PHYSICAL SCIENCES ASSESSMENT FRAMEWORK
GRADE 12 TRIAL EXAMINATION 2024

QUESTION	PAPER 1: PHYSICS – 3 HOURS		PAPER 2: CHEMISTRY – 3 HOURS	
	CONTENT	MARKS		MARKS
1	10 Multiple choice questions of 2 marks each on all topics	20	10 Multiple choice questions of 2 marks each on all topics	20
2	Newton's laws and application of Newton's laws (Gr 11)	±24	Organic Molecules – Nomenclature	±19
3	Vertical Projectile Motion in One Dimension	±16	Organic Molecules – Physical properties	±11
4	Momentum and Impulse	±6	Organic Molecules – Organic reactions	±16
5	Work, Energy and Power	±12	Rate and Extent of Reaction	±24
6	Doppler Effect	±9	Chemical Equilibrium	±16
7	Electrostatics (Grade 11)	±10	Acids and bases	±19
8	Electric Circuits (Grade 11&12)	±24	Galvanic cells	±13
9	Electrodynamics	±15	Electrolytic cells	±12
10	Photoelectric effect	±14	TOTAL	150
	TOTAL	150		

SKILLS IN PHYSICAL SCIENCES

1.Identify and question phenomena:
- Formulate an investigative question.
- List all possible variables.
- Formulate a testable hypothesis.

2.Design/Plan of an investigation:
- Identify variables (dependent, independent, and controlled variables).
- List appropriate apparatus.
- Plan the sequence of steps which should include, amongst others:
  - The need for more than one trial to minimise experimental errors.
  - Identify safety precautions that need to be taken.
  - Identify conditions that ensure a fair test.
  - Set an appropriate control.

3.Results:
- Identify patterns/relationships in data. Interpret results.

4.Graphs:
- Draw accurate graphs from given data/information.
- Interpret graphs.
- Draw sketch graphs from given information.

5.Conclusions:
- Draw conclusions from given information, e.g., tables, graphs.

Evaluate the validity of conclusions.

6.Calculations:
- Solve problems using two or more different calculations (multistep calculations).

7.Descriptions:
Explain/Describe/Argue the validity of a statement/event using scientific principles.

WEIGHTING OF COGNITIVE LEVELS

COGNITIVE LEVELS	DESCRIPTION	MARKS	
		PAPER 1	PAPER 2
1	Remembering/ Recall	15%	15%
2	Understanding/ Comprehension	35%	40%
3	Applying and analysing	40%	35%
4	Evaluating and creating (synthesis)	10%	10%

TIPS:
(a) Copy formulae exactly as they appear on the formula sheet then substitute directly on it before manipulating the formula.
(b) Revise conversions of units, e.g. nano = 10^{-9} etc, conversion to SI units e.g. hours to seconds, cm^3 to dm^3 etc

PAPER 1

A: PRIOR KNOWLEDGE FROM GRADES 10 AND 11

All skills and application of knowledge learnt in Grades 10 and 11 are applicable to assessment in Grade 12. In addition to content from Grades 10 and 11 included under examinable content for Grade 12, skills and knowledge from Grades 10 and 11 that may be assessed in Grade 12 include the following:

- The use of equations of motion in solving problems dealing with momentum, vertical projectile motion, work, energy and power
- Sound waves and properties of sound
- Electromagnetism

NOTE:
Although there will be no direct questions about these aspects, applications thereof can be assessed.

B: ACCEPTED OR NOT ACCEPTED FROM 2024 ONWARD:

CONCEPT	NOT ACCEPTED	ACCEPTED
Projectile	An object which has been given an initial velocity and then it moves under the influence of gravity/weight only.	An object which has been given an initial velocity and then it moves under the influence of the gravitational force only.
Free fall	Motion during which the only force acting on an object is the gravity/weight.	Motion during which the only force acting on an object is the gravitational force.
Newton's laws	Components of force in a free-body/force diagram for all topics requiring free-body or force diagrams (not just in Newton's laws).	Only actual forces (not their components) must be used in free-body/force diagrams.
	Superimposed forces in a free-body/force diagram for all topics requiring free-body or force diagrams (not just in Newton's laws). (1 mark deducted for the superimposed forces).	Draw each force as a straight arrow starting from the dot/ block. Even if forces are applied in the same direction, each must be drawn using a straight arrow starting from the dot/block. Make the dot/block big enough to enable you to draw straight arrows touching the dot/block.
	System approach (only 2 marks awarded – correct formula and correct final answer)	Do calculations using each object separately from the other(s), i.e use simultaneous equations.
Momentum	Mentioning of 'closed system' in stating the principle of conservation of linear momentum	Only 'isolated system' is acceptable when stating the principle of conservation of linear momentum
	Stating momentum before is equal to momentum after collision in an isolated system (1 mark will be deducted)	The total linear momentum of an isolated system remains constant (is conserved).
WEP	Mentioning of 'closed system' in stating the principle of conservation of mechanical energy (1 mark will be deducted)	The total mechanical energy (sum of gravitational potential energy and kinetic energy) in an isolated system remains constant.
Formulae	Omission of subscripts in formulae (no mark for the formula)	Copy formulae exactly as they appear in the data sheet

