

# SIMPLE INTEREST PROBLEMS SOLUTIONS

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## BANK SSC



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# Simple interest & Compound Interest

When a person borrows some money from another person, the lender has to sacrifice his present needs. So lender should compensate for this sacrifice. This compensation is known as interest.

## Simple interest

The borrower has to pay interest according to some percent(interest rate) of principle for the fixed period of time. This percentage is known as Interest Rate. For example, the rate of interest is 10% per annum means the interest payable on Rs 100 for one year is Rs 10.

## Some Basic Formulas

If A = Amount

P = Principle

I = Interest

T = Time in years

R = Rate of interest per year, then

Amount = Principle + Interest

$A = P + I$

$$\text{Simple Interest} = \frac{\text{Principle} \times \text{Rate} \times \text{Time}}{100}$$

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

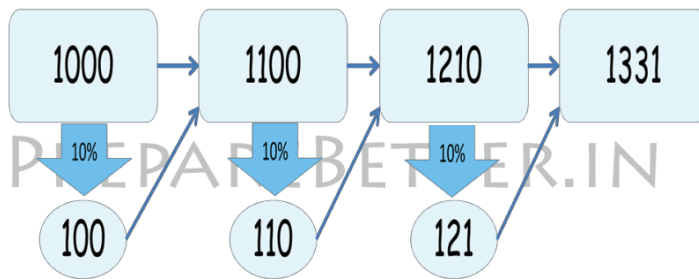
$$R = \frac{I \times 100}{P \times T} \quad \text{OR} \quad P = \frac{I \times 100}{R \times T} \quad \text{OR} \quad T = \frac{I \times 100}{P \times R}$$

## Compound Interest

In Compound Interest, every year interest value is added to principle and then interest is calculated on the amount.

To understand compound interest clearly, let's take an example.

Ram borrowed Rs 1000 from Sham for 3 years. What will be the interest value ?



Year	Principle	Interest (10%)	Amount
1st	1000	100	1100
2nd	1100	110	1210
3rd	1210	121	1331

### Difference between Simple Interest and compound interest

After three years, In simple interest, the total amount would be 1300

And in compound interest, the total amount would be 1331.

### Some Basic Formulas

If A = Amount

P = Principle

C.I. = Compound Interest

T = Time in years

R = Interest Rate Per Year

$$C.I. = P \left[ \left( 1 + \frac{R}{100} \right)^T - 1 \right]$$

$$A = P \left( 1 + \frac{R}{100} \right)^T$$

### Shortcut Formulas

**Rule 1:** If rate of interest is R<sub>1</sub>% for first year, R<sub>2</sub>% for second year and R<sub>3</sub>% for third year, then

$$A = P \left( 1 + \frac{R_1}{100} \right) \left( 1 + \frac{R_2}{100} \right) \left( 1 + \frac{R_3}{100} \right)$$

### Example

#### Rule

If principle = P, Rate = R% and Time = T years then

**1. If the interest is compounded annually:**

2:

$$A = P \left( 1 + \frac{R}{100} \right)^T$$

**2. If the interest is compounded half yearly (two times in year):**

$$A = P \left( 1 + \frac{R/2}{100} \right)^{2T}$$

**3. If the interest is compounded quarterly (four times in year):**

$$A = P \left( 1 + \frac{R/4}{100} \right)^{4T}$$

**Example 1:**

Find the simple interest on Rs.7000 at  $\frac{50}{3}\%$  for 9 months

**Solution:**

$$\begin{aligned} \text{S.I.} &= \frac{P \times R \times T}{100} \\ &= \frac{7000 \times 50 \times 9}{3 \times 12 \times 100} = 875 \end{aligned}$$

**Example 2:**

If A lends Rs.3500 to B at 10% p.a. and B lends the same sum to C at 11.5% p.a., then the gain of B (in Rs.) in a period of 3 years is

**Solution:**

$$\text{Gain of B} = \frac{3500 \times 11.5 \times 3}{100} - \frac{3500 \times 10 \times 3}{100} = 157.50$$

**Exercise**

- 1) A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:
 

a) Rs. 650	b) Rs. 690	c) Rs. 698
d) Rs. 700	e) None of these	
  
- 2) Mr. Thomas invested an amount of Rs. 13,900 divided in two different schemes A and B at the simple interest rate of 14% p.a. and 11% p.a. respectively. If the total amount of simple interest earned in 2 years be Rs. 3508, what was the amount invested in Scheme B?
 

