06

RATIO AND PROPORTION

Ratio

It is the comparison between two or more numbers. We can decide that one number is more or less than other by this ratio.

- **Ex :-** A : B = 3 : 4 Here if the total amount is 7, then the value of A will be 3 and the value of B will be 4.
- **NOTE:-** A is antecedent and B is consequent

So, we can find easily that B is more in amount than A.

Rule of Ratio

The comparison should always be done of the same quantity (of length, of weight etc.)

Properties of Ratio:

(i) If the numerator and denominator is multiplied or divided by the same number then the value of the ratio will not change.

Ex. *x* : y

by multiplying by a

 $\frac{x' a}{y' a} = \frac{xa}{ya}$

(ii) x:y

by dividing it by a

 $\frac{x}{y} = \frac{x/a}{y/a}$

Proportion

When the values of two ratios are equal, then it is called proportion. It is denoted as a : b :: c : d

Here a and d are extremes and b and c are means.

Rule of Proportion :- if a, b, c and d

Examples

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are proportional.
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1. a:b::c:d

- Then, $a \times d = b \times c$
- Ex. if 7 , 9, 21 and 27 are proportional then 7 : 9 :: 21: 27 7 × 27 = 9 × 21 189 = 189
- 2. Continued proportion : If a, b, c are such that a : b = b : c then these numbers are said to be in continued proportion.
 then a : b = b : c

$$b^2 = a \times c$$

Ex. 3, 6 and 12 are continued proportion

then, a:b = b:c 3:6 = 6:12 $b^2 = a \times c$ $(6)^2 = 3 \times 12$

36 = 361. Find the third proportional to the numbers 3 and 6. (a) 21 (b) 1.5 (c) 18 (d) 12
Sol. (d) We know that, Third Proportional = $\frac{b^2}{a}$ Where, a = 3b = 6then,

$$\oint \frac{6}{3} = 12$$

6'6

2. Two numbers are in the ratio 9:11. If sum of these two numbers is 660, find the difference between the numbers.
(a) 66 (b) 56

(c) 46 (d) 76 **Sol.** (a) Let the two numbers be 9x, 11xAccording to the question Sum @ 9x + 11x = 660 20x = 660 x = 33Difference = 11x - 9x $= 2x = 2 \times 33$ = 663. A bag contains an equal number of 50- paise, 25 paise, 20

3. A bag contains an equal number of 50- paise, 25 paise, 20 paise and 5 paise coins respectively. If the total amount is `40, how many coins of each type are there?
(a) 40 (b) 25

(c) 30 (d) 20 **Sol.** (a) According to the question, 50P : 25P : 20P : 5P
Total paise = 100P
Total ` ® ` 1

1 unit = ` 40

= 40

4. Two vessels contain equal quantity of mixtures of milk and water in the ratio 8 : 9 and 12 : 5 respectively. Both the mixtures are now mixed thoroughly. Find the ratio of milk to water in the new mixture so obtained.

(a) 7 : 10 (b) 13 : 21



Therefore, Ratio of milk to water in the new Mixture = 10 : 7

- 5. The contents of two vessels containing water and milk are in the ratio 2:3 and 4:5 are mixed in the ratio 1:2. The resulting mixture will have water and milk in the ratio.
 (a) 77:58 (b) 58:77 (c) 68:77 (d) 77:68
- **Sol.** (b) water : Milk

I (2 : 3)_{x9} = 5 $\xrightarrow{9_{x1}}$ 45 II (4 : 5)_{x10} = 9 $\xrightarrow{5_{x2}}$ 45

After equating the capacity of vessels new Ratio of water and milk water is to milk = 18 + 40 : 27 + 50

= 58 : 77

- 6. The sum of three numbers is 105. If the ratio between the first and second be 2 : 3 and that between the second and third be 4 : 5, then find the second number.
 - (a) 35 (b) 24
 - (c) 36 (d) 45
- **Sol.** (c) According to the question I + II + III = 105

I : II : III 2 : 3 : $\frac{3}{4}$ $\frac{4}{4}$: 5 $\overline{8}$: 12 : $\overline{15}$ 8 + 12 + 1535 units = 1051 unit = 3 IInd no. is = 12×3 = 36

7. A hound pursues a hare and takes 6 leaps for every 7 leaps of the hare, but 5 leaps of the hound are equal to 6 leaps of the hare. Compare the rates of the hound and the hare.

Sol. (a) According to the question,

Times
$$\rightarrow 76$$
 leaps 7 leaps
Distance $\rightarrow 6$ leaps 5 leaps

- 36 : 35
- 8. In 28 litres mixture of milk and water, the ratio of milk and water is 5 : 2. How much water should be added in the mixture so that the ratio of milk to water becomes 2 : 5?
 - (1) 42 litres
 (2) 32 litres
 (3) 24 litres
 (4) 39 litres

Sol. (a) According to the question,

$$\begin{array}{rcl} \text{Milk} & : & \text{Water} \\ \text{Old} & 2 \times (5 & : & 2) \\ & 5 \times (2 & : & 5) \\ \text{New} & 10 & : & 4 \\ & 10 & : & 25 \end{array} 21 \text{ units}$$

Initial Amount of mixture

- = 14 units
 R 28 litres
- = 1 unit ® 2
- 9. A mixture contains milk and water in the ratio 9 : 4. On adding 4 litres of water, the ratio of milk to water becomes 3 : 2. Find the total quantity of the original mixture.

