

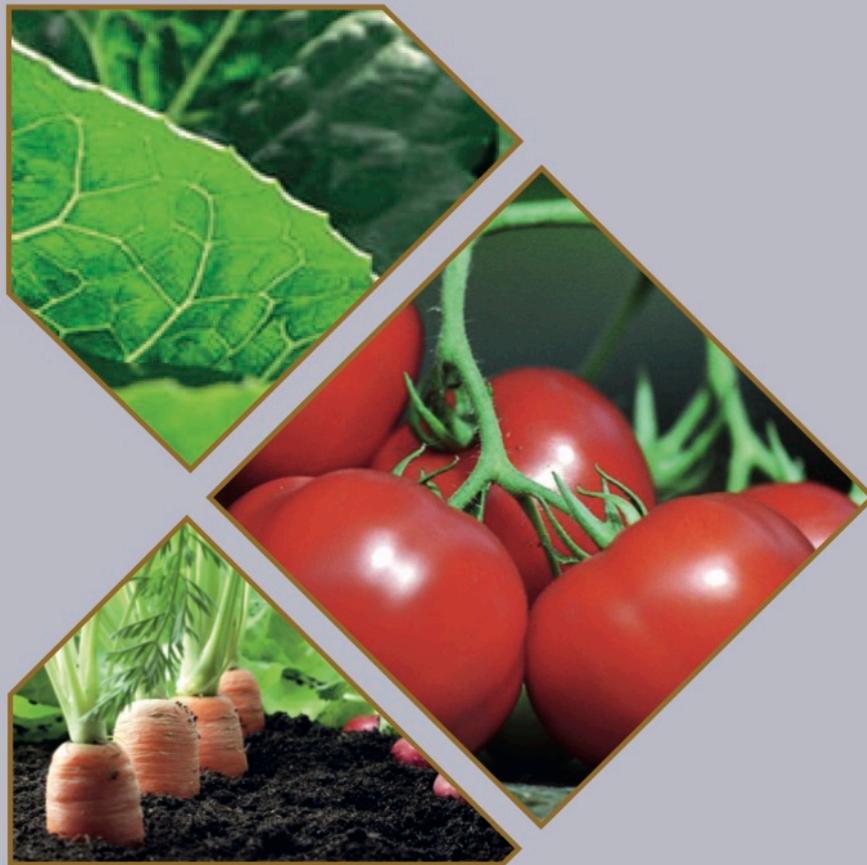


BOTSWANA
EXAMINATIONS
COUNCIL

BOTSWANA SENIOR SECONDARY EDUCATION
ASSESSMENT SYLLABUS

HORTICULTURE

[CODE: 1257]



2021 - 2026

FOREWORD

The Botswana Examinations Council (BEC) is pleased to authorise the publication of the Outcome Based Assessment (OBA) syllabus for Horticulture in the senior secondary education programme. The assessment syllabus forms part of the Botswana General Certificate of Secondary Education (BGCSE) suite of syllabi available to candidates who have followed the senior secondary programme. The BGCSE is designed for a wide range of learner ability in line with the aspirations of the Revised National Policy on Education of 1994, and its standards are based on Cambridge GCSE and IGCSE.

Our mission as Botswana Examinations Council is “provision of a credible and responsive assessment and examination system”. In the quest for responsiveness, the BEC has aligned the assessment to Outcome Based Education (OBE) that recognises the need to impart 21st century skills on learners. As such, School-Based Assessment (SBA) forms a component of the final assessment. Furthermore, periodic reviews are promoted for the assessment syllabi to reflect the aims of the national curriculum and international best practice. Customer feedback forms an integral part of such reviews.

This syllabus document is the outcome of a great deal of professional consultation and collaboration, and I wish to extend my thanks to all those who contributed towards its development. On behalf of the Botswana Examinations Council, I wish to record my appreciation for the part played by Cambridge International as part of the Accreditation Agreement between them and the Council.



