KWAZULU-NATAL DEPARTMENT OF PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

SBA GUIDELINES
Practical work:

- **Learners do TWO experiments (ONE Chemistry, ONE Physics) for SBA.**
- **Term 2: Heating/cooling curve of water.**
- **Term 3: Measurement of velocity & position/time, velocity/time and acceleration/time graphs for a moving trolley.**

2024 ATP: Grade 10 – Term 1: PHYSICAL SCIENCES

Week	Knowledge Area	Page in CAPS doc	Concepts for week	Date completed	SMT Member Signature	% curriculum coverage	
						Per term	Annual
Week 1 **17- 19 Jan**	**WAVES, SOUND AND LIGHT: - Transverse pulses on a string/spring -Transverse waves (2HRS)**	**26 - 28**	• Define a pulse, a transverse pulse and amplitude. • Define the principle of superposition. • Define constructive interference and destructive interference. • Apply the principle of superposition to pulses to explain, using diagrams, how two pulses that reach the same point in the same medium superpose constructively and destructively and then continue in the original direction of motion. • Define a transverse wave. • Define wavelength, frequency, period, amplitude, crest and trough of a wave. • Explain the wave concepts in and out of phase. • Identify the wavelength, amplitude, crests, troughs, points in phase and points out of phase on a drawing of a transverse wave. **Informal test**			**6%**	**2%**
Week 2 **22-26 Jan**	**WAVES, SOUND AND LIGHT: - Transverse waves - Longitudinal waves (4HRS)**	**26 - 28**	**Transverse waves** • Use the relationship between frequency and period to solve problems. $f = \frac{1}{T}$ • Define wave speed as the distance travelled by a point on a wave per unit time. • Use the wave equation (v = fλ) to solve problems involving waves. **Longitudinal waves** • Define a longitudinal wave. • Draw a diagram to represent a longitudinal wave in a spring, showing the direction of motion of the wave relative to the direction in which the particles move. • Define the wavelength and amplitude of a longitudinal wave. • Define a compression and a rarefaction. • Differentiate between longitudinal and transverse waves. • **Informal test**			**18%**	**6%**
Week 3 **29 Jan- 2 Feb**	**WAVES, SOUND AND LIGHT: Longitudinal waves (2HRS)** **Sound (2HRS)**	**27 - 29**	• Define the period and frequency of a longitudinal wave. • Use the relationship between frequency and period to solve problems. ○ $f = \frac{1}{T}$ • Define wave speed as the distance travelled by a point on a wave per unit time. • Use the wave equation (v = fλ) to solve problems longitudinal waves. **Sound** • Describe a sound wave as a longitudinal wave. • Explain the relationship between wave speed and the properties of the medium in which the wave travels (gas, liquid or solid). • Describe echoes as reflections of sound waves. • Use the wave equation (v = fλ) to solve problems involving sound waves including echoes, e.g. sonar, bats and dolphins.			**30%**	**9%**