(a) 26 litres(b) 18 litres(c) 10 litres(d) 30 litres

Sol. (a) According to the question,

Milk : Water old 9 : 4 $3 \times (3 : 2)$ New 9 : 4 $9 : 6^{2}$ units \rightarrow 4 litres 1 unit \rightarrow 2 litres

Initial mixture = (9 + 4) = 13units = $13 \times 2 = 26$ litres

10. The ratio of two numbers is 15:7. If each number be decreased by 2, the two numbers are in the ratio 7:3.
(a) 15,7 (b) 30,14
(c) 45,21 (d) 60,28

Sol. (b) According to the question No. are 15a and 7 a Now reducing 2 from each

 $\frac{15a-2}{7a-2} = \frac{7}{3}$ on cross multiplication 45a - 6 = 49a - 148 = 4aa = 2No. becomes $15 \times 2, 7 \times 2$ 30, 14

- 11. A mixture contains milk and water in the ratio 9 : 4. On adding 8 litres of water, the ratio becomes 3 : 2. Find the total quantity of the original mixture.
- (a) 52 litres (b) 26 litres (c) 104 litres (d)30 litres Milk : Water **Sol.** (a) Old 9 : 4 3 ×(3 : 2) New $\begin{array}{r}9 : 4\\9 : 6\end{array} 2 \text{ units} \rightarrow 8 \text{ litres}\end{array}$ 1 unit \rightarrow 4 litres Initial mixture = 9 + 4= 13 units = 13 × 4 = 52 litres 12. The ratio of incomes of two persons is 5:3 and that of their expenditures is 9:5. find the income of each person, if they save `1300 and `900 respectively. (a) `4,000, `2,400 (b) `3,000, `1,800 (c) `4,000, `2,400 (d) `4,500, `2,700 **Sol.** (a) А В • Income 5 : 3 Exp. 9 5 :
 - Saving 1300 : 900

0 = 2400

2:3:5, then

(b) 15 : 10 : 6 (d) 6 : 10 : 15

Sol. (b) $\Theta \quad \frac{1}{x} : \frac{1}{y} : \frac{1}{z} = 2:3:5$

 $\Theta \mathbf{x} : \mathbf{y} : \mathbf{z} = \frac{1}{2} : \frac{1}{3} : \frac{1}{5}$

Multiply by 30 (LCM of 2, 3, 5)

x: y: z = $\frac{1}{2} \times 30$: $\frac{1}{3} \times 30$: $\frac{1}{5} \times 30$ Then, x: y: z 15: 10: 6

14. Divide Rs. 1870 into three parts in such a way that half of the first part, one third of second and one-sixth of the third part are equal :

(a) 340, 510, 1020
(b) 400, 800, 670
(c) 470, 640, 1160
(d) None of these

Sol. (a) $A \times \frac{1}{2} = B \times \frac{1}{3} = C \times \frac{1}{6}$

 $\frac{A}{2} = \frac{B}{3} = \frac{C}{6}$ A: B: C = 2: 3: 6 2x + 3x + 6x = 1870 11x = 1870 x = 170 A = 2 × 170 = 340 B = 3 × 170 = 510 C = 6 × 170 = 1020 In a mintum of 40 litrage

15. In a mixture of 40 litres, the ratio of milk and water is 4 : 1. How much water must be added to this mixture so that the ratio of milk and water becomes 2 : 3.

(a) 20 litres (b) 32 litres (c) 40 litres (d) 30 litres

Sol. (c)



- 5 Units = 40 litres water to be added = 5 units = 40 litres
- 16. A and B are two alloys of argentum and brass prepared by mixing metals in proportions 7 : 2 and 7 : 11 respectively. If equal quantities of the two alloys are melted to form a third alloy C, the proportion of argentum and brass in C will be:

Sol. (c)

Argentum : Brass

А	$7_{\star 2}$: 2 _{×2} [9×2 =	= 18]
	14	: 4	
В	7	: 11[18	3]

for equal quantities multiply A by 2

Then the ratio in alloy C

Argentum	:	brass
(14 + 7)	:	(4 + 11)
21	:	15
7		5

17. The students in three batches at AMS Careers are in the ratio 2 : 3 : 5. If 20 students are increased in each batch, the ratio changes to 4 : 5 : 7. The total number of students in the three batches before the increase were:

(a) 10	(b) 90
(c) 100	(d) 150

Sol. (c)

Ratio of students in Batches

Here 2 Units = 20 then students before = $(2 + 3 + 5) \times 10 = 100$

- 18. After an increment of 7 in both the numerator and denominator, a fraction changes to 3/4. Find the original fraction : (a) 5/12
 - (b) 7/9
 - (c) 3/8
 - (d) can't be determined

Sol. (d) Let Original fraction = $\frac{p}{q}$

from the question,

$$=\frac{p+7}{q+7}=\frac{3}{4}$$

4p + 28 = 3q + 21

So we can not find the value of p and q can't be determined.

- 19. The present ratio of A and B is 4: 5. 18 years ago, this ratio was11 : 16. Find the sum of their present ages :
 - (a) 90 years (b) 105 years (c) 110 years (d) 80 years
- Sol. (a) Ratio of age

Present
$$4:5 \times 5$$
 (To make
18 yrs before 11:16 $\times 1$ (the differ-
ence equal

Now,

- $\begin{array}{cccc} \mathbf{A} & : & \mathbf{B} \\ \text{Present} & 20 & 25 \\ & & & \\ 18 \text{ yrs before } 11 & 16 \end{array}$
- 9 Units = 18 1 unit = 2
- Sum of present age

 $= (20 + 25) \times 2 = 90$ years

20. A beggar had ten paise, twenty paise and one rupee coins in the ratio 10 : 17 : 7 respectively at the end of the day. If that day he earned a total of Rs. 57, how many twenty paise coins did he have ?