a) Rs. 6400	b) Rs. 6500	c) Rs. 7200
d) Rs. 7500	e) None of these	
  
- 3) A sum fetched a total simple interest of Rs. 4016.25 at the rate of 9 p.c.p.a. in 5 years. What is the sum?
 

a) Rs. 4462.50	b) Rs. 8032.50	c) Rs. 8900
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- d) Rs. 8925                      e) None of these
- 4) How much time will it take for an amount of Rs. 450 to yield Rs. 81 as interest at 4.5% per annum of simple interest?  
a) 3.5 years                      b) 4 years                      c) 4.5 years  
d) 5 years                      e) None of these
- 5) Reena took a loan of Rs. 1200 with simple interest for as many years as the rate of interest. If she paid Rs. 432 as interest at the end of the loan period, what was the rate of interest?  
a) 3.6                      b) 6                      c) 18  
d) Data inadequate                      e) None of these
- 6) A sum of Rs. 12,500 amounts to Rs. 15,500 in 4 years at the rate of simple interest. What is the rate of interest?  
a) 3%                      b) 4%                      c) 5%  
d) 6%                      e) None of these
- 7) An automobile financier claims to be lending money at simple interest, but he includes the interest every six months for calculating the principal. If he is charging an interest of 10%, the effective rate of interest becomes:  
a) 10%                      b) 10.25%                      c) 10.5%  
d) Data inadequate                      e) None of these
- 8) A lent Rs. 5000 to B for 2 years and Rs. 3000 to C for 4 years on simple interest at the same rate of interest and received Rs. 2200 in all from both of them as interest. The rate of interest per annum is:  
a) 5%                      b) 7%                      c)  $7\frac{1}{8}\%$   
d) 10%                      e) None of these
- 9) A sum of Rs. 725 is lent in the beginning of a year at a certain rate of interest. After 8 months, a sum of Rs. 362.50 more is lent but at the rate twice the former. At the end of the year, Rs. 33.50 is earned as interest from both the loans. What was the original rate of interest?  
a) 3.46%                      b) 4.5%                      c) 5%  
d) 6%                      e) None of these
- 10) A man took loan from a bank at the rate of 12% p.a. simple interest. After 3 years he had to pay Rs. 5400 interest only for the period. The principal amount borrowed by him was:  
a) Rs. 2000                      b) Rs. 10,000                      c) Rs. 15,000  
d) Rs. 20,000                      e) None of these
- 11) What will be the ratio of simple interest earned by certain amount at the same rate of interest for 6 years and that for 9 years?  
a) 1 : 3                      b) 1 : 4                      c) 2 : 3  
d) Data inadequate                      e) None of these

- 12) A certain amount earns simple interest of Rs. 1750 after 7 years. Had the interest been 2% more, how much more interest would it have earned?  
a) Rs. 35                                      b) Rs. 245                                      c) Rs. 350  
d) Data inadequate                              e) None of these
- 13) A person borrows Rs. 5000 for 2 years at 4% p.a. simple interest. He immediately lends it to another person at  $6\frac{1}{4}$  pa for 2 years. Find his gain in the transaction per year.  
a) Rs. 112.50                                      b) Rs. 125                                      c) Rs. 150  
d) Rs. 150                                      d) Rs. 167.50
- 14) What will be the simple interest earned on an amount of Rs.16,800 in 9 months at the rate of  $6\frac{1}{4}$ % p.a.?  
a) Rs.787.50                                      b) Rs.812.50                                      c) Rs.860  
d) Rs.887.50                                      e) None of these
- 15) How much time will it take for an amount of Rs.450 to yield Rs.81 as interest at 4.5% per annum of simple interest?  
a) 3.5 years                                      b) 4 years                                      c) 4.5 years  
d) 5 years                                      e) None of these
- 16) A sum fetched a total simple interest of Rs.4016.25 at the rate of 9 p.c.p.a. in 5 years. What is the sum?  
a) Rs.4462.50                                      b) 8032.50                                      c) Rs.8900  
d) Rs.8925                                      e) None of these
- 17) The simple interest on a sum of money will be Rs.600 after 10 years. If the principal is trebled after 5 years, what will be the total interest at the end of the tenth year?  
a) Rs.600                                      b) Rs.900                                      c) 1200  
d) Rs.1500                                      e) Data inadequate
- 18) A sum of money trebles itself in 15 years 6 months. In how many years would it double itself?  
a) 6 years 3 months                                      b) 7 years 9 months                                      c) 8 years 3 months  
d) 9 years 6 months                                      e) None of these
- 19) If the simple interest on a certain sum for 15 months at  $7\frac{1}{2}$ % per annum exceeds the simple interest on the same sum for 8 months at  $12\frac{1}{2}$ % per annum by Rs.32.50, then the sum (in Rs.) is :  
a) Rs.3000                                      b) Rs.3060                                      c) Rs.3120  
d) Rs.3250                                      e) None of these
- 20) If the annual rate of simple interest increases from 10% to  $12\frac{1}{2}$ %, a man's yearly income increases by Rs.12520. His principal (in Rs.) is :  
a) 45,000                                      b) 50,000                                      c) 60,000  
d) 65,000                                      e) None of these