Week 4 **5-9 Feb**	**WAVES, SOUND AND LIGHT: Sound (4 hrs)** **WAVES, SOUND AND LIGHT: Sound**	**27 - 29**	• Relate the pitch of a sound to the frequency of a sound wave. • Relate the loudness of a sound to both the amplitude of a sound wave and the sensitivity of the human ear. • Relate quality of sound to the waveform as it appears to the listener. • Distinguish between the shape of a pure note and the shape of a noise. • Describe sound with frequencies higher than 20 kHz up to about 100 kHz as ultrasound. • Explain how an image can be created using ultrasound. • Describe some of the medical benefits and uses of ultrasound. • **Informal test**			**42%**	**12%**
Week 5 **12-16 Feb**	**WAVES, SOUND AND LIGHT: Electromagnetic radiation (4HRS)**	**29 - 31**	• Explain that some aspects of the behavior of electromagnetic radiation can best be explained using a wave model and some aspects can best be explained using a particle model. • Describe the source of electromagnetic waves. • Describe how an electromagnetic wave propagates. • State that these mutually regenerating fields travel through space at a const speed c = 3 x 10^8 m·s^{-1}.			**54%**	**16%**
Week 6 **19-23 Feb**	**WAVES, SOUND AND LIGHT: Electromagnetic radiation (4HRS)**	**29 - 31**	• List properties of electromagnetic waves. • Arrange different types of electromagnetic radiation, in order of frequency or wavelength. • Given the wavelength of electromagnetic waves, calculate the frequency and vice versa, using the equation c = fλ. • Give an example of the use of each type of electromagnetic radiation. • Indicate the penetrating ability of the different kinds of electromagnetic radiation and relate it to energy of the radiation. • Describe the dangers of gamma rays, Xrays and the damaging effect of ultra-violet radiation on the skin.			**66%**	**20%**
Week 7 **26 Feb- 1 March**	**WAVES, SOUND AND LIGHT: Electromagnetic radiation (1HR)** **ELECTRICITY AND MAGNETISM: Electrostatics (3hrs)**	**29-31**	● Define a photon. ● Relate the energy of a photon to the frequency and wavelength of the light. ● Calculate the energy of a photon using E = hf = $\frac{hc}{\lambda}$. Electrostatics ● State that all materials contain positive charges (protons) and negative charges (electrons). ● Describe an object as neutral when it has an equal number of protons and electrons. ● Describe positively charged objects as electron deficient and negatively charged objects as having excess of electrons. ● Describe how objects (insulators) can be charged by contact (or rubbing) - tribo-electric charging.			**78%**	**23%**
Week 8 **4-8 March**	**ELECTRICITY AND MAGNETISM: Electrostatics (4 HRS)**	**40 - 42**	● State the SI unit for electric charge. ● State the principle of conservation of charge. ● Apply the principle of conservation of charge using Q = $\frac{Q_1+Q_2}{2}$ for charges of identical size. ● State the principle of charge quantization and apply the principle: Q = nq ● State that like charges repel and opposite charges attract. Explain how charged objects can attract uncharged insulators due to polarization of molecules inside insulators.			**90%**	**27%**
Week 9 **11- 15 March**	**ELECTRICITY AND MAGNETISM:** **Electric Circuits (4 Hrs)**	**42 - 43**	● Define potential difference across the ends of a conductor. In symbols: $V = \frac{W}{Q}$ ● State the unit of potential difference.				

			● Define emf. ● Define terminal potential difference. ● Do calculations using $V = \frac{W}{Q}$. ● Define current strength, I. ● Calculate current strength in a conductor using the equation I = $\frac{Q}{\Delta t}$. ● Define one coulomb. ● Indicate the direction of conventional current in circuit diagrams using arrows. ● Draw a diagram to show how to correctly connect an ammeter and a voltmeter. ● Define resistance.			**100%**	**30%**
Week 10-11 **18-28March**	**CONSOLIDATION OF TERM 1 (4HRS)** **CONTROL TEST** **(2 HRS)**		ONE PAPER (100 marks) ● Transverse pulses on a ● string/spring ● Transverse waves ● Longitudinal waves ● Electromagnetic radiation ● Electrostatics ● Electric Circuits				

- **ALL INFORMAL experiments should be done.**

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2024 ATP: Grade 10 – Term 2: PHYSICAL SCIENCES

