



DEPARTMENT OF EDUCATION

GRADE 12 MATHEMATICS B

12.2: MANAGING MONEY 2



FODE DISTANCE LEARNING



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PAPUA NEW GUINEA



GRADE 12

MATHEMATICS B

UNIT MODULE 2

MANAGING MONEY 2

TOPIC 1: INTEREST AND INFLATION

TOPIC 2: CONSUMER CREDIT

TOPIC 3: INVESTMENTS

TOPIC 4: INSURANCE



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MR. DEMAS TONGOGO
Principal-FODE



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Papua New Guinea

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SECRETARY'S MESSAGE

Achieving a better future by individuals students, their families, communities or the nation as a whole, depends on the curriculum and the way it is delivered.

This course is part and parcel of the new reformed curriculum – the Outcome Base Education (OBE). Its learning outcomes are student centred and written in terms that allow them to be demonstrated, assessed and measured.

It maintains the rationale, goals, aims and principles of the National OBE Curriculum and identifies the knowledge, skills, attitudes and values that students should achieve.

This is a provision of Flexible, Open and Distance Education as an alternative pathway of formal education.

The Course promotes Papua New Guinea values and beliefs which are found in our constitution, Government policies and reports. It is developed in line with the National Education Plan (2005 – 2014) and addresses an increase in the number of school leavers which has been coupled with a limited access to secondary and higher educational institutions.

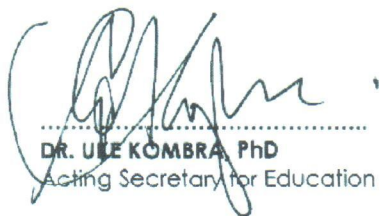
Flexible, Open and Distance Education is guided by the Department of Education's Mission which is fivefold;

- to facilitate and promote integral development of every individual
- to develop and encourage an education system which satisfies the requirements of Papua New Guinea and its people rate
- to establish, preserve, and improve standards of education throughout Papua New Guinea
- to make the benefits of such education available as widely as possible to all of the people
- to make education accessible to the physically, mentally and socially handicapped as well as to those who are educationally disadvantaged

The College is enhanced to provide alternative and comparable path ways for students and adults to complete their education, through one system, many path ways and same learning outcomes.

It is our vision that Papua New Guineans harness all appropriate and affordable technologies to pursue this program.

I commend all those teachers, curriculum writers and instructional designers, who have contributed so much in developing this course.



DR. ULE KOMBRA, PhD
Acting Secretary for Education



UNIT 2: MANAGING MONEY 2

INTRODUCTION

You have already studied many aspects of money management. That is the use of percentages which is very common in finance. In this unit we will look at the concept of interest, where percentages are particularly important, loan and credit facilities that are available to individuals. We will also study investment opportunities which are on market and the measures you can take to protect your business, property, assets, life and household items through insurance covers.

It gives basic understanding of the application of money in our everyday life and the realistic use of money. That is money is the source of livelihood today and we must understand how to make money, use money and save money properly.

Clear examples have been set to guide you and to help you to work through the problems step by step. You will need a scientific calculator to do all the calculations therefore find one to use to make your calculations easy.



LEARNING OUTCOMES

On successful completion of this module, students will be able to:

- calculate compound interest for various compounding periods
- define and calculate inflation, appreciation and depreciation
- define personal loans and credit cards
- calculate hire-purchase
- define flat rate interest loan
- construct a mortgage and housing loan schedule repayment
- identify and calculate types of service fees and charges
- identify different types of investments
- calculate the profit and investment value of real estate and stock markets
- calculate dividends of chosen stocks and on the sale of chosen properties
- identify the different types of insurances, policies and premium payments
- calculate returns over a given of time
- use simple manipulation of financial formulas



Time Frame

This unit should be completed within 10 weeks.

If you set an average of 3 hours per day, you should be able to complete the unit comfortably by the end of the assigned week.

Try to do all the learning activities and compare your answers with the ones provided at the end of the unit. If you do not get a particular exercise right in the first attempt, you should not get discouraged but instead, go back and attempt it again. If you still do not get it right after several attempts then you should seek help from your friend or even your tutor. Do not pass any question without solving it first.

12.2.1 INTEREST AND INFLATION

Money is not free to borrow. People can always find a use for money, so it costs to borrow money. How much does it cost to borrow money? Different places charge different amount at different times! But they usually charge this way, for example when you borrow K2000 from the bank, the bank says “10% per annum Interest “. So to borrow the K2000 for 1 year will cost;

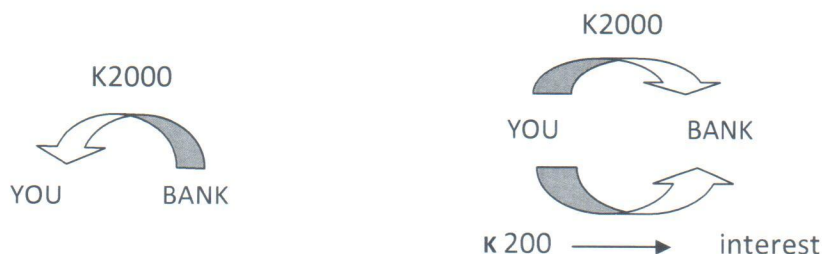
10% of K2 000

$$= \frac{10}{100} \times \text{K2 000}$$

$$= \text{K200}$$

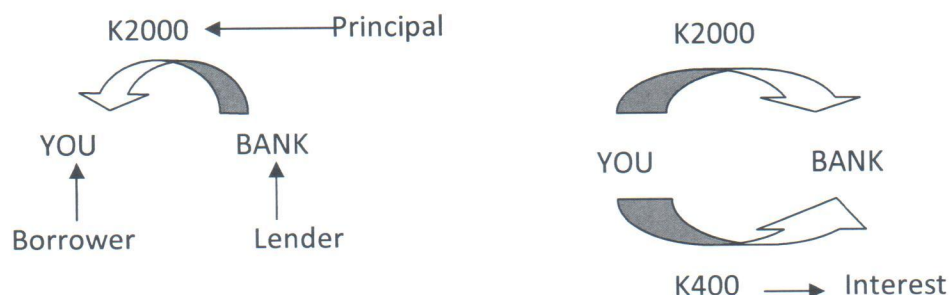
In this case the “Interest” is K200, and the Interest Rate is 10% (but people often say “10% Interest “without saying “Rate”.

Now you will have to pay back the original K2, 000 after one year, so this is what happens:



You borrow K2000, but you have to pay back K2200. This is the idea of interest..... paying for the use of money.

Note: We are showing a full year loan but banks often want you to pay back the loan in small fortnightly or monthly amounts, and they charge extra fees too. There are special **words** used when borrowing money, as shown here:



You are the **borrower**, the bank is the **lender**, K2000 is the **Principal**, and K200 is the **Interest**. The important part of the word “Interest” is inter – meaning between (you see inter – in the words like interior and interval), because the interest happens between the start and the end of the loan.

Interest simply means an amount of money paid to the lender for the use of money (as a percent, or an amount)

12.2.1.1 Percentage, Simple Interest and Compound interest

Interest rate is usually expressed as a percentage. Most calculation of interest involve per cent or percentage, therefore we will start with revision on percentage change.

A **percentage change** is a way to express a change in a variable. It represents the change between the old value and the new one.

Percent means part of 100. So 9% means 9 parts of 100 or $\frac{9}{100}$.

Using percentages to calculate the value of an increase is helpful because it relates the size of the increase to the original value.

Percentage increase

An increase of 4% in a number means that if the number is represented by 100, the increase is 4 and the new number is 104. The ratio of the new number to the old number is 104: 100.

The multiplying factor for a percentage increase of $r\%$ is $\left(1 + \frac{r}{100}\right)$

To find the increased quantity we multiply by the multiplying factor.

**Example 1**

The price of an item is increased by 6%. If the item costs K8.50 before the increase

- a. How much has the price of the item increased?

Solution: Increase $\frac{6}{100} \times 8.50 = 0.51$

The increase is 51toea.

- b. What is the multiplying factor for this increase?

The multiplying factor for this increase is $100\% + 6\% = 106\% = \frac{106}{100} = 1.06$

- c. What is the price after the increase?

By adding cost price and the increase

$$\begin{aligned}\text{Price after the increase} &= 8.50 + 0.51 \\ &= 9.01\end{aligned}$$

Or use the multiplying factor; multiply 8.50 with the factor for increase which is 1.06

$$\begin{aligned}\text{Price after the increase} &= 8.50 \times 1.06 \\ &= 9.01\end{aligned}$$

Example 2

An increase of 5% in salaries makes the wage bill for a business K55 000 per week.

- a. What was the wage bill before the increase?

If 100% represents the wage bill before the increase then 105% represents the wage bill after the increase.

$$\begin{aligned}\text{Old wage bill} &= \frac{100}{105} \times 55 \\ &= \text{K}52\,380.95\end{aligned}$$

- b. What was the amount of the increase?

$$\text{Amount of increase} = 5\% \text{ of } 52\,380.95$$

$$\begin{aligned}&= \frac{5}{100} \times 52\,380.95 \\ &= \text{K}2\,619.05\end{aligned}$$



Percentage decrease

The multiplying factor for a percentage decrease of $r\%$ is $\left(1 - \frac{r}{100}\right)$

To find the decreased quantity we multiply by the multiplying factor.

Example 3

When a sum of money is decreased by 20% it becomes K40. What was the original sum?

- a. If 100% represents the original sum then the sum after the decrease of 20% is represented by 80%. Therefore

Method 1

$$\begin{aligned}\text{Original sum} &= \frac{100}{80} \times 40 \\ &= \text{K}50\end{aligned}$$

Method 2

Let x = original sum

Factor for decrease = $100\% - 20\% = 80\%$ which gives $\frac{80}{100} = 0.8$

$$\text{Original sum} = \frac{\text{the decreased amount}}{\text{Factor for decrease}}$$

$$\begin{aligned}x &= \frac{40}{0.8} \\ &= \text{K}50\end{aligned}$$

Example 4

A television has increased in price from K495 to K545. What is the percentage increase in price?

The increase in price is $\text{K}545 - \text{K}495 = \text{K}50$

The original price is K545.

We can substitute these values in;

$$\begin{aligned}\text{Percentage increase} &= \frac{\text{Increase in Kina}}{\text{Original price}} \times 100 \\ &= \frac{50}{545} \times 100 \\ &= \text{K}9.17\end{aligned}$$

**LEARNING ACTIVITY 12.2.1.1a****20 minutes**

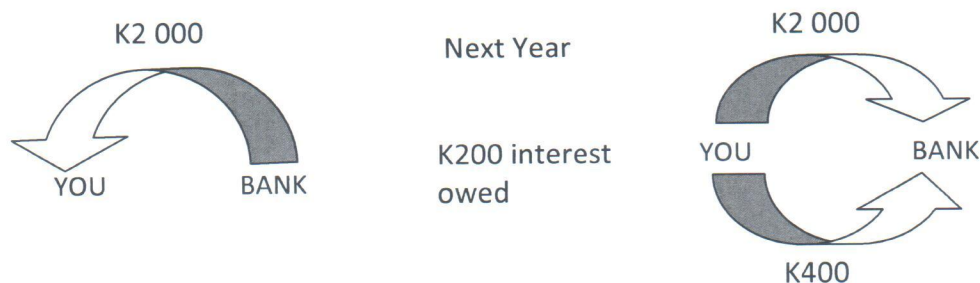
1. Give the multiplying factor for:
 - a. An increase of
 - i) 5%
 - ii) 10%
 - iii) 29%
 - b. A decrease of
 - i) 8%
 - ii) 15%
 - iii) 30%
2. The retail price of all items in a store has been reduced by 20% at the end of year sale.
 - a. If the price of an item before the sale was K24.50, what is its price at the sale?
 - b. An item is priced at K67.20 at the sale. What was the original retail price?
3. At a sale the price of long trousers is reduced by 30%.
 - a. If the sale price is K150, what was the original price?
 - b. If a customer was offered a further 20% discount from the already reduced price:
 - i) What will the customer pay
 - ii) What is the customer's percentage reduction from the original price?



Simple Interest

You have studied simple interest in either grade 9, 10 or 11 so we will briefly look at simple interest as a revision.

Let us say that the K2000 you borrowed is to be paid within the 2 years period. If the bank charges 10% s pa simple Interest then you pay another 10% for the extra year.



You will pay interest of $(K2\ 000 \times 10\%) \times 2\ \text{years} = K400$

This is how simple interest works. You pay the same amount of interest every year.

Now let us take an example; Fred borrows K3 000 for three years at 10%pa simple interest.

$$\begin{aligned}\text{Simple Interest} &= K3\ 000 \times 10\% \times 3\ \text{years} \\ &= K300 \times 3\ \text{years} \\ &= K900\end{aligned}$$

Fred will pay a total amount of $K3\ 000 + K900 = K3\ 900$ after 3 years

Simple interest is calculated on the initial amount borrowed or invested (known as principal) for the entire term of the loan. A simple interest rate is sometimes referred to as **flat interest rate**.

Typical situations where simple interest is charged are;

1. Savings account
2. Fixed term deposit accounts
3. Government bonds
4. Company debentures
5. Hire purchase agreements
6. Bridging finances



The Simple Interest Formula

Let us consider K1500 invested at 10% per annum simple interest for 5 years. The annual interest credited to the account each year would be;

$$10\% \text{ of K1500} = \text{K150}$$

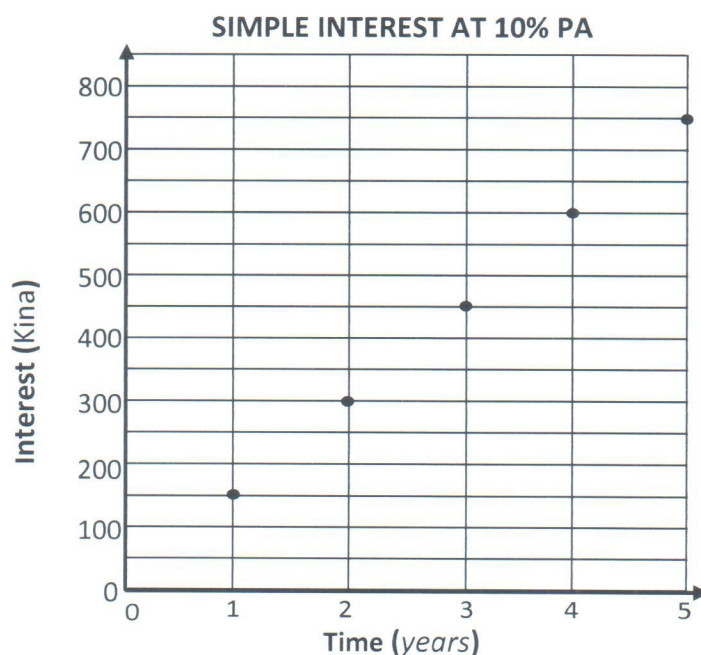
After two years the accumulated interest would be $2 \times \text{K150} = \text{K300}$

After three years the accumulated interest would be $3 \times \text{K150} = \text{K450}$

After four years the accumulated interest would be $4 \times \text{K150} = \text{K600}$

After five years the accumulated interest would be $5 \times \text{K150} = \text{K750}$

A graph of interest paid in kina against time in years shows that there is a linear relationship between interest paid and time.



We can see that the points on the graph form a straight line. Simple interest is sometimes referred to as straight – line interest or flat rate interest.

