Grade 12 Term 3 Topics

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**These are the major term 3 topics as listed in the Grade 12 Physical Sciences ATP Document for 2023/2024.**

Remember: your school may do topics in a different order or in different terms.

Page	Topic	Physics or Chemistry
2-3	Electric circuits	Physics
4-5	Electrodynamics (motors, generators, AC vs DC)	Physics
6-7	Optical Phenomena: Photoelectric effect	Physics
8-11	Electrochemical reactions (Galvanic vs electrolytic cells)	Chemistry

## Page 12/13 - Prelim/Trial and final exam info

ELECTRIC CIRCUITS
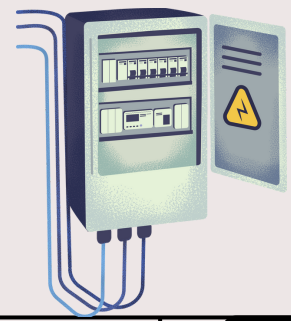
Sub topics to study and practice

Sub-topic	Formulae/things To know	☑
Solve circuit problems involving current, voltage, resistance	$R = \frac{V}{I}$ (see more on pg 3)	
Explain the terms emf and internal resistance		
Solve problems with the emf formula	$\varepsilon = I(R + r)$	

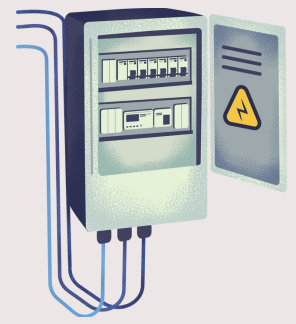**REMEMBER TO STUDY ALL YOUR ELECTRICITY PRINCIPLES & FORMULAE FROM GRADE 10 AND 11.**

WATCH VIDEOS ON MY CHANNEL TO HELP YOU REVISE & PRACTICE

MISS MARTINS
Circuits Exam summary an...
EXAM
ELECTRICITY
SUMMARY
Watch on ▶ YouTube
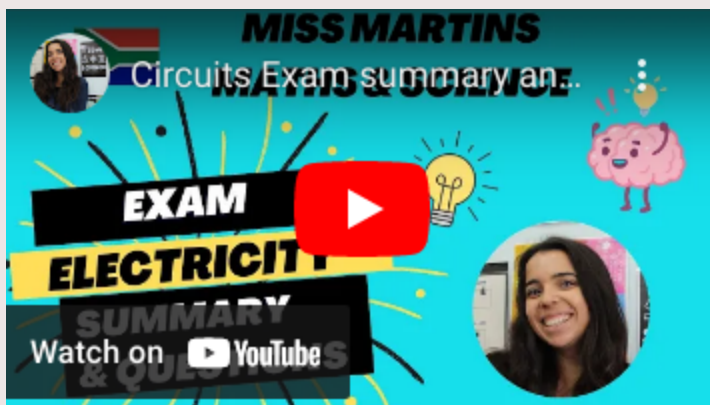
DATA SHEET

$$R = \frac{V}{I} \qquad R_s = R_1 + R_2 + \dots$$

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \dots \qquad q = I\Delta t$$

$$\text{emf}(\varepsilon) = I(R + r)$$

$$W = Vq \qquad\qquad P = \frac{W}{\Delta t}$$

$$W = VI\Delta t \qquad\quad P = VI$$

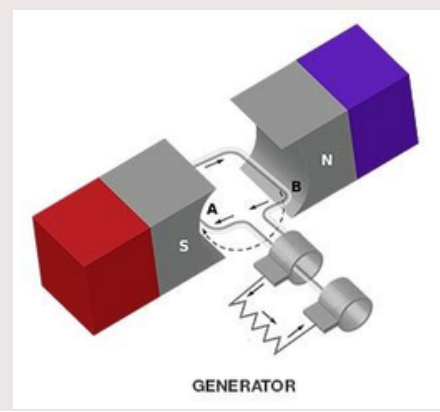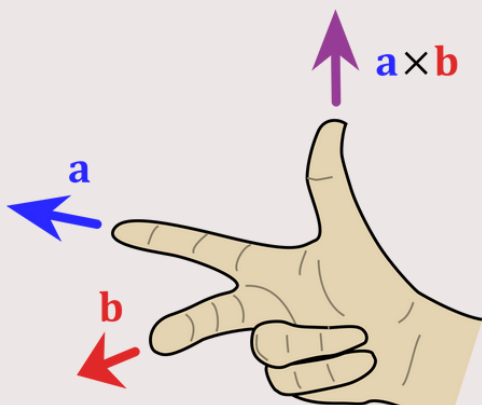$$W = I^2 R \Delta t \qquad\quad P = I^2 R$$

