Profit/ Loss, Partnership, Averages and Interest

Relevel
by Unacademy

Terms and Concepts Related to Profit/ Loss

Cost Price (CP): Cost incurred by the seller to produce/ procure the item.

Selling Price (SP): The price which is used to sell an article to the buyer.

Profit (Gain): It is the difference between the selling price and cost price when the selling price is greater than the cost price.

Loss: It is the difference between the cost price and the selling price when the cost price is greater than the selling price. Profit and loss are generally represented as a percent of the cost price unless otherwise stated.

Terms and Concepts Related to Profit/ Loss

Overhead Charges: If an individual spends money on transportation/ packaging, etc., then it is an extra expenditure, which is called overhead charges.

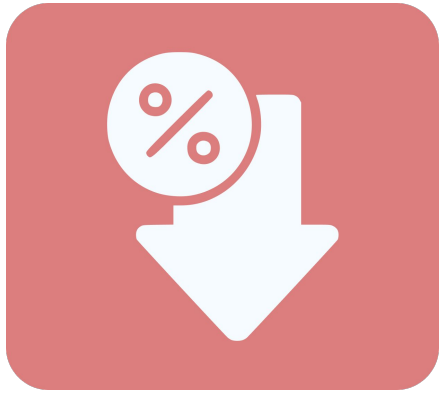
Marked Price (MP): The price written on the label of a product is called the Marked price or list price.

Discount: The reduction made on the marked price of an article is called a discount. When no discount is given, the selling price is the same as the marked price.

Markup: The variance between the cost of an article and its marked price is called Markup. A markup is added to the cost price or purchase price of an article in order to create profit.

Important Formulae

1. Profit = SP – CP..... (SP > CP)
2. Loss = CP – SP..... (CP > SP)
3. % Profit = (Profit/CP)*100 = ((SP-CP)/CP)*100
4. % Loss= (Loss/CP)*100 = ((CP-SP)/CP)*100
5. SP= {(100+ Profit%)/100}*CP
6. SP= {(100- Loss%)/100}*CP
7. Discount % = (Discount/ Marked Price)*100



Type (1)- General Questions

(i) A chair is bought for Rs.500 and sold for Rs.600. Find the profit%.

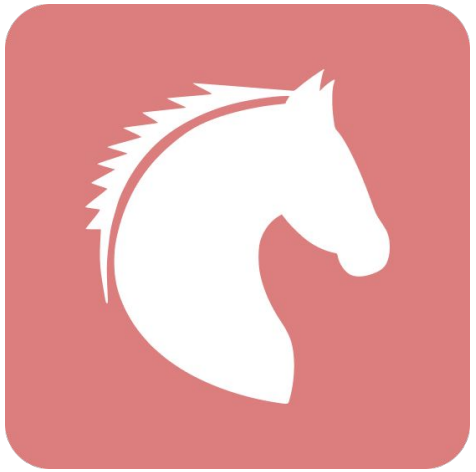
(ii) An article is manufactured for Rs 742 and sold for Rs 700. Find the loss %.

(iii) The manufacturing cost of a chair is Rs 180. Find the gain percent if it is sold for Rs 216.

Type (2)- When an article is alternately sold at a different price

(i) A horse was sold for Rs 80000 at 25% profit. In order to gain 40% profit, at what price it should be sold?

(ii) Mohan sold a plot for Rs 200000 at a 20% loss. To gain 10% profit, for what price should he sell the plot?



Type (3)- When an article is bought and sold many times

(i) A sold a watch to B at 20% gain, B sold it to C at a loss of 10%. If C bought it for Rs.216 then at what price did A purchase it?

(ii) On a book, the publisher gains 10%, the distributor 15% and at last the retailer gains 25% at the retail price of Rs 253. Find the production cost of the book.

(iii) A sold an article to B at 10% gain, B sold it at a loss of 10% to C, C sold it to D at 20% gain. D bought it for Rs. 1188. At what price did A purchase it?

