Simple Interest

Suppose Arun deposited ₹ 6000 in a bank. After one year, he found that he has ₹ 6500 in his bank account. We could notice that the bank paid ₹ 500 extra for using his deposited money.

Thus, the money borrowed or deposited in a bank is called the principal and the extra money the bank gives you on the principal is called the interest.

The total of the principal and the interest is called the amount, *i.e.,*

Amount = Principal + Interest.

Rate Per Cent: Interest is usually calculated on a percentage basis on the principal which is in the form of a rate (R) per unit of the principal borrowed.

If this rate per cent is calculated for a year it is called the rate per cent per year or rate per cent per annum.

If interest is calculated uniformly on the original principal throughout the loan period, it is called simple interest.

If **P** denotes the principal, **R** the rate of interest per annum, and **T** the number of years, then the formula for the simple interest (S.I.) is given by

$$S.I. = \frac{P \times R \times T}{100}$$

If **A** denotes the amount, then

$$A = P + S.I.$$

Ch. 8.
COMPARING
QUANTITIES.

Solved Examples

Example 1: *A man borrowed ₹ 5500 from a bank at 12% per annum on 30th May, 2004. How much money did he give to the bank to settle the account on 11th August, 2004?*

*[**Hint:** While counting the number of days, the deposited day is ignored but we count the day of withdrawal and consider 365 days a year.]*

Here time is calculated as under:

Number of days of May	=	1
Number of days of June	=	30
Number of days of July	=	31
Number of days of August	=	11
Total number of days	=	73

Time = 73 days = $\frac{73}{365}$ years or $\frac{1}{5}$ years.

P = ₹ 5500, R = 12% per annum and T = $\frac{1}{5}$ years.

Since S.I. = $\frac{P \times R \times T}{100} = \frac{5500 \times 12 \times 1}{100 \times 5} = ₹ 132$

Amount (A) = P + S.I. = ₹ 5500 + ₹ 132 = ₹ 5632

Hence, he will have to pay ₹ **5632** to the bank to settle the account.

Example 2: *At what rate will ₹ 2500 fetch an interest of ₹ 300 in 4 years?*

Here, P = ₹ 2500, S.I. = ₹ 300 and T = 4 years.

We know that, S.I. = $\dfrac{P \times R \times T}{100}$

∴ R = $\dfrac{S.I. \times 100}{P \times T}$

= $\dfrac{300 \times 100}{2500 \times 4}$ = 3% per annum

Hence, ₹ 2500 will fetch an interest of ₹ 300 in 4 years at the rate **3% per annum**.

Example 3: *A sum of ₹ 4000 is lent for 5 years at the rate of 15% per annum. Find the simple interest.*

Here, P = ₹ 4000, R = 15% per annum and T = 5 years.

Since, S.I. = $\dfrac{P \times R \times T}{100}$

∴ S.I. = $\dfrac{4000 \times 15 \times 5}{100}$

S.I. = ₹ 3000

Hence, ₹ 4000 for 5 years at 15% will earn an interest of ₹ **3000**.

Example 4: *In how many years will ₹ 1500 amount to ₹ 2100 at 6% per annum?*

Here, P = ₹ 1500, A = ₹ 2100 and R = 6% per annum.

We know that, A = P + S.I.

∴ S.I. = A – P

= ₹ 2100 – ₹ 1500 = ₹ 600

and S.I. = $\dfrac{P \times R \times T}{100}$

∴ T = $\dfrac{S.I. \times 100}{P \times R}$ = $\dfrac{600 \times 100}{1500 \times 6}$ years

= $6\dfrac{2}{3}$ years.

Hence, ₹ 1500 will amount to ₹ 2100 at 6% in $6\dfrac{2}{3}$ **years**.

Example 5: *A man borrowed ₹ 1500 at 6% per annum and promised to return it after 146 days along with the interest. Find the amount to be paid at the end of 146 days.*

Here, P = ₹ 1500, R = 6% per annum and T = 146 days = $\dfrac{146}{365}$ years.

Since S.I. = $\dfrac{P \times R \times T}{100}$

$$\therefore \text{ S.I.} = \frac{1500 \times 6 \times 146}{100 \times 365} = ₹\ 36$$

Now, Amount (A) = P + S.I.

$$= ₹\ 1500 + ₹\ 36 = ₹\ 1536$$

Hence, the amount to be paid at the end of 146 days is ₹ **1536**.

Example 6: *Find the principal which will earn an interest of ₹ 325 at $4\frac{1}{3}$% per annum in $8\frac{1}{3}$ years.*

Here, S.I. = ₹ 325, R = $4\frac{1}{3}$% $= \frac{13}{3}$% and T = $8\frac{1}{3}$ years $= \frac{25}{3}$ years.

