PERCENTILE CLASSES

Simple Interest & Compound Interest

Simple Interest & Compound Interest

Interest is the fixed amount paid on borrowed money.
The sum lent is called the Principal.
The sum of the principal and interest is called the Amount.
Interest is of two kinds:
(i)   Simple interest   (ii) Compound interest
(i)   Simple Interest: When interest is calculated on the original principal for any length of time, it is called simple interest.

➤   Simple interest $= \frac{Principal \times Time \times Rate}{100}$
      i.e., $S.I. = \frac{P \times R \times T}{100}$

➤ $Amount = Principal + Interest$
      i.e., $A = P + I = P + \frac{PRT}{100} = P\left(1 + \frac{RT}{100}\right)$

➤   Principal (P) $= \frac{100 \times S.I.}{R \times T}$
➤   Rate (R) $= \frac{100 \times S.I.}{T \times P}$
➤   Time (T) $= \frac{100 \times S.I.}{P \times R}$
➤   If rate of simple interest differs from year to year, then $S.I. = P \times \frac{(R_1 + R_2 + R_3 .....)}{100}$

(ii)   Compound Interest: Money is said to be lent at compound interest when at the end of a year or other fixed period, the interest that has become due is not paid to the lender, but is added to sum lent, and the amount thus obtained becomes the principal in the next year or period. The process is repeated until the amount for the last period has been found. Hence, When the interest charged after a certain specified time period is added to form new principal for the next time period, the interest is said to be compounded and the total interest accrued is compound interest.

➤ $C.I. = P\left[\left(1 + \frac{r}{100}\right)^n - 1\right]$;
➤   Amount (A) $= P\left(1 + \frac{r}{100}\right)^n$
➤   If rate of compound interest differs from year to year, then Amount $= P\left(1 + \frac{r_1}{100}\right)\left(1 + \frac{r_2}{100}\right)\left(1 + \frac{r_3}{100}\right) ... .$

➤   Compound interest – when interest is compounded annually but time is in fraction
➤   If time $= t\frac{p}{q}$ years, then
➤ $A = P\left(1 + \frac{r}{100}\right)^1\left(1 + \frac{\frac{p}{q}r}{100}\right)$

Compound interest – when interest is calculated half – yearly
Since r is calculated half – yearly therefore the rate per cent will become half and the time period will become twice, i.e.,
Rate per cent when interest is paid half – yearly $= \frac{r}{2}\%$
And time $= 2 \times$ time given in years
Hence,
$A = P\left(1 + \frac{r}{2 \times 100}\right)^{2n}$

➤   Different between Compound Interest and Simple Interest When T = 2
      (i) $C.I. - S.I. = P\left(\frac{R}{100}\right)^2$
      (ii) $C.I. - S.I. = \frac{R \times S.I.}{2 \times 100}$
      When T – 3
      (i) $C.I. - S.I. = \frac{PR^2}{10^4}\left(\frac{300 + R}{100}\right)$

(ii) $C.I.-S.I. = \frac{S.I.}{3}\left[\left(\frac{R}{100}\right)^2 + 3\left(\frac{R}{100}\right)\right]$

Effective Rate
If Rs. 1 is deposited at 4% compounded quarterly, a calculator can be used to find that at the end of one year, the compound amount is Rs.1. 0406, an increase of 4.06% over the original Rs. 1. The actual increase of 4.06% in the money is somewhat higher than the stated increase of 4% is called the nominal or stated rate of interest, while 4.06% is called the effective rate. To avoid confusion between stated rates and effectives rates, we shall continue to use r for the stated rate and we will used r_e for the effective rate.
Thus, the effective rate is $r_e = 6.09\%$.
In the preceding example we found the effective rate by dividing compound interest for 1 year by the original principal. The same thing can be done with any principal P and rate r compounded m times per year.

Effective rate $= \frac{compound\ interest}{principal}$

$r_e = \frac{compound\ amount - principal}{principal}$

$= \frac{P\left(1+\frac{r}{m}\right)^m - P}{P} = \frac{P\left[\left(1+\frac{r}{m}\right)^m - 1\right]}{P}$

$= r_e = \left(1+\frac{r}{m}\right)^m - 1$

➢   Present worth of Rs P due n years hence
     Present worth $= \frac{P}{\left(1+\frac{r}{100}\right)^n}$

➢   Equal annual installment to pay the borrowed amount
     Let the value of each installment = Rs x
     Rate =r% and time = n years
     Then, Borrowed Amount
     $= \frac{x}{\left(1+\frac{r}{100}\right)} + \frac{x}{\left(1+\frac{r}{100}\right)^2} + \cdots + \frac{x}{\left(1+\frac{r}{100}\right)^n}$

Examination method:
The general formula of compound interest can be changed to the following form:
If a certain sum becomes 'm' times in 't' years, the rate of compound interest r is equal to $100(m)^{1/t} - 1$
In this case, $r = 100\left[(9)^{1/t} - 1\right]$
$= 100(3 - 1) = 200\%$

Semiannually	2	$\left(1+\frac{1}{2}\right)^2 = 2.25$
Quarterly	4	$\left(1+\frac{1}{4}\right)^4 = 2.4414$
Monthly	12	$\left(1+\frac{1}{12}\right)^{12} = 2.6130$
Daily	365	$\left(1+\frac{1}{365}\right)^{365} = 2.71457$
Hourly	8760	$\left(1+\frac{1}{8760}\right)^{8760} = 2.718127$
Every minute	525,600	$\left(1+\frac{1}{525,600}\right)^{525,600} = 2.7182792$

Simple Interest

1. Interest obtained on a sum of Rs. 5000 for 3 years is Rs. 1500. Find the rate percent.
    (a) 8%   (b) 9%   (c) 10%   (d) 11%

2. Find the rate of interest if the amount after 2 years of simple interest on a capital of Rs. 1200 is Rs. 1440.
    (a) 8%   (b) 9%   (c) 10%   (d) 11%

3. What is the simple interest on a sum of Rs.700 if the rate of interest for the first 3 years is 8% per annum and for the last 2 years is 7.5% per annum?
    (a) Rs.269.5   (b) Rs. 283   (c) Rs.273   (d) Rs.280

4. What is the simple interest for 9 years on a sum of Rs. 800 if the rate of interest for the first 4 years is 8% per annum and for the last 4 years is 6% per annum?
    (a) 400   (b) 392   (c) 352   (d) Cannot be determined

5. What will be the simple interest on Rs. 700 at 9% per annum for the period from February 5, 1994 to April 18, 1994?
    (a) Rs. 12.60   (b) Rs.11.30   (c) Rs.15   (d) Rs.13

6. Ajay borrows Rs. 1500 from two moneylenders. He pays interest at the rate of 12% per annum for one loan and at the rate of 14% per annum for the other. The total interest he pays for the entire year is Rs. 186. How much does he borrow at the rate of 12%?
    (a) Rs.1200   (b) Rs.1300   (c) Rs. 1400   (d) Rs.300

7. The difference between simple and compound interest on a sum of money at 5% per annum is Rs. 25. What is the sum?
    (a) Rs.5000   (b) Rs. 10,000   (c) Rs. 4000   (d) Data insufficient

8. In what time will the simple interest on Rs. 1750 at 9% per annum be the same as that on Rs. 2500 at 10.5% per annum in 4 years?
    (a) 6 years and 8 months   (b) 7 years and 3 months
    (c) 6 years   (d) 7 years and 6 months