Type (4) When an article is sold for more or less than the initial SP

If both % are of profit or loss, then

Cost Price= ((Increase or Decrease in SP)*100)/ (Difference of Profit or Loss Percentages)

If one % is of profit and another of loss, then

Cost Price= ((Increase or Decrease in SP)*100)/ (Sum of Profit and Loss Percentages)

Type (4) When an article is sold for more or less than the initial SP

Practice Questions:

(i) A man sells his goods at 10% gain. If he sells it at 15% gain, he gets Rs 200 more. Find the cost price of his goods.

(ii) Mahesh sold a watch at a 10% loss. If he had sold it for Rs 60 more, he would have lost 5%. At what price had he bought it?

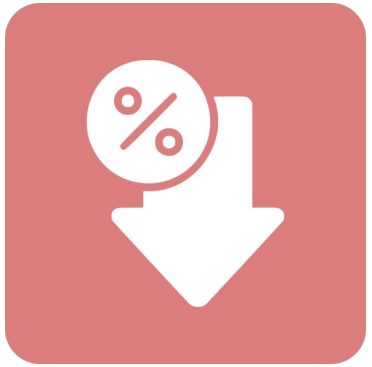
(iii) A man sold his furniture at 15% gain. If he had sold it at a 10% loss, he would have got Rs. 500 less. Find the cost price of the furniture.

Type (5) When two articles are sold for the same price

If two articles are sold at the same price, one on x% profit and another on x% loss, then there is always a loss of (x^2/100)%

(i) A shopkeeper sells two TV sets for the same price. He gains 20% on one set and loses 20% on another. What is net loss or gain% in the whole transaction?

(ii) A merchant sells two articles for Rs 99 each. There is a loss of 10% on one article and a gain of 10% on another. Find his overall gain or loss % in the transaction.



Type (6) When two articles are bought on different prices but sold on same price:

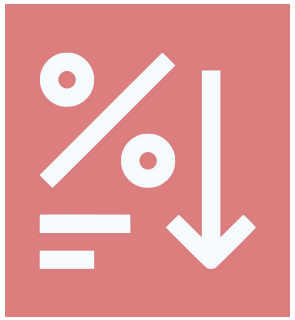
If two articles, bought on different prices, are sold for the same price at some % gain or loss then:

(first article's CP)/ (Second article's CP) = (100±gain or loss on second)/ (100±gain or loss on first)

(Use +ve sign for gain and -ve sign for loss)

Practice Questions:

(i) A man sells two articles for the same price, one on 20% gain and the other on 25% gain. If one article's cost price is Rs.10000 then what will be the second's cost price?



(ii) Sitaram sold two cars for the same price, one on 10% profit and the second on 20% loss. If the second car was bought for Rs. 121000. Then find the cost price of the first car.

Type (7) More or less quantity on decreased or increased price:

(i) When the price of rice increases by 25%, a consumer gets 10 kg less rice for Rs. 400. Find the new rate of rice.

(ii) A reduction of 20% in the price of sugar enables a customer to purchase 6 kg more for Rs. 240. Find the reduced price of sugar.

Practice Questions

1. A boy bought oranges at the rate of 9 units for Rs. 9.60 and sold them at 11 for Rs. 12. What was his gain or loss percent?

2. A merchant professes to lose 4% on a certain tea, but he uses a weight equal to 840g instead of 1 kg. Find his real loss or gain percent.

3. Find the profit percentage, if the cost price of 10 articles is equal to the selling price of 9 articles.

Practice Questions

4. A trader gives a discount of 5% for cash payments. How much percent above the cost price must he mark his goods to make a profit of 10%.

5. One merchant correctly calculates his percentage profit on the cost price; another wrongly calculates it on the selling price. Find the difference in actual profit if both claim to make 17.5% profit on goods sold at Rs. 3760.

6. Buy two and get one free. Which of the following is true?

i) The person is selling at a loss.

ii) The person is selling at a profit.

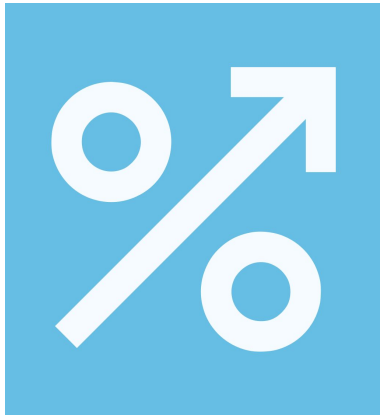
iii) The loss or gain depends on the profit from the sale of two articles.

iv) The person is selling at the cost price.

