



**PROVINCE OF KWAZULU-NATAL**  
**DEPARTMENT OF EDUCATION**

**STEP-AHEAD SUPPORT DOCUMENT**  
**LESSON PLANS**  
**GRADE 11**

**LIFE SCIENCES**

**JANUARY 2021**



## PREFACE

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This support documents serves to assist Life Sciences teachers and learners on how to deal with curriculum gaps and learning losses as a result of the impact of COVID 19 in 20202. It also captures the challenging topics in the Grade 11 work. The lesson plans should be used in conjunction with the 2021 Recovery Annual Teaching Plan. Activities should serve as a guide on how to assess topics dealt with in this document. It will cover the following:

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# TERM 1

TOPIC: Biodiversity and Classification of Micro-organisms			
<b>TERM</b>	1	<b>WEEK</b>	1
<b>DURATION</b>	3 Hours	<b>WEIGHTING</b>	29 Marks (19%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>• Micro –organisms</li> <li>• Basic structure and general characteristics of micro-organisms</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Biodiversity, prokaryote, eukaryote, pathogens, vectors, acellular, unicellular, bacillus, coccus, spirillum, vibrio, pathogens, autotrophs, heterotrophs, saprophytic		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>• Basic structure of the cell with emphasis on the nucleus</li> <li>• Differentiate between cellular and acellular</li> <li>• Mitosis</li> </ul>			
<b>RESOURCES</b>			
JIT Term 1(2020), DBE Electronic Textbook: Life Sciences Grade 11			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• Prokaryote and eukaryote</li> <li>• Autotrophs and heterotrophs</li> <li>• Viruses as living and non-living organisms</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 1</b>			
<ul style="list-style-type: none"> <li>• Revise cell structure</li> <li>• Describe the FIVE kingdoms               <ul style="list-style-type: none"> <li>✓ Monera</li> <li>✓ Fungi</li> <li>✓ Plantae</li> <li>✓ Animalia</li> <li>✓ Protista</li> </ul> </li> <li>• Define the terms micro-organism, biodiversity, prokaryote, eukaryote, capsid, host, pathogen, saprophyte, bacteriophage, autotrophs, nucleoid, binary fission, flagellum, plasmid, biotechnology, hyphae, mycelium, rhizoids, protein coat</li> </ul>			
<b>LESSON 2</b>			
<ul style="list-style-type: none"> <li>• Use diagrams to describe the basic structure and general characteristics of viruses, bacteria, fungi and Protista.</li> <li>• List the general characteristics of viruses, bacteria, fungi and protista</li> </ul>			
<b>LESSON 3</b>			
<ul style="list-style-type: none"> <li>• Using a table compare the characteristics of viruses, bacteria, fungi and protista</li> </ul>			
<b>ACTIVITIES /ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>• The FIVE Kingdom characteristics: Life Sciences Grade 11 - Electronic Textbook: Activity 1, Pg 16</li> <li>• Structure of the Bacteria - JIT Term 1 (2020) Teaching Tool 1 Pg 5, KZN March 2019 Grade 11 Paper Q2</li> <li>• Structure of the Bacteriophage - JIT Term 1 (2020) Activity 1 Pg 6</li> <li>• Structure of the virus and the Bacteria - KZN June 2018 Grade 11 Paper Q2.1</li> <li>• Case study on malaria disease - KZN March 2020 Grade 11 Paper Q2.2</li> </ul>			

### SUMMARY

- Viruses- acellular, non-living, parasitic and reproduces inside host cell
- Bacteria – unicellular, prokaryotic, parasitic/pathogenic/saprophytic/mutualistic and reproduces by binary fission
- Protista – unicellular or multicellular, eukaryotic, autotrophic/phagocytosis, aquatic and reproduces by binary fission
- Fungi - unicellular or multicellular, eukaryotic, heterotrophic, reproduce by producing spores



<b>TOPIC: Biodiversity and Classification of Micro-organisms</b>			
<b>TERM</b>	1	<b>WEEK</b>	2
<b>DURATION</b>	4 Hours	<b>WEIGHTING</b>	29 Marks (19%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>• Role of micro-organisms</li> <li>• Effects and management of diseases</li> <li>• Immunity and biotechnology</li> <li>• Scientific Investigation</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Immunity, biotechnology, capsid, antibiotics, mycelium, antigen, vector, decomposition, antibody, vaccination		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>• Pathogens causes diseases</li> <li>• Antibiotics are used to treat infections and importance of vaccinations</li> </ul>			
<b>RESOURCES</b>			
JIT Term 1 (2020), DBE Electronic Textbook: Life Sciences Grade 11, Grade 11 Examination Guidelines – KZN Draft			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• Antibodies and antibiotics</li> <li>• Vector and pathogens</li> <li>• Natural immunity and acquired immunity</li> <li>• The role of micro-organisms in maintaining balance in the environment</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 4</b>			
<ul style="list-style-type: none"> <li>• Explain the role of micro-organisms in maintaining balance in the environment</li> <li>• Describe symbiotic relationships involving micro-organisms <ul style="list-style-type: none"> <li>✓ Mutualistic relationships e.g. Nitrogen fixing Bacteria in plants and E. Coli in the human intestine</li> </ul> </li> </ul>			
<b>LESSON 5</b>			
<ul style="list-style-type: none"> <li>• Describe the causes, symptoms and management of ONE disease from each of the four groups of micro-organisms</li> </ul>			
<b>LESSON 6</b>			
<ul style="list-style-type: none"> <li>• Define immunity and the different types of immunity</li> <li>• Describe plants response against infecting micro-organisms</li> <li>• Describe animal response against infecting micro-organisms</li> </ul>			
<b>LESSON 7</b>			
<ul style="list-style-type: none"> <li>• Define vaccinations and their importance</li> <li>• Describe the use of drugs <ul style="list-style-type: none"> <li>✓ Antibiotics and their effect on micro-organism</li> </ul> </li> <li>• Describe use of micro-organisms in producing medicines e.g. antibiotics</li> <li>• Describe traditional technology in the production of wine, beer and cheese</li> </ul>			
<b>ACTIVITIES /ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>• Nitrogen cycle: DBE Life Sciences Electronic Textbook: Grade 11 Activity 3, Page 21</li> <li>• Effects and Management of diseases DBE Life Sciences Electronic Textbook: Grade 11 Activity 4 Page 35-36</li> <li>• Protista (Malaria Case Study) JIT Term 1 2020 Activity 4 Page 8</li> <li>• Vaccinations: KZN March 2018 Grade 11 Paper Q2.2</li> <li>• Biotechnology (Cancer)KZN, March 2017 Grade 11 Paper Q2.1</li> <li>• Scientific Investigation on Biotechnology: KZN March 2018 Grade 11 Paper Q2.1</li> <li>• Scientific Investigation KZN June 2019 Grade 11 Paper Q2.2</li> </ul>			

## SUMMARY

- Micro-organisms are used in industries: production of insulin, antibiotics, cheese and wine
- Micro-organisms are also used in traditional technology i.e. beer making.
- Micro-organisms cause diseases e.g. Tuberculosis (TB), Herpes and Rabies.



<b>TOPIC: Biodiversity of Plants</b>			
<b>TERM</b>	1	<b>WEEK</b>	3
<b>DURATION</b>	4 hours	<b>WEIGHTING</b>	29 Marks (19%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>Biodiversity of plants</li> <li>Reproduction in plant types</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Biodiversity, thallus, gametophyte, sporophyte, phylogenetic tree, cladogram, fertilization, haploid, diploid, zygote, endemic, indigenous, extinction		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Anatomy of plants</li> <li>Geological timescale</li> </ul>			
<b>RESOURCES</b>			
JIT Term 1 (2020), DBE Electronic Textbook: Life Sciences Grade 11			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Phylogenetic tree and the cladogram.</li> <li>Classification of the different organism's characteristics</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 1</b>			
<ul style="list-style-type: none"> <li>Review biodiversity in plants</li> <li>Review the geological timescale</li> <li>Differentiate between phylogenetic tree and cladogram</li> <li>Interpret phylogenetic tree and state its uses (Use JIT Term 1 2020 Activity 4 Page 20 – Teaching Tool)</li> </ul>			
<b>LESSON 2</b>			
<ul style="list-style-type: none"> <li>Describe the general characteristics of: <ul style="list-style-type: none"> <li>✓ Bryophytes</li> <li>✓ Pteridophytes</li> <li>✓ Gymnosperms</li> <li>✓ Angiosperms (using JIT Tool 6 Page 16 -17)</li> </ul> </li> <li>Label drawing showing various parts of 4 plant groups</li> </ul>			
<b>LESSON 3</b>			
<ul style="list-style-type: none"> <li>Describe the following trends in plant evolution: <ul style="list-style-type: none"> <li>✓ The decreasing dependence on water for reproduction from Bryophytes to Angiosperms</li> <li>✓ Changes in the structural features to show increasing adaptation to terrestrial life from Bryophytes to Angiosperms using a table</li> </ul> </li> </ul>			
<b>LESSON 4</b>			
<ul style="list-style-type: none"> <li>Use a phylogenetic tree to outline evolutionary history and relationships</li> <li>Describe trends in plant evolution</li> </ul>			
<b>ACTIVITIES /ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>Phylogenetic tree: KZN June 2015, Q 3.5, DBE Electronic Textbook: Life Sciences Grade 11 Question 1.4, 1.5 &amp; 2.1 Pg73 -74, JIT Term 1 2020 Activity 4, Pg 18</li> <li>Life Cycle: JIT Term 1 (2020) Activity 1, Pg 18</li> <li>Structure of the Fern: March 2020 KZN Question 1.3</li> <li>Comparison of Moss and Fern: JIT Term 1 (2020) Activity 2 Pg 19</li> <li>Comparison of different divisions of plant Kingdom: JIT Term 1 2020 Activity 3 Pg19</li> <li>Characteristics of FOUR plant groups: March 2017 KZN Question 3 Pg 7</li> </ul>			

