education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATES (VOCATIONAL)

ASSESSMENT GUIDELINES

PHYSICAL SCIENCE

NQF Level 4

September 2007

PHYSICAL SCIENCE – LEVEL 4

CONTENTS

SECTION A: PURPOSE OF THE SUBJECT ASSESSMENT GUIDELINES

SECTION B: ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

1 Assessment in the National Certificates (Vocational)
2 Assessment framework for vocational qualifications
2.1 Internal continuous assessment (ICASS)
2.2 External summative assessment (ESASS)
3 Moderation of assessment
3.1 Internal moderation
3.2 External moderation
4 Period of validity of internal continuous assessment (ICASS)
5 Assessor requirements
6 Types of assessment
6.1 Baseline assessment
6.2 Diagnostic assessment
6.3 Formative assessment
6.4 Summative assessment
7 Planning assessment
7.1 Collecting evidence
7.2 Recording
7.3 Reporting
8 Methods of assessment
9 Instruments and tools for collecting evidence
10 Tools for assessing student performance
11 Selecting and/or designing recording and reporting systems
12 Competence descriptions
13 Strategies for collecting evidence
13.1 Record sheets
13.2 Checklists

SECTION C: ASSESSMENT IN PHYSICAL SCIENCE

1 Schedule of assessment
2 Recording and reporting
3 Internal assessment of subject outcomes in Physical Science - Level 4
4 Specifications for external assessment in Physical Science - Level 4
4.1 Integrated summative assessment task (ISAT)
4.2 National Examination

SECTION A: PURPOSE OF THE SUBJECT ASSESSMENT GUIDELINES

This document provides the lecturer with guidelines to develop and implement a coherent, integrated assessment system for Physical Science in the National Certificates (Vocational). It must be read with the *National Policy Regarding Further Education and Training Programmes: Approval of the Documents, Policy for the National Certificates (Vocational) Qualifications at Levels 2 to 4 on the National Qualifications Framework (NQF)*. This assessment guideline will be used for National Qualifications Framework Levels 2-4.

This document explains the requirements for the internal and external subject assessment. The lecturer must use this document with the *Subject Guidelines: Physical Science* to prepare for and deliver Physical Science. Lecturers are encouraged to use a variety of resources and apply a range of assessment skills in the setting, marking and recording of assessment tasks.

SECTION B: ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

1 ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

Assessment in the National Certificates (Vocational) is underpinned by the objectives of the National Qualifications Framework (NQF). These objectives are to:

- Create an integrated national framework for learning achievements.
- Facilitate access to and progression within education, training and career paths.
- Enhance the quality of education and training.
- Redress unfair discrimination and past imbalances and thereby accelerate employment opportunities.
- Contribute to the holistic development of the student by addressing:
  - social adjustment and responsibility;
  - moral accountability and ethical work orientation;
  - economic participation; and
  - nation-building.

The principles that drive these objectives are:

- ***Integration***

To adopt a unified approach to education and training that will strengthen the human resources development capacity of the nation.

- ***Relevance***

To be dynamic and responsive to national development needs.

- ***Credibility***

To demonstrate national and international value and recognition of qualification and acquired competencies and skills.

- ***Coherence***

To work within a consistent framework of principles and certification.

- ***Flexibility***

To allow for creativity and resourcefulness when achieving Learning Outcomes, to cater for different learning styles and use a range of assessment methods, instruments and techniques.

- ***Participation***

To enable stakeholders to participate in setting standards and co-ordinating the achievement of the qualification.

- ***Access***

To address barriers to learning at each level to facilitate students' progress.

- ***Progression***

To ensure that the qualification framework permits individuals to move through the levels of the national qualification via different, appropriate combinations of the components of the delivery system.

- ***Portability***

To enable students to transfer credits of qualifications from one learning institution and/or employer to another institution or employer.

- ***Articulation***

To allow for vertical and horizontal mobility in the education system when accredited pre-requisites have been successfully completed.

- ***Recognition of Prior Learning***

To grant credits for a unit of learning following an assessment or if a student possesses the capabilities specified in the outcomes statement.

- ***Validity of assessments***

To ensure assessment covers a broad range of knowledge, skills, values and attitudes (SKVAs) needed to demonstrate applied competency. This is achieved through:

  - clearly stating the outcome to be assessed;
  - selecting the appropriate or suitable evidence;
  - matching the evidence with a compatible or appropriate method of assessment; and
  - selecting and constructing an instrument(s) of assessment.

- ***Reliability***

To assure assessment practices are consistent so that the same result or judgment is arrived at if the assessment is replicated in the same context. This demands consistency in the interpretation of evidence; therefore, careful monitoring of assessment is vital.

- ***Fairness and transparency***

To verify that no assessment process or method(s) hinders or unfairly advantages any student. The following could constitute unfairness in assessment:

  - Inequality of opportunities, resources or teaching and learning approaches
  - Bias based on ethnicity, race, gender, age, disability or social class
  - Lack of clarity regarding Learning Outcome being assessed
  - Comparison of students' work with other students, based on learning styles and language

- ***Practicability and cost-effectiveness***

To integrate assessment practices within an outcomes-based education and training system and strive for cost and time-effective assessment.

2 ASSESSMENT FRAMEWORK FOR VOCATIONAL QUALIFICATIONS

The assessment structure for the National Certificates (Vocational) qualification is as follows:

2.1 Internal continuous assessment (ICASS)

Knowledge, skills, values and attitudes (SKVAs) are assessed throughout the year using assessment instruments such as projects, tests, assignments, investigations, role-play and case studies. The internal continuous assessment (ICASS) practical component is undertaken in a laboratory or simulated laboratory. This component is moderated internally and externally quality assured by Umalusi. All internal continuous assessment (ICASS) evidence is kept in a Portfolio of Evidence (PoE) and must be readily available for monitoring, moderation and verification purposes.

2.2 External summative assessment (ESASS)

The external summative assessment is a set of written papers set to the requirements of the Subject Learning Outcomes. The Department of Education administers the theoretical component according to relevant assessment policies.

A compulsory component of external summative assessment (ESASS) is the **integrated summative assessment task (ISAT).** This assessment task draws on the students' cumulative learning throughout the year. The task requires integrated application of competence and is executed under strict assessment conditions. The task should take place in a laboratory, simulated laboratory or workplace. The integrated

summative assessment task (ISAT) is the most significant test of students' ability to apply acquired knowledge.

The integrated assessment approach allows students to be assessed in more than one subject with the same integrated summative assessment task (ISAT).

External summative assessments will be conducted annually between October and December, with provision made for supplementary sittings.