To generalize, after T years the amount of interest accumulated would be $T \times \text{K150}$

We can then derive from this generalization the rule of formula for calculating interest as;

$$\text{Interest} = \text{K1500} \times 10\% \times 5 \text{ years}$$

$$I = \text{Principal} \times \text{rate} \times \text{time}$$

Therefore simple interest can be calculated using the formula;

$$I = Prt$$

Where **P** is the principal, **r** is the rate of interest expressed in decimal and **t** is the time in years.



Using the formula,

$$\begin{aligned} I &= Prt \\ &= K1500 \times 10\% \times 5 \text{ years} \\ &= K1500 \times 0.1 \times 5 \\ &= K750 \end{aligned}$$

Example 5

Mea borrowed K4 000 for 2 years at 12% per annum interest, how much interest is this?

$$\begin{aligned} I &= Prt \\ I &= K4\,000 \times 12\% \times 2 \text{ years} & \text{Note. } 12\% = \frac{12}{100} = 0.12 \\ I &= K4\,000 \times 0.12 \times 2 \\ I &= K960 \end{aligned}$$

Mea pays K4000 plus the K960 interest which is equal to K4960 at the end of 2 years.

Transposing the simple interest formula to find the principal (P), interest rate(r) or time(t).

If we know any three of the quantities **I**, **P**, **r** and **t** then it is possible to find the fourth quantity. To do this we can transpose the simple interest formula $I = Prt$ to make **P**, **r** or **t** the subject.

To make **P** the subject, divide both sides of the formula by **rt**.

$$I = Prt \longrightarrow \boxed{P = \frac{I}{rt}}$$

To make **r** the subject, divide both sides of the formula by **Pt**.

$$I = Prt \longrightarrow \boxed{r = \frac{I}{Pt}}$$

To make **t** the subject, divide both sides of the formula by **Pr**.

$$I = Prt \longrightarrow \boxed{t = \frac{I}{Pr}}$$

**Example 6**

K700 is invested for 4 years. At the end of this time the simple interest amounts to K420. What was the rate of interest charged for this period?

$$P = K700, I = K420, t = 4 \text{ years}$$

$$\text{Substituting in } r = \frac{I}{Pt}$$

$$r = \frac{K420}{K700 \times 4}$$

$$r = \frac{K420}{K2800} \\ = 0.15 \text{ or } 15\%$$

Therefore, the rate of interest charged is 15%.

Example 7

A total of K108 is paid on an amount that has been invested for 2 years at 4% pa simple interest. What was the principal amount invested?

$$I = K108, r = 4\%, T = 2 \text{ years}$$

$$\text{Substituting in } P = \frac{I}{rt}$$

$$P = \frac{K108}{0.04 \times 2}$$

$$P = K1350$$

Therefore, the principal amount invested was K1350.

Example 8

An amount of K3000 was invested at 10% pa simple interest over a period of time which gained an interest amount of K1200. How long has this money been invested?

$$P = K3000, r = 10\%, I = K1200$$

$$\text{Substituting in } t = \frac{I}{Pr}$$

$$t = \frac{K1200}{K3000 \times 0.1}$$

$$t = \frac{K1200}{K300}$$

$$t = 4 \text{ years}$$

The money has been invested in the account for 4 years.

**Learning Activity 12.2.1.1b****20 minutes**

Follow the examples given carefully and attempt the questions in the exercise below.

1. Work out the amount of simple interest for the following:

- a. K800 invested for 1 year at 6% pa.

- b. K1500 invested for 6 years at 11% pa.

- c. K2000 invested for 10 years at 15% pa.

2. Calculate the simple interest payable if:

- a. K15 000 is borrowed for 8 years at 5% pa.

- b. K800 is borrowed for 18 months at 8.5% pa.

- c. K50 000 is borrowed for 4 years at 7.25% pa



3. Calculate the principal if:

- a. K600 is paid in interest in to an account over an investment 3 years at 5% pa.
- b. The simple interest is K432 on money invested for 2 years at 9% pa.
- c. The simple interest is K40 on money invested for 1 year at 10% pa.

4. Find the time (term) if:

- a. A loan of K48 000 is borrowed at a simple interest rate of 7% accumulates K4 896 in interest.
- b. K4 200 to be the simple interest on K6000 invested at 10%pa.
- c. K8 000 invested at 8.95% pa simple interest accumulates an interest of K1 390.

5. Find the interest rate per annum if:

- a. K420 is the interest on an investment of K700 for 5 years.



- b. A loan of K8 500 over 3 years is charged a total of K1963.50 in interest.
- c. A fixed term deposit for 3 months pays K81.78 on an initial investment of K5640.

Compound Interest

With simple interest, the principal is always the same, however long the time.

In the case of **compound interest**, the principal earns interest periodically, e.g. yearly, monthly, half- yearly, quarterly, fortnightly or even daily.

The interest earned at the end of each time period is added to the principal and the next interest is calculated using the principal plus the interest. With compound interest you earn interest on the interest. That is, you work out the interest for the first period, add it to the total, and then calculate the interest for the next period, and so on.

Consider an investment of K2000 invested in an account that pays an interest of 10% pa compounded annually.

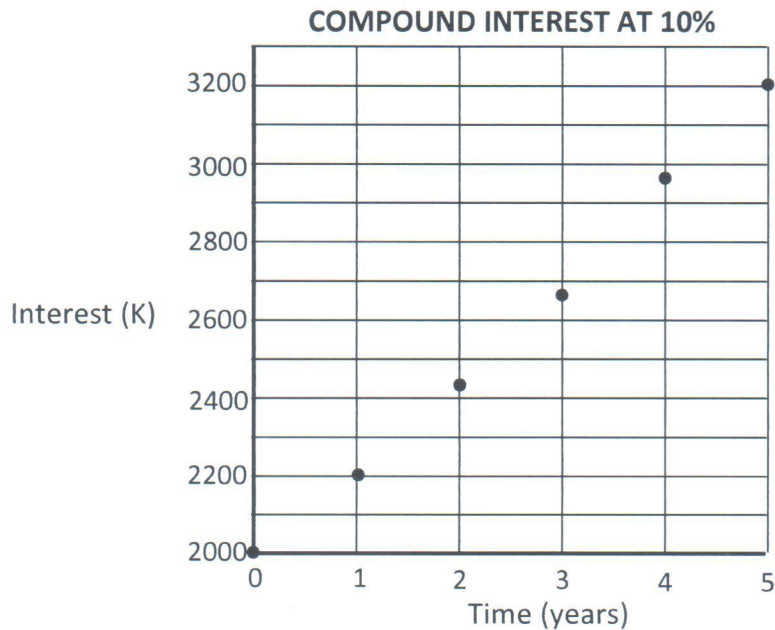
Compounded annually means that interest is calculated after each year and this interest is then added to the principal making the principal bigger to accumulate interest in the following year.

After the first year	Interest paid = 10% of K2000 = K200 Amount in the account = K2000 + K200 = K2200
After the second year	Interest paid = 10% of K2200 = K220 Amount in the account = K2200 + K220 = K2420
After the third year	Interest paid = 10% of K2420 = K242 Amount in the account = K2420 + K242 = K2662
And so on	

From the calculation we can see that the amount is increasing each year and the interest also increases.



Graphing the amount (K) in the account against time (years) over five years clearly show that the points on the graph are not in straight line. This type of graph is called exponential graph.



Example 1

K2000 is invested for 3 years at 7% interest per annum compounded annually.

Find the amount K2000 will grow to after three years.

From the information given above we know that;

Principal (P) = K2000, Rate (r) = 7% = $7 \div 100 = 0.07$, Interest = I, Period = n = 3 years

To find the total amount of money earned at the end of three years, you follow the working out shown below

Time(years)	Working	Total balance	Interest at the end of year
Start of 1st year		K2000	$\frac{7}{100} \times K2000 = K140$
Start of 2nd year	K2000 + K140	K2140	$\frac{7}{100} \times K2140 = K149.80$
Start of 3rd year	K2140 + K149.80	K2289.80	$\frac{7}{100} \times K2289.80 = K160.29$
Start of 4th year	K2289.80 + K160.29	K2450.09	

Notice that the total amount of money earned at the end of 3 years is K2450.09.



To determine the interest earned at the end of three years, just subtract as shown.

$$I = \text{Total amount} - \text{initial principal}$$

$$I = K2450.09 - K2000.00 = K450.09$$

Example 2

Kea invested K 5400 at 15% pa compounded monthly for 4 months. How much did he have at the end of four months?

There are two ways of working out the answer;

1. You use the simple interest formula for each period and add the interest to the total to calculate the next principal.

For each month, $r = 15\%$ and $n = \frac{1}{12}$, so using $I = Prt$

Time	Working	Total Balance	Interest at the end of each months
Start of 1 st month		K5 400	$K5\ 400 \times 0.15 \times \frac{1}{12} = 67.50$
Start of 2 nd month	$K5\ 400 + K67.50$	K5 467.50	$K5\ 467.50 \times 0.15 \times \frac{1}{12} = 68.34$
Start of 3 rd month	$K5\ 467.50 + K68.34$	K5 535.84	$K5\ 535.84 \times 0.15 \times \frac{1}{12} = 69.20$
Start of 4 th month	$K5\ 535.84 + K69.20$	K5 605.04	$K5\ 605.04 \times 0.15 \times \frac{1}{12} = 70.06$
Start of 5 th month	$K5\ 604.04 + K\ 70.06$	K5 675.10	

The amount at the end of the fourth month and the start of the 5th month is K 5675.10

Interest earned = Amount after 4 months – initial Principal

$$= K5\ 675.10 - K5\ 400$$

$$= K275.10$$

2. You can use the percentage increase method to get the new principal after each period.



Each month the amount increases by $15\% \div 12 = 0.00125 = 1.25\%$

Therefore each month the principal is 101.25 % of the previous principal.

Amount after one month = 101.25% of K5 400

$$= 1.0125 \times \text{K5 400}$$

$$= \text{K5 467.50}$$

Amount after two months = 101.25% of K5 467.50

$$= 1.0125 (\text{K5 467.50})$$

$$= \text{K5 535.84}$$

Amount after three months = 101.25% of K5 535.84

$$= 1.0125(\text{K5 535.84})$$

$$= \text{K5 605.04}$$

Amount after four months = 101.25% of K5 605.04

$$= 1.0125(\text{K5 605.04})$$

$$= \text{K5 675.10}$$

So Kea's investment earns K5 675.10 after four months, whichever method you use to work it out. The total amount of interest is $\text{K5 675.10} - \text{K5 400} = \text{K275.10}$.

So you can see that the same problem has been worked out in two different ways in example 5 to come up with the same answer. A much easier way is to use a rule which is called the compound interest formula.

The compound interest formula

We can use the compound interest formula to find the total amount (A) when we know the principal (P), compound interest at r% for a term of n periods.

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

A is the amount after n periods

P is the principal which is the initial value or amount invested

r is the interest rate % per period

n is the number of periods



Using the compound interest formula

Use the compound interest formula to calculate the amount earned for an investment of K5000 at 6.5% p.a compounding yearly for 5 years. Also find the interest earned after 5 years.

From the information, we know the following;

i) $P = \text{K}500, r = 6.5\% = 0.065, n = 5$

Using the formula you substitute the numbers into the formula and then calculate

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

$$A = 5\,000(1 + 0.065)^5$$

$$A = \text{K}5\,000 (1.065)^5$$

$$A = \text{K}5\,000 (1.370086663)$$

$$A = \text{K}6\,850.43$$

ii) Interest earned after 5 years = $\text{K}6\,850.43 - \text{K}5\,000 = \text{K}1850.43$

Compounding Periods

Compounding periods is not always calculated per year, it could be, half-yearly, quarterly, monthly, fortnightly or daily.

You must read the question carefully and work out the interest rate per period if interest rate is given per annum.

Let us look at some examples of compounding periods where interest rates are given per annum.

Compounding Period – Yearly (or annually)

If K2000 is invested for 3 years at 7% interest per annum compounded annually.

- i) What is the total amount after three years?
- ii) Calculate the interest earned.

Solution:

The compounding period is $n = 3$ and the interest rate is 7% pa

The working out using the formula will be: $P = \text{K}2\,000, r = 7\%, n = 3$



Substituting in the formula: $A = P(1 + r)^n$

$$A = K2\,000(1 + 7\%)^3$$

$$A = K2\,000(1 + 0.07)^3$$

$$A = K2\,000(1.07)^3$$

$$A = K2\,000(1.225043)$$

$$A = K2\,450.09 \quad (\text{round answer to two decimal places})$$

The amount after 3 years is K2 450.09

i) The interest earned = Accumulated amount – initial amount

$$= K2\,450.09 - 2\,000$$

$$= K450.09$$

Compounding Period – Half yearly

If K2 000 is invested for 3 years at 7% interest per annum compounded half – yearly, the compounding period is 2 times in a year so $2 \times 3 \text{ years} = 6$, therefore $n = 6$. The interest rate is 7% p.a but compounding period is half- yearly so $7\% \div 2 = 3.5\%$. Therefore, the interest rate used in this particular situation will be 3.5%.

Solution:

The working out using the formula will be;

i) $P = K2\,000$, $r = 3.5\%$, $n = 6$

Substituting in the formula $A = P(1 + r)^n$

$$A = K2\,000(1 + 3.5\%)^6$$

$$A = K2\,000(1 + 0.035)^6$$

$$A = K2\,000(1.035)^6$$

$$A = K2\,000(1.229255326)$$

$$A = K2\,458.51 \quad (\text{answer rounded to two decimal places})$$

The amount after 3 years is K2 458.51



$$\begin{aligned}\text{ii) The interest earned} &= \text{Accumulated amount} - \text{initial amount} \\ &= \text{K2 458.51} - \text{K2 000} \\ &= \text{K458.51}\end{aligned}$$

Compounding Period – Quarterly

If K2 000 is invested for 3 years at 7% interest per annum compounded quarterly, the compounding period is 4 times in a year. So $4 \times 3 \text{ years} = 12$, therefore $n = 12$. The interest rate is 7% p.a. but compounding period is quarterly so $7\% \div 4 = 1.75\%$. Therefore, the interest rate used in this particular situation will be 1.75%.

The working out using the formula will be;

$$\text{i) } P = \text{K 2000}, r = 1.75\%, n = 12$$

Substituting in the formula $A = P(1 + r)^n$

$$A = \text{K2 000}(1 + 1.75\%)^{12}$$

$$A = \text{K2 000}(1 + 0.0175)^{12}$$

$$A = \text{K2 000}(1.0175)^{12}$$

$$A = \text{K2 000}(1.231439315)$$

$$A = \text{K2 462.88} \quad (\text{round answer to two decimal places})$$

The amount after 3 years is K2 462.88

$$\begin{aligned}\text{ii) The interest earned} &= \text{Accumulated amount} - \text{initial amount} \\ &= \text{K2 462.88} - \text{K2 000} \\ &= \text{K462.88}\end{aligned}$$

Compounding Period – Monthly

If K2 000 is invested for 3 years at 7% interest per annum compounded monthly, the compounding period is 12 times in a year. So $12 \times 3 \text{ years} = 36$, therefore $n = 36$. The interest rate is 7% p.a. but compounding period is monthly so $7\% \div 12 = 0.5833\%$. Therefore, the interest rate used in this particular situation will be 0.5833%.