**SUMMARY** [Downloaded from Stanmorephysics.com](http://Stanmorephysics.com)

- The dependence on water for reproduction decreases from Bryophytes to Angiosperms
- The structural features changes from Bryophytes to Angiosperms in order to adapt to terrestrial life





TOPIC: Biodiversity of Plants			
TERM	1	WEEK	4
DURATION	4 Hours	WEIGHTING	29 Marks (19%)
SUB-TOPICS	<ul style="list-style-type: none"> <li>Flowers as reproductive structures</li> <li>Pollination and types of pollination</li> <li>Adaptation of flowers to different pollinating agents</li> <li>Significance of seeds and seed banks</li> </ul>		
RELATED CONCEPTS/ TERMS/VOCABULARY	Angiosperm, gymnosperm, sexual reproduction, self-pollination, asexual reproduction, cross pollination, seed banks		
PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE			
Reproduction (sexual and asexual)			
RESOURCES			
JIT Term 1 (2020), DBE Electronic Textbook: Life Sciences Grade 11, Grade 11 Examination Guidelines – KZN Draft			
ERRORS/MISCONCEPTIONS/PROBLEM AREAS			
<ul style="list-style-type: none"> <li>Correct labeling of the different parts of the flower</li> <li>Adaptation of flowers to different pollinating agents</li> </ul>			
METHODOLOGY			
LESSON 5			
<ul style="list-style-type: none"> <li>Structure of the flower <ul style="list-style-type: none"> <li>✓ Use diagrams and specimens to identify parts of the flower.</li> <li>✓ Identify the male and female parts of the flower</li> <li>✓ State the functions of different parts of a flower</li> </ul> </li> <li>Define Pollination <ul style="list-style-type: none"> <li>✓ differentiate between self and cross pollination</li> <li>✓ Describe the events that occurs after pollination</li> <li>✓ Identify the part of the flower that develop into a seed and then a fruit</li> </ul> </li> </ul>			
LESSON 6			
<ul style="list-style-type: none"> <li>Describe adaptations of flowers to the following different pollinating agents: <ul style="list-style-type: none"> <li>✓ Wind</li> <li>✓ Insects</li> <li>✓ Birds</li> </ul> </li> </ul>			
LESSON 7			
<ul style="list-style-type: none"> <li>Define sexual and asexual reproduction <ul style="list-style-type: none"> <li>✓ List examples of plants that reproduce sexually</li> <li>✓ List examples of plants that reproduce asexually</li> </ul> </li> <li>State the advantages and disadvantages of sexual reproduction and asexual reproduction</li> </ul>			
LESSON 8			
<ul style="list-style-type: none"> <li>Describe the significance of seeds <ul style="list-style-type: none"> <li>✓ Seeds as food source.</li> <li>✓ Seed banks</li> <li>✓ Endemic species in South Africa</li> </ul> </li> </ul>			
ACTIVITIES /ASSESSMENT			
<ul style="list-style-type: none"> <li>Terminology: Life Sciences Grade 11 DBE Electronic Textbook: Question 1.2 Page 72</li> <li>Structure of a flower: JIT Term 1 2020 Activity 5 and 6 Page 21-22</li> <li>Pollination: Life Sciences Grade 11 DBE Electronic Textbook Question 2.3 Page 76</li> <li>Case study on seed banks: March 2018 KZN Question 3.2 Page 7</li> <li>Significance of seeds: JIT Term 1 2020 Activity 7 Page 23</li> </ul>			

## SUMMARY

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- The flower consist of the male parts, stamen and female parts, pistil
- Pollination is the transfer of pollen grains from anther to the stigma and can be divided into self-pollination and cross pollination
- The different pollinating agents are insects, birds and wind
- Seeds are importance as source of food
- Seed banks preserves seeds to prevent extinction of plants species



<b>TOPIC. Biodiversity of Animals: Six Major Phyla</b>			
<b>TERM</b>	1	<b>WEEK</b>	5
<b>DURATION</b>	4 hours	<b>WEIGHTING</b>	18 marks (12%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>• Six Phyla</li> <li>• Key features in respect of body plan</li> <li>• Role of invertebrates</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Phylum, symmetry (asymmetry, radial, bilateral) and cephalization, embryonic layers (diploblastic, triploblastic), gut (blind, through gut) Coelom (acoelomate, coelomate) , sessile, blood system,		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>• Circulatory and digestive systems</li> </ul>			
<b>RESOURCES</b>			
JIT Term 1 (2020), DBE Electronic Textbook: Life Sciences Grade 11, Grade 11 Examination Guidelines – KZN Draft			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• Phyla, type of symmetry, embryonic layers and coelom</li> <li>• Advantages and disadvantages of endoskeleton and exoskeleton</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 1</b>			
<ul style="list-style-type: none"> <li>• Terminology</li> <li>• Describe the 5 Animal Kingdom classification of organisms based on shared characteristics</li> <li>• List distinguishing characteristics of each of the 5 kingdoms</li> </ul>			
<b>LESSON 2</b>			
<ul style="list-style-type: none"> <li>• State that the Animal Kingdom can be divided into vertebrates and invertebrates</li> <li>• Name the six phyla and provide examples of animals in each phyla <ul style="list-style-type: none"> <li>✓ Porifera</li> <li>✓ Cnidaria</li> <li>✓ Platyhelminthes</li> <li>✓ Annelida</li> <li>✓ Antropoda</li> <li>✓ Chordata</li> </ul> </li> </ul>			
<b>LESSON 3</b>			
<ul style="list-style-type: none"> <li>• Use a table to compare the key features listed in the six phyla with regards to the following: <ul style="list-style-type: none"> <li>✓ symmetry</li> <li>✓ cephalization</li> <li>✓ number of tissue layers</li> <li>✓ the number of opening in the gut</li> <li>✓ coelom and blood system (Life Sciences Grade 11 Electronic Textbook: Table 1 Pg 93)</li> </ul> </li> </ul>			
<b>LESSON 4</b>			
<ul style="list-style-type: none"> <li>• Describe the relationship between body plans of six phyla and their mode of living</li> <li>• Describe the role of invertebrates in agriculture and ecosystem in relation to pollination, decomposition and soil aeration.</li> </ul>			

## ACTIVITIES/ASSESSMENT

- Terminology: Life Sciences DBE Electronic Textbook: Grade 11 Question 1.2 Page 99
- Phyla Characteristics: Life Sciences DBE Electronic Textbook: Grade 11 Activity 3 Page 91
- Compare key features: KZN June 2018 Common Test Question 1.4
- Compare body plans: Life Sciences DBE Electronic Textbook: Grade 11 Question 2.2 Page 102
- Phylogenetic Tree: KZN June 2018 Common Test Question 2.4, Life Sciences DBE Electronic Textbook: Grade 11 Question 1.4 Pg 100
- Role of invertebrates in agriculture: Life Sciences DBE Electronic Textbook: Grade 11 Question 3.2 Page 103, JIT document 2020, Question 3.1-3.2, page 43-45

## SUMMARY

- The 5 Kingdoms system can be classified into Monera, Protista, Fungi, Plantae, Animalia
- The Animal Kingdom can be divided into vertebrates and invertebrates
- There are Six Phyla namely Porifera, Cnidaria, Platyhelminthes, Annelida, Arthropoda, Chordata
- The key features of the Six Phyla can be described under: type of symmetry, number of tissue layers, presence or absence of a coelom, presence of either blind or true gut
- Advantages of true-gut
  - ✓ Undigested material does not mix with digested material
- Advantages of exo-skeleton
  - ✓ Protects the animal against mechanical injury



