

## 2023/24 ANNUAL TEACHING PLANS: PHYSICAL SCIENCES: GRADE 12 (TERM 1)

## SBA GUIDELINES

## Practical work:

- Learners do TWO experiments (ONE Chemistry, ONE Physics) for SBA. Choose these experiments from this ATP
- Term 1: Choose ONE experiment. Record in term one
- Term 2 OR term 3: Choose ONE experiment. Record the mark in term 3
- The suggested formal experiments NOT chosen for SBA, should become informal experiments



basic education

Department:  
Basic Education  
REPUBLIC OF SOUTH AFRICA

TERM 1	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10-11
<b>CAPS TOPICS</b>	<b>MECHANICS: Momentum &amp; impulse (2 hrs)</b>	<b>MECHANICS: Momentum &amp; impulse (4 hrs)</b>	<b>MECHANICS: Momentum &amp; impulse (4 hrs)</b>	<b>MECHANICS: Vertical projectile motion (4 hrs)</b>	<b>MECHANICS: Vertical projectile motion (4 hrs)</b>	<b>MATTER &amp; MATERIALS: Organic molecules (4 hrs)</b>	<b>MATTER &amp; MATERIALS: Organic molecules (4 hrs)</b>	<b>MATTER &amp; MATERIALS: Organic molecules (4 hrs)</b>	<b>MATTER &amp; MATERIALS: Organic molecules (4 hrs)</b>	<b>Consolidation of term 1 (2 hrs) CONTROL TEST (2 hrs) Discussion and remedial work on test (2hrs)</b>
<b>TOPICS, CONCEPTS, SKILLS AND VALUES</b>	<ul style="list-style-type: none"> <li>Define &amp; calculate the momentum of a moving object: <math>p = mv</math></li> <li>Describe the vector nature of momentum &amp; draw vector diagrams</li> <li>State Newton's second law in terms of momentum: <math>F_{net} = \frac{\Delta p}{\Delta t}</math></li> <li>Calculate the change in momentum when a resultant force acts on an object</li> </ul>	<ul style="list-style-type: none"> <li>Define impulse</li> <li>Use the impulse-momentum theorem (<math>F_{net}\Delta t = m\Delta v</math>) in calculations for a variety of situations (one dimension)</li> <li>Impulse and safety considerations</li> <li>State the principle of conservation of linear momentum</li> <li>Explain what is meant by an isolated system, internal and external forces</li> </ul>	<ul style="list-style-type: none"> <li>Apply conservation of momentum to collisions of two objects (one dimension)</li> <li>Distinguish between elastic and inelastic collisions by calculation</li> </ul>	<ul style="list-style-type: none"> <li>Explain what is meant by a projectile</li> <li>Use equations of motion to determine the position, velocity, and displacement of a projectile at any given time</li> <li>Sketch <math>x</math> vs <math>t</math>, <math>v</math> vs <math>t</math> and a <math>v</math> vs <math>t</math> graph for a free falling object, an object thrown vertically upwards, object thrown vertically downwards &amp; bouncing objects</li> <li>Give equations for position versus time and velocity versus time for the graphs of 1D projectile motion</li> </ul>	<ul style="list-style-type: none"> <li>For given <math>x</math> vs <math>t</math>, <math>v</math> vs <math>t</math> or a <math>v</math> vs <math>t</math> graphs, determine position, displacement and velocity or acceleration at any time <math>t</math></li> <li>For given <math>x</math> vs <math>t</math>, <math>v</math> vs <math>t</math> or a <math>v</math> vs <math>t</math> graphs, describe the motion of an object bouncing, thrown vertically upwards &amp; thrown vertically