rs. 3900.

230. Cost of 4 mangoes = Cost of 9 lemons = Rs. $\left(\frac{4.80}{3}\times 9\right)$ = Rs. 14.40.

Cost of 1 mango = Rs. $\left(\frac{14.40}{4}\right)$ = Rs. 3.60.

Cost of 5 apples = Cost of 3 mangoes = Rs. (3.60 × 3) = Rs. 10.80.

Cost of 9 oranges = Cost of 5 apples = Rs. 10.80.

$\therefore$ Cost of 1 orange = Re. $\left(\frac{10.80}{9}\right)$ = Rs. 1.20.

231. Let the price of a saree and a shirt be Rs. x and Rs. y respectively.

Then, $2x+4y=1600$ ...(*i*) and $x+6y=1600$ ...(*ii*)

Solving (*i*) and (*ii*), we get : $x=400$, $y=200$.

$\therefore$ Cost of 12 shirts = Rs. (12 × 200) = Rs. 2400.

232. Let the cost of a table and that of a chair be Rs. x and Rs. y respectively.

Then, $2x+3y=3500$ ...(*i*) and $3x+2y=4000$ ...(*ii*)

Solving (*i*) and (*ii*), we get : $x=1000$ and $y=500$.

233. Let the fixed charge be Rs. x and variable charge be Rs. y per km.
Then, $x + 16y = 156$ ...(*i*) and $x + 24y = 204$ ...(*ii*)
Solving (*i*) and (*ii*), we get : $x = 60$, $y = 6$.
$\therefore$ Cost of travelling 30 km = Rs. $(60 + 30 \times 6)$ = Rs. 240.

234. Let the number of benches in the class be x. Then, $6(x + 1) = 7x - 5 \Leftrightarrow x = 11$.
Hence, number of students in the class = $6(x + 1) = 6 \times 12 = 72$.

235. Let the number of students in rooms A and B be x and y respectively. Then,
$x - 10 = y + 10 \Rightarrow x - y = 20$ ...(*i*) and $x + 20 = 2(y - 20) \Rightarrow x - 2y = -60$ ...(*ii*)
Solving (*i*) and (*ii*), we get : $x = 100$, $y = 80$.

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

237. Let the number of hens be x and the number of cows be y. Then,
$x + y = 48$ ...(*i*) and $2x + 4y = 140 \Rightarrow x + 2y = 70$ ...(*ii*)
Solving (*i*) and (*ii*), we get : $x = 26$, $y = 22$.

238. Suppose, Sanya and Vidushi donate money to x and $(x + 5)$ people respectively.

Then, $\frac{100}{x} - \frac{100}{x+5} = 1 \Leftrightarrow 100(x + 5) - 100x = x(x + 5) \Leftrightarrow x^2 + 5x - 500 = 0$

$\Leftrightarrow (x - 20)(x + 25) = 0 \Leftrightarrow x = 20$.

$\therefore$ Total number of recipients of charity = $x + (x + 5) = 2x + 5 = 45$.