3 MODERATION OF ASSESSMENT

3.1 Internal moderation

Assessment must be moderated according to the internal moderation policy of the Further Education and Training (FET) college. Internal college moderation is a continuous process. The moderator's involvement starts with the planning of assessment methods and instruments and follows with continuous collaboration with and support to the assessors. Internal moderation creates common understanding of Assessment Standards and maintains these across vocational programmes.

3.2 External moderation

External moderation is conducted by the Department of Education, Umalusi and, where relevant, an Education and Training Quality Assurance (ETQA) body according to South African Qualifications Authority (SAQA) and Umalusi standards and requirements.

The external moderator:

- monitors and evaluates the standard of all summative assessments;
- maintains standards by exercising appropriate influence and control over assessors;
- ensures proper procedures are followed;
- ensures summative integrated assessments are correctly administered;
- observes a minimum sample of ten (10) to twenty-five (25) percent of summative assessments;
- gives written feedback to the relevant quality assuror; and
- moderates in case of a dispute between an assessor and a student.

Policy on inclusive education requires that assessment procedures be customised for students who experience barriers to learning, and supported to enable these students to achieve their maximum potential.

4 PERIOD OF VALIDITY OF INTERNAL CONTINUOUS ASSESSMENT (ICASS)

The period of validity of the internal continuous assessment mark is determined by the *National Policy on the Conduct, Administration and Management of the Assessment of the National Certificates (Vocational).*

The internal continuous assessment (ICASS) must be re-submitted with each examination enrolment for which it constitutes a component.

5 ASSESSOR REQUIREMENTS

Assessors must be subject specialists and should ideally be declared competent against the standards set by the ETDP SETA. If the lecturer conducting the assessments has not been declared a competent assessor, an assessor who has been declared competent may be appointed to oversee the assessment process to ensure the quality and integrity of assessments.

6 TYPES OF ASSESSMENT

Assessment benefits the student and the lecturer. It informs students about their progress and helps lecturers make informed decisions at different stages of the learning process. Depending on the intended purpose, different types of assessment can be used.

6.1 Baseline assessment

At the beginning of a level or learning experience, baseline assessment establishes the knowledge, skills, values and attitudes (SKVAs) that students bring to the classroom. This knowledge assists lecturers to plan learning programmes and learning activities.

6.2 Diagnostic assessment

This assessment diagnoses the nature and causes of learning barriers experienced by specific students. It is followed by guidance, appropriate support and intervention strategies. This type of assessment is useful to make referrals for students requiring specialist help.

6.3 Formative assessment

This assessment monitors and supports teaching and learning. It determines student strengths and weaknesses and provides feedback on progress. It determines if a student is ready for summative assessment.

6.4 Summative assessment

This type of assessment gives an overall picture of student progress at a given time. It determines whether the student is sufficiently competent to progress to the next level.

7 PLANNING ASSESSMENT

An assessment plan should cover three main processes:

7.1 Collecting evidence

The assessment plan indicates which Subject Outcomes and Assessment Standards will be assessed, what assessment method or activity will be used and when this assessment will be conducted.

7.2 Recording

Recording refers to the assessment instruments or tools with which the assessment will be captured or recorded. Therefore, appropriate assessment instruments must be developed or adapted.

7.3 Reporting

All the evidence is put together in a report to deliver a decision for the subject.

8 METHODS OF ASSESSMENT

Methods of assessment refer to who carries out the assessment and includes lecturer assessment, self-assessment, peer assessment and group assessment.

LECTURER ASSESSMENT	The lecturer assesses students' performance against given criteria in different contexts, such as individual work, group work, etc.
SELF-ASSESSMENT	Students assess their own performance against given criteria in different contexts, such as individual work, group work, etc.
PEER ASSESSMENT	Students assess another student's or group of students' performance against given criteria in different contexts, such as individual work, group work, etc.
GROUP ASSESSMENT	Students assess the individual performance of other students within a group or the overall performance of a group of students against given criteria.

9 INSTRUMENTS AND TOOLS FOR COLLECTING EVIDENCE

All evidence collected for assessment purposes is kept or recorded in the student's PoE.

The following table summarises a variety of methods and instruments for collecting evidence. A method and instrument is chosen to give students ample opportunity to demonstrate the Subject Outcome has been attained. This will only be possible if the chosen methods and instruments are appropriate for the target group and the Specific Outcome being assessed.

	METHODS FOR COLLECTING EVIDENCE		
	Observation-based (Less structured)	**Task-based** (Structured)	**Test-based** (More structured)
Assessment instruments	• Observation • Class questions • Lecturer, student, parent discussions	• Assignments or tasks • Projects • Investigations or research • Case studies • Practical exercises • Demonstrations • Role-play • Interviews	• Examinations • Class tests • Practical examinations • Oral tests • Open-book tests
Assessment tools	• Observation sheets • Lecturer's notes • Comments	• Checklists • Rating scales • Rubrics	• Marks (e.g. %) • Rating scales (1-4)
Evidence	• Focus on individual students • Subjective evidence based on lecturer observations and impressions	**Open middle**: Students produce the same evidence but in different ways. **Open end**: Students use same process to achieve different results.	Students answer the same questions in the same way, within the same time.

10 TOOLS FOR ASSESSING STUDENT PERFORMANCE

Rating scales are marking systems where a symbol (such as 1 to 4) or a mark (such as 5/10 or 50%) is defined in detail. The detail is as important as the coded score. Traditional marking, assessment and evaluation mostly used rating scales without details such as what was right or wrong.

Task lists and **checklists** show the student what needs to be done. These consist of short statements describing the expected performance in a particular task. The statements on the checklist can be ticked off when the student has adequately achieved the criterion. Checklists and task lists are useful in peer or group assessment activities.

Rubrics are a hierarchy (graded levels) of criteria with benchmarks that describe the minimum level of acceptable performance or achievement for each criterion. Using rubrics is a different way of assessing and cannot be compared to tests. Each criterion described in the rubric must be assessed separately. Mainly two types of rubrics, namely holistic and analytical, are used.

11 SELECTING AND/OR DESIGNING RECORDING AND REPORTING SYSTEMS

The selection or design of recording and reporting systems depends on the purpose of recording and reporting student achievement. **Why** particular information is recorded and **how** it is recorded an essential basis for selection of the instrument.

Computer-based systems, for example spreadsheets, are cost and time effective. The recording system should be user-friendly and information should be easily accessed and retrieved.

12 COMPETENCE DESCRIPTIONS

All assessment should award marks to evaluate specific assessment tasks. However, marks should be awarded against rubrics and not be simply a total of ticks for right answers. Rubrics should explain the competence level descriptors for the skills, knowledge, values and attitudes (SKVAs) that a student must demonstrate to achieve each level of the rating scale.

