



LIFE SCIENCES

EXAMINATION GUIDELINES

GRADE 11 (RATP)

2024

This guideline consists of 16 pages.



1. Introduction

This Examination Guideline for implementation in January 2024 is designed to provide clarity on the content to be taught, learned and assessed in Grade 11 from 2024.

The purpose of these examination guidelines is to:

- Provide depth and scope of the life sciences content to be assessed in grade 11 examination paper/s.
- Assist teachers to adequately prepare learners for the examination.

This Examination Guideline must be read in conjunction with:

- Recovery ATP 2023/4
- The Life Sciences Curriculum and Assessment Policy Statement (CAPS)
- FET CAPS Amendments 2019: Abridged Section 4: grade 10-11(pages 113-120)

2. The Specific Aims for Grade 11 (CAPS)

There are three broad subject-specific aims in Life Sciences which relate to the purposes of learning science as shown below:

Specific Aim	Elaboration
Specific Aim 1	Relates to the knowing of the subject content
Specific Aim 2	Relates to doing science or practical work and investigations
Specific Aim 3	Relates to understanding the applications of Life Sciences in everyday life, as well as understanding the history of scientific discoveries and the relationship between indigenous knowledge and science

These specific aims are described in greater detail in the CAPS Policy document (Pages 13-18). It is important that these specific aims are addressed in both teaching and assessing

3. Weighting of Cognitive Levels for Grade 11 (CAPS)

The following weightings apply for assessment tasks set for Grade 11.

Category	Cognitive Levels	Percentage
A	Knowledge	40
B	Comprehension	25
C	Application	20
D	Analysis, Synthesis and Evaluation	15

4. Degrees of difficulty for examination/test questions

30%	40%	25%	5%
Easy for the average learner to answer	Moderately challenging for the average learner to answer.	Difficult for the average learner to answer	Very difficult for the average learner to answer. The skills and knowledge required to answer the question allows for level 7 learners (extremely high-achieving learners) to be discriminated from other high ability/proficiency learners.

5. Sequence of Topics for Grade 11 (CAPS)

The following sequence of topics is recommended for Grade 11 based on the progressive development of concepts through the different topics:

1. Biodiversity and classification of microorganisms
2. Biodiversity of plants and reproduction
3. Biodiversity of animals
4. Energy transformation to sustain life: Photosynthesis
5. Energy transformation: Respiration
6. Animal nutrition
7. Gas exchange
8. Excretion in humans
9. Population ecology
10. Human impact on the environment

The paper that assesses each topic and the weighting of each topic in the relevant paper is addressed in the CAPS Policy document (Page 72).

6. Programme of Formal Assessment for Grade 11 (CAPS)

- Some changes have been made to the Program of Assessment for *Grade 11* from that which is specified on Page 68 of the CAPS Policy document. Please refer to the FET CAPS Amendments 2019: Abridged Section 4: grade 10-11(pages 113-120)

7. Format of the Examination Paper

The examination will consist of 2 examination papers of 2 ½ hours and 150 marks each. Each paper will have the following format:

Section	Type of questions	Marks
A	Short answer, objective questions such as MCQ, terminology and matching	50
B	A variety of questions types: 2 questions of 50 marks each, divided into 2 – 4 Subsections	2 x 50 = 100

8. THE DISTRIBUTION OF TOPICS FOR THE TWO PAPERS

PAPER 1 TOPICS		
TOPIC	MARKS	Weightings(%)
T2: Energy transformation to sustain life: Photosynthesis	32	21
T2: Animal nutrition	32	21
T2: Energy transformation: Respiration	22	16
T3: Gas exchange	32	21
Excretion in humans	32	21
Total	150	100

PAPER 2 TOPICS		
TOPIC	MARKS	Weightings(%)
T1: Biodiversity and classification of microorganisms	29	19
T1: Biodiversity in plants and reproduction	29	19
T1: Biodiversity of animals	18	12
T3&4: Population ecology	37	25
T4: Human impact on the environment	37	25
Total	150	100

9. Elaboration of Content for Grade 11 (CAPS)

A topic-wise elaboration follows. It merely outlines the basic content that needs to be covered, but this content can be assessed at all 4 cognitive levels.

