## Percent: Simple Interest-Explanation \& Practice

When a customer deposits money in a savings account, the bank pays the customer for the use of the money. This payment is call interest. Likewise, a customer who borrows money must pay interest to the bank. The formula $I=$ prt is used to find simple interest, or interest on a specific amount at a fixed rate.

$$
\begin{array}{c|c}
\text { The formula for simple interest is } \\
I=p r t, \\
\text { where } I=\text { interest, } p=\text { principal, } \\
r=\text { rate, and } t=\text { time }
\end{array} \quad \begin{gathered}
\\
\text { The } \\
\text { rate } \\
\text { and }
\end{gathered}
$$

time must have corresponding units. That is, if the rate is given per year, the time must be in years. When using the formula, express the rate, $r$, as a decimal or a fraction. For example, express $4.5 \%$ as 0.045 or $45 / 1000$.

## EXAMPLE 1

The principal is $\$ 1200$, the rate is $7 \%$ per year, and the time is 6 months. What is the amount of interest?

Change 6 months to $1 / 2$ or 0.5 year. Also, write $7 \%$ as 0.07 .

$$
\begin{aligned}
& I=p r t \\
& I=(\$ 1200)(0.07)(0.5) \\
& I=\$ 42
\end{aligned}
$$

The interest is $\mathbf{\$ 4 2}$.

## EXAMPLE 2

What is the interest on $\$ 2500$ principal, at the interest rate of $8 \%$ a year?
$I=p r t$
$I=2500 \times 8 \% \times 1$
$I=2500 \times .08$
$I=200$
So the interest is $\$ 200$.

## EXAMPLE 3

What is the interest on $\$ 2500$ principal, at the interest rate of $7 \%$ for $1 / 4$ year?
$I=p r t$
$I=2500 \times 7 \% \times 1 / 4$
$I=2500 \times .07 \times 1 / 4$
$I=175 \times 1 / 4$
$I=\frac{175}{4}=43.75$
So the interest is $\$ 43.75$.

We often borrow money for 30, 60, or 90 days even though the interest rate is per year. To simplify calculations, business people consider 360 days a year. So if a loan was for 30 days, it would be for 30/360 of a year.

## EXAMPLE 4

What is the interest on $\$ 400$ at $8 \%$ for 30 days?
$I=p r t$
$I=400 \times 8 \% \times \frac{30}{360}$
$\left(\frac{30}{360}=\frac{1}{12}\right)$
$I=400 \times .08 \times \frac{1}{12}$
$I=32 \times \frac{1}{12}$
$I=\frac{32}{12}=2.66$
So the interest is $\$ 2.67$.

Next we consider how computations are made on an installment purchase.

## EXAMPLE 5

Suppose you owe $\$ 17,980.00$ on a loan you obtained to buy a car. You agree to a payment of $\$ 165$ a month. What would the new principal be after one month? The interest rate is $6 \%$.
a) First compute the interest:

$$
\begin{aligned}
& I=17,980 \times 6 \% \times \frac{30}{360} \\
& I=17,980 \times .06 \times \frac{1}{12} \\
& I=1078.8 \times \frac{1}{12} \\
& I=\frac{1078.8}{12}=89.90
\end{aligned}
$$

So the interest is $\$ 89.90$.
b) The new principal is the old principal minus the part of the monthly payment that was not for interest.
New Principal $=$ Original Principle $-($ Monthly
Payment - Interest)
New Principal $=\$ 17,980.00-(\$ 165.00-\$ 89.90)$

$$
=\$ 17,980.00-\$ 75.10
$$

$$
=\$ 17,904.90
$$

Do you see why it takes so long to pay off a car loan?

## PRACTICE

Find the amount of interest. Assume the interest rate is yearly.

1. $\$ 225$ at $4 \%$ for 1 year
2. $\$ 300$ at $5 \%$ for 2 years
3. $\$ 350$ at $9 \%$ for 9 months
4. $\$ 1000$ at $61 / 2 \%$ for 1 year and 3 months
5. $\$ 2500$ at $61 / 2 \%$ for 2 years
6. $\$ 1000$ at $51 / 2 \%$ for 1 year
7. $\$ 225$ at $8 \%$ for 3 months
8. $\$ 450$ at $101 / 4 \%$ for 3 years and 9 months
9. What is the interest on $\$ 4300$ principal, at the interest rate of $7 \%$ for 1 year?
10. What is the interest on $\$ 4300$ principal, at the interest rate of $8 \%$ for $1 / 2$ year?
11. What is the interest on $\$ 4800$ at $7 \%$ for 60 days?
12. Suppose you owe $\$ 9,860$ on a loan obtained to buy your car. You agree to a payment of $\$ 120$ a month. The interest rate is $8 \%$. What would the new principal be after one monthly payment?

