

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%
 $50000 - x$ = 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	.06 x
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.

$$\begin{array}{rclcl}
 \text{Interest @ 6\%} & + & \text{Interest @ 8\%} & = & \text{Total Annual Interest} \\
 .06x & + & .08(50000 - x) & = & 3360
 \end{array}$$

Equation:

$$\begin{aligned}
 .06x + .08(50000 - x) &= 3360 \\
 .06x + 4000 - .08x &= 3360 \\
 -.02x &= -640 \\
 x &= 32000
 \end{aligned}$$

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**.