When lecturers or assessors prepare an assessment task or question, they must ensure that the task or question addresses an aspect of a Subject Outcome. The relevant Assessment Standard must be used to create the rubric to assess the task or question. The descriptions must clearly indicate the minimum level of attainment for each category on the rating scale.

13 STRATEGIES FOR COLLECTING EVIDENCE

A number of different assessment instruments may be used to collect and record evidence. Examples of instruments that can be (adapted and) used in the classroom include:

13.1 Record sheets

The lecturer observes students working in a group. These observations are recorded in a summary table at the end of each project. The lecturer can design a record sheet to observe students' interactive and problem-solving skills, attitudes towards group work and involvement in a group activity.

13.2 Checklists

Checklists should have clear categories to ensure that the objectives are effectively met. The categories should describe how the activities are evaluated and against what criteria they are evaluated. Space for comments is essential.

SECTION C: ASSESSMENT IN PHYSICAL SCIENCE

1 SCHEDULE OF ASSESSMENT

At NQF levels 2, 3 and 4, lecturers will conduct assessments as well as develop a schedule of formal assessments that will be undertaken in the year. All three levels also have an external examination that accounts for 50 percent of the total mark. The marks allocated to assessment tasks completed during the year, kept or recorded in a PoE account for the other 50 percent.

The PoE and the external assessment include written evidence of practical and theory components. The practical assessment in Physical Science must, where necessary, be subjected to external moderation by Umalusi or an appropriate Education and Training Quality Assurance (ETQA) body, appointed by the Umalusi Council in terms of Section 28(2) of the *General and Further Education and Training Quality Assurance Act, 2001 (Act No. 58 of 2001).*

The subject consists of the following components that will be assessed internally and externally:

INTERNAL CONTINUOUS ASSESSMENT (ICASS) (to be completed through the year)		**EXTERNAL SUMMATIVE ASSESSMENT (ESASS)** (to be completed at the end of the year)	
50% (100 marks) **-presented in Portfolio of Evidence:**		**50% (100 marks)**	
Tasks	**Value**	**Tasks**	**Value**
• One mark consisting of 2 control tests. • One exam paper (mid-year). • One mark consisting two research tasks • ISAT • One mark consisting of four practical tasks	10 20 20 10 40 100	• Theoretical examination consisting of 2 papers: Paper 1 Paper 2	 200 200 400 ÷ 4

2 RECORDING AND REPORTING

Physical Science, as is the case for all the other Vocational subjects, is assessed according to five levels of competence. The level descriptions are explained in the following table.

Scale of Achievement for the Vocational component

RATING CODE	RATING	MARKS %
5	Outstanding	80-100
4	Highly competent	70-79
3	Competent	50-69
2	Not yet competent	40-49
1	Not achieved	0-39

Annexure A contains example mark sheet on which all marks can be recorded.

2.1 Assessment of tests and examinations

Theory tests and examinations are marked according to prepared memoranda.

2.2 Assessment of assignments

Two assignments, one based on Physics and one on Chemistry, are assessed for the year mark. The assignments should indicate the relationship of science content, related industry and the impact on the environment.

Assignments are assessed using holistic or analytical rubrics. **Annexure B** contains a marking grid for these skill areas.

- **Criteria for assignment tasks include, but are not limited to:**
  - Plan and conduct a scientific investigation to collect data using appropriate resources.
  - Communicate and present collected information and conclusions with relevant scientific references; presented in a practical report or presentation.

- **Some examples of assignment topics include, but are not limited to:**

COMPONENT	SUBJECT OUTCOME	SUGGESTED ASSIGNMENT OR RESEARCH TASK
Physics (Select any 1)	• 1.2	• Identify warning symbols used in laboratories or where chemicals are handled or transported; state where they are used and what danger do they represent. Give examples of chemicals that are classified under these symbols.
	• 2.2	• Identify different applications of Newton's 3rd Law; identify the force on each and the effect of the forces
	• 2.4	• Find applications of mechanical advantage where pulleys, belt system and gears are used; state also the type of mechanical advantages.
	• 3.1	One of the following topics • Find the use of Doppler-effect in industry e.g. radar (speed regulation, used for search and location, airport traffic control); or find examples of the effect of shock waves on structures, supersonic planes and high speed vehicles; • Find the wavelength of radio waves or microwaves and the different applications of the chosen wave. • Research laser technology- find out how lasers work, the different types of lasers and their applications. • Describe the photo electric effect and where it is applied.
	• 4.1	• Differentiate between motors and generators: how they work, energy transfer, sizes and their applications in industry.
	• 4.2	• Research the different types of capacitors in industry and their applications – refer to at least two different applications.
Chemistry (Compulsory)	• 7.2	• Compulsory research: Identify and critically evaluate the impact of one of the South African chemical industries and its effect on the quality of human, environmental and socio-economic development.

2.3 Assessment of practical tasks

In Physical Science, students are assessed during the performance of the task and on the report of the task. Criteria and outcomes for practical tasks are specified in SO 1.2.

These criteria are structured and assessed into seven skill areas for each practical assessment. These skills areas can be assessed with a rubric. **Annexure C** contains a marking grid for these skill areas.

- **Some examples of assessment tasks include, but are not limited to:**

COMPONENT	SUBJECT OUTCOME	SUGGESTED PRACTICAL TASKS
Physics (Select any 2)	• 2.1	• Determine "g". Drop object and record initial time of dropping and the time that it landed as well as distance covered.
	• 2.2	• Determine if the collision between two trolleys is elastic; or use a mass falling on a trolley.

	• 4.2	• Assemble an electronic circuit from an instruction sheet (Oscillator can be included). Explain the function of the circuit.
Chemistry (2 tasks)	• 6.1	• Plan and conduct a titration to determine unknown concentration and use indicators correctly.
	• 6.2	• Construct an electrochemical cell and measure the potential difference.
	• 6.3	• Conduct a practical to determine the effect of change in surface area/ concentration/ temperature on the rate of chemical reaction.

2.4 Evidence of assessment

All evidence of assessment must be filed for moderating purposes. The college must standardise recording and moderation documentation.

The following at least should be included in the Lecturer's Assessment Portfolio:

- A contents page
- The formal schedule of assessment
- The requirements for each assessment task
- The tools used for each assessment task
- Recording instrument(s) for each assessment task
- A mark sheet and report for each assessment task

The student's PoE must include at least:

- A contents page
- A declaration stating authenticity
- A record of the marks (and comments) achieved for each tasks
- The assessment tasks according to the assessment schedule
- The assessment tools or instruments for the task

Where a task cannot be contained as evidence in the PoE, its exact location must be recorded and it must be readily available for moderation purposes.