(a) 1	.14		(b)	17	1
(c) 9	5		(d)	85	
Sol. (d)	10P	:	20P	:	1Rs
	10	:	17	:	7
Valu	ie of	coi	ns		

1Rs + 3.4Rs + 7Rs. = 57

11.4 Rs. = 57

e has 20 paise = 85of x in the follow- 27:72:x:8(b) 7 (d) none of these Sol. (c) A B C D 27:72:x:8 $A \times D = D \times C$

 $A \times D = B \times C$ $27 \times 8 = 72 \times x$ x = 3

- 22. Two alloys contain zinc and copper in the ratio of 2 : 1 and 4 : 1. In what ratio the two alloys should be added together to get as new alloy having zinc and copper in the ratio of 3 : 1?
 (a) 7 : 5 (b) 5 : 7
 - (c) 3:5 (d) none of these



Alternatively:-



23. If two numbers are in the ratio6 : 13 and their least common multiple is 312, the sum of the numbers is :

(a) 75 (b) 57 (c) 76 (d) 67 **Sol.** (c) A В 6 13 : Let HCF = х Then LCM = $x \times 6 \times 13$ 312 = 78xx = 4Sum of the numbers = 6x + 13x= x(6 + 13)= 4 × 19 = 76

24. Rs. 770 have been divided among A, B and C such that A receives 2/9th of what B and C together receive. Then A's share is :
(a) Rs. 140 (b) Rs. 154
(c) Rs. 165 (d) Rs. 170

Sol. (a)
$$A = \frac{2}{9}(B + C)$$

 $A : (B + C)$
 $2 : 9$

Share of A = 770 ×
$$\frac{2}{11}$$
 = 140

25. What least number must be subtracted from each of the numbers 14, 17, 34 and 42 so that the remainders are proportional?

Sol. (c) Let that no. = x

then
$$\frac{14-x}{17-x} = \frac{34-x}{42-x}$$

after solving $x = 2$

1. Find the fourth proportional to the numbers 6, 8, 9.

(a) 12 (b) 7 (c) 5 (d) 14

- A bag contains one rupee, 50paise and 25-paise coins in the ratio 5 : 7 : 9. If the total amount in the bag is `430, find the number of coins of each kind.
 (a) 200, 280, 360
 - (b) 280, 200, 360
 - (c) 360, 280, 200
 - (d) 360, 200, 280
- 3. One man adds 6 litres of water to 11 litres of milk and another man adds 9 litres of water to 8 litres of milk. What is the ratio of the strengths of milk in the two mixtures?
 - (a) 2:3 (b) 3 : 2
 - (c) 11:8 (d) 8:11
- 4. Two vessels contain equal quantity of mixtures of milk and water in the ratio 9:5 and 4:3 respectively. Both the mixtures are now mixed thoroughly. Find the ratio of milk to water in the new mixture so obtained.
 - (a) 17 : 11 (b) 11 : 17
 - (c) 8 : 13 (d) 13 : 8
- 5. The contents of two vessels containing water and milk are in the ratio 3 : 4 and 5 : 4 are mixed in the ratio 1 : 4. The resulting mixture will have water and milk in the ratio.

(a) 184 : 176	(b) 167 : 184
(c) 167 : 148	(d) 148 : 167

6. An amount of `950 is distributed among A, B and C in the ratio 5 : 11 : 3, what is the difference between the share of B and A?

(a) 550	(b) 250
()	() =

(c) 200	(d) 300

7. The sum of three numbers is 275. If the ratio between the first and second be 3 : 7 and

that between the second and third be 2 : 5, then find the second number.

(a) 30	(b) 175
(c) 70	(d) 80

- 8. If A : B = 3 : 4, B : C = 5 : 7 and C : D = 3 : 5, then find A : B : C : D.
 (a) 9 : 21 : 12 : 28
 (b) 45 : 60 : 84 : 140
 (c) 9 : 12 : 28 : 21
 (d) 9 : 12 : 21 : 82
- 9. A hound pursues a hare and takes 3 leaps for every 4 leaps of the hare, but 2 leaps of the hound are equal to 3 leaps of the hare. Compare the rates of the hound and the hare.

(a) 9 : 8	(b) 7 : 6
(c) 5 : 6	(d) 8 : 9

- 10. In a mixture of 60 litres, the ratio of milk and water is 2 : 1. If the ratio of milk and water is to be 1:2, then the amount of water to be further added is:
 (a) 42 litres
 (b) 56 litres
 (c) 60 litres
 (d) 77 litres
- 11. A mixture contains milk and water in the ratio 4 : 3. On adding 2 litres of water, the ratio becomes 8 : 7. Find the total quantity of the final mixture.

(a) 16 litres (b) 12 litres (c) 28 litres (d) 30 litres

- 12. The incomes of A and B are in the ratio 9 : 4 and their expenditures are in the ratio 7 : 3 and the saving is `2000, what are their incomes?
 - (a) ` 90000, ` 4000
 - (b) `27000, `12000
 - (c) ` 72000, ` 16000
 - (d) ` 72000, ` 32000
- 13. A mixture contains milk and water in the ratio 4 : 3. On adding 6 liters of water the ratio becomes 8 : 7. Find the total quantity of the final mixtur.

(a) 168 litres (b) 12 litres (c) 42 litres (d) 90 litres

- 14. There is 81 litres pure milk in a container. One-third of milk is replaced by water in the container. Again one-third of mixture is extracted and equal amount of water is added. What is the ratio of milk to water in the new mixture?
 - (a) 1:2 (b) 1:1
 - (c) 2:1 (d) 4:5
- 15. Tom is chasing Jerry. In the same interval of time Tom jumps 8 times while Jerry jumps 6 times. But the distance covered by Tom in 7 jumps is equal to the distance covered by Jerry in 5 jumps. The ratio of speed of Tom and Jerry is

(a) 48:35	(b) 28:15

(c) 24:20 (d) 20:21

16. Three vessels each of 10 litres capacity contain a mixture of milk & water in the ratio 2 : 1, 3 : 1 and 3 : 2. If all the three vessels are emptied into a large vessel, find the ratio of milk and water in the new mixture.

