# 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** = amount in dollars invested at 6%
**50000 – x** = 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.

| Account | Interest Rate | Amount | Interest |
|---|---|---|---|
| **6%** | .06 | x | .06x |
| **8%** | .08 | 50000 – x | .08(50000 – x) |

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.

| Interest @ 6% | + | Interest @ 8% | = | 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%.

Comment: 50000 - x = 50000 - 32000

**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%

| Account | Interest Rate | Amount | Interest |
|---|---|---|---|
| **8%** | .08 | X | .08x |
| **5.5%** | .055 | 6000 – x | .055(6000 – x) |

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

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

Comment: 6000 - x = 6000 - 3800

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%

| Account | Interest Rate | Amount | Time | Interest |
|---|---|---|---|---|
| **8%** | .08 | x | 4 | (.08)(x)(4) |

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

Mr. Rogers would need to invest ***$93750***.