Ratio - 1

Career Launcher

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QA - 04

CEX-Q-0205/18

Number of Questions : 30

Ratio and Proportions

1. If $\frac{a}{b} = \frac{1}{3}, \frac{b}{c} = 2, \frac{c}{d} = \frac{1}{2}, \frac{d}{e} = 3$ and $\frac{e}{f} = \frac{1}{4}$, then what is the value of $\frac{abc}{def}$?

   (1) $\frac{3}{8}$ (2) $\frac{27}{8}$

   (3) $\frac{3}{4}$ (4) $\frac{27}{4}$

2. If a – b : b – c : c – d = 1 : 2 : 3, then what is the ratio of (a + d) : c?
   (1) 1 : 2 (2) 2 : 1
   (3) 3 : 1 (4) None of these

3. If $\frac{a}{b} = \frac{2}{3}, \frac{b}{c} = \frac{3}{5}$ and $\frac{c}{d} = \frac{5}{6}$ then what is the value of $\frac{3a + 2b + 4c + d}{3d + 4c}$?

   (1) $\frac{19}{6}$ (2) 38

   (3) 1 (4) 2

4. If $\frac{a}{2} = \frac{b}{3} = \frac{c}{4} = \frac{2a - 3b + 5c}{k}$, where a, b and c are not equal to zero , then 'k' is
   (1) 15 (2) 17
   (3) 13 (4) Cannot be determined

5. Monthly incomes of X and Y are in the ratio 1 : 3 and their expenses are in the ratio 19 : 40. X saves Rs. 18,860 less than that Y and in total they save Rs. 36,020. Income of X and Y respectively are:
   (1) Rs. 10,480 and Rs. 31440
   (2) Rs. 9,000 and Rs. 27,000
   (3) Rs. 14,200 and Rs. 42,600
   (4) Rs. 18,000 and Rs. 31,440

6. A bag contains Rs. 600 in the form of one rupee, 50 paise and 25 paise coins in the ratio of 3 : 4 : 12. Find the total value (in Rs.) of the 25 paise coins present in the bag.

7. The ratio of the first class fare and second class fare is 3 : 1 and that of the number of passengers traveling by the first class and by the second class is 1 : 27. If Rs. 2,700 is collected as fare, then the amount collected from the first class passengers is
   (1) Rs. 300 (2) Rs. 729
   (3) Rs. 270 (4) Rs. 96.42

8. The ratio of the present age of a mother to that of her daughter is 9 : 4. Ten years ago, the ratio of their ages was 7 : 2. What are their present ages?
(1) 54 years, 24 years
(2) 45 years, 20 years
(3) 54 years, 28 years
(4) 36 years, 16 years

9. The ratio of the present ages of Chinta and Mani is 14 : 19. The average age of Suknaya, Chinta and Mani is 43 years. If the ratio of present age of Suknaya to that of Chinta is 5 : 7, find the present age (in years) of Mani.
(1) 28 (2) 42
(3) 57 (4) 56

10. The ratio of number of chocolates with Munni and Chameli is 3 : 2. If Chameli has 5 chocolates less than Sheela who has three more chocolates than Munni, find the total number of chocolates with three of them.
(1) 19 (2) 20
(3) 23 (4) 24

11. In an organization, ratio of the number of males to that of the females is 4 : 3. If the number of males is increased by 10% and that of females by 20%. What is the new ratio of the number of males to that of females?
(1) 11 : 9 (2) 10 : 9
(3) 11 : 8 (4) 3 : 2

12. In two alloys, respective ratios of copper and zinc are 4 : 1 and 1 : 3. 10 kg of the 1st alloy, 16 kg of the 2nd alloy and some quantity of pure copper are melted together. In the resultant alloy the ratio of copper to zinc is 3 : 2. Find the weight (in kg) of the new alloy.
(1) 45 (2) 40
(3) 35 (4) 50

13. The present ages of a father and his son are in the ratio 9 : 4. The ratio of the father's age after 8 years from now to the age of the son 2 years ago is 8 : 3. Find the present age (in years) of the son.