(a)	101	: 111	(b)	121:	59

(c) 53 : 37 (d) 31 : 13

17. Two vessels A & B contain a mixture of milk & water in the ratio 4 : 5 and 5 : 1. If both vessels are mixed in the ratio 5 :2. Find the ratio of milk & water in new mixture.

(a) 3 : 2	(b) 5:3
(c) 5 : 4	(d) 2 : 1

18. A 2 kg metal of which 1/3 is zinc and rest is copper mixed with 3 kg of metal of which 1/4 is zinc and rest is copper. What is the ratio of zinc to copper in new mixture ?

(a) 17:43	(b) 15 : 13
(c) 21 : 19	(d) 27 : 31

19. Ratio of land and water on earth is 1 : 2 and ratio of land and wa-

ter in northern hemisphere is 2:3. Find the ratio of Land and water in Southern hemisphere.

(a) 3 : 5	(b) 4 : 7
(c) 9 : 13	(d) 4 : 11

- 20. Rs. 5600 is to be divided among A, B, C & D in such a way that the ratio of share of A : B is 1 : 2. B : C is 3 : 1, C : D is 2 : 3. Find share of (A+B)
 - (a) ` 2400 (b) ` 3000
 - (c) `4000 (d) ` 3600
- 21. The total income of A, B and C is 6060. A spend 80%, B spend 85% and C spend 75% and the ratio of their saving is 5:6:9. Find the income of A.
 - (a) ` 1500 (b) 1200
 - (c) ` 1800 (d) 2000
- 22. 500 is divided among A, B, C in such a way that `16 more 2/5 of A's share, `70 less than 3/4 of B's share, and ` 4 less than 3/5 of C's share are equal. Find B's share.
 - (a) ` 300 (b) \ 400
 - (c) ` 100 (d) 200
- 23. The ratio of amount distributed in all the male & female as salary is 6:5 while the ratio of salary of each male & each female is 2 : 3. Find the ratio of no. of male & female.

(a) 9 : 5	(b) 7:5
(c) 11 : 3	(d) 7:6

- 24. `430 is divided among 45 persons such that the ratio of total amount received by all men, all women & all children are in the ratio 12: 15 : 16. While the ratio of amount received by each men, each woman & each child is 6:5:4. Find the amount received by each man.
 - (a) ` 10 (b) `15

(c) 18 (d) ` 12

25. The ratio of last year income of A, B & C is 3 : 4 : 5. While the ratio of the last year income to current year income of A,B,C 4

: 5, 2 : 3 and 3 : 4. If their total current year income is ` 98,500. Find the present income of B+C.

(a) `	60000	(b) `	76000
(c) `	80000	(d) `	85000

26. Ratio of income of A, B, C is 3: 7:4 and the ratio of their expenditure is 4:3:5. If A saves $14\frac{2}{7}\%$ of his income. Find the

ratio of their saving.

(a) 7:65:31	(b) 6:71:11
(c) 6 : 73 : 11	(d) 7:65:13

27. A dog takes 7 jumps for every 10 jumps of the lion and a fox takes 12 jumps for every 10 jumps of the lion. And the distance covered by dog in 5 jumps, distance covered by lion in 15 jumps and the distance covered by fox in 20 jumps is equal. Find the ratio of their speeds.

` 710 is divided among A, B 28. and C in such a way that A receives ` 40 more than B, C receives ` 30 more than A. Find the Share of C.

(a) `	270	(b) `	200
(c) `	240	(d) `	300

29. The age of father is 3 times of his son. 5 years before the age of son was 1/6 times of his father. Find the present age of son. At the time of marriage of his mother, she was 5 years younger to his father. Find the age of mother.

> (a) 18 (b) 25

> > (d) 20

- (c) 28
- 30. The ratio of age of Meena to her mother is 3:8. Find the ratio of their age after 4 years, if after 10 years their age difference will be 35 years.

(a) 7 : 11	(b) 9 : 13
(c) 5 : 12	(d) 6 : 11

31. 3 Vessels whose capacities are 3 : 2 : 1 are completlely filled with milk. Mixed water in the mixture of Vessels are 5:2,4: 1 and 4 : 1 respectively. Taking 1/3 of first, 1/2 of 2^{nd} and 1/7 of 3^{rd} mixtures, kept in a new vessel is prepared. The % of water in new mixture is?

(a) 25% (b) 24% (c) 20% (d) 30%

- 32. The number of employees are reduced in the ratio 3 : 2 and the salary of each employee is increased in the ratio 4 : 5. By doing so, company saves Rs. 12,000. So, find the initial expenditure on salarly.
 - (b) ` 70000 (a) ` 60000
 - (d) ` 80000 (c) ` 72000

33. The ratio of income of A and B is 3:2 and the ratio of their expenditure is 4 : 3 and their savings are respectively ` 2,000 and Rs. 1000. Find the income of A and B respectively.

- (a) ` 6000, 4000
- (b) 3000, 2000
- (c) ` 4500, 3000
- (d) ` 7500, 5000
- 34. A, B, C along completed a piece of work in 30, 50 and 40 days. The ratio of the salary of each day is 4:3:2 respectively. If the total income of A is Rs. 144, find total income of B.

(a) `	150	(h)	•	120
(a)	130	(u)		120

- (c) 180 (d) 200
- 35. A person cover certain distance by train, bus and car in ratio 4 : 3: 2. The ratio of fair is 1: 2:4 per km. The total expenditure as a fair is Rs. 720. Then, total expenditure as fair on train.