10. Please note: Scientific investigations appear at the end of each topic. Educators must refer to the suggested investigations as they conduct their learning and teaching per sub topic.

Orientation to Life Sciences	Term 1	1 week
<p><input type="checkbox"/> Review of Classification systems and schemes</p> <ul style="list-style-type: none"> ● The need for classification <ul style="list-style-type: none"> ○ A way of organising biodiversity ● Brief history of classification <ul style="list-style-type: none"> ○ Five kingdom system is currently accepted today ● Review of the Five Kingdoms of living organisms ● Review Linnaeus' binomial system <p><input type="checkbox"/> Review the role of bacteria in the nitrogen cycle</p> <p><input type="checkbox"/> Scientific Skills</p> <ul style="list-style-type: none"> ● Review the Scientific method <ul style="list-style-type: none"> ○ Aim ○ Planning steps ○ Identification of variables ○ Ensuring validity and reliability ○ Analysis and interpretation of data ○ Drawing conclusions ● Calculations <ul style="list-style-type: none"> ○ Average ○ Percentage ○ Percentage increase and percentage decrease ● Graphs <ul style="list-style-type: none"> ○ Line graph ○ Bar graph ○ Histogram ○ Pie Chart 		



Biodiversity and Classification of Micro-organisms		Term 1	3 weeks
Paper 2: 29 marks			
CONTENT	ELABORATION		
Introduction	<input type="checkbox"/> Revise the structure of cell with emphasis on the nucleus		
Concepts in Biodiversity and Classification	<input type="checkbox"/> Microorganisms <input type="checkbox"/> Macroscopic organisms <input type="checkbox"/> Biodiversity <input type="checkbox"/> Prokaryote <input type="checkbox"/> Eukaryote		
Microorganisms	<input type="checkbox"/> Basic structure and general characteristics of: <ul style="list-style-type: none"> • Viruses - acellular, non-living, parasitic, reproduction • Bacteria - unicellular and prokaryotic, mode of nutrition, binary fission • Protista - unicellular or multicellular, eukaryotic, mode of nutrition, type of reproduction • Fungi - unicellular or multicellular, eukaryotic, mode of nutrition, type of reproduction <p>* No detailed study of macroscopic Protista and fungi is required</p> <input type="checkbox"/> Role of micro-organisms in maintaining balance in the environment and web of life <input type="checkbox"/> Symbiotic relationship <ul style="list-style-type: none"> • Nitrogen fixing bacteria in plants • E. Coli in the human intestine 		
	<input type="checkbox"/> Effects and management of diseases <ul style="list-style-type: none"> • Causes, symptoms and management of ONE disease from each of the four group of micro-organisms <ul style="list-style-type: none"> ○ Viruses: rabies, HIV/AIDS, influenza ○ Bacteria: blight, cholera, tuberculosis, anthrax ○ Protista: malaria ○ Fungi: rusts, thrush, ringworm, athlete's foot 		
	<input type="checkbox"/> Immunity <ul style="list-style-type: none"> • Definition of immunity • Types of immunity <ul style="list-style-type: none"> ○ Natural immunity ○ Acquired immunity <input type="checkbox"/> Plants' immune responses against the infecting microorganism <ul style="list-style-type: none"> • The thick bark of woody plants • The waxy cuticle • Sticky secretions • Chemical secretions 		



- Animals' immunity in preventing pathogens from entering the body
 - Mucus in the nose and throat
 - Cilia lining the nasal passages and trachea
 - Tears and conjunctiva of the eye
 - Hydrochloric acid in the stomach
 - Unbroken Skin
- Animals' immune responses against the infecting microorganism
White blood cells
- Biotechnology
 - Definition of vaccinations
 - Importance of vaccinations (briefly)
 - Use of drugs - antibiotics and their effect on micro-organisms
 - Use of microorganisms to produce medicines - insulin and antibiotics
- Traditional technology
 - Production of:
 - beer
 - wine
 - cheese
- Investigations
 - Growing cultures on agar plates


