Ratio - 2

Career Launcher

QA - 05

CEX-Q-0206/18

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Number of Questions : 30

Average

1. The average age of a group of 23 persons increases by 4 months, when a person of 20 years is replaced by a new person. The age of the new person is
   (1) 28 years (2) 27 years 8 months
   (3) 27 years (4) 26 years 6 months

2. The average age of a group of officers goes down to 56 years from 58 years, when an old member is replaced by a young member. What is the total number of members in that team if the age difference between those two members is 30 years?

3. The average height of 13 people reduces by 2 cm if a person of height 184 cm is replace by a new person. Find the height of the new person?
   (1) 154 cm (2) 159 cm
   (3) 197 cm (4) 158 cm

4. There are 24 students in a class whose average marks in a subject, the maximum marks of which is 100, is 89. If 3 students leave the class, then what is the maximum by which the average could go up?
   (1) 10.7 (2) 10.5
   (3) 11.2 (4) 11

5. A shipping clerk has five boxes of different but unknown weights each weighing less than 100 kg. The clerk weights the boxes in pairs. The weights obtained are 110, 112, 113, 114, 115, 116, 117, 118, 120 and 121 kg. What is the weight of the heaviest box?
   (1) 60 kg (2) 65 kg
   (3) 64 kg (4) 62 kg

6. There are 40 boys in a class. One of them weighing 100 kg goes away. A new boy joins the class at the same time. Consequently the average weight of the boys is increased by 0.25kg. Find the weight of the new boy.
   (1) 98.5 kg (2) 110 kg
   (3) 105 kg (4) 99 kg

7. The class teachers of three classes X, Y and Z give an algebra test to their respective students. The average scores in class X, Y and Z are 83, 76 and 85 respectively. The average score of all students in classes X and Y together is 79 and the average score of all students in classes Y and Z together is 81. What is the average for all the three classes?
   (1) 81 (2) 81.5
   (3) 82 (4) 84.5

8. There are 'n' students in a class. The average age of a student of this class is 'A' years. Two students left the class and 4 new students joined. Incidentally, the average age of a student in the class, did not change. The sum of the ages of the 6 students (who either left or joined the class) was 72 years. Find the value of A.

9. The average rainfall for Monday, Tuesday and Wednesday is 4.3 cm. The average rainfall for Friday, Saturday and Sunday is 3.9 cm. If the average rainfall for the total week is 3.7 cm, then what is the rainfall recorded on Thursday?
(1) 1.4 cm (2) 1.3 cm
(3) 1.2 cm (4) 1.1 cm

10. The average age of 5 members of a committee is the same as it was 3 years ago, because an old member has been replaced by a new member. The difference between the ages of old and new member is:

11. The average speed of a train for the first 5 hours was 63 km/hr, for next 3 hours was 58 km/hr and for next 2 hours was 72 km/hr. What was the average speed of the train for the entire journey?
(1) 65 km/hr (2) 63.3 km/hr
(3) 60 km/hr (4) 64.33 km/hr

12. Ten years ago, the ages of the members of a joint family of eight people added up to 231 years. Three years later, one member died at the age of 60 years and a child was born during the same year. After another three years, one more member died, again at 60, and a child was born during the same year. The current average age of this eight-member joint family is nearest to

13. The average marks obtained by the candidates who passed and those who failed in an examination are 60 and 25 respectively. The average marks obtained by all the candidates who appeared for the examination is more than 43 but not more than 49. The number of candidates who passed as a fraction of the total number of candidates who appeared for the examination could never be
(1) $\frac{3}{5}$ (2) $\frac{4}{7}$
(3) $\frac{18}{35}$ (4) $\frac{24}{35}$

14. Ramesh receives the following scores in his maths test: 78, 92, 83 and 99. What score does he need in the next test in order to have an average of 90 in the five tests?

15. The average age of a class of 60 students is 12 years. If the number of girls is increased by 3/4th and the number of boys is decreased by half, the total number of students does not change; nor does the average age of either the boys or the girls change. But the combined average age changes to 13.5 years. The average age of the boys is
(1) 8 years (2) 10 years
(3) 12 years (4) Cannot be determined

16. The average age of the students in an institute was 15 years. Then 10 students of average age 12 years joined the institute and the average age of the students of this institute became 14.8 years. What was the initial number of students in that institute?
(1) 140 (2) 120
(3) 150 (4) None of these