Practice Questions

7. A tradesman bought 500 meters of electric wire at 75 paise per meter. He sold 60% of it at a profit of 8%. At what gain percent should he sell the remainder so as to gain 12% on the whole transaction?

8. A merchant imported 5 typewriters for Rs. 23000 and paid 10% as excise duty. He marks a price in his catalogue and, after deducting a discount of 8%, he gains 12%. What is the marked price of each typewriter?



Answers

1. 2.27%

2. 14.3%

3. 11.11%

4. 115.7%

5. 98

6. Option 3

7. 18%

8. 6160

Partnership

A formal arrangement of two or more people who invest their money to run a business is called a Partnership. A partner who does managerial or administrative work in the business is called Working Partner and the one who simply invests the money in it is called Sleeping Partner.

If the investment period is the same for each partner, then the profit or loss is divided in the ratio of their investment amounts.

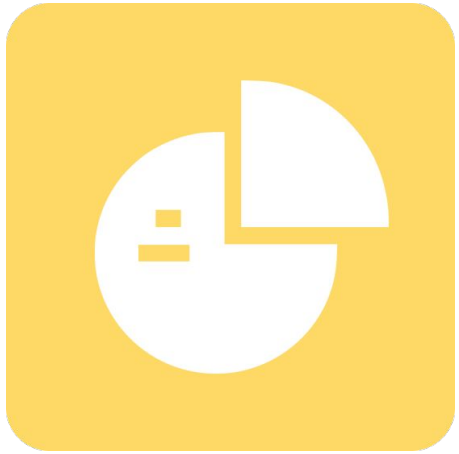
If the amount of investment is the same for each partner, then the profit or loss is divided in the ratio of their time of investment.

If the amount of investment and time of investment for each partner is different then- Let A invests Rs. ‘a’ for t1 time, B invests Rs. ‘b’ for t2 time and C invests Rs. ‘c’ for t3 time, then profit/loss is divided in the ratio: a*t1 : b*t2 : c*t3

Partnership- Practice Questions

Example 1: Three partners A, B and C invest Rs. 1600, Rs. 1800 and Rs. 2300 respectively in a business. How should they divide a profit of Rs.399?

Example 2: A, B and C enter into a partnership. A advances Rs. 1200 for 4 months, B gives Rs. 1400 for 8 months and C Rs. 1000 for 10 months. They gain Rs. 585 altogether. Find the share of profit each.



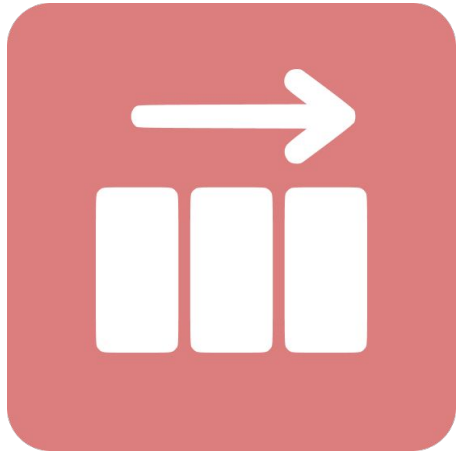
Averages

A central value for a group of values is called an average. It is the sum of values divided by the number of values in a set of data.

Average or Arithmetic mean = (Sum of all values) / (Number of values)

Example: Find the average of 10, 15, 17 and 20.