## Solutions: (decimal and fraction)

| $\text { 1. } \begin{aligned} I= & p r t \\ & =(\$ 225)(.04)(1) \\ & =\$ 9 \end{aligned}$ | $\begin{aligned} I & =p r t \\ & =\frac{\$ 225}{1} \cdot \frac{4}{100} \cdot \frac{1}{1} \\ & =\frac{225}{1} \cdot \frac{1}{25}=\frac{225}{25}=9 \end{aligned}$ | $\text { 5. } \begin{aligned} I & =p r t \\ & =(\$ 2500)(.065)(2) \\ & =\$ 325 \end{aligned}$ | $\begin{aligned} I & =p r t \\ & =\frac{2500}{1} \cdot \frac{13}{200} \cdot \frac{2}{1} \\ & =\frac{65000}{200}=325 \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| $\text { 2. } \begin{aligned} I & =p r t \\ & =(\$ 300)(.05)(2) \\ & =\$ 30 \end{aligned}$ | $\begin{aligned} I & =p r t \\ & =\frac{300}{1} \cdot \frac{5}{100} \cdot \frac{2}{1} \\ & =\frac{3000}{100}=30 \end{aligned}$ | $\text { 6. } \begin{aligned} I & =p r t \\ & =(\$ 1000)(.055)(1) \\ & =\$ 55 \end{aligned}$ | $\begin{aligned} I & =p r t \\ & =\frac{1000}{1} \cdot \frac{55}{1000} \cdot \frac{1}{1} \\ & =55 \end{aligned}$ |
| $\text { 3. } \begin{aligned} I= & =p r t \\ & =(\$ 350)(.09)(.75) \\ \text { time }= & 9 \text { months } \rightarrow \text { years } \\ & \left(\frac{9}{12}=.75 \text { years }\right) \\ = & \$ 23.625 \text { probably } \end{aligned}$ <br> would be rounded down if it is money to be paid to you. $\approx \$ 23.62$ | $\begin{aligned} I & =p r t \\ & =\frac{350}{1} \cdot \frac{9}{100} \cdot \frac{3}{4} \\ & =\frac{9450}{400}=23.625 \\ & \approx \$ 23.62 \end{aligned}$ | 7. $\begin{aligned} & I=p r t \\ &=(\$ 225)(.08)(.25) \\ & \text { time }=3 \text { months } \rightarrow \text { years } \\ &\left(\frac{3}{12}=.25 \text { years }\right) \\ &= \$ 4.50 \end{aligned}$ | $\begin{aligned} I & =p r t \\ & =\frac{225}{1} \cdot \frac{8}{100} \cdot \frac{1}{4} \\ & =\frac{1800}{400}=4.5 \end{aligned}$ |
| $\begin{aligned} & \text { 4. } I=p r t \\ & \quad= \\ & (\$ 1000)(.065)(1.25) \\ & \text { time }=1 \text { yr } 3 \text { months } \rightarrow \text { years } \\ & 1 \text { yr and } \\ & \begin{aligned} \left(\frac{3}{12}\right. & =.25) \rightarrow 1.25 \text { years } \\ & =\$ 81.25 \end{aligned} \\ & \hline \end{aligned}$ | $\begin{aligned} I & =p r t \\ & =\frac{1000}{1} \cdot \frac{13}{200} \cdot \frac{5}{4} \\ & =\frac{65000}{800}=\$ 81.25 \end{aligned}$ | $\text { 8. } \begin{aligned} & I=p r t \\ &=(\$ 450)(1.025)(3.75) \\ & \text { time }=3 \text { years } 9 \text { months } \rightarrow \text { years } \\ &=\$ 172.96875 \text { round up } \\ &=\$ 172.97 \end{aligned}$ | $\begin{aligned} I & =p r t \\ & =\frac{450}{1} \cdot \frac{41}{400} \cdot \frac{15}{4} \\ & =\frac{276750}{1600}=172.96875 \\ & \approx \$ 172.97 \end{aligned}$ |

Answers: 9. $\$ 301$
10. $\$ 172$
11. $\$ 56$
12. $\$ 9,805.73$