17. The monthly salaries of two persons A and B are in the ratio of 3 : 5 respectively. If both of them received an increment of Rs. 250, then the ratio becomes 2 : 3. What were their respective salaries before the increment?
(1) Rs. 850 & Rs. 1,275
(2) Rs. 700 & Rs. 1,050
(3) Rs. 750 & Rs. 1,250
(4) Rs. 650 & Rs. 975

18. Ramesh analysed the monthly salary figures of five vice presidents of his company. All the salary figures are integers. The mean and the median salary figures are Rs 5 lakh, and the only mode is Rs 8 lakh. Which of the options below is the sum (in Rs lakh) of the highest and the lowest salaries? **(XAT 2012)**
(1) 9 (2) 10
(3) 11 (4) 12

19. Ramu appears in six different papers in his semester examination, where the maximum marks were 50 for each paper. His marks in these papers are in the proportion 8 : 9 : 10 : 13 : 14 : 15. Considering his aggregate in all the papers together, he fails to obtain 50% of the total marks. What is the minimum possible additional marks Ramu should get to obtain 50% of the total marks, given that he got integral marks in each paper?
(1) 81 (2) 57
(3) 12 (4) 18

20. The average age of 7 consecutive natural numbers is K, then what will be the average of next 7 consecutive natural numbers?
(1) K (2) K + 7
(3) K + 1 (4) K + 49

Partnership

21. A, B and C invested their money in the ratio 3 : 6 : 7. If the total amount invested by them was Rs. 80,000 and the profit earned was 40% of the amount invested. Then what was the sum of the shares of B and C in the profit?
(1) Rs.18,000 (2) Rs.26,000
(3) Rs.26,500 (4) Rs.24,000

22. A, B and C invested Rs. 2,000, Rs. 5,000 and Rs. 4,000 respectively in a business. The net profit for the year was ₹1,210 which was divided in proportion to investment. Then the amount of profit earned by A, B and C respectively, is
(1) Rs. 220, Rs. 550, Rs. 420
(2) Rs. 220, Rs. 450, Rs. 440
(3) Rs. 220, Rs. 550, Rs. 440
(4) Rs. 210, Rs. 450, Rs. 440

23. X, Y and Z are partners in a business with a total capital of Rs. 3,300. The profit at the end of the year is Rs. 1,500 to be divided in proportion to their capitals. If X receives Rs. 450 and Y receives Rs. 550 as their share of profits, then Z's capital is
(1) Rs. 910 (2) Rs. 1,100
(3) Rs. 1,110 (4) None of these

24. A is the average of a series of n consecutive odd numbers starting with x and B is the average of n consecutive odd numbers starting with x + 4. The value of (B – A)
(1) is always 4.
(2) depends on x.
(3) depends on n
(4) is always a multiple of 4.

25. Three people A, B and C entered into partnership and the ratio of their investments was $\frac{1}{2}:\frac{1}{3}:\frac{1}{4}$. The ratio of the time period for which they invested their money was $1:\frac{1}{2}:\frac{1}{4}$. The profits were shared in the direct proportion to amount invested and time. If A's share is Rs. 30,000, then find B's share.
(1) Rs. 10,000 (2) Rs. 20,000
(3) Rs. 15,000 (4) Rs. 25,000

26. A began a business with Rs. 4,500 and was joined after wards by B with Rs. 5,400. If the profits at the end of the year were divided in the ratio 2 : 1, then B joined the business after:
(1) 5 months (2) 4 months
(3) 6 months (4) 7 months

27. In a business partnership among A, B, C and D, the profit is shared as follows :

$$\frac{\text{A's share}}{\text{B's share}} = \frac{\text{B's share}}{\text{C's share}} = \frac{\text{C's share}}{\text{D's share}} = \frac{1}{3}$$

If the total profit is Rs. 4,00,000, the share of C is

(1) Rs. 1,12,500 (2) Rs. 1,37,500
(3) Rs. 90,000 (4) Rs. 2,70,000

28. Ajay started a firm with a capital of Rs. 28,000. After 5 months, Boman joined him and invested Rs. 40,000 in the firm. Chirag was also added as a new partner with an individual investment of Rs. 56,000 after 7 months of commencement. If at the end of the year, the profit of the firm is Rs. 32,000, what is the share of Boman?

(1) Rs. 12,000 (2) Rs. 8,000
(3) Rs. 14,000 (4) Rs. 10,000

29. A, B and C invested their money in the ratio 3 : 6 : 7. If the total amount invested by them was Rs. 80,000 and the profit earned was 40% of the amount invested. Then what was the sum of the shares of B and C in the profit?

