



**Mathematical Sciences: MMSC4**  
**LESSON 11**

**UNIT STANDARD: 7449**

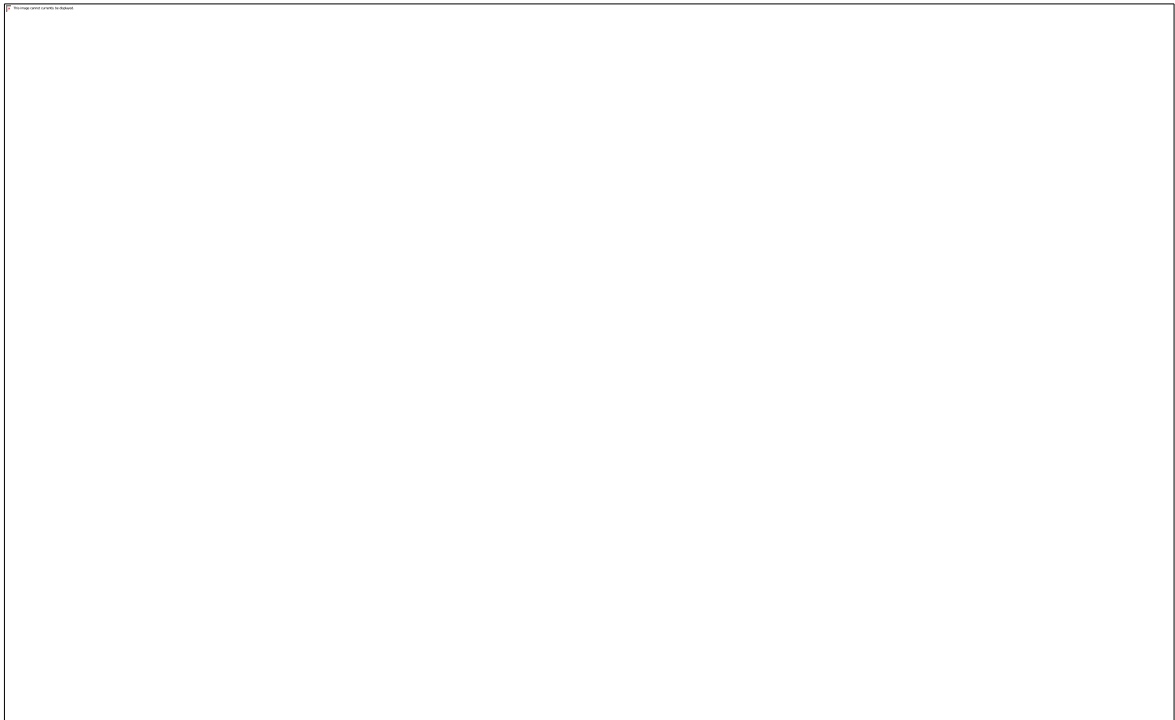
**Topic: Budgeting, Interest, Inflation and exchange rate**

**By the end of this lesson, you should be able to:**

- Calculate interest for both simple and compound investments.
- Determine and use the exchange rates correctly.
- Plan a budget based on income.

**1. INTRODUCTION**

- **Budgeting** is the process of creating a **plan to spend your money**. This spending plan is called a **budget**. Creating this spending plan allows you to determine in advance whether you will have enough money to do the things you need to do or would like to do.
- A **budget** is defined as a plan or estimate of the amount of money needed for cost of living or to be used for a specific purpose. An example of **budget** is how much a family spends on all expenses in a month. An example of **budget** is how much a person plans on spending on a new bed.
- **Budgets** are of **three types** -- balanced **budget**, surplus **budget** and deficit **budget**.





2. **Simple interest** is calculated on the principal, or original, amount of a loan. **Compound interest** is calculated on the principal amount and also on the accumulated **interest** of previous periods, and can thus be regarded as "**interest on interest**."

