Percentile Classes

Ration/Proportion/Variation/Problem on Ages/Partnership

Exercise 01

Ratio and Proportion

---

1. If A : B = 4 : 5; B:C = 3:4 C:D = 7:11 then A:D is
   (a) 3 : 4 (b) 21 : 55 (c) 21 : 44 (d) 7 : 5

2. Mean proportional between 17 and 68 is:
   (a) 51 (b) 24 (c) 4 (d) 34

3. Third proportional between 16 and 36 is:
   (a) 64 (b) 144 (c) 81 (d) 49

4. a = 2b = 3c = 4d, then a : b : c: d is:
   (a) 12:3: 6:4 (b) 3:4:6:12 (c) 6:12:4:3 (d) 12 : 6 : 4 : 3

5. The fourth proportional to 4, 7 and 20 is:
   (a) 28 (b) 21 (c) 18 (d) 35

6. If $\frac{a}{3} = \frac{b}{4} = \frac{c}{5}$ then $\frac{a+b+c}{b} = ?$
   (a) 2 (b) 3 (c) 4 (d) 5

7. If $\frac{a}{b} = \frac{c}{d}$, then:
   (a) $\frac{a+b}{a-b} = \frac{c+d}{c-d}$ (b) $\frac{a+b}{a^2} = \frac{c+d}{d^2}$ (c) $\frac{a+b}{a^2} = \frac{c+d}{c^2}$ (d) ac = bd

8. If(a + b):(a - b) = 3:2, the $(a^2 - b^2)$: $(a^2 + b^2)$ equals:
   (a) 5:13 (b) 12:13 (c) 9 : 4 (d) none of these

9. Two whole numbers, whose sum is 64, cannot be in the ratio :
   (a) 1: 7 (b) 3 : 5 (c) 5:11 (d) 1 :2

10. Two numbers are in the ratio 3 : 4. The difference between their squares is 28. Find the greater number
    (a) 12 (b) 8 (c) 24 (d) 16

11. In a mixture of 120 litres, the ratio of milk and water is 2:1 if the ratio of milk and water is 1:2, then the amount of water (in litres) is required to be added is:
    (a) 20 (b) 40 (c) 80 (d) 120

12. Four numbers are in proportion. The sum of the squares of the four numbers is 50 and the sum of the means is 5. The ratio of first two terms is 1: 3.What is the average of the four numbers?
    (a) 2 (b) 3 (c) 5 (d) 6

13. A naughty student breaks the pencil in such a way that the ratio of two broken parts is same as that of the original length of the pencil to one of the larger part of the pencil. The ratio of the other part to the original length of pencil is:
(a) $1:2\sqrt{5}$ (b) $2: (3+\sqrt{5})$ (c) $2:\sqrt{5}$ (d) can't be determined

14. A student obtained equal marks in History and Sociology. The ratio of marks in Sociology and Geography is 2:3 and the ratio of marks in History and Philosophy is 1 : 2. If he has scored an aggregate of 55% marks. The maximum marks in each subject is same. In how many subjects did he score equal to or greater than 60% marks?
(a) 1 (b) 2 (c) 3 (d) none of these

15. Rs. 4536 is divided among 4 men, 5 women and 2 boys. The ratio of share of a man, a woman and a boy is 7 : 4: 3. What is the share of a woman?
(a) Rs. 336 (b) Rs. 498 (c) Rs. 166 (d) Rs. 256

16. The ratio of working efficiency of A and B is 5:3 and the ratio of efficiency of B and C is 5: 8. Who is the most efficient: ?
(a) A (b) B (c) C (d) can't be determined

17. Equal quantities of three mixtures of milk and water are mixed in the ratio of 1: 2, 2: 3 and 3: 4. The ratio of water and milk in the mixture is:
(a) 193:122 (b) 122:193 (c) 61 : 97 (d) 137 :178

18. A hotel incurs two types of expenses, one which is fixed and others depend upon no. of guests. When there are 10 guests, total expenses of hotel are Rs. 6000. Also when there are 25 guests average expenses per guests are Rs. 360? What is the total expenses of hotel when there are 40 guests?
(a) Rs. 8,000 (b) Rs. 12,000 (c) Rs. 15,500 (d) none of these

19. The speeds of rickshaw, car and scooter are in the raise OJE 3:5:6. What is the ratio of time taken by each one of them for the same distance?
(a) 6:5:3 (b) 10:6:5 (c) 12 : 7 : 6 (d) data insufficient

20. The LCM of two numbers is 210 and their ratio is 2 : 3 the sum of these numbers is
(a) 210 (b) 175 (c) 315 (d) can't be determined

21. What number must be subtracted from each of the numbers 53, 21, 41, 17 so that the remainders are in proportion?
(a) 1 (b) 3 (c) 5 (d) none of these

22. A beggar had ten paise, twenty paise and one rupee coins in the ratio 10:17:7 respectively at the end of day. If that day he earned a total of ₹ 57, how many twenty paise coins did he have?
(a) 114 (b) 171 (c) 95 (d) 85

23. Vijay has coins of the denomination of Re. 1, 50 p and 25 p in the ratio-of 12:10:7. The total worth of the coins he has is ₹ 75. Find the number of 25 p coins that Vijay has
(a) 48 (b) 72 (c) 60 (d) None of these

24. A cask contains a mixture of 49 litres of wine and water in the proportion 5:2. How much water must be added to it so that the ratio of wine to water may be 7:4?
(a) 3.5 (b) 6 (c) 7 (d) None of these

25. A, B and C play cricket. A's runs are to B's runs and B's runs are to C's as 3:2. They score a total of 342 runs. How many runs did A make?

26. The angles of a triangle are in the ratio of 2 : 3 : 4 find the measurement of greatest angle.
(a) 30^0 (b) 60^0 (c) 100^0 (d) 80^0

27. In a wallet the ratio of 25 paise, 50 paise and Re 1 coins are in the ratio of 12 : 4 : 3 which amounts to Rs. 600. Find the no. of coins of 25 paise:
(a) 200 (b) 225 (c) 275 (d) none of these

28. Rs. 171 are divided among four friends in the ratio of $\frac{1}{3} : \frac{1}{4} : \frac{1}{5} : \frac{1}{6}$. What is the amount of the person who got the greatest share?
(a) 14 (b) 40 (c) 36 (d) 60

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

30. If three numbers are in the ratio of 1:2:3 and ha! f the sum is 18, then the ratio of squares of the numbers is:
(a) 6:12:13 (b) 1:2:4 (c) 36:144:324 (d) 3 : 5 : 7

31. The ratio between two numbers is 3:4 and their LCM is 180. The first number is:

32. The incomes of A and B are in the ratio 3 : 2 and their expenditures are in the ratio 5 : 3. If each saves ₹ 1000, then, A's income can be:
(a) ₹ 3000 (b) ₹ 4000 (c) ₹ 6000 (d) ₹ 9000

33. The speeds of three cars are in the ratio 2:3: 4. The ratio between the times taken by these cars to travel the same distance is
(a) 2:3:4 (b) 4:3:2 (c) 4:3:6 (d) 6:4:3

34. ₹ 2250 is divided among three friends Amar, Bijoy and Chandra in such a way that 1/6th of Amar's share, 1/4th of Bijoy's share and 2/5th of Chandra's share are equal. Find Amar's share,

35. The concentration of petrol in three different mixtures (petrol and kerosene) is $\frac{1}{2}, \frac{3}{5}$ and $\frac{4}{5}$ respectively. It 2 litres, 3 litres and 1 litre are taken from these three different vessels and mixed. What is the ratio of petrol and Kerosene in the new mixture?
(a) 4 : 5 (b) 3: 2 (c) 3:5 (d) 2:3

36. In the squadron of Indian Air Force the ratio of Sukhoi is to Mig and Jaguar together is 5:7 and the ratio of Jaguar is to Sukhoi and Mig together is 1: 2 Find the ratio of Sukhoi and Mig:
(a) 2:7 (b) 3:5 (c) 3:1 (d) 5:3

37. In the Ruchika's wallet there are only Rs. 16, consisting of 10 paise, 20 paise and Re. 1 coins. The ratio of no. of coins of 10 paise and 20 paise is 6:1. The minimum no. of Re 1 coin is:
(a) 5 (b) 12 1 (c) 4 (d) 8

38. The difference between two positive numbers is 10 and the ratio between them is 5:3. Find (he product of the two numbers.