(1) Rs. 18,000 (2) Rs. 26,500
(3) Rs. 26,000 (4) Rs. 24,000

30. Abhishek and Rani started a partnership business by investing Rs.1 cr and Rs.2 cr respectively in the beginning of the year. Each of them withdrew one-fourth of their investment after each quarter till 2nd quarter. At this point Susmita and Randeep joined them with Rs.50 lakh and Rs.1 cr respectively. Randeep withdrew his entire investment after 3 months. If the profit at the end of the year is Rs. 41 lakhs, the combined share of Abhishek and Rani is

(1) Rs.22 lakh (2) Rs.33 lakh
(3) Rs.8 lakh (4) Rs.30 lakh

QA - 05 : Ratio - 2
Answers and Explanations

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1	2	**2**	–	**3**	4	**4**	4	**5**	3	**6**	2	**7**	2	**8**	–	**9**	2	**10**	–
11	2	**12**	–	**13**	3	**14**	–	**15**	2	**16**	1	**17**	3	**18**	1	**19**	3	**20**	2
21	2	**22**	3	**23**	2	**24**	1	**25**	1	**26**	4	**27**	3	**28**	4	**29**	3	**30**	2

1. 2 Let x be the initial average age of persons and y be the age of new persons. Then,

$$\frac{23x - 20 + y}{23} = x + \frac{4}{12}$$

$$\Rightarrow 23x - 20 + y = 23x + \frac{23}{3}$$

$$\Rightarrow y = \frac{23}{3} + 20 = \frac{83}{3} = 27 \text{ years } 8 \text{ months}$$

2. The change in average age of the group
= 58 – 56 = 2 years.
Actual change in years = 30 years.

Therefore, Total number of members = $\frac{30}{2}$ = 15

3. 4 Average got reduced by 2 cm. So, overall decrease of 26 cm for 13 people.
Height of new person
= 184 – 13 × 2 = 184 – 26 = 158 cm.

4. 4 Sum of marks for 24 students = 24 × 89 = 2136
Average marks of a student cannot increase beyond 100. So, total marks for 21 students cannot exceed 2100.
So, maximum increase in average = 100 – 89 = 11.

5. 3 60 is wrong because then to arrive at a total of 121, the other box will have to weight 61 kg which will be obviously inot the highest. 64 is wrong too, because then to add up to 121, the other weight will have to be 57 and to make up to a total of 120, the next box shall have a weight 63 which obviously makes the maximum possible total as 64 + 63 = 127. 62 is the correct answer because the other boxes shall be 59, 54, 58, 56. These will give all the totals given above.

6. 2 Suppose the number of boys be S excluding a 100 kg boy.

Then $\frac{S+100}{40} + \frac{1}{4} = \frac{S+\text{New}}{40}$

$\Rightarrow$ New boy's weight = 110 kg.

7. 2 Let the number of students in classes X, Y and Z be a, b and c respectively. Then
Total of X = 83a
Total of Y = 76b
Total of Z = 85c

And $\frac{83a+76b}{a+b}$ = 79, i.e. 4a = 3b

Also $\frac{76b+85c}{b+c}$ = 81, i.e. 4c = 5b

Hence, b = $\frac{4}{3}$a , c = $\frac{5}{4}$b = $\frac{5}{4}\times\frac{4}{3}$a = $\frac{5}{3}$a

Average of X, Y and Z = $\frac{83a+76b+85c}{a+b+c}$

$$= \frac{83a + 76\times\frac{4}{3}a + 85\times\frac{5}{3}a}{a + \frac{4}{3}a + \frac{5}{3}a} = \frac{978}{12} = 81.5$$

8. Let s = sum of the ages of all students in the class.
x = sum of the ages of 2 students who left the class.
y = sum of the ages of 4 students who joined the class.
We have three equations.

(i) $\frac{s}{n}$ = A (ii) $\frac{s-x+y}{n}$ = A

(iii) x + y = 72
From (ii) & (iii) we get x = y = 36 years but we cannot calculate the value of A, from the given information.

9. 2 Total rainfall for the week = 3.7 × 7 = 25.9 cm ...(i)
Rainfall for Monday, Tuesday and Wednesday = 4.3 × 3 = 12.9 cm ...(ii)
Rainfall for Friday, Saturday and Sunday = 3.9 × 3 = 11.7 cm ...(iii)
Rainfall for Thursday = Equation (i) – Equation (ii) – Equation (iii) = 25.9– 12.9 – 11.7 = 1.3 cm.