.....
Dr Moreetsi Thobega
Chief Executive Officer
Botswana Examinations Council

ACKNOWLEDGEMENT

The Botswana Examinations Council wishes to acknowledge the diligent contribution of all the stakeholders who played a pivotal role in the development of the Animal Production Assessment Syllabus for the Botswana Senior Secondary Education. They gave priority to this critical national assignment at the expense of their regular work assignments. This enabled BEC to develop this important document within reasonable timelines. A task such as this one requires mental focus, commitment, dedication, a high level of accountability and responsibility, as such all of them proved to be equal to this task and hence their contribution is much appreciated.

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1.0 INTRODUCTION

Horticulture Teaching Syllabus builds onto the Junior Secondary School Agriculture Education programme and aims at a broad-based education which provides learners with competencies that meet the challenges and needs of horticulture in the 21st century. The subject falls under vocational pathway that aims to provide learners with practical and technical skills. This will help drive the country's vision of a self-sustainable, entrepreneurial society for economic diversification and growth. As part of the Botswana Senior Secondary Education Programme, the Horticulture Assessment Syllabus is designed to assess candidates who have completed a two-year course based on the vocational pathway of the Senior Secondary School Horticulture Teaching Syllabus. The syllabus aims to assess positive achievement at all levels of ability. Candidates will be assessed in ways that encourage them to demonstrate what they know, understand and can do. Provider Based Assessment will have an increased contribution in the final weighting of candidate's assessment compared to the previous BGCSE Agriculture Syllabus.

The syllabus will be assessed through one written paper, a practical examination paper and an aggregated Provider Based Assessment. The details are outlined in the scheme of assessment section of this syllabus and in the assessment guide for centres. This assessment syllabus should be read in conjunction with:

- (a) The Botswana Senior Secondary School Horticulture Teaching Syllabus
- (b) Specimen question papers and their mark schemes
- (c) Horticulture Assessment Guide for Centres
- (d) Annual Principal Moderator / Principal Examiner Reports

Syllabus specific requirements and any further information are given in the *Assessment Guide for Centres*.

Prior Learning

It is assumed that candidates assessed for this syllabus have studied Agriculture at Junior Certificate level.

Progression

Upon completion of the BSSE Horticulture syllabus, the learners are expected to be easily trainable in vocational skills related to Horticulture when they venture into the world of work or progress to tertiary institutions. The learners should display skills that are directly linked with a nation's productivity and competitiveness. Candidates are expected to be geared towards striking a balance between theoretical knowledge and practical application to everyday situations related to Horticulture.

2.0 TEACHER SUPPORT

A number of support structures are available for teachers handling the Horticulture Syllabus.

2.1 Support documents

To ensure uniformity of standards across centres, the Botswana Examinations Council will provide the Education and Training Providers (ETPs) with documents and materials that will guide them on how to conduct valid and reliable assessments. These will include practical test manuals, specimen papers with corresponding mark schemes, annual Principal Moderator and Principal Examiners' reports. The same documents will also be available on the BEC website.

2.2 Training

BEC will offer periodic training to personnel conducting provider based assessment to equip them with requisite knowledge and skills to deliver credible, valid and reliable assessments.

2.3 Resource list

Resources required for the implementation and assessment of this learning programme are included as *Appendix D*.

3.0 SYLLABUS OUTCOMES

According to the Horticulture Teaching Syllabus of the vocational pathway of the BSSE programme, candidates pursuing this course should with due consideration to safety, health, environment and quality, be able to:

- 3.1 Demonstrate specific technical and professional skills, processes, technologies and competencies relevant to horticulture.
- 3.2 Explore technology to communicate ideas and observations in horticulture.
- 3.3 Use specific technical and professional understanding to respond to, reflect on, and critically analyse and evaluate products and processes of horticulture.
- 3.4 Analyse and evaluate the role of horticulture to the economy and in the society.

4.0 ASSESSMENT OBJECTIVES (AOs)

Candidates will be assessed on the following:

- | | | |
|-----|---|-------|
| 4.1 | Knowledge with understanding | [20%] |
| 4.2 | Handling information, application and problem solving | [40%] |
| 4.3 | Practical investigative skills | [40%] |

4.1 AO1: Knowledge with understanding

Candidates should be able to:

demonstrate knowledge and understanding in horticulture in relation to correct;

- 4.1.1 Reference to facts, concepts, laws, principles, patterns, models and theories used in horticulture.
- 4.1.2 Techniques, procedures and principles of safe horticulture practices.
- 4.1.3 Use of terms, symbols, quantities and units used in horticulture.