OR


 - Bread mould on bread


Biodiversity of plants Paper 2: 29 marks	Term 1	3 weeks
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CONTENT	ELABORATION
Introduction	<ul style="list-style-type: none"> □ Review the geological timescale
Biodiversity of plants	<ul style="list-style-type: none"> □ Phylogenetic tree/cladogram and its uses □ General characteristics of: <ul style="list-style-type: none"> • Bryophytes • Pteridophytes • Gymnosperms • Angiosperms □ Presence/absence of the following key features of the plant groups listed above: <ul style="list-style-type: none"> • Vascular tissue (xylem and phloem) • True leaves and roots • Seeds or spores • Fruits □ Use of evolutionary tree to show relationships and major structural changes in the history of development of the four plant groups





	<ul style="list-style-type: none"> ❑ Dependence on water for reproduction of the 4 groups
<p>Reproduction in Plants</p>	<ul style="list-style-type: none"> ❑ Types of reproduction <ul style="list-style-type: none"> • Asexual and • Sexual reproduction ❑ Advantages and disadvantages of sexual and asexual reproduction ❑ Flowers as reproductive structures <ul style="list-style-type: none"> • Parts of a flower • Functions of each part of a flower • Definition of pollination • Types of pollination <ul style="list-style-type: none"> ○ Self-pollination ○ Cross pollination • Adaptations of flowers for different pollinating agents (different pollinators) <ul style="list-style-type: none"> ○ Wind ○ Insects ○ Birds


<p>Biodiversity of Animals: Six major Phyla Paper 2: 18 marks</p>		<p>Term 1</p>	<p>2 weeks (8 hours)</p>
<p>CONTENT</p>	<p>ELABORATION</p>		
<p>Introduction</p>	<ul style="list-style-type: none"> ❑ Definition of the Phylum. ❑ Two large groups of Animal Kingdom: <ul style="list-style-type: none"> • Invertebrates • Vertebrates 		
<p>Biodiversity of Animals</p>	<ul style="list-style-type: none"> ❑ Six animal phyla with one example in each: <ul style="list-style-type: none"> • Porifera • Cnidaria • Platyhelminthes • Annelida • Arthropoda • Chordata 		


	<ul style="list-style-type: none"> ❑ Presence/absence of key features in respect of body plans in the six animal phyla: <ul style="list-style-type: none"> • Symmetry • Cephalisation • Number of tissue layers developed from embryo • The number of openings in the gut • Coelom • Blood systems ❑ Use the evolutionary tree to outline the history and relationship of the six animal phyla in respect of the key features
	<ul style="list-style-type: none"> ❑ Role of invertebrates in agriculture and ecosystem: <ul style="list-style-type: none"> • Pollination • Decomposition • Soil aeration

<p>Energy transformations to sustain life: Photosynthesis</p> <p>Paper 1: 32 marks</p>	<p>Term 2</p>	<p>3 weeks (12 hours)</p>
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CONTENT	ELABORATION
<p>Introduction</p>	<ul style="list-style-type: none"> ❑ Review autotrophs and heterotrophs ❑ Review the transverse section of a leaf
<p>Photosynthesis</p>	<ul style="list-style-type: none"> ❑ Definition of photosynthesis ❑ Requirements and products of photosynthesis ❑ The structure and function of the chloroplast – using diagram ❑ The process of photosynthesis: <ul style="list-style-type: none"> • Light phase/light dependent phase: <ul style="list-style-type: none"> ○ Occurs in the grana of the chloroplast ○ Chlorophyll molecules absorb radiant energy from the sun ○ This energy is used to split water into hydrogen and oxygen ○ Some energy is used to form ATP (energy-carrier) ○ Energised hydrogen atoms are released and used in the dark phase ○ Oxygen is released into the atmosphere • Dark phase /Light independent phase: <ul style="list-style-type: none"> ○ Occurs in the stroma of the chloroplast ○ Carbon dioxide from the atmosphere combines with energised hydrogen atoms ○ to form carbohydrates such as glucose and starch ○ using energy in the form of ATP from the light phase