downward and so on</li> </ul>	<ul style="list-style-type: none"> <li>Define organic molecules, functional group, hydrocarbon, homologous series, saturated, unsaturated, and structural isomer</li> <li>Write condensed, structural &amp; molecular formulae (max 8 C atoms, 1 functional group per molecule) for alkanes (no rings), alkenes (no rings), alkynes, alcohols, halo alkanes (no rings), carboxylic acids, aldehydes, ketones, esters</li> <li>Write IUPAC names for structural, condensed structural formulae for compounds from above series</li> </ul>	<ul style="list-style-type: none"> <li>Write IUPAC names from structural or condensed structural formulae for compounds listed (one functional group per molecule, max two functional groups for haloalkanes)</li> <li>Identify alkyl substituents (methyl- and ethyl-), max THREE alkyl substituents</li> <li>Identify compounds that are saturated, unsaturated, structural isomers (chain, positional, functional)</li> <li>Physical properties: boiling point, melting point, vapour pressure</li> </ul>	<ul style="list-style-type: none"> <li>Relationship between physical properties and strength of IMF, type of functional group, chain length and branching</li> <li>Combustion of alkanes in excess oxygen and use as fuels</li> <li>Equation &amp; reaction conditions for the formation of an ester and IUPAC names for reactant and products</li> <li>Classify reactions as elimination, addition, or substitution</li> <li>Equations and reaction conditions for addition reactions of alkenes</li> </ul>	<ul style="list-style-type: none"> <li>Equations and reaction conditions for elimination reactions: dehydrohalogenation of haloalkanes, cracking of alkanes, dehydration of alcohols</li> <li>Equations and reaction conditions for substitution reactions: hydrolysis of halo alkanes, halogenation of alkanes</li> </ul>	<b>Revision (2 hours)</b> <b>ONE PAPER (100 marks- 2 hours)</b> <b>50 marks – Physics</b> <ul style="list-style-type: none"> <li>Newton's laws of motion</li> <li>Momentum and impulse</li> <li>Vertical projectile motion</li> </ul> <b>50 marks - Chemistry</b> <ul style="list-style-type: none"> <li>Organic molecules</li> <li>Discussion and remedial work of control test</li> </ul>
<b>REQUISITE PRE-KNOWLEDGE</b>	Newton's laws of motion	Newton's laws of motion Equations of motion	Momentum Equations of motion	Equations of motion	Equations of motion	Chemical bonding Valency	Intermolecular forces	IUPAC naming, writing different formulae	IUPAC naming, writing different formulae	
<b>RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING</b>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>PhET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>PhET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Apparatus: Conservation of momentum</li> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>PhET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Apparatus for experiment below</li> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>PhET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>PhET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Apparatus: Chemicals and apparatus for experiment below</li> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>Previous question papers</li> </ul>	

