

KEY

Interest and Finances – Practice

Simple Interest: $I = Prt$

<p>1. How much interest did I earn on a GIC that paid 3.75% interest over a 7 year period if I invested \$5000.</p> $I = Prt$ $P = 5000$ $r = 0.0375$ $t = 7$ $I = 5000(0.0375)(7)$ $I = 1312.50$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> $I = \\$1312.50$ </div>	<p>2. What principal did I invest if my Simple Interest account earned me \$2400 paying 6% interest over five years?</p> $I = 2400$ $r = 0.06$ $t = 5$ $I = P(0.06)(5)$ $\frac{2400}{0.3} = \frac{0.3P}{0.3}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> $8000 = P$ </div>
<p>3. What is a better investment and by how much?</p> <p>Option 1: \$5500 at 7.5% for 3 years Option 2: \$6000 at 6% for 3 years</p> $I = 5500(0.075)(3)$ $= 1237.50$ <p style="margin-left: 200px;">← option 1 Better</p> $I = 6000(0.06)(3)$ $I = 1080$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>Better by: \$157.50</p> </div>	<p>4. I invested \$12 000 at 9.5% interest but only had it locked in for 40 weeks. How much interest did I earn in that short period?</p> $I = Prt$ $P = 12000$ $r = 0.095$ $t = \frac{40}{52}$ $I = 12000(0.095)\left(\frac{40}{52}\right)$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> $I = 876.92$ </div>

Compound Interest: $A = P \left(1 + \frac{r}{n}\right)^{n \cdot t}$

5. I had to borrow money to deal with some home renovations. I don't have to start paying it off for 3 years, but they are going to charge me 4.5% interest, compounded monthly. How much to I owe when my repayment starts, if I had to borrow \$17 000?

$P = 17000$
 $r = 0.045$
 $n = 12$
 $t = 3$

$$A = 17000 \left(1 + \frac{0.045}{12}\right)^{12 \cdot 3}$$

$$A = 17000 (1.00375)^{36}$$

$A = 19452.21$

6. I received an inheritance of \$24 000 and was provided two options for investing.

Option 1: 7.5% interest, compounded weekly, for 5 years

Option 2: 7% interest, compounded daily, for 6 years

What is a better deal and by how much?

$$A = 24000 \left(1 + \frac{0.075}{52}\right)^{52 \cdot 5}$$

$$A = 24000 \left(1 + \frac{0.075}{52}\right)^{260}$$

$$A = 34910.36$$

$$A = 24000 \left(1 + \frac{0.07}{365}\right)^{365 \cdot 6}$$

$$A = 24000 \left(1 + \frac{0.07}{365}\right)^{2190}$$

$$A = 36525.61 \leftarrow \text{Better}$$

Better by: 1615.25

7. How much would I need to invest to have \$2 000 000 at the end of 20 years, if the savings account paid me 9% interest, compounded quarterly.

$$2000000 = P \left(1 + \frac{0.09}{4}\right)^{4 \cdot 20}$$

$$2000000 = P (1.0225)^{80}$$

$$P = \frac{2000000}{1.0225^{80}}$$

$$P = \$ 337\,259.86$$

Credit Cards and Variable Annuities:

$$F = \frac{R \left[\left(1 + \frac{r}{n}\right)^{nt} - 1 \right]}{\frac{r}{n}}$$

8. I have started a savings account for my son Atlas. I have it locked into an account that pays 8.5% interest for 15 years. I make monthly recurring payments of \$500. How much do I have at the end of the 15 years?

$$R = 500$$

$$r = 0.085$$

$$t = 15$$

$$n = 12$$

$$F = \frac{500 \left[\left(1 + \frac{0.085}{12}\right)^{12 \cdot 15} - 1 \right]}{\frac{0.085}{12}}$$

$$= \$ 180\,873.18$$

monthly

9. How much would I need to invest as a recurring payment if the interest rate was locked in at 9.75% if my goal was to have \$50 000 at the end of 10 years?

$$F = \frac{R \left[\left(1 + \frac{r}{n} \right)^{n \cdot t} - 1 \right]}{\frac{r}{n}}$$

$$F = 50\,000$$

$$R = ?$$

$$r = 0.0975$$

$$t = 10$$

$$n = 12$$

$$50\,000 = \frac{R \left[\left(1 + \frac{0.0975}{12} \right)^{12 \cdot 10} - 1 \right]}{\frac{0.0975}{12}}$$

$$50000 = R(201.937623)$$

$$R = 247.60$$

10. I have a credit card balance of \$1255, I was unable to pay anything more than \$250 and have to charge an additional \$300 last month. If the monthly interest 2.3% how much interest was I charged for the month and what will my new bill be?

$$1255 + 300 - 250 = 1305$$

$$1305 \cdot 0.023 = 30.02$$

Interest charged: \$30.02

New total: 1335.02

Instalment Loans

11. I borrowed \$30 000 to pay off some debt from travelling and to buy a used car. The interest rate was locked in at 3.5% Simple Interest and I have 7 years to pay it off. What is the interest I will owe and what will my monthly payments be in order to pay it off in the 7 years?

$$I = 30\,000(0.035)(7)$$

$$I = 7350$$

$$\text{Total: } 37350$$

$$7 \text{ years} = 84 \text{ months}$$

$$\frac{37\,350}{84} = \$444.64/\text{month}$$

12. I bought a new electric SUV and it cost my \$77 000. They charged me compound interest at 1.5% interest compounded monthly, and I have a 5 year repayment plan. How much do I owe with the interest included, and what will my bi-weekly payments be in order to pay it off in the 5 years?

$$A = 77\,000 \left(1 + \frac{0.015}{12}\right)^{12 \cdot 5}$$

$$= \$82\,993.19$$

Paying bi-weekly for 5 years : $5 \cdot 26 = 130$ payments

$$\frac{82\,993.19}{130} = \$638.41 \text{ per bi-weekly payment}$$