## TERM 2

<b>TOPIC:</b> Photosynthesis			
<b>TERM</b>	2	<b>WEEK</b>	1
<b>DURATION</b>	4 Hours	<b>WEIGHTING</b>	32 Marks (21%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>• Cell structure and leaf as an organ</li> <li>• Requirements, products and importance of photosynthesis</li> </ul>		
<b>RELATED CONCEPTS/TERMS/VOCABULARY</b>	Chloroplast, chlorophyll, stroma, granum, guard cells, enzymes, starch granule, tissue, palisade mesophyll, spongy mesophyll, stomata		
<b>PRIOR-KNOLWEDEGE/BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>• The cell structure (emphasis on chloroplast and functions)</li> <li>• Plant tissues found in the leaf.</li> <li>• Overview of photosynthesis as energy transformation process</li> </ul>			
<b>RESOURCES</b>			
Textbook/unlabelled diagrams of leaf and chloroplast, leaf specimen, Grade 11 JIT 2 Document(2020), Previous questions papers (activities and revision)			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• Chloroplast and chlorophyll</li> <li>• Requirements and products</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 1</b>			
<ul style="list-style-type: none"> <li>• Recap grade 10 work on cell structure and leaf tissues (labels and functions)</li> <li>• Emphasis on the chloroplast</li> <li>• Provide unlabelled structure of the chloroplast and the leaf</li> </ul>			
<b>LESSON 2</b>			
<ul style="list-style-type: none"> <li>• Draw and label a chloroplast</li> <li>• Look at the structural adaptation of leaf and chloroplast for photosynthesis</li> <li>• Use activity 1.2 (JIT Doc 2020) for structural adaptation of chloroplast</li> </ul>			
<b>LESSON 3</b>			
<ul style="list-style-type: none"> <li>• Define photosynthesis</li> <li>• Write down the requirements and products of photosynthesis (word equation and table) Use teaching tool 3 (JIT Doc, 2020) structure, products and requirements</li> </ul>			
<b>LESSON 4</b>			
<ul style="list-style-type: none"> <li>• Describe the biological importance of photosynthesis               <ul style="list-style-type: none"> <li>✓ source of energy in ecosystems</li> <li>✓ reduction of carbon dioxide in atmosphere</li> <li>✓ produce oxygen for cellular respiration</li> </ul> </li> </ul>			
<b>ACTIVITIES/ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>• Label diagram of leaf</li> <li>• Draw and label chloroplast</li> <li>• Complete equation of photosynthesis</li> </ul>			

## SUMMARY

- Photosynthesis is a process where carbon dioxide and water are combined in the presence of chlorophyll and light to form glucose. During the process oxygen is released.
- Requirements: Carbon dioxide, water, chlorophyll, light energy and enzymes
- Products: glucose stored as starch granule and oxygen
- Structural adaptation of chloroplast
  - ✓ Double membrane is selectively permeable for oxygen, carbon dioxide, glucose and water to pass through
  - ✓ Stroma contains enzymes for dark phase
  - ✓ Thylakoids contain chlorophyll which traps light
- Biological importance of photosynthesis
  - ✓ Source of energy for ecosystems
  - ✓ Reduces the levels of carbon dioxide in the atmosphere (carbon sink)
  - ✓ Releases oxygen for cellular respiration



<b>TOPIC:</b> Photosynthesis			
<b>TERM</b>	2	<b>WEEK</b>	2
<b>DURATION</b>	3 Hours	<b>WEIGHTING</b>	32 Marks (21%)
<b>SUB-TOPICS</b>	Process of photosynthesis		
<b>RELATED CONCEPTS/TERMS/VOCABULARY</b>	Light phase, dark phase, stroma, granum/grana, enzymes, ATP, diffusion		
<b>PRIOR-KNOWLEDGE/BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>• Requirements and products of photosynthesis (recap)</li> <li>• Structure and function of chloroplast</li> </ul>			
<b>RESOURCES</b>			
Textbook, Previous question papers, Grade 11 JIT 2 Document(2020)			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• Light phase and dark phase</li> <li>• Order and sequence of events in each phase</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 5</b>			
<ul style="list-style-type: none"> <li>• Review the structure of the chloroplast</li> <li>• Site of light phase (grana)</li> <li>• Briefly outline the steps/stages in light phase</li> </ul>			
<b>LESSON 6</b>			
<ul style="list-style-type: none"> <li>• Site of dark phase (stroma)</li> <li>• Briefly outline the steps/stages of the dark phase</li> </ul>			
<b>LESSON 7</b>			
<ul style="list-style-type: none"> <li>• Compare the dark phase and light phase</li> <li>• Use diagram to show the sequence of events occurring in each phase</li> </ul>			
<b>ACTIVITIES/ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>• Describe the events of the light and dark phases of photosynthesis in the form of a paragraph (question papers)</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>• The process of photosynthesis is made-up of light phase and dark phase</li> <li>• Light Phase <ul style="list-style-type: none"> <li>✓ takes place in the presence of light within the grana</li> <li>✓ light is absorbed by chlorophyll and converted to chemical potential energy</li> <li>✓ which is used to split water molecule producing energy rich H atoms and oxygen</li> <li>✓ Oxygen is released via stomata</li> <li>✓ energy rich atoms are taking by co-enzymes into stroma for dark phase</li> </ul> </li> <li>• Dark Phase <ul style="list-style-type: none"> <li>✓ Takes place in the stroma and light is not required for this phase</li> <li>✓ carbon dioxide combined with high energy hydrogen atom to form glucose</li> <li>✓ the reaction is controlled by enzymes</li> </ul> </li> </ul>			

<b>TOPIC:</b> Photosynthesis			
<b>TERM</b>	2	<b>WEEK</b>	3
<b>DURATION</b>	2 Hours	<b>WEIGHTING</b>	32 Marks (21%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>• Factors affecting rate of photosynthesis</li> <li>• Role of greenhouse improving crop yield</li> </ul>		
<b>RELATED CONCEPTS/TERMS/VOCABULARY</b>	Greenhouse, light intensity, temperature, carbon dioxide concentration		
<b>PRIOR-KNOWLEDGE/BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>• Enzyme activity</li> <li>• Requirements and products of photosynthesis</li> </ul>			
<b>RESOURCES</b>			
Textbook (graphs showing factors vs rate of photosynthesis), Grade 11 JIT Document, Previous question papers (investigating light intensity)			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• Variables on graphs for each factor</li> <li>• Dark phase occurring at night/when dark</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 8</b>			
<ul style="list-style-type: none"> <li>• Recap the requirements for photosynthesis</li> <li>• Outline how each factor affects the rate of photosynthesis with aid of graphs.</li> </ul>			
<b>LESSON 9</b>			
<ul style="list-style-type: none"> <li>• Define what is a greenhouse</li> <li>• Discuss the role of the following factors in the greenhouse system to improve crop yields: carbon dioxide enrichment, optimum light, and optimum temperature</li> </ul>			
<b>ACTIVITIES/ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>• Draw/interpret/describe the effect of various factors on the rate of photosynthesis</li> <li>• Draw/interpret graphs / describe the effect of various factors on the rate of photosynthesis activity 4.2, 6 and 9 on Grade 11 JIT 2 document</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>• Factors that affect rate of photosynthesis <ul style="list-style-type: none"> <li>✓ Carbon dioxide concentration;</li> <li>✓ Light intensity; and</li> <li>✓ Temperature</li> </ul> </li> <li>• A green house is a special building used for growing plants in an area where they would not normally grow well.</li> <li>• Greenhouse systems can be used to increase crop yields through: <ul style="list-style-type: none"> <li>✓ Carbon dioxide enrichment;</li> <li>✓ Optimum light; and</li> <li>✓ Optimum temperature</li> </ul> </li> </ul>			



<b>TOPIC:</b> Photosynthesis			
<b>TERM</b>	2	<b>WEEK</b>	4
<b>DURATION</b>	2 Hours	<b>WEIGHTING</b>	32 Marks (21%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>• Practical</li> <li>• Revision and topic test</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Destarch		
<b>PRIOR-KNOWLEDGE/BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>• Requirements and products of photosynthesis</li> <li>• Grade 10 starch test</li> </ul>			
<b>RESOURCES</b>			
Textbook (experimental set-up), Grade 11 JIT 2 Document (2020), Previous question papers			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• control and experiment</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 10</b>			
<ul style="list-style-type: none"> <li>• Practical: Test for starch in a leaf</li> </ul>			
<b>LESSON 11</b>			
<ul style="list-style-type: none"> <li>• Practical: Determine whether light is essential for photosynthesis</li> </ul>			
<b>ACTIVITIES/ASSESSMENT</b>			
Draw/interpret graphs / describe the effect of various factors on the rate of photosynthesis (activity 5 and 8 on Grade 11 JIT 2 document(2020))			
<b>SUMMARY</b>			
<p>In each practical mention:</p> <ul style="list-style-type: none"> <li>• Safety precaution conducting experiment</li> <li>• the functions of apparatus and reagents used</li> <li>• brief outline of steps followed when conducting experiments</li> <li>• The positive result for each experiment</li> </ul>			