TERM 1		WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10-11
ASSESSMENT	INFORMAL ASSESSMENT: REMEDIATION	• Homework	• Homework	• Homework • Informal test	• Homework	• Homework • Informal test	• Homework	• Homework • Informal test	• Homework	• Homework • Informal test	
	SBA (FORMAL) CHOOSE ONE EXPERIMENT	None	None	Formal practical (Physics): Conservation of linear momentum	Formal practical (Physics): Determine the acceleration due to gravity	None	None	None	Formal practical: (Chemistry) Preparation of three esters <b>OR</b> reactions of alkanes and alkenes with Br <sub>2</sub>	None	Control test

## 2023/24 ANNUAL TEACHING PLANS: PHYSICAL SCIENCES: GRADE 12 (TERM 2)

TERM 2	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
<b>CAPS TOPICS</b>	<b>MECHANICS:</b> Work, energy, and power (2 hrs)	<b>MECHANICS:</b> Work, energy, and power (4 hrs)	<b>MECHANICS:</b> Work, energy, and power (2 hrs)	<b>WAVES, SOUND &amp; LIGHT: Doppler Effect</b> (3 hrs)	<b>WAVES, SOUND &amp; LIGHT: Doppler Effect</b> (2 hrs) <b>CHEMICAL CHANGE: Rate and extent of reaction</b> (2 hrs)	<b>CHEMICAL CHANGE: Rate and extent of reaction</b> (4 hrs)	<b>CHEMICAL CHANGE: Chemical equilibrium</b> (4 hrs)	<b>CHEMICAL CHANGE: Chemical equilibrium</b> (4 hrs)	<b>CHEMICAL CHANGE: Acids and bases</b> (4 hrs)	<b>CHEMICAL CHANGE: Acids and bases</b> (3 hrs)	June examination OR Control test (4 hrs)
<b>TOPICS, CONCEPTS, SKILLS AND VALUES</b>	<b>Work</b> <ul style="list-style-type: none"> <li>Define the work done on an object</li> <li>Draw force diagram &amp; free-body diagrams</li> <li>Calculate the net work done on an object</li> <li>Distinguish between positive work and negative net work done on the system</li> </ul>	<ul style="list-style-type: none"> <li>State the work-energy theorem</li> <li>Apply the work-energy theorem on horizontal, vertical, and inclined planes</li> <li>Define conservative and non-conservative forces and give examples</li> <li>State the principle of conservation of mechanical energy</li> <li>Solve problems using the equation <math>W_{nc} = \Delta E_k + \Delta E_p</math></li> <li>Show that <math>E_{mech}</math> is conserved in the absence of non-conservative forces</li> </ul>	<ul style="list-style-type: none"> <li>Define power and calculate the power involved when work is done</li> <li>Perform calculations using <math>P_{ave} = FV_{ave}</math> when an object moves at a constant speed along a rough horizontal surface or a rough inclined plane</li> <li>Calculate the minimum power required of an electric motor to pump water from a borehole of a particular depth at a particular rate using <math>W_{nc} = \Delta E_k + \Delta E_p</math></li> </ul>	<ul style="list-style-type: none"> <li>State the Doppler Effect and explain (using illustrations) the change in pitch observed when a source moves toward or away from a listener (sound and ultrasound)</li> <li>State applications of the Doppler Effect with ultrasound waves in medicine, e.g. to measure the rate of blood flow or the heartbeat of a foetus in the womb</li> <li>Solve problems using <math>f_L = \frac{v \pm v_L}{v \pm v_S} f_s</math> when EITHER source or listener moves</li> </ul>	<p><b>Doppler Effect</b></p> <ul style="list-style-type: none"> <li>With light, explain 'red shifts' &amp; use the Doppler Effect to explain why we conclude that the universe is expanding</li> </ul> <p><b>Rate of reaction</b></p> <ul style="list-style-type: none"> <li>Define <i>reaction rate</i></li> <li>Calculate reaction rate from given data</li> <li>List the factors that affect the rate of chemical reactions</li> </ul>	<ul style="list-style-type: none"> <li>Explain in terms of the collision theory how the various factors affect the rate of chemical reactions</li> <li>Answer questions and interpret data (tables or graphs) on different experimental techniques for measuring the rate of a given reaction</li> <li>Define the term <i>positive catalyst</i></li> <li>Interpret graphs of distribution of molecular energies to explain how a catalyst, temperature and concentration affect rate</li> </ul>	<ul style="list-style-type: none"> <li>Explain: