(Ratio) %

The ratio shows in relation to two how much one amount is than the other. This is indicated by placing the (:) sign between the two amounts. $\frac{a}{b}$ is called the ratio of a and b and it is denoted by a:b.

Proportion: When the ratio of the first and second amount is equal to the ratio of the third and the fourth amount, then it is called to be in proportion. This is indicated by placing the (::) sign between the two ratios. If the two ratios, a : b is equal to c : d, then it is written as a : b :: c : d.

Important Points

1. **Mean proportional:**
   a : x :: x : b or, $\frac{a}{x} = \frac{x}{a}$ or, $x^2 = ab, x\sqrt{ab}$

   That is, the middle ratio of a and b= $\sqrt{ab}$

2. **Compound Ratio:**
   $$\frac{\text{The multiplication of the first terms of the ratio}}{\text{The multiplication of the last terms of the ratio}}$$
   The ratio of a : b, c : d, e : f is $\frac{a \times c \times e}{b \times d \times f}$

3. **Duplicate Ratio:**
   The square ratio of a : b is $a^2 : b^2$

4. **Sub- Duplicate Ratio:**
   The square ratio of a : b is $\sqrt{a} : \sqrt{b}$

5. **Inverse or Reciprocal ratio:**
   The inverse ratio of a : b is $\frac{1}{a} : \frac{1}{b}$

6. **Mean Proportion:**
   The mean proportion of a : b is $\sqrt{ab}$

7. **Third Proportion**
   The third proportion of a : b is $\frac{b^2}{a}$

8. **If a : b :: c : d then,**

(a) a : b :: d : c
(b) c : a :: dc
(c) a : c :: b : d
(d) (a + b) : a :: (c + d) : c
(e) (a – b) : a :: (c – d) : c
(f) (a + b) : (a – b) :: (c + d) : (c – d)
(g) (a + b) : (c + d) :: (a – b) : (c – d)
(h) (a + c) : (b + d) :: (a–c) : (b–d)

PERCENTAGE:
The word percentage is made up of two words 'per' and 'cent' which means 'in every hundred'. 7 percent means 7 out of every hundred. Hence, the fraction in which the denominator is 100 is called percentage. And the fraction of the fraction is called the percentage rate. It is often denoted by %. There is no such unit as Rs-, meter, kg-litre, etc.

कुछ महत्वपूर्ण प्रतिशत का मान भिन्न के रूप में			
4% = $\frac{1}{25}$	50 % = $\frac{1}{2}$	$6\frac{1}{4}$ % = $\frac{1}{16}$	$66\frac{2}{3}$ % = $\frac{2}{3}$
5% = $\frac{1}{20}$	60% = $\frac{3}{5}$	$12\frac{1}{2}$ % = $\frac{1}{8}$	$133\frac{1}{3}$ % = $\frac{3}{4}$
10% = $\frac{1}{10}$	75 % = $\frac{3}{4}$	$37\frac{1}{2}$ % = $\frac{3}{8}$	$66\frac{1}{2}$ % = $\frac{5}{8}$
16% = $\frac{4}{25}$	80 % = $\frac{4}{5}$	$87\frac{1}{2}$ % = $\frac{7}{8}$	$14\frac{2}{7}$ % = $\frac{1}{7}$
20% = $\frac{1}{5}$	100 % = 1	$8\frac{1}{3}$ % = $\frac{1}{12}$	$11\frac{1}{9}$ % = $\frac{1}{9}$
25 % = $\frac{1}{4}$	120 % = $\frac{6}{5}$	$16\frac{2}{3}$ % = $\frac{1}{6}$	$9\frac{1}{11}$ % = $\frac{1}{11}$
40 % = $\frac{2}{5}$	125 % = $\frac{5}{4}$	$33\frac{1}{3}$ % = $\frac{1}{3}$	150 % = $\frac{3}{2}$

SOME IMPORTANT RULES:

1. (a) To change a fraction to percentage, it should be multiplied with 100.

   Example- $\frac{7}{20} = \frac{7}{20} \times 100$ = 35%

   (b) To change a percentage to fraction, it should be divided with 100.

   Example- $85 = \frac{85}{100} = \frac{17}{20}$

2. x , y is $\frac{x}{y} \times 100\%$

   Example- $\frac{1}{2}$ is what percent of $\frac{1}{4}$?

   Answer: $\frac{1}{2} / \frac{1}{4} \times 100$ = 200%

3. (a) If A is x% more than B then B will be $\frac{x \times 100}{100+x}$ % less than A.