(a) 375 (b) 75 (c) 275 (d) 125

39. A cat takes 5 leaps for every 4 leaps of a dog. but 3 leaps of the dog are equal to 4 leaps of the cat. What is the ratio of the speed of the cat to that of the dog?
(a) 11:15 (b) 15:11 (c) 16:15 (d) 15:16

40. A dishonest milkman mixed I litre of water for every 3 litres of milk and thus made up 36 litres of milk. If he now adds 15 litres of milk to the mixture, find the ratio of milk and water in the new mixture,
(a) 12:5 (b) 14:3 (c) 7:2 (d) 9:4

41. If ₹ 58 is divided among 150 children such that each girl and each boy gets 25 p and 50 p respectively. Then how many girls are there?

42. A mixture contains milk and water in the ratio 5:1. On adding 5 litres of water, the ratio of milk to water becomes 5:2. The quantity of milk in the mixture is:
(a) 16 litres (b) 25 litres (c) 32.5 litres (d) 22.75 litres

Answer Key & Explanations

Exercise 01

1. Ans. (b)
2. Ans. (d)
3. Ans. (c)
4. Ans. (d)
5. Ans. (d)
6. Ans. (b)
7. Ans. (a)
8. Ans. (b)
9. Ans. (d)
10. Ans. (b)
11. Ans. (d)
12. Ans. (b)

Solution: a : b : c : d

$a^2 + b^2 + c^2 + d^2 = 50$

$b + c = 5$

and $a : b = 1 : 3$

if consider $a : b = 1 : 3$ it is, then

$c = 2$ (5-3=2)

and $d = 6$ (a:b::c:d)

$a^2 + b^2 + c^2 + d^2 = 1^2 + 3^2 + 2^2 + 6^2 = 50$

Hence the presumed values are correct.

Thus, the average of a, b, c and d $= \frac{a+b+c+d}{4}$

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

Hence (b) is the correct.

Alternatively: assume option (b)

$\frac{a+b+c+d}{4} = 3$

⇨ $a+b+c+d = 12$

Now ∴ b + c = 5

a + d = 7

again a:b = 1:3

c:d = 2 : 6

Now verify that $a^2 + b^2 + c^2 + d^2 = 50$ since it is correct.

Hence option (b) is correct.

Note: it can also be solved by forming quadratic equations.

13. Ans. (b)

Solution: $\frac{a}{b} = \frac{a+b}{a}$

⇨ $a^2 = ab + b^2$ -----a---|--b-----

⇨ $a^2-b^2-ab = 0$

Let b = 1 then a : b = a : 1 (by putting b = 1)

$a^2 - a - 1 = 0$

⇨ $a = \frac{a \pm \sqrt{5}}{2}$ (Solving quadratic equation by Sridharacharya's formula)

$a = \frac{a+\sqrt{5}}{2}$ (negative value can't be considered)

$a : b = \frac{a+\sqrt{5}}{2} : 1$

or

$a : b = (a + \sqrt{5}) : 2$

Therefore, $\frac{b}{a+b} = \frac{2}{1+\sqrt{5}+2} = \frac{2}{3+\sqrt{5}}$

Hence, option (b) is correct.

14. Ans. (b)

Solution: H : S = 1 : 1

And S : G = 2 : 3

H : P = 1 : 2

H : S : G : P = 2 : 2 : 3 : 4

= 2x : 2x : 3x : 4x

Therefore $\frac{2x+2x+3x+4x}{4} = \frac{11x}{4} = 55$

⇨ x = 20

Marks in History = 40

Sociology = 40

Geography = 60

Philosophy = 80

Hence, only in tow subjects he scored 60% or above.

Hence option (b) is correct.

15. Ans. (a)

Solution: Share of a man, a woman and a boy = 7 x , 4x and 3x then the share of 4 men = 4 X 7x = 28x

Then the share of 5 women = 5 X 4x = 20x

Then the share of 2 boys = 2 X 3x = 6x

Now, the share of all women = $\frac{20x}{(28x+20x+6x)}$x 4536

$= \frac{20}{54} X 4536$ = Rs. 1680

Hence, the share of one woman = $\frac{1680}{5} = 336$

16. Ans. (a)

Solution: A : B = 5 : 3

B : C = 5 : 8

A : B : C = 25 : 15 : 24

So, A is the most efficient.

17. Ans. (a)

Solution: A B C

(proportion of $\frac{1}{3}$: $\frac{2}{5}$: $\frac{3}{7}$

Milk in mixture)

Or $\frac{35}{105}$: $\frac{42}{105}$: $\frac{45}{105}$

Quantity of milk in new mixture = 35 + 42 + 45 = 122*l*

Quantity of water in new mixture = (105 X 3) – 122 = 193 *l*

Therefore, ratio of water is to milk = 193 : 122

18. Ans. (b)

Solution: K + 10x = 6000

K + 25x = 9000 (25 X 360 = 9000)

⇨ 15x = 3000

⇨ X = 200 and k = 4000

k + 40x = 4000 + 40 X 200 = 12,000

Where *k* is the fixed expenditure.

19. Ans. (b)

Solution: Since for the constant distance time is inversely proportional to the speed, so, the required ratio of time taken by each of the rickshaw. Car and scooter is

$$\frac{1}{3}:\frac{1}{5}:\frac{1}{6} = 10:6:5$$

$$\left[\frac{1}{3}\times\frac{10}{10}:\frac{1}{5}\times\frac{6}{6}:\frac{1}{6}\times\frac{5}{5} = \frac{10}{30}:\frac{6}{30}:\frac{5}{30} = 10:6:5\right]$$

20. Ans. (b)

Solution: 210 = 2 X 3 X 5 X 7

Therefore, $\frac{N_1}{N_2} = \frac{2k\ X\ 5\ X\ 7}{3k\ X\ 5\ X\ 7}$

Since $N_1 = 70$ and $N_2 = 105$

$N_1 + N_2 = 2 : 3$

Therefore, $N_1 + N_2 = 70 + 105 = 175$

21. Ans. (c)

Solution: $\frac{(53-x)}{(21-x)} = \frac{(41-x)}{(17-x)}$ ➔ x = 5

Alternatively: Go through options.

22. Ans. (d)

Solution: The ratio of the value of the three coins are :

10 X 10 : 17 X 20 : 7 X 100 = 100 : 340 : 700 = 5 : 17 : 35 is the ratio of division of value of coins.

Thus, 0 paise coins correspond to ₹17 hence there will be 85 coins.

23. Ans. (d)

Solution: Ratio of no. of coins = 12 : 10 : 7

Ratio of individual values of cons = 1 “ 0.5 : .25

Ratio of gross value of coins = 12 : 5 : 1.75

= 48 : 20 : 7 ➔ 75₹

Thus, he has ₹ 7 in 25 paise coins. Which means that he would have 28 such coins.

24. Ans. (b)

Solution: A = K X B X C ➔ is known that when A = 6 B = 3 and C= 2 thus we get 6 = 6K ➔ K = 1.

Thus, our relationship between A, B and C becomes A = B X C thus, when B = 5 and C = 7 we get A = 35.

25. Solution: 162

A : B = 3 : 2

B : C = 3 : 2

A : B : C = 9 : 6 : 4

9k + 6k + 4k = 342

K = $\frac{342}{19}$ = 18

Runs made by A = 9 X 18 = 162

26. Ans. (d)
Solution: 2x + 3x + 4x = 180
⇨ x = 20
⇨ 4x = 80

27. Ans. (d)
Solution: (25 X 12x) + (50 X 4x) + (100 X 3x) = 800x = 60000
⇨ X = 75
Number of coins of 25 paise = 12x = 12 X 75 = 900
Alternatively: Go through options, choices (a), (b) and (c) are eliminated since neither of 200, 225, 275 is divisible by 12. Hence choice (d) is correct.

28. Ans. (d)
Solution: $\frac{1}{3}:\frac{1}{4}:\frac{1}{5}:\frac{1}{6}$
⇨ $\frac{20}{60}:\frac{15}{16}:\frac{12}{60}:\frac{10}{60}$ (by taking LCM)
⇨ 20 : 15 : 12 : 10
Largest share = $\frac{20}{(20+15+12+10)} X\ 171$
= $\frac{20}{57} X\ 171$ = 60.

29. Ans. 40
Solution: in 40 liter milk = 32 and water = 8. We want to create 2 : 3 milk to water mixture, for this we would need: 32 milk and 48 water since milk is not increasing thus, we need to add 40 litres of water.

30. Ans. (c)
Solution: 1 : 2 : 3 → x, 2x and 3x add up to 36
So, the numbers are 6, 12 and 18.
Ratio of squares = 36 : 144 : 324.

31. Ans. 45
Solution: the numbers would be 3x and 4x and their LCM would be 12x. this gives us the values as 45 and 60. The first number is 45.