Open &amp; closed systems, reversible reactions, dynamic equilibrium</li> <li>List the factors which influence the position of an equilibrium</li> <li>State Le Chatelier's principle and use it to explain changes in equilibria</li> <li>Interpret simple graphs of equilibrium</li> <li>List the factors which influence the value of the equilibrium constant <math>K_c</math></li> </ul>	<ul style="list-style-type: none"> <li>Write an expression for the equilibrium constant from a given equation</li> <li>Perform calculations based on <math>K_c</math> values</li> <li>Explain the significance of high and low values of the equilibrium constant</li> </ul>	<ul style="list-style-type: none"> <li>Define acids and bases according to Arrhenius and Lowry-Brønsted</li> <li>Distinguish between strong and weak acids/bases with examples</li> <li>Distinguish between concentrated and dilute acids/bases</li> <li>Identify conjugate acid-base pairs for given compounds</li> <li>Write neutralisation reactions of common laboratory acids and bases</li> <li>Perform calculations based on titration reactions &amp; motivate the choice of an indicator</li> </ul>	<ul style="list-style-type: none"> <li>Determine the approximate pH of salts in salt hydrolysis</li> <li>Explain the pH scale and calculate pH values of strong acids and strong bases</li> <li>Define the concept of <math>K_w</math> and explain the auto-ionisation of water</li> <li>Compare the <math>K_a</math> and <math>K_b</math> values of strong and weak acids and bases</li> <li>Compare strong and weak acids by looking at pH, conductivity &amp; reaction rate</li> </ul>	<p>June examination <b>TWO PAPERS</b></p> <ul style="list-style-type: none"> <li><b>Paper 1 – 150 marks, 3 hrs AND</b></li> <li><b>Paper 2 – 150 marks, 3 hrs OR</b></li> </ul> <p><b>CONTROL TEST (150 marks – 3 hours)</b></p> <ul style="list-style-type: none"> <li><b>75 marks – Physics</b></li> <li><b>75 marks - Chemistry</b></li> </ul>
<b>REQUISITE PRE-KNOWLEDGE</b>	<ul style="list-style-type: none"> <li>Gravitational potential and kinetic energy</li> <li>Equations of motion</li> <li>Force and free-body diagrams</li> </ul>	<ul style="list-style-type: none"> <li>Gravitational potential and kinetic energy</li> <li>Equations of motion</li> <li>Newton's 2<sup>nd</sup> law of motion</li> </ul>	<ul style="list-style-type: none"> <li>Gravitational potential and kinetic energy</li> <li>Equations of motion</li> <li>Newton's 2<sup>nd</sup> law of motion</li> </ul>	<ul style="list-style-type: none"> <li>Wave properties: Frequency, wavelength, amplitude</li> <li>Graphical representation of waves</li> </ul>	<ul style="list-style-type: none"> <li>Wave properties: Frequency, wavelength, amplitude</li> <li>Writing of formulae and balanced equations</li> <li>Energy in chemical reactions – Gr 11</li> </ul>	<ul style="list-style-type: none"> <li>Writing of formulae and balanced equations</li> <li>Energy in chemical reactions – Gr 11</li> </ul>	<ul style="list-style-type: none"> <li>Writing of formulae and balanced equations</li> <li>Stoichiometry</li> </ul>	<ul style="list-style-type: none"> <li>Writing of formulae and balanced equations</li> <li>Stoichiometry</li> </ul>	<ul style="list-style-type: none"> <li>Writing of formulae and balanced equations</li> <li>Stoichiometry</li> </ul>	<ul style="list-style-type: none"> <li>Writing of formulae and balanced equations</li> <li>Stoichiometry</li> </ul>	<ul style="list-style-type: none"> <li>Writing of formulae and balanced equations</li> <li>Stoichiometry</li> </ul>
<b>RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING</b>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Apparatus for experiment below</li> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Apparatus: Chemicals and apparatus for experiment below</li> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Apparatus: Chemicals and apparatus for experiment below</li> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Apparatus: Chemicals and apparatus for experiment below</li> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>Previous question papers</li> </ul>

