2023/24 ANNUAL TEACHING PLANS: TECHNICAL SCIENCES: GRADE 10 (TERM 1)

Important notes

1. The content of the tables are CAPS aligned
2. The formal assessment will consist of:
   - 2.1 Control Test & formal experiment 1/PAT 1 (40% of PAT)
   - 2.2 June Exam & formal experiment 2/PAT 2 (30% of PAT)
   - 2.3 Control Test & formal experiment 3/PAT 3 (30% of PAT)
   - 2.4 Final Examination

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	WEEK 11
CAPS TOPICS	**MECHANICS:** Units and measurement (3 hrs)	**MECHANICS:** **Scientific notation** **Working with formulae** **(4 hrs)**	**MECHANICS:** **Rate, vectors, scalars, and graphical representation of vectors** **(4 hrs)**	MECHANICS: Graphical representation of vectors **(4 hrs)**	**MECHANICS:** **Motion in one dimension – position, distance, displacement, speed, velocity, and acceleration** **(4 hrs)**	**MECHANICS** **Motion in one dimension and introduction of force** **(4 hrs)**	**MECHANICS:** **Kinds of forces & force diagram** **(4 hrs)**	**MECHANICS:** Force diagram, free body diagram, resultant and equilibrant (4 hrs)	**MECHANICS:** **Equilibrant & equilibrium of forces in one dimension** **(4 hrs)**	**MECHANICS** **Control Test**	**REVISION** **CONTROL TEST**
TOPICS/CONCEPTS, SKILLS AND VALUES	• CGS units • List seven fundamental units of SI system • Derived units • Prefixes • Conversion of units: CGS units to SI units and vice versa • Focus on conversion on units related to technology	• Use scientific notation to express number as a power • Focus on examples using scientific notation related to technology • Identify the correct formula • Substitute the given values into the formula • Solve for the unknown quantity • Develop examples to solve problems using equations from technology	• Rate is the change in a physical quantity in unit time • Give examples related to the concept of rate in technology • Define a vector quantity • Define a scalar quantity • Give examples of vectors and scalars • Differentiate between vector and scalar quantities • Represent vectors graphically	• Identify the properties of vectors: Equal vectors, negative vectors, addition and subtraction of vectors **NB: Use one-dimension applications only** • Define resultant vector as: The resultant of two or more vectors is the single vector which can produce the same effect as the two or more vectors • Find resultant of two or more vectors in different directions: a) Graphically use the **tail-to-head** method b) By calculation	• Define one-dimensional motion as motion along a line either forward or backward • Define position as location of an object relative to the origin • Define distance as actual path length between two points SI unit: m • Define displacement as the shortest path between two points in a particular direction SI unit: m • Differentiate between displacement and distance • Define speed as a rate of change of distance $speed = \frac{distance}{time}$ SI unit: m.s^{-1} • Define velocity as a rate of change of displacement $velocity = \frac{displacement}{time}$ SI unit: m.s^{-1} • Define acceleration as a rate of change of velocity $Acceleration = \frac{changeinvelocity}{time}$ SI unit: m.s^{-2}	• Do calculations using speed, velocity and acceleration Experiment: *Determine the velocity of a trolley: (materials: Ticker timer, tape, power supply, trolley, ruler, etc.)* • Define force as a push or a pull SI unit of force is newton (N) • In contact forces, the interacting bodies must physically touch one another • In non-contact forces, the forces work over a distance without physically touching one another	• Define tension as force acting in a string or rope • Define normal force, F_N, as the perpendicular force exerted by a surface on an object that lies on that surface • Define force of gravity, F_g, as the force of attraction exerted by the earth on an object. The force of gravity is also known as weight $F_g = mg$ • It acts vertically downwards • Differentiate between mass and weight • Define frictional force, F_f, as the force parallel to the surface that opposes the motion of an object and acts in the direction opposite to the motion of the object Experiment:	Force diagram: • A force diagram is the representation of all the forces acting on the object drawn as arrows Free body diagram: • In a free body diagram, the object is replaced by a point with all the forces acting on it as arrows Give various situations for learners to draw the force diagrams and free body diagrams Resultant and equilibrant: • Define the resultant of two or more forces as the single force which can produce the same effect as two or more forces • Define the equilibrant as the force that has the same magnitude as the resultant but acts in the opposite direction Give various situations for learners to	• Do calculations on the resultant and equilibrant of a number of forces (give various situations for learners to do calculations) Experiment: Use spring balances to demonstrate the resultant and equilibrant are equal (materials: three spring balances, string, etc.) • A body is in equilibrium when the resultant force is zero	Units and measurement Scientific notation Working with formulae Rate Scalars and vectors Motion in one direction Forces	Moments of a force Laws of moments Simple machines Energy Classification of matter Balancing of equations