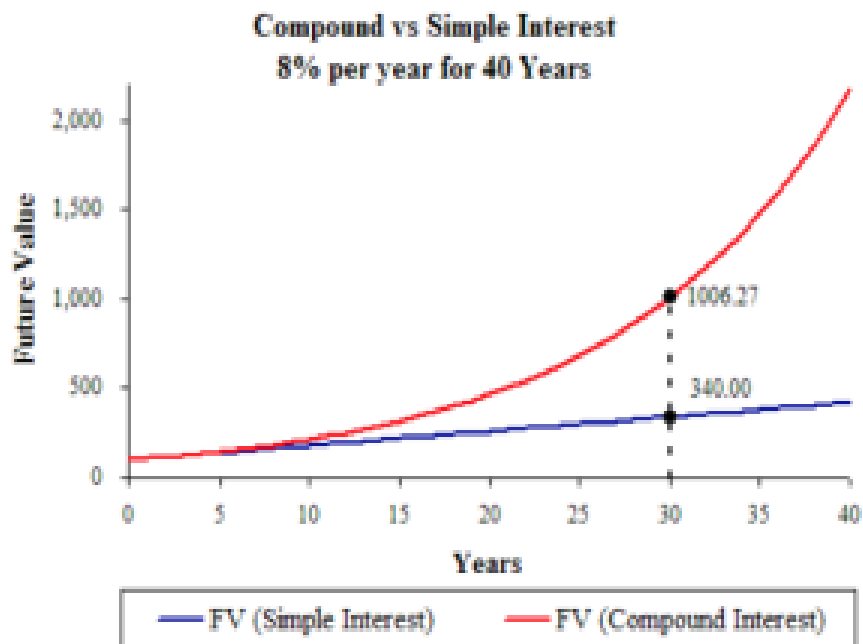
**Simple interest** is only paid on principal, while **compound interest** is paid on the principal plus all of the **interest** that has previously been earned

### Simple Interest and Compound Interest

- What is the difference between simple interest and compound interest?
  - Simple interest: Interest is earned only on the principal amount.
  - Compound interest: Interest is earned on both the principal and accumulated interest of prior periods.

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**Simple Interest Formula,**

$$SI = \frac{PRT}{100}$$

**Where SI is the Simple interest**

**P is the principal amount invested**

**R is the rate (%)**

**T is the time or period of the investment**

**Therefore, Amount will be,**

$$A = P(1 + it)$$

$$A = I + P$$

**Where I is Interest**

**Compound Interest Formula,**

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

**Example 1**

Faith invested R1500 to Esteem consult bank and he agreed to terminate the investment after 3 years at 12% p.a. simple interest. Calculate the interest of Faith's investment and total amount of the investment.

**Solution**

$$SI = \frac{PRT}{100}$$

$$SI = \frac{1500 * 12 * 3}{100}$$

$$SI = \frac{54000}{100}$$

$$SI = R540$$

**Therefore,**

$$A = R540 + R1500$$

$$A = R2040$$



### Example 2

Lerato borrows R8000 from Esteem Consult for 5 years at 10% interest compounded annually, what is the total amount Lerato needs to pay to Esteem Consult ?