32. Ans. (c)
Solution: solve using options. Option (c) fits the situation as if you take A's income as ₹6000 B's income will become ₹4000 and if they each save ₹1000 their expenditures would be ₹5000 ₹3000 respectively. This gives the required 5 : 3 ratio.

33. Ans. (d)
Solution: the ratio of time would be such that speed x time would be constant for all three, thus if take the speeds as 2x, 3x and 4x respectively, the times would be 6y 4y and 3y respectively.

34. Ans. 1080
Solution: amar's share should be divisible by 6. Option d gets rejected by this logic.
Further A + B + C = 2250.
If amar share is 720 (acc. To option a) Bijoy share should be 480 and Chandra's share should be 300. Gives us a total of 720 + 480+ 300 = 1500.

35. Ans. (b)
Solution: Concentration of petrol in

A	B	C
$\frac{1}{2}$	$\frac{3}{5}$	$\frac{4}{5}$

Quantity of petrol taken from A = 1 litre out of 2 litre
Quantity of petrol taken from B = 1.8 litre out of 3 litre
Quantity of petrol taken from C = 0.8 litre out of 1 litre
Therefore total petrol taken out from
A, B and C = 1 + 1.8 + 0.8 = 3.6 litre
So, the quantity of Kerosene = (2+3+1) – (3.6) = 2.4 litre
Thus, the ratio of petrol to Kerosene = $\frac{3.6}{2.4} = \frac{3}{2}$

36. Ans. (d)
Solution:
S : (M+J) = 5:7 ➔ 7S = 5M + 5J .....(1)
J : (S + M) = 1 : 2 ➔ 2J = S + M .....(2)
By solving equations (1) and (2) we get
S : M : J = 5 : 3 : 4
S : M = 5 : 3

37. Ans. (c)
Solution: 10x + 20 y + 100z = 1600
Again since x : y = 6 : 1
60y + 20y + 100z = 1600
⇨ 80y + 100z = 1600
⇨ 4y + 5z = 80
Putting z = 1, 2, 3, 4, 5…, we get at z = 4, y=15 (an integer)
Hence min. 4 coins of Re. 1 will be there

38. Ans. (a)
Solution: Their ratio being 5 : 3, the difference according to the ratio is 2; but this difference is 10. To get the values. Expand the ratio 5 times. This gives 25 and 15 as the required values. Hence, the product is 375.

39. Ans. (d)
Solution: assume that 1 cat leap is equal to 3 metres and 1 dog leap is equal t o4 metres.
Then the speed of the cat in one unit time = 3 X 5 = 15 metres.
Also, the speed of the dog in one unit time = 4 X 4 = 16 metres.
The required ratio is 15 : 16.

40. Ans. (b)
Solution: The initial amount of water is 9 litres and milk is 27 literes. By adding 15 litres of milk the mixture becomes 42 milk and 9 water ➔ 14 : 3 the required ratio.

41. Ans. 68
Solution: Solve using options.
For option (c). 68 girls hence 82 boys
Amount with girls = 68 X 0.25 = 17
Amount with Boys = 82 X 0.5 = 41
Total of ₹58.
Thus, option (c) fits the conditions.

42. Ans. (b)
Solution: Let the values of milk and water be 5x and x respectively. Then when we add 5 litres of water to this mixture, water wold become x + 5.
Now: 5x/(x+5) = 5:2 ➔ x = 5. Thus 5x is 25

Exercise 02

Ratio Proportion

1. In Ramnagar Colony, the ratio of school going children to non school going children is 5 : 4 if in the next years, the number of non school going children is increased by 20% making it 35400 what is the new ratio of school going children to non school going children?
   (a) 4 : 5 (b) 3 : 2 (c) 25 : 24 (d) none of these

2. In 2006, Raveendra was allotted 650 shares of sun system Ltd in the initial public offer at the face value of Rs. 10 per share. In 2007 sun systems declared a bonus at the rate of 3:13 in 2008 the company again declared a bonus at the rate of 2 : 4 in 2009, the company declared a dividend of 12.5% what is the ratio of the dividend and the initial investment of Raveendra in 2009?

3. Two jars having a capacity of 3 and 5 litres respectively are filled with mixtures of milk and water. In the smaller jar 25% of the mixture is milk and in the larger 25% of the mixture is water. The jars are emptied into a 10 litres cask whose remaining capacity is filed up with water. Find the percentage of milk in the cask.
   (a) 55% (b) 50% (c) 45% (d) none of these

4. Two cubes of bronze have their total weight equivalent to 60kg the first piece contains 10 kg of pure zinc and the second piece contains 8 kg of pure zinc. What is the percentage of zinc in the first piece of bronze if the second piece contains 15 per cent more zinc than the first?
   (a) 15% (b) 25% (c) 55% (d) 24%

5. The speed of three buses are in the ratio 2 : 3 : 4 the ratio between the time taken by these buses to travel the same distance is:
   (a) 2 : 3 : 4 (b) 4 : 3 : 2 (c) 4 : 3 : 6 (d) 6 : 4 : 3

6. The difference between the two positive numbers is 10 and the ratio between them is 5 : 3 find the product of the two numbers.
   (a) 375 (b) 325 (c) 275 (d) 125

7. A group of students decided to buy a book jointly which costs between ₹170 to 195. However at the last moment, two students decided not to contribute and so, each of the remaining students had to pay one rupee each more. What was the price of the book if the students paid equal share?
   (a) ₹182 (b) ₹188.12 (c) ₹192.4 (d) ₹180

8. An alloy of manganese, tin and bronze contains 90% bronze 7% manganese, and 3% tin. A second alloy of bronze and tin is melted with the first and the mixture contains 85% of bronze 5% of manganese, and 10% of tin. What is the percentage of bronze in the second alloy?
   (a) 67.5% (b) 72.5% (c) 77.5% (d) 82.5%

9. A bag contains ₹600 in the form of one urpee, 50 paise and 25 paise coins in the ratio of 3 : 4 : 12 find the total number of 25 paise coins in the bag.
   (a) 75 (b) 200 (c) 300 (d) 900

10. The ratio of metal 1 and metal 2 in alloy A is 3 : 4 in Alloy B same metals are mixed in the ratio 5:8 if 26 kg of alloy B and 14 kg of alloy A are mixed then find out the ratio of metal 1 and metal 2 in the new alloy?

11. From a full barrel containing 729 litres of honey we pour off a litre and add water to fill up the barrel. After stirring the solution thoroughly we pour off a litre of the solution and again add water to fill up the barrel after the procedure is repeated 6 times the solution in the barrel contains 64 litre of honey find a.
(a) 243 litres (b) 81 litres (c) 2.7 litres (d) 3 litres

12. Two candles of the same length are lighted at 12 noon. The first is consumed in 6 h and the second in 4 h assuming that each candle burns at a constant rate, in how many hours after being lighted was the first candle twice the length of the second?
(a) 3 pm (b) 2 pm (c) 1:30 pm (d) 2:30 pm

13. A drum of 20 litres is filled with milk. A milkman has only two measuring vessels of 3 litres and 5 litres without any calibration. He has to measure four litres of milk for a customer without using any other vessel. Minimum how many operations are required for this work, where an operation is counted if the milk is transferred from one vessel to another vessel?
(a) 5 (b) 6 (c) 8 (d) 11

14. If $\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = \frac{d}{e} = \frac{e}{f} = \frac{1}{3}$, find the value of $(\frac{a+b+c+d+e}{b+c+d+e+f})$:
(a) $\frac{1}{81}$ (b) $\frac{1}{27}$ (c) $\frac{1}{3}$ (d) 1

15. Three cats are roaming in a zoo in such a way that when cat A takes 5 steps, B takes 6 steps and cat C takes 7 steps. But the 6 steps of A are equal to the 7 steps of B and 8 steps of C. what is the ratio of their speeds:
(a)140 : 144 : 147 (b) 40 : 44 : 47 (c) 15 : 21 : 28 (d) 252 : 245 : 240

16. The ratio of the density of 3 kinds of petrol P_1, P_2 and P_3 is 9 : 7 : 5. The density of P_1 is 18 gm/cc and P_1, P_2, P_3 are mixed in the ratio of 6: 5: 4 by weight. If a litre of P_3 cost Rs. 40, then find the cost of P_3 in 450 kg of mixture of P_1, P_2 and P_3:
(a) Rs. 380 (b) Rs. 480 (c) Rs. 355 (d) Rs. 448