The working out using the formula will be;

$$\text{i) } P = \text{K2 000}, r = 0.5833\%, n = 36$$



Substituting in the formula $A = P(1 + r)^n$

$$A = K2\,000(1 + 0.5833\%)^{36}$$

$$A = K2\,000(1 + 0.005833)^{36}$$

$$A = K2\,000(1.005833)^{36}$$

$$A = K2\,000(1.232910878)$$

$$A = K2\,465.82 \quad (\text{round answer to two decimal places})$$

The amount after 3 years is K2 465.82

ii) The interest earned = Accumulated amount – initial amount

$$= K2\,465.82 - K2\,000$$

$$= K465.82$$

Your final answer should be rounded to two decimal places because we are dealing with money.

Example 3

Kea invested K5 400 at 15% pa compounded monthly for 4 months. How much did he have at the end of four months?

i) $P = K5400, r = 15 \div 12 = 1.25\%, n = 4$

Substituting in the formula $A = P(1 + r)^n$

$$A = K5\,400(1 + 1.25\%)^4$$

$$A = K5\,400(1 + 0.0125)^4$$

$$A = K5\,400(1.050945337)$$

$$A = K5\,675.10$$

The amount after 4 months is K5 675.10

ii) The interest earned = Accumulated amount – initial amount

$$= K5\,675.10 - K5\,400$$

$$= K275.10$$

Similar approach is used to calculate the amount at the end of a given period if the interest rate is given per annum and the compounding period is fortnightly or daily.



If the interest rate in per cent per annum is compounded;

- Annually – the compounding period is 1
- Half-yearly – the compounding period is 2
- Quarterly – the compounding period is 4
- Monthly – the compounding period is 12
- Fortnightly- the compounding period is 26 and so on.

Example 4

For an investment of K6 000 at 9% pa compounded quarterly for $1\frac{1}{2}$ year, calculate the

- a. The amount after one and half year.

Solution:

$P = \text{K6 000}$, $R = 9\% \text{ p.a.} = 0.09$, quarterly Interest rate $= 0.09\% \div 4 = 0.0225\%$, $n = 6$
Compounding period is quarterly so $1\frac{1}{2} \times 4 = 6$, the number of time period in one and half year is 6.

Substituting in the formula $A = P(1 + r)^n$

$$A = \text{K6 000} \left(1 + \frac{0.0225}{100}\right)^6$$

$$A = \text{K6 000} (1 + 0.0225)^6$$

$$A = \text{K6 000} (1.0225)^6$$

$$A = \text{K6 000} (1.142825442)$$

$$A = \text{K6 856.9}$$

- b. Total interest earned after $1\frac{1}{2}$ year $= \text{K6 856.95} - \text{K6 000} = \text{K856.95}$

Example 5

Let's say K5 400 is invested at the interest rate of 15% per annum for 2 years to be compounded monthly. Find the amount after 2 years.

Solution:

Initial Value (P) is K5 400, rate is 15% per annum but the interest is added to the principal every month. So monthly interest rate (r) is $= 15\% \div 12 \text{ months} = 1.25\%$.

Number of compounding periods (n) is $12 \text{ months} \times 2 \text{ years} = 24$

$P = \text{K5 400}$, $r = 1.25\%$, $n = 24$



Using the formula:

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

$$A = K5\,400(1 + 1.25\%)^{24}$$

$$A = K5\,400(1.0125)^{24} \quad (\text{use your scientific calculator})$$

$$A = K5\,400(1.34735105)$$

$$A = K7\,275.6956$$

$$A = K7\,275.70 \quad (\text{rounded to 2 decimal places})$$

You may use any of the three methods above to work out your answers but using a compound interest formula makes calculation easier.

Example 6

Let us look at Kea's investment of K5 400 at 15% p.a. compounded monthly for four months and how much interest he earned after 4 months using the compound interest formula.

Solution:

$$P = K5\,400, r = 15\% \text{ pa so the monthly rate is } \frac{15}{12} = 1.25\%, n = 4.$$

$$\text{Now you can substitute to the } A = P(1 + r)^n$$

$$A = K5\,400(1 + 1.25\%)^4$$

$$A = K5\,675.10$$

$$\text{Interest earned after 4 months} = \text{Amount after 4 months} - \text{initial Principal}$$

$$= K5\,675.10 - K5\,400$$

$$= K275.10$$

Example 7

Calculate the amount accrued and the amount of interest earned for an investment of K1 500 at 7.8% p.a. compounded fortnightly for a year.

Solution:

a. Amount accrued:

$$A = K1\,500(1.003)^{26}$$

$$A = K1\,500(1.080996427)$$

$$A = K1\,621.49$$

b. Interest earned = K1 621.49 – K1 500 = K121.49



If we know any three of the quantities **A**, **P**, **r** and **t** then it is possible to find the fourth quantity. To do this we can;

Transposing the compound interest formula

The formula can be transposed to give;

$A = P(1+r)^n$ Find the amount (A) when we know the principal, rate and period.

$P = \frac{A}{(1+r)^n}$ Find the principal (P) when we know the amount, rate and period.

$r = \left(\frac{A}{P}\right)^{\frac{1}{n}} - 1$ Find Interest rate (r) when we know the amount, principal and period.

$N = \ln\left(\frac{A}{P}\right) \div \ln(1+r)$ Find the number of period (n) when we know the amount, principal and rate.

Note: Rate is easier to use as a decimal.

Example 8

Find the initial amount (P) for an investment which amounted to K11, 446 after 3 years at an interest rate of 10% p.a.

Solution: $A = K11\ 446$, $r = 10\% = 0.1$ $n = 3$ years, substitute to find the principal

$$P = \frac{A}{(1+r)^n}$$

$$P = \frac{11\ 446}{(1+0.1)^3}$$

$$P = K8\ 599.55$$

Example 9

K20 000 invested at the interest rate of 8% p.a. compounding annually amounts to K35 000. Find how many years the money was invested?

Solution:

$$n = \ln\left(\frac{A}{P}\right) \div \ln(1+r)$$

$$n = \ln\left(\frac{K35\ 000}{K20\ 000}\right) \div \ln(1+0.08)$$

$$n = 7.27 \text{ year}$$

**Learning Activity 12.2.1.1c**

20 minutes

1. Copy and complete the spaces in the table to determine the final value of K2400 invested at 6% per annum compound interest for three years.

a.

Time	Working	Total balance	Interest at the end of year
Start of 1 st year		K2400	$\frac{6}{100} \times K2\ 400 = K144$
Start of 2 nd year	K2 400 + K144	a)	$\frac{6}{100} \times K2\ 544 = K152.64$
Start of 3 rd year	K2 544 + K152.64	b)	c))
Start of 4th year	d)	e)	

- b. Calculate the total interest earned

2. Copy and complete the table to determine the final value of K 3600 invested at 5% pa compound interest for 4 years.

Time	Working(balance + Interest)	Total balance	Interest at the end of year
Start of 1st year		K3 600	$\frac{5}{100} \times K3\ 600 = K180$
Start of 2nd year	K3 600 + K180	K3 780	$\frac{5}{100} \times K3\ 780 = K189$
Start of 3rd year	K3 780 + K189	a) _____	b)) _____
Start of 4th year	c) _____	d) _____	e) _____

- f. Calculate the total interest earned



3. Using the compound interest formula, calculate the amount accruing after the stated period:

a. K250 is invested for 5 years at 8% p.a.

b. K4 000 is invested for 7 years at 9% p.a.

c. K1 200 is invested for 12years at 10 % p.a.

d. K2 500 is invested for 15 years at 11.5 % p.a.



4. Using the compound interest formula, work out the amount of interest earned at the end of the stated period:
- a. K5 000 is invested for 6 years at 7% p.a.

 - b. K3 500 is invested for 20 years at 9% p.a.

 - c. K8 000 is invested for 12 years at 12% p.a.
5. Using the compound interest formula; calculate the amount, when
K8600 is invested for three years at 10% p.a, if the interest is compounded
- a. Yearly
 - b. Quarterly



c. Fortnightly

d. Monthly

6. Marian invested K5 600 at 8% per annum compounded weekly. Given that the investment amounted to K6 545, for how many years was the money invested?
7. For an investment of K8 100 at 5% per annum compounded daily, the amount due is K9 410. How many years was it invested for?



12.2.1.2: Inflation, Appreciation and Depreciation

Inflation

The term inflation describes the way that prices of goods and services rise or change over time. The price of everyday goods and services tend to increase with time and this increase is called **inflation**.

In PNG the annual inflation rate is measured by the Consumer Price Index (CPI). This is calculated to represent an “average” change in cost of living and is based on the prices of a selected “basket” of goods and services including groceries, transport, housing, health and education.

When the general price level rises, each unit of currency buys fewer goods and services. Consequently, inflation reflects a reduction in the purchasing power per unit of money.

The measurement of inflation is important for many reasons. All levels of government need to take account of the effect of inflation in their financial planning, so do business houses. Some welfare payments are indexed, that is, the amount of payment is adjusted from time to time to take account of the effect of inflation. Changes in wages and salaries are sometimes linked with inflation.

Since inflation is expressed as a percentage, the calculations of inflated prices require same idea as compound interest.

That is; price after n years = original price $\times (1 + r)^n$

Example 1

The price of petrol increases at the same rate as inflation. The inflation rate over three years is 2.5 % p.a. If petrol is K2.63 per litre now, how much will it be in two years' time?

Solution: Price after 1 year = $K2.63 \times 1.025 = K2.70$ per litre (rounded to 2 dec. places)

Price after 2 years = $2.70 \times 1.025 = K2.76$ per litre

Or using the formula: Petrol price = Original Price $\times (1 + 2.5\%)^2$
 $= K2.63 \times (1 + 0.025)^2$
 $= K2.76$

The price of petrol after 2 years is 2.76 per litre.

**Example 2**

If the inflation rate remains steady at 4% per year for the next three years, what will be the purchasing power of K100 in three years' time?

Solution:

$$P = A \times (1 + i)^n$$

$$P_{-3} = K100 \times (1 + 0.04)^{-3}$$

$$P_{-3} = K100 \times (1.04)^{-3}$$

$$P_{-3} = K88.90$$

This means that the goods that can be bought with K100 in three years' time would only cost K88.90 today.

Example 3

Ten years ago Billy built a house 6 m by 9 m with only K15, 000. Today the same size houses will cost K50, 000. If the inflation remained consistent for the ten years

- a. Find the average rate of inflation over the 10 years.

Solution:

$$K50\ 000 = K15\ 000 \times (1 + r)^{10}$$

$$1.127944873 = 1 + r$$

$$1.127944873 - 1 = r$$

$$0.1279 = r$$

(Move the decimal point 2 places to the right and write the symbol %)

$$12.79\% = r$$

$$r = 12.79\%$$

Therefore the average annual inflation rate is 12.8 %. (Round off to 1 decimal)

- b. Determine the average value of inflation on materials over the ten years

$$K50\ 000 - K15\ 000 = K35\ 000$$

Appreciation

Rarely does the value of any possession remain constant, especially during periods of inflation. Real estate (land, houses, etc) may appreciate or grow in value, compared to other assets such as vehicles and machinery which degenerate with use.

If the value of an item increases with time then the value of the item is said to have appreciated.



This usually occurs with items or properties such as house, land or paintings (art work).

The amount of change in value is expressed as a percentage of the value at the beginning of the year. When the appreciation percentage remains constant from year to year, the compound interest formula can be used.

Example 4

An allotment of land is bought for K50 000 with an expected appreciation rate of 8% per annum. How much should it sell after 2 years?

Solution

$$\begin{aligned}A &= P (1 + r)^n \\&= \text{K}50\,000 (1 + 0.08)^2 \\&= \text{K}50\,000(1.08)^2 \\&= \text{K}58\,320\end{aligned}$$

Depreciation

The value of some items decrease with time and these items are said to have depreciated. Depreciation occurs where items tend to wear out. The value of a machinery, computer equipment and motor transport etc reduce in value as time goes on i.e. they depreciate in value.

The depreciation of capital items in a business is an important consideration for both taxation purpose and future planning

Depreciation is the loss in value of item overtime

There are three types of depreciation. These are;

- Flat rate depreciation
- Reducing balance
- Unit cost depreciation

Flat rate depreciation means that an item decreases in value by the same amount each year. The amount can be a constant or a percentage of the purchase price. The reducing value of the item is called its book value.

Flat rate depreciation is sometimes called straight line depreciation because if the value is graphed against time then the graph will be a straight line

**Example 5**

A car is bought for K25 000 and used for 5 years, after which time will it be traded in for K 6000. If flat rate depreciation is applied to this car;

- Find the amount that it depreciates each year
- Draw a table that will show its value for its useful life.

Solution:

- Purchase price - trade in value = K25 000 – K11 000 = K14 000

If the car is kept for 5 years then it will depreciate a total of K 14 000 over the 5 years and since it depreciates the same amount each year, this amount will be

- Table showing the value for its useful life.

Age of Car (years)	Depreciation	Book Value
0	K2800	K25 000
1	K2800	K22 200
2	K2800	K19 400
3	K2800	K16 600
4	K2800	K13 800
5	K2800	K11 000

Example 6

Joshua bought an outboard motor for K9 500 and he is told that it will depreciate at a flat rate of 6% of the purchase price each year. He can trade the motor for the depreciated value at any time in the first 7 years.

- How much will the motor depreciate each year?

Solution:

$$6\% \text{ of K9 500} = 0.06 \times \text{K9 500} = \text{K570}$$

Therefore, the motor will depreciate by K570.00 per year.

- If he trades it in after 5 years what is his trade in value?

Solution:

$$\begin{aligned}\text{Value after 5 years} &= \text{K9 500} - (5 \times \text{K570}) \\ &= \text{K9 500} - \text{K2 850} \\ &= \text{K6 650.00}\end{aligned}$$

Therefore, after 5 years the motor will cost K6 650.00.



Reducing - balance depreciation means that an item depreciates by a constant percentage for each year of useful life.

Example 7

A speedboat was purchased for K 120 000.00 and the boat depreciates by 10% each year. Draw up a table showing the value of the boat over 6 years.

Age (yrs)	Depreciation (Kina)	Value (kina)
0		K120 000
1	10% of K120 000 = $0.10 \times \text{K120 000} = \text{K12 000}$	$\text{K120 000} - \text{K12 000} = \text{K108 000}$
2	10% of K108 000 = $0.10 \times \text{K108 000} = \text{K10 800}$	$\text{K108 000} - \text{K10 800} = \text{K97 200}$
3	10% of K97 200 = $0.10 \times \text{K97 200} = \text{K9 720}$	$\text{K97 200} - \text{K9 720} = \text{K87 480}$
4	10% of K87 480 = $0.10 \times \text{K87 480} = \text{K8 748}$	$\text{K87 480} - \text{K8 748} = \text{K78 732}$
5	10% of K78 732 = $0.10 \times \text{K78 732} = \text{K7 873.20}$	$\text{K78 732} - \text{K7 873.20} = \text{K70 858.8}$
6	10% of K70 858.80 = $0.10 \times \text{K70 858.80} = \text{K7 085.8}$	$\text{K70 858.8} - \text{K7 085.88} = \text{K63 772.92}$

The depreciation formula is very similar to the compound interest formula and it is

$$A = P(1 - r)^T$$

Where **A** stands for the value after **T** years, **P** stands for the initial cost and **r** stands for the rate of depreciation per year expressed in decimal.