### Solution

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

$$A = 8000(1 + 10\%)^5$$

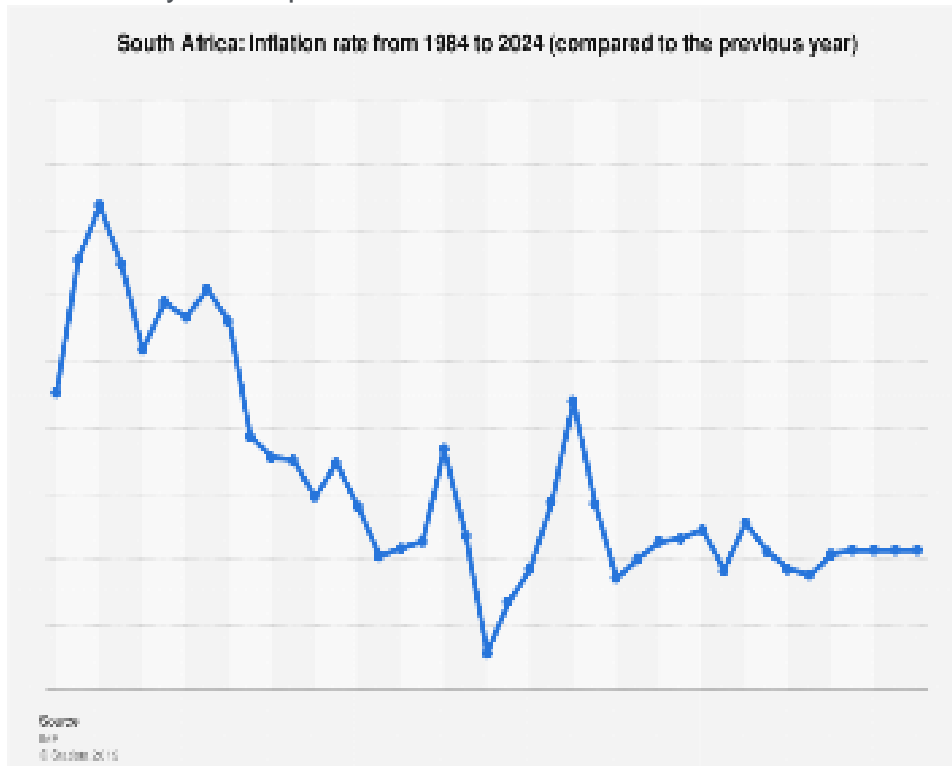
$$A = 8000\left(1 + \frac{10}{100}\right)^5$$

$$A = 8000(1 + 0.1)^5$$

$$A = 8000(1.1)^5$$

$$A = \mathbf{R12884.08}$$

3. **Inflation:** is a sustained increase in the general price level of goods and services in an economy over a period of time.





### Example

The population of a city in January 1960 was 30 000. The population is growing by 1.98% every year

Determine what the population of the city was in January 1971, if the growth remained constant.

### SOLUTION

(a)

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

$$P = 30\,000$$

$$i = \frac{1.98}{100}$$

$$t = 1971 - 1960$$

$$t = 11$$

$$A = ?$$

$$A = 30\,000 \left(1 + \frac{1.98}{100}\right)^{11}$$

$$A = 37\,220.85$$

$$\text{Population} = 37\,220$$

4. **Exchange rate** is the price of one **currency** in terms of another **currency**.

Description: **Exchange rates** can be either fixed or floating. Fixed **exchange rates** are decided by central banks of a country whereas floating **exchange rates** are decided by the mechanism of market demand and supply.



**EXAMPLE,**

American dollar	0,144	6,945
Australian dollar	0,144	6,948
Botswana pula	0,954	1,048
British pound	0,090	11,107
Euro	0,105	9,565
Hong Kong dollar	1,122	0,891
Japanese yen	11,905	0,084
Singapore dollar	0,183	5,453
Thai baht	4,386	0,228

Use above table to determine

- Israel is travelling to United State and he wants to buy \$1 200. How much Israel will pay in Rands?
- A British tourist travelling to South Africa is quoted R54 000 for a two weeks holiday. What will this cost him in British pounds?

**SOLUTION**

a.  $1\ 200 \times 6.945 = R8\ 334$

b.  $54\ 000 \times 0.090 = \pounds 4\ 860$



### ACTIVITY 1

Calculate the simple interest earned on investing R5 000 at 8,5% interest p.a. for 5 years.

Calculate the total amount owed if R12 500 is borrowed at 12,5% p.a. simple interest for 30 months.

How long will it take to double an amount of money invested at 12,5% p.a. *SI*?

### ACTIVITY 2

Find the compound interest earned on investing R2 600 at 7% p.a. *CI* for 4 years.

How much money would you have at the end of 5 years, if you invested R15 070 at 9,75% p.a. *CI*?



### ACTIVITY 3

Use the following exchange rates to answer the questions:

\$1 : R7,05; £1 : R11,35 and €1 : R9,92.

You found the following prices for a Mini Cooper S on the Internet. Calculate each value in rands and decide which is the cheapest option if you were to buy the car. (Overseas prices include transport and import costs to SA.)

- a) USA – \$21 850
- b) Germany – €20 950
- c) RSA – R206 100
- d) UK – £17 580

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