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?

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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:

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

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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

$$\begin{aligned} x + y &= 16\,500 && \text{the amounts add up to \$16 500} \\ 0.1x - 0.03y &= 220 && \text{the interests earned add up to \$2200} \end{aligned}$$

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

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

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.

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