## Section 4.2 - Interest and Finances

This booklet belongs to: $\qquad$ Block: $\qquad$

## Simple Interest

- Interest money that is added to the PRINCIPAL (money invested or borrowed)
- It is decided based on a given percentage rate
- Low Interest Rates
- Awesome for a borrower, you pay less to the lender
- Bad if you are trying to grow interest on savings
- High Interest Rates
- Brutal/Crippling for a borrower, you pay more to the lender
- Great if it is interest earned in savings
- Simple Interest is calculated this way: $\quad \boldsymbol{I}=\boldsymbol{P r} \boldsymbol{t}$
- I: is the amount of interest calculated
- P: is the Principal (the amount of money borrowed or saved)
- $\quad r$ : is the Percentage Rate, expressed as a decimal $(25 \%=0.25)$
- $\quad t$ : is Time, in years

Example 1: How much interest is paid over a 3 year period on $\$ 5000$ at a APR (Annual Percentage Rate) of $3 \%$ ?

Solution 1: $\quad I=\operatorname{Prt}$
Here: $\quad P=\$ 5000$

$$
t=3 \quad r=3 \%=0.03
$$

$$
I=(5000)(0.03)(3)
$$

$$
I=450
$$

So, in 5 years without touching the money, you earn an extra $\$ 450$

- You can simply flip the scenario to borrowing and if you borrowed $\$ 5000$ you would owe an extra $\$ 450$ back on top of the $\$ 5000$
- You can also use algebra to manipulate the equation to solve for $P, r$, or $t$

Example 2: What Principal at $4.75 \%$ will earn interest of $\$ 27.15$ in 9 months?
Solution 2: $\quad$ Since $\boldsymbol{I}=\boldsymbol{P r t}$, We need $\boldsymbol{P}$ alone, and doing algebra give us:

$$
\frac{I}{r t}=P
$$

and since Time in in years, 9 months means 9 out of 12 months,

$$
\frac{9}{12} \text { of a year } \quad \text { Or.... } \frac{3}{4} \text { years }
$$

So...

$$
P=\frac{I}{r t} \rightarrow \frac{27.15}{(0.0475)\left(\frac{3}{4}\right)} \rightarrow \$ 762.11
$$

## Compound Interest - Bonus

* Compound Interest is much more complicated. You build/owe on the Principal + the Interest earned in a compounding period
- It can be used to your benefit when savings
- It can drown you when it's used against your debt
- Compound Interest is calculated this way: $\quad A=P\left(1+\frac{r}{n}\right)^{n(t)}$
- $A$ : is the final amount earned
- $\quad P$ : is the Principal (the initial amount of money borrowed or saved)
- $\quad r$ : is the Yearly Percentage Rate, expressed as a decimal $(25 \%=0.25)$
- $n$ : is the number of times yearly interest is compounded per year
- $t$ : is time, in years
- Compounding periods means the number times the interest is calculated in a year
- Yearly: $n=1$
- Quarterly: $n=4$
- Monthly: $n=12$
- Daily: $n=365$

Example 3: Find the interest earned if $\$ 6500$ is deposited in an account paying 6\% compounded monthly for 5 years

Solution 3: $\quad \boldsymbol{A}=\boldsymbol{P}\left(\mathbf{1}+\frac{r}{n}\right)^{\boldsymbol{n}(\boldsymbol{t})}$ so we sub in for the information given to fins the solution

$$
A=6500\left(1+\frac{0.06}{12}\right)^{12(5)} \quad \rightarrow \quad A=6500(1.005)^{60} \quad \rightarrow \quad A=\$ 8767.53
$$

- The interest is: $\quad I=A-P \quad \rightarrow \quad \$ 8767.53-\$ 6500=\$ 2267.53$

Example 4: What is the initial investment needed to become a millionaire in 25 years if interest is $12 \%$ compounded quarterly?

Solution 4: $\quad \boldsymbol{A}=\boldsymbol{P}\left(\mathbf{1}+\frac{r}{n}\right)^{\boldsymbol{n}(\boldsymbol{t})}$ so we calculated what we can then use algebra to find the unknown

$$
1000000=P\left(1+\frac{0.12}{4}\right)^{4(25)} \rightarrow 1000000=P(1.03)^{100} \quad \rightarrow \quad P=\frac{\$ 1000000}{(1.03)^{100}}
$$

$P=\$ 52032.84 \quad$ You only need to invest $\$ 52032.84$ to be a millionaire in 25 years

Example 5: $\quad$ What is the difference in earnings on an investment of $\$ 8000$ for 10 years at $6 \%$ compounded yearly, monthly, and daily?