Profit Loss

- Purchase Price - The price at which an item is purchased.
- Sale Price - The price at which an item is sold.
- Overhead- The expenditure incurred in bringing the purchased item to the sales centre and its maintenance is called overhead.
- Cost sum of Value- Purchase price and overhead is added to the cost.
- Profit or loss is always at the cost price.
- Discount is always at marked price
- Profit = Sale Price - Purchase Price
- Loss = Purchase Price - Sale Price

(a) Profit percent = SP-CP/CP $\times$ 100

SIMPLE INTEREST and COMPOUND INTEREST

SIMPLE INTEREST: When interest is added on the principal only in all years, it is called simple interest.

IMPORTANT POINTS:

1. (a) Simple Interest = $\frac{\text{Principle} \times \text{Rate} \times \text{Time}}{100}$

(b) Rate = $\frac{\text{Interest} \times 100}{\text{Principle} \times \text{Time}}$

(c) Time = $\frac{\text{Interest} \times 100}{\text{Principle} \times \text{Rate}}$

(d) Principle = $\frac{\text{Interest} \times 100}{\text{Principle} \times \text{Time}}$

(e) Simple Interest

= Principle $\times$ (Rate $\times$ Time)

(f) Amount = Principle + Interest

(g) Interest = Amount – Principle

(h) Principle = $\frac{\text{Principle} \times 100}{100+(\text{Interest} \times \text{Time})}$

COMPOUND INTEREST

When the interest paid after a certain time is not paid to the depositor and then added to the principal, then the interest received is compounded, thus the interest received is called compound interest.

Some formulas

(a) Amount = Principal + Interest

(b) Amount = Principal $\times (1 + \frac{\text{Rate}}{100})^{\text{Time}}$

(c) If the rate of interest on a bank compounded for 3 years is r1% in the first year r2% the second year and r3% in the third year then the compound interest for three years will be

= $(1 + \frac{r1}{100})(1 + \frac{r2}{100})(1 + \frac{r3}{100})$

EXERCISE

1. If x: y is 3:5, then what will be the value of (2x+5y): (2y-3x)?
   (1) 31:1   (2) 19:1
   (3) 19:6   (4) 31:5

2. The ratio of the present age of Mohan and Sohan is 2:3 and it will become 3:4 after ten years. What is the present age (in years) of Mohan?
   (1) 10   (2) 15
   (3) 20   (4) 30

3. The total number of runs scored by three players A, B and C are 1800. The ratio of runs scored by A and B is 5:7 and the ratio of run scored by B and C is 3:2. How many runs were scored by A?
   (1) 756   (2) 612
   (3) 562   (4) 540

4. The ratio of the monthly income of X and Y is 5: 11. The difference between their incomes is Rs. 24000. What will be the monthly income of Y?
   (1) 44000   (2) 20000
   (3) 22000   (4) 33000

5. The ratio of the monthly income of Deepak and Raj is 4:9 and the ratio of their expenditures is 1:3. If each saves Rs. 9000 each month, then what will be the monthly income of Deepak?
   (1) 54000   (2) 33000
   (3) 24000   (4) 42000

6. If the length of a rectangle is increased by 20% then by what percent will the breadth will have to be reduced so that its area remains same?
   (1) 10   (2) 20
   (3) 25   (4) 16.66

7. 1224 is how much percent of 4800?
   (1) 24.5   (2) 25
   (3) 24   (4) 25.5

8. If the length of a rectangle is increased by 25% then by what percent will the breadth will have to be reduced so that its area remains same?
   (1) 15   (2) 20
   (3) 12.5   (4) 25

9. 1008 is how much percent of 7200?
   (1) 11   (2) 12
   (3) 15   (4) 14

10. If 30% of P = 40% of Q then by what percent is Q less than P.
    (1) 20   (2) 25
    (3) 12.5   (4) 10

11. If P is 30% more than Q and R id 30% less than Q then by what percent is R less then P?
    (1) 60   (2) 51
    (3) 46.15   (4) 69

12. After deducting 80 from 20% value of a number, the result is 80 then what will be the value of the number?
    (1) 330   (2) 440
    (3) 550   (4) 220

13. A number is deducted by 30% first and is then increased by 30%. If the resultant number is 72 less than the original number, then what is the value of the original number.
    (1) 720   (2) 800
    (3) 960   (4) 1080

14. The one-third of a number is 120. What will be 55% of that number?
    (1) 192   (2) 198
    (3) 171   (4) 206

15. If the cost price of 6 objects is equal to the selling price of 9 objects then what will be the loss percentage?
(1) 25   (2) 33.33
(3) 50   (4) 20

16. A person earns a profit of 50% when he sells an object at a fixed price. If the price is reduced to half then what will be the loss percentage?
(1) 25   (2) 50
(3) 75   (4) 37.5

17. The price of an object is 40% more than its cost/ purchase price. What will be the loss percentage if the object is sold on a 45% discount?
(1) 23   (2) 29
(3) 19   (4) 25