9. What is the time period for which Rs. 8000 amounts to Rs. 12000 at 20% p.a. of simple interest?
    (a) 4 years   (b) 2.5 years   (c) 3.25 years   (d) 6 years

10. What is the rate of simple interest at which Rs. 14,000 gives interest of Rs. 1960 in two years?
    (a) 4%   (b) 5%   (c) 7%   (d) 10%

11. What is the sum of amount which gives Rs. 6300 as interest @ 7% per annum of simple interest in $7\frac{1}{2}$ years?
    (a) 36000   (b) 24000   (c) 63000   (d) 12000

12. If the rate of simple interest is 12% per annum, the amount that would fetch interest of Rs. 6000 per annum is: (a) Rs. 7200   (b) Rs. 48000   (c) Rs. 50000   (d) Rs. 72000

13. In what time will a sum of money double itself @ 20% per annum (p.a.) simple interest?
    (a) 10 years   (b) 5 years   (c) 2 years   (d) 4 years

14. A sum of money trebles (i.e., 3 times) in 15 years at r% of simple interest per annum. What is the value of r?
    (a) 12%   (b) $\frac{40}{3}$%   (c) $\frac{50}{3}$%   (d) can't be determined

15. On of a sum of Rs. 625, a part was lent at 5% SI and the other at 10% SI. If the interest on the first pan after 2 years is equal to the interest on the second pan after 4 years, then (he-second sum (in Rs.) is :
    (a) 250   (b) 300   (c) 125   (d) 275

16. A lent Rs. 6000 to B for 2 years and Rs. 1500 to C for 4 years and received altogether from both Rs. 900 as simple interest. The rate of interest is:
(a) 4%   (b) 8%   (c) 10%   (d) 5%

17. A lends a sum of money for 10 years at 5% SI. *B* lends double the amount for 5 years at the same rate of interest. Which of the following statements is true in this regard?
(a) A will get twice the amount of interest that B would get
(b) B will get twice the amount of interest that A would get
(c) A will get the same amount of interest that B would get
(d) B will get four times the amount of interest that A would get

18. Pratibha invests an amount of Rs. 15,860 in the names of her three daughters A, B and C in such a way that they get the same interest after 2, 3 and 4 years respectively. If the rate of simple interest is 5% p.a., then the ratio of the amounts invested among A, B and C will be:
(a) 5: 10: 12   (b) $\frac{1}{10}: \frac{1}{15}: \frac{1}{20}$ (c) 6:7:8   (d) 6:5:4

19. What annual payment will discharge a debt of Rs. 580 in 5 years, the rate being 8% p.a.?
(a) 120   (b) 100   (c) 80   (d) 78

20. Find the amount of Rs. 1700 invested at 16% half yearly at simple interest for one year:
(a) 2100   (b) 2244   (c) 2200   (d) 2500

21. A cellphone is available for Rs. 600 or for 300 cash down payment together with Rs. 360 to be paid after two months. Find the rate of interest charged under this scheme:
(a) 20%   (b) 50%   (c) 120%   (d) none of these

22. Rs. 3500 was lent partly @ 4% and partly @ 6% SI. The total interest received after 3 years is 498. What is the amount lent @ 4% SI?
(a) Rs. 1300   (b) Rs. 1800   (c) Rs. 200   (d) Rs. 2200

23. Akram left an amount of Rs. 340000 to be divided between his two sons aged 10 years and 12 years such that both of them would get an equal amount when each attain 18 years age. What is the share of elder brother if the whole amount was invested at 10% simple interest:
(a) 12000   (b) 16000   (c) 160000   (d) 180000

24. A and B run a joint venture in which the profit earned by A and B are in the ratio 28 :15. A invest his share at the start of the year and B joins in after 9 months of the same year What is the ratio of their initial investment respectively?
(a) 7:15   .   (b) 8 : 13   (c) 5 : 17   (d) 15 : 7

25. Arvind and Govind each invested Rs. 15000 for 3 years at the same rate of interest but Arvind's investment is compounded annually while Govind's investment is charged on simple interest. What amount did Arvind receive more than Govind?
(a) Rs. 680   (b) Rs. 3450   (c) data insufficient   (d) none of these

Compound Interest

1. The effective annual rate of interest corresponding to a CI rate of 8% per annum payable half yearly is:
    (a) 8%   (b) 8.01%   (c) 8.13%   (d) 8.16%

2. A man takes a loan of Rs.10,000 and pays back Rs.13,310 after 3 yr. What is the rate of CI?
    (a) 8%   (b) 9%   (c) 10%   (d) 11%

3. In 3yr, the difference between the simple and the compound interest on same principal amount at the rate of 20% is Rs.48. Find the principal,
    (a) Rs.650   (b) Rs.300   (c) Rs.375   (d) Rs.400

4. A sum of money becomes eight times in 3 yr, if the rate is compounded annually. In how years the same amount at the same compound interest rate will become sixteen times?
    (a) 6 yr   (b) 4 yr   (c) 8 yr   (d) 5 yr

5. The interests in the first two successive years were Rs.400 and Rs.420, respectively, when a sum of money is invested at CI. Find the sum.
    (a) Rs.8000   (b) Rs.7500   (c) Rs.8500   (d) Rs.8200

6. If a sum on CI becomes three times in 4 yr, then with the same interest rate, the sum will become 81 times
    in: (a) 12 yr   (b) 18 yr   (c) 16 yr   (d) 14 yr

7. Rs. 2100 is lent at compound interest of 5% per annum for 2 years. Find the amount after two years.
    (a) Rs.2300   (b) Rs.2315.25   (c) Rs.2310   (d)   Rs.2320

8. Find the difference between the simple and the compound interest at 5% per annum for 2 years on a principal of Rs.2000.
    (a) 5   (b) 105   (c) 4.5   .   (d) 5.5

9. Find the compound interest on Rs.1000 at the rate of 20% per annum for 18 months when interest is compounded half-yearly.
    (a) Rs.331   (b) Rs.1331   (c) Rs.320   (d) Rs.325

10. Find the principal if compound interest is charged on the principal at the rate of $16\frac{2}{3}$% per annum for two years and the sum becomes Rs.196.
    (a) Rs. 140   (b) Rs. 154   (c) Rs. 150   (d) Rs. 144

11. The SBI lent Rs.1331 to the Tata group at a compound interest and got Rs.1728 ate three years. What is the rate of interest charged if the interest is compounded annually?
    (a) 11%   (b) 9.09%   (c) 12%   (d) 8.33%

12. In what time will Rs.3300 become Rs.3399 at 6% per annum interest compounded half yearly?
    (a) 6 month   (b) 1 year   (c) $1\frac{1}{2}$ year   (d) 3 month

13. Vinay deposited Rs. 8000 in ICICI Bank, which pays him 12% interest per annum compounded quarterly. What is the amount that he receives after 15 months?
    (a) Rs.9274.2   (b) Rs.9228.8   (c) 9314.3   (d) Rs.9338.8

14. Ranjeet makes a deposit of Rs. 50,000 in the Punjab National Bank for a period of $2\frac{1}{2}$ years. If the rate of interest is 12% per annum compounded half-yearly, find the maturity value of the money deposited by him.
    (a) 66,911.27   (b) 66,123.34   (c) 67,925.95   (d) 65,550.8