This assessment objective defines the factual knowledge the candidate may be required to recall and explain. Questions testing the assessment objective may begin with one of the following command words: *define, state, name, describe, explain or outline* (Refer to the glossary of terms under appendix A)

4.2 AO2: Handling information, application and problem solving

Candidates should be able to:

- 4.2.1 Follow instructions in horticulture.
- 4.2.2 Choose and use suitable techniques, equipment and materials safely and correctly.
- 4.2.3 Record observations, measurements and estimates.
- 4.2.4 Use information to identify patterns, report trends, draw inferences, make predictions and propose hypothesis.
- 4.2.5 Translate information from one form to another.
- 4.2.6 Present reasoned explanations for phenomena, patterns and relationships.
- 4.2.7 Solve problems, including some of quantitative nature.

These assessment objectives cannot be precisely specified in the subject content because questions testing such skills may be based on information that is unfamiliar to the candidate. In answering such questions candidates are required to use principles and concepts that are within the syllabus and apply them in a logical, reasoned or deductive manner to a novel situation. Questions testing these objectives will often begin with one of the following command words: *discuss*, *predict*, *suggest*, *calculate* or *determine*. (Refer to the glossary of terms under appendix A).

4.3 AO3: Practical investigative skills

Candidates should be able to:

- 4.3.1 Handle and use equipment, tools, materials and stock correctly.
- 4.3.2 Identify a problem, plan an investigation and carry out investigation.
- 4.3.3 Interpret and evaluate observations and experimental data.
- 4.3.4 Draw conclusions, make recommendations and report results.
- 4.3.5 Solve problems of a quantitative and qualitative nature.
- 4.3.6 Grow and manage crops through appropriate practices.

These objectives can be assessed by observing a candidate carrying out a specified practical oriented task. A set criteria is used to determine the extent to which the candidate has mastered a given task. In a case where a written report is produced to account for a task carried out by the candidate, writing skills do not form part of the awarding criteria.

5.0 SCHEME OF ASSESSMENT

5.1 The components

Paper 1	100 marks	2 hrs.30 minutes	40%
<p>A structured item paper targeting assessment objectives 1 (AO1) and assessment objectives 2 (AO2).</p> <p>The questions will test skills in assessment objectives 1 (AO1) and assessment objectives 2 (AO2) and will be of a difficulty appropriate to grades A to G.</p>			
Paper 2	50 marks	1hr 30 minutes	20%
<p>A practical examination paper targeting assessment objectives 2 (AO2) and assessment objectives 3 (AO3). Details on how to prepare for administering the paper will be provided in form of instructions manual accompanying the question paper.</p> <p>The questions will test skills in assessment objectives 2 (AO2) and assessment objectives 3 (AO3) and will be of a difficulty appropriate to grades A to G.</p>			
Paper 3	100 marks	5 terms	40%
<p>Provider Based Assessment Targeting Assessment Objectives 2 (AO2) and Assessment Objectives 3 (AO3). The component will aggregate proportionally the scores from practical tasks assessments, farm diary, field observation reports and field practical training report as specified in the Assessment Guide for Centres (Appendix P). The assessment will run the full length of the syllabus instruction. Therefore, its moderation can only be done upon completion of the teaching syllabus.</p>			

5.2 Relationship between assessment objectives and components

Assessment Objective	Marks and weightings			Total weighting (%)
	Paper 1	Paper 2	Paper 3	
AO1: Knowledge with Understanding	50 [20]	0	0	20
AO2: Handling Information, Application and Problem Solving	50 [20]	20 [8]	30 [12]	40
AO3: Practical Investigative Skills	0	30 [12]	70 [28]	40
Total Marks	100	50	100	
Weighting of Paper (%)	40	20	40	100

NB: [] weighted mark in brackets

5.3 Grade descriptors

Candidates will be graded on a scale A – G. As a guide to what might be expected of a candidate's performance, grade descriptors are outlined below.

