**Interest Problems**

Interest is calculated using the following formula:

\[
\text{Interest} = \text{Principal} \times \text{Rate} \times \text{Time}
\]

The **principal** is the amount of money invested, the **rate** is the annual rate of interest, and the **time**, as it is used in the formula, is the number of **years** that the money will be invested for.

**HINT:** For problems involving **annual interest**, time is equal to 1. In such cases, time is not a factor in interest calculations and can be excluded from the equation above. It is also important to know that **time** has to be in terms of **years** before using the formula. Ex. if the time given is 6 months, convert this time to years by dividing the number of months by 12. (6/12 = ½ = 0.5)

**Example:** Mr. Silver invested part of $50,000 in an account paying 6%. He invested the rest into a separate account paying 8%. If the total annual interest is $3360, how much was invested at each rate?

Let \( x = \text{amount in dollars invested at 6\%} \)

\[50000 - x = \text{amount in dollars invested at 8\%}\]

We use \(50000 - x\) for the amount in dollars invested at 8\% because \(x\) dollars out of the total $50000 was invested at 6\%. Since time is equal to 1, we can exclude it from our calculations.

<table>
<thead>
<tr>
<th>Account</th>
<th>Interest Rate</th>
<th>Amount</th>
<th>Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>6%</td>
<td>.06</td>
<td>(x)</td>
<td>.06(x)</td>
</tr>
<tr>
<td>8%</td>
<td>.08</td>
<td>(50000 - x)</td>
<td>.08(50000 - (x))</td>
</tr>
</tbody>
</table>

The **interest** in dollars of each account can be obtained by multiplying the interest rate by the amount invested in that account. We can then form the equation by **adding** the **interest** from each account and setting this sum equal to the total annual interest in dollars.

\[
\text{Interest @ 6\%} + \text{Interest @ 8\%} = \text{Total Annual Interest}
\]

\[
.06x + .08(50000 - x) = 3360
\]

\[
.06x + 4000 - .08x = 3360
\]

\[
-.02x = -640
\]

\[
x = 32000
\]

Mr. Silver invested **$32000** at 6\% and **$18000** at 8\%.
Sample Problems:

1. Hania had saved $6000, which she wished to invest. She put part in a term bank savings account at 8% and part in a regular savings account at $5 \frac{1}{2}$ % . How much was invested in each account if her total yearly income amounted to $425?  

Let \( x \) = amount in dollars invested at 8%  
\( 6000 - x \) = amount in dollars invested at 5.5%  

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</thead>
<tbody>
<tr>
<td>8%</td>
<td>.08</td>
<td>( x )</td>
<td>.08x</td>
</tr>
<tr>
<td>5.5%</td>
<td>.055</td>
<td>( 6000 - x )</td>
<td>.055(( 6000 - x ))</td>
</tr>
</tbody>
</table>

Equation: \( .08x + .055(6000 - x) = 425 \)  
\( .08x + 330 - .055x = 425 \)  
\( .025x = 95 \)  
\( x = 3800 \)  

Hania invested $3800 at 8% and $2200 at 5.5%.  

2. Mr. Rogers wishes to invest a sum of money so that the interest would help pay for his son’s college expenses. If the money is to be invested at 8% for 4 years, and his son’s college expense at the end of 4 years would be $30000, how much should Mr. Rogers invest?  

Let \( x \) = amount in dollars invested at 8%  

<table>
<thead>
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<th>Amount</th>
<th>Time</th>
<th>Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>8%</td>
<td>.08</td>
<td>( x )</td>
<td>4</td>
<td>(.08)(( x ))(4)</td>
</tr>
</tbody>
</table>

Equation: \( (.08)(\( x \))(4) = 30000 \)  
\( .32x = 30000 \)  
\( x = 93750 \)  

Mr. Rogers would need to invest $93750.