15. If the difference between the simple interest and compound interest on some principal amount at 20% per annum for 3 years is Rs. 48, then the principle amount must be
(a) Rs.550   (b) Rs.500   (c) Rs.375   (d) Rs.400

16. A sum of money becomes 4 times at simple interest m 10 years. What is the rate of interest?
(a) 10%   (b) 20%   (c) 30%   (d) 40%

17. A sum of money doubles itself in 5 years. In how many years will it become four fold (if interest is compounded)?
(a) 15   (b) 10   (c) 20   (d) 12

18. A sum of money placed at compound interest doubles itself in 3 years. In how many years will it amount to 80 times itself?
(a) 9 years   (b) 8 years   (c) 27 years   (d) 7 years

19. The compound interest on Rs. 1000 at 10% p.a. in 3 years is:
(a) 331   (b) 1331   (c) 133   (d) 300

20. The compound interest on Rs. 10000 at 20% p.a. in 4 years:
(a) 10736   (b) 736   (c) 20736   (d) 7280

21. The compound interest on Rs. 4000 at 25% p.a. in 3 years:
(a) 1235   (b) 5625   (c) 3812.5   (d) 3750.5

22. A sum of Rs. 400 would become Rs. 441 after 2 years at r% compound interest, find the value of' 'r':
(a) 10%   (b) 5%   (c) 15%   (d) 20%

23. Rs. 6000 amounts to Rs. 7986 in 3 years at CI. The rate of interest is:
(a) 20%   (b) 10%   (c) 6%   (d) 7.5%

24. The least number of complete years in which a sum of money put at 20% CI will be more than doubled is:
(a) 4   (b) 5   (c) 6   (d) 8

25. A sum of Rs. 2400 deposited at CI, doubled after 5 years. After 20 years it will become:
(a) Rs. 24000   (b) Rs. 38400   (c) Rs. 19200   (d) can't be determine

26. The difference between CI and SI on a sum of money lent for 2 years at 10% is Rs. 40. The sum is:
(a) 1600   (b)   (c) 4000   (d) none of these

27. The compound interest on a certain sum at a certain rate of interest for the second year and third year is Rs. 21780 and Rs. 23958 respectively. What is the rate of interest?
(a) 6%   (b) 12%   (c) 10%   (d) 15%

28. Akbar lends twice the interest received from Birbal to Chanakya at the half of the interest at which he lent to Birbal. If Akbar lent Rs. P @ r% per annum for 1 year to Birbal then the interest received by Akbar from Chanakya is:
(a) $\frac{Pr^2}{100}$ (b) $\left(\frac{Pr}{100}\right)^2$ (c) $P\left(\frac{r}{10}\right)^2$ (d) $P\left(\frac{r}{100}\right)^2$

29. The ratio of the amount for two years under CI annually and for one year under SI is 6 : 5. When the rate of interest is same, then the value of rate of interest is:
(a) 12.5%   (b) 18%   (c) 20%   (d) 16.66%

30. Rs. 100000 was invested by Mohan in a fixed deposit @ 10% per annum at CI. However every year he has to pay 20% tax on the compound interest. How much money does Mohan has after 3 year?
(a) 128414   (b) 108000   (c) 126079.2   (d) none of these

SI/CI/Installments

1. A woman borrows Rs.4000 from a bank at 7.50% CI. At the end of every year, she pays Rs.1500 as a part repayment of loan and interest. How much does she still owe to the bank after three such installments
   (a) Rs.123.25   (b) Rs.125   (c) Rs.400   (d) Rs.469.18

2. At the rate of 12%, the difference between SI and CI compounded annually on Rs.5000 for 2yr will be:
   (a) Rs.17.50   (b) Rs.36   (c) Rs.45   (d) Rs.72

3. If the compound interest on a certain sum for 2 years is Rs.21. What could be the simple interest?
   (a) Rs.20 .   (b) Rs.16   (c) Rs.18   (d) Rs.20.5

4. Divide Rs. 6000 into two parts so that simple interest on the first part for 2 years at 6% p.a. may be equal to the simple interest on the second part for 3 years at 8% p.a.
   (a) Rs. 4000, Rs. 2000   (b) Rs. 5000, Rs. 1000   (c) Rs. 3000, Rs. 3000   (d) None of these

5. A sum of money becomes 7/4 of itself in 6 years at a certain rate of simple interest. Find the rate of interest.
   (a) 12%   (b) 12.5%   (c) 8%   (d) 14%

6. If the difference between compound and simple interest on a certain sum of money for 3 years at 2% p.a. is Rs.604, what is the sum?
   (a) 5,00,000   (b) 4,50,000   (c) 5,10,000   (d) None of these

7. If a certain sum of money becomes double at simple interest in 12 years, what would be the rate of interest per annum?
   (a) 8.33   (b) 10   (c) 12   (d) 14

8. A sum of Rs. 600 amounts to Rs. 720 in 4 years at Simple Interest. What will it amount to if the rate of interest is increased by 2%?
   (a) Rs.648   (b) Rs.768   (c) Rs. 726   (d) Rs. 792

9. What is the amount of equal instalment, if a sum of Rs.1428 due 2 years hence has to be completely repaid in 2 equal annual instalments starting next year
   (a) 700   (b) 800   (c) 650   (d) Cannot be determined

10. A sum of money invested at simple interest triples itself in 8 years. How many times will it become in 20 years' time?
    (a) 8 times   (b) 7 times   (c) 6 times   (d) 9 times

11. Find the compound interest on Rs. 64,000 for 1 year at the rate of 10% per annum compounded quarterly (to the nearest integer).
    (a) Rs.8215   (b) Rs.8205   (c) Rs.8185   (d) None of these

12. If a principal P becomes Q in 2 years when interest R% is compounded half-yearly. And if the same principal P becomes Q in 2 years when interest S% is compound annually, then which of the following is true?
    (a) R>S   (b) R = S   (c) R<S   (d) R≤S

13. The difference between CI and SI on a certain sum of money at 10% per annum for 3 years is Rs. 620. Find the principal if it is known that the interest is compounded annually.
    (a) Rs. 200,000   (b) Rs. 20,000   (c) Rs. 10,000   (d) Rs. 100,000

14. Mohit Anand borrows a certain sum of money from the Mindworkzz Bank at !0% per annum at compound interest. The entire debt is discharged in full by Mohit Anand on payment of two equal amounts of Rs. 1000 each, one at the end of the first year and the other at the end of the second year. What is the approximate value of the amount borrowed by him?
    (a) Rs.1852   (b) Rs.1736   (c) Rs. 1694   (d) Rs. 1792

15. In order to buy a car. a man borrowed Rs. 180,000 on the condition that he had to pay 7.5% interest every year. He also agreed to repay the principal in equal annual instalments over 21 years. After a certain number of years, however, the rate of interest has been reduced to 7%. It is also known that at the end of the agreed period, he will have paid in all Rs. 270.900 in interest. For how many years does he pay at the reduced interest rate?
(a) 7 years   (b) 12 years   (c) 14 years   (d) 16 years

16. A sum of Rs.8000 is borrowed at 5% p.a. compound interest and paid back in 3 equal instalments. What is the amount of each instalment?
(a) Rs.2937.67   (b) Rs.3000   (c) Rs.2037.67   (d) Rs.2739.76

17. A person lent out some money for 1 year at 6% per annum simple interest and after 18 months, he again lent out the same money at a simple interest of 24% per annum. In both the cases, he got Rs. 4704. Which of these could be the amount that was lent out in each case if interest is paid half-yearly?
(a) Rs.4000   (b) Rs.4400   (c) Rs.4200   (d) Rs.3600