<b>TOPIC:</b> Animal Nutrition			
<b>TERM</b>	2	<b>WEEK</b>	1
<b>DURATION</b>	3 Hours	<b>WEIGHTING</b>	27 marks (18%)
<b>SUB-TOPICS</b>	Importance of food and dentition,		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Herbivores, carnivores, omnivores, molars, canines ,food chain food web		
<b>PRIOR-KNOWLEDGE/BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>The importance of the organic and inorganic compounds e.g. carbohydrates, fats and proteins.</li> <li>Energy as a flow of energy through a food chain</li> <li>Definition of 'autotrophs' and 'heterotrophs'</li> <li>food chains and food webs</li> </ul>			
<b>RESOURCES</b>			
<ul style="list-style-type: none"> <li>Grade 11 text books, caps document, previous question papers</li> </ul>			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Molars and pre-molars</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 1</b>			
<ul style="list-style-type: none"> <li>Recap of the importance of the organic and inorganic compounds e.g. carbohydrates, fats and proteins.</li> <li>Revise energy flow as a flow of energy through a food chain</li> <li>Revise the definition of autotrophs and heterotrophs</li> </ul>			
<b>LESSON 2</b>			
<ul style="list-style-type: none"> <li>Discuss the importance of food</li> <li>Define dentition</li> <li>Define the following terms: ingestion, digestion, absorption, assimilation, egestion</li> </ul>			
<b>LESSON 3</b>			
<ul style="list-style-type: none"> <li>Describe the differences in dentition of herbivores, carnivores and omnivores in terms of nutritional requirements.</li> <li>Describe the adaptations of teeth of herbivores, carnivores and omnivores to different diets in terms of different nutritional requirements.</li> </ul> <p>Write the importance of different food sources: carbohydrates, lipids and proteins.</p>			
<b>ACTIVITIES/ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>Describe the importance of different food sources</li> <li>Tabulate the adaptations of teeth of herbivores, carnivores and omnivores according to their diet.</li> <li>Identify the teeth that relates to the diet in the picture/ photograph/diagram given (use teaching tool in JIT Document page 22 (2020))</li> </ul>			
<b>SUMMARY</b>			
The diet consumed by organisms in relations to the teeth			

<b>TOPIC:</b> Animal Nutrition			
<b>TERM</b>	2	<b>WEEK</b>	2
<b>DURATION</b>	4 Hours	<b>WEIGHTING</b>	(27 Marks) 18%
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>Organs associated with animal nutrition</li> <li>Sub-process of nutrition(ingestion)</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	<ul style="list-style-type: none"> <li>Alimentary canal, esophagus, digestion, ingestion, epiglottis</li> </ul>		
<b>PRIOR-KNOWLEDGE / BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Digestion</li> </ul>			
<b>RESOURCES</b>			
<ul style="list-style-type: none"> <li>Textbooks, Grade 11 JIT Document, Previous questions papers</li> </ul>			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Bile is produced in the gall bladder and not in the liver</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 4</b>			
<ul style="list-style-type: none"> <li>Identify the following parts: mouth (tongue and teeth), pharynx, esophagus, stomach, small intestines, large intestine, rectum and anus and state their functions</li> </ul>			
<b>LESSON 5</b>			
<ul style="list-style-type: none"> <li>Describe the macro-structure of the alimentary canal and associated organs and the functions of the different parts using a diagram/ chart/model</li> </ul>			
<b>LESSON 6</b>			
<ul style="list-style-type: none"> <li>State the associated organs with human alimentary canal</li> <li>Describe the functions of the following associated organs: salivary glands, liver, gall bladder, pancreas</li> </ul>			
<b>LESSON 7</b>			
<ul style="list-style-type: none"> <li>Describe the process of intake of food through the mouth</li> <li>Define mechanical digestion</li> <li>Describe the process of mechanical digestion: <ul style="list-style-type: none"> <li>✓ Chewing process/ mastication</li> <li>✓ role of different type of teeth and tongue</li> <li>✓ Bolus formation- role of saliva and swallowing of food (use diagrams from grade 11 textbook)</li> <li>✓ Peristalsis – definition and its significance along the alimentary canal</li> </ul> </li> </ul>			
<b>ACTIVITIES/ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>Identify parts of the alimentary canal and their functions (2020 JIT 2 Teaching tool 2 page 23)</li> <li>Provide biological terms to match when given the description (2020 JIT 2 Activity 1 page 23)</li> <li>Write down the role played by the liver ,pancreas and the stomach during digestion</li> <li>Describe the process of mechanical digestion in paragraph form</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>The structure of the human alimentary canal :parts and functions</li> <li>The process of mechanical digestion</li> <li>The role played by organs associated with alimentary canal liver, pancreas ,salivary glands and gall bladder</li> </ul>			

<b>TOPIC:</b> Animal Nutrition			
<b>Term</b>	2	Week	3
<b>Duration</b>	4 Hours	<b>Weighting</b>	27 marks (18%)
<b>Sub-topics</b>	Processes of digestion, absorption and assimilation		
<b>RELATED CONCEPTS/TERMS/VOCABULARY</b>	Alimentary canal, ingestion, digestion, absorption, assimilation, egestion, epiglottis, bolus, peristalsis, bile		
<b>PRIOR-KNOWLEDGE/BACKGROUND KNOWLEDGE</b>			
Digestion			
<b>RESOURCES</b>			
Textbooks, Grade 11 JIT Document (2020), Previous question papers (variety of questions on digestion)			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• Ingestion and egestion</li> <li>• Assimilation and absorption</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 8</b>			
<ul style="list-style-type: none"> <li>• Define chemical digestion</li> <li>• Describe the process of chemical digestion: <ul style="list-style-type: none"> <li>✓ Role of water in digestion</li> <li>✓ Role of the following groups of enzymes (pH, substrate and end-product) and where they are produced (specific names of enzymes need not be mentioned)</li> <li>✓ Carbohydrates</li> <li>✓ Proteases</li> <li>✓ Lipases</li> <li>✓ Role of bile in chemical digestion</li> </ul> </li> </ul>			
<b>LESSON 9</b>			
<ul style="list-style-type: none"> <li>• Describe the structural adaptations and the role of the small intestines in facilitating absorption by being <ul style="list-style-type: none"> <li>✓ long,</li> <li>✓ folded,</li> <li>✓ having lots of blood vessels</li> <li>✓ numerous villi</li> </ul> </li> <li>• Describe the structure and the role of the villi in absorption (columnar epithelium, capillary network, lacteal, microvilli, goblet cells)</li> <li>• Describe the importance of hepatic portal system in the transport of absorbed food to the liver then the rest of the body.</li> </ul>			
<b>LESSON 10</b>			
<ul style="list-style-type: none"> <li>• Describe the process of absorption: <ul style="list-style-type: none"> <li>✓ Identify end products of digestion (glucose and amino acids) that are absorbed by the villi in the small intestines.</li> <li>✓ Actively absorbed against the concentration gradient into blood capillaries.</li> <li>✓ End products of lipids, that is glycerol and fatty acids diffuse into the lacteals, to lymphatic vessels which open into thoracic duct then blood system.</li> <li>✓ Water is absorbed into the capillaries by osmosis,</li> <li>✓ Capillaries unite to form larger veins that open into hepatic portal vein.</li> <li>✓ Importance of hepatic portal system in the transport of absorbed food to the liver and then through hepatic vein to the rest of the body.</li> </ul> </li> </ul>			

## LESSON 11 [Downloaded from Stanmorephysics.com](http://Stanmorephysics.com)

- Definition of assimilation
- Describe the role of liver:
  - ✓ glucose metabolism - excess glucose stored in the form of glycogen
  - ✓ deamination – breaking down of excess amino acids and formation of urea
  - ✓ breaking down of alcohol, drugs and hormones

### ACTIVITIES/ASSESSMENT

- Copy a table showing the name of gland, digestive juice, contents and their functions in chemical digestion (2020 JIT 2)
- Write down the role of the liver during digestion
- Write down how the villi structure is adapted to perform the function of absorption
- Use diagrams showing the liver with its associated structures to answer questions (Use Grade 11 textbook and previous exam question papers)  
Complete the questions by filling in missing words referring to the villus structure (2020 JIT 2)

### SUMMARY

Describe how food is digested, absorbed and assimilated.



<b>TOPIC: Animal Nutrition</b>			
<b>TERM</b>	2	<b>WEEK</b>	4
<b>DURATION</b>	3 Hours	<b>WEIGHTING</b>	27 Marks (18 %)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>Homeostatic control of blood glucose</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Homeostasis, Islets of Langerhans ,hormone, glucagon, diabetes, insulin		
<b>PRIOR-KNOLWEDEGE/BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Balanced diet</li> </ul>			
<b>RESOURCES</b>			
Textbooks, Previous question papers, Grade 11 JIT Document (2020)			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Glucagon and glycogen</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 12</b>			
<ul style="list-style-type: none"> <li>Define homeostasis.</li> <li>Describe Negative feedback mechanism involving glucagon and insulin in controlling glucose levels in the blood</li> </ul>			
<b>LESSON 13</b>			
<ul style="list-style-type: none"> <li>Select a suitable question on investigation based on relationship between insulin and glucagon</li> <li>Interpret a graph to state a relationship between glucagon and insulin</li> <li>Using a flow diagram GRADE 11 JIT (2020), identify organs, glands, hormones and describe the mechanism that controls the levels of glucose in the body</li> </ul>			
<b>ACTIVITIES/ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>Use the past exam papers to assess glucose in an investigation approach</li> <li>Use a case study, to answer questions on homeostatic control</li> <li>Interpret graphs /data and make analysis on the relationship between glucagon and insulin (past exam papers &amp; 2020 JIT document)</li> <li>Describe negative feedback mechanism involving glucagon and insulin in controlling glucose levels in the blood</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>Homeostasis is a process whereby the internal environment is kept constant irrespective of the changes in the external environment.</li> <li>Insulin secreted by the pancreas when blood sugar levels are high</li> <li>Glucagon is secreted by pancreas when blood sugar is low</li> </ul>			