14. Three friends A, B and C went on a picnic. A brought 5 apples and B brought 3 apples, and C had Rs. 80. They divided the apples equally among themselves and C gave all his money to A and B for their contributions. What are the respective shares of A and B from that money?
(1) 50, 30 (2) 70, 10
(3) 40, 40 (4) 33.33, 66.66

15. When two students of a class with strength of 40 students were expelled, the average age of the class did not change. If one of the students was 14 years old and average of the class was 18 years, what was the age (in years) of the second student?

16. A student scored marks in the ratio 5 : 4 : 6 : 8 : 7 in five subjects having equal maximum marks. In all, he scored 50% of the maximum marks in all the five subjects taken together. In how many subjects did he score more than 55% of the maximum marks?

17. The sum of four numbers is 253. The ratio of the first number to the second one is 2 : 3. The ratio of the second number to the third one is 5 : 6. The ratio of the third number to the fourth one is 8 : 9. What is the average of the second and the third number?

18. When three brands of juices are mixed in the ratio of 3 : 4 : 5 and 4 : 5 : 6, the cost price of the two piece mixtures comes out to be Rs. 20 per litre and Rs. 25 per litre respectively. Find the cost price of a litre of mixture of juices in which the three brands of original juices are mixed in the ratio of 6 : 7 : 8.
(1) Rs. 30.7 (2) Rs. 30.5
(3) Rs. 29.5 (4) Rs. 29.7

19. The value of a diamond is directly proportional to the square of its weight. If a diamond weighing 4 kg breaks into 2 pieces, its total value decreases by 37.5%. Weights of the two pieces are:
(1) 2 kg, 2 kg (2) 2.5 kg, 1.5 kg
(3) 3 kg, 1 kg (4) None of these

20. A family consists of father, mother, son and daughter. The ratio of the weight of the father to that of the son is 3 : 2. The ratio of the weight of the son to that of the mother is 5 : 6. If the weight of the daughter is 35 kg, which is half the weight of the father, find the weight of the mother.
(1) 42 kg (2) 56 kg
(3) 46.6 kg (4) Cannot be determined

21. The ratios of the incomes and the expenditures of Aishwarya, Babita and Charu are 7 : 9 : 12 and 8 : 9 : 15 respectively. If Aishwarya saves one-fourth of her income, then the ratio of their savings is
(1) 56 : 99 : 69 (2) 69 : 56 : 99
(3) 99 : 56 : 69 (4) 99 : 69 : 56

22. One year ago, the ratio of Harsha's and Mandar's salaries was 3 : 5. The ratios of their individual salaries of last year and present year are 2 : 3 and 4 : 5 respectively. If their combined salary for the present year is Rs.86,000, find the present salary of Harsha.
(1) Rs.38,000 (2) Rs.24,000
(3) Rs.39,000 (4) Rs.36,000

23. A man sells chocolates that come in boxes. Either full boxes or half a box of chocolates can be bought from him. A customer comes and buys half the number of boxes the seller has, plus half a box. A second customer comes and buys half the remaining number of boxes plus half a box. After this, the seller is left with no chocolate box. How many chocolate boxes did the seller have before the first customer came?
(1) 2 (2) 3
(3) 4 (4) 3.5

24. The numbers of students in Batch A and Batch B were in the ratio 2 : 3 in January and 5 : 8 in February. The numbers of students in Batch A and Batch B increased from February to March at rates that were twice and thrice, respectively, of rates at which they increased from January to February. If the ratio of the total number of students in these two batches in February and January was 26 : 5, then find the ratio of number of students in Batch A and Batch B in March?
(1) 25 : 64 (2) 25 : 84
(3) 45 : 112 (4) 35 : 92