17. In Maa Yatri Temple every devotee offers fruits to the orphans. Thus every orphan receives bananas, oranges and grapes in the ratio of 3 : 2 : 7 in terms of dozen. But the weight of a grape is 24 gm and weight of a banana and an orange are in the ratio of 4 : 5, while the weight of an orange is 150 gm find the ratio of all the three fruits in terms of weight, that an orphan gets:
(a) 90 : 75 : 42 (b) 180 : 150 : 82 (c) 75 : 42 : 90 (d) none of these

18. If $f(x) = \frac{(x+1)}{(x-1)}$ then the ratio of x to f(y) where y = y (x) is
(a) x : y (b) $x^2 : y^2$ (c) 1 : 1 (d) y : x

19. A bag contains 25 paise 50 paise and 1 Re coins. There are 220 coins in all and the total amount in the bag is ₹ 160. If there are thrice as many 1 Re. coins as there are 25 paise coins, then what is the number of 50 paise coins?
(a) 60 (b) 40 (c) 120 (d) 80

20. The number of oranges in three baskets are in the ratio of 3 : 4 : 5 in which ratio the no. of oranges in first two baskets must be increased so that the new ratio becomes 5 : 4 : 3?
(a) 1 : 3 (b) 2 : 1 (c) 3 : 4 (d) 2 : 3

Answer Key & Explanations
Exercise 02

1. Ans. (c)
   Solution: 5 : 4 → 5 : 4 : 8 → 25 : 24.
   Option (c) is correct.
2. Solution: 0.23
   In 2007 total number of shares = 650 + 650 X $\frac{3}{13}$ = 800
   In 2008 total number of shares = 800 + 800 X $\frac{2}{4}$ = 1200
   The dividend being 12.5% he would get Rs. 1.25 per share as the dividend (calculated as 12.5% of the face value of the share). Hence. His total dividend in 2009. Would be Rs. 1500 also his total initial investment is Rs. 6500 (650 shares at Rs. 10 per share).
   Hence the required ratio = 1500/ 6500 = 3/13 = 0.23
   $\frac{dividend}{Initial\ Investment} = \frac{12.5}{100} X \frac{1200}{650} = 0.23$
3. Ans. (c)
   Solution: there will be a total of 4.5 litres of milk (25% of 3 + 75% of 5) giving a total of 4.5 hence 45%
4. Ans. (b)
   Solution: $\frac{8}{x} - \frac{10}{60-x} = 0.15$
5. Ans. (d)
   Solution: Required ratio = 1/2 : 1/3 : ¼
   To find the simple ratio, we will multiply each of these by the LCM of 2, 3 and 4.
6. Ans. (a)
   Solution: Let the numbers be 5x and 3x
   Then, 5x – 3x = 10
   2x = 10, x = 5
   Required product = 5x X 3x = 5 X 5 X 3 X 5 = 375
7. Ans. (d)
   Solution: through the options
8. Ans. (b)
   Solution: Let x and y be the mass of first ally and second alloy respectively.
   bronze in first alloy = $\frac{9}{10}x$
   Manganese in first ally = $\frac{7}{100}$x
   Tin in first alloy = $\frac{3}{100}$x

   For manganese, we have

   $\frac{\frac{7}{10}x}{x+y}$ X 100 = 5 → 7x = 5x + 5y → 2x = 5y
   Hence $\frac{x}{y} = \frac{5}{2}$
   Applying allegation,
   t = % bronze in second alloy
   $\frac{x}{y} = \frac{5}{85-t}$

   $$\frac{2}{5} = \frac{S}{y85 - t'}$$

   t= 72.5
9. Ans. (d)
   Solution: Let the number of coins denomination ₹1, 50 paise and 25 paise be 3x, 4x, and 12x respectively.

Then $3x. + 4x.\frac{1}{2} + 12x.\frac{1}{4} = 600$

$3x + 2x + 3x = 600 \Rightarrow x = 75$

Number of 25 paise coins = 12 X 75 = 900

10. Solution: 0.67

Quantity of Metal 1 in mixture = $14 \text{ X } \frac{3}{7} + 26 \text{ X } \frac{5}{13} = 16\text{kg}$

Required ratio = $\frac{16}{40-16} = \frac{16}{24} = 0.67$

11. Ans. (a)

Solution: Check each of the options as follow:

Suppose you are checking option b which gives the value of a as 81 litres.

Then it is clear that when you are pouring out 81 litres. You are leaving 8/9 of the honey in the barre. Thus the amount of honey contained after 6 such operations will be given by:

$729 \text{ X } (8/9)^6$ if this answer has to be correct this value must be equal to 64 (which it clearly is not since the value will be in the form of a fraction.)

Hence, this is not the correct option. You can similarly rule out the other options.

12. Ans. (a)

Solution: Assume the length of each candles = 12 cm (LCM of 4 and 6)

Hence, rate of burning of 1st candle = 2 cm/h and rate of burning of 2nd candle = 3 cm/h

Assume that after t hours of burning 1st candle is twice the length of 2nd candle.

According to the question, (12-2t):(12-3t) = 2:1 or 12-2t = 2 (12-3t) or 12-2t = 24-6t

Solving it we get t= 3j

Hence option (a) is the answer.

13. Ans. (c)

Solution: Do it yourself.

14. Ans. (c)

Solution: b = 3a

c = 3b = 9a

d = 3c = 9c = 27a

e= 3d = 9c = 27b = 81a and f = 3e = 243a

put the values and simplify.

Or we know that $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} \ldots = \frac{a+c+e}{b+d+f}$

15. Ans. (a)

Solution: Frequency of step of A : B : C = 5 : 6 : 7

But it terms of size of step, 6A = 7B = 8C

Ratio of speeds of A, B and C = $\frac{5}{6} : \frac{6}{7} : \frac{7}{8}$

= 280 : 288 : 294

= 140 : 144 : 147

16. Ans. (b)

Solution: Density of P_1,P_2 and P_3 are 18, 14 and 10 gm/cc

Again since volume = $\frac{weight}{density}$

Now the weight of P_3 in 450 kg mixture = $\frac{450\ X\ 4}{15}$ = 120 kg

Now volume of $P_3 = \frac{120}{10}$ = 12 litre

The cost of 12 litre P_3 petrol = 12 X 40 = Rs. 480

17. Ans. (a)

Solution: Ratio of fruits (by dozen) = 3 : 2 : 7

Ratio of fruits by weight = 120 : 150 : 24

Ratio of fruits (combined) by weight
= 3 X 120 : 2 X 150 : 7 X 24
= 30 : 25 : 14

18. Ans. (c)
Solution: Let x = 5
Then f(x) = 6/4 = 1.5 = y
And f(y) = 2.5/0.5 = 5,

Thus, the ratio of x :f(y) = 1 : 1
Note: Even if you take some other value of y, you would still get the same answer.

19. Ans. (a)
Solution: The no. of coins of 1Re. = 3x and 25 p = x.
Conventionally, we can solve this using equations as follow.
A + B + C = 220 (1)
A = 3C (2)
A + 0.5B + 0.25 C = 160 (3)
We have a situation with 3 equation and 3 unknown and we can solve for
A (no. of 1 Re coins),
B (no. of 50 paise coins)
C (no. of 25 paise coins)
However a much smarter approach would be to go through the options. If we check option (a) – number of 50 paise cons = 60 we would get the number of 1 re coins as 120 and the number of 25 paise cons as 40.
120 x 1 + 60 X 0.5 + 40 X 0.25 = 160
This fits the conditions perfectly and is hence the correct answer.

