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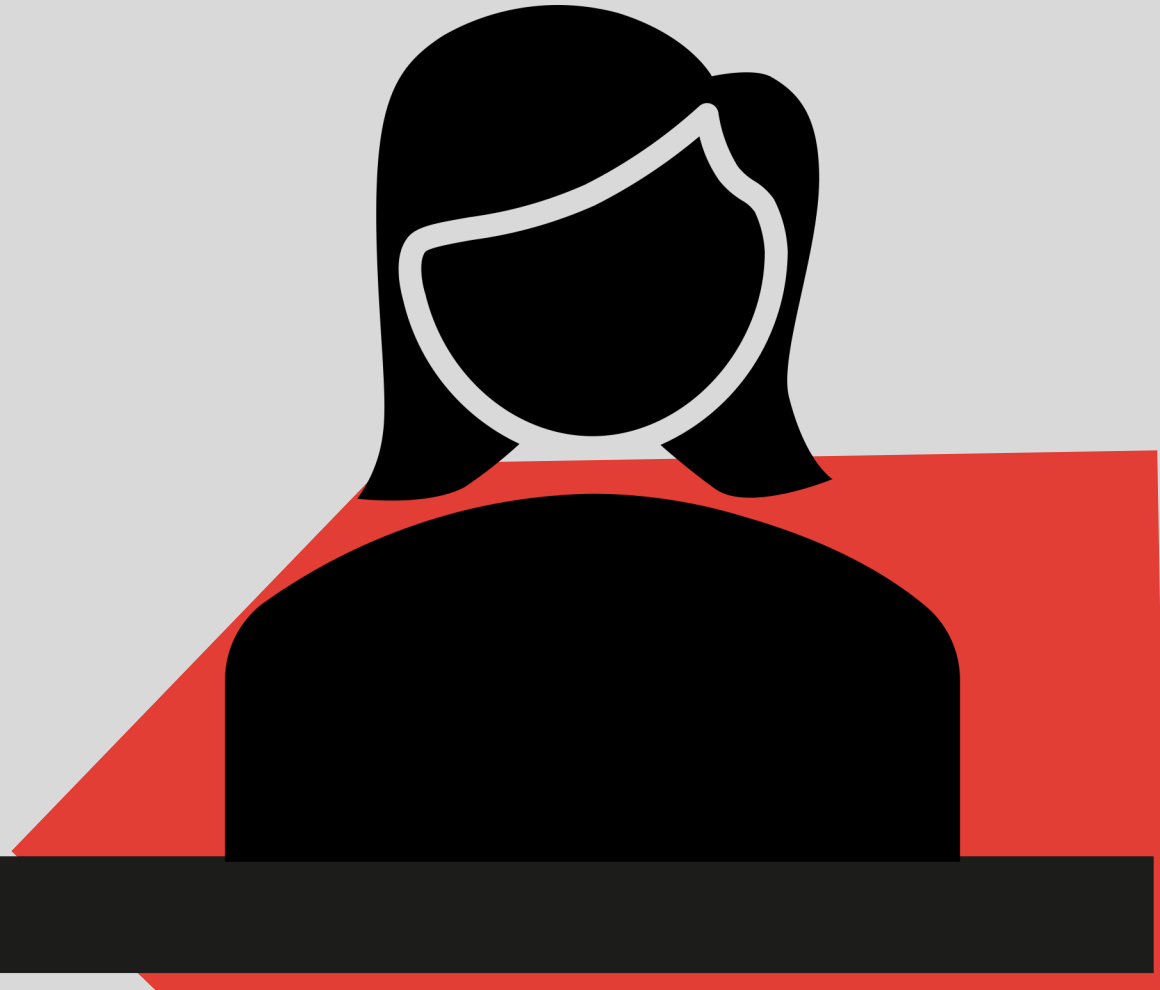
GRADE 11 MATHS