C: COMMON MISTAKES

CONCEPT	NOT ACCEPTED	ACCEPTED
Change (Δ)	Initial – final	Always when calculation change, it must be final - initial

PAPER 2:

A: PRIOR KNOWLEDGE FROM GRADES 10 AND 11

Representing Chemical Change

Balanced chemical equations

- Write and balance chemical equations.
- Interpret balanced reaction equations in terms of:
  - Conservation of atoms
  - Conservation of mass (use relative atomic masses)

Quantitative Aspects of Chemical Change

Molar volume of gases

- 1 mole of any gas occupies 22,4 dm^3 at 0 °C (273 K) and 1 atmosphere (101,3 kPa).

Volume relationships in gaseous reactions

- Interpret balanced equations in terms of volume relationships for gases, i.e. under the same conditions of temperature and pressure, equal number of moles of all gases occupy the same volume.

Concentration of solutions

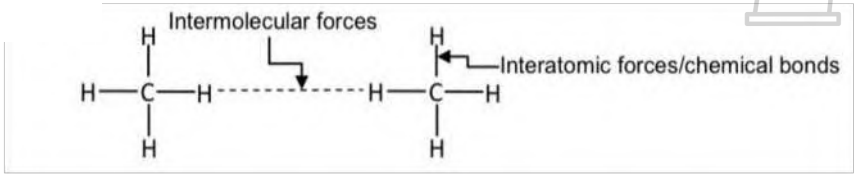
- Calculate the molar concentration of a solution.

More complex stoichiometric calculations

- Determine the empirical formula and molecular formula of compounds.
- Determine the percentage yield of a chemical reaction.
- Determine percentage purity or percentage composition, e.g. the percentage $CaCO_3$ in an impure sample of seashells.
- Perform stoichiometric calculations based on balanced equations.
- Perform stoichiometric calculations based on balanced equations that may include limiting reagents.

Intermolecular Forces

- Name and explain the different intermolecular forces (Van der Waal's forces):
  (i) Dipole-dipole forces: forces between two polar molecules
  (ii) Induced dipole forces or London forces: forces between non-polar molecules
  (iii) Hydrogen bonding: forces between molecules in which hydrogen is covalently bonded to nitrogen, oxygen or fluorine a special case of dipole-dipole forces
- Describe the difference between intermolecular forces and interatomic forces (intramolecular forces) using a diagram of a group of small molecules; and in words. Example:



- State the relationship between intermolecular forces and molecular size. For non-polar molecules, the strength of induced dipole forces increases with molecular size.
- Explain the effect of intermolecular forces on boiling point, melting point and vapour pressure.

B: ACCEPTED OR NOT ACCEPTED FROM 2024 ONWARD:

CONCEPT	NOT ACCEPTED	ACCEPTED
Weak acid	A weak acid ionises incompletely in water.	A weak acid ionises incompletely in water to form a low concentration of H_3O^+ ions.
Strong acid	A strong acid ionises completely in water.	A strong acid ionises completely in water to form a high concentration of H_3O^+ ions.
Weak base	A weak base dissociates/ionises incompletely in water.	A weak base dissociates/ionises incompletely in water to form a low concentration of OH^- ions.
Strong base	A strong base dissociates/ionises completely in water.	A strong base dissociates/ionises completely in water to form a high concentration of OH^- ions.
Balanced equations	Balancing an equation using multiple coefficients will no longer be accepted. E.g. $4C_3H_8 + 20O_2 \rightarrow 12CO_2 + 16H_2O$ (1 mark will be deducted for inappropriate balancing).	When balancing an equation, if all your coefficients are even numbers, then that equation is inappropriately balanced. Divide those coefficients by the smallest coefficient in that equation, e.g. in the equation given on the left, divide all coefficients by 4. Then the correctly balanced equation will be: $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$
Inappropriate abbreviations	Using IMF instead of intermolecular forces will no longer be accepted.	Always write the words intermolecular forces in full (not IMF).
Writing equations	Putting an equal sign in an equation instead of an arrow, e.g. $Ag^+ + e^- = Ag$ (no mark is awarded, i.e. $^0/_2$).	Always use an arrow to separate reactants from products, e.g. $Ag^+ + e^- \rightarrow Ag$

C: COMMON MISTAKES

CONCEPT	NOT ACCEPTED	ACCEPTED
Inappropriate abbreviations	$E^{\theta}_{cell} = E^{\theta}_{cat} - E^{\theta}_{an}$; $E^{\theta}_{cell} = E^{\theta}_{red} - E^{\theta}_{ox}$; $E^{\theta}_{cell} = E^{\theta}_{oxidising} - E^{\theta}_{reducing}$	Copy formulae in full as they appear in the data sheet