Week	Knowledge Area	Page in CAPS doc	Concepts for week	Date completed	SMT Member Signature	% curriculum coverage	
						Per term	Annual
Week 1 3-5 April	**CONTROL TEST (Discussion, and Remedial Work of Control Test)** (2 HRS)		Discussion, and Remedial Work of Control Test			**6%**	**32%**
Week 2 8-12 April	**ELECTRICITY AND MAGNETISM: Electric circuits** (4 HRS)	**43 - 45**	• Explain why a battery in a circuit goes flat by referring to the energy transformations in the battery and the resistors in a circuit. • Know that current is the same through each resistor in a series circuit. • Describe series circuits as potential difference dividers. • Calculate the total resistance of resistors connected in series: $R_t = R_1 + R_2 +$ • Know that potential difference is the same across resistors connected in parallel. • Describe parallel circuits as current dividers because the • total current in the circuit is equal to the sum of the branch currents. • Calculate the total resistance of resistors connected in parallel: $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$ • Solve problems using R = V/I for circuits containing resistors that are connected in series and/or in parallel (maximum four resistors).			**18%**	**35%**
Week 3 15-19 April	**MATTER AND MATERIAL: States of matter and the kinetic molecular theory (2 HRS)**	**15-19**	● Describe matter as being made up of particles. ● State and define the properties of material: ○ Strength ○ Brittle, malleable or ductile ○ Density (lead / aluminium) ○ Melting points and boiling points ● Define a mixture, a pure substance, an element and a compound and give examples. ● Describe the particle nature of matter by referring to diffusion and Brownian motion ● List and characterise the three states of matter. ● Define freezing point, melting point and boiling point. Interpret/Draw heating and cooling curves and interpret data given on such curves.			**24%**	**37%**
Week 4 22-26 April	**MATTER AND MATERIAL: States of matter and the kinetic molecular theory (2 HRS)** **The atom** **(1 HR)**	**15-19** **20-21**	● Identify the physical state of a substance at a specific temperature, given its melting point and the boiling point. ● Define melting, evaporation, freezing, sublimation and condensation as changes in state. ● Describe a solid, a liquid and a gas according to the Kinetic Molecular Theory in terms of particles of matter ● Describe the structure of an atom (nucleus in centre and electrons in the space around). ● Define atomic number. ● Determine for an atom/ion the: o Atomic number o Number of protons o Number of electrons o Number of neutrons o Mass number ● Determine the charge on an ion after removing/ adding electrons to an atom.			**33%**	**40%**

Week 5 **29 April-3 May**	**MATTER AND MATERIAL:** **The atom** **(4 HRS)**	**21-24**	● Define: isotopes, relative atomic mass. ● Calculate the relative atomic mass of naturally occurring elements from the percentage of each isotope in a sample. ● Represent atoms using the notation E_Z^A where E = symbol of element, Z = atomic number, A = mass number. ● Use Aufbau diagrams and sp notation (electron configuration) to give electronic arrangements of atoms up to Z = 20. Describe an atomic orbital. Know that each orbital corresponds to a specific energy of electrons in it.			**45%**	**43%**
Week 6 **6-10 May**	**MATTER AND MATERIAL:** **Periodic Table** **(4 HRS)**	**32-34**	●Write names and formulae of elements and compounds using the cation and anion table. ●Classify substances as metals, non-metals and metalloids and their positions on the periodic table. ●Identify metalloids as showing increase in conductivity with increasing temperature. ●Classify substances, with examples, as electrical conductors, semiconductors and insulators. ●Classify substances, with examples, as thermal conductors and insulators. ●Classify substances, with examples, as magnetic and nonmagnetic. ● Describe the PT as displaying elements in order of increasing atomic number and showing how periodicity of physical and chemical properties of elements relates to atomic structure. ● Define the group number and the period number. ● Relate the position of an element in the PT to its electronic structure and vice versa. ● Describe periodicity from Li to Ar in terms of atomic radius, ionisation energy, electron-affinity and electronegativity. ● Define atomic radius, ionisation energy, electron-affinity and electronegativity. ● Relate the electronic arrangements to chemical properties of group 1, 2, 17 and 18 elements. ● Describe the trend in reactivity of elements in groups 1, 2 and 17. ● Indicate the positions of metals, non-metals and transition metals in the PT.			**57%**	**47%**
Week 7 **13-17 May**	**MATTER AND MATERIAL:** **Chemical bonding** **(4 HRS)**	**25**	● Define a chemical bond. ● Draw Lewis dot diagrams of elements. ● Define: covalent bond, molecule ● Draw Lewis dot diagrams of simple covalent molecules: H2; F2, Cℓ2, O2, N2, HF, HCℓ, CH4, NH3, H2O ● Write names and formulae of covalent compounds. ● Define: ionic bonding, formula-unit, ion, anion, cation. ● Draw Lewis dot diagrams of cations and anions. ● Draw Lewis dot diagrams to show the formation of simple ionic compounds such as NaCℓ, KCℓ, KBr, $CaC\ell_2$ and $MgBr_2$. ● Use the PT to predict the ions formed by atoms of metals and non-metals. ● Name ionic compounds.			**69%**	**50%**
Week 8 **20-24 May**	**MATTER AND MATERIAL:** **Chemical bonding (2 HRS)** **CHEMICAL CHANGE: Physical and chemical change (2 HRS)**	**25** **35**	Chemical bonding ●Define metallic bonding. ●Calculate the relative atomic mass for covalent molecules e.g. Mr(H2O) = 18 ●Calculate relative formula masses for ionic compounds. Physical change & chemical change ● Define a physical change and give examples. ● Define a chemical change and give examples.			**81%**	**54%**
Week 9 **27- 31 May**	**CHEMICAL CHANGE:** **Representing chemical change** **Physical and Chemical Change (4 HRS)**	**36-37**	● Write word equations from chemical equations and vice versa ● Use (s), (aq), (l) and (g) to indicate phases. ● Write balanced chemical equations. ● Conservation of atoms and mass ● Law of constant composition.			**93%**	**57%**