18. A person bought a motorbike under the following scheme: Down payment of Rs.15,000 and the rest amount at 8% per annum for 2 years. In this way, he paid Rs.28,920 in total. Find the actual price of the motorbike. (Assume simple interest),
(a) Rs.26,000   (b) Rs. 27,000   (c) Rs. 27,200   (d) Rs. 26,500

19. Some amount was lent at 6% per annum simple interest. After one year, Rs. 6800 is repaid and the rest of the amount is repaid at 5% per annum. If the second year's interest is 11/20 of the first year's interest, find what amount of money was lent out.
(a) Rs. 17,000   (b) Rs. 16,800   (c) Rs. 16,500   (d) Rs. 17,500

20. An amount of Rs. 12820 due 3 years hence, is fully repaid in three annual instalments starting after 1 year. The first instalment is 1/2 the second instalment and the second instalment is 2/3 of the third instalment. If the rate of interest is 10% per annum, find the first instalment.
(a) Rs.2400   (b) Rs.1800   (c) Rs.2000   (d) Rs.2500

21. A sum is divided between A and B in the ratio of 1 : 2. A purchased a car from his part, which depreciates $14\frac{2}{7}$% per annum and B deposited his amount in a bank, which pays him 20% interest per annum compounded annually. By what percentage will the total sum of money increase after two years due to this investment pattern (approximately)?
(a) 20%   (b) 26.66%   (c) 30%   (d) 25%

22. Abhinav purchases a track suit for Rs. 2400 cash or for Rs. 1000 cash down payments and two monthly instalments of Rs. 800 each. Find the rate of interest:
(a) 75%   (b) 120%   (c) 50%   (d) none of these

23. A sum of Rs. 390200 is to be paid back in three equal annual instalments. How much is each instalment, if the rate of interest charged is 4% per annum compounded annually?
(a) Rs. 140608   (b) Rs. 120560   (c) Rs. 10000   (d) Rs. 18000

24. Purnima borrowed a sum of money and returned it in three equal quarterly instalments of Rs. 17576 each. Find the sum borrowed, if the rate of interest charged was 16% per annum compounded quarterly. Find also the total interest charged:
(a) 46900 and 4700   (b) 48775 and 3953   (c) 68320 and 1200   (d) none of these

25. Sapna borrowed some money on compound interest and returned it in three years in equal annual instalments. If the rate of interest is 15% per annum and annual instalment is Rs. 486680, find the sum borrowed:
(a) 1112220   (b) 1111200   (c) 1122000   (d) none of these

26. P and Q invest some amount under SI and CI respectively but for the same period at 6% per annum. Each gets a total amount of Rs. 65,000 at the end of 6 years. Which of the following is definitely true?
    (i) Q's initial principal is less than that of P
    (ii) Q's initial principal is equal to that of P
    (iii) P's percentage earning is less than that of Q
    (a) (i) only   (b) (ii) only   (c) (iii) only   (d) (i) and (iii) only

27. Mr. Lala Ram has lent some money to Aaju at 6% p.a. and the Baaju at 8% p.a. At the end of the year he has gain the overall interest at 7% per annum. In what ratio has he lent the money to Aaju and Baaju?
    (a) 2 : 3   (b) 1 : 1   (c) 5:6   (d) 4 : 3

28. We had 1000 goats at the beginning of year 2001 and the no. of goats each year increases by 10% by giving birth (compounded annually). At the end of each year we double the no. of goats by purchasing the same no. of goats as there is the no. of goats with us at the time. What is the no. of goats at the beginning of 2004?
    (a) 10600   (b) 10648   (c) 8848   (d) 8226

29. Hari Lal and Hari Prasad have equal amounts. Hari Lal invested all his amount at 10% compounded annually for 2 years and Hari Prasad invested 1/4 at 10% compound interest (annually) and rest at r% per annum at simple interest for the same 2 years period. The amount received by both at the end of 2 year is same. What is the value of r?
    (a) 14%   (b) 12.5%   (c) 10.5%   (d) 11%

30. HDFC lends 1 million to HUDCO at 10% simple interest p.a. for 2 years and HUDCO lends the same amount to SAHARA STATES HOUSING corporation at 10% p.a. of compound interest for 2 years. What is the earning of HUDCO in this way?
    (a) Rs. 133100   (b) Rs. 33100   (c) Rs. 131000   (d) no profit no loss

TITA/Short Answers

1. The difference between the CI and SI on a certain sum of money for 2yr at 15% per annum is Rs.45. Find the sum.
   _____

2. A sum is invested for 3 yr compounded at 5%, 10%, and 20% per annum, respectively. In 3 yr, if the sum amounts to Rs.1386, then find the sum.
   _____

3. If in a certain time period, Rs.10,000 amount to Rs.160,000 at CI. What is the amount in half at that time if principal is Rs.10,000?
   _____

4. What will be the amount if a sum of Rs.10,000 is placed at CI for 3 yr while rate of interest for the first, second, and third years is 10%, 5%, and 2%, respectively?
   _____

5. What is the difference between the simple interest on a principal of Rs. 500 being calculated at 5% per annum for 3 years and 4% per annum for 4 years?
   _____

6. In what time will Rs. 500 give Rs. 50 as interest at the rate of 5% per annum simple interest?
   _____

7. Raju lent Rs.400 to Ajay for 2 years, and Rs.100 to Manoj for 4 years and received together from both Rs.60 as interest. Find the rate of interest, simple interest being calculated,
   _____

8. A sum of money invested at simple interest triples itself in 8 years at simple interest. Find in how many years will it become 8 times itself at the same rate?
   _____

9. If Rs.1100 is obtained after lending out Rs. x at 5% per annum for 2 years and Rs. 1800 is obtained after lending out Rs. y at 10% per annum for 2 years, find x + y.
   _____

10. The population of a city is 200,000. if the annual birth rate and the annual death rate arc 6% and 3% respectively, then calculate the population of the city after 2 years.
    _____

11. A part of Rs. 38,800 is lent out at 6% per six months. The rest of the amount is lent out at 5% per annum after one year. The ratio of interest after 3 years from the time when first amount was lent out is 5 : 4. Find the second part that was lent out at 5%.
    _____

12. A sum of Rs. 1000 after 3 years at compound interest becomes a certain amount that is equal to the amount that is the result of a 3 year depreciation from Rs. 1728. Find the difference between the rates of CI and depreciation. (Given CI is 10% p.a.). (Approximately)
    _____

13. Amit borrowed Rs. 800 at 10% rate of interest. He repaid Rs. 400 at the end of first year. What is the amount required to pay at the end of second year to discharge his loan which was calculated at compound interest?
    _____

14. Jalela and Dalela have to clear their respective loans by paying 3 equal annual instalments of Rs. 30000 each. Jalela pays @ 10% per annum of simple interest while Dalela pays 10% per annum compound interest. What is the difference in their payments?
     _____

15. The population of vultures in a particular locality is decreases by a certain rate of interest (compounded annually). If the current population of vultures be 29160 and the ratio of decrease in population for second year and 3rd year be 10 : 9. What was the population of vultures 3 years ago?
     _____

Simple Interest & Compound Interest
Answers Key and Solution

Simple Interest

1.	c	2.	c	3.	c	4.	d	5.	a	6.	a	7.	d
8.	a	9.	b	10.	c	11.	d	12.	c	13.	b	14.	b
15.	c	16.	d	17.	c	18.	b	19.	b	20.	b	21.	c
22.	d	23.	d	24.	a			25.	c				

Compound Interest

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

SI/CI/Installments

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

TITA/Short Answers

1.	2000	2.	1000	3.	40000	4.	11781	5.	5	6.	2	7.	5
8.	28	9.	2500	10.	212180	11.	28800	12.	2	13.	528	14.	300
15.	4000	16.		17.		18.		19.		20.		21.	