	<ul style="list-style-type: none"> ❑ Biological importance of photosynthesis: <ul style="list-style-type: none"> • Provision of energy for all living organisms • Maintaining the correct balance of O₂ and CO₂ in the atmosphere • Oxygen is released as a by-product
	<ul style="list-style-type: none"> ❑ The factors affecting the rate of photosynthesis: <ul style="list-style-type: none"> • Carbon dioxide concentration • Light intensity • Temperature
	<ul style="list-style-type: none"> ❑ Greenhouse Systems <ul style="list-style-type: none"> • Definition of the greenhouse • Improve crop yields in greenhouse system: <ul style="list-style-type: none"> ○ Carbon dioxide enrichment ○ Optimum light ○ Optimum temperature ❑ Role of ATP as energy carrier in the cell
	<ul style="list-style-type: none"> ❑ Investigation <ul style="list-style-type: none"> • Light is essential for photosynthesis

<p>Energy transformations to sustain life: Cellular Respiration Paper 1 22 marks</p>	<p>Term 2</p>	<p>2 weeks (8 Hours)</p>
<p>CONTENT</p>	<p>ELABORATION</p>	
<p>Introduction</p>	<ul style="list-style-type: none"> ❑ Review the biological importance of photosynthesis 	
<p>Cellular respiration</p>	<ul style="list-style-type: none"> ❑ Aerobic respiration ❑ Definition of aerobic respiration-using words and symbols ❑ Process of aerobic respiration-no biochemical details required <ul style="list-style-type: none"> • Glycolysis <ul style="list-style-type: none"> ○ Occurs in the cytosol pyruvic acid ○ Glucose is broken down to form pyruvic acid ○ releasing energized hydrogen and ATP • Krebs Cycle <ul style="list-style-type: none"> ○ Occurs in the mitochondrion ○ In the presence of oxygen ○ Pyruvic acid produced during glycolysis ○ Is used in cyclic series of reactions ○ Energised hydrogen atoms are released ○ CO₂ released into the atmosphere 	

	<ul style="list-style-type: none"> • Oxidative Phosphorylation <ul style="list-style-type: none"> ○ Occurs in the mitochondrion ○ The energised hydrogen atoms from glycolysis and Krebs Cycle ○ Are used to form ATP ○ The hydrogen finally combines with oxygen to form water □ Structure and functions of the mitochondrion- using diagrams
	<ul style="list-style-type: none"> □ Definition of anaerobic respiration <ul style="list-style-type: none"> • Anaerobic respiration in muscles during exercise • Role of anaerobic respiration in industry – brewing and bread making □ Differences between aerobic and anaerobic respiration □ Investigations <ul style="list-style-type: none"> • Oxygen is used by living organisms during aerobic respiration • Carbon dioxide is released by living organisms

Animal Nutrition Paper 1 32 marks	Term 2	3 weeks (12 Hours)
CONTENT	ELABORATION	
Introduction	□ Review of the biological importance of organic and inorganic compounds	
Nutrition in Animals	□ Definition of dentition <ul style="list-style-type: none"> • Differences in dentition in terms of nutritional requirements of the following: <ul style="list-style-type: none"> ○ Herbivores ○ Carnivores ○ Omnivores 	
Human Nutrition	□ Structure and functions of the alimentary canal and associated organs <ul style="list-style-type: none"> • Parts of the alimentary canal: <ul style="list-style-type: none"> ○ Mouth (tongue and teeth) ○ Pharynx ○ Oesophagus ○ Stomach ○ Small intestines and large intestine ○ Rectum and ○ Anus • Associated organs: <ul style="list-style-type: none"> ○ Salivary glands ○ Liver ○ Gall bladder and ○ Pancreas 	