<b>TOPIC: Cellular Respiration</b>			
<b>TERM</b>	2	<b>WEEK</b>	1
<b>DURATION</b>	4 Hours	<b>WEIGHTING</b>	22 Marks (14%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>• Cell structure (mitochondrion)</li> <li>• Requirements, products, importance</li> <li>• Process of cellular respiration</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Mitochondrion, matrix, ribosome, cristae, glycolysis, pyruvic acid, Krebs cycle, oxidative phosphorylation, aerobic, anaerobic, lactic acid fermentation, alcohol fermentation, ethanol, lime water, germinating seeds, dead seeds		
<b>PRIOR-KNOWLEDGE/BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>• The cell structure (emphasis on mitochondrion labels and functions)</li> <li>• Overview of respiration as energy transformation process</li> <li>• Review requirements products of cellular respiration</li> </ul>			
<b>RESOURCES</b>			
Textbook/Unlabelled diagrams of mitochondrion, Grade 11 JIT 2 Document (2020), Previous questions papers			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• Structure of mitochondrion and chloroplast</li> <li>• Aerobic and anaerobic</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 1:</b>			
<ul style="list-style-type: none"> <li>• Define cellular respiration</li> <li>• Revise structure of the cell: mitochondrion</li> <li>• Draw and fully label a mitochondrion</li> <li>• Describe functions and structural adaptation of mitochondrion for cellular respiration</li> </ul>			
<b>LESSON 2</b>			
<ul style="list-style-type: none"> <li>• State where cellular respiration takes place</li> <li>• Describe the two types of cellular respiration and how they differ (aerobic &amp; anaerobic)</li> <li>• Write down the requirements and products of cellular respiration (word equation and table)</li> <li>• Why cellular respiration is important</li> <li>• Overview of cellular respiration: Activity 2 JIT 2 Document (2020)</li> </ul>			
<b>LESSON 3</b>			
<ul style="list-style-type: none"> <li>• Define aerobic respiration</li> <li>• State the raw materials needed for cellular respiration</li> <li>• Discuss the phases/stages of aerobic respiration</li> <li>• Product of aerobic respiration</li> <li>• Consolidate understanding: Activity 3 and 4 on JIT 2 Document (2020)</li> </ul>			
<b>LESSON 4</b>			
<ul style="list-style-type: none"> <li>• Demonstrate and discuss aspects of aerobic respiration practical                             <ul style="list-style-type: none"> <li>✓ Determine whether carbon dioxide is given off during cellular respiration (compulsory)</li> <li>✓ Outline clearly the functions of the apparatus used</li> <li>✓ On experiment outline the following terms: aim, variables, controlled and experiment</li> <li>✓ Allow learners to observe and draw up conclusions</li> </ul> </li> </ul>			

## ACTIVITIES/ASSESSMENT [Stanmorephysics.com](https://www.stanmorephysics.com)

- Draw and label mitochondrion
- Practical assessment: Teaching tool 2 in JIT document (2020)
- Terminology: Activity 1 in JIT document (2020)
- List requirements and products of cellular respiration and state the importance of cellular respiration
- Describe the events of glycolysis, Krebs' cycle and oxidative phosphorylation

## SUMMARY

- Cellular respiration is a process of breaking down glucose (energy rich molecule) to release water, carbon dioxide, and energy (ATP)
- There are two types of respiration:
  - ✓ Aerobic respiration: occurs in the presence of oxygen
  - ✓ Anaerobic respiration: occurs in the absence of oxygen
- The process of aerobic respiration has three stages:
  - ✓ Glycolysis
  - ✓ Krebs' Cycle
  - ✓ Oxidative Phosphorylation





<b>TOPIC:</b> Cellular Respiration			
<b>TERM</b>	2	<b>WEEK</b>	2
<b>DURATION</b>	3 Hours	<b>WEIGHTING</b>	22 Marks (14%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>Anaerobic respiration</li> <li>Anaerobic respiration in plants (alcohol fermentation)</li> <li>Anaerobic respiration in animal cells (lactic acid fermentation)</li> <li>Requirements, products, importance in plants</li> <li>Comparisons between aerobic and anaerobic respiration</li> </ul>		
<b>RELATED CONCEPTS/TERMS/VOCABULARY</b>	Mitochondrion, matrix, ribosome, cristae, glycolysis, pyruvic acid, Krebs cycle, oxidative phosphorylation, aerobic, anaerobic, lactic acid fermentation, alcohol fermentation, ethanol, lime water, germinating seeds, dead seeds		
<b>PRIOR-KNOLWEDEGE/BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Overview of aerobic respiration</li> </ul>			
<b>RESOURCES</b>			
Textbook/Unlabelled diagrams of mitochondrion, Grade 11 JIT 2 Document (2020), Previous questions papers			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Alcohol fermentation and lactic acid fermentation</li> <li>Anaerobic respiration with aerobic respiration</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 5</b>			
<ul style="list-style-type: none"> <li>Revise process of aerobic respiration</li> <li>Define anaerobic respiration</li> <li>Describe the two types of anaerobic respiration: alcohol fermentation and lactic acid fermentation</li> </ul>			
<b>LESSON 6</b>			
<ul style="list-style-type: none"> <li>Tabulate differences between aerobic and anaerobic fermentation</li> <li>Differentiates between products of anaerobic respiration in plants and animals (respectively)</li> <li>Describe the role of anaerobic respiration in industry/economy</li> </ul>			
<b>LESSON 7</b>			
<ul style="list-style-type: none"> <li>Revise and consolidate topic using activities from past papers and JIT 2 Document (2020)</li> <li>Provide learners with unlabelled worksheets on mitochondria and chloroplast to compare</li> <li>Use cut and sequence activity for learners to put events of aerobic and anaerobic respiration in a correct order</li> <li>Instruct learners to write paragraph on process of aerobic and anaerobic respiration</li> </ul>			
<b>ACTIVITIES/ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>Differentiate between aerobic and anaerobic respiration</li> <li>State the importance of anaerobic respiration on industry</li> <li>Draw graphs, interpret data on anaerobic cellular respiration</li> </ul>			

## SUMMARY

Anaerobic respiration is the process of breaking down glucose in the absence of oxygen within cytosol

- Glucose is partially broken down into:
  - ✓ Alcohol and carbon dioxide in plants
  - ✓ Lactic acid and carbon dioxide in animals
  - ✓ Small amount of energy is released
- Describe the production of lactic acid in humans during strenuous exercises
- Describe the role of anaerobic respiration in industry
  - ✓ Brewing and bread making
- Scientific investigations: (carbon dioxide is released by living organisms is Compulsory to do)
  - ✓ Provide relevant data that can be interpreted by learners to enable them to identify aim, variables, controlled variables and record observations
- Comparisons between aerobic and anaerobic using table
- Comparisons between alcohol fermentation and lactic acid fermentation using a table



**TERM 3**

<b>TOPIC:</b> Gaseous Exchange			
<b>TERM</b>	3	<b>WEEK</b>	1
<b>DURATION</b>	3 Hours	<b>WEIGHTING</b>	32 Marks (21%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>Differences between cellular respiration, breathing and gas exchange</li> <li>Requirement of the efficient gas exchange organs</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	ATP, breathing, inhalation, exhalation, alveoli, ventilation		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Respiratory systems</li> <li>Cellular respiration</li> </ul>			
<b>RESOURCES</b>			
Textbooks, ATP, Previous question papers			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Aerobic and anaerobic</li> <li>Gaseous exchange and breathing</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 1</b>			
<ul style="list-style-type: none"> <li>Define the following processes: <ul style="list-style-type: none"> <li>✓ cellular respiration</li> <li>✓ breathing</li> <li>✓ gas exchange</li> </ul> </li> <li>Differentiate between the following processes: <ul style="list-style-type: none"> <li>✓ cellular respiration</li> <li>✓ breathing</li> <li>✓ gas exchange</li> </ul> </li> <li>Explain the need for oxygen in the body and the need to eliminate carbon dioxide from the body</li> </ul>			
<b>LESSON 2</b>			
<ul style="list-style-type: none"> <li>State the requirements of efficient gas exchange organs</li> </ul>			
<b>LESSON 3</b>			
Explain how the requirements of efficient gas exchange are met in aquatic and terrestrial environments in different organisms			
<b>ACTIVITIES/ ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>List requirements of an efficient gas exchange organ in human</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>During cellular respiration, carbon dioxide is released.</li> <li>Gaseous exchange involves the exchange of gases (Carbon dioxide and Oxygen) at lung level as well as tissue fluid level</li> <li>Breathing is the process of inhalation and exhalation</li> <li>Gas exchange surface should be thin, moist, well protected, ventilated and have a good transport system.</li> </ul>			