Example 8 $A = \text{K120 000}$, $r = 10\%$ or 0.10 , $T = 6$ yrs

$$\begin{aligned} A &= P(1 - r)^T \\ &= \text{K120 000}(1 - 0.10)^6 \\ &= \text{K120 000} \times (0.9)^6 \\ &= \text{K63 772.92} \end{aligned}$$

Therefore after 6 years the value of the boat will be K63 772.92.

Example 8

A car bought for K35 000 depreciates by 8% per year.

- Calculate the value of the car after 2 years.
- If it is sold when its value is below K20 000, how many years will the car be kept?



Solution:

a. $P = \text{K}35\,000, r = 8\%, T = 2\text{years}$

$$\begin{aligned}\text{Value after 2 years (A)} &= \text{K}35\,000 \times (1 - 0.08)^2 \\ &= \text{K}35\,000 \times (0.92)^2 \\ &= \text{K}35\,000 \times 0.8464 \\ &= \text{K}29\,624.00\end{aligned}$$

The value of the car after two years is K29 624.00

b. To find the number of years used the formula: $N = \ln\left(\frac{A}{P}\right) \div \ln(1 + r)$

$$\begin{aligned}&= \ln\left(\frac{\text{K}20\,000}{\text{K}35\,000}\right) \div \ln(1 - 0.08) \\ &= 6.7\end{aligned}$$

Therefore, $n = 6$ years 8 months.

Unit cost depreciation

Flat rate depreciation and reducing balance depreciation depend on the life of an item expressed in years. However, **unit cost depreciation** depends on the use of an item as a measure of its depreciation in value.

(That is when the amount is calculated depending on the amount of use the item has had and not on age.)

For example, a taxi could be replaced after covering a certain number of kilometers, rather than a fixed number of years. The depreciation expense for the taxi depends on the kilometers covered by the taxi during the accounting period.

Example 9

A taxi purchased for K 24 000 depreciates at an average rate of 25 toea per kilometer driven. If the taxi is to be scrapped when it is book value of K 6000, find how many kilometers it will have travelled by that time.

Solution:

$$\begin{aligned}\text{Original cost} &= \text{K}24\,000 \\ \text{Scrap or book value} &= \text{K}6\,000 \\ \text{Depreciation rate} &= 25 \text{ toea per kilometer (K}0.25 \text{ per kilometer)} \\ \text{Now book value} &= \text{Original cost} - \text{Total depreciation} \\ \therefore \text{K}6\,000 &= \text{K}24\,000 - \text{Total depreciation}\end{aligned}$$



$$\begin{aligned}\text{Total depreciation} &= \text{K}24\,000 - \text{K}6\,000 \\ &= \text{K}18\,000\end{aligned}$$

$$\begin{aligned}\text{Distance travelled} &= \frac{\text{Total depreciation}}{\text{Depreciation rate}} \\ &= \frac{\text{K}18\,000}{0.25} \\ &= 72\,000 \text{ km}\end{aligned}$$

Hence the distance travelled is 72 000 km



Learning Activity 12.2.1.2



20 minutes

After completing the practice exercises you should now be familiar with the problems. Now you may do these questions. It may take slightly more than 20 minutes.

1. A loaf of bread at SVS costs K3.90 today. The price increases at the same rate as inflation. The rate of inflation is 6%. Find the expected price of a loaf of bread after
 - a. 2 years
 - b. 4 years
2. What price would you expect to pay for each of the following items after the number of years shown

Item	Present price	Inflation rate	Number of years	Answers
21inchTVscreen	K499	3.2	3	a.
Acer Lap top	K2200	1.8	4	b.
10kg root rice	K31.95	3.5	3	c.
No1Tea(100bags)	K7.59	4	2	d.
Ox & Palm red	K9.95	5	2	e.



3. The cost of a new Nissan Navara 4 wheel drive is K76 000.00 today. If inflation averages 2.5% per year, how much will the same model vehicle cost in 4 years?
4. An investor bought a block of land 5 years ago for K55 000 and sold it this year for K82 000. Over the five years the inflation rate has been around 3.5% each year.
- a. What is the profit as a percentage of the purchasing price?
- b. What is the value of the sales price in terms of the kina value at the time the land was bought?
- c. What is the percentage profit on the sale in terms of the Kina value at the time it is bought (percentage profit in real terms)?
5. Find the value in the following cases
- a. A K95 000 home appreciating at 11% pa over 6 years.



- b. A K390 000 penthouse appreciating at $9\frac{1}{2}\%$ pa over 3 years.
- c. A K42 000 outer suburban block of land appreciating at 8% pa over 4 years.



SUMMATIVE TASK 12.2.1



30 minutes

Part A: Multiple Choice questions

Circle the letter which corresponds to your best answer.

- Q1. K500 invested for two years at 10% compound interest p.a. becomes
- A. K600 B. K605 C. K665.50 D. K700
- Q2. The value of a machine depreciates in value by 10 % of its cost price each year. It cost K 4000 when new. Its value after 4 years will be
- A. Nothing B. K1 067 C. K2 624 D. K6 034
- Q3. The value of a bicycle depreciates by 10% of the value each year. If the price was K500 when new, what will be its value at the end of 2years?
- A. K490 B. K480 C. K405 D. K400
- Q4. K2000 invested for 2 years at 10% compound interest becomes
- A. K2 400 B. K2 420 C. K2 662 D. K6 000
- Q5. A sum of K800 amounted to K815 after 9 months at simple interest. What rate of interest was earned?
- A. $\frac{5}{24}\%$ B. $2\frac{1}{2}\%$ C. $13\frac{1}{2}\%$ D. 20%



1. A person borrows K3 000 for a period of 2 years at 12% simple interest per annum.

a. The amount of interest payable on the loan.

2. Find the simple interest for K8 000 invested for 2 years at 12% pa.

4. Find the rate percent per annum simple interest for

b. K1 200 to be the interest on K3 000 invested for 4 years



Q5. Papindo store bought a new delivery truck for K25 000 and its scrap value is K 5000. If the truck depreciates at 20% flat rate per annum:

- a. Find its yearly depreciated value.
- b. Prepare a depreciation table.
- c. Plot the book value (K, b) of the truck against its age (t years). Hence find the relation between b and t.
- d. After how many years will the truck be written off?



- Q6. A machine is bought for K 65 000 and is subject to 12% per annum reducing balance depreciation.
- Find the book value of the machinery after two years.
 - What is the total amount of depreciation after two years?
- Q7. A block of land is expected to appreciate at 10% each year. If the land was bought for K28 000, how much is it expected to be worth in 5 years' time?
- Q8. The unit cost of depreciation of a car 15 toea per kilometer.
- If the car is purchased for K43 500, find the book value of the car after it has travelled 30 000km.
 - If the car is replaced after it is driven for 120 000 km, what is the scrap value?
- Q9. If inflation remains steady at 3% per year for the next 5 years, what will be the purchasing power, in terms of today's Kina of K100 in five years?



12.2.2: CONSUMER CREDIT

There are many options available these days for people to borrow money from many different financial institutions. In this section we will look at money borrowed for personal use called **personal loan**, **credit loans** and money borrowed to buy house called **housing loan**. When borrowing money it is very important to consider the terms and conditions of the options available to you.

12.2 .2.1: Personal Loans and Credit Loans

Personal loans

These days a lot of people take out personal loans from banks, credit unions, financial institutions to meet family obligations such as bride price payments, funeral costs, or purchase cars, furniture, outboard motor, whitegoods or overseas holiday just to name a few.

Personal loans are smaller amounts, usually between K500 – K5000. They are repayable with some interest over a period of not more than three years.

A sum of money that is borrowed and is expected to be repaid back with some interest is called **personal loan**.

Types of personal loans

Personal loans are of different types and they include;

- Convertible loan
- Fixed-Rate loans
- Instalment loans
- Payday loans
- Secured loans
- Single payment loans
- Unsecured loans
- Variable- rate loans

Each loan type serves a purpose so it is important to understand how to obtain the best type of loan for your individual situation.

Convertible loans

This type of loan allows lenders the option to convert the outstanding principal of the loan into an equity position in the borrowers company which over time may be worth more.



Fixed- rate loans

Most personal loans are **fixed-rate loans**. The interest rate remains fixed, so you pay the same amount until the loan is paid in full.

Instalment loans

You borrow a set amount of money and then repay it along with interest at regular intervals over a set period. These loans typically finance homes, cars and expensive items.

Payday loans

Sometimes called **cash advances** are one of the most expensive borrowing options, with extremely high interest rates and excessive fees. They are small short- term loans secured against your pay check and are typically used for emergencies.

Secured loans

A **secured loan** is one for which the borrower has some back up source of finance or security against the loan made. For example the borrower may take a personal loan using his house as a security. If in the event that the borrower defaults (cannot repay the loan) the bank can sell the house and take the money owed to them.

Unsecured loans

An **unsecured loan** is one where there is no security; it only requires your signature. Generally unsecured loan can be made through certain financial institutions; however the interest rates are usually high.

When taking out a loan, the regular repayment amount per fortnight or month for the amount of the loan, the interest rate and term of the loan will be specified by the bank.

Normally banks and financial institutions have tables of repayment for various loans and such information is available at the enquiry counters.

Example 1

Frank took out a personal loan of K3000 over 1 year from the bank to buy furniture. The bank calculated the fortnightly repayment of K145. The application fee is K100. How much in total will Frank pay to the bank and what total interest has been charged?

Solution:

$$\text{Total paid} = K145 \times 26 + K100$$

$$= K3\,770 + K100$$

$$= K3\,870$$

$$\text{Total interest} = K3\,870 - K3\,000$$

$$= K3\,770 - K100 \text{ (Application fee not included)}$$

$$= K770$$



Reducing balance loans

This is another type of personal loan where interest is calculated daily on the outstanding balance in the borrower's bank account. The interest is added to the balance each month on the day the repayment is made. The balance will be less in the next month because payment has been made and the daily interest will be less.

This type of loan is called **reducing balance loan**.

Example 2

A borrower took out a bank loan of K6000 at 12.34% p.a over 3 years to buy furniture. The bank calculates monthly repayment of K203.30. The loan was taken out on 15th May with repayments due on the 15th each month. Show the progress of the loan over the first 3 months.

Solution: First month is 17 days (31 days - 14 days)

Daily interest rate will be $12.34\% \div 365$ days a year

$$= 0.0338\%$$

$$= 0.0338 \div 100$$

$$= 0.000338$$

The interest is calculated as simple interest

$$I = P \times r \times t$$

$$= K6\,000 \times 0.000338 \times 31$$

$$= K62.868$$

Balance on 15th June after a repayment = previous balance + interest - repayment

$$= K6\,000 + K62.87 - K203.39$$

$$= K5\,859.48$$

From 15th June to 14th July (There are 30 days.)

$$I = P \times r \times t$$

$$= K5\,859.48 \times 0.00038 \times 30$$

$$= K59.4151272$$

Therefore, the interest is K59.42

Balance on 15th July after a repayment = Previous balance + interest - repayment

$$= K5\,859.48 + K59.42 - K203.30$$

$$= K5\,715.51$$



From 15th July to 14th August (There are 31 days.)

$$\begin{aligned} I &= P \times r \times t \\ &= K5\,715.51 \times 0.000338 \times 31 \\ &= K59.887114 \end{aligned}$$

Therefore, the interest is K59.89.

$$\begin{aligned} \text{Balance on 15}^{\text{th}} \text{ August after repayment} &= \text{Previous balance} + \text{interest} - \text{repayment} \\ &= K5\,715.51 + K59.89 - K203.30 \\ &= K5\,572.01 \end{aligned}$$

You can see how the balance owing is reducing. The slight difference in the interests for July and August is simply because July has 30 days while August has 31 days.

Credit cards

A credit card allows people to purchase goods and services without paying for them on the spot. They can be used to obtain cash advances, pay bills, and make purchase over the phone or on internet.

Common credit cards used these days are Master Card, Visa, Diners club, bankcards and American Express.

Using credit card involves borrowing money from the bank for a short period of time and interests are charged in various ways. With some credit cards:

- No interest is charged if money is repaid within a specified period of time, although there is often a regular fee for using the account.
- Interest free period of up to 55 days is given. If money is not repaid on time then high interest is charged.

Terms associated with credit card, you need to be familiar with:

- Statement - a letter mailed to you showing all the transactions on your account
- Statement date - date on which your account statement is processed
- Statement cycle - the number of days from one statement to the next (about 28 to 33 days)
- Posting date - date on which a particular transaction is entered in the account
- Due date - date by which a payment must be made to the account; usually 25 days after the statement date
- Credit limit - amount of borrowing you are allowed on your account
- Available credit - amount of credit available on your card at any particular time.
- Cash advance - money withdrawn as cash from a credit card account. (a loan)
- Opening balance - amount outstanding on your account at start of the statement cycle
- Closing balance - amount outstanding on your account at the end of the statement cycle. It is calculated as follows



$$\text{Closing balance} = \text{opening balance} + \text{purchase} + \text{cash advance} + \text{interest} - \text{payment}$$

Many people consider and use credit cards as a convenient way of spending money; however, the trap of accumulating huge unpaid bills must be avoided. With high interest rates for this form of borrowing, it is difficult to get off the credit- merry -go- round if you get caught

Example 3

Study the sample Credit Card statement to answer questions 1 to 7.

Answer

- What was the opening balance? K262.18
- What was the closing balance? K902.52
- When is payment due? 13/3/14
- What is the minimum payment due? K45.00
- What is the current annual interest rate according to the statement? 21%
- What is the credit limit for this card holder? K2 500.00
- What is the average daily debit balance? K379.92

An example of a **credit card statement**

CREDIT CARD		Payment due date 13.03.2014	Opening balance 262.18
Posting Date	Description of transaction	Amount (K)	
071014	Gate way hotel	330.63	
080114	Payment received	262.18	
100114	Avis Port Moresby	124.53	
140114	Ponder Rosa	68.86	
140114	Holiday inn	132.56	
170114	Vision City	79.41	
170114	RH hyper mart	60.27	
	Credit business duty	0.62	
170114	Target shooting club	99.00	
180114	Credit charge	6.64	
CREDIT CARD	Average daily debit balance for credit charge	379.92	Closing balance K902.52
	Credit limit 2500.00	Available Credit K1 597.48	Statement date 10.02.2014
		Annual % rate 21%	Monthly % rate 1.750%
	Past due	Minimum payment due K 45.00	Date paid Amount paid



Minimum payment

This is the least amount of money you must pay by the due date on your statement. Usually it is 3% of your closing balance to the nearest kina.

Let us see how balances and minimum balances are calculated.

Example 4

Find the due date, closing balance and minimum payment due for an account with the following information on the statement. No interest has been accrued from the previous statement.

Statement date: 23 June	Opening balance: K274.45
Purchases: K79.99, K39.95	Payment: K300

Solution:

The due date is 25 days after the statement date so 25 days after 23 June is 18 July.
As there are no cash advances or interest,

$$\begin{aligned}\text{Closing balance} &= \text{opening balance} + \text{purchases} - \text{payment} \\ &= \text{K}274.45 + \text{K}79.99 + \text{K}39.95 - \text{K}300 \\ &= \text{K}94.39\end{aligned}$$

$$\begin{aligned}\therefore \text{Minimum payment due} &= 3\% \text{ of closing balance} \\ &= 0.03 \times \text{K}94.39 \\ &= \text{K}2.83\end{aligned}$$

As this is less than K10 the minimum payment due will be K10.