Grade A

The candidate should be able to:

- ❖ Use and recall in detail a wide range of Horticulture scientific vocabulary, concepts, facts, principles and theories to recognize relationships with ease.
- ❖ Apply scientific knowledge and understanding, identify patterns, report trends from given information and draw appropriate conclusions and give detailed and concise recommendations to new situations with ease.
- ❖ Translate information from one form to another: process information from graphs, tables and charts in Horticulture without guidance.
- ❖ Make concise and complete experimental procedure (plan): critically discuss the plan, generate the hypothesis to solve horticulture problems which may involve a wide range of variables with ease.
- ❖ Consistently use appropriate tools, implements, machinery and chemicals correctly evaluating and managing risk: follows given instructions to perform an experiment that involves a series of steps with ease.
- ❖ Make accurate observations, decide on the level of precision needed in measurements and record experimental data: process data, make conclusions and generalizations where appropriate and identify anomalous observations without guidance.
- ❖ Explore a range of technology to clearly communicate ideas and observations about horticulture and evaluate implications of this technology.
- ❖ Use specific technical and professional understanding to respond to, reflect on and to critically analyse and evaluate horticultural products and processes precisely and without guidance.
- ❖ Grow a selected horticultural crop to maturity with complete adherence to all scientific facts and principles of production to meet market and societal requirements with a complete adherence and compliance to safety, health, environment and quality details.

Grade C

The candidate should be able to:

- ❖ Use and recall a range of horticulture scientific vocabulary, concepts, facts, principles and theories to recognize relationships.
- ❖ Apply scientific knowledge and understanding, identify patterns, report trends from given information and draw conclusions and give recommendations to new situations.
- ❖ Translate information from one form to another: process information from graphs, tables and charts in horticulture with some guidance.
- ❖ Make concise and complete experimental procedure (plan): critically discuss the plan, generate the hypothesis to solve horticulture problems which may involve a narrow range of variables with some guidance.
- ❖ Use appropriate tools, implements, machinery, and chemicals correctly evaluating and managing risk: follows given instructions to perform an experiment that involves a few steps.

- ❖ Make accurate observations, decide on the level of precision needed in measurements and record experimental data: process data, make conclusions and generalizations where appropriate and identify major anomalous observations.
- ❖ Explores technology to communicate ideas and observations about horticulture and evaluate implications of this technology.
- ❖ Use specific technical and professional understanding to respond to, reflect on and to critically analyse and evaluate horticultural products and processes precisely and with guidance.
- ❖ Grow a selected horticultural crop to maturity with adherence to most scientific facts and principles of production to meet market and societal requirements observing most of the safety, health, environment and quality details.

Grade E

The candidate should be able to:

- ❖ Use and recall elementary horticulture scientific vocabulary, concepts, facts, principles and theories to recognize obvious relationships.
- ❖ Apply scientific knowledge and understanding, identify patterns, report trends from given information and draw a conclusion and give recommendations to familiar situations.
- ❖ Translate basic information from one form to another: process limited information from graphs, tables and charts in horticulture with significant guidance.
- ❖ Make complete experimental procedure (plan): discuss the plan, generate the hypothesis to solve horticultural problems which involves two variables with some guidance.
- ❖ Use appropriate tools, implements, machinery, and chemicals correctly: follows given instructions to perform an experiment that involves only basic steps.
- ❖ Make basic observations, decide with guidance on the level of precision needed in measurements and record experimental data: process data, make conclusions and generalizations where appropriate.
- ❖ Explore technology to communicate ideas and observations about horticulture.
- ❖ Use specific technical and professional understanding to respond to, reflect on and to analyse horticultural products and processes.
- ❖ Grow a selected horticultural crop to maturity to meet market and societal requirements with a compromised compliance to some of the safety, health, environment and quality details.

Grade G

The candidate should be able to:

- ❖ Use and recall elementary horticulture scientific vocabulary, concepts, facts, principles and theories.
- ❖ Apply scientific knowledge and understanding, identify patterns, report trends from given information and draw a conclusion.
- ❖ Translate information from one form to another with difficulty: process information from graphs, tables and charts in horticulture with significant guidance all the way.
- ❖ Make an experimental procedure (plan): discuss the plan, generate the hypothesis to solve horticultural problems which may involve one variable with significant guidance all the way.