<b>TOPIC:</b> Gaseous Exchange			
<b>TERM</b>	3	<b>WEEK</b>	2
<b>DURATION</b>	3 Hours	<b>WEIGHTING</b>	32 Marks (21%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>Human gas exchange – Structure, location, functions and adaptations of the ventilation system</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Trachea, cartilaginous rings, pharynx, larynx, glottis, epiglottis, pleura, pulmonary artery and vein, nasal passage, alveolus, diaphragm, bronchus, bronchioles, air sacs, active transport, squamous epithelial cells		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Structure and part of the respiratory system</li> <li>Circulatory system</li> </ul>			
<b>RESOURCES</b>			
Textbooks, ATP document, Examination Guidelines, Videos, models and charts			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Learners confuse pharynx and larynx</li> <li>Diaphragm and diagram</li> <li>Bronchus and bronchioles</li> <li>Functions of the pulmonary vein and pulmonary artery</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 4</b>			
<ul style="list-style-type: none"> <li>Provide and define a list of biological terms</li> </ul>			
<b>LESSON 5</b>			
<ul style="list-style-type: none"> <li>Label the structure of the respiratory system.</li> <li>Describe the location functions of the following parts: <ul style="list-style-type: none"> <li>✓ cartilaginous ring</li> <li>✓ intercostal muscles</li> <li>✓ alveoli</li> <li>✓ diaphragm</li> </ul> </li> </ul>			
<b>LESSON 6</b>			
<ul style="list-style-type: none"> <li>Describe the structural adaptations of the parts of the ventilation system.</li> </ul>			
<b>ACTIVITIES/ ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>Label diagrams on the human gas exchange system and provide functions of labelled parts</li> <li>Provide learners with descriptions that require biological terms</li> <li>Give the structure of the gaseous exchange system to be labelled by learners</li> <li>Recognise the structures and give their functions</li> <li>Describe the structural adaptations of the gaseous exchange system</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>Gaseous exchange system plays a vital role in ensuring that sufficient oxygen and carbon dioxide are taken in and out respectively</li> <li>Adaptions of the various structures to carry out their functions</li> </ul>			

<b>TOPIC:</b> Gaseous Exchange			
<b>TERM</b>	3	<b>WEEK</b>	3
<b>DURATION</b>	4 hours	<b>WEIGHTING</b>	32 Marks (21%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>• Ventilation of lungs</li> <li>• Homeostatic control of lungs</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Inhalation, exhalation, alveoli, ventilation, diaphragm , external-intercostal muscles, diffusion gradient, homeostasis , bicarbonate ions, oxyhaemoglobin, carbhaemoglobin		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>• Structure of gaseous exchange</li> <li>• Adaptation of ventilation system</li> </ul>			
<b>RESOURCES</b>			
Textbook, ATP, Examination Guidelines, Model of breathing system, Charts, Previous Exam Papers			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• Inhalation and exhalation</li> <li>• Diaphragm and diagram</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 8</b>			
<ul style="list-style-type: none"> <li>• Explain the following terms: <ul style="list-style-type: none"> <li>✓ inhalation</li> <li>✓ exhalation</li> </ul> </li> <li>• Construct a model to show inhalation and exhalation</li> </ul>			
<b>LESSON 9</b>			
<ul style="list-style-type: none"> <li>• Use charts and diagrams to demonstrate how gaseous exchange occurs in the alveoli and in the tissues.</li> </ul>			
<b>LESSON 10</b>			
<ul style="list-style-type: none"> <li>• Describe the transportation of gases (Oxygen and Carbon dioxide) around the body.</li> </ul>			
<b>LESSON 11</b>			
<ul style="list-style-type: none"> <li>• Describe how the breathing rate may be modified to meet the changing needs of the body.</li> </ul>			
<b>ACTIVITIES/ ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>• Describe inhalation and exhalation</li> <li>• Describe the homeostatic control of breathing</li> <li>• Analyse and interpret data on the number of red blood cells and the effect of exercise on breathing/pulse rate</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>• Oxygen is taken in by process of inhalation and Carbon dioxide is taken out by exhalation</li> <li>• In alveoli Oxygen diffuses into the red blood cells, and Carbon dioxide diffuses into the lungs</li> <li>• Oxygen and Carbon dioxide are transported by haemoglobin and plasma</li> <li>• Medulla oblongata is responsible for homeostatic control of gases in the blood</li> </ul>			

<b>TOPIC:</b> Excretion			
<b>TERM</b>	3	<b>WEEK</b>	1
<b>DURATION</b>	4 Hours	<b>WEIGHTING</b>	32 Marks (21%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>• Organs of excretion</li> <li>• Urinary system</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Excretion, metabolism, toxic substances, waste products, osmoregulation		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>• Excretory system</li> </ul>			
<b>RESOURCES</b>			
Textbooks, models, study guides, ATP			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• Ureter and urethra</li> <li>• Excretion and secretion</li> <li>• Renal artery and renal vein in terms of functions</li> <li>• Urea and uric acid</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 1</b>			
<ul style="list-style-type: none"> <li>• List the organs of excretory system and their functions</li> </ul>			
<b>LESSON 2</b>			
<ul style="list-style-type: none"> <li>• State the excretory organs and the waste product that they excrete</li> </ul>			
<b>LESSON 3</b>			
<ul style="list-style-type: none"> <li>• Draw and label the structure of the kidney</li> </ul>			
<b>LESSON 4</b>			
<ul style="list-style-type: none"> <li>• List four functions of the kidney which are related to excretion</li> </ul>			
<b>ACTIVITIES/ ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>• Label drawings of excretory system and of the nephron and provide the functions of the labelled parts</li> <li>• Describe the functioning of nephron in the process of excretion</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>• Excretion is the removal of waste products using different organs such as <ul style="list-style-type: none"> <li>✓ Skin</li> <li>✓ Lungs</li> <li>✓ Kidney</li> </ul> </li> <li>• The functional unit of the kidney which is the nephron plays a vital role in the process of excretion such as: <ul style="list-style-type: none"> <li>✓ Glomerular filtration</li> <li>✓ Tubular reabsorption</li> <li>✓ Tubular excretion</li> </ul> </li> </ul>			



<b>TOPIC:</b> Excretion			
<b>TERM</b>	<b>3</b>	<b>WEEK</b>	<b>2</b>
<b>DURATION</b>	4 Hours	<b>WEIGHTING</b>	32 Marks (21%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>• Structure of Nephron</li> <li>• Functioning of Nephron</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Metabolism, filtration, glomerulus ultra-filtration, active reabsorption, passive reabsorption		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>• Internal Structure of Kidney</li> <li>• Urinary System</li> </ul>			
<b>RESOURCES</b>			
Textbooks, ATP, Examination Guidelines, Models			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• Absorption and reabsorption</li> <li>• Excretion and secretion</li> <li>• Descending limb and ascending limb</li> <li>• Efferent artery and afferent artery</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 5</b>			
<ul style="list-style-type: none"> <li>• Draw and Label the structure of Nephron</li> </ul>			
<b>LESSON 6</b>			
Differentiate between Efferent and Afferent in terms of structural adaptation			
<b>LESSON 7</b>			
<ul style="list-style-type: none"> <li>• Major role played by the following: <ul style="list-style-type: none"> <li>✓ Proximal convoluted tubule</li> <li>✓ Distal convoluted tubule</li> </ul> </li> </ul>			
<b>LESSON 8</b>			
<ul style="list-style-type: none"> <li>• Summarize the functioning of nephron</li> </ul>			
<b>ACTIVITIES/ ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>• Describe structural adaptation of Nephron</li> <li>• List and describe processes occurring inside the Nephron</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>• Nephron is the functional unit of the kidney</li> <li>• It consist of two parts (Malpighian body and renal tubule)</li> <li>• Structural suitability of afferent and efferent</li> <li>• Description of the glomerulus ultrafiltration</li> </ul>			



<b>TOPIC:</b> Homeostatic control of water and salts, role of ADH and aldosterone			
<b>TERM</b>	3	<b>WEEK</b>	3
<b>DURATION</b>	2 Hours	<b>WEIGHTING</b>	32 Marks (21%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>• Homeostasis</li> <li>• Describe the role of ADH and aldosterone in water and salt balance respectively</li> <li>• Diseases of the excretory system</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Osmoregulation, homeostasis, pituitary gland, ADH, adrenal glands, aldosterone, nephron, negative feedback mechanism		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>• Excretory system</li> <li>• Cellular respiration</li> </ul>			
<b>RESOURCES</b>			
Textbook, ATP, Examination Guidelines			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>• The level of water in the blood not the body</li> <li>• The level of salts in the blood not the body</li> <li>• Learners confuse the function of a hormone with that of a gland</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 9</b>			
<ul style="list-style-type: none"> <li>• Define osmoregulation</li> <li>• Describe the role of ADH in osmoregulation: <ul style="list-style-type: none"> <li>✓ Based on the bodies need for water</li> <li>✓ Its effect on the permeability of the renal tubules</li> </ul> </li> </ul>			
<b>LESSON 10</b>			
<ul style="list-style-type: none"> <li>• Location of adrenal glands</li> <li>• Describe the homeostatic role of aldosterone in the regulation of salt</li> </ul>			
<b>ACTIVITIES/ ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>• Describe homeostasis</li> <li>• Differentiate between the gland and the hormone</li> <li>• List functions of pituitary gland and aldosterone (Hormones that they secrete)</li> <li>• Describe the process of osmoregulation</li> <li>• Describe the process of salt balance</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>• The internal environment in human beings must be kept constant or within narrow limits</li> <li>• When water and salts are above or below normal in the blood, the imbalance is created which must be corrected by means of endocrine glands secreting ADH and aldosterone respectively</li> <li>• Water and salts thus return to the normal levels to allow for the normal functioning of the body</li> <li>• Kidneys as organs are affected by the lifestyle of a human being which might lead to them failing to function normal</li> </ul>			