- 21) An amount of Rs.1,00,000 is invested in two types of shares. The first yields an interest of 9% p.a. and the second, 11% p.a. If the total interest at the end of one year is  $9\frac{3}{4}\%$ , then the amount invested in each share was :
- a) Rs.52,500, Rs.47,500                      b) Rs.62,500, Rs.37,500  
c) Rs.72,500, Rs.27,500                      d) Rs.82,500, Rs.17,500  
e) None of these
- 22) If a sum of money at simple interest doubles in 6 years, it will become 4 times in :
- a) 12 years                      b) 14 years                      c) 16 years  
d) 18 years                      e) None of these
- 23) A lends Rs.2500 to B and a certain sum to C at the same time at 7% p.a. simple interest. If after 4 years, A altogether receives Rs.1120 as interest from B and C, then the sum lent to C is :
- a) Rs.700                      b) Rs.1500                      c) Rs.4000  
d) Rs.6500                      e) None of these
- 24) What should be the least number of years in which the simple interest on Rs.2600 at  $6\frac{2}{3}\%$  will be an exact number of rupees?
- a) 2                      b) 3                      c) 4  
d) 5                      e) None of these
- 25) Mr.Thomas invested an amount of Rs.13,900 divided in two different schemes A and B at the simple interest rate of 14% p.a. and 11% p.a. respectively. If the total amount of simple interest earned in 2 years be Rs.3508, what was the amount invested in Scheme B?
- a) Rs.6400                      b) Rs.6500                      c) Rs.7200  
d) Rs.7500                      e) None of these
- 26) The compound interest on a sum of money for 2 years is Rs.832 and the simple interest on the same sum for the same period is Rs.800. The difference between the compound Interest and the simple interest for 3 years will be;
- a) Rs.48                      b) Rs.66.56                      c) Rs.98.56  
d) Data inadequate                      e) None of these
- 27) On a sum of money, the simple interest for 2 years is Rs.660, while the compound interest is Rs.696.30, the rate of interest being the same in both the cases. The rate of interest is :
- a) 10%                      b) 10.5%                      c) 12%  
d) Data inadequate                      e) None of these

### **Solutions:**

1. Option C

S.I. for 1 year = Rs. (854 - 815) = Rs.39

S.I. for 3 years = Rs. (39 × 3) = Rs.117

So, principal = Rs. (815 - 117) = Rs.698

2. Option A

Let the sum invested in scheme A be Rs. x and that in scheme B be Rs. (13900 - x)

$$\text{Then, } \left[ \frac{x \times 14 \times 2}{100} \right] \div \left[ \frac{(13900 - x) \times 11 \times 2}{100} \right] = 3508$$

$$28x - 22x = 350800 - (13900 \times 22)$$

$$6x = 45000$$

$$x = 7500$$

So, sum invested in Scheme B = Rs. (13900 - 7500) = Rs.6400

3. Option D

$$\frac{x \times 9 \times 5}{100} = 4016.25$$

$$x = \frac{4016.25 \times 100}{9 \times 5} = 8925$$

4. Option B

$$\text{Time} = \left[ \frac{100 \times 81}{450 \times 4.5} \right] \text{ years} = 4 \text{ years}$$