- ❖ Use appropriate tools, implements, machinery, and chemicals: follows given instructions to perform an experiment with significant guidance.
- ❖ Make generalized observations, and record experimental data: process data, make basic conclusions and generalizations where appropriate.
- ❖ Explore the use of technology in horticulture.
- ❖ With guidance, reflect on and to analyse horticultural products.
- ❖ Grow a selected horticultural crop to maturity to meet market and societal requirements with compromised compliance to safety, health, environment and quality details when instructed.

5.4 Availability of the syllabus

This syllabus is available to all candidates who have completed and meet the requirements of the Horticulture Teaching Syllabus.

5.5 Combining the syllabus with other syllabuses in an examination series

Candidates taking Horticulture Syllabus may not combine it in an examination series with any of the following Botswana Senior Secondary Education syllabuses:

1255 Animal Production

1256 Field Crop Production

1517 Agricultural Science

6.0 CONTENT

The assessment of this syllabus covers the following Learning Outcomes as indicated by the Horticulture Teaching Syllabus. Each Learning Outcome (LO) will be assessed based on its Performance Criteria (PC) and the accompanying Range Statements (RS).

Module 1	
HORSL 1	Grow Plants
HORSL 1.1: describe trends of horticulture in Botswana. HORSL 1.2: demonstrate understanding of plant growth and development. HORSL 1.3: demonstrate propagation of horticultural crops in various environment.	
Module 2	
HORSL 2	Produce Vegetable Crops
HORSL 2.1: demonstrate pre-planting activities in vegetable production. HORSL 2.2: demonstrate skills in planting vegetable crop. HORSL 2.3: demonstrate skills in managing vegetable crops. HORSL 2.4: maintain health of vegetable crops. HORSL 2.5: demonstrate skills in harvesting vegetable crops. HORSL 2.6: demonstrate skills in marketing vegetable products.	
Module 3	
HORSL 3	Produce Fruit Trees
HORLS 3.1: demonstrate pre-planting activities of fruit trees. HORLS 3.2: demonstrate skills in producing fruit tree seedlings. HORLS 3.3: demonstrate skills in planting fruit trees. HORLS 3.4: demonstrate skills in managing fruit trees. HORLS 3.5: maintain health of fruit trees. HORLS 3.6: demonstrate skills in harvesting of fruit trees. HORLS 3.7: demonstrate skills in marketing fruit tree products.	
Module 4	
HORSL 4	Produce Ornamentals and Lawn
HORSL 4.1: demonstrate skills in the propagation of ornamental plants. HORSL 4.2: demonstrate skills in management of ornamentals. HORSL 4.3: demonstrate skills in marketing of ornamentals. HORSL 4.4: demonstrate skills in establishing lawn. HORSL 4.5: demonstrate skills in management of lawn. HORSL 4.6: demonstrate skills in marketing of planting materials of lawn.	
Module 5	
HORSL 5	Establish a Landscape
HORSL 5.1: demonstrate skills in landscaping. HORSL 5.2: demonstrate skills in maintaining a landscape.	
Module 6	
HORSL 6	Perform Field Practical Training
HORSL 6.1: carry out day to day activities of the horticulture farm and produce a report.	

The details of the performance criteria, content areas, range statements, facilitation strategies and assessment strategies are specified by the Teaching Syllabus.

7.0 PROVIDER BASED ASSESSMENT

Provider Based Assessment in Horticulture entails a continuous assessment of the candidate's work throughout the execution of the learning programme. This will establish the extent of mastery of the Learning Outcomes (LOs) by the candidates. The education provider shall assess the candidate and keep evidence of assessment for every performance criteria as stipulated in the teaching syllabus. The Botswana Examination Council shall select the scores from the different provider based assessments to be included in the final assessment of the candidate as specified in the *Assessment Guide for Centres* (Appendix P) and will remain subject to review from time to time. A portfolio of assessment evidence shall be kept in the centre for every candidate for authentication of the scores awarded to each candidate.

7.1 Composition of provider based assessment

According to the Horticulture Teaching Syllabus, provider based assessment is expected to be achieved through the following;

- Farm diary
- Specimen album
- Laboratory experiment reports
- Field practical reports (observations, visits)
- Marked tests, assignments and quizzes
- Field practical training report

The contribution of provider-based assessment is 40% of the total syllabus mark. The percentage contribution of the provider-based assessment will remain subject to review based on the reliability and validity of the scores provided by the centres. The Botswana Examinations Council shall subject the provider-based assessment to external moderation.