(a) `	150	(b) `	160
· · ·		()	

(c)	` 175	(d)) `	200

36. Rs. 7800 are distributed among

A, B and C. The share of A is $\frac{3}{4}$

share of B and share of B is $\frac{2}{3}$ of the share of C. Then find the

difference between share of B

and C.

- (a) ` 1200 (b) ` 1500
- (c) ` 1800 (d) ` 2000
- 37. A bag contains Rs. 410 in the from of Rs. 5, Rs. 2 and Rs. 1 coins. The number of coins are in ratio of 4 : 6 : 9. So, find the number of 2 Rs. coins.
 - (a) 50 (b) 70
 - (c) 60 (d) 80
- 38. The salaries of A, B and C are in the ratio 1 : 3 : 4. If the salaries are increased by 5%, 10% and 15% respectively, then the increased salaries will be in the ratio.
 - (a) 21 : 66 : 92 (b) 7 : 13 : 17 (c) 21 : 69 : 83 (d) 7 : 17 : 23
 - (c) 21 · 09 · 05 (u) 7 · 17 · 25
- 39. Rs. 68,000 is divided among A, B and C in the ratio of 1 1 5
 - $\frac{1}{2}:\frac{1}{4}:\frac{5}{16}$. The difference of the

greatest and the smallest parts is

- (a) ` 12000 (b) ` 15000
- (c) ` 18000 (d) ` 16000
- 40. A sum of ` 3115 is divided among A, B and C such that if ` 25, ` 28 and ` 52 be diminished from their shares respectively, the remainder shall be in the ratio of 8 : 15 : 20. Find the share of C.
 - (a) ` 1200 (b) ` 585
 - (c) ` 1452 (d) ` 1078
- 41. Gold is 19 times as heavy as water and copper is 9 times as heavy as water. The ratio in which these two metals be mixed so that the mixture is 15 times as heavy as water, is:

- (a) 4 : 3 (b) 3 : 1 (c) 3 : 2 (d) 11 : 9
- 42. The are two vessels of equal capacity, one full of milk, and the second one-third full of water. The second vessel is then filled up put of the first, the contents of the second are then poured back into the first till it is full and then again the contents of the first are poured back into the second till it is full. What is the proportion of milk in the second vessel?

(a) 20 : 7	(b)	7	:	2
(c) 9 : 7	(d)	7	:	5

- 43. The ratio of two number's difference, sums, and multiple of number 1 : 7 : 24 respectively. Find the multiple of their number.
 - (a) 51 (b) 48
 - (c) 64 (d) 80
- 44. 3 vessels are filled with water.1/3rd from first is poured into second,then 1/4th from second is poured into third. Finally, 1/10th from third is poured into first.At last, each vessel contains 9 litres of water. Find quantity of water in each vessel at start.

(a) 12, 8, 7	(b) 12, 10, 9
(c) 15, 10, 8	(d) 12, 7, 8

45. 180 contained in a box consists of one rupee , 50 paise and 25 paise coins in the ratio 2 : 3 : 4. What is the number of 50 paise coins?

(a) 60	(b) 120
(c) 150	(d) 180

- 46. If $a: b = \frac{2}{9}: \frac{1}{3}$, $b: c = \frac{2}{7}: \frac{5}{14}$ and $d: c = \frac{7}{10}: \frac{3}{5}$ then a: b: c: d is (a) 4: 6: 7: 9(b) 16: 24: 30: 35(c) 8: 12: 15: 7(d) 30: 35: 24: 1647. If a: b: c = 2: 3: 4 and 2a - 3b + 4c = 33, then the value of c is (a) 6 (b) 9
- (c) 12
 (d) ⁶⁶/₇
 48. 33,630 are divided among A, B and C in such a manner that the ratio of the amount of A to that of B is 3 : 7 and the ratio of the amount of B to that of C is 6 : 5. The amount of money re
 - ceived by B is (a) 14,868 (b) 16,257
 - (c) 13,290 (d) 12,390
- 49. The total marks obtained by Arun in english and Mathematics are 170. If the difference between his marks in these two subjects is 10. Then the ratio of his marks in these subjects is
 - (a) 7 : 8 (b) 8 : 7
 - (c) 9:8 (d) 9:7
- 50. The weight of Mr. Gupta and Mrs. Gupta are in the ratio 7 : 8 and their total weight is 120 kg. After taking a dieting course Mr. Gupta reduces by 6 kg and the ratio between their weights changes to 5 : 6, So Mrs. Gupta has reduced by

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

Solution

6.

(a) We know that fourth Propor-1. tional $d = \frac{b' c}{a}$ Where b = 8c = 9 a = 6 then, $\frac{8'9}{6} = 12$ 2. (a) According to the question, `1 : 50P : 25P Volumes $\rightarrow 5x$: 7x: <u>9x</u> No. of coins \rightarrow 1×5x = 5x : $\frac{50 \times 7x}{100}$ = 3.50x: $\frac{25 \times 9x}{100}$ = 2.25x Given, Total Rupees = 5x +3.50x + 2.25x10.75x = 430x = 40 \land No. of coins 5×40 ; 7×40 , 9×40 200, 280, 360 (c) $\begin{array}{c|c} \text{Milk} & : & \text{Water} \\ 11 & : & 6 \end{array} : \begin{array}{c|c} \text{Milk} & : & \text{Water} \\ 8 & : & 9 \end{array}$ 3. Milk : Water $\frac{11}{17}$: $\frac{8}{17}$ 11 : 8 (a) According to the question 4. Milk Water Ist vessel 9 : 5 = 14 2nd vessel $4_{\times 2}$: $3_{x_2} = 7_{x_2} = 14$ 17Therefore, Ratio of milk to water in the new Mixture = 17:11(c) I (3 : 4)×_{9×1}=7 9 II (5 : 4)×_{7×4}=9 7 63 5. After equating the capacity of the vessels the resulting ratio of water and milk Water : Milk 27 : 36 140 : 112

