Financial Maths 1

Key Concepts

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

- Simple Interest
- Compound Interest
- Compound decrease/Depreciation

Terminology & definitions

- **Interest** is paid on money that is either borrowed or invested.
- If you **borrow** money the cost to you is the interest you will have to pay back on the borrowed amount.
- Money that is **invested** will earn interest over a period of time.
- We express **interest rates** as a percentage.
- There are two **different ways** in which interest is calculated: Simple interest and Compound interest.

Concept: Simple Interest

- Simple interest is calculated on the initial/principal amount of money.
- The amount of interest received each period will be the same.
- Generally used in hire purchase agreements.

Formula :

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

X-ample 1

Find the simple interest earned on R6000 invested for 3 years at 12% p.a.

X-ample 2

How much would you have to invest at 7,5% p.a. simple interest to get R12000 after 2 years?

Concept: Compound Interest

- Compound interest is calculated on the principal amount and accumulated interest. It is, therefore, referred to as interest on interest.
- Compound interest earned will change from period to period.
- Can be calculated more than once a year.

Formula:

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

X-ample 3

a) You invest R10 000 for 3 years at 12% p.a. compound interest. What will your investment be worth after 3 years? Use formula: $A = P(1+i)^n$

b) How much will you have to invest, at 6% p.a. for 5 years, to get R10 000

Concept: Compound decrease/ Depreciation

- When an asset decreases in price or value we say it has depreciated For example, cars, equipment and furniture all lose value over time.

Formula:

$$A = P(1-i)^n$$

X-ample 4

A new sound system costs R12500. If the value of the sound system depreciates at a rate of 15% p.a., how much will you be able to sell it for at the end of 4 years?

X-ample 5

You have just bought a new car. The salesman tells you that the car will be worth R60 000 after 10 years at a depreciation rate of 7% p.a. How much does the car cost now? Use the formula

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

X-ample 6

A very rich woman wins the lottery. She decides to give all the money she has won away. In the first week, she gives away 25% of the prize money. In the second week, she gives away 25% of what's left, and so on. If she has R100 of the prize money left after 33 weeks, how much did she win? (to the nearest rand).
Use the formula

$$A = P(1-i)^n$$

X-ercise

1) Calculate the present value of a sum of money that amounts to R1000 in 5years time, if the simple interest is 5% p.a. Use the formula

$$P = \frac{A}{(1+in)}$$

2) R5000 was invested at 5,2% p.a. Simple interest. Find the number of years and days it took to accumulate to double its present value. Use the formula

$$n = \frac{A-P}{iP}$$

3) You invest R10 000 in a bank for 5years. How much will you get at the end of the fifth year if:
   a) Interest is calculated at 35% p.a. Simple interest
   b) Interest is calculated at 23% p.a. Compound interest.

4) Jabu is starting a business. He plans to invest his money with a bank for 8 years at an interest rate of 12% compounded annually. If he would like his investment to be worth R90 000 at the end of 8years, how much should he invest now? Use

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

5) You buy a car worth R95 000. How much will your car be worth after 5 years at a depreciation rate of 10% p.a. Use the formula:

$$A = P(1-i)^n$$

Answers

1) A = 1000 n= 5 i = 0,05
   P= 1000 / (1+0.05*5) = R800

2) P = 5000 A= 10 000 i= 0.052
   n= (10000-5000)/(0.052*5000) = 19,2307yrs
   = 19 years and 84 days to the nearest day.

3) a) A = 10000(1+.035*5) = R27 500
   b) A = $10000(1+0.23)^5$ = R28 153,06

4) A= 90000 i=0.12 n=8
   P=$90000/(1.12)^8$ = R36 349,49

5) P = 95 000 i=0.1 n=5
   A=$95000(1-0.1)^5$ = R56 096,55