## Solution 5:

| Yearly | Monthly | Daily |
| :---: | :---: | :---: |
| $A=P\left(1+\frac{r}{n}\right)^{n(t)}$ | $A=P\left(1+\frac{r}{n}\right)^{n(t)}$ | $A=P\left(1+\frac{r}{n}\right)^{n(t)}$ |
| $A=8000\left(1+\frac{0.06}{1}\right)^{1(10)}$ | $A=8000\left(1+\frac{0.06}{12}\right)^{12(10)}$ | $A=8000\left(1+\frac{0.06}{365}\right)^{365(10)}$ |
| $A=\$ 14326.78$ | $A=\$ 14555.17$ | $A=\$ 14576.23$ |

## Different types of accounts

- There are a few more types of accounts, generally when things get more complicated
- We will only focus on these this year.
- Every account feature change depending on bank/credit union, do your research

Chequing Account - The most common type of account, it is one linked to direct deposit from your employer, your ATM card, and cheques.

- Some chequing accounts have fees associated with them:
- Paper statement fees: generally, you can opt out and receive e-bills
- Minimum Balance: If you maintain a certain balance they waive the monthly fees
- ATM fees: Your own bank and different banks
- Overdraft fees: When you spend more than you have in the account, can be steep
- Money transfer fees: e-transfer generally

Savings Account - A account that people use to save money, generates interest. It can be attached to an ATM card, but Chequing accounts are used more for the day-to-day

- Savings accounts also have added features
- Interests rates can change depending on the introductory offer
- You may require a minimum deposit to start the account
- There may be service or transaction fees depending on your institution
- You have to pay taxes on the interest earned in Savings accounts

Tax Free Savings Account - An account that people use to save money over a long period of time, not connected to an ATM. Money put in, interest earned, and even money withdrawn is not taxed (some exceptions).

- There is a yearly contribution limit of $\$ 5500$ starting in 2017
- The contribution total builds, so you can continue to grow the account
- Interest Rate is higher than the basic Savings Account
- Withdrawals can occur, but require communication with your provider and there may be some added rules and regulations


## Types of Cards

Debit Card - Your classic bank card, connect to your chequing and/or savings account

- Has withdrawal fees at your own institution and other (do your research)
- Extra fees at standalone ATM's
- Can work in a multitude of countries (research)
- Can be connected to your phone/watch

Credit Cards - Credit Cars are two-faced, they can be beneficial, but they can be crushing. There are many different varieties with different features (research everything).

- Some benefits:
- Bonus Points
- Air Miles
- Bonus Dollar reward Programs
- Cash Back
- Travel Programs
- Insurance Coverage
- Some detriments
- High-Interest Rates
- Hidden Fees
- It's NOT money you necessarily have


## Making Purchases

Planned Purchases - It is always good form to make planned and smart money decisions. Buying things on a whim or impulse is how people get themselves into debt troubles.

On average Canadians owe $\$ 1.71$ for every $\$ 1$ of disposable income! That is not good...
Savings vs Borrowing - these can both be beneficial, savings allows you to pay without going into debt, but it isn't always possible to save the quantity you need. Borrowing works if they offer you a low/no interest rate

Good Debt - Mortgages, Car loans (Low-Interest), University/College Loans, (Life Investments)
Bad Debt - Payday Loans, credit card, high interest rate borrowing (don't buy it if you can't afford it)

## Section 4.2 - Practice Problems

Given the information provided, solve for Interest

1. $P=\$ 2500 \quad r=12 \% \quad t=2 y r s \quad I=$ ?
2. $P=\$ 4200 \quad r=3 \% \quad t=5$ yrs $\quad I=$ ?
3. $P=\$ 12250 \quad r=5 \% \quad t=6$ mnths $I=$ ?
4. $P=\$ 20 \quad r=28 \% \quad t=6 y r s \quad I=$ ?

Given the information provided, solve for the missing value
5. $P=? \quad r=4.5 \% \quad t=4 y r s \quad I=\$ 150.30$
6. $P=\$ 1800 \quad r=? \quad t=4$ mnths $\quad I=\$ 12$
7. $P=\$ 2500 \quad r=$ ? $t=5$ yrs $\quad I=\$ 375$
8. $P=\$ 1250000 \quad r=8 \% \quad I=\$ 300000 t=$ ?
9. What amount will an account have after 2 years, if $\$ 7500$ is invested at an annual rate of $8 \%$ compounded annually?
10. An investment opportunity of $\$ 50000$ for 10 years has two options: the first pays $7 \%$ compounded annually, the second pays $6.8 \%$ compounded monthly. Which is the belter investment, and by how much?
11. Do some research.
a. Pick a financial institution in Victoria (Bank or Credit Union)
b. Find out as much information as you can about:

- Fees
- Types of accounts
- Debit Card Procedures
- Pertinent Need to Know Info

12. Do some research.
a. Pick a credit card (Company and Type of Card)
b. Find out as much information as you can about:

- Interest Rates
- Introductory Limits
- Bonus Programs

