

## Mixed Interest Problems

Show all work to answer each question. Be sure to write out the formula and how you plug the numbers into the formula.

1. Erika invested \$3,600 at 3.95% annual interest compounded annually for 5 years. Her sister Amelia invested \$3,200 at 5.7% annual interest compounded annually for 5 years. What is the difference in their earnings?

- A) \$147.37  
B) \$4222.06  
C) \$252.63  
D) \$4369.43

Erika - Compound

$$\begin{aligned} P &= 3600 \\ r &= 3.95\% = 0.0395 \\ t &= 5 \text{ yrs} \\ A &= P(1+r)^t \\ A &= 3600(1+0.0395)^5 \\ A &= \$4369.43 \\ \text{Int.} &= 4369.43 - 3600 \\ \text{Int.} &= \$769.43 \end{aligned}$$

Amelia - Compound

$$\begin{aligned} P &= 3200 \\ r &= 5.7\% = 0.057 \\ t &= 5 \text{ yrs} \\ A &= P(1+r)^t \\ A &= 3200(1+0.057)^5 \\ A &= \$4222.06 \\ \text{Int.} &= 4222.06 - 3200 \\ \text{Int.} &= \$1022.06 \end{aligned}$$

Amelia - Erika

$$\begin{aligned} 1022.06 - 769.43 \\ \text{Int.} &= \$252.63 \end{aligned}$$

3. Jamal is investing \$4,500 into a savings account. The account accrues simple interest at a rate of 3.5%. Jamal will leave the money in the account untouched for 30 months.  $t = 2.5 \text{ yrs}$

- a. What will Jamal's earnings be?

$$\begin{aligned} I &= P \cdot r \cdot t \\ P &= 4500 \\ r &= 0.035 \\ t &= 2.5 \end{aligned}$$

$$\begin{aligned} I &= 4500 \cdot 0.035 \cdot 2.5 \\ I &= \$393.75 \end{aligned}$$

- b. What will be the total amount in Jamal's account at the end of the 30 months?

$$\text{Total} = P + I$$

$$\text{Total} = 4500 + 393.75$$

$$\text{Total} = \$4893.75$$

2. Javier is comparing bank savings plans. The table below shows two savings options.

	Option A	Option B
Interest Rate $r$	3.6%	3%
Interest Type	Simple	Compound

Javier has  $\overset{P}{\$425}$  to invest for  $\overset{t}{3.5 \text{ years}}$ . Which option will earn him the most money?

- A) Option A because he will earn \$5,355.  
B) Option B because he will earn \$471.32.  
C) Option A because he will earn \$7.23 more than Option B.  
D) Option B because he will earn \$417.77 more than Option A.

Opt. A

$$\begin{aligned} I &= prt \\ I &= 425 \cdot 0.036 \cdot 3.5 \\ I &= \$53.55 \end{aligned}$$

Opt. B

$$\begin{aligned} A &= P(1+r)^t \\ A &= 425(1+0.03)^{3.5} \\ A &= \$471.32 \\ \text{Int.} &= A - P \\ \text{Int.} &= 471.32 - 425 \\ \text{Int.} &= \$46.32 \end{aligned}$$

$$\begin{aligned} 53.55 \\ - 46.32 \\ \text{Int.} &= \$7.23 \end{aligned}$$

4. Carrie is taking out a \$2,200 loan. The interest for the loan will be compounded annually at a rate of 2%. Carrie will carry the loan for 18 months.  $t = 1.5 \text{ yrs}$

- a. How much interest will the loan accrue?

$$\text{Int.} = A - P$$

$$\text{Int.} = 2266.33 - 2200 = \$66.33$$

- b. How much will Carrie have to pay back in total at the end of the 18 months?

$$\begin{aligned} A &= P(1+r)^t \\ A &= 2200(1+0.02)^{1.5} \\ A &= \$2266.33 \end{aligned}$$

5. Gina deposits \$150 into a college savings account that pays 4% simple interest at the end of each year. She does not deposit the interest she earns each year. How much total interest will Gina earn on her deposits through the end of the fifth year?

$$I = p \cdot r \cdot t$$

$$I = 150 \cdot 0.04 \cdot 5$$

$$I = \$30$$

6. Randee invested \$1000 for college in an account earning 5% simple interest. When she withdrew the investment, she had earned a total of \$550 in interest. How long was the money invested? How much interest does the first account earn in 10 years?

$$I = p \cdot r \cdot t$$

$$550 = 1000 \cdot 0.05 \cdot t$$

$$\frac{550}{50} = \frac{50t}{50}$$

$$11 = t$$

$$11 \text{ years}$$

$$I = p \cdot r \cdot t$$

$$p = 1000$$

$$r = 0.05$$

$$t = 10$$

$$I = 1000 \cdot 0.05 \cdot 10$$

$$I = \$500$$

$$\text{in 1st 10 years}$$

7. Andreas invested \$1000 in a savings account. After 4 years, the account had earned a total of \$112 simple interest without any additional deposits. What was his interest rate?

$$I = p \cdot r \cdot t$$

$$112 = 1000 \cdot r \cdot 4$$

$$\frac{112}{4000} = \frac{4000 \cdot r}{4000}$$

$$0.028 = r$$

$$0.028 = r$$

$$r = 2.8\%$$

8. Lester deposited \$400 into a savings account earning 4.5% simple interest, and \$450 into an investment account earning 3.2% interest compounded annually. What was the total interest he earned in 3 years?

Acct 1 - Simple

$$I = p \cdot r \cdot t$$

$$I = 400 \cdot 0.045 \cdot 3$$

$$I = \$54$$

Acct 2 - Compound

$$A = P(1+r)^t$$

$$A = 450(1+0.032)^3$$

$$A = \$494.60$$

$$\text{Int.} = 494.60 - 450$$

$$\text{Int.} = \$44.60$$

$$54 + 44.60 = \$98.60 \text{ total int}$$

9. Huan deposited \$850 into a college savings account earning 4.8% interest compounded annually. He also deposited \$850 into a second account earning 4.8% simple interest. He made no additional deposits.

- a. How much interest does the first account earn in 10 years?

$$A = P(1+r)^t$$

$$P = 850$$

$$r = 0.048$$

$$t = 10$$

$$A = 850(1+0.048)^{10}$$

$$A = \$1358.41$$

$$\text{Int} = A - P$$

$$\text{Int} = 1358.41 - 850$$

$$\text{Int} = \$508.41$$

- b. How much interest does the second account earn in 10 years?

$$I = p \cdot r \cdot t$$

$$p = 850$$

$$r = 0.048$$

$$t = 10$$

$$I = 850 \cdot 0.048 \cdot 10$$

$$I = \$408$$

- c. After 10 years, which account earned more interest? How much more?

Account 1 (compound) earned more interest.

It earned \$108.41 more in interest.

$$508.41$$

$$- 400.00$$

$$\$108.41$$