Average = (10+15+17+20)/4 = 15.5

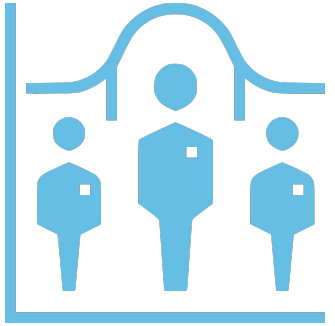


Averages- Types of Questions

(1) When a new person comes to the group:

(a) If a new person comes into the group and the average rises, then the
weight of the new person = new average + (increase in average * previous number of people)

Example: The average weight of 34 students of a school is 42 kg. If the weight of the teacher is included, the average rises by 400 grams. Find the weight of the teacher.
Solution: The weight of the teacher = 42.4 +(0.4*34) = 56.0 kg



(b) If a new person comes into the group and the average decreases,
the weight of new person = new average - (decrease in average previous number of people)

Example: The average age of 6 salesmen in a company is 37 years. If a new salesman is employed, the average age is decreased by 2 years. Find the age of the new salesman.
Solution: The age of new salesman = 35- (2*6) = 23 years.

Averages- Types of Questions

(2) When a person went out from the group:

(a) If a person went out from the group and the average decreased, then age of excluded person = previous average + (decrease in average * new number of people)

Example: The average of 15 numbers is 20. If one number is excluded, the average decreases by 1. Find the excluded number.
Solution: The excluded number = 20 + (1 * 14) = 34

(b) If a person went out from the group and average increased, then the age of excluded person = previous average - (increase in average * new number of people)

Example: The average weight of 24 salespersons is 60 kg. When one salesperson is transferred to another department, the average decreases by 1/ 2 kg. Find the weight of the transferred salesperson.
Solution: The weight of transferred salesperson = 60 - (1/2 * 23) = 48.5 kg

Averages- Types of Questions

(3) When a person is replaced by another person:

If a person is replaced by a new person, then the weight of new person =
weight of replaced person [+ (increase) or – (decrease)] * number of people

Example: The average weight of 12 salesmen is increased by 1/3 kg. When one of the salesmen whose weight is 55 kg is replaced by a new salesman, what is the weight of the new salesman?
Solution: The weight of the new salesman = 55+ ((1/ 3)*12) = 59 kg

Practice Questions

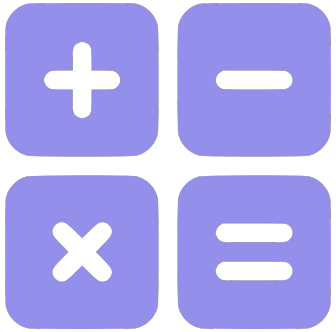
1. Find the average of –

i) First 81 natural numbers

ii) Cubes of natural numbers from 1 to 27.

iii) First 31 consecutive even numbers.

iv) First 50 consecutive odd numbers.



2. The average marks of three batches of students containing 70, 50 and 30 students are 50, 55 and 45 respectively. Find average marks of all the 150 students.

Practice Questions

3. Which of the following is/ are true?

(a) The average age of 25 boys is 12 years and that of 25 girls is 10 years, then the average age of the entire group of 50 students is 11 years.

(b) If the average cost of 10 items is Rs. 7 and if the average cost of six of them is Rs.5, then the average cost of remaining 4 is Rs. 10.

(c) The average of the first 100 natural numbers is 50.

(d) The average of the first 15 even numbers is 16.

(i) a & b only (ii) b, c & d only (iii) a, b, & d only (iv) None

4. In the group of A, B and C, the average weight is 84 kgs. If D, joins their group, the average weight of the group becomes 80 kg. If another man E who weighs 3 kgs more than D, replaces A, then the average of B, C, D and E turns to 79 kg. What is the weight of A?

Practice Questions

5. In the class of 15 students, the average mark obtained is 145, the maximum mark being 150. If the two lowest scores are dropped out, the average increases by 5. Also, the two lowest scores are consecutive multiples of 9. Find out the lowest score in the class.

6. A, B, and C enter into a partnership where A advances Rs. 1200, B Rs. 1400, and C Rs. 1000 for 4,8,10 months respectively. They gain Rs. 585 altogether. Find the profit share of each.

7. A is working and B is a sleeping partner in a business. A puts in Rs. 5000 and B put in Rs. 6000. A receives 12.5% of the profits for managing the business, and the rest is divided in proportion to their capitals. What share does each get out of a profit of Rs. 880?

Practice Questions

8. A puts in Rs. 6000 more in a business than B, but B has invested his capital for 5 months while A has invested his sum for 4 months. If the A's share is Rs. 48 more than that of B out of the total profits of Rs. 528; find the capital contributed by each?