	<ul style="list-style-type: none"> □ Process of digestion <ul style="list-style-type: none"> • Definitions: <ul style="list-style-type: none"> ○ Ingestion ○ Digestion (mechanical/physical and chemical digestion) ○ Absorption ○ Assimilation ○ Egestion • Mechanical digestion <ul style="list-style-type: none"> ○ Role of different type of teeth and tongue ○ Chewing process/ mastication ○ Bolus formation- role of saliva and swallowing of food ○ Peristalsis – definition and its significance along the alimentary canal • Chemical digestion <ul style="list-style-type: none"> ○ Role of the following groups of enzymes - <i>site of production, substrate, pH and end products</i> (specific names of enzymes need not be mentioned) <ul style="list-style-type: none"> ➢ Carbohydrates ➢ Proteases ➢ Lipases
	<ul style="list-style-type: none"> □ Process of absorption <ul style="list-style-type: none"> • Description of absorption • Structural adaptations in facilitating absorption: <ul style="list-style-type: none"> ○ Small intestines ○ Villi □ Importance of hepatic portal system in transport of absorbed food
	<ul style="list-style-type: none"> • Role of the liver in: <ul style="list-style-type: none"> ○ Glucose metabolism ○ Deamination ○ Breaking down of alcohol, drugs and hormones
<p>Homeostatic control of blood sugar levels</p>	<ul style="list-style-type: none"> □ Homeostasis <ul style="list-style-type: none"> • Definitions: <ul style="list-style-type: none"> ○ Homeostasis ○ Negative feedback mechanism • Homeostatic control of glucose levels – Insulin and glucagon





Gaseous Exchange Paper 1: 32 marks		Term 3	3 weeks
CONTENT	ELABORATION		
Introduction	<input type="checkbox"/> Distinguish between the following processes: <ul style="list-style-type: none"> • Cellular respiration • Breathing • Gas exchange 		
Gaseous Exchange	<input type="checkbox"/> Requirements of efficient gas exchange organs: <ul style="list-style-type: none"> • Large surface area • Thin • Moist • Well ventilated • Protected • Transport system 		
Human Gaseous Exchange	<input type="checkbox"/> The structure of the human ventilation system <ul style="list-style-type: none"> • Trachea, epiglottis, bronchi, bronchioles, lungs, ribs, intercostal muscles, diaphragm and alveoli • Functions and structural adaptations of each part of the ventilation system <input type="checkbox"/> Processes involved in gaseous exchange <ul style="list-style-type: none"> • Ventilation of the lungs (inhalation and exhalation) • Gaseous exchange in alveolus • Transport of gases (oxygen and carbon dioxide) around the body • Gaseous exchange in tissues <input type="checkbox"/> Composition of inspired air compared to expired air <input type="checkbox"/> Homeostatic control of breathing		

Excretion in Humans Paper 1: 32 marks		Term 3	3 weeks
CONTENT	ELABORATION		
Introduction	<input type="checkbox"/> Differentiate between excretion and secretion		
Excretion in various organs	<input type="checkbox"/> Brief role of the following organs in excretion <ul style="list-style-type: none"> • Lungs • Kidneys and bladder • Liver • Alimentary canal (Gut) • Skin <input type="checkbox"/> Substances excreted by each of the excretory organs and their origins		
Urinary system	<input type="checkbox"/> Structure of the urinary system (kidneys, ureters, bladder and urethra) <input type="checkbox"/> Structure and functions of the kidney <ul style="list-style-type: none"> • Removal of urea and excess water and salts • Re-absorption of glucose and some salts • Control of the water balance in the body • Regulation of pH <input type="checkbox"/> Structure and functioning of the nephron <ul style="list-style-type: none"> • Ultra-filtration • Re-absorption • Tubular excretion • pH control • Formation of urine <input type="checkbox"/> Homeostatic control of water and salts (Osmoregulation) <ul style="list-style-type: none"> • Role of ADH and aldosterone 		