TERM 2		WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
ASSESSMENT	INFORMAL ASSESSMENT: REMEDIATION	<ul style="list-style-type: none"> <li>Homework</li> </ul>	Homework	<ul style="list-style-type: none"> <li>Homework</li> <li>Informal test</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Informal test</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Informal test</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Practical: Demonstrate factors that influence the equilibrium of <math>\text{CoCl}_2</math> &amp; <math>\text{H}_2\text{O}</math> or <math>\text{NO}_2</math> &amp; <math>\text{N}_2\text{O}_4</math> (demo)</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Informal test</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Practical: Titration of a weak acid against a strong base to determine the concentration of the strong base</li> <li>Informal test</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Informal test</li> </ul>
	SBA (FORMAL)	None	None	Formal practical (Physics): Perform simple experiments to determine the work done and power expended in walking up (or running up) a flight of stairs	None	None	Formal practical (Chemistry): Determine the effect of temperature and concentration on the rate of reaction between $\text{Na}_2\text{S}_2\text{O}_3$ and $\text{HCl}$ OR determine factors (any factor) affecting the rate of a reaction	None	None	None	Formal practical: (Chemistry) Determine the unknown concentration of an acid or base by titration against a standard solution	Control test or June examination

## 2023/24 ANNUAL TEACHING PLANS: PHYSICAL SCIENCES: GRADE 12 (TERM 3)

TERM 3	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8-11
<b>CAPS TOPICS</b>	<b>CONTROL TEST:</b> Discussion, corrections, remedial work (1 hr) <b>ELECTRICITY &amp; MAGNETISM:</b> Electric circuits (2 hrs)	<b>ELECTRICITY &amp; MAGNETISM:</b> Electric circuits (4 hrs)	<b>ELECTRICITY &amp; MAGNETISM:</b> Electrodynamics (4 hrs)	<b>ELECTRICITY &amp; MAGNETISM:</b> Electrodynamics (1 hr) <b>M &amp; M: Optical phenomena and properties of materials</b> (2 hrs)	<b>MATTER &amp; MATERIALS:</b> Optical phenomena and properties of materials (4 hrs)	<b>CHEMICAL CHANGE:</b> Electrochemical reactions (4 hrs)	<b>CHEMICAL CHANGE:</b> Electrochemical reactions (4 hrs)	<b>TRIAL EXAMINATION</b> P1: 3 hrs P2: 3 hrs
<b>TOPICS, CONCEPTS, SKILLS AND VALUES</b>	<ul style="list-style-type: none"> <li>Discussion, corrections, remedial work of June control test or exam</li> </ul> <b>Electric circuits</b> <ul style="list-style-type: none"> <li>Solve problems involving current, voltage and resistance for circuits containing arrangements of resistors in series and in parallel (maximum four resistors excluding internal resistance)</li> </ul>	<ul style="list-style-type: none"> <li>Explain the term internal resistance</li> <li>Solve circuit problems using <math>\epsilon = IR_{\text{ext}} + Ir</math> or <math>\epsilon = V_{\text{load}} + V_{\text{int resistance}}</math></li> <li>Solve problems, with internal resistance, for circuits containing arrangements of resistors in series and in parallel (maximum four resistors)</li> </ul>	<ul style="list-style-type: none"> <li>State the energy conversion in generators &amp; use principle of electro-magnetic induction to explain how generators work</li> <li>Give examples of uses of AC &amp; DC generators &amp; functions of components</li> <li>State the energy conversion in motors &amp; use motor effect to explain how motors work</li> <li>Explain the functions of components of motors and give examples of uses of motors</li> <li>State the advantages of alternating current over direct current</li> <li>Draw and interpret sketch graphs of voltage vs time and current vs time for an AC circuit</li> </ul>	<ul style="list-style-type: none"> <li>Define the term <i>rms</i> for an alternating voltage or an alternating current</li> <li>Solve problems using           <math display="block">I_{\text{rms}} = \frac{I_{\text{max}}}{\sqrt{2}}</math> <math display="block">V_{\text{rms}} = \frac{V_{\text{max}}}{\sqrt{2}}</math> <math display="block">P_{\text{ave}} = I_{\text{rms}}^2 R</math> <math display="block">P_{\text{ave}} = \frac{V_{\text{rms}}^2}{R}</math> <math display="block">P_{\text{ave}} = V_{\text{rms}} I_{\text{rms}}</math> <math display="block">P_{\text{ave}} = V_{\text{rms}} I_{\text{rms}} = \frac{1}{2} I_{\text{max}} V_{\text{max}}</math> </li> </ul> (For purely resistive circuit) <b>Optical phenomena and properties of materials</b> <ul