RATIO AND PROPORTION

Concepts

Strategy Analysis: In the table, the difficulty level of questions has been mentioned. Check if you are attempting the easier questions before you solve the difficult ones. If you have attempted the difficult ones but have not solved the easy ones, be careful with the selection of questions in the next test!

- If the ratio of two numbers is a : b, then
  - The first number is a multiple of '**a**' & the second number is a multiple of '**b**'.
  - Their sum will be a multiple of **a + b**.
  - The difference between the two numbers will be a multiple of **a-b**.
  - The product will be a multiple of **ab**.
- If the same positive integer is added to both numerator & denominator of
  - a proper fraction then the resulting fraction will be greater than the original fraction.
  - an improper fraction then the resulting fraction will be less than the original fraction.
- If we compare the two fractions $\frac{a}{b}$ and $\frac{a}{c}$, then = $\frac{a}{b} < \frac{a}{c}$ if b>c.
- If we compare the two fractions $\frac{a}{b}$ and $\frac{c}{b}$, then = $\frac{a}{b} < \frac{c}{b}$ if a<c.
- The duplicate and triplicate ratios of a:b are $a^2:b^2$ and $a^3:b^3$ respectively.
- The sub-duplicate and sub-triplicate ratios of a : b are $\sqrt{a} : \sqrt{b}$ and $\sqrt[3]{a} : \sqrt[3]{b}$
- If a : b = c : d, then a × d = b × c.(Product of extremes = product of means)
- If there are n variables in a set of equations, we need n such equations to find the solution set (when there are no constraints on the variables).
- If the number of equations is less than the number of variables that need to be solved for, without any constraints on the values the variables can take, then there are infinite solutions possible.
- A clue for solving problems on ages: The difference in ages between two people will always remain a constant.

Drill

1. The ratio of the number of 50 paise coins and one rupee coins with Ramya is 7 : 10. If the value of the 50 paise coins with her is Rs. 280, then what is the number of one rupee coins with her?
2. If a : b = 3 : 5, b : c = 5 : 4, c : d = 2 : 3, find the ratio between a and d.
3. The ratio of the ages of Abishek, Bala, Chitra and Deepak is 8:10:7:9 respectively. The oldest person is 9 years older than the youngest person. Find the age of Abishek.
4. The ratio of ages of Bhavana and Gowtham is 2 : 3. Bhavana's present age is 24. If the ages of Bhavana, Gowtham and Chirag are in continued proportion, find Chirag's age?
5. What is the least number that must be subtracted from 18, 30 & 54 such that the resultant numbers are in continued proportion?
6. A Policeman takes 7 steps for every 5 steps of the thief, but the distance covered by 5 steps of the thief is equal to 6 steps of the Policeman. What is the ratio of speed of the Policeman to that of the thief?
7. The amount of water evaporating from a pond in a day is proportional to the square of the surface area of the pond. 70 litres of water evaporates in a day from a pond of area 1250 m^2. If 42 litres of water evaporates in a day from a pond, what will be the area of that pond?
8. The mileage obtained by a car is directly proportional to the average speed at which it is travelling and is inversely proportional to the passenger load. The car gets a mileage of 20 kmph when it is travelling at a speed of 60 kmph and the passenger load is 150 kg. What will be the mileage when the car is travelling at a speed of 70 kmph with a passenger load of 140 kg?
9. A diamond falls down and breaks into 3 pieces whose weights are in the ratio 1 : 3 : 6. The value of a diamond is proportional to square of its weight. If the original value was Rs. 30,000, then what is the loss in value due to breakage?
10. In a group of goats and ducks, the total number of legs is 10 more than thrice the number of heads. If the number of goats and ducks put together is 30, find the number of goats.
11. A railway half ticket costs half the full fare and the reservation charge is the same on half ticket as on full ticket. One reserved first class ticket from Chennai to Trivandrum costs Rs. 216 and one full and one half reserved first class ticket cost Rs. 327. What is the reservation charge?
12. The ages of Arun and Bala are in the ratio 3 : 1. Fifteen years hence, the ratio of their ages will be in the ratio 2 : 1. Find the present age of Arun.
13. The sum of the present ages of a father and his son is 60 years. Six years ago, the father's age was five times the age of the son. After 6 years, what will be the son's age?

Concept review questions

1. 21 pencils and 29 pens cost Rs. 79. But, if the number of pencils and pens were interchanged, the cost would have reduced by Rs. 8. Find the cost of each pen.

   a. 1 b. 2 c. 3 d. 4

2. If 1½ years is added to 3/7th of the age of Ravi, it will be half of his present age. What is his present age?

   a. 14 years b. 21 years c. 28 years d. None

3. One year ago, a father was 8 times as old as his son. Now, his age is the square of his son's age. Find the age of the father.

   a. 24 b. 49 c. 48 d. 25

4. The cost of registration at a professional association meeting was Rs. 50 per person. Lunch was provided to the participants at an additional cost of Rs. 24. If the number of participants who paid for lunch was 100 more than the number who did not, and if receipts for registration and lunch totalled Rs. 69400, how many people paid just for registration at the meeting?

   a. 1100 b. 800 c. 500 d. 600

5. There are two examination rooms, A and B. If 10 students are sent from A to B, then the number of students in each room is the same. If 20 candidates are sent from B to A, then the number of students in A is double the number of students in B. The number of students in room A is

   a. 40 b. 80 c. 100 d. None

6. The ratio of a father's age to his son's age is 4 : 1. The product of their ages is 196. What will be the ratio of their ages after 5 years?

   a. 3:2 b. 4:11 c. 11:4 d. 4:1

7. A bag contains Rs. 102 in the form of 1 rupee, 50 paise and 10 paise coins in the ratio 3 : 4 : 10. What is the number of 10 paise coins?

   a. 170 b. 160 c. 68 d. None

8. In a parking lot with only two and four wheelers, there are a certain number of four wheelers and 28 two wheelers. What can be the possible number of tyres in the parking lot?

   a. 66 b. 62 c. 72 d. 82

9. If a carton containing a dozen mirrors is dropped, which of the following cannot be the ratio of broken mirrors to unbroken mirrors?

   a. 4:2 b. 3:1 c. 3:2 d. 7:5

10. A earns twice as much as B does but spends two and a half times of what B does. If both of them save Rs. 2000 each, find A's earning.

    a. 12,000 b. 16,000 c. 8,000 d. None

11. A zookeeper counted the heads of the animals in a zoo and found it to be 80. When he counted the legs of the animals he found it to be 260. If the zoo had only pigeons and horses, how many horses were there in the zoo?

    a. 40 b. 30 c. 50 d. 60

12. Free notebooks were distributed equally among the children of a class. The number of notebooks each child got was one-eighth of the number of children. Had the number of children been half, each child would have got 16 notebooks. How many notebooks were distributed totally?

    a. 512 b. 64 c. 1024 d. 8

13. Aldrin was to earn $ 300 and a free holiday for seven weeks' work. He worked for only 4 weeks and earned $ 30 and a free holiday. What was the value of the holiday?

    a. $90 b. $330 c. $270 d. Data insufficient

14. The force of attraction between 2 bodies varies inversely as the square of distance between them. When two bodies are 2 feet apart, force of attraction is 18 N. What is the force of attraction, when they are 3 feet apart?

    a. 9 N b. 8 N c. 40.5 N d. 12N

15. Jack bought 10 apples, 15 pears and Jill bought 20 apples and some pears. Jack paid Rs. 20 for his purchase and Jill paid Rs. 40 for his purchase. How many pears did Jill buy?

    a. 45 b. 30 c. 15 d. Cannot determined