TERM 1		WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
						• Do calculations using the above concepts		Measure the weight of different objects using a spring balance (materials: spring balances, mass pieces, etc.)	calculate the resultant and equilibrant of a number of forces			
RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING		• Question bank such as previous papers or study guides • Videos	• Question bank such as previous papers or study guides • Practical apparatus • Simulations • Videos	• Question bank such as previous papers or study guides • Practical apparatus • Simulations • Videos	• Question bank such as previous papers or study guides • Practical apparatus • Simulations • Videos	• Question bank such as previous papers or study guides	• Question bank such as previous papers or study guides		• Question bank such as previous papers or study guides	• Question bank such as previous papers or study guides		
ASSESSMENT	**INFORMAL ASSESSMENT: REMEDIATION**	• Corrections of control test 1 • Homework	• Homework	• Homework	• Homework • Informal experiment	• Homework	• Informal test	• Homework	• Homework	• Homework		
	SBA (FORMAL)	None	None	None	None						Controlled Test	
	PAT (FORMAL)					**PAT 1 experiment**						

2023/24 ANNUAL TEACHING PLANS: TECHNICAL SCIENCES: GRADE 10 (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
CAPS TOPICS	**Corrections of March Controlled test** **MECHANICS:** **Moment of a force (2 hrs)**	**MECHANICS:** **Laws of moments (2 hrs)** **Simple machines (2 hrs)**	**MECHANICS:** **Simple machines (3 hrs)**	**MECHANICS:** **Energy (4 hrs)**	**MECHANICS:** **Energy** (**4 hrs**)	**MATTER & MATERIALS:** **Metals, metalloids, and Non-metals** **Electrical conductors, semiconductors and insulators** **(4 hrs)**	**MATTER AND MATERIALS:** **Classification of matter** **(4 hrs)**	**MATTER AND MATERIALS:** **Classification of matter** **(4 hrs)**	**MATTER AND MATERIALS:** **Classification of matter** **(4 hrs)**	**MATTER AND MATERIALS:** **Classification of matter** **(4 hrs)**	**REVISION**
TOPICS/CONCEPTS, SKILLS AND VALUES	**Moment of a force (torque)** • Moment of a force about a point is defined as the turning effect of the force about that point • It is measured as the product of the force and the perpendicular distance from the point to the line of action of the force Torque = $Fxr_{\perp}$ SI unit: N.m • Use the formula to calculate torque	**Laws of moments** • For a body in equilibrium, the sum of the clockwise moments about a point must be equal to the sum of anti-clockwise moments about the same point. • Do calculations to show that the clockwise moment is equal to the anti-clockwise moment Experiment: *Use a meter stick and mass pieces to prove the laws of moments* • (materials: meter sticks, mass pieces, retort stand, etc.) Simple machines: • Define a lever as a simple machine • Understand that machines are used to make work easier • Define a fulcrum as the turning point of the lever (the lever rotates about this point) • Identify different types of levers used in daily life • Define type 1, type 2 and type 3 levers	• Define mechanical advantage as the ratio of load to effort $\text{MA} = \frac{\text{Load}(L)}{\text{Effort}(E)} = \frac{\text{Effort distance}(e)}{\text{Load distance}(l)}$ • Do calculations using the above formula Mechanical advantage has no unit Experiment: • *Determine the mechanical advantage of type 1 lever* (materials: stick, mass pieces, knife edge etc.) • Consolidation and revision	Gravitational potential energy Define gravitational potential energy of an object as the energy it has because of its position from the surface of the earth E_P = mgh or (U = mgh) • Do calculations using the above equation Kinetic energy: • Define kinetic energy as the energy of an object due to its motion $E_k = \frac{1}{2}mv^2$ or $K = \frac{1}{2}mv^2$ • Do calculations using the above equation Mechanical energy: • Define mechanical energy as the sum of the gravitational potential energy and kinetic energy $M_E = E_P + E_K$ • Do calculations using the above equation	Experiment: *Determine the potential energy of an object at different heights* (Materials: 1 kg mass piece, meter stick, retort stand etc.).	Metals, metalloids and non-metals: • Classify substances as metals, metalloids and non-metals using their properties • Identify their positions on the periodic table • Describe metalloids as having mainly non-metallic properties Electrical conductors, semiconductors and insulators: • Revise the classification of materials as: Electrical conductors, semiconductors and insulators • Give examples of electrical conductors, semiconductors and insulators • Identify the substances and the 'appliances or objects', which are in common daily use in homes and offices, that are specifically chosen because of their electrical properties (Conductors, semiconductors and insulators)	• The different properties of materials: Strength, thermal and electrical conductivity, brittle, malleable or ductile, magnetic or non- magnetic, density (lead/ aluminium), melting points and boiling points Classification of matter: • Define a pure substance as a single type of material (elements or compounds) • Define an element as the simplest type of a pure substance • Define a compound as a substance made up of two or more elements in the exact ratio Classify substances as pure, compounds or elements	Naming of compounds: Name compounds using the names of the elements from which they are made **Cations and anions** • Define the terms cation and anion • Identify cations and anions • List the common compound anion, only sulphate, carbonate, sulphite, hydroxide	Molecular formulae: • Write the name of a compound when a molecular formula is given • Write the molecular formulae when given the names of compounds	• Use suffixes like –ide, -ite and –ate to name compounds • Use prefixes like di-, tri- etc. to name compounds • Use suitable examples from technology, like the reaction in a catalytic convertor • Represent reactions in equations and balancing of equations	Moments of a force Laws of moments Simple machines Energy classification of matter Balancing of equations