20. Ans. (b)
Solution: $B_1 : B_2 : B_3 = 3x : 4x : 5x$
Again $B_1 : B_2 : B_3 = 5y : 4y : 3y$
Since there is increase in no. of oranges in first two basket only, it means the no. of oranges remains constant in the third basket
$5x = 3y$
Hence, 3x:4x:5x
⇨ $\frac{9y}{5} : \frac{12y}{5} : \frac{15y}{5} = 9y : 12y : 15y$
And
5y : 4y : 3y => 25y : 20y : 15y
Therefore, increase in first basket = 16
And increase in second basket = 8
The required ratio = 2 : 1

Exercise 03

Variation

---

1. A quantity x varies inversely as the square of y. Given that x = 4, when y = 3, the value of x when y = 6 is :
(a) 1 (b) 2 (c) 3 (d) 4

2. Suppose y varies as the sum of two quantities of which one varies directly as x and the other inversely as x if y = 6 when x - 4 and y = $3\frac{1}{3}$ when x = 3, then the relation between x and y is :

(a) $x = y + 4$ (b) $y = 2x + \frac{8}{x}$ (c) $y = 2x - \frac{8}{x}$ (d) $y = 2x - \frac{4}{x}$

3. The time period of a pendulum is proportional to the square root of the length of the pendulum. Consider the following statements:
(1) If the length of the pendulum is doubled, then the time period is also doubled.
(2) If the length is halved, then time period becomes one-fourth of the original time period.
The correct assertions are:
(a) 1 (b) 2 (c) neither 1 nor 2 (d) both 1 and 2

4. Time period (T) of pendulum is directly proportional to the squat e loin of length of trying by which bob is attached to a fixed point and inversely proportional to the square root of gravitational constant 'g'. Time period of a bob is 3 seconds when the gravitational constant g is 4 in/sec^2 and length of string is 9 metre, what is the time period of a bob having a string of length 64 metre and gravitational constant 16 in/sec^2?
(a) 4 seconds (b) 12 seconds (c) 16 seconds (d) 10 seconds

5. The period of the pendulum is directly proportional to the square root of the length of the string. The period of such a pendulum with string of length 16 cm is 52 seconds. Find the length of the string if the period is 65 seconds:
(a) 4.5 cm (b) 5 cm (c) 6 cm (d) none of these

6. Weight of a sumo is jointly varies as his height and his age. When height is 1.2 m and age is 20 years his weight is 48 kg. Find the weight of the sumo when his height is 1.5 metre and age is 30 years :
(a) 60 kg (b) 72 kg (c) 90 kg (d) 58 kg

7. The cost of the marble varies directly with square of its weight. Marble is broken into 3 parts whose weights are in the ratio 3: 4:5. If marble had been broken into three equal parts by weight then there would have been a further loss of Rs. 1800. What is the actual cost of the original (or unbroken) marble?
(a) Rs. 3600 (b) RS. 10,800 (c) Rs. 2160 (d) none of these

8. A precious stone weighting 35 grams worth Rs. 12250 is accidentally dropped and gets broken into tow pieces having weights in the ratio of 2 : 5 if the price varies as the square of the weight then find the loss incurred.
(a) Rs. 5750 (b) Rs. 6000 (c) Rs. 5500 (d) Rs. 5000

9. The volume of a pyramid varies jointly as it height and the area of its base; and when the area of the base is 60 square dm and the height 14 dm, the volume is 280 cubic dm. what is the area of the base of a pyramid whose volume is 390 cubic dm and whose height is dm?
(a) 40 (b) 45 (c) 50 (d) none of these

10. An .engine can move at the speed of $\frac{20}{3}$ m/s without any wagon attached. Reduction in the speed of the train is directly proportional to the square root of the no. of wagons attached to the engine. When there are only four wagons attached its speed is $\frac{50}{9}$ m/s. The greatest no. of wagons with which the engine can move is:
(a) 144 (b) 143 (c) 12 (d) none of these

11. In a family there were n people. The expenditure of rice per month in this family is directly proportional to the 5 time the square of no. of people in the family. If the elder son left the family to study is USA there was decrease in consumption of 95 kg rice per month. What is the value of n?
(a) 5 (b) 12 (c) 9 (d) 10

12. Measurement of the temperature is carried out using thermometers in which the mercury expands linearly with the change in temperature. If the temperature range from the melting point of water to the boiling point of

water is divided into 0 to 100 in Celsius scale and 32 to 212 in Fahrenheit scale, what is the temperature at which both the scales indicate the same value?

(a) 0 (b) 40 (c) 32 (d) -40

13. Distance covered by a train is directly proportional to the time taken and also it varies directly as the square root of fuel used and varies inversely as the no. of wagons attached to it. a train covers 192 km journey in 20 hours when there are 10 wagons attached to it and total fuel consumption was 256 litre of diesel find the consumption of fuel per km when a train goes 200 km in 25 hr with 15 wagons attached to it:

(a) 1.5 *l/km* (b) 2 *l/km* (c) 2.8 *l/km* (d) 20 *l/km*

14. If A varies as C, and B a varies as C, then which of the following is false:

(a) (A+B) $\propto$ C (b) (A-B) $\propto$ 1/C (c) $\sqrt{AB} \propto C$ (d) AB $\propto C^2$

15. At constant temperature, pressure of a definite mass of gas is inversely proportional to the volume, if the pressure is reduced by 20% find the respective change in volume.

(a) -16.66% (b) +25% (c) -25% (d) +16.66%

16. If x varies inversely as y^2-1 and is equal to 24 when y = 10, find x when y 5.

(a) 99 (b) 101 (c) 91 (d) 93

17. If x varies as y and y = 7 when x = 18 find x when y = 21.

(a) 36 (b) 54 (c) 72 (d) 18

18. A varies jointly as B and C, and A = 6 when B = 3, C = 2; find A when B = 5, C = 7.

(a) 17.5 (b) 35 (c) 70 (d) 105

19. If x varies as y directly, and as z inversely, and x = 14 when y = 10; find z when x = 49, y = 45.

(a) 14/10 (b) 10 (c) 10/14 (d) cannot be determined

20. X varies directly as (y2 + z2), at y = 1 and z = 2 the value of x is 15. Find the value of z , when x = 39 and y = 2.

21. The duration of a railway journey varies as the distance and inversely as the velocity the velocity varies directly as the square root of the quantity of coal used, and inversely as the number carriages in the train. In a journey of 50 km in half an hour with 18 carriages, 100 kg of coal is required. How much coal will be consumed in a journey of 42 km in 28 minutes with 16 carriages.

(a) 64 kg (b) 49 kg (c) 25 kg (d) 36 kg

22. The weight of a circular disc varies as the square of the radius when the thickness remains the same; it also varies as the thickness when the radius remains the same. Two disc have their thickness in the ratio of 9 : 8 the ratio of the radii if the weight of the first is twice that of the second is

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

23. If x varies as y then $x^2 + y^2$ varies as

(a) x + y (b) x – y (c) $x^2 – y^2$ (d) none of these

24. Total expenses of running the hostel last Harvard business school are partly fixed and partly varying linearly with the number of boarders. The average expenses per boarder is $70 when there are 25 boarders and $60 when there are 50 boarders. What is the average expense per boarder when there are 100 boarder.

(a) 55 (b) 56 (c) 54 (d) 50

25. x varies directly as y and x varies inversely as the square of z. When y = 75 and x = 6, then z = 5. Find the value of x when y = 24 and z = 4:
(a) 1 (b) 2 (c) 3 (d) 4

26. x varies directly as $(y^2 + z^2)$. At y = 1 and z - 2, the value of x is 15. Find the value of 2, when x = 39 and y = 2:
(a) 2 (b) 3 (c) 4 (d) 6

27. The speed of the engine of Gondwana express is 42 km/h when no compartment is attached. And the reduction is speed directly proportional to the square root of the number of compartments attached if the speed of the train carried by this engine is km/h when 9 compartments are attached, the maximum number of compartments that can be carried by the engine is
(a) 49 (b) 48 (c) 46 (d) 47

28. P is directly proportional to Q, and Q = 7 when P = 15, find P when Q = 14.
(a) 36 (b) 54 (c) 30 (d) 60

29. The value of a diamond varies directly as the square of its weight. If a diamond worth Rs, 10000 is divided into 2 piece in the ratio of 4 : 6, what is the loss in value?
(a) 52 % (b) 48% (c) 36 % (d) none of these

30. The price of a necklace varies directly as the no. of pearls in it. also it varies directly as the square root of radius of a pearl. The price of a necklace was Rs. 150. When it had 75 pearls each of radius 1 cm find the radius of the pearl of a necklace having 100 pearls whose cost is Rs. 600.
(a) 2 (b) 9 (c) 3 (d) 4

31. The price of book varies directly as the no. of pages in it and inversely as the time periods in years that have elapsed since the date of purchase. Two books cost the same, however the no. of pages in the first book is triple of the second book. If the first book is sold on 18 years ago, how long ago was the second book sold?
(a) 54 years (b) 9 years (c) 6 years (d) 3 years

32. A is proportional to B, B is inversely proportional to C, C is proportional to the square of D. D is directly proportional to the cube root of E. assuming positive integers, if A increases then E:
(a) increase (b) decrease (c) cannot say (d) could increase of decrease

Answer Key and Explanations
Exercise 03

1. Ans. (a)
2. Ans. (c)
3. Ans. (c)
4. Ans. (a)

Solution: $T \propto \frac{\sqrt{l}}{\sqrt{g}} \rightarrow T = k\sqrt{\frac{l}{g}}$

Therefore, $3 = K\sqrt{\frac{9}{4}}$ or $3 = K\sqrt{\frac{3}{2}} \rightarrow K = 2$