5. Option B

Let rate = R% and time = R years

$$\text{Then, } \left[ \frac{1200 \times R \times R}{100} \right] = 432$$

$$12r^2 = 432$$

$$R^2 = 36$$

$$R = 6$$

6. Option D

S.I. = Rs. (15500 - 12500) = Rs.3000

$$\text{Rate} = \left[ \frac{100 \times 3000}{12500 \times 4} \right] \% = 6\%$$

7. Option B

Let the sum be Rs.100. Then,

$$\text{S.I. for first 6 months} = \text{Rs. } \left[ \frac{100 \times 10 \times 1}{100 \times 2} \right] = \text{Rs.5}$$

$$\text{S.I. for last 6 months} = \text{Rs. } \left[ \frac{105 \times 10 \times 1}{100 \times 2} \right] = \text{Rs.5.25}$$



So, amount at the end of 1 year = Rs.  $(100 + 5 + 5.25) = \text{Rs.}110.25$   
 So, effective rate =  $(110.25 - 100) = 10.25\%$

8. Option D

Let the rate be R% p.a.

$$\text{Then, } \left[ \frac{5000 \times R \times 2}{100} \right] + \left[ \frac{3000 \times R \times 4}{100} \right] = 2200$$

$$100R + 120R = 2200$$

$$R = \left[ \frac{2200}{220} \right] = 10$$

So, rate = 10%

9. Option A

Let the original rate be R%. Then, new rate =  $(2R)\%$

Note: Here original rate is for 1 year (s); the new rate is for only 4 months i.e.  $\frac{1}{3}$  year(s).

$$\text{So, } \left[ \frac{725 \times R \times 1}{100} \right] + \left[ \frac{362.50 \times 2R \times 1}{100 \times 3} \right] = 33.50$$

$$(2175 + 725)R = 33.50 \times 100 \times 3$$

$$(2175 + 725)R = 10050$$

$$(2900)R = 10050$$

$$R = \frac{10050}{2900} = 3.46$$

So, original rate = 3.46%

10. Option C

$$\text{Principal} = \text{Rs. } \left[ \frac{100 \times 5400}{12 \times 3} \right] = \text{Rs.}15000$$

11. Option C

Let the principal be P and rate of interest be R%.

$$\text{So, required ratio} = \frac{\frac{P \times R \times 6}{100}}{\frac{P \times R \times 9}{100}} = \frac{6PR}{9PR} = \frac{6}{9} = 2 : 3$$

12. Option D

We need to know the S.I., principal and time to find the rate.  
 Since the principal is not given, so data is inadequate.

13. Option A

$$\text{Gain in 2 years} = \text{Rs. } \left[ \left( 5000 \times \frac{25}{4} \times \frac{2}{100} \right) - \left( \frac{5000 \times 4 \times 2}{100} \right) \right]$$

$$= \text{Rs. } (625 - 400)$$

$$= \text{Rs.}225$$

So, gain in 1 year = Rs.  $\left[\frac{225}{2}\right]$  = Rs.112.50

14. Option A

Time = 9 months =  $\frac{3}{4}$  years

So, S.I. = Rs.  $\left[16800 \times \frac{25}{4} \times \frac{3}{4} \times \frac{1}{100}\right]$  = Rs.787.50

15. Option B

Time =  $\left[\frac{100 \times 81}{450 \times 4.5}\right]$  years = 4 years

16. Option D

Principal = Rs.  $\left[\frac{100 \times 4016.25}{9 \times 5}\right]$  = Rs.  $\left[\frac{401625}{45}\right]$  = Rs.8925

17. Option C

Let the sum be Rs. x. Now, S.I. = Rs.600, T = 10 years

Rate =  $\left[\frac{100 \times 600}{x \times 10}\right]\%$  =  $\left[\frac{6000}{x}\right]\%$

S.I. for first 5 years = Rs.  $\left[\frac{x \times 5 \times 6000}{x \times 100}\right]$  = Rs.300

S.I. for last 5 years = Rs.  $\left[3x \times 5 \times \frac{6000}{x \times 100}\right]$  = Rs.900

So, total interest = Rs.1200

18. Option B

Let sum = x. Then, S.I. = 2x, Time =  $15\frac{1}{2}$  years =  $\frac{31}{2}$  years