25. A person buys some apples and mangoes from the market. Cost price of a mango is twice that of an apple and the selling price of a mango is thrice that of an apple. By selling an apple at twice its cost price, he makes 150% profit on the whole. Find the ratio of the number of mangoes to that of apples that he bought from the market.
(1) 3 : 5 (2) 3 : 4
(3) 1 : 2 (4) 2 : 3

Direct/Inverse Proportions

26. Total expenses of a boarding house are partly fixed and partly varying linearly with the number of boarders. The average expense per boarder is Rs. 700 when there are 25 boarders and Rs. 600 when there are 50 boarders. What is the average expense per boarder when there are 100 boarders? **(CAT 1999)**
(1) 550 (2) 580
(3) 540 (4) 570

27. A is directly proportional to B. B is inversely proportional to C. C is directly proportional to the square of D. D is directly proportional to the cube root of E. Assuming all are positive integers, as A increases, E
(1) increases
(2) decreases
(3) remains constant
(4) doubles

28. The height of Santosh is directly proportional to the square root of his age. What will be the height of Santosh at 16 years, if he is 4 ft tall at the age of 9 years?
(1) 5 ft 4 inches (2) 5 ft 2 inches
(3) 5 ft (4) 5 ft 3 inches

29. The pressure of a gas is directly proportional to its temperature and inversely proportional to its volume. The initial pressure, volume and temperature are 150 pascals, 20 cu. m and 100° Kelvin respectively. Find the final temperature if the final volume and pressure of the same gas are 8 cu. m and 150 pascals respectively under the same conditions.
(1) 80° Kelvin (2) 50° Kelvin
(3) 40° Kelvin (4) 45° Kelvin

30. A can contains a solution of two liquids A and B in the proportion of 7 : 5. When 9 L of solution is drawn out and the can is filled with B, the proportion of A and B in the final mixture becomes 7 : 9. How many litres of liquid A was there in the can initially?
(1) 21 L (2) 31 L
(3) 80 L (4) 85 L

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Answers and Explanations

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

1. 1 $\frac{a}{b}=\frac{1}{3}$ $\frac{b}{c}=\frac{2}{1}$

$\Rightarrow$ a : b : c = 2 : 6 : 3

Similarly a : b : c : d : e : f = 2 : 6 : 3 : 6 : 2 : 8

$\therefore \frac{abc}{def} = \frac{2\times6\times3}{6\times2\times8} = \frac{3}{8}$

Hence option (1).

Alternate Solution:

We have to find the value of $\frac{a}{f}\times\frac{c}{d}\times\frac{b}{e}=\frac{abc}{def}$

Now, $\frac{c}{d}=\frac{1}{2}$ and we will get $\frac{a}{f}$ by multiplying all the ratios. So, $\frac{a}{f}=\frac{1}{4}$.

Similarly, $\frac{b}{f}\times\frac{c}{d}\times\frac{d}{e}=\frac{b}{e}=3$.

So, $\frac{abc}{def}=\frac{1}{4}\times\frac{1}{2}\times3=\frac{3}{8}$.

2. 2 Let a – b = x, b – c = 2x and c – d = 3x

$\therefore$ c = 3x + d

b = 2x + c = 5x + d

a = x + b = 6x + d

$\therefore \frac{a+d}{c}=\frac{6x+d+d}{3x+d}=\frac{2}{1}$.

