# Examples

Find the simple interest, If

1. P = Rs.1000, R = 20% per annum, T = 4 years.
2. P = Rs.600, R = 5% per annum, T = 4 months.
3. P = Rs.200, R = 6% per six months, T = 3 years.
4. P = Rs.500, R = 2% per six months, T = \( \frac{5}{2} \) years.
5. P = Rs.400, R = 3% per three months, T = 2 months.
6. P = Rs.730, R = 10% per annum, T = 120 days.
7. P = Rs. 3000, R = 6\( \frac{1}{4} \) per annum, T = period from 4th Feb to 18th Apr.

# Solution

1. \( 4 \times 20 \times 10 = 800 \)

2. \( 2 \times 5 = 10 \)
3. \(6 \times 2 \times 3 \times 2 = 72\)

\[
\begin{align*}
\frac{4}{12} \times 5 &= \text{S.I} \times 100 \\
\frac{1}{3} \times 5 \times 6 &= \text{S.I} \\
\text{S.I} &= 5 \times 2 \\
&= 10
\end{align*}
\]

4. \(5 \times 2 \times 5 = 50\)

\[
\begin{align*}
\frac{5}{2} \times (2 \times 2) &= \text{S.I} \times 100 \\
5 \times 2 \times 5 &= \text{S.I}
\end{align*}
\]

5. \(4 \times 2 = 8\)

\[
\text{(time \times rate)} = \frac{\text{S.I}}{\text{Principal}} \times 100
\]

\[
\begin{align*}
\frac{2}{12} \times (3 \times 1) &= \frac{\text{S.I}}{100} \times 100 \\
2 \times 4 &= \text{S.I}
\end{align*}
\]

6. \(73/3 = 24\)
7. **37.50**

\[ T = (24+31+18) \text{ days} = 73 \text{ days} = \frac{73}{365} \text{ yr.} \]

\[ \frac{1}{5} \times \frac{25}{4} = \frac{S.I}{3000} \times 100 \]

\[ \frac{5}{4} \times 30 = S.I \]

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#2

**Find the following:**

1. \( P = \text{Rs. 100}, R = 3\% \text{ per annum}, T = 2 \text{ year}, A = ? \)
2. \( P = \text{Rs. 500}, R = 6\% \text{ per annum}, T = 4 \text{ months}, A = ? \)
3. \( P = \text{Rs. 400}, R = 3.65\% \text{ per annum}, T = 150 \text{ days}, A = ? \)
4. \( A = \text{Rs. 540}, S.I = \text{Rs. 108}, R = 5\% , T = ? \)
5. \( A = \text{Rs. 1,120}, R = 5\% , T = 2\frac{2}{5} \text{ yr}, S.I = ? \)

**# Solution:**

1. \( S.I = 6 \); \( A = S.I + \text{principal} \); \( A = 6 + 100 \) \( = 106 \)
Simple Interest and Compound Interest

Method I

\[ r \times t = \frac{S.I}{Principal} \]

\[ 3 \times 2 = \frac{S.I}{100} \times 100 \]

\[ 6 = S.I \]

Amount = S.I + Principal

Amount = 6 + 100

\[ A = 106 \]

Method II

\[ A = P \left( 1 + \frac{RT}{100} \right) \]

\[ A = 100 \left( 1 + \frac{3 \times 2}{100} \right) \]

\[ A = 100 \times \frac{106}{100} \]

Amount = 106

2. S.I = 10 ; A = S.I + P ; A = 10 + 500

3. S.I = 6 ; A = 400 + 6

4. T = 5 yr.
5. **120**

### Method I

\[
\frac{12}{5} \times 5 = \frac{S.I}{x} \times 100
\]

\[
\frac{12x}{100} = S.I
\]

\[
A = S.I + P
\]

\[
A = \frac{12x}{100} + x
\]

\[
1120 = \frac{112x}{100}
\]

\[
1000 = x
\]

S.I = A - P

S.I = 1120 - 1000 \(\Rightarrow 120\)

### Method II

\[
\frac{A}{SI} = \left(1 + \frac{100}{RT}\right)
\]

\[
540 = 108 \left(1 + \frac{100}{RT}\right)
\]

\[
\Rightarrow \frac{1120}{SI} = \frac{112}{12}
\]

#3

1. A sum of money lent out at simple interest amounts to Rs. 720 after 2 years and to Rs. 1020 after a further period of 5 years. Find the sum and the rate %.

2. Adam borrowed some money at the rate of 6% p.a. for the first two years, at the rate of 9% p.a. for the next three years, and at the rate of 14% p.a. for the period beyond five years. If he pays a total interest of Rs. 11,400 at the end of nine years, how much money did he borrow? *(Bank P.O 1999)*
3. A person borrows Rs. 5000 for 2 years at 4% p.a. simple interest. He immediately lends it to another person at $6\frac{1}{4}$% p.a. for 2 years. Find his gain in the transaction per year. *(S.S.C.2000)*

4. A certain sum of money amounts to Rs. 1008 in 2 years and to Rs. 1164 in $3\frac{1}{2}$ years. Find the sum and the rate of interest?

5. The simple interest on a certain sum of money for $2\frac{1}{2}$ years at 12% per annum is Rs. 40 less than the simple interest on the same sum for $3\frac{1}{2}$ years at 10% per annum. Find the sum.