			Interpret balanced equations in terms of conservation of atoms and mass.				
Week 10 **3-7 June**	**CHEMICAL CHANGE:** **Quantitative Aspects of chemical Change (3 HRS)**	**50-52**	• Define one mole. • Define relative atomic mass. • Describe Avogadro's number. • Define molar mass. • Describe the relationship between molar mass and relative molecular mass and relative formula mass. • Calculate the molar mass of a substance given its formula. • Calculate mass, molar mass and number of moles using n = $\frac{m}{M}$. • State Avogadro's law. • For gases, calculate volume and moles using molar gas volume at STP. • Interpret balanced equations in terms of volume relationships for gases.			**100%**	**60%**
Week 11 **10- 14 June**	**CONSOLIDATION** **(2 HRS)** **CONTROL TEST** **(2 HRS)**		• ONE PAPER • (100 marks) • Electric circuits • Matter and • classification • States of matter and the kinetic molecular theory. • The atom • The periodic table • Chemical bonding • Energy • Physical and chemical change • Representing chemical change • Quantitative aspects of chemical change				

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2024 ATP: Grade 10 – Term 3: PHYSICAL SCIENCES

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Week 1 9-12 July	**CONTROL TEST (Discussion and Remedial Work on Control Test) (1 HR)** **CHEMICAL CHANGE: Quantitative aspects of chemical change (2 HRS)**	**50-52**	● Define concentration. ● Calculate concentration in mol·dm-3 using c = $\frac{n}{V}$. ● Determine percentage composition of an element in a compound. ● Determine the empirical formula for a substance from percentage composition. ● Define an empirical formula as the simplest. ● Determine the number of moles of water of crystallization in salts like $CuSO_4 \cdot 5H2O$. ● Define water of crystallization.			**8%**	**62%**
Week 2 15-19 July	**CHEMICAL CHANGE: Quantitative aspects of chemical change (4 HRS)**	**50-52**	● Perform stoichiometric calculations based on balanced equations (concentration, mass, moles, molar mass, number of particles and volume). ● Determine the theoretical yield of a product in a chemical reaction when you start with a known mass of reactant. ● Determine the percentage yield of a chemical reaction:			**19%**	**66%**
Week 3 22-26 July	**MECHANICS: Vectors and scalars (4 HRS)**	**53**	● List physical quantities, for example time, mass, weight, force, charge, etc. ● Define a vector and a scalar quantity. ● Represent vectors graphically with an arrow. ● Use the force vector as an example to show equality of vectors, negative vectors and addition of vectors in one dimension only. ● Define a resultant. ● Determine a resultant graphically using the tail-to-head method as well as by calculation for a maximum of four force vectors in one dimension.			**29%**	**69%**
Week 4 29 July- 2 Aug	**MECHANICS: Motion in one dimension (3 HRS)**	**54 – 55**	● Describe the concept of a frame of reference (has an origin and a set of directions, e.g. east and west or up and down). ● Define one-dimensional motion. ● Define position relative to a reference point and understand that position can be positive or negative.			**37%**	**72%**
Week 5 5-9 Aug	**MECHANICS: Motion in one dimension (4 HRS)**	**54 – 55**	● Define: distance, displacement ● Describe and illustrate the difference between displacement and distance. ● Calculate distance and displacement for one-dimensional motion. ● Define: average speed, average velocity ● Calculate average speed and average velocity for one-dimensional motion.			**47%**	**76%**
Week 6 12-16 Aug	**MECHANICS: Motion in one dimension (4 HRS)**	**54 – 55**	● Define acceleration. (a = $\frac{\Delta v}{\Delta t}$). ● Differentiate between positive acceleration, negative acceleration and deceleration. ● Calculate acceleration one-dimensional motion.			**57%**	**79%**
Week 7 19-23Aug	**MECHANICS: Instantaneous speed and velocity and the equations of motion (4 HRS)**	**56-57**	● Define instantaneous velocity and instantaneous speed. ● Describe in words and distinguish between motion with uniform velocity and uniformly accelerated motion. ● Describe the motion of an object given its position versus time, velocity versus time and acceleration versus time graph. Determine the velocity of an object from the gradient of the position versus time graph.			**67%**	**82%**