Again $T = K\sqrt{\frac{l}{g}} = 2 \times \sqrt{\frac{64}{16}} = 4$

T = 4 seconds

5. Ans. (d)

Solution: $P \propto \sqrt{l} \Rightarrow p = k\sqrt{l}$

$52 = k\sqrt{16}$

k = 13

again, $P = k\sqrt{l}$

⇨ l = 25cm

6. Ans. (c)

Solution: $W \propto HA \rightarrow W = K \times H \times A$

Now, $48 = K \times 1.2 \times 20 \rightarrow 2$

Again $W = 2 \times 1.5 \times 30$

W = 90

7. Ans. (d)

Solution: $W_1 : W_2 : W_3 = 3 : 4 : 5$

$\text{Cost} = (3x)^2 + (4x)^2 + (5x)^2 = 50\,(x)^2$

Again W1 : W2 : W3 = 4 : 4 : 4 (when weights are equal)

$\text{Cost} = (4x)^2 + (4x)^2 + (4x)^2 = 48x^2$

$\text{Loss} = 50x^2 - 48x^2 = 2x^2$

$1800 = 2x^2$

X = 30

Actual cost of unbroken marble $= (4x + 4x + 4x)^2$

$= (12x)^2 = 144x^2$

$= 144\ x\ x^2$

$= 144 \times 900 = 129600$

8. Ans. (d)

Solution: $P = K \times W^2 \rightarrow 12250 = K \times 35^2 \rightarrow K = 10$.

Thus our price and weight relationship is: $P = 10W^2$ when the two pieces are in the ratio 2 : 5 (weight wise) then we know that their weights must be 10 grams and 25 grams respectively. Their values would be: 10 gram piece:

10×10^2 = Rs. 1000;

25 gram piece; 10×25^2 = Rs. 6250.

Total price = 1000 + 62450 = 7250.

From an initial value of 12250. This represents a loss of Rs. 5000.

9. Ans. (b)

Solution: $V = k\ AH \rightarrow 280 = k \times 60 \times 14 \rightarrow 280 = 840k$.

Thus k = 1/3 and the equation becomes;

V = AH / 3 and $390 = 26A=3 \rightarrow A = 45$.

10. Ans. (b)

Solution: Let we the number of wagons and s be the speed of engine without wagon $= \frac{20}{3}$m/s = 24 km /hr

Then speed of the train $= s - k\sqrt{w}$

$20 = 24 - k\sqrt{w}$ $\left[\frac{50}{9}\text{m/s} = 20\ \text{km/hr}\right]$

= = 2

When train will stop its speed becomes zero

$0 = 24 - 2\sqrt{w}$ (:. k =2)

⇨ W = 144

Since at 144 wagons train will stop, so at 143 wagons train just can move with its least possible speed having

maximum possible wagons.

11. Ans. (d)

Solution: Expenditure = 5 (no. of family members)^2

⇨ $E_1 = 5(n)^2$ ....(1)

Again ➔ $E_2 = {}^5(n-1)^2$ ....(2)

But $E_1 - E_2 = 95$

$5 [n^2 - (n-1)^2] = 95$

$5 [n^2 - (n^2 + 1)^2] = 95$

$5 [n^2 - (n^2 + 1 - 2n] = 95$

$n^2 - n^2 - 1 + 2n = 19$

⇨ $2n = 20$ ➔ $n = 10$

12. Ans. (d)

Solution: Using the formula $\frac{C}{5} = \frac{F-32}{9}$

We well get [-40] as answer.

13. Ans. (b)

Solution: D $\propto \frac{\sqrt{F}\, x\, T}{W}$, D distance, F ➔ fuel, T ➔ time, W➔ No. of wagons

D= k $\frac{\sqrt{F}\, x\, T}{W}$

192 = k D $\propto \frac{\sqrt{256}\, x\, 20}{10}$

⇨ K = 6

Again 200 = D $\propto \frac{6\, x\, \sqrt{F}\, x\, 25}{15}$

⇨ $\sqrt{F} = 20 ==> F = 4000\ litre$

∴ Fuel used per km = $\frac{400}{200}$ = 2l/km

14. Ans. (b)

Solution: Option (b) is not true.

15. Ans. (b)

Solution: Since pressure and volume are inversely proportional, we get that if one is reduced by 20% option (b) is correct.

16. Ans. (a)

Solution: $x = k(y^2-1)$. This gives k = 24 x 99 = 2376.

The equation becomes x = 2376/24 = 99.

17. Ans. (b)

Solution: x = ky ➔ 18 = 17 k ➔ k = 18/7

Hence, x = 18/7 *X* y

When y = y = 21, x = 54.

18. Ans. (b)

Solution: A = K x B x C ➔ it is known that when A = 6, B = 3 and C = 2, thus we get 6 = 6K ➔ K = 1.

Thus, our relationship between a, B and C becomes A = B x C.

Thus, when B = 5 and C = 7 we get a = 35

19. Ans. (d)

Solution: x = ky/z

We cannot determine the value of k from the given information and hence cannot answer the question.

20. Solution 3

$x \propto (y^2 + z^2)$

$x = k (y^2 + z^2)$

$15 = k (1^2 + 2^2)$

∴ = 3

Thus, $x = 3 (y^2 + z^2)$

$39 = 3 (4 + z^2)$

$z^2 = \frac{39-12}{3} = 9$

$z = 3$

21. Ans. (a)
Solution: $T = KD/V$ $V = (K_1Q^{1/2})/ N$ where K and K_1 are constants, T is the time duration of the journey, Q is the quantity of coal used and N is the number of carriages.
Thus, $T = (KDN)/ (K_1Q^{1/2})$ or $T = (K_2DN)/ (Q^{1/2})$ → if we take K/K_1 as K_2.
From the information provided in the question: $30 = (K_2 \times 50 \times 18) /10$ $24 K_2 = 1/3$
Thus, the equation becomes: $T = (DN)/ (3Q^{1/2})$.
Then, when D = 42, T = 28 and N = 16 we get:
$28 = 42 \times 16 (3Q^{1/2})$ → $Q = 64$

22. Ans. (a)
Solution: $\frac{2w_2}{w_2} = \frac{9r_1^2}{8r_2^2}$
Thus, $r_1 / r_2 = 4 : 3$

23. Ans. (d)
Solution: x varies as y, means x = kv, this does not have any relation to the variance of $x^2 + y^2$.

24. Ans. (a)
Solution: When there are 25 boarders, the total expenses are $1750. When there are 50 boarders, the total expenses are $ 3000 the change in expense due to the coming in of 25 boarders is $1250. Hence expenseper boarder is equal to $50. This also means that when there are 25 boarders. The variable cost would be 25 x 50 = $1250.
Hence $500 must be the fixed expenses.
So, for 100 boarders, the total cost would be $ 500 (fixed) + $ 5000 = $ 5500

25. Ans. (c)
Solution: $x \propto y$ and $x \propto \frac{1}{z^2}$

$x \propto \frac{y}{z^2} = x = k \frac{y}{z^2}$

$6 = k X x \propto \frac{75}{5^2} = 5 = 2$

Again $X = 2$ $X x \propto \frac{24}{4^2} = x = 3$

26. Ans. (b)
Solution: $x \propto (x^2 + y^2)$ → $x = k (y^2 + z^2)$
$15 = k (1^2 + 2^2)$ → $k = 3$
Again $39 = 3 \times (2^2 + z^2)$
$13 = (4+ z^2)$ → $z = 3$

27. Ans. (b)
Solution: $S = 42 - k\sqrt{n}$
So, $24 = 42 – k \times 3$ → $k = 6$
$S = 42 - 6\sqrt{n}$
For 49 compartments the train would not move. Hence it would move for 48 compartments.

28. Ans. (c)
Solution: $p \propto q$ → $p = k q$
$15 = k \times 7$, $k = \frac{15}{7}$
$P = kq = 14 \times 15/7 = 30$

29. Ans. (b)
Solution: $V \propto W^2$ $V = KW^2$, V = value of diamond and W = weight of diaomd

K = constant

$10000 = K.(10)^2$ ➔ K = 100

Hence, $V = 100 \times 4^2 = 1600$

$V = 100.6^2 = 3600$

Net loss = (Rs. 10000 - 5200) = (Rs. 4800, i.e. 48%)

30. Ans. (b)

Solution: $P \propto n\sqrt{r}$ ➔ $P = kn\sqrt{r}$

Where P is the price of necklace, n is number of pearls and r is the radius of a peral.