18. If the cost price of 5 objects is equal to the selling price of 8 objects then what will be the loss percentage?
(1) 40   (2) 37.5
(3) 50   (4) 56.25

19. A person earns a profit of 25% when he sells an object at a fixed price. If the price is reduced to half then what will be the loss percentage?
(1) 62.5   (2) 27.5
(3) 37.5   (4) 32.5

20. The price of an object is 35% more than its cost/ purchase price. What will be the loss percentage if the object is sold on a 45% discount?
(1) 19   (2) 22
(3) 27   (4) 16

21. An amount of Rs 2200 was invested in a scheme with compound interest. If the rate of interest is 10% per annum, how much interest (in Rs) has been earned in 2 years?
(1) 462   (2) 628
(3) 576   (4) 682

22. An amount of Rs 35000 was invested in a scheme with compound interest. If the rate of interest is 20% per annum, how much interest (in Rs) has been earned in 2 years?
(1) 56200   (2) 50400
(3) 48600   (4) 42500

23. An amount of money invested in compound interest becomes Rs 2420 in 2 years. If the principle amount is Rs. 2000, then find the rate of interest?
(1) 15   (2) 10
(3) 8   (4) 12

24. A sum of money is invested at simple interest gives interest of Rs. 2550 at the rate of 17% per year in 3 years. What is the principal (in Rs)?
(1) 4000   (2) 5000
(3) 6000   (4) 4500

25. An amount of money when invested in simple interest becomes 3 times in 4 years. In how many years will it become 21 times the original price?
(1) 20   (2) 36
(3) 40   (4) 30

26. An amount of money invested in compound interest. After two years the amount is Rs 1210 and after 3 years the amount is Rs. 1331. Find the rate of interest.
(1) 5   (2) 10
(3) 15   (4) 20

27. Ravi bought two objects at Rs. 1500 each. He sold one object at 6% profit and another at 4% loss. Find the profit/ loss percent in this transaction.

(1) Profit 1%   (2) Loss, $1\frac{1}{2}$ %

(3) Profit, 2%   (4) Loss, 1%

28. A shopkeeper sells 25 books at Rs 45 each after giving a discount of 10% and earns 50% profit. If there was no discount given then what will be the profit percentage?
(1) 60   (2) 66
(3) $66\frac{1}{3}$ (4) $66\frac{2}{3}$

29. A shopkeeper reduced the prices of objects by 10%. What is the new price of an object that was sold for Rs 500 earlier?
(1) ₹550   (2) ₹450
(3) ₹400   (4) ₹510

30. A man marks the price of objects 40% more than their cost price and gives a 40% discount on the cost price. What will be the profit/loss percentage?

(1) No Loss/ No Profit (2) Loss, 80%

(3) Profit, 10 (4) Loss, 16%

31. At what rate of interest will an amount of money becomes twice when invested in simple interest for 8 years.

(1) 11.0% (2) 12.5%

(3)12% (4) 13.5%

32. The difference between simple interest and compound interest received on an investment after 2 years at the rate of 4 % annual interest is Rs. 10. The value of the investment will be.

(1) ₹4500 (2) ₹5550

(3) ₹5750 (4) ₹6250

33. An amount of money in compound interest becomes Rs. 4818 in 3 years and Rs. 7227 in 6 years. The amount of money is-

(1) ₹3122 (2) ₹3212

(3) ₹2409 (4) ₹2490

34. Find the amount when Rs. 6,250 is compounded annually for $2\frac{3}{4}$ years at the rate of 8%:

(1) ₹7,872.60 (2) ₹7,165.60

(3) ₹7,581.40 (4) ₹7,727.40

35. If (a+b): (b+c) : (c+a) = 6:7:8 and a+b+c = 14 then c=

(1) 6 (2) 74

(3) 80 (4) 14

36. Neena and Meena started a business from Rs. 30,000 and Rs. 45,000 respectively. What will be the share of Meena in the profit of 150000 after 2 years?

(1) ₹30000 (2) ₹45000

(3) ₹75000 (4) None of these

37. If a:b = 4:5, b:c = 6:9, c:d = 15:19 then a:b:c:d is.

(1) 8:10:15:19 (2) 10:11:15:19

(3) 8:9:15:19 (4) 19:15:6:8

38. If (3a + 5b): (3a - 5b) = 5:1 then a:b will be-

(1) 3:2 (2) 5:3

(3) 2:1 (4) 5:2

39. A person has coins of Rs. 1, 50 paisa and 25 paisa that total up to an amount of Rs. 210 and their ratio is 5:6:8. How many coins of Rs. 1 are there?

(1) 41 (2) 42

(3) 103 (4) 105

40. In a meeting, $\frac{4}{25}$ of the total members are women. What percent of the total members are women?

(1) 24% (2) 16%

(3) 4% (4) 40%