3. 3 $\frac{a}{2}=\frac{b}{3}$, $\frac{b}{3}=\frac{c}{5}$, $\frac{c}{5}=\frac{d}{6}$

$\therefore \frac{a}{2}=\frac{b}{3}=\frac{c}{5}=\frac{d}{6}$ = k (say)

$\therefore \frac{3a+2b+4c+d}{3d+4c} = \frac{3(2k)+2(3k)+4(5k)+(6k)}{3(6k)+4(5k)}$

$= \frac{38}{38} = 1.$

4. 1 Let $\frac{a}{2}=\frac{b}{3}=\frac{c}{4}=\frac{2a-3b+5c}{k}=\lambda$

$\therefore$ a = 2λ, b = 3λ, c = 4λ

$\because \frac{2a-3b+5c}{k}=\lambda$

$\Rightarrow \frac{2\times2\lambda-3\times3\lambda+5\times4\lambda}{k}=\lambda$

$\Rightarrow \frac{15\lambda}{k}=\lambda \Rightarrow k=15.$

5. 1 Let income of X be Rs. p and income of Y be Rs. 3p
Let expenses of X be Rs. 19q and expenses of Y be Rs. 40q
Hence, savings of X = Rs. (p – 19q) and savings of Y = Rs. (3p – 40q)
Total savings = (4p – 59q) = 36020
Difference of savings = (2p – 21q) = 18860
Solving the above equations, we get p = 10480, Thus, income of X and Y is Rs. 10,480 and Rs. 31, 440 respectively.

6. Let the number of one rupee coins, 50 paise coins and 25 paise coins be 3x, 4x and 12x respectively.

Value of one rupee coins = 3x, 50 paise coins = $\frac{4x}{2}$

and 25 paise coins = $\frac{12x}{4}$

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

Therefore, value of 25 paise coins = $\frac{12\times75}{4}$

= Rs. 225

7. 3 Ratio of amounts collected from first and second classes = (3 × 1) : (1 × 27) = 1 : 9
So, amount collected from first class passenger is

$= \frac{1}{10}$ Rs. × 2700 = Rs. 270.

8. 2 Let present ages (in years) of mother and daughter be 9x and 4x respectively.

$\therefore \frac{9x-10}{4x-10} = \frac{7}{2}$

$\Rightarrow x = 5$

Hence, present ages of mother and daughter are 45 years and 20 years respectively.

Alternate Solution:

Pick the options and check. So, answer is option (2).

9. 3 On the basis of the given information, we can conclude that ratio of present ages of Chinta, Mani and Suknaya is 14 : 19 : 10.

Let the ages (in years) of Chinta, Mani and Sukanya be '14x', '19x' and '10x' respectively.

$\therefore \frac{14x+19x+10x}{3} = 43 \Rightarrow x = 3$

$\therefore$ Age of Mani = 19x = 19 × 3 = 57 years.

10. 1 Let the numbr of chocolate with Sheela, Munni and Chameli be 's', 'm' and 'c' respectively.

s = c + 5 and s = m + 3

$\Rightarrow$ m – c = 2

$\Rightarrow \frac{3c}{2} - c = 2 \qquad [\because m : c = 3 : 2]$

$\Rightarrow$ c = 4

$\therefore$ s = 9 and m = 6

$\therefore$ m + c + s = 6 + 4 + 9 = 19.

11. 1 The ratio = (4 × 1.1) : (3 × 1.2) = 11 : 9.

12. 3 Let the quantity of pure copper which is melted along with the two alloys be x kg.

$\therefore \frac{8+4+x}{2+12} = \frac{3}{2}$

$\Rightarrow x = 9$

Hence, the weight of new alloy = 10 + 16 + 9 = 35 kg.

13. Let the present ages (in years) of the father and his son be 9x and 4x respectively.

Age of the father after 8 years = (9x + 8)

Age of the son 2 years ago = 4x – 2

$\therefore \frac{9x+8}{4x-2} = \frac{8}{3}$

$\Rightarrow$ 27x + 24 = 32x – 16

$\Rightarrow x = 8$

$\therefore$ Present age of the son = 4x = 32 years.

14. 2 Each person receives = $\frac{8}{3} = 2.67$ apples

The ratio of the amount received by A and B from C

$= \frac{5-2.67}{3-2.67} = 7 : 1.$

Hence, the respective share of A and B from the amount of C is Rs. 70 and 10 respectively.