style="list-style-type: none"> <li>Describe the photoelectric effect and state its significance</li> <li>Define threshold frequency, <math>f_0</math></li> <li>Define work function, <math>W_0</math></li> </ul>	<ul style="list-style-type: none"> <li>Perform calculations using the photoelectric equation:           <math display="block">E = W_0 + K_{\text{max}}</math>, where <math>E = hf</math> and <math>W_0 = hf_0</math> and <math>K_{\text{max}} = \frac{1}{2} m(v_{\text{max}})^2</math> </li> <li>Explain the effect of intensity and frequency on the photoelectric effect</li> <li>Understand that the photo-electric effect demonstrates the particle nature of light</li> <li>Explain the formation of atomic spectra by referring to energy transition</li> <li>Explain the difference between atomic absorption spectra and atomic emission spectra</li> </ul>	<ul style="list-style-type: none"> <li>Define oxidation &amp; reduction in terms of electron transfer &amp; oxidation numbers</li> <li>Define oxidising &amp; reducing agents in terms of oxidation and reduction</li> <li>Define an anode and cathode in terms of oxidation and reduction</li> <li>Define an <i>electrolyte</i></li> </ul> <b>Galvanic cells</b> <ul style="list-style-type: none"> <li>Define a galvanic cell</li> <li>State the function of salt bridge</li> <li>Predict the movement of ions and the direction of electron flow in external circuit</li> <li>Write half-reactions at each electrode &amp; the overall cell reaction</li> <li>Predict in which half-cell oxidation/reduction takes place</li> <li>Use cell notation or diagrams to represent a galvanic cell</li> <li>Calculate emf for a galvanic cell</li> <li>Explain that <math>V_{\text{cell}}</math> decreases as [product ions] increases and [reactant ions] decreases and <math>V_{\text{cell}} = 0</math> when equilibrium is reached, (the cell is 'flat')</li> <li>State the standard conditions under which standard electrode potentials are determined</li> </ul>	<ul style="list-style-type: none"> <li>Describe the standard hydrogen electrode and explain its role as the reference electrode</li> <li>Explain how standard electrode potentials can be determined using the reference electrode, state the convention regarding positive and negative values</li> </ul> <b>Electrolytic cells</b> <ul style="list-style-type: none"> <li>Define an electrolytic cell</li> <li>Describe the movement of ions in the solution</li> <li>State the direction of electron flow in the external circuit</li> <li>Write equations for the half-reactions at the anode and cathode</li> <li>Write down the overall cell reaction</li> <li>Describe, using half-reactions and the equation for the overall cell reaction as well as the layout of the particular cell using a schematic diagram, the following electrolytic processes:           <ul style="list-style-type: none"> <li>The decomposition of copper(II) chloride</li> <li>Electroplating, e.g. the electroplating of an iron spoon with silver, nickel</li> <li>Refining of copper</li> <li>The electrolysis of a concentrated solution of sodium chloride</li> </ul> </li> </ul>	<b>PAPER 1: 150 marks</b> <ul style="list-style-type: none"> <li>Mechanics (65)</li> <li>Waves, sound, and light (15)</li> <li>Electricity and magnetism (55)</li> <li>Matter &amp; materials (15)</li> </ul> <b>PAPER 2: 150 marks</b> <ul style="list-style-type: none"> <li>Chemical change (92)</li> <li>Matter &amp; materials (58)</li> </ul> The following <b>Gr 10 and 11 topics</b> will form part of the two papers: <b>Paper 1:</b> <ul style="list-style-type: none"> <li>Newton's laws (Gr 11)</li> <li>Electrostatics (Gr 11)</li> <li>Electric circuits (Gr 11)</li> </ul> <b>Paper 2</b> <ul style="list-style-type: none"> <li>Representing chemical change (Gr 10)</li> <li>Intermolecular forces (Gr 11)</li> <li>Energy and chemical change (Gr 11)</li> <li>Stoichiometry (application only) (Gr 11)</li> </ul>
<b>REQUISITE PRE-KNOWLEDGE</b>	Electric circuits from Grade 11	<ul style="list-style-type: none"> <li>Electric circuits from Grade 11</li> </ul>	<ul style="list-style-type: none"> <li>Electromagnetic induction</li> <li>Hand rules for direction of induced current</li> </ul>	<ul style="list-style-type: none"> <li>Electrical power</li> </ul>	<ul style="list-style-type: none"> <li>Wave properties: frequency, wavelength, amplitude</li> <li>Graphical representation of waves</li> </ul>	<ul style="list-style-type: none"> <li>Redox reactions</li> </ul>	<ul style="list-style-type: none"> <li>Redox reactions</li> </ul>	