167 : 148

(d) Given Total amount 950 ÷Ċ Ŕ А 5x : 11x : 3x19x = 950x = 50Difference between the share of B and A 11x - 5x $= 6x = 6 \times 50 = 300$ Alternate:-Total 950 A : B : C 5 : 11 : 3 Total 19 units = 9501 unit = 50According to the question, B - A = 6 units $= 6 \times 50 = 300$ 7. (c) According to the question I + II + III = 275given, I : II : III 3 : 7 : 7 $\frac{2}{6}$: $\frac{2}{14}$: $\frac{5}{35}$ 35 Total 55 units Þ 275 1 units = 5IInd no. is $\not= 14 \times 5 = 70$ (b) According to the question, A : B = 3 : 4B:C=5:7C: D = 3:5then, A : B : C : D3:4:4:4 <u>5</u>: 5: 7: <u>7</u> 3:3:3:545: 60: 84: 140

Hounds Rabbit 9. (a) Jumps 3 : 4 Distance 3 2 o 8 Milk : Water 10. (c) Old (2 : 1)2(×1 : 2) New 2 : 1 3 unit 2 Initial amount of mixture = 2 +1 = 3 units Amount of water to be added = 4 - 1 = 3 units \otimes 60 litres 11. (d) According to the question Milk : Water Old $2 \times (4 : 3)$ 8 : 7 New 8 : 6 8 : 7 $1 \text{ unit} \rightarrow 2 \text{ litres}$ Final mixture = 8 + 7 = 15 units $= 15 \times 2 = 30$ litres 12. (d) A : B Old Income 9_{x4} : $4_{x4} = 5$ (diff.) Expenditure7_{$\times 5$} : 3_{$\times 5$} = 4 on cross multiplication New Income \rightarrow 36 : 16 Exp. → 35 : 15 Saving =1unit \rightarrow Rs.2000 A's income = 36×2000 = `72000 B's income = 16×2000 = ` 32000 13. (d) According to the question Old Milk : Water 2×(4 3) : 8 : 7 New 8:6) 1 unit →6 liters 8 Final mixture = 8 + 7 = 15 units $= 15 \times 6 = 90$ liters

Ratio and Proprotion

8.

14. (d) Lets take ratio = $\frac{1 \rightarrow \text{water}}{3 \rightarrow \text{milk}}$ 35:28 5:4 18. (a) Milk Initially Finally milk Zinc : Copper 3 2 3 9 2 1_{x8} 1_{×9} 9 units = 81 liters 8+9 1 unit = 9 liters17 : 4 units = 36 liters \mid milk = 36 17:43and, Water = 81 - 36 = 4519. (d) : Water \ Milk 36 : 45 4 5 • Alternate:-2 Final milk = Initial milk × $-\frac{\text{milk taken out }\ddot{\mathbf{o}}^{n}}{\text{initial milk }\overset{\circ}{\boldsymbol{\phi}}}$ æ ç1 $= 81 \begin{array}{c} \overset{\text{a}}{\underline{\xi}} 1 - \frac{27 \ddot{o}^2}{81 \frac{1}{\alpha}} = 81 \begin{array}{c} \overset{\text{a}}{\underline{\xi}} 1 - \frac{1}{3 \frac{1}{\alpha}} \\ \overset{\text{b}}{\underline{\xi}} 1 - \frac{1}{3 \frac{1}{\alpha}} \end{array}$ = 81 $\times \frac{2}{3} \times \frac{2}{3}$ = 36 liters final water = 81-36 = 45 liters 1 2 Required ratio = $\frac{36}{45} = \frac{4}{5}$ 3 3 2 2 Tom : Jerry 15. (d) Jumps 8 : 6 Distance in each Jump 5 : 7 Speed $\overline{40}$: $\overline{42}$ 20 : 21 16. (b) M W : 2_{x20} $1_{x20} \rightarrow 3 \times 20 \rightarrow 60$ $1_{\times 15} \rightarrow 4 \times 15 \rightarrow 60$ 3_{×15} $\frac{2_{\times 12} \rightarrow 5 \times 12 \rightarrow 60}{20 + 15 + 24}$ $\mathbf{3}_{\mathbf{x}_{12}}$ 40+45+36 121: 59 17. (c) M : W $5_{x_{10}} \rightarrow 9 \times \underline{2} \rightarrow 18 \times \underline{5} \rightarrow 90$ 4_{×10} $\frac{1_{\times_6} \rightarrow 6 \times \underline{3} \rightarrow 18 \times \underline{2} \rightarrow 36}{50 + 6}$ 5_{*6} = 6k (say) 40+30 50+6 (LCM of 2,3,3) 70 : 56 A = 15k - 40