The following is a guide to the number of internal assessment units for Physical Sciences:

NUMBER OF UNITS	METHOD	ASSESSMENT	COVERAGE	
2	Test based	Formal written tests	One or more completed topics	
1		Internal written exam	All completed topics	
2	Task based	Research assignments	One based on Physics One based on Chemistry	Both related to industry
4	Task based and observation	Practical tasks	Two Physics tasks Two Chemistry tasks	Must cover the related Subject Outcomes

ASSESSMENT OF PHYSICAL SCIENCE

LEVEL 4

3 INTERNAL ASSESSMENT OF SUBJECT OUTCOMES IN PHYSICAL SCIENCE - LEVEL 4

Topic 1: Measurements

SUBJECT OUTCOME	
1.1 Identify and apply symbols.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Correct SI symbols and units are identified and used in problem solving and related content.	• Identify and use *Systeme Internationale* (SI) symbols and units correctly as applied at this level.
• Hazardous warning symbols that are used in laboratories are identified (related to chemicals, radiation, electricity and others).	• Identify hazardous warning symbols (related to chemicals, radiation, electricity a.o. symbols.)
ASSESSMENT TASKS OR ACTIVITIES	
• Assessment Integrated with content of other topics in this level. • Worksheet: Identify correct units and symbols to be used in this level. • Research: Identify warning symbols used in laboratories or where chemicals are handled or transported; state where they are used and what danger do they represent. Give examples of chemicals that are classified under these symbols.	

SUBJECT OUTCOME	
1.2 Conduct scientific investigations to collect, represent and interpret data.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Scientific investigation is planned and conducted using the correct apparatus. • Data is collected systematically and accurately and the variables are controlled. • Measurements and/or observations are recorded in tables.	• Plan and conduct a scientific investigation to collect data systematically with regard to accuracy, reliability and the need to control variables.
• Patterns and trends in the information collected identified using graphs and calculations • Patterns and trends are linked to existing scientific knowledge to help draw conclusions	• Seek patterns and trends in the information collected and link it to existing scientific knowledge to help draw conclusions.
• Collected information and conclusions communicated and presented in a practical report with relevant scientific arguments.	• Present collected information and conclusions with relevant scientific arguments.
ASSESSMENT TASKS OR ACTIVITIES	
Practical tasks: integrated with content of other topics in this level.	

Topic 2: Mechanics

SUBJECT OUTCOME	
2.1 Interpret, evaluate and apply motion of free falling bodies.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Vertical motion is analysed to do problem solving using diagrams and equations of motion. *Range: Linear equations of motion are* $v_f = v_i + g\,\Delta t$, $s = v_i\,\Delta t + ½\,g\Delta t^2$, $v_f^2 = v_i^2 + 2gs$ • Vertical motion is identified and analysed using graphs of motion. (s-t, v-t and a-t graphs). • Gravitational acceleration (g) is independent of the object's mass is identified.	• Identify, analyse, describe and solve problems on vertical motion presented in diagrams, equations and graphs of motion. • Identify that gravitational acceleration is independent of the mass of an object.

• Principles of projectile motion are applied to diagrams and used in problem solving.	• Apply principles of projectile motion to diagrams and solve problems using equations of motion.
ASSESSMENT TASKS OR ACTIVITIES	
• Class test. • Worksheet on bodies dropped or projected vertically upwards and caught again or objects projected at an angle from a height and then falling to ground. • Student practical: Determine "g". Drop object and record initial time of dropping and the time that it landed as well as distance covered. • Demonstration: Investigate which object will reach ground first: -Two are masses at same height – one object is dropped the same time that another object is projected horizontally and allowed to fall – apply to missiles. -Drop two masses of different magnitudes from the same height to illustrate that "g" is independent of mass.	

SUBJECT OUTCOME	
2.2 State, explain, interpret and apply momentum and force.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Momentum of an object is defined and calculated (ρ = mv). • Momentum change of an object is calculated using $\Delta\rho = m\Delta v = m(v_f - v_i)$	• Define and calculate momentum and calculate the change of momentum of an object.
• Impulse is defined (F_{nett} t) as the change in momentum • $F_{nett}\ \Delta t = m\Delta v$ is used for calculations and problem solving.	• Define impulse (F_{nett} t) as the change in momentum and use $F_{nett}\ \Delta t = m\Delta v$ for calculations and problem solving.
• Newton's 3rd Law is defined • Examples of pairs of interacting objects that exert equal forces on each other are identified.	• Define Newton's 3rd Law and identify examples of interacting objects that exert equal forces on each other.
• Law of conservation of momentum is defined • Elastic and inelastic collisions are identified and differentiated referring to conservation of kinetic energy. ▪ Law of conservation of momentum is applied on collisions using calculations.	• Define the law of conservation of momentum • Identify and distinguish between elastic and inelastic collisions; and apply law using calculations.
ASSESSMENT TASKS OR ACTIVITIES	
• Worksheet: Contextualise calculations of momentum and momentum change on sport; use law to solve problems dealing with car crashes, explosions etc. • Practical**:** Determine if the collision between two trolleys is elastic; or use a mass falling on a trolley. • Research: Identify different applications of Newton's 3rd Law; identify the force on each and the effect of the forces.	

SUBJECT OUTCOME	
2.3 Define, interpret and apply principles of work, power and energy.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Work is defined. • Examples are identified where no mechanical work is done.	• Define work and identify examples where no mechanical work is done.
• Work done on an object and/or system for vertical displacement is defined and calculated; refer to gravitational potential energy. • Work done on an object and/or system for horizontal displacement is defined and calculated. • Mechanical work done by external force on the object and/or system using the change of mechanical energy of	• Define and calculate work done on an object and /or system for vertical and horizontal displacement.

the system is identified and calculated.	
• Power is defined and applied.	• Define and apply mechanical power.
ASSESSMENT TASKS OR ACTIVITIES	
• Work sheet to determine work done when an object is lifted; work done by an object falling through glass; work done on an object landing in water or in sand; work done on a moving object by friction of a surface. • Assignment: Identify examples of moving objects where there is no mechanical work ; discuss the work done and power by cranes and earth moving equipment. ▪ Class test.	