10. Let us assume that the average age of 5 members 3 years ago be M years.
Total age of 5 members 3 years ago = 5M
Let the age of the old member and new member be O years and N years respectively.
Present age of these 5 members = 5M + 15

$\Rightarrow$ New Average age (M) = $\frac{(5M+15-O+N)}{5}$

$\Rightarrow$ N – O = 5M – 5M –15
$\Rightarrow$ O – N = 15 years

11. 2 Average speed of the train

$= \frac{63\times5+58\times3+72\times2}{10} = \frac{633}{10} = 63.3 \text{ km/hr.}$

12. Ten years ago, the total age of all the eight people in the family = 231
As per the information given in the question, the total age of all the people in the family
= 231 + 3 × 8 – 60 + 0 = 195
Similarly, the total age of the people 7 years ago in the family four years ago = 195 + 3 × 8 – 60 + 0 = 159.
Therefore, the current average age of all the people in the family = $\frac{159+32}{8} = 24$ years.

13. 3 Let, the number of candidates who passed in the examination be 'p' and number of candidates who failed in the examination be 'f'.

$\therefore \quad 43 < \frac{60p+25f}{p+f} \le 49$

$\Rightarrow \quad 43-25 < \frac{60p+25f}{p+f} - 25 \le 49-25$

$\Rightarrow \quad \frac{18}{35} < \frac{p}{f+p} \le \frac{24}{35}$

Note: For positive numbers a and b if a > b then $\frac{1}{a} < \frac{1}{b}$.

14. Let x be the next test score. Then,

The average = $\frac{78+92+83+99+x}{5} = 90$

$\Rightarrow \frac{352+x}{5} = 90 \Rightarrow x = 98.$

15. 2 Let the number of boys and girls in the class be 'b' and 'g' respectively and the average age (in years) of boys and girls be 'x' and 'y' respectively.

Given, b + g = 60 and $\frac{b}{2} + \frac{7g}{4} = 60$

$\Rightarrow$ b = 36 and g = 24
Now, 36x + 24y = 720 and 18x + 42y = 810
$\Rightarrow$ x = 10 and y = 15
Hence, the average age of the boys is 10 years.

16. 1 Let the initial strength of the students in the institute be x. Then,
Total age of x students = 15x
According to the question,
15x + (10 × 12) = 14.8(x + 10)
$\Rightarrow$ 15x + 120 = 14.8x + 148
$\Rightarrow$ 0.2x = 28

$\Rightarrow \quad x = \frac{28\times10}{2} = 140.$

17. 3 Let 3x and 5x be the salaries of A and B respectively.
$\Rightarrow$ 9x + 750 = 10x + 500 $\Rightarrow$ x = 250
Salary of A = 250 × 3 = Rs. 750 and B = 250 × 5
= Rs. 1, 250.

Alternate Method:
Pick the options and check the conditions.

18. 1 Let the salaries (in Rs. lakh) of 5 VPs (Vice presidents) be a, b, c, d and e respectively in ascending order.
Median salary is Rs. 5 lakh i.e. c = 5

As, mode of the salaries is Rs. 8 lakh, it implies that at least two VPs are getting salaries of Rs. 8 lakh. Also, salaries of only two VPs are greater than Rs. 5 lakh.
Hence, d = e = 8
Given mean of the salaries is Rs. 5 lakh.

$\therefore \frac{a+b+c+d+e}{5} = 5$

$\Rightarrow \frac{a+b+5+8+8}{5} = 5 \Rightarrow a+b = 4$

$\Rightarrow$ a = 2 and b = 2 or a = 1 and b = 3 (As salaries are in integer lakh).
But if a = 2 and b = 2, then Rs. 8 lakh will not be the only mode.
Therefore, a = 1 lakh and b = 3 lakh
Hence, required sum = 8 + 1 = Rs. 9lakh.

19. 3 Marks obtained should be less than 50 in each paper. There are three cases possible.
(a) Marks are 8, 9, 10, 13, 14, 15.
(b) Marks are 16, 18, 20, 26, 28, 30.
(c) Marks are 24, 27, 30, 39, 42, 45.
If we take case (a), then he required 81 marks more to get 50% of the total.
If we take case (c), then he got more than 50% marks.
IN case (b) he required 12 marks more to get 50% marks, which is less than the case (a). So this is the right answer.

