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. \((6/12 = \frac{1}{2} = 0.5)\)

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 \(x = \) 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.

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

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

Equation: \(.06x + .08(50000 - x) = 3360\)

\(.06x + 4000 - .08x = 3360\)
\(=.02x = -640\)
\(x = 32000\)

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 \(\frac{51}{2}\)% . 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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<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%

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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.