9. A grocer mixed two kinds of coffee in the ratio of m: n. The first kind costs him Rs. x/kg and the second kind Rs. y/kg. Find the cost, to the grocer, of 1 kg of the mixture (in Rs.)

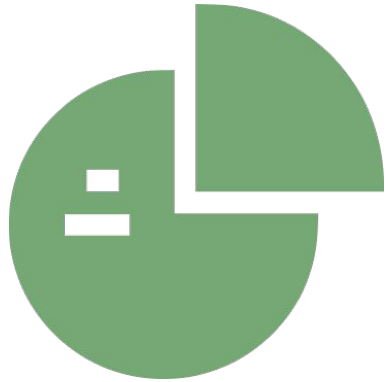
10. A merchant has 100 kg of sugar, some of which he sells at 7% profit and the rest at 17% profit. He gains 10% on the total sale. Find how much is sold at 7% profit.

Practice Questions

11. In what proportion should sugar at Rs. 11, at Rs. 13 and at Rs. 18 per kg be mixed so that the price of the mixture is Rs. 15 per kg.

12. A trader has 50 kg of pulses, some of which he sells at 8% profit and the rest at 18% profit. He gains 14% on the total sale. How much quantity is sold at 18% profit?

13. Three friends A, B, C, together started a joint venture by investing money in the ratio of 2: 3: 4, respectively. A withdrew half of his money after some months. A few months prior to the end of the year, C too withdrew 1/4 of his money. If they distributed their profits in the ratio 2: 4: 5 respectively, then after how many months did C withdraw 1/4 of his money?



Practice Questions

14. Suresh bought one writing table and one table fan together for Rs. 500. After some days he sold the fan with 25% profit and the table with 20% profit. The overall profit he made on the transaction was 23%. Find the individual prices of the table and fan.

15. The average of a, b, and c is more by 5 than the average of b, c, and d and 2 times of a is less than 3 times of d by 7. Find the average of a and d.

Answers

1. (i). 41

   (ii) 529

   (iii) 32

   (iv) 50

2. 50. 67

3. (3)

4. 75 kg

5. 108

6. A’s share = Rs.108, B’s share = Rs.252, C’s share = Rs. 225

Answers

7. A's share = Rs. 460, B's share = Rs. 420

8. A's capital = 18000 B's capital = 12000

9. (mx + my)/(m+n)

10. 70 kg

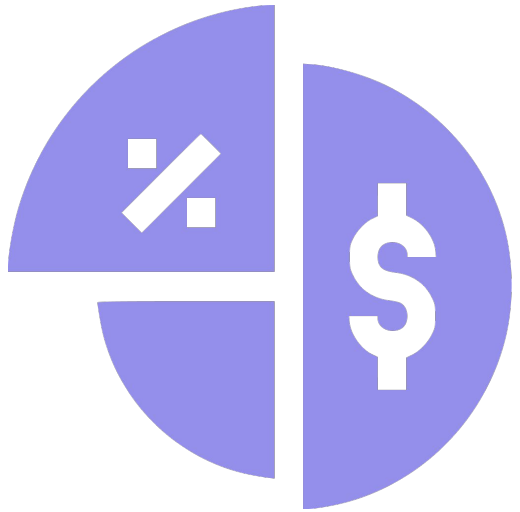
11. 1: 1 : 2

12. 30 kg

13. 9 months

14. Writing table = Rs.300, Table fan = Rs.200

15. 44.5



Simple Interest

Principal: Certain amount of money borrowed or lent out for a certain time

Interest: Extra money paid with borrowed money

Amount: Principal + Interest

Simple Interest (SI)= P*T*R/ 100, where P= principal, R= rate of interest, and T= time period

SI- Type of Questions

Type 1: General Questions

Q 1. Find the simple interest on Rs. 500 at 10% p.a. for 3 years.

Q 2. At what rate percent per annum will simple interest of Rs. 600 for 10 years be Rs. 120.

Q 3. Find the principal for which simple interest is Rs. 280 at the rate of 7% p.a. for 4 years.