20. 2 Let first number be x.
Then, 7th number will be x + 6, and 14th number will be x + 13.
Average of first seven numbers

$$= K = \frac{x + x + 1 + x + 2 + x + 3 + x + 4 + x + 5 + x + 6}{7}$$

$$\Rightarrow K = \frac{7x + 21}{7} = x + 3$$

Average of next seven numbers

$$= \frac{x + 7 + x + 8 + x + 9 + x + 10 + x + 11 + x + 12 + x + 13}{7}$$

$$= \frac{7x + 70}{7} = x + 10 = K + 7.$$

21. 2 Profit = Rs. 8,0000 $\times \frac{40}{100}$ = Rs. 32,000

Ratio of shares of A, B and C in the profit = Ratio of amount invested

B's share in the profit = Rs. 32000 $\times \frac{6}{16}$ = Rs. 12,000

C's share in the profit = Rs. 32000 $\times \frac{7}{16}$ = Rs. 14,000

Sum of the shares of B and C in the profit
= Rs. 12,000 + Rs. 14,000 = Rs. 26,000

22. 3 A : B : C = 2000 : 5000 : 4000 = 2 : 5 : 4

Profit share of A = $\frac{2}{11}$ Rs. × 1210 = Rs. 220

Profit share of B = $\frac{5}{11}$ Rs. × 1210 = Rs. 550

Profit share of C = $\frac{4}{11}$ Rs. × 1210 = Rs. 440

23. 2 Profit received by Z = Rs. {1500 – (450 + 550)}
= Rs. 500
Ratio in capital = X : Y : Z = 450 : 550 : 500 = 9 : 11 : 10

$\therefore$ Z's capital = Rs. $\frac{10}{30}$ × 3300 = Rs. 1,100

24. 1 Let n be 4. Then consecutive odd numbers beginning with x will be:
x, x + 2, x + 4, x + 6
n consecutive odd number beginning with x + 4 will be:
x + 4, x + 6, x + 8, x + 10
Average of first group of numbers, A = (x + 3)
Average of second group of numbers, B = (x + 7)
Therefore (B – A) = 4
Similarly, if n is odd, we can deduce that difference still remains 4. The difference will not depend upon n or x.

25. 1 Ratio of investments is

$$\Rightarrow A : B : C = \frac{1}{2} : \frac{1}{3} : \frac{1}{4} = 6 : 4 : 3$$

Ratio of time period is

$$\Rightarrow \quad t_A : t_B : t_C = 1 : \frac{1}{2} : \frac{1}{4} = 4 : 2 : 1$$

$\therefore$ Ratio of profit shared
$\Rightarrow$ $At_A : Bt_B : Ct_C = 24 : 8 : 3$

$\because$ B's share is $\frac{1}{3}$ of A's share

$\therefore$ B's share = $\frac{1}{3}$ × 30,000 = Rs. 10,000

26. 4 Ratio of profit sharing = 4500 × 12 : 5400 × n
where n is the period for which B invested.
$\because$ Ratio = 4500 × 12 : 5400 × n = 10 : n
Now, this ratio is equal to 2 : 1.
$\therefore$ 10 : n = 2 : 1
$\Rightarrow$ n = 5 months
Thus, B joined A after 12 – 5 = 7 months

27. 3 Let D's share be 27x.
Then, C's share = 9x, B's share
= 3x and A's share = x
Then, x + 3x + 9x + 27x = 4,00,000
$\Rightarrow$ x = 10,000
Hence, C's share = 9x = Rs. 90,000.

28. 4 The ratio in which profit will be shared among Ajay, Boman and Chirag
= 28000 × 12 : 40000 × 7 : 560000 × 5 = 6 : 5 : 5

Hence, share of Boman = $\frac{5}{16}$ × 32000 = Rs. 10,000.

29. 3 Profit = Rs. 80000 × $\frac{40}{100}$ = Rs. 32,000

Ratio of shares of A, B and C in the profit = Ratio of amount invested

B's share in the profit = Rs. 32000 × $\frac{6}{16}$ = Rs. 12,000

C's share in the profit = Rs. 32000 × $\frac{7}{16}$ = Rs. 14,000

$\therefore$ Sum of the shares of B and C in the profit
= Rs. 12,000 + Rs. 14,000 = Rs. 26,000.

30. 2 In terms of Rupee-Month for the entire year,
(i) Abhishek's Investment
= (100 × 3) + (75 × 3) + (50 × 6) Lakhs R-month
= 825 lakhs R-month
(ii) Rani's Investment
= (200 × 3) + (150 × 3) + (100 × 6)
= 1650 Lakhs R month
(iii) Susmita's Investment
= 50 × 6 = 300 Lakhs R-month
(iv) Randeep's Investment = 100 × 3 = 300 Lakhs R-month
$\therefore$ Their ratio of Investment = 11 : 22 : 4 : 4
$\therefore$ Abhishek and Rani's combined share of profit

$= \left(\frac{11+22}{41}\right) \times 41 = 33$ lakhs.