Example 5

Mary has a credit card with no interest - free period, no annual charge and an interest rate of 13%. In the month July, her purchases using the card were:

5 July	K290
10 July	K85
12 July	K340
25 July	K45

She received the account statement dated 30 July on the 3rd August and paid it on the 5th August. How much would she have paid?



Solution:

Date	Amount	Interest to 5th August
5 July	K290	$I = \frac{K290 \times 13 \times 25}{100 \times 365} = 0.76$
10 July	K85	$I = \frac{K85 \times 13 \times 25}{100 \times 365} = 0.76$
12 July	K340	$I = \frac{K340 \times 13 \times 23}{100 \times 365} = 2.79$
25 July	K45	$I = \frac{K45 \times 13 \times 10}{100 \times 365} = 0.16$
Totals	K760	K6.81

Mary would have to pay $K760 + K6.81 = K766.81$



Learning Activity 12.2.2.1



20 minutes

1. A loan of K10 000 over 4 years at 11.27% p.a with monthly repayment of K262.90 starting on the 20th April, repayments will be done on the 20th of each month. Show the progress of the loan over the first 3 months.



2. A borrower borrowed K7 800 over 2 years and 6 months at 11.75% p.a. with fortnightly repayment of K138.66 starting on the 12 August, repayment every 2 weeks with first on the 26 August. Show the progress of the loan over the first 3 fortnights.
3. Calculate the total paid and the interest paid for the following personal loans
- K8 500 over 3 years and 6 months with monthly repayment of K254.04, fees of K120
 - K1 300 over 1 year with fortnightly repayment of K53.36, fees K80
 - K15 000 over 6 years with fortnightly repayments of K133.08, fees of K220



d. K55 000 over 10 years with monthly repayments of K594.03, no fees

4. Calculate the due date, the closing balance and the minimum payment due for the following sets of statement information.

a. Statement date 10 th August	Opening balance	K286.74
Purchases K30.94, K344.60	Cash advance	nil
Payments K100		

b. Statement date 28 January	Opening balance	K682.10
Purchases K125.80	Cash advance	nil
Payments K500.00		

5. Jane has a credit card with no interest – free period and an interest rate of 12.5%. Her purchases in March were

1 March	Wetsuit	K 340
8 March	Scuba tank	K980
15 March	Weights	K80
22 March	Lessons	K130
25 March	Car service	K138

Jane's statement was dated 31st March, but she didn't go to pay it until 8th April.

- a. What amount due was shown on the statement?

- b. What amount was actually due on the 8th April?



12.2 2.2: Flat rate interest loans

With flat- rate loans, the rate of interest is charged on the full amount of the loan over the term of the loan, even when most of the loan has been repaid

For example a loan of K6000 taken out at a fixed interest of 9% is to be repaid over six months. Money paid out:

	Principal (K)	Interest (K)
Month 1	1 000	45
Month 2	1 000	45
Month 3	1 000	45
Month 4	1 000	45
Month 5	1 000	45
Month 6	1 000	45
Total		6 270

Each month interest of K45 is payable. This is 9% of K6000 per month

$$\begin{aligned}\text{Amount Payable per month} &= \text{K1 000} + (\text{interest}) \\ &= \text{K1 000} + 9\% \text{ of K6 000} \\ &= \text{K1 000} + \text{K45}\end{aligned}$$

In the final month, when only K1 000 remains to be paid, interest is still charged on the full amount (K6 000) of the loan.

Hire - purchase agreements (or time- payment plan)

An example of a flat rate interest loan would be the interest paid to retailers on a hire-purchase plan.

When goods are purchased and paid for by instalments, they are said to be bought through hire-purchase.

Usually the purchaser pays a deposit. The remainder of the purchase price called the **balance plus the interest** is repaid in a number of instalments. If the buyer defaults then the item is repossessed by the retailer.

**Example 4**

A woman buys refrigerator for K680. She pays a deposit of 25% and interest at 20% is paid on the outstanding balance. She pays back the balance plus interest in twelve monthly instalments. Calculate the amount of each instalment.

Solution:

$$\text{Deposit} = 25\% \text{ of K680}$$

$$= \text{K170}$$

$$\text{Balance} = \text{K680} - \text{K170}$$

$$= \text{K510}$$

$$\text{Interest} = 20\% \text{ of K510}$$

$$= \text{K 102}$$

$$\text{Total to be repaid} = \text{K510} + \text{K102}$$

$$= \text{K612}$$

$$\text{Monthly repayment} = \frac{\text{K612}}{12}$$

$$= \text{K 51}$$

In the above example 20% would be the true rate of interest if all of the outstanding was at the end of the year. However, as each instalment is paid the amount outstanding is reduced and a larger portion of each successive payment is interest. The true rate called annual percentage rate (APR) is in fact higher.

Example 5

Tina buys a table for K64 on hire-purchase. She pays no deposit but repays the loan plus interest at 10% for the whole period of the loan in quarterly instalments. What is the true rate of interest (APR)?

Solution:

$$\text{Interest} = 10\% \text{ of K64}$$

$$= \text{K6.40}$$

$$\text{Total to be paid} = \text{K64} + \text{K6.40}$$

$$= \text{K70.40}$$

$$\text{Amount of each Instalment} = \frac{\text{K7.40}}{4}$$

$$= \text{K17.60}$$



K64.00 is the balance outstanding for the first 3months

K48.00 is the balance outstanding for the next 3months

K32.00 is the balance outstanding for the next 3months

K16.00 is the balance outstanding for the final 3months

Average amount of loan for the entire year = K (64 +48 +32 +16) $\div$ 4

$$= \text{K } 40$$

As K6.40 is the interest paid on an actual loan of K40, the true rate of interest may be calculated using simple interest formula

$$\begin{aligned} R &= \frac{100 \times I}{Pt} \\ &= \frac{100 \times 6.40}{40 \times 1} \\ &= 16\% \end{aligned}$$

Therefore annual percentage rate (APR) is = 16%



Learning Activity 12.2.2.2



20 minutes

This activity is based on the work on flat-rate interest loan. Study the examples carefully before attempting the questions.

1. A woman buys a washing machine K450. She pays a deposit of K90 and she is charged 10% interest on the balance.
 - a. How much is the balance?
 - b. Calculate the amount of interest payable. Workout the balance plus interest.
 - c. If the balance and the interest is to be repaid in ten monthly instalment, work out the amount of each instalment



2. Julie buys a refrigerator for K 710. She pays no deposit and is charged 10%p.a for the full period of the loan. The loan plus interest is to be repaid in four equal instalments. Work out
- The amount of interest payable
 - The total amount to be repaid
 - The amount of each quarterly instalment
 - The average amount of the loan for the whole year
 - The true rate of the interest charged on the loan.
3. A firm buys furniture for K2 800. A deposit of 25% is paid and interest at 15% per year is charged on the outstanding balance. The balance is paid in 12 monthly installments.
- Calculate the amount deposited.
 - How much is the outstanding balance?
 - If 15% interest was charged on the outstanding, calculate the interest charged.
 - Find the total amount to be paid at the end of 12 months.
 - Calculate the amount of each installment.



12.2 2.3: Mortgages and Housing Loans

In this section we will look at some of the cost involved in buying a house using a mortgage.

Mortgage is a loan used to buy land or a house or any kind of building

There are several major differences between housing loan and personal loan but the calculation on the progress of housing loan is usually similar to personal loan.

The differences are:

- i) A housing loan is secured by a mortgage over the property being purchased, that is, the financing institution holds the title deeds to the property and can sell it to recoup their money if the buyer defaults (cannot fully meet the repayments).
- ii) With housing loan the interest rates are much lower than those for personal loans.
- iii) The cost of setting up the purchase of a house and the associated loan is much higher. The **application fee** may cost about K600 or more.
- iv) Government charge of **stamp duty** on both the loan and the transfer of property that the buyer has to pay plus **legal fees** for setting up contracts, conducting enquiries and search of documents relating to the property.

A **mortgage** is a loan advanced in order to purchase a house. If someone buying a house cannot pay out right, he /she arrange a loan called **mortgage**.

The table below shows the rate for the government charge **stamp duty** for owner occupied houses. There are different rates for investment properties, i.e. houses that are bought to rent out as an investment.

Purchase price	Stamp duty
Up to K250 000	K1.00 per K100 or part of K100
K251 000 to K500 000	K2500 + K3.50 per K100 or part of K100 over K250 000
Over K500 000	K11 250 + K3.75 per K100 or part of K100 over K500 000

Example 1

Calculate the stamp duty payable on the following prices for owner occupied home purchases:

a. K182 000

b. K296 000

c. K639 000



Solution:

- a. K1.00 per K100 means 1% (one in every hundred) so we find 1% of the price
Stamp duty on K182 000 = $0.01 \times \text{K}182\,000$
= K1 820.00

- b. K296 000 is in the range K250 000 to K500 000
Amount over K250 000 = $\text{K}296\,000 - \text{K}250\,000$
= K46 000

K3.50 per K100 is 3.50% = 0.035
Stamp duty on K296 000 = $\text{K}2\,500 + 0.035 \times \text{K}46\,000$
= $\text{K}2\,500 + \text{K}1\,610$
= K4 110

- c. K639 000 is in the over K500 000 range
Amount over K 500 000 = $\text{K}639\,000 - \text{K}500\,000$
= K139 000

K3.75 per K100 is 3.75% = 0.0375
Stamp duty on K639 000 = $\text{K}11\,250 + 3.75\% \text{ of } \text{K}139\,000$
= $\text{K}11\,250 + 0.0375 \times \text{K}139\,000$
= $\text{K}11\,250 + \text{K}5\,212.50$
= K16 462.50

Summary of costs associated with buying a home are as follows:

The **valuation fee** is applied when the bank has an independent valuer to look at the property to make sure that the value of the property covers the loan amount

The **settlement fee** is to cover the cost of the bank arranging the final payment to the previous owner through their solicitor or lawyer.

The **conveyance fee** is the cost of legally transferring the title (ownership) of the property from the seller to the buyer.

Costs associated with buying homes are different everywhere; however, below is a simple example of what you would expect to pay if you were to buy a home. (Figures given are examples)

- | | |
|--------------------------|---------------------|
| • Loan application fee | K500 – K600 |
| • Valuation fee | K100 – K250 |
| • Stamp duty on mortgage | 0.4% loan amount of |
| • Settlement fee | K50 – K300 |
| • Conveyance fee | K500 – K1 000 |

**Example 2**

Honeylett is buying a house priced at K234 000. To do this Honeylett is taking out a loan for K200 000 from her bank. The loan has an application fee of K500 and a settlement fee of K250. Her lawyer charges her a fee of K650 for conveyance. Calculate the total in fees and charges that Honeylett will have to pay.

Solution

Honeylett has to pay government stamp duty on the purchase price and also stamp duty on the loan amount.

$$\begin{aligned}\text{Stamp duty on purchase (up to K250 000)} &= 1\% \text{ of K234 000} \\ &= 0.01 \times \text{K 234 000} \quad (1\% = 1 \div 100 = 0.01) \\ &= \text{K2 340}\end{aligned}$$

$$\begin{aligned}\text{Stamp duty on loan of 0.4\%} &= 0.004 \times \text{K200 000} \quad (0.4\% = 0.4 \div 100 = 0.004) \\ &= \text{K800}\end{aligned}$$

$$\begin{aligned}\text{Total of charges} &= \text{K2 340} + \text{K800} + \text{K500} + \text{K250} + \text{K650} \\ &= \text{K4 540}\end{aligned}$$

**Learning Activity 12.2.2.3****20 minutes**

Refer to the table below to answer Question 1 and 2.

Purchase price	Stamp duty
Up to K250 000	K1.00 per K100 or part of K100
K251 000 to K500 000	K2500 + K3.50 per K100 or part of K100 over K250 000
Over K500 000	K11 250 + K3.75 per K100 or part of K100 over K500 000

1. Calculate the amount of government stamp duty payable using the table below for each of the following home purchase prices.

a. K300 000

c. K650 000

b. K145 000

d. K25 900



CONSUMER CREDIT

2. Calculate the amount of government stamp duty payable (at the rate of 0.4%) on the following home loan amounts.
- a. K145 000
- c. K92 000
- b. K340 000
- d. K43 500
3. Darren bought a house with a price of K560 000.To do so he took out a loan from his bank for K452 000. The bank charged an application fee of K 550, a valuation fee of K300 and a settlement of K300. His solicitor charged him K875 for conveyance fee. Calculate Darren's total cost in fees and charges including stamp duty on the purchase and loan.

**SUMMATIVE TASK 12.2.2****30 minutes**

1. A man took out a personal loan of K3 500 over 1 year from the bank to buy furniture. The bank calculated the fortnightly repayment of K145. The application fee is K100. How much in total will he pay the bank and what total interest has been charged?
2. A borrower took out a bank loan of K6 000 at 12.34% p.a. over 3 years to buy furniture. The bank calculates monthly repayment of K203.30. The loan was taken out on 15th May with repayments due on the 15th each month. Show the progress of the loan over the first one (1) month.
3. Find the due date, closing balance and minimum payment due for an account with the following information on the statement. No interest has been accrued from the previous statement.

Statement date: 25 June

Opening balance: K274.45

Purchases: K79.99, K39.95

Payment: K200



4. A woman buys a used car worth a cash price of K7 500, on hire-purchase. She makes a deposit of K1 500 and agrees to pay the balance plus interest in monthly instalment for one year. If flat rate of 11% p.a. is charged, find the amount of each instalment

5. Use the table to answer the question that follows.

Purchase price	Stamp duty
Up to K250 000	K1.00 per K100 or part of K100
K251 000 to K500 000	K2500 + K3.50 per K100 or part of K100 over K250 000
Over K500 000	K11 250 + K3.75 per K100 or part of K100 over K500 000

Calculate the stamp duty payable on the following prices for owner occupied home purchases of K232 000.



12.2.3: Investments

The action or process of putting money into financial schemes, shares or property with the expectation of achieving a profit is called **investment**.

You could engage in business.

You could put the money in the bank to earn interest.

You could buy something valuable, such as an antique or a rare coin with the hope that in the future it will be worth a lot more.

You could buy a share in a company on a stock exchange.

- i. They can pay dividends (regular payments to you based on their profit)
- ii. And you can sell the stock later, maybe for a higher price

There are lots of options for investing money

Risks and rewards

Unfortunately there is always RISK when investing.

- i. The Company you put your money might go bankrupt
- ii. When you try to sell that rare coin, you may find no one wants to buy it, except at a very low price.
- iii. And that wonderful business might suddenly face big competition.

Often the investments that promise the biggest profits are also the ones with the biggest risks.

As Reward goes up, Risk usually increases too.

For example, banks pay low interest but they are also low risk.

And that wonderful investment in a gold mine that promises 30% profit? It may work out well or it may not.

Remember risk is risky. The more risk you take the higher the chance that you will end up losing.



12.2.3.1 Types of investments

There are two main types of investments available;

- a. Those in which your money earns interest. You lend funds for a stated rate of interest either for a fixed period of time or “at call” - redeemable period of time. This broad group is called the **loan market**. It includes banks, building societies, finance companies and government bonds.
- b. Those in which you acquire a share of asset. You receive a share of the profits and have the possibility of your asset increasing in value. This broad group is called **capital market**. It includes stocks and shares, real estate and collectable items such as stamps, paintings and jewelry.

There are many kinds of investments, each with its own level of risk and return.

The choice of investment should be made after considering the advantages and disadvantages of each type of investment.