Q 4. Rs.1500 is given a rate of 6% p.a. for 5 years. How much will the amount be at the end of the duration?

Q 5. In how many years will simple interest be Rs. 150 if Rs. 500 is lent out at the rate of 5% p.a.?

SI- Type of Questions

Type 2: If a sum of money becomes a/b of itself, then

Amount = Principal* (a/b)
(Amount/ Principal)= (a/b), Let amount = a and principal = b
SI = a – b, Rate of interest ={ (a-b)*100}/ (b*time)

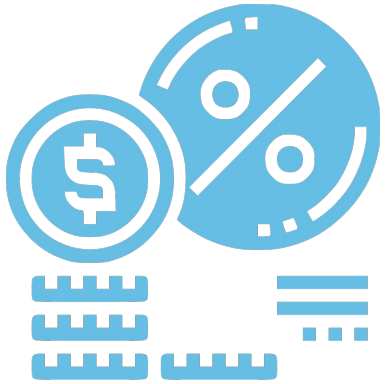
Q 1. Ram lent a sum of money to Mohan for 4 years. At the last of duration, Mohan paid 6/5 of the money to Ram. Find the rate of interest per annum.

SI- Type of Questions

Type 3: When interest becomes a/b of principal

Then SI= Principal* (a/b)

(SI/P)=(a/b), therefore Rate of interest= (a*100)/(b*time)



Q 1. A sum of money was lent on simple interest. After 3 years its simple interest became 3/5 of it. Find the rate of interest per annum.

Q 2. The simple interest of money is 3/16 of it. If the number of years is 3 times of number representing the rate percent, find the rate of interest.

SI- Type of Questions

Type 4: Questions based on sum and difference of interests:

(a) If the sum of interest is given, then, Principal= (Sum of interest *100)/ (Rate of interest * Sum of time periods)

(b) If the difference of interest is given then, Principal= (Difference of Interest *100)/ (Rate of Interest * Difference of time periods)

Q 1. The simple interest on money for 3 years at 4% p.a. is Rs. 400 less than the simple interest on the same money at 5 years. Calculate the money.

Q 2. A man lent some money to Ram at 6% p.a. for 8 years and the same money to Shyam at the same rate for 10 years. He gains Rs. 2160 as total interest from Ram and Shyam. Calculate the money lent to everyone.

SI- Type of Questions

Type 5: Questions based on amounts for two times:

Q 1. A sum of money amounts to Rs. 575 after 3 years and Rs. 625 after 5 years at the same rate of simple interest. What is the rate of interest % p.a.?

Q2. A sum of money amounts to Rs. 1210 at 7% p.a. after 3 years. In how many years will it amount Rs. 1350, at the same rate of interest?

Q3. Certain money amounts Rs. 1950 at 5% p.a. after 6 years. How much will it amount at the same rate of interest after 8 years?

SI- Type of Questions

Type 6: Questions based on the average rate of interest:

Q 1. Gopal lent Rs. 5000 into two parts to two men, one at 4% and another at 5%. After 2 years he gains interest at 4.2% p.a. on the total money. Find the money lent on 4%.

Q 2. A man lent some part of Rs. 15000 at 15% and rest part at 10%. He gained interest at an average rate of 12% p.a. Find the money lent at 10%.

SI- Type of Questions

Type 7: Questions based on many rates of interest:
Total interest = P(r1*t1 + r2*t2 + r3*t3.....)/100

Q 1. A man borrowed Rs. 8000 at the rate of 6% for the first 5 years, for the next 3 years at the rate of 8%, and at the rate of 10% for the period beyond 8 years. If he paid the total amount at the end of 12 years, how much interest will have he to pay?

Q 2. The simple interest on money at the rate of 4% for the first 2 years, at the rate of 6% for the next 4 years, and at the rate of 8% for the period beyond 6 years was to count. If the total interest for 9 years was Rs. 1120, find the money.

SI- Type of Questions

Type 8: When a sum of money becomes n times itself:

If a sum of money Rs. P becomes n times itself at r% p.a. in t years, then amount = nP

Simple Interest = nP – P = (n-1) P

Thus, (n-1)P = PRT/100

So, rt = 100(n-1)

Q 1. At what rate of SI, a sum of money will become double in 5 years?