7.2 Moderation of provider based assessment

In order to validate the provider based assessment scores from the centres, moderation of scores will be done. Prior to assessment of the candidates, centres are required to moderate their assessments internally by standardising each assessment. The internally moderated scores will then be subjected to external moderation.

7.2.1 Internal moderation

The ETPs must establish an internal moderation process, administered by the ETPs Internal Assessment Office, that meets the standards set by the awarding body. Evidence of internal moderation and the ETPs monitoring of internal moderation must be retained until the end of the following academic year. Each ETP must adhere to internal moderation procedures from the awarding body.

7.2.2 External moderation

The Botswana Examinations Council shall provide the centres with an external moderation schedule in advance of the moderation exercise. Details of documents required for moderation are specified in the *Assessment Guide for Centres*. The assessments identified for inclusion into the summative assessment shall include; practical task assessments, farm diary reports, field observation reports and field practical training report.

8.0 OTHER INFORMATION

8.1 Equality and inclusion

Botswana Examinations Council has taken care in the preparation of this assessment syllabus and accompanying assessment materials to avoid bias of any kind. To comply with the accreditation standards this assessment was designed with the aim of avoiding direct and indirect discrimination.

The standard assessment arrangements may present unnecessary barriers for candidates with special learning needs. Access arrangements will be put in place to enable such candidates to be assessed and to be given a fair recognition of their attainment. Access arrangements that give a candidate an unfair advantage over others or that compromise the standards being assessed will not be permitted.

Candidates who are unable to access the assessments of any component may be eligible to receive an award based on the parts of the assessment they have taken.

Modifications made to assessments will be in line with the special education needs guidelines of BEC. It is recommended when registering the candidates for entry into the syllabus, centres should specify the special learning requirements for such candidates.

8.2 Grading and reporting

The Botswana General Certificate of Secondary Education (BGCSE) reports on a grading scale ranging from A* to G with A* being the highest and G being the lowest. Candidates failing to reach the minimum standard for the lowest grade shall assigned letter U.

8.3 Language

This assessment syllabus and all the associated assessment materials are available in English only.

8.4 Technical terms

Horticulture is a wide discipline that uses a wide range of technical terms. These terms are operational and carry a specific meaning in the context of horticulture production. These technical terms are included in the assessment guide for centres to aid understanding and do not form part of assessment of this syllabus.

9.0 APPENDICES

A Glossary of terms

It is hoped that the glossary will prove helpful to candidates as a guide i.e. it is neither exhaustive nor definitive. The glossary has been deliberately kept brief not only with respect to the number of terms included but also to the description of their meanings. Candidates should appreciate that the meaning of a term must depend in part on its context.

- 1 **Define:** (the term(s)) is intended literally, only a formal statement or equivalent paraphrase being required.
- 2 **What do you understand by / what is meant by the (the term(s)):** normally implies that a definition should be given, together with some relevant comment on the significance or context of the term(s) concerned, especially where two or more terms are included in the question. The amount of supplementary comment intended should be interpreted in the light of the intended mark value.
- 3 **State:** implies a concise answer with little or no supporting argument e.g. numerical answer that can be obtained by inspection.
- 4 **List:** requires a number of points, generally each of one word, with no elaboration. Where a given number of points are specified this should **not** be exceeded.
- 5 (a) **Explain:** may imply reasoning or some reference to theory, depending on the context. It is another way of asking candidates to give reasons for something. The candidate needs to leave the examiner in no doubt **why** something happens.
(b) **Give a reason / give reasons:** is another way of asking candidates to explain **why** something happens.
- 6 **Describe:** requires the candidate to state in words (using diagrams where appropriate) the main points of the topic. It is often used with reference either to particular phenomena or particular experiments. In the former instance, the term usually implies that the answer should include reference to (visual) observations associated with the phenomena.