Now, $150 = k \times 75 \times \sqrt{1}$

=. k = 2

Again $600 = 2 \times 100 \times \sqrt{r}$

$\sqrt{r} = 3$ ➔ r = 9cm

31. Ans. (c)

Solution: $P \propto \frac{N}{T}$ ➔ $P = K\frac{N}{T}$

P → price of a book, N --< Number of pages, T → Time period

$P_1 = P_2$

$$K\frac{N_1}{T_1} = K\frac{N_2}{T_2}$$

⇨ $\frac{3N}{18} = \frac{N}{T}$

$T = 6\ years$

32. Ans. (b)

Solution: $A \propto B$

$B \propto (1/C)$

$C \propto D^2$

$D \propto E^{1/3}$

When A increase ➔ B also increase ➔ C decreases

Decreases in C results in decrease in D and decrease in d results decrease in E.

Exercise 04
Problems on Ages

1. Amit is as much younger to Barkha as he is older to Chaman. If the sum of the ages of Barkha and Chaman is 48 years, what is the present age of Amit?
(a) 18 years (b) 36 years (c) 24 years (d) 28 years

2. Renuka got married 8 years ago. Today her age is $1\frac{1}{3}$ times he age at the time of marriage. Her daughter's age is 1/8 times her age. Her daughter's age is:
(a) 3 years (b) 4 years (c) 6 years (d) 8 years

3. Ten years age B was twice of A in age, if the ratio of their present ages is 4 : 3 what is the sum of their present ages?
(a) 25 years (b) 30 years (c) 40 years (d) 35 years

4. The sun of the ages of Aryabhatta and Shridhar is 45 years. Five years ago the product of their ages was 4 times the Aryabhatta age at that time. The present ages of Aryabhatta and Shridhar respectively are:
(a) 25 and 20 (b) 35 and 10 (c) 36 and 9 (d) 40 and 5

5. The ratio of ages of Rahul and Deepesh is 3 : 5 : 10 years later this ratio becomes 5 : 7. What is the present age of Deepesh?
(a) 20 years (b) 50 years (c) 25 years (d) 40 years

6. The sum of the ages of the 4 members of Sinha family is 140 years. 5 years ago the ages of the 4 years members Nishu, Vicky, Mrs. Sinha and Mr. Sinha were in the ratio of 2 : 3 : 7 : 8 after how many years would Nishu be as old as the present age of his mother?
(a) 10 years (b) 17 years (c) 30 years (d) 32 years

7. The work done by a man, a woman and a child is in the ratio of : 2 : 1 there are 20 men, 30 women and 36 children in a factory, their weekly wages amount to Rs. 780, which is divided in the ratio of work done by the men, women and children. What will be the wages of 15 men, 21 women and 30 children for 2 weeiks?
(a) Rs. 585 (b) Rs. 292.5 (c) Rs. 1170 (d) Rs. 900

8. 10 Years ago the age of karishma was $\frac{1}{3}$rd of the age of Babita 14 Years hence the ratio of ages of Karishma and Babita will be 5 : 9. Find the ratio of their present ages.
(a) 13 : 29 (b) 11 : 27 (c) 29 : 17 (d) 13 : 25

9. The ages of Vinay, Varshav Veera and Vikram are in arithmetic progression, but not in order. the ratio of ages of vinay and Varsha is 6 : 5 and Veera is to vikram is 7 : 8 two years later the age of Varsha and Vikram will be 2 :3 find the ratio of ages of Vinay and Veera:
(a) 7 : 6 (b) 5 : 8 (c) 6 : 7 (d) 8 : 9

10. The ratio of age between A and B is 6 : 5 and the age of each C and D is $\frac{9}{10}$ times that of B. age of F is less than A but greater than B. the ratio of ages between B and E is 2 : 3 also age of A is 3 years less than E. what is the ratio of ages of A and F if all the ages are in integers?
(a) 12 : 11 (b) 9 : 7 (c) 24 : 19 (d) 12 : 13

11. The present ratio of ages of A and B is 4 : 5 18 years ago, this ratio was 11 : 16 find the sum total of their present ages.
(a) 90 years (b) 105 years (c) 110 years (d) 80 years

12. If the ratio of the ages of Maya and Chhaya is 6 : 5 at present, and fifteen years from now, the ratio will get changed to 9 : 8 then find Maya's present age.
(a) 24 years (b) 30 years (c) 18 years (d) 33 years

13. Pooja, Shipra and Monika are three sisters. Pooja and shipra are twins. The ratio of sum of the ages of Pooja and Shipra is same as that of Monika along. Three years earlier the ratio of age of Pooja and Monika was 2 : 7. What will be the age of Shipra 3 years hence?
(a) 21 years (b) 16 years (c) 8 years (d) 12 years

14. A couple got married 9 years ago when the age of wife was 20% less than her husband. 6 years from now the age of wife will be only 12.5% less than her husband. Now they have six children including single, twins and triplets and the ratio of their ages is 2 : 3 respectively. What can be the maximum possible value for the present age of this family?
(a) 110 years (b) 103 years (c) 105 years (d) 83 years

15. At Sahar shopping centre a person can purchase as much articles at a time as his or he rage that is a person of n years age can purchase only n similar articles at a time. Amisha is younger to her elder brother who has just entered into his twenties. One day amisha went to the Sahara shopping centre. She purchased same toffees at a particular rate on the ground floor. But when she reached on third floor she found that she could purchase double the no. of toffees with the same amount as she bad spent on the ground floor. Also to purchase the same no. of toffees on the third floor she had to spend Rs. 2 less than that of on the first floor. How many toffees did she buy?
(a) 6 (b) 12 (c) 18 (d) 15

Answer Key & Explanations
Exercise 04

1. Ans. (c)
2. Ans. (b)
3. Ans. (d)
4. Ans. (c)
5. Ans. (c)

   Solution: $\frac{R}{D} = \frac{3x}{5x}$ and $\frac{R}{D} \rightarrow \frac{3x+10}{5x+10} = \frac{5}{7}$

   ⇨ x = 5

   Hence, $\frac{R}{D} = \frac{15}{25}$
6. Ans. (c)

   Solution: Let their ages 5 years ago be 2x, 3x 7x and 8x.
   Their ages now 2x + 5, 3x + 5, 7x + 5, 8x + 5.
   Or 20 x + 20 = 140
   ⇨ 20x = 120 = x = 6
   Present age of Nishu = 2 x 6 + 5 = 17 years
   Present age of Mother = 7 x 6 + 5 = 47 years
   Hence, required years (47 - 17) years = 30 years
7. Ans. (c)

   Solution: Let the wages of a man, a woman and a child he 3x, 2x and x respectively,
   Then, 20 x 3x + 30 x 2x + x *x* 36 = 780
   60x + 60x + 36x = 780
   = 156x = 780 = x = 5
   Required amount = 2(15 x 3 x 5 + 21 x 2 x 5 + 30 x 5)
   = 2 (225 + 210 + 150) = Rs. 1170
8. Ans. (a)

   Solution: Let the present age of Karishma and Babita be x and y then,
   $\frac{x-10}{y-10} = \frac{1}{3}$ .....(1)
   Again $\frac{x+14}{y+14} = \frac{5}{9}$ .....(2)
   By solving (1) and (2) we get x = 26 and y = 58
9. Ans. (c)

   Solution: Varsha : Vinay = 5 : 6 = 5x : 6x
   Veera : vikram = 7 : 8 = 7y : 8y
   But their ages are in A.P.
   Therefore, 6x – 5x = 8y – 7y
   ⇨ x = y
   again, $\frac{5x+2}{8y+2} = \frac{2}{3}$
   $= \frac{5x+2}{8x+2} = \frac{2}{3}$
   ⇨ x = 2
   Therefore, the ages of Varsha , Vinay, Veera and Vikram are 10, 12, 14 and 16 years respectively.
   Therefore, the ratio of ages of Vinay and Veera = 6 : 7
10. Ans. (a)

    Solution: B = $\frac{5}{6}$ A .....(i)
    And C = D = $\frac{9}{10}$ B .....(ii)
    Also B = $\frac{2}{3}$ E .....(iii)
    And E- A = 3 .....(iv)
    From (i) and (iii) $\frac{A}{E} = \frac{4}{5}$ or E = $\frac{5}{4}$A
    E – A = $\frac{5A}{4}$ – A = 3 from (iv) and (v)
    ⇨ A = 12 and E = 15 and B = 10

Also C = D = 9 and F = 11, since B< F < A and F is integer A : F = 12 : 11

11. Ans. (a)
Solution: 4x and 5x are their current ages, according to the problem 4x – 18 : 5x – 18 = 11 : 16 → x = 10 and problem ,
4x – 18 : 15x – 18 = 11 : 16 → x = 10 and hence the sum total of their present ages is 90 years (40 + 50).