15. Let the sum of ages of the remaining students be S_{38}.

$\therefore \frac{S_{38}+14+a}{40} = 18 \qquad \ldots (i)$

and $\frac{S_{38}}{38} = 18 \qquad \ldots (ii)$

Solving (i) and (ii), a = 22 years. (Where 'a' is the age of 2nd student).

16. Let his marks be 5x, 4x, 6x, 8x and 7x respectively.

Aggregate marks obtained = 30x = 50% of aggregate maximum marks. Thus, aggregate maximum marks = 60x.

$\Rightarrow$ Maximum marks per subject = 12x

55% of maximum marks per subject = 6.6x. Hence in two subjects, marks are more than 6.6x

17.

1st	2nd	3rd	4th	sum
2	3			
	5	6		
		8	9	
80	120	144	162	506

The above total = 506. For the sum of 253 the numbers are 40, 60, 72 and 81. Average of the 2nd and 3rd is 66.

Alternate solution:

Ratio of four numbers = 1st : 2nd : 3rd : 4th = 40 : 60 : 72 : 81

Therefore, sum = 40 + 60 + 72 + 81 = 253.

Hence, average of 2nd and 3rd number is 66.

18. 1 Let a, b and c be the cost-prices of three brands of juices per litre

Therefore, $\frac{3a+4b+5c}{12} = 20$

$\Rightarrow$ 3a + 4b + 5c = 240

and $\frac{4a+5b+6c}{15} = 25$

$\Rightarrow$ 4a + 5b + 6c = 375

$\therefore \frac{(6a+7b+8c)}{21}$

$= \frac{3(4a+5b+6c) - 2(3a+4b+5c)}{21}$

$= \frac{3(375) - 2(240)}{21} =$ Rs. 30.7.

19. 3 Let initial value be v_1.
Here $v_1 = k(w)^2$, where k is a proportionality constant, and w is the weight.
According to the question, $w = 4 \Rightarrow v_1 = 16\ k$
Suppose the diamond breaks into two pieces of weights x kg and (4 – x) kg, and let their values be v_2 and v_3 respectively.
Hence, $v_2 = kx^2$ and $v_3 = k(4 - x)^2 = k(x^2 + 16 - 8x)$
Also, $(v_2 + v_3) = (62.5)\%$ of v_1

$\Rightarrow 2k(x^2 - 4x + 8) = \frac{5}{8} \times 16k$

$\Rightarrow x = 1$ or 3
Therefore, weight of the parts are 1 kg and 3 kg.

20. 2 Let the weights (in kg) of the father, the son and the mother be x, y and z respectively.
According to the question,
x : y = 3 : 2 and y : z = 5 : 6
Therefore, x : y : z = 15 : 10 : 12
Weight of the father = 2 × 35 = 70 kg

Weight of the mother = $\frac{12}{15} \times 70 = 56$ kg.

21. 1 Let the incomes (in Rs.) of Aishwarya, Babita and Charu be 7x, 9x and 12x and their expenditures (in Rs.) be 8y, 9y and 15y respectively. Then,

$7x - 8y = \frac{7x}{4}$

$\Rightarrow \frac{21}{4}x = 8y$

$\Rightarrow x = \frac{32}{21}y$

So their respective incomes (in Rs.) are $\frac{32}{3}y$, $\frac{96}{7}y$ and $\frac{128}{7}y$ and respective savings (in Rs.) will be $\frac{8}{3}y$, $\frac{33}{7}y$ and $\frac{23}{7}y$.

Hence, the required ratio is 56 : 99 : 69.

22. 4 Assume the last year Harsha's salary and Mandar's salary were 3x and 5x respectively.
Then their salaries in this year are 4.5 x and 6.25 x.
So, the ratio of their salaries in this year is
4.5 x : 6.25 x, i.e. 18 : 25 respectively.
∴ Present salary of Harsha

$= 86000 \times \frac{18}{43} = \text{Rs. } 36{,}000.$

23. 2 The shortest method of arrive at the answer is to verify the answer choices. We find tht choice (2) fits in with the data.
However, a theoretical solution is given below.
Let the number of boxes seller had be x.