In other contexts, describe should be interpreted more generally i.e. the candidate has greater discretion about the nature and organisation of the material to be included in the answer.
[Describe and explain may be coupled, as state and explain].
- 7 **Discuss:** requires the candidate to give a critical account of the points involved in the topic.
- 8 **Outline:** implies brevity i.e. restricting the answer to giving the essentials.
- 9 **Predict:** implies that the candidate is not expected to produce the required response by recall but by making a logical connection with other pieces of information. Such information may be wholly given in the question or may depend on the answers extracted in an early part of the question. Predict also implies a concise answer with no supporting statement required.
- 10 **Deduce:** is used in a similar way to predict except that some supporting statement is required, e.g. reference to law principle, or the necessary reason is to be included in the question.
- 11 **Suggest:** is used in two main contexts i.e. either to imply that there is no unique answer (e.g.) in Chemistry two or more substances may satisfy the conditions describing an unknown or to imply that the candidates are expected to apply their general knowledge to a “novel” situation, one that may be formally not in the syllabus.
- 12 **Find:** is a general term that may variously be interpreted as calculate, measure, determine etc.

- 13 **Calculate:** is used when numerical answers are required. In general, working should be shown, especially where two or more steps are involved.
- 14 **Measure:** implies that the quantity concerned can be directly obtained from a suitable measuring instrument e.g. length, using a ruler, or mass, using a balance.
- 15 **Determine:** often implies that the quantity concerned can be directly obtained from a suitable measuring instrument e.g. length, using a ruler, or mass, using a balance.
- 16 **Estimate:** implies a reasoned order or magnitude statement or calculation of the quantity concerned making such simplifying assumption as may be necessary about points of principle and about the values of quantities not otherwise included in the question
- 17 **Sketch:** when applied to graph work, implies that the shape and/or position of the curve need only be qualitatively correct, but candidates should be aware that, depending on the context some quantitative aspects may be looked for e.g. passing through the origin, having an intercept, asymptote or discontinuity at a particular value. In diagrams sketch implies that a simple freehand drawing is acceptable, nevertheless care should be taken over proportions and the clear exposition of important details.

It is expected that candidates will demonstrate background knowledge of and or an increased depth of knowledge, in the following physical, chemical and mathematical concepts and processes.

In all questions, the number of marks allocated are shown on the examination paper and should be used as a guide by candidates to know how much detail to give. In describing a process, the mark allocation should guide the candidate about how many steps to include. In explaining why something happens, it guides the candidate to how many reasons to give or how much detail to give for each reason.

B Mathematical skills

Calculators may be used in all parts of the assessment.

Candidates should be able to:

- 1 Add, subtract, multiply and divide
- 2 Understand averages, decimals, fractions, percentages and ratios
- 3 Understand the relationship between surface area and volume
- 4 Use direct and inverse proportion
- 5 Draw charts and graphs, including histograms from given data
- 6 Interpret charts and graphs
- 7 Select suitable scales and axes for graphs

C Presentation of data

These terms will be used by the Principal Examiners during the setting of papers. Candidates should be made aware of the terminology during teaching and practical work.

This section follows the practice laid down in the following documents: Association for Science Education Booklet, SI Units, Symbols and Abbreviations (1981).

Institute of Biology, Biological Nomenclature: Recommendations on Terms, Units and Symbols (1989).

1 Numbers

The decimal point will be placed on the line e.g. 66.07

The numbers from 1000 to 9999 will be printed without commas or spaces

Numbers greater than or equal 10 000 will be printed without commas. A space will be left between each group of three whole numbers e.g. 7 286 315

2 Units

The international system of units will be used (SI units). The units will be indicated in the singular not in the plural, e.g. 47kg.

(a) SI units commonly used in Agriculture are listed below

N.B. Care should be taken in the use of mass and weight. In many agricultural contexts the term mass is correct e.g. dry mass, biomass.