Q 2. For what time in years, a sum of money will become 4 times itself at 10% p.a.?

SI- Type of Questions

Type 9: When a sum of money becomes n1 times itself in t1 and n2 times in t2 years:
t1/t2= (n1-1)/ (n2-1)

Q 1. A sum of money becomes double in 20 years at the rate of simple interest. In how many years will it become 4 times itself at the same rate of interest?

Type 10: When two different amounts of money are lent at two rates of interest for two times, but the interests paid are same, P1 *T1 * R1 = P2 * R2 * T2

Q 1. Rs. 1500 is lent on 6% for 10 years and Rs. 3000 is lent on 5% p.a. for t years. If their interests are the same, then find the value of t.

Compound Interest

When at the end of a fixed period the interest is not paid to the lender but is added to borrowed money and such amount becomes as principal for the next period, and this process is repeated until the last period, the difference between the final amount and the original principal is known as compound interest.

Principal = Rs. P, Rate = r%, Time = n years

Amount = P* (1+ (r/100))^n

Compound Interest = Amount – Principal

Compound Interest

There are 6 types of questions that may be asked in upcoming tests:

General Questions

Questions based on multiples

When amounts on two periods are known.

When the difference between C.I. and S.I. is known.

When interest is reckoned half-yearly and quarterly.

Questions based on instalments.

CI- Type of Questions

Type 1 - General Questions:

Q1. Find the compounded amount on Rs. 3000 at 20% p.a. for 2 years.

Type 2 - Questions based on multiples:
If the sum of money amounts n times in t1 year and m times (let m= n^a) in t2 years then,
t2= t1*a

Q1. A certain amount of money at compound interest amounts thrice itself in 3 years. After how many years it will be 9 times itself?

CI- Type of Questions

Type 3 - When amounts of two periods are known:

(a) If amounts in two consecutive years are given, then
Rate of interest = (difference between amounts/ first amount)*100
(b) If a sum of money on compound interest becomes Rs.A in t1 years and Rs.B in t2 years, then
(1+(r/100))^(t2-t1)= B/A

Q1. A sum of money amounts to Rs. 800 in 3 years and Rs. 840 in 4 years at compound interest. What is the rate of compound interest per annum?

CI- Type of Questions

Type 4 - When the difference between C.I. and S.I. is known:

(a) Difference of interest in two years = P*(r/100)^2

Q1. A sum of money was lent on compound interest and simple i nterest both 4% respectively. The difference between CI and SI is Rs. 8 for 2 years. Find the sum of money.

(b) Difference between CI & SI in three years= P*(r/100)^2*((r+300)/100)

Q2. On a certain sum, the difference between compound interest and simple interest at 5% p.a. for 3 years is Rs. 15.25. What is the sum?

(c) Difference SI & CI in more than three years= [P* (1+ (r/100))^n]- P - (PTR/100)

Q3. Rs 684 is the difference between C.I. and S.I. on a sum of money at 20% for 4 years is Rs. 684. Find the sum of money.

CI- Type of Questions

Type 5 - When interest is reckoned half-yearly and quarterly.

Rate of interest half-yearly = rate of interest yearly/2

Number of half years = number of years* 2

Rate of interest quarterly = rate of interest yearly/ 4

Number of quarters = number of years* 4

Q1. Find the compound interest on Rs. 8000 at 8% per annum, for 2 years, compounded half-yearly.

Q2. Find the compounded interest on Rs. 2000 at 12% p.a. for 9 months compounded quarterly.

CI- Type of Questions

Type 6 - Questions based on instalments

If lent money is Rs. P and each instalment are Rs. X, then

{x/(1+(r/100))}+{x/(1+(r/100))^2}+{x/(1+(r/100))^3}+.....=P

Q1. A sum of Rs. 16400 was taken at the rate of 5% p.a. to be paid back in two equal annual instalments. Find the value of each instalment.

Q2. A sum of money was lent on compound interest at the rate of 10% p.a. is fully paid back in three equal annual instalments of Rs. 2500. Find the sum of money.

In the next class we will study:

- Intro to Database and SQL