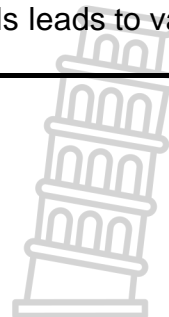


<b>TOPIC:</b> Population Ecology			
<b>TERM</b>	3	<b>WEEK</b>	1
<b>DURATION</b>	3 Hours	<b>WEIGHTING</b>	37 marks (25%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>Factors affecting the population size</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Species, population, community, immigration, emigration, mortality, natality, fluctuations and limiting factors, carrying capacity, density dependent factors, density independent factors,		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Environmental studies and ecosystem</li> </ul>			
<b>RESOURCES</b>			
Textbooks, ATP, Examination Guidelines			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Population vs community</li> <li>Emigration vs immigration</li> <li>Density dependent factors vs Density independent factors</li> <li>Interpretations of different phases within growth form curves</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 1</b>			
<ul style="list-style-type: none"> <li>Define concepts in Population ecology</li> </ul>			
<b>LESSON 2</b>			
<ul style="list-style-type: none"> <li>Describe how each of the above concepts affect the population size <ul style="list-style-type: none"> <li>✓ Immigration</li> <li>✓ Emigration</li> <li>✓ Mortality</li> <li>✓ Natality</li> <li>✓ Population fluctuations and regulation</li> </ul> </li> </ul>			
<b>LESSON 3</b>			
Conduct a case study on the rationale for culling e.g. Elephants in Kruger National Park			
<b>ACTIVITIES/ ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>Give learners descriptions to provide biological terms</li> <li>Interpretation of phases in graphs</li> <li>Case studies to enable learners to plot graphs</li> <li>Case studies about culling of wild animals in National parks</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>The population size in the environment is affected by a variety of factors, these factors might cause an increase or decrease in the density of the population</li> <li>Population growth models how influence of factors affect the growth and or the decrease in the population sizes, this is illustrated with the consideration of factors affecting population size and carrying capacity</li> </ul>			

<b>TOPIC:</b> Population Ecology			
<b>TERM</b>	3	<b>WEEK</b>	2
<b>DURATION</b>	2 Hours	<b>WEIGHTING</b>	37 marks (25%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>Population growth forms (Logistic and Geometric growth curves)</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Lag phase, stationery phase, decelerating phase, equilibrium, carrying capacity		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Population ecology</li> </ul>			
<b>RESOURCES</b>			
Textbooks, ATP, Examination Guidelines			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Lag phase and log phase</li> <li>Geometric growth forms and logistic growth forms</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 1</b>			
<ul style="list-style-type: none"> <li>Using graphs, describe the following population growth form: <ul style="list-style-type: none"> <li>✓ Geometric growth form</li> </ul> </li> </ul>			
<b>LESSON 2</b>			
<ul style="list-style-type: none"> <li>Growth forms with data ,tables to interpret</li> </ul>			
<b>ACTIVITIES/ ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>Use the data provided to draw a graph showing any growth form</li> <li>Interpretation of phases in different growth form curves</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>In geometric growth form, the population grows rapidly and form a J –curve whereas in logistic growth form the population grows through certain phases and is influenced by certain limiting factors</li> <li>Population growth form influences how factors affect the growth and or the decrease in the population size, this is illustrated with the consideration of factors affecting the population size and carrying capacity</li> </ul>			



<b>TOPIC:</b> Population ecology			
<b>TERM</b>	3	<b>WEEK</b>	3
<b>DURATION</b>	4 Hours	<b>WEIGHTING</b>	37 marks (25%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>Interactions in the environment</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Predation, competition, specialization, parasitism, mutualism, commensalism, ecological niche, resource partitioning, intra/inter specific competition, symbiosis		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Species and population</li> <li>Environmental studies (Grade 10)</li> </ul>			
<b>RESOURCES</b>			
<ul style="list-style-type: none"> <li>Textbooks, ATP, Examination Guidelines</li> </ul>			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Intra-specific and inter-specific competition</li> <li>Predator-prey interactions and predator-prey oscillation</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 5</b>			
<ul style="list-style-type: none"> <li>Differentiate between inter- specific competition and intra- specific competition using examples</li> <li>Describe the outcomes of competition</li> </ul>			
<b>LESSON 6</b>			
<ul style="list-style-type: none"> <li>Define the following terms, ecological niche, competitive exclusion, resource partitioning and predation</li> </ul>			
<b>LESSON 7</b>			
<ul style="list-style-type: none"> <li>Interpret graphs showing predator-prey relationships and competition</li> </ul>			
<b>LESSON 8</b>			
<ul style="list-style-type: none"> <li>Differentiate amongst the three different types of symbiosis, using examples</li> </ul>			
<b>ACTIVITIES/ ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>Interpret graphs showing predator prey relationship and competition</li> <li>Explain the competitive exclusion and coexistence principles, resource partitioning</li> <li>Differentiate amongst the four different types of symbiosis, using examples</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>Organisms compete for resources that they share, competition results to exclusion and or otherwise coexistence.</li> <li>To reduce the level of competition, organisms tend to partition their resources.</li> <li>The interaction between different organisms at different levels leads to various relationships that have existed to control populations.</li> </ul>			



<b>TOPIC:</b> Human population			
<b>TERM</b>	3	<b>WEEK</b>	4
<b>DURATION</b>	3 Hours	<b>WEIGHTING</b>	37 marks (25%)
<b>SUB-TOPICS</b>	<ul style="list-style-type: none"> <li>Exponential growth in human population</li> <li>Age-gender pyramids in South Africa and other countries</li> </ul>		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Census, developed and undeveloped countries, age pyramid, gender pyramid, ecological footprint		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Population ecology</li> </ul>			
<b>RESOURCES</b>			
Textbook, ATP, Examination Guidelines			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Learners confuse between age pyramid and gender pyramid</li> <li>Interpretation of age-gender pyramids</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 9</b>			
<ul style="list-style-type: none"> <li>Use data table to show the estimation of human population growth measured in different decades/centuries</li> <li>Describe the factors that has led to the increase in human population e.g. Medical revolution, Agricultural revolution</li> </ul>			
<b>LESSON 10</b>			
<ul style="list-style-type: none"> <li>Explain age-gender pyramids of different countries: <ul style="list-style-type: none"> <li>✓ Developed countries</li> <li>✓ Under developed countries</li> </ul> </li> <li>Determine the human populations that are increasing, declining or stable</li> </ul>			
<b>LESSON 11</b>			
<ul style="list-style-type: none"> <li>Describe the impact of human population growth on the environment</li> <li>Explain the needs of humans versus conservation</li> </ul>			
<b>ACTIVITIES/ ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>Interpret age pyramid for stable, declining and growing populations and relate this to developing and developed countries</li> <li>Draw a bar graph to compare population statistics of different countries</li> <li>Explain/Interpret graphs on the effect of human population growth on the environment</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>Data show that human population has been increasing globally for the past centuries generally</li> <li>However this pattern of human population growth is not common in all countries, other countries are showing declining and or stable human population growth</li> <li>Age – gender pyramids are used to illustrate the population of humans in categories of age and gender in different countries</li> <li>As human population is increasing, their activities are destroying the environment and are threatening to disrupt ecosystems</li> </ul>			

## TERM 4

TOPIC: Human Impact on the Environment			
<b>TERM</b>	4	<b>WEEK</b>	1
<b>DURATION</b>	4 Hours	<b>WEIGHTING</b>	37 marks (25%)
<b>SUB-TOPICS</b>	The atmosphere and climate change		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Greenhouse effect, global warming, desertification, carbon footprint, ozone layer depletion		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
Carbon Cycle			
<b>RESOURCES</b>			
Textbooks, Past exam papers, Charts and Examination guideline			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Ozone layer depletion and global warming</li> <li>Greenhouse effect and global warming</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 1:</b>			
<ul style="list-style-type: none"> <li>Recap carbon cycle</li> <li>State what is meant by the greenhouse effect and why it is important for life on earth.</li> <li>Describe how an increase in greenhouse gases ( enhanced greenhouse effect) leads to global warming</li> </ul>			
<b>LESSON 2:</b>			
<ul style="list-style-type: none"> <li>Describe the sources of carbon dioxide emissions and methane emissions (greenhouse gases) which lead to the greenhouse effect. Define the green- house effect</li> <li>Describe how global warming may lead to desertification, drought and flood.</li> </ul>			
<b>LESSON 3</b>			
<ul style="list-style-type: none"> <li>Describe the effect of deforestation and its influence on the CO<sub>2</sub> concentration in the atmosphere.</li> <li>Define carbon footprint.</li> <li>Describe the ways of reducing our “carbon footprint”</li> </ul>			
<b>LESSON 4:</b>			
<ul style="list-style-type: none"> <li>Describe the causes and consequences of ozone depletion.</li> <li>Describe strategies to decrease ozone depletion.</li> </ul>			
<b>ACTIVITIES/ ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>Describe/ interpret data on :               <ul style="list-style-type: none"> <li>✓ carbon footprint</li> <li>✓ Deforestation</li> <li>✓ Greenhouse effect</li> <li>✓ Global warming</li> <li>✓ Ozone depletion</li> </ul> </li> </ul>			
<b>SUMMARY:</b>			
<ul style="list-style-type: none"> <li>Greenhouse effect- is the accumulation of certain gases (e.g. CO<sub>2</sub>, nitrous oxide, methane) that trap heat within the earth’s atmosphere.</li> <li>Global warming- is an increase in the average temperature of the earth.</li> <li>Carbon footprint- total amount of carbon dioxide released by an individual, a factory or country in tons per year.</li> <li>Deforestation- removal of trees in large numbers from an area.</li> </ul>			