Week 8 **26-30 Aug**	**MECHANICS:** **Instantaneous speed and velocity and the equations of motion** **(4 HRS)**	**56-57**	● Determine the instantaneous velocity at a particular time using the gradient of a tangent to a position versus time graph. ● Determine the acceleration of an object from the gradient of the velocity vs. time graph. Determine the displacement of an object by finding the area between the time axis and the graph of a velocity vs. time graph.			**78%**	**86%**
Week 9 **2-6 Sept**	**MECHANICS:** **Instantaneous speed and velocity and the equations of motion** **(4 HRS)**	**56-57**	● Use the equations of motion, listed below, to solve problems involving motion in one dimension in the horizontal plane only. $v_f = v_i + a\Delta t$ $\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$ $v_f^2 = v_i^2 + 2a\Delta x$ $\Delta x = (\frac{v_i + v_f}{2})\Delta t$ Solve problems for the motion of a vehicle including safety issues such as the relationship between speed and stopping distance.			**88%**	**90%**
Week 10 **9- 13 Sept**	**MECHANICS:** **Energy** **(4 HRS)**	**58-59**	● Define gravitational potential energy of an object. ● Calculate the gravitational potential energy of an object using Ep = mgh OR U = mgh. ● Define kinetic energy of an object. ● Calculate the kinetic energy of an object using Ek = ½mv^2 OR K = ½mv^2			**100%**	**93%**
Week 11 **16-20Sept**	**CONSOLIDATION** **CONTROL TEST** **(3 HRS)**		ONE PAPER (100 marks) • Quantitative aspects of chemical change • Vectors and scalars • Motion in one dimension • Instantaneous speed and velocity				

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2024 ATP: Grade 10 – Term 4: PHYSICAL SCIENCES

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Week 1 1- 4 Oct	**SEPT CONTROL TEST (Discussion and Remedial Work) (3 HRS)**		Discussion and Remedial Work			**43%**	**95%**
Week 2 7 -11 Oct	**MECHANICS: Energy (4 HRS)**	**58-59**	● Define mechanical energy. ● Calculate mechanical energy using EM = Ek + Ep. OR EM = K + U ● State the law of conservation of energy. ● State the principle of conservation of mechanical energy. ● Apply the principle of conservation of mechanical energy to various contexts, viz. objects dropped or thrown vertically upwards, the motion of a pendulum bob, roller coasters and inclined plane problems.			**100%**	**100%**
Week 3 14-18 Oct	**CONSOLIDATION AND REVISION (4 HRS)**		All topics				
Week 4 21-25 Oct	**CONSOLIDATION AND REVISION (4 HRS)**		All topics				
Week 5 28 Oct-1Nov	**CONSOLIDATION AND REVISION (4 HRS)**		All topics				
Week 6 4-8 Nov	**CONSOLIDATION AND REVISION (4 HRS)**		All topics				
Week 7 11-15 Nov	**CONSOLIDATION AND REVISION (4 HRS)**		All topics				
Week 8-10 18 Nov-11 Dec	**FINAL EXAMINATION** **P1: 2 hrs** **P2: 2 hrs**		**Physics Paper 1 (100 marks)** • Transverse pulses • Transverse waves • Longitudinal waves • Sound • Electromagnetic radiation • Electrostatics • Electric circuits • Vectors and scalars • Motion in one dimension • Instantaneous speed and velocity and the equations of motion • Energy **Chemistry Paper 2 (100 marks)** • Matter and classification • States of matter and the kinetic molecular theory. • The atom • The periodic table • Chemical bonding • Physical and chemical change • Representing chemical change Quantitative aspects of chemical change				