We know that, S.I. $= \frac{P \times R \times T}{100}$

$$\therefore \quad P = \frac{S.I. \times 100}{R \times T}$$

$$= \frac{325 \times 100 \times 3 \times 3}{13 \times 25} = ₹\ 900$$

Hence, ₹ **900** will earn an interest of ₹ 325 at $4\frac{1}{3}$% in $8\frac{1}{3}$ years.

Exercise 8.6

1. At what rate will ₹ 3000 amount to ₹ 3360 in 3 years?

2. Amit deposited ₹ 5000 in a bank which pays 8% per annum interest on deposits. How much interest will he get at the end of 4 years?

3. Find the interest on ₹ 1250 at 18% per annum for a period of 2 years 4 months.

4. In how many years will ₹ 750 amount to ₹ 900 at 4% per annum?

5. Find the interest on ₹ 1600 for 36 months at 4% per annum.

6. Find the interest on ₹ 1820 from October 9, 2006 to December 21, 2006 at $7\frac{1}{2}$% per annum.

7. A sum of ₹ 600 is lent for 3 years at the rate of 6% per annum. Find the interest. Also find the amount which is to be paid to the lender at the end of 3 years.

8. What principal will amount to ₹ 2600 in 3 years at 10% simple interest?

9. Find the sum which will amount to ₹ 364.80 at $3\frac{1}{2}$% per annum in 8 years at simple interest.

10. What sum of money will amount to ₹ 1472 in 3 years at 5% per annum?

11. Snehasish opened a saving bank account on 23rd July, 2005 with a deposit of ₹ 2600. He closed his account on 4th October of the same year. If the bank paid him 6% interest, what amount did he receive?
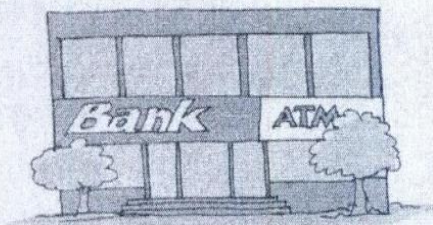
12. A sum amounts to ₹ 1326 in 6 years at 5% per annum. In what time will this sum double itself at the same rate of interest?

13. Divide ₹ 2500 into two parts such that the simple interest on one at 4% for 5 years is double that on the other at 5% for 3 years.

14. If ₹ 450 amounts to ₹ 504 in 3 years, how much will ₹ 615 amount to in $2\frac{1}{2}$ years at the same rate of interest?

15. Fill in the blanks in the given table:

	Principal	Period	Rate per annum	Interest	Amount
(i)	₹ 810	3 years	5%	_____	_____
(ii)	₹ 500	2 years	$5\frac{1}{2}\%$	_____	_____
(iii)	_____	4 years	6%	₹ 90	_____
(iv)	₹ 800	_____	$7\frac{1}{2}\%$	₹ 90	_____
(v)	₹ 3000	6 years	_____	_____	₹ 4530

QUICK RECALL

- The ratio of two quantities in the same unit is a fraction that one quantity is of the other.

- The ratio has no unit.

- An equality relation between two ratios is called the proportion.

- In a proportion, the product of the extreme terms is equal to the product of the middle terms.

- If $a : b = b : c$, then $b^2 = ac$.

- Per cent means per hundred.

- To convert a per cent into a fraction, we drop '%' sign and multiply it by $\frac{1}{100}$.

- To convert a fraction into a per cent, we multiply the fraction by 100 and then suffix % sign to it.

- To convert a per cent into a ratio, we drop '%' sign and multiply it by $\frac{1}{100}$.

- To convert a ratio into a per cent, we first write it as a fraction, then multiply it by 100 and then suffix % sign to it.

- To convert a per cent into a decimal, we drop '%' sign and shift the decimal point two places further to the left.

- To convert a decimal into a per cent, we shift the decimal point two places further to the right and then suffix % sign to it.

- Profit = S.P. – C.P., if S.P. > C.P.

- Loss = C.P. − S.P., if S.P. < C.P.

- Profit % = $\dfrac{\text{Profit}}{\text{C.P.}} \times 100$

- Loss % = $\dfrac{\text{Loss}}{\text{C.P.}} \times 100$

- S.P. = $\dfrac{\text{C.P.} \times (100 + \text{profit\%})}{100}$; if there is profit.

- S.P. = $\dfrac{\text{C.P.} \times (100 - \text{loss\%})}{100}$; if there is loss.

- C.P. = $\dfrac{\text{S.P.} \times 100}{(100 + \text{profit\%})}$; if there is a profit.

- C.P. = $\dfrac{\text{S.P.} \times 100}{(100 - \text{loss\%})}$; if there is a loss.
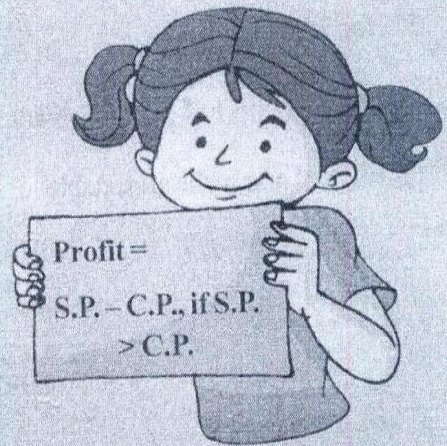
Profit = S.P. − C.P., if S.P. > C.P.