Solutions

Simple Interest

1. Ans. (c)
Solution: The Interest earned per year would be 1500/3 = 500
This represents a 10% rate of interest.

2. Ans. (c)
Solution: Interest in 2 years = Rs.240
Interest per year = Rs.120
Rate of interest = 10%

3. Ans. (c)
Solution: 8% @ 700 = Rs.56 per years for 3 years
7.5% @ 700 = Rs.52.5 per years for 2 years
Total interest = 56 X 3 + 52.5 X 2 = 273.

4. Ans. (d)
Solution: 8% o 800 for 4 years + 6% of 800 for 4 years
= 64 X 4 + 48 X 4 = 256 + 192 = 448.
However we do not know the rate of interest applicable in the 5th year and hence cannot determine the exact simple interest for 9 years.

5. Ans. (a)

Solution: (73/365) X 0.09 X 700 = Rs. 12.6

6. Ans. (a)
Solution: The average rate of interest he pays is 186 X 100 / 1500 = 12.4%
The average rate of interest being 12.4% it means that the ratio in which the two amounts would be distributed would be 4:1 using allegation. Thus, the borrowing at 12% would be Rs.1200.

7. Ans. (d)
Solution: The data is insufficient as we do not know the time period involved.

8. Ans. (a)
Solution: 42% on 2500 = Rs.1050.
The required answer would be 1050 / 157.5 = 6 years and 8 month.

9. Ans. (b)
Solution: $(12000-8000) = \frac{8000 x\ t\ x\ 20}{100}$

$t = \frac{5}{2}$years

10. Ans. (c)

Solution: $1960 = \frac{14000 \, x \, r \, x \, 2}{100}$ ➔ r = 7%

11. Ans. (d)

Solution: $6300 = \frac{p \, x \, 7 \, x \, 15}{100 \, x \, 2}$

P = Rs. 12000

12. Ans. (c)

Solution: $6000 = \frac{P \, x \, 12 \, x \, 1}{100}$

P = 50000

13. Ans. (b)

Solution: SI = 2P-P = (Interest = Amount - Principal)

$P = \frac{P \, x \, 20 \, x \, T}{100}$ ➔ t = 5 Years

14. Ans. (b)

Solution: $2P = \frac{P \, x \, 15 \, x \, r}{100}$ (2P=3P-P)

$R = \frac{40}{3}$ % p.a.

15. Ans. (c)

Solution: $\frac{P_1 x \, 5 \, x \, 2}{100} = \frac{P_2 x \, 10 \, x \, 4}{100}$

⇨ $P_1 : P_2 = 4:1$

Therefore second principal is Rs. 125

$\left(= 625 \times \frac{1}{5}\right)$

Alternative: Go through options.

16. Ans. (d)

Solution: $\left(\frac{6000 \times 2 + 1500 \times 4}{100}\right) r = 900$

⇨ R = 5%

17. Ans. (c)

Solution:

A	B
$P_A = P$	$P_B = 2P$
$r_A = 5\%$	$r_B = 5\%$
t = 10 years	t = 5 years
interest of A = $\frac{P x 5 x 10}{100}$	interest of B = $\frac{2P x 5 x 5}{100}$
$= \frac{P}{2}$	$= \frac{P}{2}$

Hence (c) is correct

18. Ans. (b)

Solution: $\frac{P_1 \times 2 \times 5}{100} = \frac{P_2 \times 3 \times 5}{100} = \frac{P_3 \times 4 \times 5}{100}$

⇨ $10 P_1 = 15 P_2 = 20P_3$

⇨ $P1 : p2 : p3 = 30 : 20 : 15 = \frac{1}{10} : \frac{1}{15} : \frac{1}{20}$

19. Ans. (b)

Solution: $580 \left[(x) + \left(x + \frac{x \times 1 \times 8}{100}\right) + \left(x + \frac{x \times 2 \times 8}{100}\right) + \left(x + \frac{x \times 3 \times 8}{100}\right) + \left(x + \frac{x \times 4 \times 8}{100}\right)\right]$

$580 = 5x + \frac{8x}{10} = \frac{58x}{10}$

X = 100

20. Ans. (b)

Solution: $1700 + \frac{1700 \, x \, 16 \, x2}{100} = $ Rs. 2244

21. Ans. (c)

Solution: Amount as a principal for first and second month = 600 – 300 = Rs. 300

Now, interest = 360 – 300 = Rs. 60

$60 = \frac{300}{100} x \frac{2}{12} x r$

r = 120%

22. Ans. (d)

Solution: The best way is to go through options

$\frac{2200 \, x \, 4 \, x \, 3}{100} + \frac{1300 \, x \, 6 \, x \, 3}{100} = $ Rs. 498

Hence, the presumed option is correct.

Note: we consider Rs. 2200 for 4% then the rest amount i.e. Rs. 1300 = (3500-2200) will be considered automatically for 6%

Alternatively: Average % rate = $\frac{166}{35}$ %

$\left[\because 498 = \frac{3500 \, x \, r \, x \, 3}{100}\right]$ ➔ $r = \frac{166}{35}$ %

$\frac{35}{35} \times 4$ $6 \times \frac{35}{35}$

$\frac{166}{35}$

$\frac{44}{35}$ $\frac{26}{35}$

22   :   13

Thus the ratio of principal at 4% and 6% will be in the ratio of 22 : 13 respectively.

23. Ans. (d)

Solution: Go through options

$1.8 + \frac{1.8 \, x \, 6 \, x \, 10}{100} = 1.6 + \frac{1.6 \, x \, 8 \, x \, 10}{100}$

Hence, (d) is correct.

Alternatively: $P_1 + \frac{P_1 \, x \, 6 \, x \, 10}{100} = P_2 + \frac{P_2 \, x \, 8 \, x \, 10}{100}$

$\frac{P_1}{P_2} = \frac{9}{8}$

24. Ans. (a)

Solution: $\frac{A}{B} = \frac{12 \, X \, x}{B \, X \, y} = \frac{28}{15}$

⇨ $\frac{A}{B} = \frac{7}{15}$

25. Ans. (c)

Solution: We don't know the rate of interest.

Compound Interest

1.   Ans. (d)
Solution: Rate of 8% per annum payable half yearly. So, effective rate = 4%
Effective annual rate = $4+4+\frac{4\times4}{100}$ = 8.16%

Hence, option (d) is the answer.

2.   Ans. (c)
Solution: Let the rate of CI be r.
Then, $10000 \times \left(\left(1+\frac{r}{100}\right)^3\right) = 13310$

$\Rightarrow \left(\left(1+\frac{r}{100}\right)^3\right) = \frac{1331}{1000} \rightarrow 1+\frac{r}{100} = \frac{11}{10}$

$\Rightarrow \frac{r}{100} = \frac{1}{10} \rightarrow$ r = 10%
Hence, option (c) is the answer.