Quantity	Name of units	Symbol for unit
Length	kilometre	<i>km</i>
	metre	<i>m</i>
	centimetre	<i>cm</i>
	millimetre	<i>mm</i>
	micrometre	μm
Mass	tonnes	<i>t</i>
	kilogram	<i>kg</i>
	gram	<i>g</i>
	milligram	<i>mg</i>
	microgram	μg
Time	year	<i>y</i>
	day	<i>d</i>
	hour	<i>h</i>
	minute	<i>min</i>
	second	<i>s</i>
molarity	mole	<i>mol</i>

(b) Derived SI units are listed below

Quantity	Name of units	Symbol for unit
energy	kilojoule	<i>kJ</i>
	joule	<i>J</i>

(c) Recommended units for area, volume and density are listed below

Quantity	Name of units	Symbol for unit
area	hectare	<i>ha</i>
	square metre	<i>m²</i>
	square centimetre	<i>cm²</i>
	square decimetre	<i>dm²</i>
	square millimetre	<i>mm²</i>
volume	cubic metre	<i>m³</i>
	litre	<i>l</i>
	cubic centimetre	<i>cm³</i>
	cubic decimetre	<i>dm³</i>
	cubic millimetre	<i>mm³</i>
density	kilogram per cubic metre	<i>kg m⁻³</i>
	gram per cubic centimetre	<i>g m⁻³</i>

(d) Use of solidus

Negative indices- symbol combined in a quotient – will be written as, for example, either $m\ s^{-1}$ or metres per second

The solidus (/) will not be used for a quotient e.g. m / s for metre per second

The solidus (/) is used in tables and graphs to separate a physical quantity from its appropriate unit e.g. time / s, not time measured in seconds (see section 3)

3 Presentation of data

(a) Tables

- (i) Each column of a table will be headed with the physical quantity and appropriate SI units e.g. time / s, rather than time (s).

There are three acceptable methods of stating units e.g. metre per sec or m per s or $m\ s^{-1}$

- (ii) The column headings of the table can then be directly transferred to the axes of a constructed graph.

(b) Graphs

- (i) The independent variable will be plotted on the x (horizontal axis) and the dependent variable plotted on the y (vertical axis).

- (ii) The graph is the whole diagrammatic presentation. It may have one or several curves plotted on it.

- (iii) Curves and lines joining points on the graph should be referred to as 'curves'.

- (iv) Points on the curve should be clearly marked as crosses (x) encircled dots (.). If a further curve is included, vertical crosses (+) may be used to mark the points.

(c) Pie charts

These should be drawn with the sectors in rank order, largest first, beginning at 'noon' and proceeding clockwise. Pie charts should preferably contain no more than six sectors.

(d) Bar charts

These are drawn when one of the variables is not numerical, e.g. number of eggs of different colours. They should be made up of narrow blocks of equal width which do not touch.

(e) Column graphs

These are drawn when plotting frequency graphs from discrete data, e.g. frequency of occurrence of nests with different numbers of eggs. They should be made up of narrow blocks of equal width which do not touch.

(f) Histograms

These are drawn when plotting frequency graphs with continuous data, e.g. frequency of occurrence of stems of different lengths or chicks of different masses. The blocks should be drawn in order of increasing magnitude and should be touching.

D Resources required

The assessment of this syllabus will require availability of the following tools, implements, machinery and materials

1. Orchard: At least two hectares of fenced land
2. 2 x (30 m *10m) Net shade and 2 tunnels.
3. Reliable water supply
4. Horticultural farms nearby for students to visit
5. Horticulture Tools: Knapsack sprayer, Wheel burrows, Digging forks, Sled, Pitch fork, Scythe, Spades, Axe with handle, Watering cans, Saw , Secateurs, Hoe, Pick axes, Axe Felling, Blade Bow Saw, Leaf Rake, Metal Rakes, Fertilizer tank, Lawn mower , Lawn Roller , Hand trowel , Hand fork, Harvesting crates , Electronic scales, Lawn Spiker, Lawn scarifier
6. Landscaping area (Size will depend on Land availability).
7. Ornamental Plants: (number and type will depend on the need of the school).
8. Different planting material for lawn.
9. Seeds of different vegetables and fruits (e.g. Onions, Tomatoes, Butternut, Spinach, Rape, Choumolia, Cabbage Hybrid, and watermelon)
10. Garden
11. Different Pesticides
12. Different Fertilizers: (e.g. LAN Fertilizer, Urea fertilizer, 2:3:2 (22) fertilizer
13. Laboratory x 1
14. Consumable relevant to topics in the syllabus
15. Cold room storage (for vegetables and some fruits)
16. Boom sprayer
17. Video camera