SUBJECT OUTCOME	
2.4 State, evaluate and apply mechanical advantage.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Torque is defined and its application on simple machines identified.	• Define torque and identify its application on simple machines.
• Mechanical advantage in a wheel and axle is identified and described.	• Describe and identify the mechanical advantage in a wheel and axle.
• A pulley is defined and the difference between fixed and movable pulleys identified. • Mechanical advantage of pulleys and belt system is identified and described.	• Define a pulley and distinguish between fixed and movable pulleys. • Identify and describe the mechanical advantage of a pulley system.
• Gears and gear trains are defined • The difference between the application of gears and pulleys identified.	• Define gears and gear trains and distinguish between the use of gears and pulleys.
• Mechanical advantage (ideal and actual) is calculated for pulleys (hoist).	• Analyse and apply law (equation) of simple machines on pulleys (hoist) to determine the mechanical advantage.
ASSESSMENT TASKS OR ACTIVITIES	
• Worksheet: Identify and determine the mechanical advantage in a pulley, belt system and gears or gear trains. • Research: Find applications of mechanical advantage where pulleys, belt system and gears are used; state also the type of mechanical advantages. • Demonstration: Show the mechanical advantage using pulleys, belt system or a set of gears; or find the mechanical advantage using more than one pulley when lifting a heavy mass piece. • Class test	

Topic 3: Waves, sound and light

SUBJECT OUTCOME	
3.1 Describe and apply properties of waves on everyday life contexts.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Basic concepts of Doppler -effect with sound and ultrasound are identified and described. • The Doppler-effect is applied to radar and examples of sonic boom.	• Identify and describe the basic concepts of the Doppler-effect with sound and ultrasound • Apply the Doppler-effect to radar and examples of sonic boom.
• EM radiation is defined. • EM spectrum is defined and examples (light, radio waves, microwave, IR, UV and others) and application identified.	• Define EM radiation; identify the EM spectrum and identify examples (light, radio waves, microwave, IR , UV and others) and their application.
• The nature of an EM wave as mutual -induction of oscillating magnetic and electric fields is described. • The nature of EM as particle (energy of photon related to frequency and wavelength) is described.	• Describe the dual nature of EM radiation; i.e. wave and particle nature.

• The relationship of wavelength to frequency is identified to explain colour and energy of light. • Lasers are defined and examples of its use identified..	• Identify the relationship of wavelength to frequency to explain colour and energy of light. • Define lasers and give examples of its application.
• Photoelectric effect is explained and applied and examples of its use identified.	• Explain and apply the photoelectric effect give examples of its application.
ASSESSMENT TASKS OR ACTIVITIES	
• Worksheet: Describe Doppler effect used in radar, to explain the difference in pitch of sound of a passing ambulance; light, microwaves IR and UV identified as waves from EM spectrum; wave property of EM applied on light and the difference of energies identified; describe the photo electric effect. • Research: One of the following topics 1. Find the use of Doppler-effect in industry e.g. radar (speed regulation, used for search and location, airport traffic control); or find examples of the effect of shock waves on structures, supersonic planes and high speed vehicles; 2. Find the wavelength of radio waves or microwaves and the different applications of the chosen wave. 3. Research laser technology- find out how lasers work, the different types of lasers their classification and their applications. 4. Describe the photo electric effect and where it is applied. • Demonstration: Refer students to the change of sound of a police or ambulance siren; show photo cells; use micro wave kits to demonstrate the wave property of EM waves.	

Topic 4: Electricity and electronics

SUBJECT OUTCOME	
4.1 State, explain and apply principles used in electrodynamics.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Stationary and moving electrical machines (transformer generator and motor) are identified and purpose compared. • Efficiency of stationary and moving electrical machines described.	• Identify and differentiate between stationary and moving electrical machines (transformer generator and motor) • Describe the efficiency of stationary and moving electrical machines.
• Single-phase and three-phase defined and its applications identified.	• Define single-phase and three-phase and identify its applications.
• Energy transfer as work done in an electrical circuit is defined and calculated.	• Define and calculate energy transfer in an electrical circuit.
• Electrical power defined and calculated and its application identified as specifications (on tools etc)	• Define and calculate electrical power and identify its application on tools etc.
• The relationship between current, pd, resistance and power is identified	• Determine the relationship between current, pd, resistance and power.
ASSESSMENT TASKS OR ACTIVITIES	
• Work sheet: Classify transformers, generators and motors as moving or stationary electrical machines; identify the type of energy transfer in the specified electrical machines. Identify the common specification use of three- phase and one phase. Calculate energy transfer, power of an electrical circuit or tools. State the relationship between A, V, R and P. • Research: Differentiate between motors and generators: how they work, energy transfer, sizes and their applications in industry. • Discussion: Best choice of electrical tool based on electrical specifications; Explain why you can watch TV if 2 phases are out. • Class Test	

SUBJECT OUTCOME	
4.2 State and apply principles and components used in electronics.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Capacitance and inductance and their application are defined.	• Define capacitance and inductance and the application thereof.
• Conduction in semi-conductors described.	• Describe in semi-conductors
• Intrinsic properties and doping- properties by design are identified. • The principles of p-n junction described.	• Identify intrinsic properties and doping- properties by design. • Describe principles of the p-n junction.
• Basic principles of digital electronics- logical gates (And, or and Not)	• Identify basic principles of digital electronics- logical gates.
• Symbols and use of active circuit elements are identified. • Components are identified from a circuit diagram. *Range: Active circuit elements are LED, diode, transistor and operational amplifier.*	• Identify symbols and use of active circuit elements and identify components from circuit diagram. *Range: Active circuit elements are LED, diode, transistor and operational amplifier*.
ASSESSMENT TASKS OR ACTIVITIES	
• Worksheet: Describe capacitances and inductance and give an example; describe doping and write a diagram showing p-n junction, explain the junction diode; Identify (And, or, Not- gates); draw a circuit and identify the symbols. • Practical: Assemble an electronic circuit from an instruction sheet (Oscillator can be included). Explain the function of the circuit. • Class test	

Topic 5: Matter and materials

SUBJECT OUTCOME	
5.1 Identify and critically evaluate the impact of atomic nuclei on the quality of human, environmental and socio-economic development.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Nuclear structure described and related to its stability.	• Describe the nuclear structure of an atom and relate to its stability.
• Radioactivity is defined and its particles identified. • Radioactivity measurement is identified.	• Define radioactivity and identify its particles and how it is measured.
• Examples of radioactive use in industry are identified and evaluated. • Biological effects of radiation and safety are identified.	• Identify and evaluate examples of use in industry and the biological effects of radiation and safety.
• Nuclear fusion and nuclear fission are differentiated between. • Nuclear power and its impact on socio-economic development is evaluated.	• Differentiate between nuclear fusion and nuclear fission and evaluate nuclear power.
ASSESSMENT TASKS OR ACTIVITIES	
• Work sheet. Define radioactivity , units of radioactivity and instruments identified, effects of radiation stated and safety levels indicated • Assignment: Radioactivity and its uses in industry (other than source of electrical energy), include human safety; • Nuclear power as a safe alternative source of energy discussed in Topic 7.	