$$W = \frac{V^2 \Delta t}{R} \qquad\quad P = \frac{V^2}{R}$$

ELECTRODYNAMICS

Sub topics to study and practice

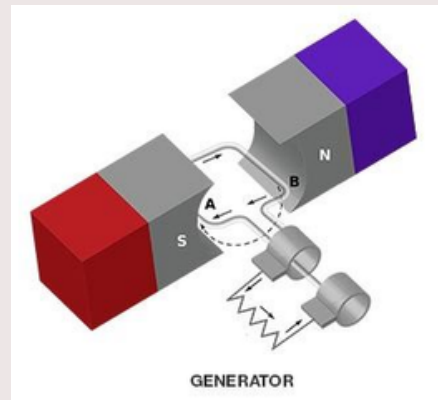| SUB-TOPIC	FORMULAE/THINGS TO KNOW	☑
Generators: energy conversion + principle of electromagnetic induction		
AC vs. DC generators: components, functions and uses		
Motors: energy conversion + motor effect		
Components of motors and examples of uses		
AC vs. DC current: Differences and advantages of AC over DC		
Draw and interpret graphs: • voltage vs. time • current vs. time } for AC and DC		
Define the term "rms" for alternating voltage & current and perform calculations	$I_{rms} = \dfrac{I_{max}}{\sqrt{2}}$ $V_{rms} = \dfrac{V_{max}}{\sqrt{2}}$ (see page 5 for more formulae)	

$a \times b$
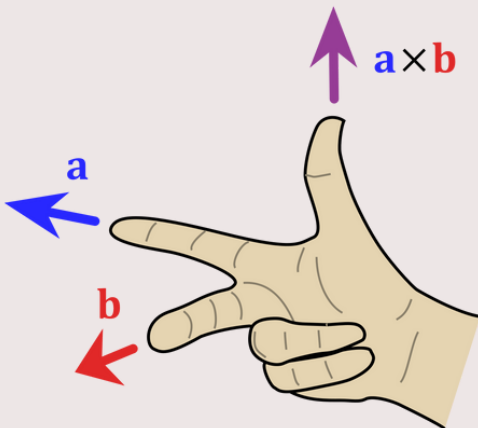
a

b

GENERATOR

DATA SHEET

$$I_{rms} = \frac{I_{max}}{\sqrt{2}}$$

$$V_{rms} = \frac{V_{max}}{\sqrt{2}}$$
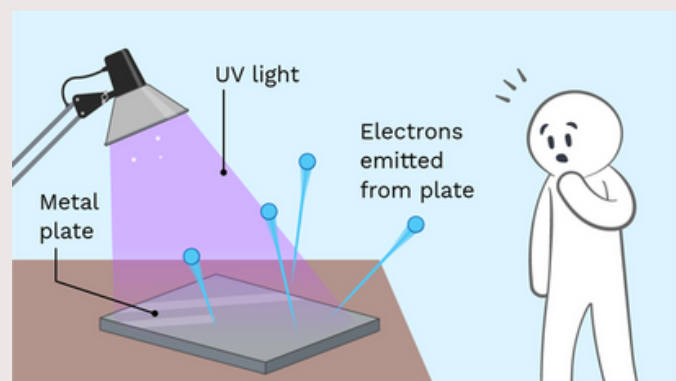
$$P_{ave} = V_{rms} I_{rms}$$

$$P_{ave} = I^2_{rms} R$$

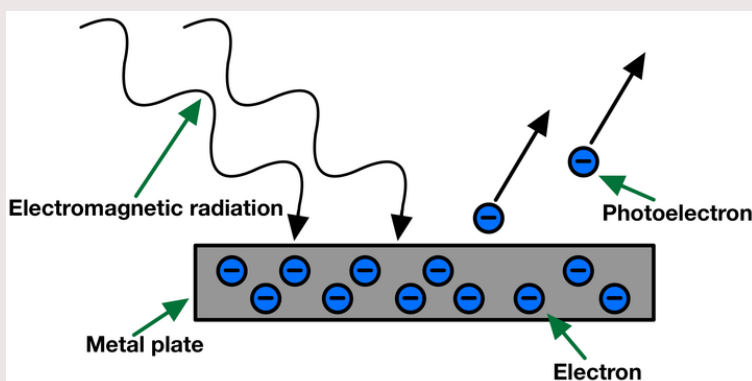$$P_{ave} = \frac{V^2_{rms}}{R}$$

$\mathbf{a} \times \mathbf{b}$

$\mathbf{a}$

$\mathbf{b}$

GENERATOR

OPTICAL PHENOMENA: PHOTOELECTRIC EFFECT

Sub topics to study and practice

SUB-TOPIC	FORMULAE/THINGS TO KNOW	☑
Describe the photoelectric effect, state it's significance and understand that it demonstrates the particle nature of light		
Define the following terms: - threshold frequency f_0 - work function W_0	$W_0 = hf_0$	
Perform calculations using the photoelectric equation	$E = W_0 + E_{K(max)}$	
Explain the effect of intensity and frequency on the photoelectric effect		
Explain the formation of atomic spectra		
Explain the difference between atomic admission spectra and atomic absorption spectra		

