GRADE 12
Financial Maths

Simple and Compound Interest

FINANCIAL MATHS REVISION

Simple Interest:

$$A = P\,(1 + ni)$$

Compound Interest:

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

A = total amount (End Amount)
P = principle amount (Beginning Amount)
n **= number of time periods**
i **= interest rate**

TO WORK OUT n:

Substitute for A, P and i

- Simplify
- Write in logarithmic form
- Use the log keys on the calculator
- Round off the answer to the nearest year

FINANCIAL MATHS REVISION

Simple Decay:

$$A = P\,(1 - ni)$$

Compound Decay:

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

A = total amount (End Amount)

P = principle amount (Beginning Amount)

n **= number of time periods**

i **= interest rate**

TO WORK OUT n:

Substitute for A, P and i

- Simplify
- Write in logarithmic form
- Use the log keys on the calculator
- Round off the answer to the nearest year

FINANCIAL MATHS- COMPOUND AND SIMPLE DECAY

- ***Decay or depreciation*** is when a quantity decreases by a percentage of the amount present. For example, your assets (house, car) and machinery lose value through age and use.
- Ways of calculating depreciation
- ***Simple decay or depreciation***: $A = P(1 - ni)$
- This is also called ***straight line depreciation*** because it can be represented with a ***straight line graph.***

FINANCIAL MATHS- SIMPLE DECAY

EXAMPLE 1

A car worth R120 000 depreciates at a rate of 12% (simple interest) p.a.

How much will the car be worth after 5 years?

A= ?

P= R120000

i= 12% = $\frac{12}{100} = 0.12$

n= 5 years

$$A = P(1 - i.n)$$
$$A = 120000(1 - 0.12 \times 5)$$
$$A = 48000$$
$$\therefore The\ car\ is\ worth\ R48000\ after\ 5\ years$$

The same formula as Simple Interest except there is a minus

FINANCIAL MATHS- COMPOUND DECAY

EXAMPLE 2

A car worth R120 000 depreciates at a rate of 12% p.a. (on a reducing balance).How much will the car be worth after 5 years?

A= ?

P= R120000

i= 12% = $\frac{12}{100} = 0.12$

n= 5 years

$$A = P(1-i)^n$$
$$A = 120000(1-0.12)^5$$
$$A = 63327.83002\ldots$$
$$\therefore The\ car\ is\ worth\ R63327.83\ after\ 5\ years$$

The same formula as Compound Interest except there is a minus

EXAMPLE 3

The value of a piece of machinery depreciates from R10 000 to R 5 000 in 4 years. What is the rate of depreciation, correct to two decimal places, if calculated on the:

a) Straight line method (i.e. simple depreciation)

A= R5000
P= R10000
i=?
n= 4 years

$A = P(1 - i.n)$
$5000 = 10000(1 - i.4)$
$\frac{5000}{10000} = 1 - i.4$
$\frac{1}{2} - 1 = -i.4$
$-\frac{1}{2} = -i.4$
$\frac{\frac{1}{2}}{4} = i$
$0.125 = i$
$\therefore$ *The interest rate is* 12.5%

b) Reducing balance (i.e. compound depreciation)

A= R5000
P= R10000
i=?
n= 4 years

$A = P(1 - i)^n$
$5000 = 10000(1 - i)^4$
$\frac{5000}{10000} = (1 - i)^4$
$\frac{1}{2} = (1 - i)^4$
$\sqrt[4]{\frac{1}{2}} = 1 - i$
$\sqrt[4]{\frac{1}{2}} - 1 = -i$
$0.1591035 = i$
$\therefore$ *The interest rate is* 15.9%