- The money borrowed from a lender is called the Principal.

- 'Interest' is the 'additional money' paid by the borrower to the lender for using his money.

- Simple interest is calculated on the original principal throughout the loan period.

- S.I. = $\dfrac{P \times R \times T}{100}$

- Amount (A) = P + S.I.

Objective Type Questions

I. Multiple Choice Questions.

1. 6% is equivalent to the fraction:

   (i) $\dfrac{1}{6}$ ☐ (ii) $\dfrac{1}{100}$ ☐ (iii) $\dfrac{3}{50}$ ☐ (iv) none of these ☐

2. 0.75 is equivalent to:

   (i) $\dfrac{3}{4}$ ☐ (ii) $\dfrac{4}{3}$ ☐ (iii) $\dfrac{1}{75}$ ☐ (iv) $\dfrac{75}{1}$ ☐

3. 20% of 155 is:

   (i) 20 ☐ (ii) 31 ☐ (iii) 155 ☐ (iv) none of these ☐

4. A machine is purchased for ₹ 64500 and sold for ₹ 70000. The gain per cent is:

(i) 7% ☐   (ii) 10% ☐   (iii) 8.52% ☐   (iv) 9% ☐   ☐

5. A man spends ₹ 1800 per month and saves 25% of his income. His monthly income is:

(i) ₹ 2000 ☐   (ii) ₹ 2220.50 ☐   (iii) ₹ 2360 ☐   (iv) ₹ 2400 ☐   ☐

II. Fill in the blanks.

6. _____ is 50% more than ₹ 60.

7. $12\frac{1}{2}$% of 25 g is _____.

8. The interest on ₹ 3500 for 3 years at the rate of 15% is _____.

9. Express $\frac{9}{20}$ in the form of a per cent _____.

10. The price for which an article is sold is called the _____.

III. Tick (✓) for 'True' and (✗) for 'False'.

11. Loss = Cost Price – Selling Price.   ☐

12. Amount = Principal – Interest.   ☐

13. The additional money paid by the borrower to the lender after a period of time is called interest.   ☐

14. 25% of 50 is 12.5.   ☐

15. 28% is equivalent to $\frac{7}{25}$.   ☐

(iii) C.P. = ₹ 4550   S.P. = ₹ 5060

(iv) C.P. = ₹ 6560   S.P. = ₹ 6000

2. **Find the profit or loss per cent in the following.**

   (i) C.P. = ₹ 230   loss = ₹ 8

   (ii) C.P. = ₹ 840   profit = ₹ 36

   (iii) C.P. = ₹ 150   loss = ₹ 12

   (iv) C.P. = ₹ 24   profit = ₹ 4

3. A man buys an old house for ₹ 300000. He spends ₹ 65000 on its repairs and sells it for ₹ 325000. Find his profit or loss per cent.

4. The cost price of 15 books is equal to the selling price of 12 books. Find the gain per cent.

5. A man bought 6 dozens of bananas for ₹ 15 a dozen and sold them for ₹ 10 a dozen. Find his loss or gain per cent.

6. A man buys 120 apples at 3 a rupee and 120 more at 2 a rupee, and then he sells the whole lot at 5 for two rupees. Find his total loss or profit per cent.

7. By selling an article for ₹ 240, a man makes a profit of 20%. What is his C.P.? What would his profit per cent be if he sells the article for ₹ 275?

8. If the C.P. of 20 tables is equal to the S.P. of 25 tables. Find the profit or loss per cent.

9. By selling a T.V. set, a retailer suffered a loss of 5%. Had he sold for ₹ 2880 more, he would have earned a profit of 10%. What was the C.P. of the T.V. set?

10. By selling a grocery item for ₹ 249.75 a kg, a profit of $12\frac{1}{2}$ % is made.

   (i) Find the cost price.

   (ii) What should the selling price be to get a profit of 25%?

11. A shopkeeper makes a profit of 15% by selling a book for ₹ 230. What is the C.P. and the actual profit?

12. A fruit-seller bought 25 kg apples at ₹ 8 per kg and 30 kg apples at ₹ 10 per kg. At what rate per kg should he sell them to gain 21%.

13. Sumit bought one dozen oranges for ₹ 24. He sold the oranges at a loss of 10%. Find the selling price of an orange.

14. A fan costs ₹ 670. And ₹ 45 is spent on its repairs. It is then sold for ₹ 880. What is the gain per cent?

15. By selling an air-cooler for ₹ 5950, Nitin lost 15%. For what price should he have sold it to get a profit of 10%?