So, rate =  $\left[\frac{100 \times 2x}{x \times \frac{31}{2}}\right]\%$  =  $\frac{400}{31}\%$

Now, sum = x, S.I. = x, Rate =  $\frac{400}{31}\%$

So, time =  $\frac{100 \times x}{x \times \frac{400}{31}} = \frac{31}{4}$  years = 7 years 9 months

19. Option C

Let the sum be Rs. x. Then,  $\left[x \times \frac{15}{2} \times \frac{5}{4} \times \frac{1}{100}\right] - \left[x \times \frac{25}{2} \times \frac{2}{3} \times \frac{1}{100}\right] = 32.50$

$\frac{75x}{8} - \frac{25x}{3} = 3250$

$25x = (3250 \times 24)$

$x = \left[\frac{3250 \times 24}{25}\right] = 3120$

20. Option B

Let the sum be Rs. x. Then,  $\left[ x \times \frac{25}{2} \times \frac{1}{100} \right] - \left[ \frac{x \times 10 \times 1}{100} \right] = 1250$

$$25x - 20x = 250000$$

$$5x = 250000$$

$$x = 50000$$

21. Option B

Let the sum invested at 9% be Rs. x and that invested at 11% be Rs. (100000 - x)

$$\text{Then, } \left[ \frac{x \times 9 \times 1}{100} \right] + \left[ \frac{(100000 - x) \times 11 \times 1}{100} \right] = \left[ 100000 \times \frac{39}{4} \times \frac{1}{100} \right]$$
$$\frac{9x + 1100000 - 11x}{100} = \frac{390000}{4} = 97500$$

$$2x = (1100000 - 975000) = 125000$$

$$x = 62500$$

Sum invested at 9% = Rs.62500

Sum invested at 11% = Rs. (100000 - 62500) = Rs.37500

22. Option D

Let sum = x. Then, S.I. = x.

$$\text{So, rate} = \left[ \frac{100 \times x}{x \times 6} \right] \% = \frac{50}{3} \%$$

$$\text{Now, sum} = x, \text{ S.I.} = 3x, \text{ Rate} = \frac{50}{3} \%$$

$$\text{So, time} = \frac{100 \times 3x}{r \times \frac{50}{3}} = 18 \text{ years}$$

23. Option B

$$\text{Let the sum lent to C be Rs. x. Then, } \left[ \frac{2500 \times 7 \times 4}{100} \right] + \left[ \frac{x \times 7 \times 4}{100} \right] = 1120$$

$$\frac{7}{25x} = (1120 - 700)$$

$$x = \left[ \frac{420 \times 25}{7} \right] = 1500$$

12. Option B

$$\text{S.I.} = \text{Rs. } \left[ 2600 \times \frac{20}{3} \times \frac{1}{100} \times T \right] = \text{Rs. } \left[ \frac{520}{3} \times T \right]$$

Which is an exact number of rupees when T = 3

25. Option A

Let the sum invested in Scheme A be Rs. x and that in Scheme B be Rs. (13900 - x)

$$\text{Then, } \left[ \frac{x \times 14 \times 2}{100} \right] + \left[ \frac{(13900 - x) \times 11 \times 2}{100} \right] = \text{Rs.} 3508$$

$$28x - 22x = 350800 - (13900 \times 22)$$

$$6x = 45000$$

$$x = 7500$$

So, sum invested in Scheme B = Rs. (13900 - 7500) = Rs.6400

26. Option C

Difference in C.I. and S.I. for 2 years = Rs.32

S.I. for one year = Rs.400

So, S.I. on Rs.400 for one year = Rs.32

$$\text{So, } \left[ \text{rate} = \frac{100}{400} \times \frac{32}{1} \right] \% = 8\%$$

Hence, difference in C.I. and S.I. for 3<sup>rd</sup> year = S.I. on Rs.832 = Rs.  $\frac{832 \times 8 \times 1}{100}$   
= Rs.66.56

Total difference = Rs. (32 + 66.56) = Rs.98.56

27. Option E

Difference in C.I. and S.I. for 2 years – Rs. (696.30 - 660) = Rs.36.30

S.I. for one year = Rs.330

So, S.I. on Rs.330 for 1 year = Rs.36.30

$$\text{So, } \left[ \text{rate} = \frac{100}{330} \times \frac{36.30}{1} \right] \% = 11\%$$