Population Ecology Paper 2: 37 Marks		Term 3	3 Weeks
CONTENT	ELABORATION		
Introduction	<input type="checkbox"/> Review the following concepts: <ul style="list-style-type: none"> • Ecosystem • Ecology • Population 		
Population ecology	<input type="checkbox"/> Influence of the following factors on population size: <ul style="list-style-type: none"> • Immigration • Emigration • Mortality • Natality • Carrying capacity • Limiting factors 		
	<input type="checkbox"/> Population growth forms: <ul style="list-style-type: none"> • Logistic growth curve • Geometric growth curve 		
	<input type="checkbox"/> Interactions in the environment <ul style="list-style-type: none"> • Predation • Competition within ecological niche <ul style="list-style-type: none"> ○ interspecific ○ intraspecific • Specialisation <ul style="list-style-type: none"> ○ competitive exclusion ○ resource partitioning • Mutualism • Commensalism • Parasitism 		
	<input type="checkbox"/> Human population <ul style="list-style-type: none"> • Age and gender distribution for different countries • South Africa's population growth over the next twenty years and possible consequences for the environment 		

Human Impact on the Environment Paper 2: 37 marks		Term 4	3 weeks
CONTENT	ELABORATION		
Introduction	<ul style="list-style-type: none"> ❑ Revision of Carbon Cycle ❑ Emphasis on the interrelatedness and interdependence of human impacts on the environment 		
Human Impact on the Environment	<ul style="list-style-type: none"> ❑ The atmosphere and climate change <ul style="list-style-type: none"> • Sources of carbon dioxide emissions and methane emissions (greenhouse gases) • The greenhouse effect and its importance for life on Earth • Difference between the greenhouse effect and the enhanced greenhouse effect • Global warming: due to an increase in greenhouse gases (enhanced greenhouse effect) • Effects of global warming: desertification, drought and floods • Deforestation and its influence on the CO₂ concentration in the atmosphere • Carbon footprint: ways of reducing our 'carbon footprint' • Causes and consequences of ozone depletion • Methane emissions 		
	<ul style="list-style-type: none"> ❑ Water availability <ul style="list-style-type: none"> • Influence of the following factors on the availability of water: <ul style="list-style-type: none"> ○ Construction of dams ○ Destruction of wetlands ○ Exotic plantations and depletion of the water table ○ Water wastage ○ Cost of water ○ Poor farming practices ○ Droughts and floods ○ Boreholes and its effects on aquifers 		
	<ul style="list-style-type: none"> ❑ Water quality <ul style="list-style-type: none"> • Factors that reduce water quality: <ul style="list-style-type: none"> ○ Eutrophication and algal bloom ○ Domestic, industrial and agricultural use – leading to pollution and disease ○ Mining ○ Alien plants, e.g. <i>Eichhornia</i> ○ Thermal pollution ❑ Need for water purification and recycling 		
	<ul style="list-style-type: none"> ❑ Food security <ul style="list-style-type: none"> • Definition of food security • Factors that influence food security: <ul style="list-style-type: none"> ○ Human exponential population growth ○ Droughts and floods (climate change) ○ Alien plants and the reduction of agricultural land ○ The loss of wild varieties: impact on gene pools ○ Wastage ○ Genetically engineered foods 		

	<ul style="list-style-type: none"> ○ Poor farming practices such as: <ul style="list-style-type: none"> ➤ Monoculture ➤ Overgrazing and the loss of topsoil ➤ The use of fertilisers ➤ The use of pesticides
	<ul style="list-style-type: none"> □ Loss of Biodiversity – 6th extinction <ul style="list-style-type: none"> • The importance of maintaining biodiversity • Factors that reduce biodiversity <ul style="list-style-type: none"> ○ Habitat destruction through: <ul style="list-style-type: none"> ➤ Farming methods (overgrazing and monoculture) - Golf estates ➤ Mining ➤ Urbanisation ➤ Deforestation ➤ Loss of wetlands and grasslands ○ Poaching (e.g. rhino horn, ivory, 'bush meat') ○ Alien plant invasions • Factors that reduce the loss of biodiversity: <ul style="list-style-type: none"> ○ Control of alien plant invasion using mechanical, chemical and biological Methods ○ The sustainable use of the environment