 $2_{\times 8} \rightarrow 3 \times \underline{4} \rightarrow 12 \times \underline{2} \rightarrow 24$ $3_{x_9} \rightarrow 4 \times \underline{3} \rightarrow 12 \times \underline{3} \rightarrow 36$ 16+27 43 Earth : NH : 1 23 Land : Water ZEarth Earth $1_{\times 10}$: $2_{\times 10} \rightarrow 3 \times \underline{5 \times 2} \rightarrow 30$ N.H. $2_{\times 3}$: $3_{\times 3} \rightarrow 5 \times 3 \times 1 \rightarrow 15$ S.H. 10-6 : 20-9 $\searrow_{N.H.}$ 4 : 11 24 20. (d) A : B : C : D to 2 2 ea 1 1 ra 2 3 6 12 4 6 10 3 : 6 : 2 : 3 $(A+B) = \frac{9}{14} \times 5600$ = Rs. 3600 Ans. 21. (a) A : B : С Saving. 5 : 6 : 9 Income 25 : 40 : 36 ® 101 $\land \text{ Income A} = \frac{6060}{101} \times 25$ = Rs. 1500 22. (d) $\frac{2A}{5} + 16 = \frac{3B}{4} - 70 = \frac{3C}{5} - 4$

$$B = 8k + \frac{280}{3}$$

$$C = 10 k + \frac{20}{3}$$
Sum = (15k+8k+10k)
+ (-40 + $\frac{280}{3} + \frac{20}{3}$) = 500

$$k = \frac{40}{3}$$

$$V = 8k + \frac{280}{3}$$

$$= 8 \times \frac{40}{3} + \frac{280}{3} = Rs.200$$
3. (a) M : F
all 6 5
each 2 3

$$V = 8k + \frac{2}{3}$$

$$Q = 15$$
4. (d)
M : W : C
tal 12 15 16 \rightarrow 43units \rightarrow Rs. 430
ch $\frac{6}{2} = \frac{5}{3} + \frac{1}{2} = \frac{1}{2} + \frac{1}{2} = \frac{1}{2}$

$$Q = 15$$

$$M : W : C$$
tal 12 15 16 \rightarrow 43units \rightarrow Rs. 430
ch $\frac{6}{2} = \frac{5}{3} + \frac{1}{2} = \frac{1}{2} + \frac{1}{2} = \frac{1}{2}$

$$Q = 15$$

$$Q = 15 \text{ women : 15 women : 20 children = 10$$

= 12×10 = Rs. 120 each man = Rs. $\frac{120}{10}$ = Rs. 12

\ Money Þ all men

each woman = Rs. $\frac{150}{15}$ = Rs. 10 25. (b) А в С Last 3 4 5 L:C 4:5 2:3 3:4 LCM =12 (2,3,4)

\ 3×12 4×12 5×12 $9\begin{pmatrix} 36\\ 4:5 \end{pmatrix} 24\begin{pmatrix} 48\\ 2:3 \end{pmatrix} 20\begin{pmatrix} 60\\ 3: \\ 3: \end{pmatrix}$ 45 : 72 : $80 \rightarrow 197$ 197 Units = 98500 $(B+C) = \frac{152}{197} \times 98,500$ = Rs. 76,000 26. (b) A В С 4k →14 I 3k 7k E 4y 3y 5y $14\frac{2}{7}\% = \frac{1(\text{saving})}{7(\text{income})}$ A spend $\frac{1}{7}$ th of his income $\sqrt{\frac{3k}{4v}} = \frac{7}{6} \text{ p } \frac{k}{v} = \frac{14}{9}$ = (42-36) : (98-27) : (56-45)= 6:71:11 Dog = lion = fox5 jumps 15 jumps 20 jumps 4 m 12 m 3 m 27. (b) lion fox Dog 7 10 12 ×12 ×4 ×3 84 :40 :36 ∴ 21 :10 :9 = A+30 = B+70\ 3B+110 = 710 ♭ B = 200 \land C = Rs. 270 ans 29. (d) Age of son be x and father's age be 3x5 years ago, (3x-5) = 6(x-5)3x-5 = 6x-30

age of son = $\frac{25}{3}$ Father's age = 25 years mother age = 20 years Meena : Mother 30. (c) 3 8 diff = (8–3)= 5 units = 35 1 unit = 7 $21 : 56 \\ \downarrow +4 \qquad \downarrow +4 \\ 25 : 60 = 5:12$ 31. (b) M : W $V_{1} 5 \times 5 : 2 \times 5 \rightarrow 7 \qquad 3 \times \frac{1}{3}$ $V_{2} 4 \times 7 : 1 \times 7 \rightarrow 5 \xrightarrow{7} 35_{2} \times \frac{1}{2}$ $V_{3} 4 : 1 \rightarrow 5 \qquad 1$ $7 \times 1 \times \frac{1}{-}$ \ 25+28+4 : 10+7+1 57 :18Þ 19:6 $\sqrt{\%}$ water = $\frac{6}{25} \times 100 = 24\%$ 32. (c) no. of employees 3:2 salary. 4:5 $1\overline{2:10}$ 2 units = 12000 \land initial expenditure = $\frac{12}{2} \times 120,00$ Þ Rs. 72,000 33. (a) A : B $I \rightarrow 3x$ 2x $E \rightarrow 4y$ 3v 3x-4y = 2000 and 2x-3y =1000 9x-12y = 6000 and 8x-12y =4000 x = 2000, $I_{A} = Rs. 6000, I_{B} = Rs. 4000$ 34. (c) Α : B : С day 30 50 40 salary 4 3 2

120 150 80 12 : 15 : 8 12 units = 144 \ Income of B = $\frac{144}{12} \times 15$ =Rs. 180 Т В С 35. (b) : : 3 2 Distance 4 4 Fair 1 2 4 • 6 8 or 2 : 3 4 9 units = 720 \ Total expenditure as Fair on train = $\frac{2}{9} \times 720$ = Rs. **160** 36. (a) A B C 3 4 4 2 2 3 8 12 6 Or 3:4:6 (B - C) share = $\frac{2}{13} \times 7800$ = Rs.1200 37. (c) Rs.5 : Rs.2 : Rs.1 coins 4 6 9 Value 20 : 12 : 9 = 41 √ Value of Rs. 2 = $\frac{12}{41}$ ×410 = Rs.120 $\sqrt{100}$ No. of 2 Rs. coins = $\frac{120}{2}$ = **60** 38. (a) A В С : : : 1 3 : 4 100 300 400 After 105 330 460 income = 21:66:92 39. (d) A : B : C $\frac{1}{2} \times 16$ $\frac{1}{4} \times 16$ $\frac{5}{16} \times 16$ 8 : 4 : 5 = 17