Nsuku Ngoveni



LESSON OBJECTIVES

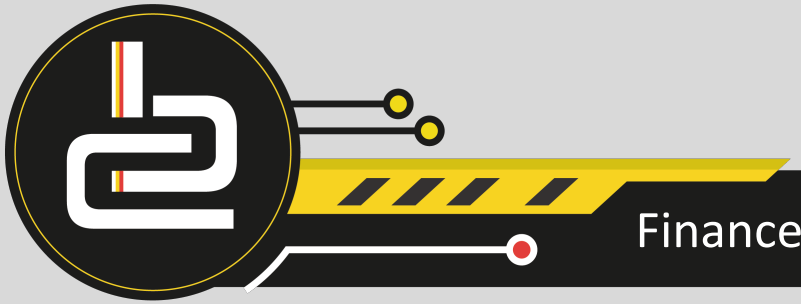
- Compound interest
- Simple interest
- Nominal interest rate

REVISION(SIMPLE AND COMPOUND INTEREST)

- **Interest** is a fee paid for the use of borrowed money, or money earned on money saved. It is calculated as a percentage of the money borrowed or lent.

- **Simple interest** is the interest on an initial (principal) sum of money. Each year you receive or you are charged the same amount of interest.

- **Compound interest** is also interest on a principal amount P. For each year, the previous year's final amount becomes the new principal amount. So the interest is calculated on the principal and the interest from the previous year.



SIMPLE AND COMPOUND INTEREST

Simple interest

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

Compound interest

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

Where:

P is the principal (original sum of money invested or borrowed)
i is the interest rate
n is the number of years
A is the final amount

SIMPLE AND COMPOUND INTEREST EXAMPLE

Sam wants to invest R 3450 for 5 years. Wise Bank offers a savings account which pays simple interest at a rate of 12,5% per annum, and Grand Bank offers a savings account paying compound interest at a rate of 10,4% per annum. Which bank account would give Sam the greatest accumulated balance at the end of the 5 year period?

Simple interest

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

Compound interest

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

SIMPLE AND COMPOUND INTEREST EXAMPLE SOLUTION

Simple interest

P = 3450
i = 0,125
n = 5
$A = P(1 + ni)$

Compound interest

P = 3450
i = 0,104
n = 5
$A = P(1 + i)^n$

SIMPLE AND COMPOUND INTEREST EXAMPLE SOLUTION

Substitute the values to determine the accumulated amount for the Wise Bank savings

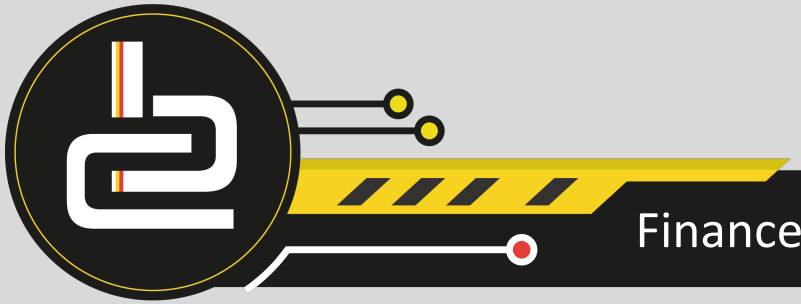
Simple interest

$$A = 3450(1 + 0{,}125 \times 5)$$
$$= R\ 5606{,}25$$

Substitute the values to determine the accumulated amount for the Grand Bank savings
account.

