

## Sample Problems

1. We invested \$10 000 into two bank accounts. One account earns 14% per year, the other account earns 8% per year. How much did we invest into each account if after the first year, the combined interest from the two accounts is \$1238?
2. We invested \$7000 into two bank accounts. One account earns 14% per year, the other account earns 9% per year. How much did we invest into each account if after the first year, the combined interest from the two accounts is \$840?
3. Maria invests a total of \$16 500 in two accounts. The first account earned a rate of return of 10% (after a year). However, the second account suffered a 3% loss in the same time period. At the end of one year, the total amount of money gained was \$220. How much was invested into each account?

## Practice Problems

1. Dilbert invests a total of \$33 000 in two accounts paying 6% and 10% interest, respectively. How much was invested in each account if, after one year, the total interest was \$2780?
2. Joy invests a total of \$6000 in two accounts paying 5% and 11% interest, respectively. How much was invested in each account if, after one year, the total interest was \$570?
3. Juan invests a total of \$35 000 in two accounts. The first account earned a rate of return of 3% (after a year). However, the second account suffered a 2% loss in the same time period. At the end of one year, the total amount of money gained was \$125.00. How much was invested into each account?

## Answers to Sample Problems

1. \$7300 at 14% and \$2700 at 8%      2. \$4200 at 14% and \$2800 at 9%      3. \$5500 at 10% and \$11 000 in the account that lost 3%

## Answers to Practice Problems

1. \$13 000 at 6% and \$20 000 at 10%      2. \$1500 at 5% and \$4500 at 11%      3. \$16 500 in the account that gained 3% and \$18 500 in the account that lost 2%

## Solutions to Sample Problems

1. We invested \$10 000 into two bank accounts. One account earns 14% per year, the other account earns 8% per year. How much did we invest into each account if after the first year, the combined interest from the two accounts is \$1238?

Solution: Let us denote the amount invested at 14% by  $x$  and the amount invested at 8% by  $y$ . The two equations express that

$$\begin{aligned} x + y &= 10\,000 && \text{the amounts add up to \$10\,000} \\ 0.14x + 0.08y &= 1238 && \text{the interests earned add up to \$1238} \end{aligned}$$

We solve the system of equation by elimination. But let us first make the second equation simpler:

$$\begin{aligned} 0.14x + 0.08y &= 1238 && \text{multiply by 100} \\ 14x + 8y &= 123\,800 && \text{divide by 2} \\ 7x + 4y &= 61\,900 \end{aligned}$$

We now have

$$\begin{aligned} x + y &= 10\,000 \\ 7x + 4y &= 61\,900 \end{aligned}$$

We will multiply the first equation by  $-4$  to eliminate  $y$ .

$$\begin{aligned} -4x - 4y &= -40\,000 \\ 7x + 4y &= 61\,900 \end{aligned}$$

We add the equations and solve for  $x$ .

$$\begin{aligned} 3x &= 21\,900 && \text{divide by 3} \\ x &= 7300 \end{aligned}$$

Thus we invested \$7300 at 14%. The other amount is then from the first equation:

$$\begin{aligned} 7300 + y &= 10\,000 \\ y &= 2700 \end{aligned}$$

We invested \$7300 at 14% and \$2700 at 8%. We check: the amounts add up to  $\$7300 + \$2700 = \$10\,000$ . The interest from the accounts are

$$\begin{aligned} 14\% \text{ of } 7300 & \text{ is } 0.14(7300) = 1022 \text{ and} \\ 8\% \text{ of } 2700 & \text{ is } 0.08(2700) = 216 \end{aligned}$$

Since  $1022 + 216 = 1238$ , our solution is correct.

2. We invested \$7000 into two bank accounts. One account earns 14% per year, the other account earns 9% per year. How much did we invest into each account if after the first year, the combined interest from the two accounts is \$840?

Solution: Let us denote the amount invested at 14% by  $x$  and the amount invested at 9% by  $y$ . The two equations express that

$$\begin{aligned} x + y & = 7000 && \text{the amounts add up to } \$7000 \\ 0.14x + 0.09y & = 840 && \text{the interests earned add up to } \$840 \end{aligned}$$

We solve the system of equation by elimination. But let us first make the second equation simpler:

$$\begin{aligned} 0.14x + 0.09y & = 840 && \text{multiply by } 100 \\ 14x + 9y & = 84\,000 \end{aligned}$$

We now have

$$\begin{aligned} x + y & = 7000 \\ 14x + 9y & = 84\,000 \end{aligned}$$

We will multiply the first equation by  $-9$  and leave alone the second equation. Then we add the two equations:

$$\begin{aligned} -9x - 9y & = -63\,000 \\ 14x + 9y & = 84\,000 \end{aligned}$$

We add the two equations -  $y$  is cancelled out

$$\begin{aligned} 5x & = 21\,000 && \text{divide by } 5 \\ x & = 4200 \end{aligned}$$

Then  $y = 7000 - x = 7000 - 4200 = 2800$ . Thus we invested \$4200 at 14% and \$2800 at 9%. We check: the amounts add up to  $\$4200 + \$2800 = \$7000$ . The interest from the accounts are:

$$14\% \text{ of } 4200 \text{ is } 0.14(4200) = 588 \text{ and } 9\% \text{ of } 2800 \text{ is } 0.09(2800) = 252$$

Since  $588 + 252 = 840$ , our solution is correct.

3. Maria invests a total of \$16 500 in two accounts. The first account earned a rate of return of 10% (after a year). However, the second account suffered a 3% loss in the same time period. At the end of one year, the total amount of money gained was \$220. How much was invested into each account?

Solution: Let us denote the amount invested at 10% by  $x$  and the amount invested at the account that lost 3% by  $y$ . The two equations express that

$$\begin{aligned} x + y & = 16\,500 && \text{the amounts add up to } \$16\,500 \\ 0.1x - 0.03y & = 220 && \text{the interests earned add up to } \$220 \end{aligned}$$

We solve the system of equation by elimination. But let us first make the second equation simpler:

$$\begin{aligned} 0.1x - 0.03y & = 220 && \text{multiply by } 100 \\ 10x - 3y & = 22\,000 \end{aligned}$$

We now have

$$\begin{aligned}x + y &= 16\,500 \\10x - 3y &= 22\,000\end{aligned}$$

We will multiply the first equation by  $-3$  and leave alone the second equation. Then we add the two equations:

$$\begin{aligned}3x + 3y &= 49\,500 \\10x - 3y &= 22\,000\end{aligned}$$

We add the two equations -  $y$  is cancelled out

$$\begin{aligned}13x &= 71\,500 && \text{divide by 13} \\x &= 5500\end{aligned}$$

Then  $y = 16\,500 - x = 16\,500 - 5500 = 11\,000$ . Thus we invested \$5500 at 10% and \$11 000 in the account that lost 3%. We check: the amounts add up to  $\$5500 + \$11\,000 = \$16\,500$ . The interest from the accounts are:

$$10\% \text{ of } 5500 \text{ is } 0.1(5500) = 550 \text{ and } 3\% \text{ of } 11\,000 \text{ is } 0.03(11\,000) = 330$$

Since  $\$550 - \$330 = \$220$ , our solution is correct.