Electromagnetic radiation

Photoelectron

Metal plate

Electron

UV light

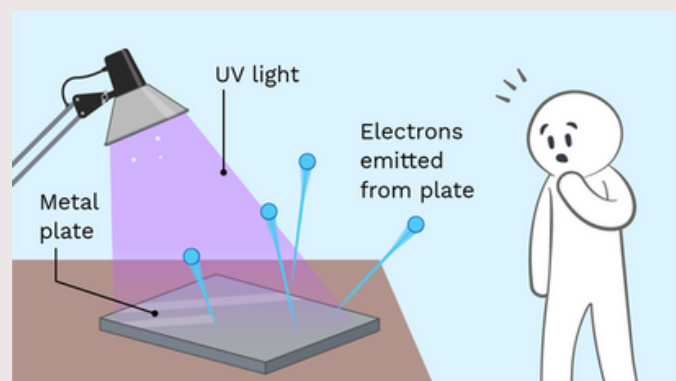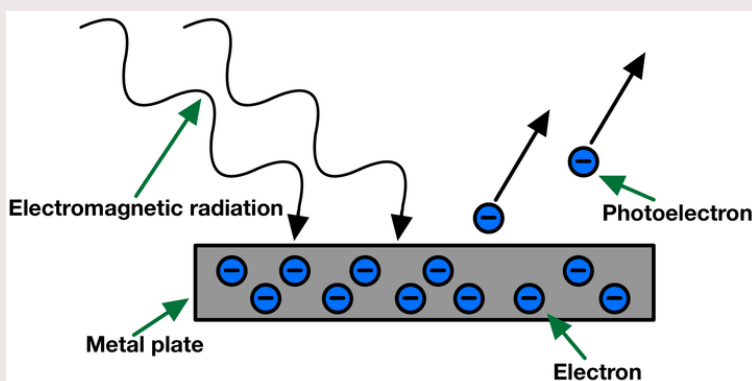Electrons emitted from plate

Metal plate

DATA SHEET

$$V = f\lambda \qquad T = \frac{1}{F}$$

$$E = hf \quad \text{OR} \quad E = h\frac{c}{\lambda}$$

$$E = W_0 + E_{k(max)} \quad \text{where...}$$

$$W_0 = hf_0 \quad \text{and} \quad E_{k(max)} = \frac{1}{2}mv^2_{max}$$

Electromagnetic radiation · Photoelectron · Metal plate · Electron

UV light · Electrons emitted from plate · Metal plate

ELECTROCHEMICAL REACTIONS
(ELECTROCHEMISTRY)

Sub topics to study and practice

General

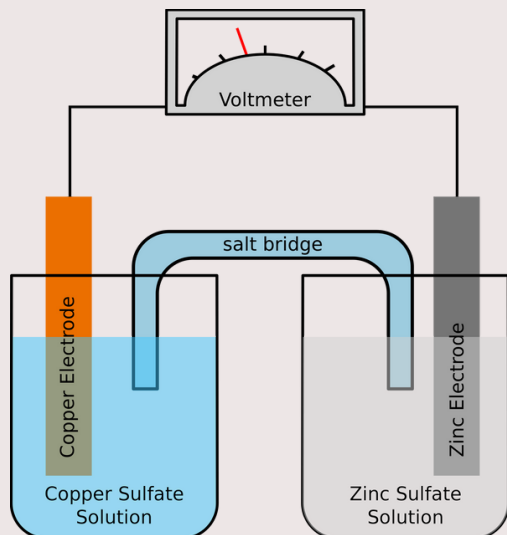| Sub-topic	Formulae/things To know	☑
Define oxidation and reduction in terms of electron transfer and oxidation numbers		
Define oxidising and reducing agents		
Define an anode and a cathode in terms of oxidation and reduction		
Define the term electrolyte		