If you invest in banks, building societies, finance companies, or government bonds, your return will be from interest. Your original capital has the same value but its purchasing power will be reduced by inflation. The rate of interest needs to be compared with inflation. It is important to realize that the rate of interest offered usually reflects the security of the investment. There may be a high degree of risk associated with the high rates of interest.

If you invest in stocks and shares or real estate, your return is probably not as great as in the loan market, but if you have chosen wisely the value of your shares or property will have risen to keep pace with the inflation or better.

Collectable items give no return until they are sold. There is high risk involved in this area unless you are an expert. There are usually charges involved in the purchase of stocks and shares, real estate or collectables.

Examples of the types of investments

- Investment of money that earns interest
- Term deposit (Fixed term investment)
- Investment bonds
- Investing in real estates
- Investing in stock market

Investment of money that earns interest

If money is invested with a bank or a building society, interest is paid to the investor for lending the money. If money is borrowed then the borrower will be charged interest on the loan.



The value of investments may be calculated using prepared tables of values.

The following table shows the value of K1.00 invested at various interest rates over various time periods.

Periods	Interest rate per period			
	1%	5%	10%	15%
1	1.010	1.050	1.100	1.150
2	1.020	1.103	1.210	1.323
3	1.030	1.158	1.331	1.521
4	1.041	1.216	1.461	1.750
5	1.051	1.276	1.611	2.011
6	1.062	1.340	1.772	2.313
7	1.072	1.407	1.949	2.660
8	1.083	1.477	2.144	3.059

The simple and compound interest formula are used to determine the present and future values of the investment

Example 1

Use the table to find the future value of:

- a. K5000 invested at 10% compounded annually for 3 years.

Solution:

$$\begin{aligned}\text{Amount} &= \text{K}5000 \times 1.331 \\ &= \text{K}6\,655 \text{ (to the nearest Kina)}\end{aligned}$$

- b. K380 invested at 1% compounded quarterly for 1 year and 3 months

Solution:

$$\begin{aligned}\text{Amount} &= \text{K}380 \times 1.051 \text{ (1 year 3 months is equal 5 periods)} \\ &= \text{K}399.38\end{aligned}$$

**Term deposit (Fixed term investment)**

A type of investment account that pays a fixed rate of interest on a fixed amount of money invested for a set time. It is also known as **fixed deposit**.

Conditions associated with term deposits are;

- Money cannot be withdrawn at any time
- Term deposits offer high rate
- Financial institution knows it has that money for lending to borrowers for that time period.
- Time period of term deposit is chosen by the customer, within limits and the interest rate varies according to the length of time.
- Interest usually paid at the time of maturity (end of the fixed time)
- Some are paid monthly, quarterly, yearly.

Term	K1000 to K4999	K5000 to K 19000	K20000 to K 49 000
7days to 1 month	1.00% p.a.	2.00% p.a	4.00% p.a
1 to < 2 months	1.00% p.a.	3.00% p.a	4.50% p.a
2 to < 4 months	1.5% p.a.	4.50% p.a	5.50% p.a
4 to < 12 months	2.5% p.a.	6.00% p.a	6.00% p.a
12 to < 18 months	2.75% p.a.	6.30% p.a	6.50% p.a
18 to < 24 months	3.00% p.a.	6.50% p.a	6.50% p.a
24 to 36 months	3.20% p.a.	6.75% p.a	6.75% p.a

Example 2

Calculate the total value (principal + interest) of a fixed deposit of K 2000 for 18 months.

Solution:

From the table the interest rate for K 2000 (in the range K 1000 to K 4999) for 18 months is 3%p.a.

$$P = \text{K}2000, r = 3\% = 0.03, t = 18 \text{ months} = \frac{18}{12} = 1.5 \text{ years}$$

$$I = P \times r \times t$$

$$I = \text{K} 2000 \times 0.03 \times 1.5$$

$$I = \text{K} 90.00$$

The total value of the investment after the 18month term is $\text{K}2000 + \text{K}90 = \text{K}2090.00$



Example 3

Kenneth places K6500 in a fixed term deposit for 3 years and the interest is to be paid at six monthly intervals. How much interest will be received in each 6 monthly payments?

Solution:

Because it is a 3 year term deposit of K6500 (in the range of K5000 to K19 000) the interest rate is 6.75% p.a.

Interest is paid 6 monthly so time period is $\frac{6}{12} = 0.5$

Principal = K6500, $r = 6.75\% = \frac{6.75}{100} = 0.0675$

Working out:

$$I = P \times r \times t$$

$$I = K6500 \times 0.0675 \times 0.5$$

$$I = K219.38$$

$\therefore$ Interest received every 6 months will be K219.38

Example 4

A term deposit offers 6% per annum (p.a.) for an investment of 2 years. How much would need to be invested to achieve an interest payment of K1000 after 2 years?

Solution:

This time we know the interest ($I = K1000$) and we wish to find the principal (P)

$$I = P \times r \times t$$

$$1000 = P \times 0.06 \times 2$$

$$P \times 0.06 \times 2 = 1000$$

$$P = \frac{1000}{0.06 \times 2}$$

$$P = 8333.33$$

So K8333.33 would need to be invested.



Investment bonds

Bonds offered by government (or banks) earn interest which is paid either monthly, quarterly, half yearly or annually are called **investment bonds**.

Bonds may also be sold or transferred prior to maturity. The face value of the bonds is returned to the owner in full on maturity.

Example 5

Ben invests K2700 in state government bonds at 7.4% per annum. The investment is for 5 years and the interest is paid quarterly.

- a. How much interest is received quarterly?

Solution:

$$\text{Principal} = \text{K2 700}, \text{Rate} = 7.4\% \text{ p.a.}, \text{Time} = 3 \text{ months} = \frac{3}{12} = 0.25 \text{ years}$$

$$I = ?$$

Working out:

$$I = Prt$$

$$I = \text{K2700} \times 0.074 \times 0.25$$

$$I = \text{K49.95}$$

So, the interest received quarterly is K49.95

- b. How much interest will be received in total?

Solution:

$$\text{The number of interest payments} = 4 \times 5 = 20$$

$$\text{Therefore, the total interest received} = 20 \times \text{K49.95}$$

$$= \text{K799.20}$$

So the total interest received is K799.20

**Learning Activity 12.2.3.1****20 minutes**

1. Use the table from the example to find future value of

Periods	Interest rate per period			
	1%	5%	10%	15%
1	1.010	1.050	1.100	1.150
2	1.020	1.103	1.210	1.323
3	1.030	1.158	1.331	1.521
4	1.041	1.216	1.461	1.750
5	1.051	1.276	1.611	2.011
6	1.062	1.340	1.772	2.313
7	1.072	1.407	1.949	2.660
8	1.083	1.477	2.144	3.059

- a. K12 000 invested at 10% compounded annually for 6 years.
- b. K1 120 invested at 1% per quarter compounded quarterly for 6 quarters.
- c. K750 invested at 15% per quarter compounded quarterly for 1 year.
- d. K100 000 invested at 5% per month compounded monthly for 5 months.



Use this table to answer questions 2 & 3.

Term	K1 000 to K4 999	K5 000 to K19 000	K20 000 to K49 000
7 days to 1 month	1.00% p.a.	2.00% p.a.	4.00% p.a.
1 to < 2 months	1.00% p.a.	3.00% p.a.	4.50% p.a.
2 to < 4 months	1.5% p.a.	4.50% p.a.	5.50% p.a.
4 to < 12 months	2.5% p.a.	6.00% p.a.	6.00% p.a.
12 to < 18 months	2.75% p.a.	6.30% p.a.	6.50% p.a.
18 to < 24 months	3.00% p.a.	6.50% p.a.	6.50% p.a.
24 to 36 months	3.20% p.a.	6.75% p.a.	6.75% p.a.

2. Calculate the total interest paid on maturity on the following term deposits.
(Use the table above).
 - a. K3 000 for 2 years
 - b. K12 400 for 15 months
 - c. K25 000 for 3 weeks
3. Use the same table to calculate the interest payment made for each payment interval.
 - a. K1 500 for 3 years with yearly interest payment intervals



- b. K40 000 for 6 months with monthly payment intervals
4. Kate has K4 000 to invest in term deposit that offers an interest rate of 5.95% p.a. for investment up to 3 years. How long would she need to invest to earn interest of
 - a. K450
 - b. K600
5. How much would you need to invest in a term deposit for 3 years at 7.35%pa to achieve a total interest payment of
 - a. K2 000
 - b. K10 000
6. Timothy invested K85 000 in government bonds at 7.2%p.a interest. The interest was paid quarterly.
 - a. What percentage interest rate is he paid each quarter?
 - b. How much interest is he paid each quarter?



- c. How much interest is he paid per year?
- d. How long would the money need to be invested to earn a total of K10 710 interest?
- e. How long does it take to K13 770 in interest?

12.2.3.2: Real estates

In real estate investment people buy properties, from which they can make a profit either as regular income, from capital growth (increase in value in the future) or from both.

An investment property could be;

- Farming land
- A business property – a warehouse, a storage shed
- A container storage land
- A residential house
- Block of land for residential purposes, units, apartments

Investing in real estate may seem to be a good way of increasing wealth; however, there are many hidden costs and pitfalls that can mean that it doesn't always happen the way you think.

Cost of purchasing real estate will include;

- Cost of finding property
- Cost of the property itself
- Cost of setting up a loan at a bank or financial institution
- Conveyance fee
- Stamp duty
- Ongoing cost of owning a property (such as interest, bank fee, insurance, repairs etc).
- Cost on selling the property (real estate selling fee. Capital gain tax, closing loan fee).



Duty amount on the sale of real estate property

Value of property	Rate of stamp duty
Up to K35 000	2%
K35 000 to K70 000	3%
K70 000 to K140 000	4%
Over K140 000	5%

Example 6

John Kelly bought an investment property 6 years ago for K130 000 and has just sold it for K370 000. Calculate:

- The total cost of buying this property if the initial cost of buying the property were K4 300 and Kelly paid a stamp duty on the purchase price of the property
- The total cost of selling the property if the selling agent charged a fee of 3% of the selling price.
- If inflation has been averaging 6% in the five years that Kelly owned the property, what price would someone buying the property expecting to pay now if the price of the property had increased with inflation?
- Assuming that the ongoing costs of the property were paid for by the rent, how much profit has Kelly made by buying and selling the property?
- Kelly has acquired this property for the purpose of making a profit so he will need to pay capital gain tax on the profit that he has made. Kelly's other income means that he will be paying 30% on K110 000 of this profit and 40% on the remainder. How much will Kelly pay in capital gain tax?

Solutions:

- Buying costs** (cost of property is K130 000)
Initial cost is K4300
Government stamp duty: $4\% \text{ of } K130\,000 = 0.04 \times K130\,000 = K5200$
Total buying cost: $K4300 + K5200 = K9\,500$
- Selling costs:**
Selling agents fee = $0.03 \times K370\,000 = K11\,100$
Total selling costs = K381 100



- c. A 6% increase means that the multiplying factor will be $(1 + \frac{6}{100} = 1.06)$ each year
Someone buying the house today would expect to pay $K130\,000 \times 1.06^5 = K173\,969.33$
- d. Profit = Selling price – buying price – costs of buying / selling
 $= K370\,000 - K130\,000 - K20\,600$
 $= K219\,400$
- e. 30% of K110 000 + 40% of K219 400 – K110 000)
 $= \frac{30}{100} \times K110\,000 + \frac{40}{100} \times K109\,400$
 $= K33\,000 + K43\,760$
 $= K76\,760$

He will need to pay K76 760 in capital gains tax.

Example 7

John bought an investment property for K580 000. He has paid a deposit of 40% and is borrowing K550 000 from the bank. The bank has offered a five year loan of K450 000 charging him 10% p.a. interest on the reducing balance, payment being made monthly.

- a. How much stamp duty will John pay on his purchase?
- b. How much did John pay as a deposit?
- c. Use the annuities formula $Q = \frac{(PR^n - A)(R - 1)}{R^n - 1}$ to determine the amount John repaid monthly.

Solution:

- a. Stamp duty will be 5% of K580 000
 $= \frac{5}{100} \times K580\,000 = K29\,000$
- b. The deposit was 40% of the purchase price: 40% of K580 000
 $= \frac{40}{100} \times K580\,000 = K232\,000$



- c. In the annuities formula, Q is the monthly repayment, P is the amount borrowed, A is the amount still owing, R is the rate p.a.

$$R = 1 + \frac{r}{100} \text{ where } r = \frac{10}{12} = 0.833, n = 5 \times 12 = 60$$

$$Q = ?, P = 450\,000, A = 0, R = 1.00833, n = 60$$

$$\text{Substituting in the formula: } Q = \frac{(PR^n - A)(R - 1)}{R^n - 1}$$

$$Q = \frac{(K450\,000 \times 1.00833^{60} - 0)(1.00833 - 1)}{1.00833^{60} - 1}$$

$$= \frac{K6166.22}{0.64498}$$

$$= K9560.28$$

John will repay K9560.28 each month.



Learning Activity 12.2.3.2



20 minutes

Use the stamp duty table below to answer Question 1.

DUTY AMOUNT ON THE SALE OF REAL ESTATE PROPERTY

Value of property	Rate of stamp duty
Up to K35 000	2%
K35 000 to K70 000	3%
K70 000 to K140 000	4%
Over K140 000	5%

1. Calculate the stamp duty payable on properties whose purchase prices are as follows:
 - a. K45 000
 - b. K90 000



c. K135 000

d. K350 000

2. Jane bought an investment property for K480 000. She paid 30% deposit and is borrowing K400 000 from a bank that is charging her 12% interest on the reducing balance with monthly payment over 5 years.

a. How much stamp duty will Jane need to pay on her purchase?

b. How much did Jane pay as a deposit?

c. Use the annuities formula $Q = \frac{(PR^n - A)(R - 1)}{R^n - 1}$ to determine the amount Jane will be repaying monthly.

d. If Jane is going to sell the property after five years and inflation has averaged 8% over the five years, what amount can she expect to get when she sells the property?



-
- e. How much will Jane need to pay the selling agent if she sells the property at K730 000 and the following structure is used to calculate the agents fee:
6% on the first K300 000 + 3.5%, on the next K250 000 + 2.5% on the balance
3. An estate agent has the following fee scale for the sale of properties 6% on the first K300 000 + 4.5% on the next K200 000 + 3% on the balance. Calculate the selling agents fees for a property sold for:
- a. K390 000
- b. K760 000
- c. K1 250 000



12.2.3.3: Stock market

One way a company can raise its capital is to sell shares to the investors. When the shares are first issued by the company, they (shares) have a face or a par value. The shares are listed on the stock market and the price fluctuates. The price of the share being traded on the stock exchange is called **market price**.

Any profits made by the company are divided amongst the shareholders. This return to the shareholders is called a **dividend**. The dividend may be an amount per share or as a percentage of the face or par value. The return on the money invested is called the **yield** and is calculated using the formula below;

$$\text{Percentage yield} = \frac{\text{Amount of dividend}}{\text{Market price}} \times 100\%$$

A **stock broker** does the buying and selling of shares on behalf of the investor.

Brokerage is a fee charged by stockbrokers. The tax charged on buying and selling shares is called **stamp duty**.