SUBJECT OUTCOME	
5.2 State, evaluate and apply properties of fluids on every day life and industrial contexts	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Hydrostatic pressure is defined. • Hydrostatic pressure and its relation to depth and density of a liquid is identified.	• Define and apply hydrostatic pressure and its relation to depth and density of a liquid.
• Pascal's' principle is defined and examples (hydraulic press, brakes) are described.	• Define, give examples of, and use Pascal's principle.
• Fluid flow is described and a Venturi meter is used to show the relationship between pressure and cross-section of the pipe changes speed of fluid flow.	• Describe fluid flow and use a Venturi meter to show the relationship between pressure, cross-section of the pipe changes speed of fluid flow.
ASSESSMENT TASKS OR ACTIVITIES	
• Work sheet: Define and apply hydrostatic pressure using examples; define Pascal's principle and apply on examples; describe fluid flow, the effect of pressure and cross-section of the pipe changes speed of fluid flow. • Assignment: Write a report on a case study of industrial application of Pascal's principle, and Bernoulli's principle in fluid flow. • Demonstration: Refer students to increase of pressure experienced by deep sea diving; show the flow of a liquid in clear pipe- system of different diameters. • Class test	

SUBJECT OUTCOME	
5.3 Identify and apply knowledge of organic molecules in every day life and industrial context.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Hydro-carbon and organic molecules and the use as fuels defined. • Fractional distillation of crude oil identified as a source of different fuels.	• Define hydro carbon and organic molecules and identify its use as fuels. • Identify fractional distillation of crude oil as a source of different fuels.
• Physical property is identified as the effect of chain length and examples given.	• Identify physical property as the effect of chain length and give examples.
• Functional groups, saturated and unsaturated structures identified. • Chemical properties associated with functional groups identified. *Range: Functional groups alkane, alkene, alkyne, alcohol, carboxylic acids.*	• Identify functional groups, saturated and unsaturated structures of organic molecules and relate it to chemical properties.
• Organic molecules named (IUPAC) and structural formulae drawn. *Range: Functional groups alkane, alkene, alkyne, alcohol, carboxylic acids- limited to 4 carbon chains.*	• Draw structural formulae and name (IUPAC) organic molecules.
• Plastics and polymers are described and the related South African industry identified. • Thermoplastics and thermo set are described.	• Describe plastics and polymers refer to related South African industry. • Describe what are thermoplastics and thermo set.
ASSESSMENT TASKS OR ACTIVITIES	
• Work sheet. Identify and write structural formula down of stated molecules; identify the phase of the hydrocarbon using chain length; identify chemical properties of the functional groups; describe plastics and polymers and thermo plastics. • Test. • Research: Identify the type of plastic or polymers manufactured in the South African polymer industry and name a few applications.	

Topic 6: Chemical Change

SUBJECT OUTCOME	
6.1 Identify and apply knowledge of acids and bases	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Acid, base and buffers is defined and identified using definitions of Arrhenius and Lowry Bronstaed.	• Define acid, base and identify buffers using definitions of Arrhenius and Lowry Bronstaed.
• pH values are identified and applied.	• Identify and apply pH values.
• Neutralisation (acid-base) reaction is written down and the unknown value is calculated.	• Write neutralisation (acid-base) reaction down and calculate unknown value.
• The use of indicators and titration are identified.	• Identify the use of indicators and titration.
• Industrial acids and alkali and their application is identified. *Range: Acids can include Sulphuric acid, Nitric acid and hydrochloric acid.*	• Identify industrial acids and alkali and their application.
ASSESSMENT TASKS OR ACTIVITIES	
• Worksheet. Identify a chemical as an acid or base using Arrhenius and Lowry Bronstaed definitions; the meaning of pH values. • Practical: Plan and conduct a titration to determine unknown concentration and use indicators correctly. • Test.	

SUBJECT OUTCOME	
6.2 Identify and apply knowledge of electrochemical cells.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Oxidation, reduction, cathode, anode and electron transfer are defined.	• Define oxidation, reduction, cathode, anode and electron transfer.
• Oxidation and reduction half reactions are written down.	• Write oxidation and reduction half reactions.
• Purpose of a sacrificial anode and corrosion of metals is described and illustrated with chemical reactions.	• Describe the purpose a sacrificial anode and corrosion of metals and write reactions down to illustrate.
• Electrochemical cells are described and examples in every day life / industry identified. • Electrochemical cell labelled and drawn and the cell potential determined and compared with cells used in everyday life (Li, Cd, Pb- cells).	• Describe an electrochemical cell and identify examples in every day life/ industry. • Draw and label an electrochemical cell and determine cell potential and compare with cells used in everyday life (Li, Cd, Pb- cells).
ASSESSMENT TASKS OR ACTIVITIES	
• Worksheet: Identify oxidation and reduction reactions and identify the transfer of electrons, cathode and anode described, sacrificial anode identified from examples, cell • Practical: Construct an electrochemical cell and measure the potential difference. • Assignment: Corrosion of metals and examples and purpose of sacrificial anode and corrosion protection; or research examples of batteries and or electrochemical cells.	

SUBJECT OUTCOME	
6.3 Describe, analyse and apply the rate and extent of chemical reaction.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Rates of reactions are defined. • Factors effecting rate of reactions and examples are identified.	• Define rates of reactions and identify factors effecting rate and refer to examples.
• Mechanism of reaction and of catalysis is identified.	• State mechanism of reaction and of catalysis.
• Chemical equilibrium is defined and conditions for	• Define chemical equilibrium and identify conditions for

equilibrium are identified.	equilibrium.
• Factors affecting equilibrium (T, c and p) are identified and applied on chemical reactions. • The effect of disturbance on reaction is predicted using Le Chatelier's principle.	• Identify factors affecting equilibrium apply and evaluate the effect on chemical reactions using Le Chatelier's principle.
• Equilibrium constant is defined and interpreted	• Define and interpret the equilibrium constant.
ASSESSMENT TASKS OR ACTIVITIES	
• Worksheet. Identify the factors that affects the rates e.g. dust in coal mines or flour mills, accelerators or catalysts used in fibreglass and cement; differentiate between rates of reaction and equilibrium; identify the effect on products produced if concentration, pressure and temperature of a chemical reaction is varied. Use and interpret the value of equilibrium constant. • Practical: Conduct a practical to determine the effect of change in surface area/ concentration/ temperature on the rate of chemical reaction. • Assignment: Discuss the effect of temperature and accelerators on cement, fibreglass and metals in terms of rate of chemical reactions. • Class test.	