TERM 2		WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
							Experiment: • *Determine the electrical conductivity of different materials* *(materials: battery, ammeter, connecting wires etc.)*					
RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING		• Question bank such as previous papers or study guides • Videos	• Question bank such as previous papers or study guides • Practical apparatus • Simulations • Videos	• Question bank such as previous papers or study guides • Practical apparatus • Simulations • Videos	• Question bank such as previous papers or study guides • Practical apparatus • Simulations • Videos	• Question bank such as previous papers or study guides	• Question bank such as previous papers or study guides		• Question bank such as previous papers or study guides	• Question bank such as previous papers or study guides		
ASSESSMENT	**INFORMAL ASSESSMENT: REMEDIATION**	• Corrections of control test 1 • Homework	• Homework	• Homework	• Homework • Informal experiment	• Homework	• Informal test	• Homework	• Homework	• Homework		
	SBA (FORMAL)	None	None	None	None						June Exam	
	PAT (FORMAL)					**PAT 2 experiment**						

2023/24 ANNUAL TEACHING PLANS: TECHNICAL SCIENCES: GRADE 10 (TERM 3)

TERM 3	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
CAPS TOPICS	**REVISION: CONTROL/June exam TEST 2 (1 hr)** **ELECTRICITY & MAGNETISM** **Electrostatics** **(2 hrs)**	**ELECTRICITY & MAGNETISM** **Electrostatics** **(4 hrs)**	**ELECTRICITY & MAGNETISM:** **Electric circuits** **(4 hrs)**	**ELECTRICITY & MAGNETISM:** **Electric circuits** **(3 hrs)**	**ELECTRICITY & MAGNETISM:** **Electric circuits** **(4 hrs)**	**ELECTRICITY & MAGNETISM:** **Electric circuits** **(4 hrs)**	**ELECTRICITY & MAGNETISM:** Electric circuits **(4 hrs)**	**ELECTRICITY & MAGNETISM:** **Electric circuits** **(4 hrs)**	**MATTER & MATERIALS:** **Structure of an atom** **(4 hrs)**	**Consolidation and revision of Term 3 work** **(4 hrs)**	**REVISION** **Control** **Test**
TOPICS/CONCEPTS, SKILLS AND VALUES	Revision of controlled test/ June examination Two kinds of charge: • Explain that all materials contain positive charges (protons) and negative charges (electrons) • Explain that an object which has an equal number of electrons and protons is neutral (no net charge) • Explain that positively charged objects are electron deficient and negatively charged objects have an excess of electrons • Describe how objects (insulators) can be charged by contact (or rubbing) Experiment: • *Investigate the two kinds of charges* • Use any of the following: 1. A perspex rod, a polythene rod, a woollen cloth, small pieces of paper 2. Van der Graaff generator Gold leaf electroscope	Charge conservation: • The principle of conservation of charge states that the net charge of an isolated system remains constant during any physical process • Apply the principle of conservation of charge • Determine the charge of two objects after they touch and separate using: $Q = \frac{Q_1 + Q_2}{2}$ **NOTE:** Use the above equation to solve problems involving charges Give various situations to calculate the charge when two charges touch and separate	Components of electric circuit: • Draw the components of a circuit using