TERM 3		WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8-11
<b>RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING</b>		<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Apparatus for experiment below</li> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Apparatus: Chemicals and apparatus for experiment below</li> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>	<ul style="list-style-type: none"> <li>Mind the Gap</li> <li>Study guides</li> <li>YouTube &amp; Mindset videos</li> <li>pHET simulations</li> <li>Previous question papers</li> </ul>
<b>ASSESSMENT</b>	<b>INFORMAL ASSESSMENT: REMEDIATION</b>	<ul style="list-style-type: none"> <li>Corrections</li> <li>Homework</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Informal test</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Practical: Functioning of a simple electric motor (demonstration)</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Informal test</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Informal test</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Informal test</li> </ul>	NA
	<b>SBA (FORMAL)</b>	None	Formal practical (Physics): Internal resistance of a battery and equivalent resistance of resistors in series & parallel	None	None	None	None	None	Formal practical (Chemistry): Verify the reactions that take place in a galvanic cell and an electrolytic cell

## 2023/24 ANNUAL TEACHING PLANS: PHYSICAL SCIENCES: GRADE 12 (TERM 4)

TERM 4		WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5-10
<b>CAPS TOPICS</b>		<b>TRIAL EXAM: Discussion (3 hrs)</b>	<b>TRIAL EXAM: Discussion (4 hrs)</b>	<b>CONSOLIDATION AND REVISION (4 hrs)</b>	<b>CONSOLIDATION AND REVISION (4 hrs)</b>	<b>FINAL EXAMINATION</b> P1: 3 hrs P2: 3 hrs
<b>TOPICS, CONCEPTS, SKILLS AND VALUES</b>		Discussion, corrections, and remedial work of trial examination	Discussion, corrections, and remedial work of trial examination	All topics	All topics	<b>PAPER 1: 150 marks</b> <ul style="list-style-type: none"> <li><b>Mechanics (65)</b> Momentum and impulse, vertical projectile motion, work, energy and power, Newton's laws (Gr 11)</li> <li><b>Waves, sound, and light (15)</b> Doppler Effect</li> <li><b>Electricity and magnetism (55)</b> Electric circuits, electrodynamics, electrostatics (Gr 11), Electric circuits (Gr 11)</li> <li><b>Matter &amp; materials (15)</b> Optical phenomena and properties of materials</li> </ul> <b>PAPER 2: 150 marks</b> <ul style="list-style-type: none"> <li><b>Chemical change (92)</b> Rate and extent of reaction, chemical equilibrium, acids and bases, representing chemical change (Gr 10), Energy and chemical change (Gr 11), stoichiometry (application only) (Gr 11)</li> <li><b>Matter &amp; materials (58)</b> Organic molecules, intermolecular forces (Gr 11)</li> </ul>
<b>REQUISITE PRE-KNOWLEDGE</b>		NA	NA	NA	NA	NA
<b>RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING</b>		<ul style="list-style-type: none"> <li>Trial exam question papers</li> </ul>	<ul style="list-style-type: none"> <li>NA</li> </ul>	<ul style="list-style-type: none"> <li>Study guides</li> <li>Previous question papers</li> <li>Mindset &amp; YouTube videos</li> <li>Simulations</li> </ul>	<ul style="list-style-type: none"> <li>Study guides</li> <li>Previous question papers</li> <li>Mindset &amp; YouTube videos</li> <li>Simulations</li> </ul>	NA
<b>ASSESSMENT</b>	<b>INFORMAL ASSESSMENT: REMEDIATION</b>	<ul style="list-style-type: none"> <li>Trial exam question papers</li> </ul>	<ul style="list-style-type: none"> <li>Trial exam question papers</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Informal test</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Informal test</li> </ul>	NA
	<b>SBA (FORMAL)</b>	None	None	None	None	Final examination