OILRIG

Sub topics to study and practice

Galvanic cell

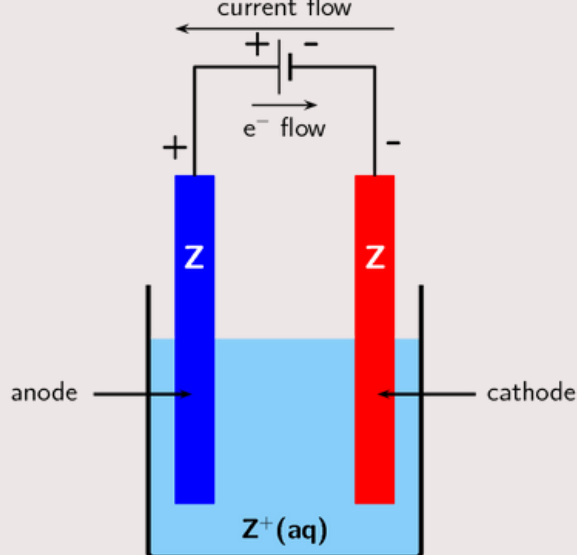| SUB-TOPIC	FORMULAE/THINGS TO KNOW	☑
Define a galvanic cell and energy conversions		
Understand the components of a galvanic cell and their functions e.g. salt bridge		
Predict * movement of ions * Flow of electrons in external circuit * In which half cell oxidation/reduction takes place		
Write half reactions at each electrode and overall (net) cell reactions		
Use cell notation to represent a galvanic cell		
Calculate the emf of a galvanic cell	$E^{\ominus}_{cell} = E^{\ominus}_{cathode} - E^{\ominus}_{anode}$ OR $E^{\ominus}_{cell} = E^{\ominus}_{reduction} - E^{\ominus}_{oxidation}$	
Understand and explain why V_{cell} decreases and when the cell reaches $V_{cell} = 0$		
State the standard conditions under which standard electrode potentials are determined		
Describe the standard hydrogen electrode and explain how electrode potentials are determined		

Sub topics to study and practice

Electrolytic cell

Sub-topic	Formulae/things To know	☑
Define an electrolytic cell, energy conversions and the term "electrolysis"		
Describe * The movement of ions in solution * Direction of electron flow in external circuit		
Write half reactions at each electrode and overall (net) cell reactions		
Describe and understand: The decomposition of copper (II) chloride	Use - half reactions - equations for the overall cell reaction - layout of cell	
Describe and understand: Electroplating	Use - half reactions - equations for the overall cell reaction - layout of cell	
Describe and understand: Refining of metals	Use - half reactions - equations for the overall cell reaction - layout of cell	
Describe and understand: Electrolysis of a concentrated solution of sodium chloride	Use - half reactions - equations for the overall cell reaction - layout of cell	

DATA SHEET FOR ELECTROCHEMISTRY

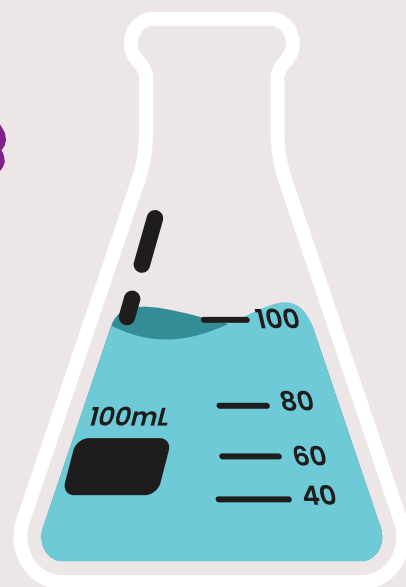$$E^{\ominus}_{cell} = E^{\ominus}_{cathode} - E^{\ominus}_{anode}$$

OR

$$E^{\ominus}_{cell} = E^{\ominus}_{reduction} - E^{\ominus}_{oxidation}$$

OR

$$E^{\ominus}_{cell} = E^{\ominus}_{oxidising\ agent} - E^{\ominus}_{reducing\ agent}$$

Remember in your exam to use EITHER Table 4A OR Table 4B

100
80
100mL
60
40

Prelim/trial and final exam info!

Paper 1: Physics

Time:	3 hours
Total marks:	150

TOPIC	Sub-topic	Mark allocation
Mechanics	• Newtons laws (grade 11) • Vertical projectile motion • Momentum & impulse • Work energy Power	65
Waves, sound & light	• The Doppler effect	15
Electricity & magnetism	• Electrostatics (gr 11) • Electric circuits (including gr 11 stuff) • Electrodynamics	55
Matter & materials	• Optical phenomena and properties of materials (photoelectric effect)	15

Prelim/trial and final exam info!

Paper 2: Chemistry

Time: 3 hours
Total marks: 150

TOPIC	Sub-topic	Mark allocation
Matter and materials	• Organic molecules (organic chemistry) • Intermolecular forces	58
Chemical change	• Rate and extent of reaction • chemical equilibrium • Acids and bases • Representing chemical change (grade 10) • Energy and chemical change (grade 11) • Stoichiometry application (grade 11) • Electrochemical reactions (electrochemistry)	92

Summary of topics compiled by Miss Martins.

Qualified Physical Sciences and Maths teacher.

Information obtained from the 2023/2024 annual teaching plans accessed at: https://www.education.gov.za/Curriculum/NationalCurriculumStatementsGradesR-12/2023ATPsFET.aspx

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