appropriate circuit symbols • Give the meanings of all symbols used Current: • Define current, I, as the rate of flow of charge. It is measured in ampere (A), which is the same as coulomb per second • Calculate the current flowing using the equation $I = \frac{Q}{\Delta t}$ • Indicate the direction of the current in circuit diagrams (conventional)	Potential difference: • Define potential difference in terms of work done and charge $V = \frac{W}{Q}$ Emf: • Emf is the potential difference across the cell when no current is flowing in the circuit (open circuit) • Give the difference between emf and potential difference Emf and pd are measured in volts (V) Do calculations using the above equations Measurement of voltage (pd) and current *Experiment:* *Build an electric circuit to measure current through a resistor and to measure the voltage across a resistor, draw diagram of the circuit* *(materials: conducting wire, cells, voltmeter, resistor, ammeter, switch etc.)*	Resistance: • Resistance is defined as the opposition to the flow of electric current $1\ \Omega = 1\ V.A^{-1}$ • Give a microscopic description of resistance in terms of electrons moving through a conductor and colliding with the particles of which the conductor (metal) is made and thereby transferring kinetic energy • State and explain factors that affect the resistance of a substance Experiment: *Investigate the following factors that affect the resistance of a conductor:* • *Temperature* • *Thickness* • *Length* • *Type of materials* (materials: copper and nichrome wires of different thicknesses, cells, voltmeter, ammeter, switch etc.) Resistors in series: • Resistors are in series when they are connected end to end, such that the current has only one path through each resistor	Experiment: *Set up a circuit to show that series circuits are voltage dividers, while current remains constant* (materials: light bulbs or resistors, batteries, switches, connecting leads, ammeters, voltmeters etc.) Resistors in parallel: • Resistors are in parallel when they are connected to the same point, such that the current has different paths through each resistor $\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ • Alternatively, when we have two resistors in parallel, we can use the formula $R_P = \frac{R_1 \times R_2}{R_1 + R_2}$ • Voltage is constant across each resistor, connected in parallel $V_T = V_1 = V_2 = V_3$	Experiment: *Set up a circuit to show that parallel circuits are current dividers, while potential difference remains constant* (materials: light bulbs or resistors, batteries, switches, connecting leads, ammeters, voltmeters etc.)	Administering of the PAT 3 experiment:	Structure of the atom: Atomic number, mass number with their symbolic presentation: • Define the atomic number of an element as the number of protons in the atom • Define the mass number as the number of protons and neutrons in the atom • Use a periodic table to determine the number of: a) Protons b) Electrons c) Neutrons in different elements • State the charge of a proton, neutron and electron	• Revision of Term 3 work	Electric circuits Metals, metalloids and non-metals Electric conductors, semiconductors and insulators Electrostatics Structure of an atom