Topic 7: Chemical systems and industry

SUBJECT OUTCOME	
7.1 Identify and critically evaluate the impact of exploiting the lithosphere on the quality of human, environmental and socio-economic development.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Energy resources, their use, pollution and renewability are identified and evaluated. *Range: Coal, oil, gas, solar, hydro, wind, electrochemical, nuclear, geothermal, vegetative and other energy sources.*	• Identify and evaluate the energy resources, their use, pollution and renewability.
ASSESSMENT TASKS OR ACTIVITIES	
Worksheet: List the natural resource, how the energy is transferred to electrical or mechanical energy and its pollution. Group discussion: Assess the impact using the different energy sources on the environment. Select the best option in your area to enhance the quality of human and sosio-economic development	

SUBJECT OUTCOME	
7.2 Identify and critically evaluate the impact of scientific knowledge on the chemical industries and the quality of human, environmental and socio-economic development.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The following industrial examples are studied and used for context with appropriate topics in terms of resources, needs and the chemical connection: ▪ Organics: Sasol, SA Breweries, Polyfin (monomer and polymers); petroleum industry, paint and adhesive industry. ▪ Acids and Alkali: Chloralkali (soap, PVC etc), cement (Lafarge and PPC), mines (extraction of ore), explosives (AECI), fertilizer industry (N, P, K). ▪ Redox reactions: Electrochemical and battery industries. .	• Study the following industrial examples with appropriate topics in terms of resources, needs and the chemical connection: ▪ Organics: Sasol, Polyfin (monomer and polymers); petroleum industry, paint and adhesive industry. ▪ Acids and Alkali:Chloralkali (soap, PVC etc), cement (Lafarge and PPC), mines (extraction of ore), explosives (AECI), fertilizer industry (N,P,K). ▪ Redox reactions: Electrochemical and battery industriesIdentify and critically evaluate the impact of scientific knowledge on the chemical industries and the quality of human, environmental and socio-economic development.
ASSESSMENT TASKS OR ACTIVITIES	
Compulsory research: Identify and critically evaluate the impact of one of the South African chemical industries and its effect on the quality of human, environmental and socio-economic development.	

4 SPECIFICATIONS FOR EXTERNAL ASSESSMENT IN PHYSICAL SCIENCE - LEVEL 4

4.1 Integrated summative assessment task (ISAT)

A compulsory component of the external assessment (ESASS) is the **integrated summative assessment task (ISAT)**. The integrated summative assessment task (ISAT) draws on the students' cumulative learning achieved throughout the year. The task requires **integrated application of competence** and is executed and recorded in compliance with assessment conditions.

Students achieve the competencies during the year but the competencies are assessed cumulatively in a single assessment or examination session at the end of the year.

The integrated summative assessment task (ISAT) is set by an externally appointed examiner and is conveyed to colleges in the first quarter of the year.

The integrated assessment approach enables students to be assessed in more than one subject with the same integrated summative assessment task (ISAT).

4.2 National Examination

A national examination is conducted annually in October or November by means of a paper(s) set and moderated externally. The following distribution of cognitive application is suggested.

	KNOWLEDGE AND COMPREHENSION	APPLICATION	ANALYSIS, SYNTHESIS AND EVALUATION
LEVEL 4	40%	40%	20%

ANNEXURE A: MARK SHEET FOR CAPTURING STUDENT MARKS

Campus: Level:	INTERNAL CONTINUOUS ASSESSMENT																		FINAL EXAM: END OF YEAR			FINAL MARK		ACHIEVEMENT RATING
Class:	RESEARCH TASKS				PERFORMANCE TASKS						TESTS				EXAM		ISAT	ICASS						
Name of Students ↓	Physics	Chemistry	TOTAL	ICASS I = TOTAL ÷ 2	Physics prac 1	Physics prac 2	Chemistry Prac 1	Chemistry Prac 2	TOTAL	ICASS II = TOTAL÷ 2,5	Test 1	Test 2	TOTAL	ICASS III = TOTAL ÷ 10	MID YEAR EXAM	ICASS IV = TOTAL ÷5	ICASS V	A = ICASS =I+II+III+IV+V	Paper 1	Paper 2	B = EXAM = P1 +P2 ÷ 4	A+ B = FINAL TOTAL	Total÷ 2	According to scale
Mark totals →	20	20	40	20	25	25	25	25	100	40	50	50	100	10	100	20	10	= 100	200	200	=100	200	%	5
1.																								
2.																								
3.																								
4.																								
5.																								
6.																								
7.																								
8.																								
9.																								
10.																								
11.																								
12.																								
13.																								
14.																								
15.																								
16.																								
17.																								
18.																								

ANNEXURE B: EXAMPLE OF AN ASSESSMENT RUBRIC FOR ASSIGNMENT OR RESEARCH TASK

CRITERIA / SCORE → ↓	**0**	**1**	**2**	**3**	**4**
1. Planning and analysis (diagnosis) skills	• Shows no attempt to identify and collect information to analyse the given problem or need.	• Shows an attempt to identify and collect relevant information to analyse the given problem or need.	• Identifies the given problem correctly and collects relevant information to analyse the problem or need.	• Analyses the given problem correctly and shows evidence of using a range of information to understand the problem or need.	• Identifies the given problem correctly and uses a variety of investigated strategies to obtain relevant information to develop and design innovative ideas.
2. Interrelationship and effect between scientific knowledge, society, environment and industry	• Makes no attempt to consider the interrelationship.	• Demonstrates awareness of interrelationship.	• Demonstrates awareness and knowledge of interrelationship.	• Demonstrates knowledge of interrelationship and effect.	• Evaluates knowledge of interrelationship and effect and considers preventative measures.
3. Knowledge of content	• Makes no attempt to consider the content.	• Shows limited background knowledge on content used.	• Shows some knowledge of content and properties.	• Shows adequate knowledge of content and properties, concepts and principles.	• Shows sufficient knowledge of content and properties, concepts and principles to solve problems.
4. Communication	• Makes no attempt to use communication techniques.	• Gives scant attention to communication techniques and no information sources.	• Gives attention to communication techniques with some information sources.	• Gives attention to communication techniques with information sources and uses another type of communication.	• Gives attention to communication techniques with information sources and uses different types of communication.
5. Presentation of assignment	• Makes no attempt to compile presentation.	• Presents incomplete presentation which is poorly ordered and prepared.	• Completes presentation but it is poorly ordered and prepared.	• Completes presentation and it is well presented.	• Completes presentation with high level of innovation and creativity.