Compound interest

$$A = 3450(1 + 0{,}104)5$$
$$= R\ 5658{,}02$$



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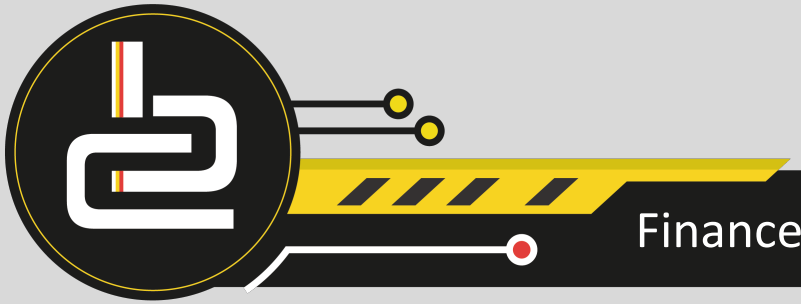
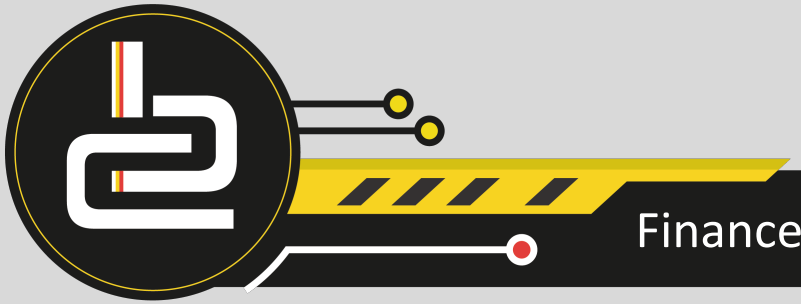


SIMPLE AND COMPOUND DECAY

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.

Compound decay or depreciation: $A = P(1 - i)^n$. This is also called depreciation on a reducing balance because the interest is calculated on the amount left over as it decreases. The amount left over is 'the reducing balance'.

Simple decay or depreciation example

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?

$A = P(1 - ni)$ A = ? P = 120 000 i = 12% = 0,12 n = 5 years

$A = 120\,000\,(1 - 5\,.\,0{,}12)$

A = 48 000

The car will be worth R48 000 after 5 years.

compound decay or depreciation example

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?

$A = P(1 - i)^n$ A = ? P = 120 000 i = 12% = 0,12 n = 5 years

$A = 120\,000\,(1 - 0{,}12)5$

$A = R63\,327{,}83$ (to the nearest cent)

Compare this with simple depreciation:

The car's value is R63 327,83 – R48 000 = R15 327,83 less on simple decay

than on compound decay.

NOMINAL AND EFFECTIVE INTEREST RATES

- ✓A nominal interest rate is the quoted interest rate.
- ✓An effective interest rate is the actual interest rate received. If you are quoted a nominal interest rate of 8% p.a., the resulting effective rate will be different depending on if it is worked out annually, monthly or semi-annually
- ✓We use the following formula to calculate the effective interest rate from the nominal interest rate or vice versa:

$$1 + i^{effective} = \left(1 + \frac{i^{nominal}}{k}\right)^{k}$$

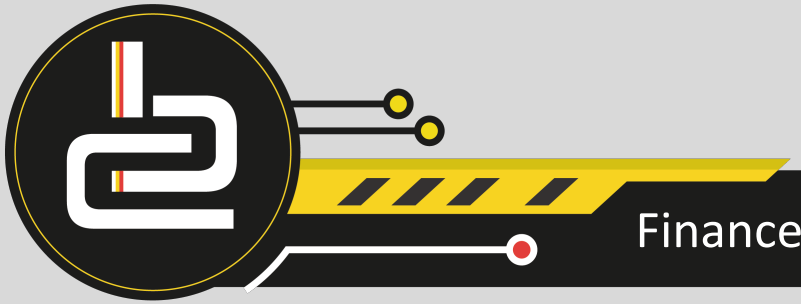
NOMINAL AND EFFECTIVE INTEREST RATES

1.You borrow R500 at 8% p.a. compounded for one year.

At the end of the year you owe 500(1+ 0,08)1 = R 540.

2. You borrow R500 at 8% p.a. compounded monthly for one year. At the end of the year you owe $500(1+\frac{0,08}{12})^{1x12} = 541,50$ So effectively, you are charged R41,50 interest on R500.

Your interest rate is actually 8,3% (divide interest by principal amount then multiply by 100).



THE END

Remember, numbers don’t lie.