

SESSION 4: INTEREST**Key Concepts**

In this session we will focus on summarising what you need to know about:

- Interest
- Simple Interest
- Compound Interest

X-planation**1. INTEREST**

When we borrow money from a bank, we have to pay interest to the bank or financial institution. This is how the bank makes its money. The amount of interest we pay for money borrowed depends on:

- The amount we borrow, also called the principle sum/amount.
- The length of time we borrow the money for. The longer we borrow the money for, the more interest we pay.
- The current interest rate. Different banks charge different rates of interest for different kinds of loans.

When we borrow money, we want the lowest interest rate possible.

When we save or invest money, we want the highest interest rate possible.

The amount of interest earned or paid is always calculated as the accumulated amount (final amount) less the principle amount (amount invested or borrowed) $I = A - P$ or $A = P + I$

2. SIMPLE INTEREST

Simple interest is when you pay or earn interest on the original amount only. It is calculated as a percentage of the amount borrowed/invested and is the same year on year.

a) If you want to calculate the simple interest, you use the following formula:

$$SI = p \times i \times n$$

Where: SI = simple interest you will pay/earn
P= principle amount (amount being borrowed or invested)
i = interest rate being used (% per annum)
n = time in years you are borrowing/investing the money for

b) To calculate the total amount paid (interest + the original amount), you can use the formula:

$$A = p(1 + in)$$

Where A = accumulated amount (final amount)
P= principle amount (amount being borrowed or invested)
i = interest rate being used (% per annum)
n = time in years for which you are borrowing/investing the money

Example: If Peter invests R1,000.00 at 8% simple interest per annum (per year).

- i) How much interest does he earn after 10 years?
- ii) What is his total investment worth after 10 years?

3. COMPOUND INTEREST

This type of interest is most commonly used by financial institutions. It is when interest earned or charged is added to the principle amount regularly. The interest is calculated on a different amount each time, you pay or earn interest on interest.

We use the following formula for compound interest or compound growth:

$$A = p(1 + i)^n$$

Where: A = accumulated amount (final amount).
P = principle amount (amount being borrowed or invested).
i = interest rate being used for the payment interval.
n = the number of compound periods over the term of the loan/investment.

Note: When interest is compounded more than once a year (annually) you first have to calculate i and n in the following way:

- Where interest is calculated bi-annually $i = \text{rate} \div 2$ and $n = \text{no of years} \times 2$
- Where interest is calculated quarterly $i = \text{rate} \div 4$ and $n = \text{no of years} \times 4$
- Where interest is calculated monthly $i = \text{rate} \div 12$ and $n = \text{no of years} \times 12$

Example:

- i) Pumi invested R20 000 worth of shares in a publishing house. If she earns 12% per annum compound interest, what will the value of her investment be after 5 years.
- ii) Pumi invested R20 000 worth of shares in a publishing house. If she earns 12% per annum compound interest, compounded monthly, what will the value of her investment be after 5 years?

X-ample Questions

Question 1

The table below is an extract from a letter from Samlow to Mr Tshabalala. It shows the amounts that are available on instant loan from Samlow and the repayment involved.

Dear Mr Cohen,
As a valued Samlow customer, we are pleased to be able to offer you a personal loan at the following rates.

Loan Amount	24 months	36 months	48 months	60 months
R4 000	R229	R174	R147	R131
R8 000	R448	R338	R285	R253
R16 000	R864	R643	R534	R470
R25 000	R1 344	R1 000	R830	R730
FIXED REPAYMENTS!!!!!!!!!!				

These loan repayments conveniently **include** a monthly premium of R3,95 per R1 000 of the loan and a monthly administration fee of R9,50 for your optional personal protection plan.

- a) If Mr Tshabalala chooses to borrow R16 000 from Samlow, calculate how much he will finally repay if he takes to loan over
- i) 24 months? (2)
 - ii) 60 months? (2)
 - iii) In general do you advise him to borrow for longer or shorter time?
Give reason for your answer. (2)
- b) If he chooses the 60 month option, calculate the interest that he will pay over the period. (3)
- c) The loan repayments include insurance premium and administration fees. If Mr Tshabalala borrows R16 000, how much of each month's payment is the premium and how much is the administration fee? (4)
- d) Mr Tshabalala has two other options for borrowing the money.
- i) A friend has offered to lend him the R16 000 for five years at 18% per annum, simple interest. What would the total cost for this option be at the end of 5 years? (4)
 - ii) The Criterion Bank will lend him the R16 000 for 5 years at 16% per annum compounded monthly. Determine the cost of this option. (5)
- e) Which of the three options will be best for Mr Tshabalala? (2)

Question 2

- a) The population in Gauteng increased from 1 358 000 in 1970 to 3 246 000 in 1990.
- i) Determine the annual compound growth rate of the population as a percentage. (5)
 - ii) If the same annual growth rate is maintained, determine the population in Gauteng in the year 2050. (3)
- b) How much must Peter deposit in a bank if he needs R9 500 for an air ticket in three years' time and interest is 11,3% per annum compounded quarterly? (4)
- c) Kelly buys a couch for R3500, a coffee table for R1200 and 2 winged back chairs for R1470 each for her new lounge. She takes the goods on hire purchase. She pays a 20% deposit. She is charged 13.5% p.a. simple interest. She decides to take 3 years to pay off the loan. Calculate her monthly instalments. (6)
- d) Determine the compound interest rate per annum in order for money to double in value over a period of 6 years. (5)

Question 3

Mr Nkosi wants to open a small café on the corner of Church Street. He needs the following to start his business:

Buying of initial stock:	R80 000, once-off
Rent:	R6 000 per month
Infra structure:	R12 750, once-off
Salaries:	R288 000 <u>per annum</u>
Running costs (transport, electricity, etc.):	R2 420 per month

- a) How much money does he need to cover his expenses for the first month? Show all your calculations. (3)
- b) In order to cover all these expenses he will have to take out a loan from APSA Bank. He wants to borrow R125 170 and repay it over a period of three years.

He has two options:

Option 1: 14,5% interest per year, compounded quarterly

Option 2: 13,5% interest per year, compounded monthly

Use the formula: $A = P(1 + i)^n$.

- i) For each option calculate the total amount he would have to pay over the three year period. (7)
- ii) Motivate which option will be the best for Mr Nkosi. (2)

X-ercise

Question 1

Bongani is now 35 years old. He inherited R610 000 from his grandfather. He invested R340 000 at a rate of 8,2% compound interest which is calculated quarterly. He used R250 000 to pay off the bond on his home. He kept the rest for home improvements and other shopping.

- a) Calculate the amount that Bongani kept for home improvements and other shopping. (2)
- b) What percentage (%) of his inheritance did he use to pay off the bond on his home? (2)
- c) Bongani wants to retire after 25 years (at the age of 60). Calculate what his investment would be worth after 25 years if the interest rate stays the same. Use the formula: $A = p(1 + i)^n$ (5)
- d) Calculate how much interest he would have earned after 25 years. (2)
- e) Bongani wants to buy a plasma TV. He sees one on special at Your Shop. Look at the advert below and answer the following questions:



- i) Work out what percentage of the present cash price the deposit is. (2)
- ii) Work out what Bongani will pay if he buys the TV on terms. (3)
- iii) Do you think he should buy the TV on terms? Explain your answer. (2)

Question 2

- a) If you need R25 000 in 4 years' time, how much money must you deposit into an account if interest is compounded monthly at 9,7% p.a.? (4)
- b) Samantha invested an amount of R5 340. At the end of three years her investment was worth R6 501.85. What interest rate did she receive if her money was compounded monthly? (6)