RECORDING SHEET (RUBRIC) FOR RESEARCH TASK

Assignment: _____ Total: Mark _____/ 20 ; Rating _____/ 5

Name of Candidate: _____ Campus: _____

Level: _____ Date: _____/_____/_____

CRITERIA ASSESSED:	PERFORMANCE					COMMENT
Criteria 1: Planning and analysis (diagnosis)skills	0	1	2	3	4	
Criteria 2: Interrelationship and effect between scientific knowledge, society, environment and industry	0	1	2	3	4	
Criteria 3: Knowledge of content	0	1	2	3	4	
Criteria 4: Communication	0	1	2	3	4	
Criteria 5: Presentation of assignment	0	1	2	3	4	
	TOTAL = ___/ 20					

STUDENT ACHIEVEMENT (Tick appropriate rating)	RATING CODE	RATING	MARKS
	5	Outstanding	16-20
	4	Highly competent	14-15
	3	Competent	10-13
	2	Not yet competent	8-9
	1	Not achieved	0-7

ANNEXURE C: RUBRIC FOR ASSESSMENT OF PRACTICAL TASKS.

SCORE → SKILL AREA ↓	0	1	2	3	4
ASSESSMENT DURING PERFORMANCE OF PRACTICAL TASK:					
1. Group work skills	• Shows no attempt to co-operate or work with the group.	• Assists in setting up of apparatus. • Assists in tidying up work area and apparatus after the practical.	• Assists in setting up of apparatus. • Assists in tidying up work area and apparatus after the practical. • Works effectively in the group.	• Assists in setting up of apparatus. • Assists in tidying up work area and apparatus after the practical. • Works effectively in the group. • Co-operates with group members. • Makes suggestions and accepts suggestions from group members.	
2. Procedural or manipulative skills	• Shows no attempt to execute practical.	• Selects and handles some apparatus. • Executes practical.	• Selects and handles apparatus correctly. • Performs practical in an organised way.	• Selects and handles apparatus correctly. • Performs practical in a methodical way. • Applies safety precautions.	
ASSESSMENT OF CONTENT OF PRACTICAL REPORT:					
3. Write up skills (holistic approach)	• Shows no attempt to present work.	• Presents own work. • Uses some suggested headings.	• Presents own work neatly. • Uses and underlines all headings clearly.	• Presents own work neatly and systematically. • Uses and underlines all headings clearly. • Presents graphs, calculations and diagrams (if required).	
4. Observation and measurement skills	• Shows no attempt to take or record measurements or make observations.	• Takes and records measurements using measuring instruments or observations are mentioned.	• Takes and records measurements using measuring instruments and observations are appropriate to practical. • Uses units.	• Takes and records measurements using measuring instruments correctly and observations are accurate and appropriate to practical. • Uses the correct units.	• Takes and records measurements using measuring instruments correctly and observations are accurate and appropriate to practical. • Uses the correct units. • Takes an adequate number of readings or observations.

5. Recording skills		• Shows no attempt to present data.	• Presents data.	• Presents data in tables. • Presents column headings.	• Presents data is neatly in tables. • Presents column headings with units.	• Presents data neatly in tables. • Presents column headings with correct units. • Numbers entries in the table.
6. Interpretation of data skills	Criterion for a written interpretation	• Shows no attempt to give a written explanation.	• Attempts a written explanation.	• Writes correct explanation. • Bases interpretation closely on results.	• Writes correct explanation. • Bases interpretation closely on results. • Gives interpretation in accordance to the relevant theory.	• Write correct explanation. • Bases interpretation closely on results. • Gives interpretation in accordance to the relevant theory. • Gives interpretation that addresses all relevant issues.
	Criterion for a graphical interpretation	• Shows no attempt to draw a graph.	• Draws a graph.	• Draws appropriate graph. • Gives graph a heading and labels the axes.	• Draws appropriate graph. • Gives graph correct heading and labels the axes. • Draws line of best fit through plotted area.	• Draws appropriate graph. • Gives graph a heading and labels the axes. • Draws line of best fit through plotted area. • Includes simple calculations, e.g. gradient or area.
	Criterion for a calculated interpretation	• Shows no attempt to select a formula.	• Selects a formula.	• Selects an appropriate formula. • Substitutes SI values.	• Selects an appropriate formula. • Substitutes SI values correctly. • Answers correctly, with units present.	• Selects an appropriate formula. • Substitutes SI values correctly. • Answers correctly, with units present. • Comments on validity of results and makes suggestions of experimental error.
7. Skill to interpret findings and conclusion		• Shows no attempt to give a conclusion.	• Gives conclusion that does not respond to the aim of the experiment.	• Gives conclusion that responds to the aim of the experiment. • Presents issues in practical.	• Gives conclusion that responds to the aim of the experiment. • Addresses issues in the practical. • Refers to errors or incorrect values.	• Gives conclusion that responds to the aim of the experiment. • Addresses all issues in the practical. • Refers to any errors or incorrect values. • Presents logical explanation(s).

RECORDING SHEET (RUBRIC) FOR PRACTICAL TASK

Practical Task: _____ Total: Mark _____/ 25 ; Rating _____/ 5

Name of Student: _____ Campus: _____

Level: _____ Date: _____

SKILLS AREA ASSESSED:	Score per skill					COMMENT
Skill area 1: Group work skills	0	1	2	3		
Skill area 2: Performing and procedural skills	0	1	2	3		
Skill area 3: Write up skills	0	1	2	3		
Skill area 4: Observation and measuring skills	0	1	2	3	4	
Skill area 5: Recording skills	0	1	2	3	4	
Skill area 6: Interpretation of data skills and analyse findings	0	1	2	3	4	
Skill area 7: Finding and presenting a conclusion	0	1	2	3	4	
	TOTAL = ___/ 25					

STUDENT ACHIEVEMENT (Tick appropriate rating)	RATING CODE	RATING	MARKS
	5	Outstanding	20-25
	4	Highly competent	17-19
	3	Competent	13-16
	2	Not yet competent	10-12
	1	Not achieved	0-9

ANNEXURE D: EXAMPLE OF A DECLARATION OF AUTHENTICITY

DECLARATION OF AUTHENTICITY

NAME OF THE COLLEGE: …….

NAME OF STUDENT: …….....

(FULL NAME(S) AND SURNAME)

EXAMINATION NUMBER: ……..

NAME OF LECTURER: ……...

COLLEGE STAMP

I hereby declare that the project submitted for assessment is my own, original work and has not been previously submitted for moderation.

_____ _____

SIGNATURE OF STUDENT **DATE**

As far as I know, the above declaration by the candidate is true and I accept that the work offered is his or her own.

_____ _____

SIGNATURE OF LECTURER **DATE**