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**# Solution**

1. **Principal = 600, R = 10%**

   
   \[ \text{SI} = \frac{P \times R \times T}{100} \]

   \[ \text{SI} = 1020 - 720 = 300 \]

   In 2 Years = SI \(\Rightarrow\) Rs. 120

   \[ P = 720 - 120 \Rightarrow 600 \]

   \[ R = \frac{120}{600 \times 2} \times 100 \]

   \[ R = 10\% \]

2. **12000**
3. \[ 112.50 \]
4. \[ 1164 - 1008 = 156 \] \[ \frac{156}{3 \times 4} = 208 ; R = \frac{208}{2 \times 800} \times 100 \] \[ 13 \]

5. \[ \frac{7x}{20} - \frac{3x}{10} = 40 \] \[ x = \left( 40 \times 20 \right) \] \[ x = 800 \] [ Hint : Given Below ]

\[ R \times T = \frac{SI}{P} \times 100 \]

Let \( P = x \)

\[ \frac{5}{2} \times 12 = \frac{SI}{x} \times 100 \]

\[ \frac{30x}{100} = SI \]

\[ SI = \frac{3x}{10} \]

**# COMPOUND INTEREST**
Simple Interest and Compound Interest

# Formulas

**Case 1. When interest is not Compound yearly,**

Amount after 't' years \( A = P \left[ 1 + \frac{r}{n \times 100} \right]^t \)

- \( P \) = Principal
- \( R \) = Rate of interest
- \( T \) = Time

When interest is compounded half yearly, \( n = 2 \)
- compounded quarterly, \( n = 4 \)
- compounded monthly, \( n = 12 \)

**Case 2. When rate % is no equal every year and interest is compounded yearly**

Basic formula :

\( P \left[ 1 + \frac{r}{100} \right] \left[ 1 + \frac{r}{100} \right] \ldots \text{upto 't' times} \)
Simple Interest and Compound Interest

But as rate % is not same every year, so
A = P \left[1 + \frac{r_1}{100}\right]^{t_1} \left[1 + \frac{r_2}{100}\right]^{t_2} \ldots \text{and so on}
Where R_1 = \text{Rate} \% \text{p.a. for } t_1 \text{ years. and } R_2 = \text{Rate} \% \text{p.a. for } t_2 \text{ years.}

Case 3 When interest is compounded yearly but time is in fraction
T = 5\frac{3}{4} \text{ years}
A = (\text{whole part}) \times (\text{fraction part of time })
A = P \left[1 + \frac{r}{100}\right]^5 \times \left[1 + \frac{3r}{4\times100}\right]

# Difference between Compound Interest and Simple Interest

\text{CI} - \text{SI} = P \left[\frac{R}{100}\right]^2
When time \( t = 3 \) years
\text{CI} - \text{SI} = P \left[\frac{R}{100}^3 + 3 \left(\frac{R}{100}\right)^2\right]

# Examples

#1

- If the compound interest on a certain sum for two years at 10% p.a. is Rs 2,100
  the simple interest on it at the same rate for two years will be. \( \text{(RRB, 2009)} \)

- The compound interest on a sum 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 and simple interest for 3 years will be.

- The difference between simple interest and compound interest on a sum for 2
  years at 8% when the interest is compounded annually is Rs. 16, if the interest
  were compounded half yearly, the difference in one interest would be nearly.

- The difference in C.I and S.I for 2 years on a sum of money is Rs. 160.If the S.I for
  2 years be Rs. 2880, the rate of percent is .

# Solution
1. **2000**

\[
P \left( 1 + \frac{10}{100} \right)^2 - P = 2100 \\
P (1.21 - 1) = 2100 \\
P \times 0.21 = 2100 \\
P = \frac{2100}{0.21} \times 100 \\
P = 10,000
\]

**SI = 2000**

2. **98.56**

<table>
<thead>
<tr>
<th>Year</th>
<th>SI</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>800</td>
<td>832</td>
</tr>
<tr>
<td>II.</td>
<td>400</td>
<td>432</td>
</tr>
<tr>
<td>III.</td>
<td>400</td>
<td>400 + 66.56</td>
</tr>
</tbody>
</table>

**Rs. 32**

\[ r\% = 8\% \]

3. **04**
4. Simple Interest and Compound Interest

**Simple Interest**

\[ P \left( \frac{r}{100} \right) = 16 \]

\[ P \times \frac{16}{100 \times 100} = 16 \]

\[ P = 2500 \]

**Compound Interest**

\[ S.I = \frac{SI}{2500 \times 100} \times 8 \times 2 = 16 \times 8 \times 2 = SI \]

\[ C.I = P \left( 1 + \frac{R}{100 \times 2} \right) - P \]

\[ = 2500 \left( 1 + \frac{8}{100 \times 2} \right) - 2500 \]

\[ = 2500 \times \frac{26}{25} - 2500 \]

\[ = 676 \times 4 - 2500 = 20\, \text{CI} \]

<table>
<thead>
<tr>
<th>Year</th>
<th>S.I</th>
<th>C.I</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>1440</td>
<td>1440</td>
</tr>
<tr>
<td>II.</td>
<td>1440</td>
<td>1600</td>
</tr>
</tbody>
</table>

\[ r\% = \frac{160}{1440} \times 100 \]

\[ = \frac{100}{9} \]

\[ = 11 \frac{1}{9}\% \]