First man buys $\frac{x}{2} + \frac{1}{2}$ boxes.

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

$= \frac{1}{2}\left[\frac{x}{2} - \frac{1}{2}\right] + \frac{1}{2} = \frac{x}{4} + \frac{1}{4}$

Total number of boxes sold = $\frac{x}{2} + \frac{1}{2} + \frac{x}{4} + \frac{1}{4} = \frac{3x}{4} + \frac{3}{4}$

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

$\Rightarrow \quad x = \frac{3x}{4} + \frac{3}{4} \qquad \Rightarrow \frac{x}{4} = \frac{3}{4} \quad \therefore x = 4$

24. 3 Let the number of students in Batch A in January be 2x.
Let number of students in Batch A in February be 5y.
Total numbers of students in Batch A and Batch B combined in January and February are 5x and 13y respectively.
Therefore 13y : 5x = 26 : 5 or y : x = 2 : 1 or y = 2x.
From here, we can compile the following table:

	Batch A	Batch B
Number of students in January	2x	3x
Number of students in February	10x	16x
Rate of increase from Jan to Feb	400%	(1300/3)%
Rate of increase from Feb to March	800%	1300%
Number of students in March	90x	224x

Required Ratio = 45 : 112.

25. 3 Suppose the person buys A apples and M mangoes and cost price of an apple is Rs. x.
Therefore, cost price of a mango will be 2x.
Total cost price = Ax + 2Mx.
Now selling price of an apple is 2x.
∴ SP of a mango will be 6x.
Total SP = 2Ax + 6Mx.
Now we have

$2Ax + 6Mx = \frac{5}{2}(Ax + 2Mx)$ or $\frac{M}{A} = \frac{1}{2}$.

26. 1 Let x be the fixed cost and y the variable cost. Then,
17500 = x + 25y … (i)
30000 = x + 50y … (ii)
Solving the equation (i) and (ii), we get
x = 5000, y = 500
Now if the average expense of 100 boarders be 'A'. Then
100 × A = 5000 + 500 × 100
$\Rightarrow$ A = Rs. 550.

27. 2 $A \propto B; B \propto \frac{1}{C}; C \propto D^2; D \propto E^{1/3}$

$\therefore \quad A = k_1 B = \frac{k_2}{C} = \frac{k_3}{D^2} = \frac{k_4}{E^{2/3}}$

So as A increases, E decreases.

28. 1 Height (H) is proportional to the square root of age (A)

i.e. $H = K\sqrt{A}$, where K = Proportionality constatn H = 4ft at A = 9 years

$\therefore \quad K = \frac{4}{3}$

So when A = 16 years, $H = \frac{4}{3}\sqrt{16} = 5\frac{1}{3}$ ft or 5 ft 4 inches.

29. 3 $P \propto T$ and $P \propto \frac{1}{V}$, combining

$P \propto \frac{T}{V}$ or $P = K\frac{T}{V}$

Hence, $\frac{PV}{V} = K$

or $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} = K$

or $\frac{150 \times 20}{100} = \frac{150 \times 8}{T_2}$

$\Rightarrow \quad T_2 = 40°$ kelvin

30. 1 Let the initial capacity of the can be x.
After the process,

ratio of A to total mixture = $\frac{\frac{7}{12}(x-9)}{x} = \frac{7}{16}$

$\Rightarrow \quad \frac{7}{12}\left(1-\frac{9}{x}\right) = \frac{7}{16}$

$\Rightarrow \quad 1-\frac{9}{x} = \frac{3}{4}$

$\Rightarrow \quad x = 36$ L

$\therefore \quad A = \frac{7}{12} \times 36 = 21$L