Example 7

Calculate the total cost to purchase 700 oil search K1.00 shares with a stock market of K1.49. Brokerage is 2.5% and stamp duty is 15 toea per K100 or part thereof.

$$\text{Cost of share} = 700 \times \text{K}1.49$$

$$= \text{K}1\,043$$

Round the cost of shares up to the next hundred and use this value

$$\text{Brokerage} = 2.5\% \text{ of K}1\,043$$

$$= .025 \times \text{K}1\,043$$

$$= \text{K}26.075$$

$$= \text{K}26.08$$

$$\text{Stamp duty} = \frac{1100}{100} \times \text{K}0.15 \longrightarrow \text{Rounded K}1\,043 \text{ to K}1\,100 \text{ to find stamp duty only}$$

$$= \text{K}1.65$$

$$\text{Total cost} = \text{K}1043 + \text{K}26.08 + \text{K}1.65$$

$$= \text{K}1\,070.73$$

**Example 8**

Calculate the amount obtained when 1200 D Jones shares are sold at K 1.36.
Brokerage is K29 fixed and stamp duty is 15 toea per K1.00 or part thereof.

$$\text{Selling income} = 1200 \times \text{K}1.36$$

$$= \text{K}1632$$

Round the cost of shares
up to the next hundred
(ie. K1 632 = K1700)

$$\text{Stamp duty} = \frac{1700}{100} \times \text{K}0.15$$

Rounded K1 632 to K1 700
to find stamp duty only

$$= \text{K}2.55$$

$$\text{Amount obtained} = \text{Selling Income} - (\text{stamp duty} + \text{Brokerage})$$

$$\text{Amount obtained} = \text{K}1\,632 - \text{K}2.55 - \text{K}29$$

$$= \text{K}1\,600.45$$

**Learning Activity 12.2.3.3**

20 minutes

1. Calculate the total cost to purchase 600 oil search K1.00 shares with a stock market of K7.97. Brokerage is 2.5% and stamp duty is 15 toea per K100 or part thereof.
2. Calculate the total cost to purchase 300 Kina finance K1.00 shares with a stock market of K4.65. Brokerage is 2.5% and stamp duty is 15 toea per K1.00 or part thereof.



- 80

**12.2.3.4 Dividends**

Dividend is a payment made by a company to its shareholders usually as a distribution of profits.

Example 1

Calculate the amount of dividend on 1 500 shares with a face value of 50 toea if the dividend is 15%.

$$\begin{aligned}\text{Dividend per share} &= 15\% \text{ of } 50 \text{ toea} \\ &= 0.15 \times 50 \text{ toea} \\ &= 7.5 \text{ toea}\end{aligned}$$

$$\begin{aligned}\text{Total dividend} &= 1\,500 \times 7.5 \text{ toea} \\ &= 11\,250 \text{ toea} \\ &= \text{K}112.50\end{aligned}$$

**Learning Activity 12.2.3.4**

20 minutes

1. Calculate the amount of dividend on 1 200 shares with face value of 90 toea if the dividend is 13%.
2. Calculate the amount of dividend on 2 000 shares with a face value of 50 toea if the dividend is 10%.



3. Calculate the amount of dividend on 2 000 shares with a face value of 50 toea if the dividend is 5%.

4. Calculate the amount of dividend on 3500 shares with a face value of 100 toea if the dividend is 8%.

**SUMMATIVE TASK 12.2.3**

30 minutes

Part A: Multiple Choice Questions

1. Calculate the total cost to purchase 400 AMP shares with a market price of K15.05. Brokerage is 2.5% and stamp duty is 15 toea per K100 or part thereof. The answer is

A. K6 020 B. K6 170.50 C. K6 179.65 D. K6 179.76

2. Calculate the amount when 500 Air Niugini shares are sold at K4. 85. Brokerage is K29 fixed and stamp duty is 15 toea per 100 or part thereof. The answer is

A. K2 425 B. K2 395.96 C. K2 392.25 D. K2 457.75

3. A dividend of 24toea per share is paid on TST Group of company shares with a market value of K3.25 and a face value of K1.00. The percentage yield is

A. 7.38% B. 13.54% C. 24% D. 3.25%

4. The amount of dividend on 1100 shares with a face value of 50 toea and a market value of 93 toea if the dividend is 8% is

A. K81.84 B. K0.04 C. K0.43 D. K44.00

**Part B: Solving Problems Questions**

1. Calculate the amount of dividend on 2 500 shares with a face value of 100 toea if the dividend is 8%.
2. Calculate the amount obtained when 1200 LNG shares are sold at K5.50. Brokerage is K30 fixed and stamp duty is 15 toea per K100 or part thereof.

3. Stamp duty table

Value of property	Rate of stamp duty
Up to K35 000	2%
K35 000 to K70 000	3%
K70 000 to K140 000	4%
Over K140 000	5%

Use the duty table to calculate the duty payable to a property whose purchase price is K40 000.

5. An estate agent has the following fee scale for the sale of properties 6% on the first K300 000 + 4.5% on the next K200 000 + 3% on the balance.

Calculate the selling agents fees for a property sold for K90 000.



12.2.4: INSURANCES

Insurance is the pooling, or sharing of risks. This means that a group of people put money into a pool or fund. When one of the groups suffers a loss, they can be compensated from the fund.

Or we can describe it as a contract between two parties, the **insurer** (the insurance company) and the **insured**, where the insurer agrees to pay for any or certain specified losses suffered by the insured

Our future is something which is far from certain. We could become too ill to work or could be badly injured or even get killed in an accident. Our house could burn down or could be burgled or we might be involved in a car accident and be liable for injuries and damage. How do we take care of such situations?

The answer is to take out insurance policies. Insurance provides some financial protection against possible unexpected events such as those mentioned above. It is based on risk sharing.

In this section of the unit you are going learn about:

- The main types of insurance policies
- How to calculate premium payments

The insurance company collects premiums from people who wish to insure themselves. It invests the money to earn interest and this money (i.e. Premium + interest) is then available to pay policy holder who make a claim when they suffer certain losses or damages.

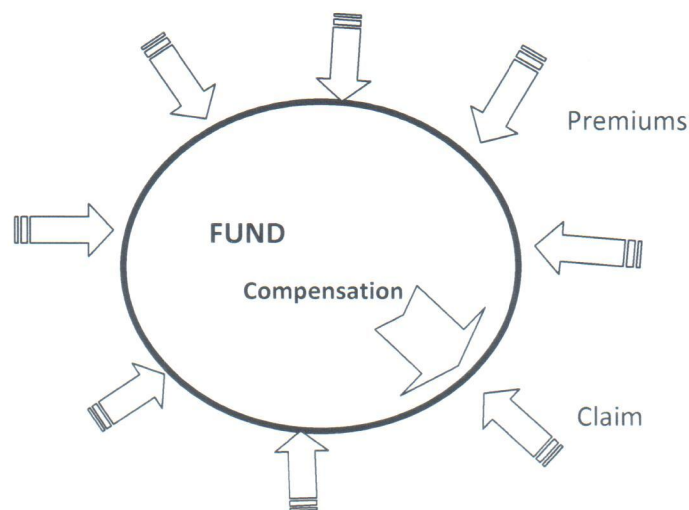


Figure: Insurance Pool



12.2.4.1: Types of insurance

There are several types of insurance policies. The common insurance policies we will discuss in this section are;

- Household insurance
- Motor Vehicle insurance
- Life and Health insurance

Household insurance

Household insurance is an insurance policy that combines various personal insurance protections, which include loss occurring to one's home, its contents, and loss of other personal possessions of the home owner.

Items that are covered by policies differ between different companies, but generally household are covered against loss by fire, flood or theft.

When purchasing household insurance it is important to determine the value of the property to be insured.

Example 1

A householder values his house and its content at K45 000. His insurance company charges a premium of K4.00 per K1000 insured. How much is the annual premium?

$$\begin{aligned}\text{Annual premium} &= \frac{4 \times \text{K}45\,000}{1000} \\ &= \text{K}180\end{aligned}$$

The householder (insured) pays premium to the insurer for insurance. The insurer issues an **insurance policy** (contract) when both parties agree on all the details of the insurance. In the event that the house is destroyed by fire, the insured can make a claim to the insurer.

Example 2

A householder wishes to insure his house for K30 000. The insurance company charges a premium of 15 toea per K100 insured. Calculate the householder's annual premium.

$$\begin{aligned}\text{Annual premium} &= \frac{0.15}{100} \times \text{K}30\,000 = \text{K}45 \\ \text{Annual premium is K}45.\end{aligned}$$

**Example 3**

James has insured his house for a total of K60 000 but it is actually worth K80 000. James makes a claim for K25 000 for damage caused by fire. How much will he receive from the insurance company?

Solution:

$$\frac{\text{Insured cost}}{\text{Actual worth}} \times \text{Amount claimed} = \text{amount paid by insurance company}$$

$$\frac{\text{K60 000}}{\text{K80 000}} \times \text{K25 000} = \text{K18 750}$$

Motor Vehicle insurance

There are two ways of insuring vehicles:

1. By **third party insurance**. This covers the other person who is involved in an accident which is the fault of the policy holder. It does not cover the policy holder who will have to pay himself for any damage to his car. Under the government legislation it is compulsory for a vehicle owner to have the insurance. The premium is paid yearly with vehicle registration.
2. By a **fully comprehensive policy** which covers damage to policy holders car plus the damage to other people and their property.

If a car owner makes no claim during the year he gets a no claim bonus which means that he/she will smaller amount the following year.

Some of the compulsory third party premiums are shown in the table below on the next page.

**TABLE OF COMPULSORY THIRD PARTY PREMIUMS**

Vehicle description	Base rate (K)	INS levy 1%	NRSC 5%	Sub total	Vat(GST) 10%	Total payable (nearest 5t)
Sedan - private use	271	2.71	13.55	287.26	28.78	316
Station Wagon -Private use	342	3.42	17.1	362.52	36.25	398.8
Van 9 seats or less	421	4.21	21.05	446.26	44.63	490.9
Ambulance	298	2.98	14.9	315.88	31.59	347.5
Sedan - business use	301	3.01	15.05	319.06	31.91	351
station wagon -business use	364	3.64	18.2	385.84	38.58	424.4
Bus -9seats or less	359	3.59	17.95	380.54	38.05	419
Utility-business use	674	6.74	33.7	714.44	71.44	785.9
Van 9 seats or less	349	3.49	17.45	369.94	36.99	406.9
Van -exceeding 9 seats	778	7.78	38.9	824.68	82.47	907.15
Truck	950	9.5	47.5	1007	100.07	1107.1
PMV	1367	13.67	68.35	1449.02	144.9	1593.9
Taxi - commercial	539	5.39	26.95	571.34	57.13	628.5
Motorcycle	171	1.71	8.55	181.26	18.13	199.4

INS is the insurance levy

NRSC is the National Road Safety council

Example 4

The premium of a fully comprehensive policy on a car is K 280. The owner is allowed a no-claim bonus of 40%. How much is the premium for the next year?

Solution

$$\begin{aligned}\text{No-claim bonus} &= 40\% \text{ of K280} \\ &= \text{K112.00}\end{aligned}$$

$$\begin{aligned}\text{Premium payable} &= \text{K280} - \text{K112} \\ &= \text{K168.0}\end{aligned}$$

Example 5

Using the table above, how much does Billy pay in compulsory third party insurance for a PMV he owns?

Solution: K1 593.90



Life Insurance

Life insurance or commonly life assurance is a contract between the insured and the insurer or assurer where the insurer promises to pay a designated beneficiary a sum of money for a premium (the benefits) in exchange for a premium upon the death of the insured person.

Depending on the contract, other events such as terminal illness or critical illness may also trigger payments. The policy holder typically pays a premium, either regularly or as a lump sum. Other expenses (such as funeral expenses) are also sometimes included in the benefits. Life policies are legal contracts and the terms of contract describe the limitations of the insured events. Specific exclusions are often written into the contract to limit liability of the insurer; common examples are claim relating to suicide, fraud, war, riot and civil commotion.

The size of the premium depends upon:

1. The age of the person (the younger the policy holder is, the less he or she pays because there is less risk of him or her dying soon)
2. The amount of money the policy holder wants his dependents to receive (the greater the amount the larger the premium).

Example 5

A man aged 35 years wishes to assure his life for K7 500. The insurance company quotes an annual premium K13.90 per K1 000 assured. Work out the monthly premiums

$$\begin{aligned}\text{Annual premium} &= \text{K}13.90 \times \frac{\text{K}7\,500}{\text{K}1\,000} \\ &= \text{K}104.25\end{aligned}$$

$$\begin{aligned}\text{Monthly premium} &= \text{K}104.25 \div 12 \\ &= \text{K}8.69\end{aligned}$$

Endowment Assurance

This is similar to life insurance but the person can decide for how long he or she is going to pay the premium. At the end of the chosen period a certain sum of money will be paid to the policy holder. If, however, the policy holder dies before the end of the chosen period, the assured sum of money is paid to his or her dependents.

Some endowment and life policies are 'with profits', which means that the sum assured may increase over the period depending upon the profits made by the insurance company.

**Example 6**

A woman aged 40 years wishes to buy an endowment 'with profits' assurance policy. She quoted a price of K48.50 per K1000 assured over a period of 20 years. Calculate the monthly premium if he wishes to assure himself for K6 000.

$$\text{Annual premium} = \text{K } 48.50 \times \frac{\text{K}6\,000}{\text{K}1\,000}$$

$$= \text{K } 291.00$$

$$\text{Monthly premiums} = \text{K } 291 \div 12$$

$$= \text{K } 24.25$$

Health Insurance

Health insurance is insurance against the risk of incurring medical expenses among individuals. By careful estimation of risk against health care and health system expenses among targeted group of people, an insurer develops a routine financial structure, such as a monthly premium or payroll tax, to ensure that money is available to pay the health care benefits specified in the insurance agreement. This is administered by organization such as government agency, private business or not for profit entity.

Health insurance is defined as "coverage that provides for the payment of benefits as a result of sickness or injury. It includes insurance for losses from accidents, medical expense, disability, or accidental death and dismemberment". Other conditions such as HIV/AIDS, suicide, sexually transmitted infections (STD) etc are not included in the health plan.

A health insurance policy is a contract between an insurance provider and an individual. The contract can be renewed annually, monthly or lifelong in the case of private insurance.

Below is an example of a health insurance scheme.

Yearly premiums and limits for medical insurance that is organized in a workplace.

	Up to 5 members (K)	More than 5 members(K)	Limit of medical and hospital benefits(K)
Single plan	920	480	15 000
Couple plan	1190	690	25 000
Family plan	1330	870	40 000

- A Single plan covers a member without dependents
- A couple plan covers a member with a dependent spouse and no children



- A family covers a member with a dependent spouse and children under 18 years, or children who are unmarried students under 25 years of age. There is also limited cover, K1 000, for the natural parents of the member and the spouse.
- All claims have a 20% excess.

Example 7

John bought a health insurance plan for him and his dependent wife. He had no children when he bought the plan.

Use the information from the table above and answer the following questions.

- a. How much would John pay fortnightly for his health insurance plan?

John would buy a 'couple plan' in the category Up to 5 members so the cost would be K1190 a year.

This is $\frac{K1190}{26} = K45.77$ per fortnight.

- b. John's wife was ill and her medical bill amounted to K538. How much John's wife would be reimbursed by the health insurance company?

All claims have a 20% excess, which means John's wife will pay 20% of the costs and the insurance company will reimburse 80%.

Therefore, $80\% \text{ of } K538 = 0.80 \times K538$
 $= K430.40$



Learning Activity 12.2.4.1



20 minutes

Study the notes and the examples carefully before you attempt these questions.