12. Ans. (b)
Solution: 6x + 15 : 5x + 15 = 9 : 8
→ 45x + 135 = 48 x + 120
- 3x = 15 → x = 5
- Maya's present age = 6x = 30

13. Ans. (c)
Solution: Since Pooja and Shipra are twins so their ages be same. Let their ages be x and age of Monika be y, then,
x + x = y .....(i)
and $\frac{(x-3)}{(y-3)} = \frac{2}{7}$
⇨ 7x – 2y = 15
Now, from equation (1),
7x – 4x = 15 → x = 5
So the age of Shipra 3 years will be 5 + 3 = 8 years.

14. Ans. (b)
Solution: $\frac{H-9}{W-9} = \frac{5}{4}$ and $\frac{H+6}{W+6} = \frac{8}{7}$
Thus the present age of Husband is 34 and present age of his wife is 29 years.
Now, the maximum age of any child must be less than 9 years. Hence their ages can be 2,3 and 4 ,6 and 8 years. So the max. possible sum of age of this family
= 34 + 29 + (1 x 4 + 2 x 6 + 3 x 8)
= 103 years

15. Ans. (b)
Solution: Just go through option and factorize the product into two factors such that the given conditions must satisfy.
e.g.6 = 1 x 6
2 x 3
3 x 2
6 x 1
It is not true.
Again consider option (b)
Now you can see that the rate is being half from 4 to 2 so she can purchase double number of toffees as she was already purchasing on the ground floor. Again to purchase the same number of toffees she bad to spend Rs. 2 less than the spending on the groun floor:

Rate	Number of toffee / Re		Total number of toffee
4	x 3	=	12
2	x 6	=	12

And if you check other option (c) and (d) they will not satisfy the given conditions.

Exercise 05
Partnership

---

1. A company make a profit of Rs. 900,000, 20% of which is paid as taxes, if the rest is divided among the partners P, Q and R in the ratio of 1 : 1 : $\frac{1}{2}$: 2 then the share of P, Q and R are respectively.
(a) 2,40,000 : 3,20,000 : 1,60,000 (b) 3,20,000 : 2,40,000 : 1,60,000
(c) 1,60,000 : 3,20,000 : 2,40,000 (d) 1,60,000 : 2,40,000 : 3,20,000

2. Four milkmen rented a pasture. A put to graze 16 cows for 3 months, B 20 cows for 4 months, C 18 cows for 6 months and D 42 cows for 2 months. If A's share of rent be Rs. 2400. The rent paid by c is:

(a) Rs. 3200 (b) Rs. 4200 (c) Rs. 4000 (d) Rs. 5400

3. Two-fifth of anil's salary is equal of Bhuvan's salary and seven ninth of Bhuvan's salary is equal to Chandra's salary. The sum of the salary of all of them is Rs700 which of the following is the salary of each?
(a) 300, 225, 250 (b) 500, 425, 375 (c) 450, 180, 140 (d) 520, 610, 475

4. Pawan, Qureshi and Ravi entered into partnership, and provided capital of Rs. 22000 , Rs26000 and Rs34000 respectively. Some months later 10000 extra capital was supplied by Qureshi at the end of 12 months, the total profit was Rs50274 and Pawan's share was Rs12474 when did Qureshi supply the extra capital?
(a) after 4 months (b) after 5 months (c) after 6 months (d) none of these

5. A, B and C subscribe Rs. 47000 for a business if a subscribes Rs. 7000 more than B and B rs. 5000 more than C. then out of total profit of Rs. 4700, C receives.
(a) Rs. 1200 (b) Rs. 4500 (c) Rs. 1000 (d) none of these

6. The ratio of income of Anil and Mukesh is 2 : 3 the sum of their expenditure is Rs. 8000 and the amount of savings of Anil is equal to the amount of expenditure of Mukesh. What is the sum of their savings?
(a) 22,000 (b) 4,000 (c) 16,000 (d) 12,000

7. Hutch and Essar entered into a partnership just 5 months ago. The ratio of profit claimed by Hutch and Essar is 6 : 17 if essar had just started his business 12 months ago with Rs. 1275 what is the amount contributed by Hutch?
(a) Rs. 980 (b) Rs. 1080 (c) Rs. 1200 (d) Rs. 998

8. Rs. 960 were distributed among A, B, C and D in such a way that C and D together gets half of what A and B together gets and c gets on third amount of B. Also D gets $\frac{5}{3}$ Times as much as C. what is the amount of A?
(a) Rs. 240 (b) Rs. 280 (c) Rs. 320 (d) Data insufficient

9. A, B, C enter into a partnership. A contributes one third of the whole capital while B contributes as much as A and C together contribute. If the profit at the end of the years is Rs. 84000 how much would each receive?
(a) 24,000, 20,000, 40,000 (b) 28,000, 42,000,14,000
(c) 28,000, 42,000, 10,000 (d) 28,000, 14,000, 42,000

10. A and B invested Rs. 12,000 and Rs. 18,000 respectively, in a business for the whole year. At the year end there, was a total profit of Rs. 2000. What is the share of A in the profit?
(a) Rs. 800 (b) Rs. 1200 (c) Rs. 1600 (d) none of these

11. A and B invested the same capital in a business at the year end, they share the profit in the ratio of 3 : 2 if a has invested his capital for the whole years, for how many months B has invested his capital?
(a) 6 months (b) 8 months (c) 9 months (d) none of these

12. A and B invest Rs. 12,000 and Rs 16,000 respectively. In a business. At the year end, they share the profit in the ratio of 3 : 1 if A has invested his capital for the whole year, for how many months B has invested his capital?
(a) 4 months (b) 3 months (c) 6 months (d) 8 months

Answer Key and Explanations

1. Ans. (d)
2. Ans. (d)
3. Ans. (c)
Solution: Let salary of Anil = Rs. x
Bhuvan's salary = $\frac{2}{5}$x
Chandra's salary = $\frac{7}{9}, \frac{2}{5}x = \frac{14x}{45}$
$x + \frac{2}{5}x + \frac{14x}{45} = 770$

⇨ $\frac{77x}{45} = 770$

⇨ $x = 450$

4. Ans. (c)
Solution: Since we do not know the share of either of them, we cannot find the required time.
5. Ans. (c)
6. Ans. (d)
Solution: Let the incomes of A and M is 2x and 3x
Let the savings of A be K, then the expenditure of M be K also expenditure of A = 2x – K
Given (2x-K) + K = 8000 ➔ x=4000
Total income of
A and B = 2x + 3x = 5x = 5 X 4000 = 20000
Total savings of A and B = 20000 – 8000 = Rs. 12,000
7. Ans. (b)
Solution: $\frac{Profit\ of\ Hutch}{Profit\ of\ Essar} = \frac{Time\ Period\ X\ amount\ of\ Hutch\ invested}{time\ period\ X\ amount\ of\ Essar\ invested}$

$\frac{6}{17} = \frac{5\ x\ K}{12\ X\ 1275}$

⇨ K = $\frac{6\ X\ 12\ X\ 1275}{17\ X\ 5} = 1080$
8. Ans. (b)
Solution:

$$\underbrace{A + B}_{2} : \underbrace{C + D}_{1}$$

And $\frac{B}{3} : \frac{C}{1}$ and $\frac{C}{3} : \frac{D}{5}$

⇨ B : C : D
⇨ 9 : 3 : 5
Again A + B : C + D

$$\underbrace{7 + 9}_{16} \quad \underbrace{3 + 5}_{8}$$

Thus A + B = 16 ➔ A = 7 when B = 9

Therefore share of A = 7/24 X 9600 = Rs. 280
9. Ans. (b)
Solution: A's contribution = 33.33%
B's contribution = 50%
C's contribution = 16.66%
Ratio of profit sharing = Ratio of contribution
= 2 : 3 :1
Thus, profit would be shared as : 28000 : 42000 : 14000.
10. Ans. (a)
Solution: Ratio of their investment = 12000 : 18000 = 2 : 3
A's share in profit = (2/5) X 2000 = rs. 800
11. Ans. (b)
Solution: Suppose B invested for n months
Hence, $\frac{12\ X\ x}{n\ X\ x} = \frac{3}{2}$x = their investment
$\frac{12}{n} = \frac{2}{3}$, n = 8
12. Ans. (b)
Solution: Let B invested for n months
Then, $\frac{12{,}000\ X\ 12}{16{,}000\ X\ n} = \frac{3}{1}$
n = 3