3.   Ans. (c)
Solution: Let the principal amount be 100.
The, SI = $\frac{100\times20\times3}{100}$ = Rs.60 and CI = $100\left(1+\frac{20}{100}\right)^3 -$ 100

$= 100 \times \left(\frac{6}{3}\right)^3 - 100 = \frac{364}{5}$

$\therefore$ CI-SI = $\frac{364}{5} - 60 = \frac{64}{5}$

If difference is $\frac{64}{5}$, principal = 100

If difference is 48, principal = $\frac{100\times5}{64} \times 48$ = Rs.375
Hence, option (c) is the answer.

4.   Ans. (b)
Solution: Let the sum of money be Rs.x.
Then, $8x = x\left(1+\frac{r}{100}\right)^3$

$\Rightarrow \left(1+\frac{r}{100}\right)^3 = (2)^3 \rightarrow \left(1+\frac{r}{100}\right) = 2$
...(i)
Again let the sum will become 16 times in n years.
Then, $16x = x\left(1+\frac{r}{100}\right)^n \rightarrow 16 = 2^n \rightarrow 2^4 \rightarrow 2^n$
[From equ. (i)]
$\Rightarrow$ N = 4 yr

5.   Ans. (a)
Solution: Difference in interest between 2 yr = Rs.420-Rs.400 = Rs.20
So, rate % = $\frac{20}{400}$ x 100 = 5%
Given that Rs.400 is the interest on the sum for 1st year.
Sum = $100 \times \frac{400}{5} \times 1$ = Rs.8000
Hence, option (a) is the answer.

6.   Ans. (c)

Solution: Let the sum be P. the sum P becomes 3P in 4 yr on CI.
Method I
$3P = P\left(1+\frac{R}{100}\right)^4 \rightarrow 3 = \left(1+\frac{R}{100}\right)^4$ Let the sum P becomes 81 P in N years or
$81P = P\left(1+\frac{R}{100}\right)^n$

$\Rightarrow 81 = \left(1+\frac{R}{100}\right)^n \rightarrow (3)^4 = \left(1+\frac{R}{100}\right)^n$

$\Rightarrow \left(\left(1+\frac{R}{100}\right)^4\right)^4 = \left(1+\frac{R}{100}\right)^n \rightarrow \left(1+\frac{R}{100}\right)^{16} = \left(1+\frac{R}{100}\right)^n$

$\Rightarrow$ n=16

$\Rightarrow$ i.e., the sum will become 81 times in 16 yr.
Method 2
We know that amount follows geometric progression in case of CI.
Thus, $P \xrightarrow{4yr} 3P \xrightarrow{4yr} 9P \xrightarrow{4yr} 27P \xrightarrow{4yr} 81P$
Hence, option (c) is the answer.

7.   Ans. (b)
Solution: 2100 + 5% of 2100 = 2100 + 105 = 2205 (after 1 year). Next year it would become 2205 + 5% of 2205 = 2205 + 110.25 = 2315.25

8.   Ans. (a)
Solution: Simple interest or 2 years = 100+100 = 200.
Compound interest for 2 years. Year 1 = 5% of 2000 = 100
Year 2 : 5% of 2100 = 105 $\rightarrow$ Total compound interest = Rs. 205.
Difference between the simple and compound interest = 205 -200 = Rs.5

9.   Ans. (a)
Solution: $1000 \xrightarrow{10\%\uparrow} 1100 \xrightarrow{10\%\uparrow} 1210 \xrightarrow{10\%\uparrow} 1331$.
Compound interest = 1331 – 1000 = Rs.331

10.   Ans. (d)
Solution: P X 7/6 X 7/6 = 196 $\rightarrow$ P = (196 X 6 X 6)/7 X 7 = 144

11.   Ans. (b)
Solution: 1331 X 1.090909 X 1.090909 X 1.090909 = 1331 X 12/11 X 12/11 X 12/11 = 1728.
Hence the rate of compound interest is 9.09%

12.   Ans. (a)

Solution: Since compounding is half yearly, it is clear that the rate of interest charged for 6 month would be 3%

$3300 \xrightarrow{3\%\uparrow} 3399$.

13. Ans. (a)
Solution: 12% per annum compound quarterly means that the amount would grow by 3% every 3 month.
Thus, 8000 → 8000 + 3% of 8240 = 8487.2 after 6 month and so on till five3 month time periods get over. It can be seen that the value would turn out to be 9274.2

14. Ans. (a)
Solution: $50000 \xrightarrow{6\%\uparrow} 53000 \xrightarrow{6\%\uparrow} 56180 \xrightarrow{6\%\uparrow} 59550.8 \xrightarrow{6\%\uparrow}$ $63123.84 \xrightarrow{6\%\uparrow} 66911.27$

15. Ans. (c)
Solution: solve using options. If we try 500 option b for convenience we can see that the difference between the two is Rs.64 as the SI would amount to 300 and CI would amount to 100+ 120+ 144 = 364 Since we need a difference of only Rs.48 we can realize that the value should be 3/4th of 500. Hence, 375 is correct.

16. Ans. (c)
Solution: The sum becomes 4 time → the interest earned is 300% of the original amount. In 10 years the interest is 300 % means that the yearly interest must be 30%.

17. Ans. (b)
Solution: It would take another 5 years to double again, thus, a total of 10 years to become four fold.

18. Ans. (a)
Solution: If it doubles in 3 years it would become 4 times in 6 years and 8 times in 9 years.

19. Ans. (a)
Solution: $A = P \left(1 + \frac{r}{100}\right)^n$
$A = 1000 \left(1 + \frac{10}{100}\right)^3$

$A = 1000 \times (1.1)^3$
$A = 1331$
$CI = A-P = 1331-1000 = 331$

20. Ans. (a)
Solution: $A = 10000 \times (1.2)^4$
$A = 1000 \times 2.0736$
$A = 20736$
$CI = A-P$
$CI = 20736-10000 = 10736$

21. Ans. (c)
Solution: $CI = [4000 \times (1.25)^3] - (4000)$
$= 4000 \times 1.953125 - 4000$
$= 4000 \times 0.953125$
$= 3812.5$

22. Ans. (b)
Solution: $441 = 400 \left(1 + \frac{r}{100}\right)^2$
$\Rightarrow \frac{21}{20} = 1 + \left(\frac{r}{100}\right)$
$\Rightarrow r = 5\%$

23. Ans. (b)
Solution: $7986 = 6000 \left(1 + \frac{r}{100}\right)^3$
$\frac{7986}{6000} = \left(1 + \frac{r}{100}\right)^3$
$\Rightarrow \frac{1331}{1000} = \left(1 + \frac{r}{100}\right)^3$
$\Rightarrow \frac{11}{10} = \left(1 + \frac{r}{100}\right)$
$\Rightarrow R = 10\%$
Alternatively: Go through options.
$6000 \xrightarrow{+10\%} 6000 \xrightarrow{+10\%} 7260 \xrightarrow{+10\%} 7986$
Hence, assumed option is correct.

24. Ans. (a)
Solution: Go through option
$1 \times (1.2) = 1.2$
$1 \times (1.2)^2 = 1.44$
$1 \times (1.2)^3 = 1.728$
$1 \times (1.2)^4 = 2.0736$
Hence, minimum 4 years are required to double the sum.