TERM 3		WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
						$R_s = R_1 + R_2 + R_3$ • The same current flows through each resistor $I_T = I_1 = I_2 = I_3$ • Series circuits are called potential dividers $V_T = V_1 + V_2 + V_3$	• Resistors in parallel are current dividers $I_T = I_1 + I_2 + I_3$					
REQUISITE PRE-KNOWLEDGE		• Unit conversion • Rate	• Unit conversion	• Unit conversion				• Classification of materials as: Electrical conductors, semiconductors and insulators				
RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING		• Question bank such as previous papers or study guides • Video • Simulations	• Question bank such as previous papers or study guides • Practical apparatus • Simulations • Videos	• Question bank such as previous papers or study guides • Practical apparatus • Simulations • Videos	• Question bank such as previous papers or study guides • Videos • Practical apparatus • Simulations	• Question bank such as previous papers or study guides • Practical apparatus • Simulations • Videos	• Question bank such as previous papers or study guides • Practical apparatus • Simulations • Videos	• Question bank such as previous papers or study guides • Practical apparatus • Simulations • Videos	• Question bank such as previous papers or study guides	• Question bank such as previous papers or study guides		
ASSESSMENT	**INFORMAL ASSESSMENT: REMEDIATION**	• Homework	• Homework • Informal experiment	• Homework • Informal experiment	• Homework • Informal experiment	• Informal experiment	• Homework	• Informal experiment	• Informal test			
	SBA (FORMAL)	None	None	None	None	None	None	None		None	Control Test	
	PAT (FORMAL)								PAT 3 experiment			

2023/24 ANNUAL TEACHING PLANS: TECHNICAL SCIENCES: GRADE 10 (TERM 4)

TERM 4		WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8 – 9	WEEK 10
CAPS TOPICS		**HEAT AND THERMODYNAMICS** Heat and temperature (2 hrs)	**HEAT AND THERMODYNAMICS** Heat and temperature (4 hrs)	**HEAT AND THERMODYNAMICS** **Heat and temperature** **(4 hrs)**	**HEAT AND THERMODYNAMICS** **Heat and temperature** **(4 hrs)**	CONSOLIDATION AND REVISION (4 hrs)	CONSOLIDATION AND REVISION (4 hrs)	**FINAL EXAMINATION**	**FINAL EXAMINATION**	**FINAL EXAMINATION**
TOPICS/CONCEPTS, SKILLS AND VALUES		Heat and temperature: • Define heat as a form of energy SI unit of heat is joule (J) Temperature is an indication of how hot or cold a body is SI unit of temperature is kelvin (K) Temperature is measured with a thermometer in degree Celsius (^{0}C) • Alcohol thermometer, mercury thermometer, thermoelectric thermometer • Give the application of thermometers in technology	Activity: Use a mercury thermometer to measure the temperature of the following substances: (a) Ice water (b) Tap water (c) Boiling water Celsius scale and kelvin scale • Celsius scale is used to measure temperature for general purposes	• The kelvin scale is used for thermodynamics calculations **T = t+273** **T** is the temperature in kelvin **t** is the temperature in degree Celsius Use the above equation to convert temperature from Celsius to kelvin	Experiment: *Measure the melting point of wax* (materials: Paraffin wax, Bunsen burner, thermometer, 500 ml beaker, boiling tube, clamps, etc.)	• Revision of Term 1 and 2 topics	Revision of Term 3 and 4 topics	All Grade 10 topics	All Grade 10 topics	All Grade 10 topics
RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING		• Question bank such as previous papers or study guides • Practical apparatus • Simulations • Videos	• Question bank such as previous papers or study guides • Simulations • Videos	• Question bank such as previous papers or study guides • Practical apparatus			Question bank such as previous papers			
ASSESSMENT	**INFORMAL ASSESSMENT: REMEDIATION**	Informal experiments	Homework	Homework	Informal experiments	Informal experiment	Informal test			
	SBA (FORMAL)	None	None	None	None	None	None	Final examination	Final examination	Final examination