Difference = $\frac{8-4}{17} \times 68,000$ $=\frac{4}{17} \times 68,000 = \text{Rs.}$ **16000** 40. (c) diminished = 25 + 28 + 52= Rs. 105 \land Left = Rs. 3115 – 105 = Rs.3010 \land Share of C = $\frac{20}{43} \times 3010$ = Rs.1400 total share = Rs. 1452 41. (c) 19x 9x5x6x4x= 3:242. (a) Milk : Water 3 1 1st Pour 1m 2m + 1w (2:1)2nd Pour $1m + \frac{4}{3}m + \frac{2}{3}w$ $\frac{2}{3}$ m+ $\frac{1}{3}$ w $\frac{7}{3}$ m+ $\frac{2}{3}$ w (7 : 2) $\frac{2}{3}$ m+ $\frac{1}{3}$ w 3rd Pour $\overset{\text{arg}}{\underset{0}{\xi}} \overset{7}{_{3}}m - \overset{7}{_{9}} \times 2m_{\overset{\circ}{\sigma}}^{\overset{\circ}{_{2}}} + \overset{2}{\underset{0}{\xi}} \overset{2}{_{3}} - \overset{2}{_{9}} \times 2\overset{\overset{\circ}{_{g}}}{_{\overset{\circ}{\sigma}}}W$ $e^{\frac{a}{2}} \frac{1}{2} + \frac{7 \times 2\ddot{o}}{9} + \frac{a}{\phi} + e^{\frac{a}{2}} \frac{1}{2} + \frac{2 \times 2\ddot{o}}{9} + e^{\frac{a}{2}} \frac{1}{2} + \frac{2 \times 2\ddot{o}}{9} + e^{\frac{a}{2}} \frac{1}{2} + \frac{$ $p = \frac{7}{9}m + \frac{2}{9}w$ $\frac{\pounds^2}{\pounds^2} + \frac{14}{9} \frac{\ddot{o}}{\phi} m + \frac{\pounds^1}{\pounds^3} + \frac{4}{9} \frac{\ddot{o}}{\phi} w$ = 7:2 1st $\frac{20}{9}m + \frac{7}{9}w$ = 20 : 7

43. (b) $\frac{x+y}{x-y} = \frac{7}{1}$ b $\frac{x}{y} = \frac{4}{3}$ (4×3=12) 47. (c) a : x = 8, y = 6Multiple = 48 44. (b) Solve objectively, easier А В С 12 8 7 12–4 = 8 8+4=127 8 7 12 $e^{\frac{\alpha}{2}}_{e^{\frac{1}{2}}} B^{\ddot{o}}_{\pm}$ 8 12-37+3 8 9 10 $\frac{a}{c}\frac{1}{10}C^{\ddot{c}}_{\pm}$ 8+1 9 10-1 9 9 9 Hence, Required quantity of Water in each vessel = 12, 8 and 7. 45. (b) 1 : 50 p : 25 p 2 : 3 : 4 $\Rightarrow 2x: 3x: 4x - coins$ $1 \times 2x$: $\frac{3x}{2}$: $\frac{4x}{4}$ - rupees $\Rightarrow \frac{4x + 3x + 2x}{2} = 180$ $\Rightarrow \frac{9x}{2} = 180$ x = 40... number of coins of 50 = 3×40=120 46. (b) a : b = $\frac{2}{9}$: $\frac{1}{3}$ = 2 : 3 \Rightarrow b:c = $\frac{2}{7}:\frac{5}{14}$ = 4:5 \Rightarrow d : c = $\frac{7}{10}$: $\frac{3}{5}$ = 7 : 6 $\begin{array}{ccccc} A & : & B & : & C & : & D \\ x & \vdots & y \\ \end{array}$ x pm : ypm : yqm: yqn Required ratio = $2 \times 4 \times 6 : 6 \times 4 \times 3$ $: 6 \times 5 \times 3 : 7 \times 5 \times 3$

16:24:30:35 с 4 Let2x : 3x : 4x2a - 3b + 4c = 33 $2 \times 2x - 3 \times 3x + 4 \times 4x = 33$ 4x - 9x + 16x = 3311x = 33*x* = 3 $\therefore C \Rightarrow 4 \times 3$ = 12 48. (a) A : B : С 6 : 5 18:42:35 18x + 42x + 35x $\Rightarrow 95x$ 95x = 33630x = 354 \therefore money received by B = 42x= 42 × 354 = ` 14868 Note:- To save time check unit digit for example 42×354 = unit digit is 2 $\times 4 = 8$ Check option with unit digit 8. There is only one Option 14868 (c) Marks in 49. Math + English = 170Math – English = 10 $\frac{\text{Math} \Rightarrow \frac{180}{2} = 90$ \therefore English \Rightarrow 80 Math English : 90 : 80 9 8 50. (b) Mr. : Mrs. Before 7x8x After 5y 6y \Rightarrow before 7x + 8x = 12015x = 120x = 8 ∴ Mr. gupta = 7 × 8 = 56 Mrs. gupta = $8 \times 8 = 64$: after lossing 6 kg by Mr. gupta the ratio be comes 5 : 6. $\therefore \quad \frac{56-6}{64-x} > \frac{5}{6}$ 300 = 320 - 5x

5x = 20 \therefore x = 4 kg.