25. Ans. (b)
Solution: $2 P = P \left(1 + \frac{r}{100}\right)^5$
$2 = \left(1 + \frac{r}{100}\right)^5$
Now, $(2)^4 = \left(\left(1 + \frac{r}{100}\right) 5\right)^4$
$= \left(1 + \frac{r}{100}\right)^{20}$
$\Rightarrow$ The amount becomes 16 (=2^4) times
$\Rightarrow$ Hence (b) is correct : (24000 x 16 = 38400)

26. Ans. (c)
Solution: Difference between CI and SI for 2 years =
$P \left(\frac{r}{100}\right)^2$
$40 = P \left(\frac{10}{100}\right)^2 \rightarrow P = 4000$
Alternatively: Go through options

	First Year	Second Year
SI	400	400
CI	400	440

Alternatively: go back in the reverse process. Rs. 40 at 10% implies that the principal for this interest

was Rs. 400. Again by the same logic Rs. 400 as interest obtained at the principal of Rs. 4000 at 10%

27. Ans. (c)

Solution: $\frac{P\left(1+\frac{r}{100}\right)^8}{P\left(1+\frac{r}{100}\right)^2} = \left(1+\frac{r}{100}\right)$

$\frac{23958}{21780} = \left(1+\frac{r}{100}\right)$

$\left(1+\frac{2178}{21780}\right) = 1+\frac{r}{100}$

$r = 10\%$

Alternatively: Remember the difference between compound interest of any two consecutive years will be same as the interest on the amount of total previous year.

So, 23958 – 21780 = 2178

Now, $r = \frac{2178}{21780} x\ 100$

$R = 10\%$

28. Ans. (d)

Solution: Interest received from Birbal = $\frac{Pr}{100}$

Interest received from Chanakya = $\frac{\left(2\frac{Pr}{100}\right) x\ \frac{r}{2}}{100}$

$P = \left(\frac{r}{100}\right)^2$

29. Ans. (c)

Solution: On the second year (in terms of CI) is

$$\frac{p\left(1+\frac{10}{100}\right)^3}{\left(P+\frac{Pr}{100}\right)} = \frac{6}{5}$$

$\Rightarrow\quad \left(1+\frac{r}{100}\right) = \frac{6}{5}$

$R = 20\%$

30. Ans. (d)

Solution: Note that, ultimately 8% interest is charged.

So the net value after 3 years = 125971.2

SI/CI/Installments

1. Ans. (a)

Solution: Amount remaining after:

1yr = 4000 $\left(1+\frac{7.5}{100}\right)$- 1500 = 2800

2yr = 2800 $\left(1+\frac{7.5}{100}\right)$ – 1500 = 1510

3yr = 1510 $\left(1+\frac{7.5}{100}\right)$ – 1500 = 123.25

Hence, option (b) is the answer.

2. Ans. (d)

Solution: $\left[5000\left(1+\frac{12}{100}\right)^2 - 5000\right] - \frac{5000\ \times 12\ \times 2}{100}$

$= 5000\left(\frac{28}{25} \times \frac{28}{25} - 1\right)$-1200

$= 5000\left(\frac{784-625}{625}\right) - 1200 = Rs.72$

Hence, option (d) is the answer.

3. Ans. (a)

Solution: If we take the principal as 100, the CI @ 10% rate of interest would be Rs.21.

In such a case, the SI would be Rs.20.

4. Ans. (a)

Solution: 12% of x = 24% of (600-x) → x = 4000

Thus the two parts should be Rs.4000 and Rs.2000.

5. Ans. (b)

Solution: The total interest in 6 years = 75%

Thus per years = SI = 12.5%

6. Ans. (a)

Solution: Solve through trial and error using the values of the option. Option (a) 500000 fits the situation perfectly as the SI = Rs.30000 while the CI = 30604.

7. Ans. (a)

Solution: 100/12 = 8.33%

8. Ans. (b)

Solution: 600 becomes 720 in 4 years SI → SI per year = Rs.30 and hence the SI rate is 5%

At 7% rate of interest the value of 600 would become 768 in 4 years. (600 + 28% of 600)

9. Ans. (d)

Solution: The rate of interest is not defined.

Hence option (d) is correct.

10. Ans. (c)

Solution: Tripling in 8 years means that the interest earned in 8 year is equal to 200% of the capital value.

Thus interest per years simple interest is 25% of the capital. In 20 years total interest earned = 500% of the capital and hence the capital would become 6 times its original value.

11. Ans. (d)

Solution: $64000 \times (1.025)^4 = 70644.025$
Interest 6644.025
Option (d). none of these is correct.

12.   Ans. (c)
Solution: Since the interest is compounded half yearly at R% per annum, the value of R would be lesser than the value of S. remember half yearly compounding is always profitable for the depositor.

13.   Ans. (b)
Solution: Go through trial and error of the options. You will get:
   $20000 \times (1.3) = 26000$ (@ simple interest)
   $20000 \times 1.1 \times 1.1 \times 1.1 = 26620$ (@ compound interest)
   Thus 20000 is the correct answer.

14.   Ans. (b)
Solution: P + 2 years interest on P = 1000 + 1 years interest on 1000 + 1000
   ➔ $1.21P = 2100 \rightarrow P = 1736$ (approx)

15.   Ans. (c)
Solution: Solve this one through option. option (c) reduced rate for 14 years fits the conditions.

16.   Ans. (a)
Solution: Let the repayment annually be X. then:
8000+ 3 years interest on 8000 (on compound interest of 5%) = X + 2 years interest on X + X + 1
Years interest on X + X ➔ X = 2937.67

17.   Ans. (c)
Solution: $4200 + (4\% \text{ of } 4200)$ 3 times = $4200 + 0.04 \times 3 \times 4200 = 4704$.

18.   Ans. (b)
Solution: Solve using options. If the price is 27000 the interest on 12000 after subtracting the down payment would be 16% of 12000 = 1920
Hence the total amount paid would be 28920.

19.   Ans. (a)
Solution: It can be sent that for 17000, the first year interest would be 1020. While the second year interest after a repayment of 6800 would be on 10200 @5% per annum. The interest in the second year would thus be Rs.510 which is exactly half the interest of the first year. Thus option (a) is correct.

20.   Ans. (c)
Solution: Solve using options. Option (c) fits the situation as 12820 = 2000 + 2 years interest on 2000 + 4000 + 1 years interest on 4000 + 6000 (using 10% compound interest for calculation of interest) ➔
12820 = 2000 + 420 + 4000 + 6000.

21.   Ans. (a)
Solution: Let the amounts be Rs.100 and Rs.200 respectably the value of the 100 would become 100 X 6/7 X 6/7 = 3600/49 = 73.46
The other person's investment of 200 would become 200 X 1.2 X 1.2 = 228
The total value would become 288 + 73.46 = 361.46
This represents approximately a 20% increase in the value of the amount after 2 year. Hence option (a) is correct.