1. A man aged 25 years wishes to insure his life for K7 000. He is quoted a rate of K9.00 per K1 000 insured. How much in premiums will he pay monthly?



2. A car owner is quoted an annual premium of K180 but she is allowed a no- claims bonus of 35%. Calculate the amount of her premium.

3. For a monthly premium of K50 a woman aged 40 is guaranteed K6624 at the end of ten years. However, the insurance company states that the maturity value of the policy is likely to be K11 241.
 - a. Workout how much the woman will pay in premium over the ten year period?

 - b. Calculate the amount of profit she is likely to make on the policy.

4. David wishes to insure the contents of his house for K5 000. The insurance company quotes a premium of K4 per K1 000 insured. How much is his annual premium?

5. John is one of the employees and he has an illness for which he incurs K238 in claimable expenses. How much will he receive from his medical insurance company?

**SUMMATIVE TASK 12.2.4**

20 minutes

After going through the practice exercises you should now be confident to do this activity.

Yearly premiums and limits for medical insurance that is organized in a workplace.

	Up to 5members (K)	More than 5 members(K)	Limit of medical and hospital benefits(K)
Single plan	920	480	15 000
Couple plan	1190	690	25 000
Family plan	1330	870	40 000

Use the table above to answer questions 1 and 2.

Vicky bought a health insurance plan for him and his dependent wife. He had no children when he bought the plan.

Use the information from the table above and answer questions 1 & 2.

1. How much would Vicky pay fortnightly for his health insurance plan?
2. Vicky's wife had her routine health check and her medical bill amounted to K720.
How much would Vicky's wife reimburse from the health insurance company?



3. For a monthly premium of K60 a woman aged 50 years is guaranteed K12 000 at the end of ten years. However, the insurance company states that the maturity value of the policy is likely to be K17 241.
- a. Workout how much the woman will pay in premium over the ten year period?
- b. Calculate the amount of profit she is likely to make on the policy.
4. A man aged 35 years wishes to assure his life for K12 500. The insurance company quotes an annual premium K24.90 per K1000 assured. Work out the monthly premiums
5. Ravu wishes to insure the contents of his house for K30 000. The insurance company quotes a premium of K8 per K 1000 insured.
- How much is his annual premium?
6. The premium of a fully comprehensive policy on a car is K450. The owner is allowed a no- claim bonus of 30%. How much is the premium for the next year?



UNIT SUMMARY

This summary outlines the important key ideas and concepts to be remembered.

12.2.1 Interest and Inflation

- **Simple Interest**

$$I = P \times r \times t \quad \text{where}$$

I = Interest earned
 P = principal, the amount of money or borrowed
 r = interest rate per time period
 t = number of time period

- **Compound interest**

$$A = P \times (1 + r)^n \quad \text{where}$$

A = Total amount accumulated
 P = principal, the amount of money or borrowed
 r = interest rate per time period
 n = number of time period

- **Inflation** describes the way in which the price of goods and services rise over time. It is measured by the **Consumer Price Index (CPI)**.

There are two ways we can think of inflation: **prices go up**, and **the value of our money (buying/purchasing power) goes down**.

It is a compound growth situation so we use compound interest formula to work out inflation.

$$\text{Price after } n \text{ years} = \text{original price} \times (1 + r)^n$$

- **Appreciation** is the increase in value of items or quantity over time

$$\text{Appreciated value} = P \times (1 + r)^T$$

- **Depreciation** is the loss in value of item overtime

$$\text{Depreciated value} = P \times (1 - r)^T$$

12.2.2 Consumer credit

- **Loans**

Personal loans involve cost such as application fee, loan insurance and interest. Most personal loans are reducing balance types in which the interest is calculated for each interest period (often daily) on the balance still owing.



- **Credit cards**

- a. Can have yearly fee and an interest free period for purchase or
- b. Can have no yearly fee and no interest free period for purchase
- c. Interest are charged on cash withdrawals from credit cards
- d. Interests charged are quite high.

Credit cards are offered to customers who have stable income and have history of being able to manage their money

- **Housing loan**

If someone buying a house cannot pay out right, he /she arrange a loan called **mortgage**, from a **building society**.

12.2.3 Investment

There are two main types of investments available;

- Those in which your money earns interest. You lend funds for a stated rate of interest either for a fixed period of time or “at call” - redeemable period of time. This broad group is called the loan market. It includes banks, building societies, finance companies and government bonds.
- Those in which you acquire a share of asset. You receive a share of the profits and have the possibility of your asset increasing in value. This broad group is called capital market. It includes stocks and shares, real estate and collectable items such as stamps, paintings and jewelry.

12.2.4 Insurance

The common insurance policies are;

- **Household insurance**
It is an insurance policy that combines various personal insurance protections, which include loss occurring to one’s home, its contents, and loss of other personal possessions of the home owner
- **Motor Vehicle insurance**
Two ways of insuring vehicles are;
 - i. By third party insurance.
 - ii. By a fully comprehensive policy
- **Life insurance**
Life insurance or commonly life assurance is a contract between the insured and the insurer or assurer where the insurer promises to pay a designated beneficiary a sum of money for a premium (the benefits) in exchange for a premium upon the death of the insured person.



- Endowment Assurance

This is similar to life insurance but the difference is that the person can decide for how long he/she is going to pay the premium where in at the end of the chosen period a certain amount of money will be paid to the policy holder.

- Health Insurance

This is an insurance against the risk of incurring medical expenses among individuals. It is defined as “coverage that provides for the payment of benefits as a result of sickness or injury.”

REVISE SECTIONS 12.2.1 TO 12.2.4 THEN DO MODULE ASSESSMENT 2

**ANSWERS TO LEARNING ACTIVITIES 12.2.1.1 TO 12.2.4.1****Learning activity 12.2.1.1a**

1. a. i) 1.05 ii) 1.1 iii) 1.29
b. i) 0.92 ii) 0.85 iii) 0.70
2. a. $0.8 \times 24.50 = \text{K}19.60$ b. $\text{K}67.20 \div 0.8 = \text{K}84$
3. a. $\text{K}150 \times 0.7 = \text{K}214.29$ b. i) $\text{K}150 \times 0.8 = \text{K}120$ ii) 56%

Learning activity 12.2.1.1b

1. a. K48 b. K990 c. K3 000
2. a. K6 000 b. K1 020 c. K14 500
3. a. K4 000 b. K2 400 c. K400
4. a. 1.5years b. 7 years c. 19.4 years
5. a. 12% b. 7.7% c. 5.8%

Learning activity 12.2.1.1c

1. a. K2544
b. K 26 966.64
c. $0.06 \times \text{K}26\,966.64 = \text{K}161.80$
d. $\text{K}26\,966.64 + \text{K}161.80$
e. K27 128.44
2. a. K3 969 b. $0.05 \times \text{K}3\,969 = \text{K}198.45$ c. $\text{K}3\,969 + \text{K}198.45$
d. K4 167.45 e. $0.05 \times \text{K}4\,167.45 = \text{K}208.37$ f. K775.82
3. a. K367.33 b. K7 312.16 c. K3 766.11 d. K12 795.67
4. a. K2 503.65 b. K16 115.44 c. K23 167.81
5. a. K11 466 b. K11 566.04 c. K11 602.11
6. 2.03 years or about 2 years
7. 3.07 years or about 3 years

**Learning activity 12.2.1.2**

1. a. $K3.90 \times 1.06 = K4.38$ b. $K4.38 \times 1.06 = K4.92$
2. a. K548.45 b. K2 362.73 c. K35.42
d. K8.21 e. K10.97
3. K83 889.78
4. a. 49.01% b. K65 322 c. 49%
5. a. K177 689.38 b. K512 043.63 c. K57 140.54

Summative Task 12.2.1**Part A: Multiple-Choice**

1. B 2. C 3. C 4. B 5. B

Part B: Problem Solving

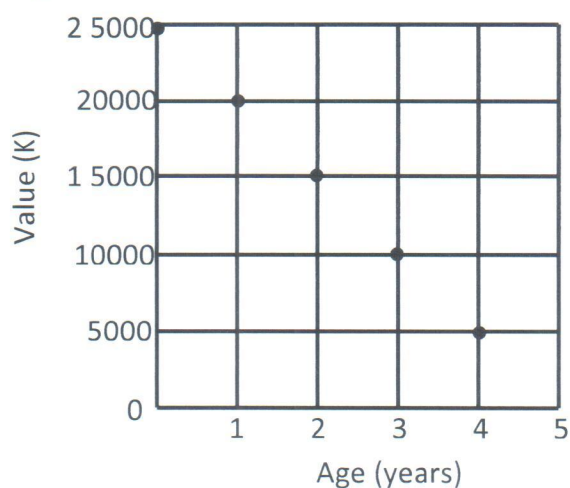
1. a. K720 b. K3 720 2. a. K1 920 3. 4.5 years
4. a. 12% b. 10%
5. a. K5 000

b.

Age	Depreciation	Value
0		K25 000
1	K5 000	K20 000
2	K5 000	K15 000
3	K5 000	K10 000
4	K5 000	K5 000

d. 4 years

c.



6. a. K49 400 b. K15 600
7. a. K45 094.28
8. a. K39 000 b. K25 500
9. K91.51

**Learning activity 12.2.2.1**

1. 20 May interest = K92.70 Balance = K9 829.80
20 June interest = K94.16 Balance = K9 661.06
20 July interest = K89.56 Balance = K9 487.12
2. 26 Aug Interest = K35.16 Balance = K7 696.50
9 Sept Interest = K34.70 Balance = K7 592.50
23 Sept interest = K34.23 Balance = K7 488.11
3. a. Total = K10 789.68 Interest = K2 169.68
b. Total = K1 467.36 Interest = K87.36
c. Total = K20 980.48 Interest = K5 760.48
d. Total = K71 283.60 Interest = K16 283.60
4. a. Due date : 4th September, Closing balance = K562.29,
Minimum payment due = K16.87 or K17.00
b. Due date: 22nd February, Closing balance = K307.90
Minimum payment due = K9.24 or K10.00

Learning activity 12.2.2.2

1. a. K360 b. K36 c. K396 d. K39.60
2. a. K71 b. K781 c. K195.25 d. K443.75 e. 16%
3. a. K700 b. K2 100 c. K315 d. K2 415 e. K201.25

Learning activity 12.2.2.3

1. a. K4 250 b. K1 450.00 c. K16 875 d. K2 846.50
2. a. K580 b. K1360 c. K368 d. K174
3. K17 333

Summative Task 12.2.2

1. Total paid = $K145 \times 26 + K100$
 $= K3\,770 + K100$
 $= K3\,870$

Total interest = $K3\,770 - K3\,500$
 $= K270$ (Application fee not included)



2. First month is 17 days (31days -14days)

Daily interest rate will be $12.34\% \div 365$ days a year

$$= 0.0338\%$$

$$= 0.0338 \div 100$$

$$= 0.000338$$

The interest is calculated as simple interest

$$I = P \times \frac{r}{100} \times t$$

$$= K6\,000 \times 0.000338 \times 31$$

$$= K62.868$$

Balance on 15th June after a repayment = previous balance + interest - repayment

$$= K6\,000 + K62.87 - K203.39$$

$$= K5\,859.48$$

3. The due date is 25 days after the statement date so 25 days after 25 June is 20 July.
As there are no cash advances or interest,

$$\text{Closing balance} = \text{opening balance} + \text{purchases} - \text{payment}$$

$$= K274.45 + K79.99 + K39.95 - K200$$

$$= K194.39$$

$$\therefore \text{Minimum payment due} = 3\% \text{ of closing balance}$$

$$= 0.03 \times K194.39$$

$$= K5.83$$

As this is less than K10 the minimum payment due will be K10.

4. Cash price = K7 500

$$\text{Deposit} = K1\,500$$

$$\text{Balance} = \text{Cash price} - \text{deposit}$$

$$= K7\,500 - K1\,500$$

$$= K6\,000$$

$$\text{Interest on balance} = PRT = K6\,000 \times 0.11 \times 1 = K660$$

5. K1.00 per K100 means 1% (one in every hundred) so we find 1% of the price

$$\text{Stamp duty on K232\,000} = 0.01 \times K232\,000$$

$$= K2\,320.00$$

**Learning activity 12.2.3.1**

1. a. K21 264 b. K1 189
c. K1 312.50 d. K127 000
2. a. K192 b. K976.50 c. K57.69
3. a. K48 b. K200
4. a. 1 year 326 days b. 2 years 191 days
5. a. K9 070.29 b. K45 351.47
6. a. 1.8% b. K1 530 c. K6 120
d. 1 year 9 months e. 2 years 3 months

Learning activity 12.2.3.2

1. a. K1 350 b. K3 600
c. K5 400 d. K17 500
2. a. K24 000 b. K144 000
c. K8 897.78 d. K705 277.48

Learning activity 12.2.3.3

1. Cost of shares = K4 782, Brokerage = K119.55, stamp duty = K7.20,
Total cost = K4 908.70
2. K2 863.95
3. K1 444.75
4. 7.58%
5. 5.11%
6. 8.66%

Learning activity 12.2.3.4

1. K140.40 2. K100 3. K50 4. K280

**Summative Task 12.2.3**

1. C 2. C 3. A 4. D
5. K200
6. K6 639.90
7. K1 200

Learning activity 12.2.4.1

1. K5.25
2. K117
3. a. K6 000 b. K5 241
4. K20
5. K190.40

Summative Task 12.2.4

1. K1 190
2. K576
3. a. K7200 b. K10041
4. K25.94
5. K240
6. K315

END OF UNIT MODULE 2



REFERENCES

- Grade 12 General Mathematics save buk
- Insight General Mathematics
- A complete GCSE mathematics Higher Course 3rd Edition
- URL .[http:// www.supermoney.com/loans/personal](http://www.supermoney.com/loans/personal) loans
- URL .[http:// www.mathsisfun.com/interest.html](http://www.mathsisfun.com/interest.html)
- URL .[http:// www.investopedia.com/university/inflation.asp](http://www.investopedia.com/university/inflation.asp)

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FODE PROVINCIAL CENTRES

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SUBJECT AND GRADE TO STUDY

Grade Levels	Subjects
Grades 7 and 8	1. English
	2. Mathematics
	3. Science
	4. Social Science
	5. Making a Living
	6. Personal Development
	7. English
Grades 9 and 10	1. English
	2. Formal Mathematics
	3. Practical Mathematics
	4. Science
	5. Social Science
	6. Commerce
	7. Design and Technology- Computing
	8. Personal Development
Grades 11 and 12	1. English • Applied English • Language and Literature
	2. Mathematics • Mathematics A • Mathematics B
	3. Science
	4. Social Science • History • Geography • Economics
	5. Business Studies
	6. Personal Development
	7. ICT

REMEMBER:

- For Grades 7 and 8, you are required to do all six (6) courses.
- For Grades 9 and 10, you must study English, Mathematics, Science, Personal Development, Social Science and Commerce. Design and Technology-Computing is optional.
- For Grades 11 and 12, you are required to complete seven (7) out of thirteen (13) courses to be certified. Your Provincial Coordinator or Supervisor will give you more information regarding each subject.

Certificate in Matriculation

CORE COURSES

Basic English
English 1
English 2
Basic Maths
Maths 1

Maths 2

History of Science & Technology

OPTIONAL COURSES

Science Streams: Biology

Chemistry, Physics and Social Science Streams:

Geography, Introduction to Economics and Asia and the Modern World

REMEMBER:

You must successfully complete 8 courses; 5 compulsory and 3 optional