22.   Ans. (b)
Solution: Amount as a principal for 2 month = 2400-1000 = 1400
   At the rate of r% per annum after 2 months, Rs. 1400 will amount to
$$Rs \left(1400 + \frac{1400 \, x \, r \, x \, 2}{100 \, x \, 12}\right) \quad \text{...(i)}$$
   Again total amount for the 2 instalments at the end of second month will be
$$Rs \left[800 + \left(\frac{800 \, x \, r \, x \, 1}{100 \, x \, 12}\right)\right] \quad \text{.....(ii)}$$
   From (i) and (ii), we get
$$1400 + \frac{2800r}{1200} = 1600 + \frac{800r}{1200}$$
$$\frac{2000r}{1200} = 200$$
$$R = 120\%$$

23.   Ans. (a)
Solution: Let each instalments be Rs. x
   The amount to be paid instalments = 390200
   The total value of all the three instalments is
$$Rs. \left[x \left(\frac{25}{26}\right) + x \left(\frac{25^2}{26}\right) + x \left(\frac{25^3}{26}\right)\right]$$

   And this must be equal to Rs. 390200
   Hence $x \times \frac{25}{26}\left[1 + \frac{25}{26} + \frac{625}{676}\right] = 390200$
   X = Rs. 140608

24.   Ans. (b)
Solution: Rate of interest of 16% annum Actual rate of interest of 4 % per quarter
Principal of all three instalments
$$= \left[17576 \left(\left(\frac{25}{26}\right) + \left(\frac{25^2}{26}\right) + \left(\frac{25^3}{26}\right)\right)\right]$$

$$= \frac{17576 \, x \, 25 \, x \, 1951}{26 \, x \, 676}$$

$$= 48775$$
Total amount paid = Rs. 17576 x 3 = 52728
Interest charged = 52728 = 48775 = 3953

25.   Ans. (b)
Solution: $P = 486680 \left[\left(\left(\frac{20}{23}\right) + \left(\frac{20^2}{23}\right) + \left(\frac{20^3}{23}\right)\right)\right]$

$\Rightarrow$ $P = \left[486680 \times \frac{20}{23}\left(1 + \frac{20}{23} + \frac{400}{529}\right)\right]$

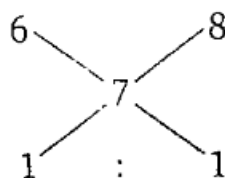$\Rightarrow$ $P = 1111200$

26. Ans. (d)
Solution:

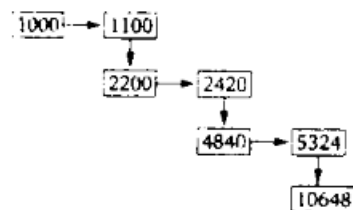Obviously Ps > Pc, therefore percentage gain of Pc is greater than Ps

27. Ans. (b)
Solution:

28. Ans. (b)
Solution:

29. Ans. (c)
Solution: Let the amount of investment with each one be Rs. 400, them

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$[400\,(1.1)^2] = [100\,(1.1)^2] + \left[300 + \frac{300 \times r \times 2}{100}\right]$

$\Rightarrow$ R = 10.5 %

30. Ans. (c)
Solution: Amount earned by HDFC = 1000000 + $\frac{1000000 \times 10 \times 2}{100}$

= 1200000

Amount earned by HUDCO = 1000000 $(1.1)^3$ = 1331000

Net earnings of HUDCO = 133100 – 1200000 = 13100

TITA/Short Answers

1. Ans. 2000
Solution: Difference between CI and SI for yr = $\frac{R^2}{100}$ of

Principal = $\frac{15^2}{100}$% of principal
Or, 2.25% of principal = Rs.45
Therefor principal = Rs.2000

2. Ans. 1000
Solution: amount = 1386 = $\left(1 + \frac{5}{100}\right) \times \left(1 + \frac{10}{100}\right) \times \left(1 + \frac{20}{100}\right)$

Or 1386 = P $\left(\frac{21}{20}\right) \times \left(\frac{11}{10}\right) \times \left(\frac{6}{5}\right)$
Solving it, we get P = Rs.1000

3. Ans. 40000
Solution: Let the rate of interest be R% per annum. Assume that Rs.10000 amount to Rs.160000 in T years.
$10000\left(1 + \frac{R}{100}\right)^T = 160000$

$\Rightarrow$ $\left(1 + \frac{R}{100}\right)^T = \frac{160000}{10000} = 16$

$\Rightarrow$ $\left(1 + \frac{R}{100}\right)^{\frac{T}{2}} = \sqrt{16} = 4$

$\Rightarrow$ In T/2 yr, Rs.10000 amounts to 10000 $\left(1 + \frac{R}{100}\right)^{\frac{T}{2}}$

$\Rightarrow$ 10000 X 4 = 40000

4. Ans. 11781
Solution: When rates are different for different years, A
= P $\left(1 + \frac{R1}{100}\right) \times \left(1 + \frac{R2}{100}\right) \times \left(1 + \frac{R3}{100}\right)$
Amount after 3 yr = 100000 × $\left(1 + \frac{2}{100}\right) \times \left(1 + \frac{5}{100}\right) \times \left(1 + \frac{10}{100}\right)$

= 10,000 × $\left(\frac{102}{100}\right) \times \left(\frac{105}{100}\right) \times \left(\frac{110}{100}\right)$

= 102 X 105 X $\frac{11}{10}$

= Rs.11, 781

5. Ans. 5

Solution: 5% for 3 years (SI) = 15% o the amount; at the same time 4% SI for 4 years means 16% of the amount. The difference between the two is 1% of the amount. 1 % of 500 = Rs.5

6.   **Ans. 2**
Solution: Interest per year = Rs.25.
Thus an interest of Rs.50 would be earned in 2 years.

7.   **Ans. 5**
Solution: Total effective amount lent or 1 years
= Rs.400 X 2 + Rs.100 X 4 = Rs.1200
Interest being Rs.60 rate of interest 5%

8.   **Ans. 28**
Solution: In 8 year the interest earned = 200%
Thus, per year interest
    Rate = 200/8 = 25%
    To become 8 times we need a 700% increase
    700/25 = 28year.

9.   **Ans. 2500**
Solution: x = Rs.1000 As 1000 @ 5% for 2 year = 1100
Similarly   y = Rs.1500.
    x + y = 2500.

10.   **Ans. 212180**
Solution: The yearly increase in the population is 3% thus, the population would increase by 3% each year. 200000 would become 206000 while 206000 would become 212180.

11.   **Ans. 28800**
Solution:
$$\frac{F \times (0.06) \times 6}{(38800 - F) \times 0.05 \times 2} = 5/4$$

Where F is the first part.

        1.44F = 19400-0.5F
    F = 19400 / 1.94 = 10000.
Thus, the second part = 38800 – 10000 = 28800

12.   **Ans. 2**
Solution: The amount @ 10% CI could become Rs.1331 Also Rs.1728 depreciated at R% has to become Rs.1331
Thus,
    $1728 \times [(100-R)/100]^3 = 1331$ (approximately)
    The closet value of R = 8%
    Thus, the difference is 2%

13.   **Ans. 528**
Solution: Amount to be paid at the end of 2 years =
$\frac{800 \times 10 \times 2}{100}$ + 800 = 880
Amount left as principal for the second year = 480 = (880-400)

Amount to be paid after 2nd year = $480 + \frac{480 \times 10}{100}$
                        = Rs. 528

14.   **Ans. 300**
Solution: $30000 (1+1.1 + (1.1)^2) - 30000 (1+1.1+1.2) =$ Rs. 300
    $30000 (1+\frac{10}{100})^2 - \frac{30000 \times 10 \times 2}{100}$
    ⇒   Rs. 300

15.   **Ans. 40000**
Solution: $\frac{Decreases\ in\ second\ year}{Decreases\ in\ third\ year} = \frac{100}{100-r} = \frac{10}{9}$
    ⇒   R = 10%
Let the population of vultures 3 yeas ago be P, then
$P \left(1 - \frac{10}{100}\right)^3 = 29160$
    P = 40000