TOPIC: Human Impact on the Environment			
<b>TERM</b>	4	<b>WEEK</b>	2
<b>DURATION</b>	4 hours	<b>WEIGHTING</b>	37 marks (25%)
<b>SUB-TOPICS</b>	Water availability and water quality		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Eutrophication, algal bloom, water pollution, thermal pollution, aquifers, acid mine drainage		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Organic and inorganic compounds</li> <li>Abiotic factors and ecosystems</li> </ul>			
<b>RESOURCES</b>			
Text books, charts, previous exam papers and Grade 11 Exam Guidelines			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Water quality and water availability</li> <li>Eutrophication and algal bloom</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 5:</b>			
<ul style="list-style-type: none"> <li>Describe how the following factors influence the availability of water: <ul style="list-style-type: none"> <li>✓ Construction of dams</li> <li>✓ Destruction of wetlands</li> <li>✓ Exotic plantations and depletion of water table</li> </ul> </li> </ul>			
<b>LESSON 6:</b>			
<ul style="list-style-type: none"> <li>Describe how the following factors influence the availability of water: <ul style="list-style-type: none"> <li>✓ Water wastage</li> <li>✓ Cost of water</li> <li>✓ Poor farming practices</li> <li>✓ Droughts and floods</li> <li>✓ Boreholes and their effects on aquifers</li> </ul> </li> </ul>			
<b>LESSON 7:</b>			
Describe how the following factors reduce water quality:			
<ul style="list-style-type: none"> <li>Eutrophication and algal bloom</li> <li>Domestic, industrial and agricultural use – leading to pollution and disease</li> <li>Mining</li> </ul>			
<b>LESSON 8:</b>			
<ul style="list-style-type: none"> <li>Describe how the following factors reduce water quality: <ul style="list-style-type: none"> <li>✓ Alien plants e.g. <i>Eichornia</i></li> <li>✓ Thermal pollution</li> </ul> </li> <li>Describe the role of water purification and recycling in improving the quality of water</li> </ul>			
<b>ACTIVITIES/ ASSESMENT</b>			
<ul style="list-style-type: none"> <li>Factors that influence water availability ( drought, construction of dams, destruction of wetlands, poor farming practices, drilling of boreholes, alien plants)</li> <li>Factors that reduce water quality ( excessive use of fertilisers, thermal pollution, chemicals from mines, untreated sewage)</li> </ul>			

## SUMMARY

- Alien plants:- plants that do not live naturally in a particular habitat/ area. Also called exotic plants.
- Eutrophication: an increase in the amounts nutrients such as phosphates and nitrates in a body of water leading to rapid growth of algae.
- Algal bloom: a rapid increase in algae as a result of Eutrophication.
- Aquifers: underground layer of water stored in permeable rock.
- Thermal pollution: an increase in the temperature of water in rivers and other sources due to release of very hot water from industries.
- Wetlands: areas that become waterlogged and water may collect on the surface of the soil.



<b>TOPIC: Human Impact on the Environment</b>			
<b>TERM</b>	4	<b>WEEK</b>	3
<b>DURATION</b>	4 Hours	<b>WEIGHTING</b>	37 marks (25%)
<b>SUB-TOPICS</b>	Food security		
<b>RELATED CONCEPTS/ TERMS/VOCABULARY</b>	Food security, food insecurity, monoculture and crop rotation		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Genetically engineered foods ( GMOs)</li> </ul>			
<b>RESOURCES</b>			
Textbooks, Charts, Past exam papers, JIT document grade 11(2020)			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Food security and food insecurity</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 9</b>			
<ul style="list-style-type: none"> <li>Define food security</li> <li>Describe how the following influence food security: <ul style="list-style-type: none"> <li>✓ Human exponential population growth</li> <li>✓ Droughts and floods ( climate change)</li> </ul> </li> </ul>			
<b>LESSON 10</b>			
<ul style="list-style-type: none"> <li>Describe how the following influence food security: <ul style="list-style-type: none"> <li>✓ Alien plants and reduction of agricultural land</li> <li>✓ The loss of wild varieties: impact on gene pools</li> <li>✓ Food wastage</li> </ul> </li> </ul>			
<b>LESSON 11</b>			
<ul style="list-style-type: none"> <li>Describe how the following influence food security: <ul style="list-style-type: none"> <li>✓ Poor farming practices such as :</li> <li>✓ Genetically engineered foods</li> <li>✓ Pest control Monoculture</li> </ul> </li> </ul>			
<b>LESSON 12</b>			
<ul style="list-style-type: none"> <li>Describe how the following influence food security: <ul style="list-style-type: none"> <li>✓ Overgrazing and the loss of topsoil</li> <li>✓ The use of fertilisers</li> <li>✓ The use of pesticides</li> </ul> </li> </ul>			
<b>ACTIVITIES/ASSESSMENT</b>			
<ul style="list-style-type: none"> <li>Describe factors that have an impact on food security (e.g. droughts and floods, poor farming practices, population growth, alien plants)</li> <li>Interpret data related to food security/ food insecurity</li> <li>Explain how floods impact on food security</li> </ul>			
<b>SUMMARY</b>			
<ul style="list-style-type: none"> <li>Food security- The availability of nutritious food, that is sufficient to all people at all times</li> <li>Food insecurity- when people do not have enough nutritious food for at least some part of the year</li> <li>Monoculture- growing of the same species of plant season after season in the same area.</li> <li>Crop rotation- growing different crops on the same piece land in different seasons, giving the soil time to recover</li> <li>Factors affecting the food security: droughts, floods, human population growth, poor farming practices</li> </ul>			



TOPIC: Human Impact on the Environment			
TERM	4	WEEK	4
DURATION	4 Hours	WEIGHTING	37 marks (25%)
SUB-TOPICS	<ul style="list-style-type: none"> <li>Loss of Biodiversity : the sixth extinction</li> <li>Solid Waste Disposal</li> </ul>		
RELATED CONCEPTS/ TERMS/VOCABULARY	Biodiversity, Poaching, Habitat destruction, Alien plant invasion, Exotic plants, Landfill site, Nuclear Waste, Pollution		
<b>PRIOR-KNOWLEDGE/ BACKGROUND KNOWLEDGE</b>			
<ul style="list-style-type: none"> <li>Biodiversity of Life on Earth</li> <li>Biodiversity and Endemism in Southern Africa</li> </ul>			
<b>RESOURCES</b>			
Textbooks, Past exam papers, charts			
<b>ERRORS/MISCONCEPTIONS/PROBLEM AREAS</b>			
<ul style="list-style-type: none"> <li>Alien species and alien invasive species</li> <li>Alien and endemic species</li> <li>Landfill site and dump sites</li> </ul>			
<b>METHODOLOGY</b>			
<b>LESSON 13</b>			
<ul style="list-style-type: none"> <li>State the importance of maintaining biodiversity</li> <li>Describe factors that reduce biodiversity such as:</li> <li>Habitat destruction through : <ul style="list-style-type: none"> <li>✓ Farming methods( Overgrazing and monoculture)</li> <li>✓ Golf estates</li> <li>✓ Mining</li> <li>✓ Urbanization</li> <li>✓ Deforestation</li> <li>✓ Loss of wetlands and grasslands</li> </ul> </li> </ul>			
<b>LESSON 14</b>			
<ul style="list-style-type: none"> <li>Habitat destruction through: <ul style="list-style-type: none"> <li>✓ Poaching (e.g. rhino horn, ivory, "bush meat")</li> <li>✓ Alien plant invasions using mechanical, chemical and biological methods</li> <li>✓ Describe the sustainable use of the environment using any ONE of the following examples: Devil's claw, rooibos, fynbos, the African potato (<i>Hypoxis</i>) and Hoodia.</li> </ul> </li> </ul>			
<b>LESSON 15</b>			
<ul style="list-style-type: none"> <li>Define solid waste</li> <li>Describe the need to reduce solid waste or ways of managing it.</li> <li>Describe the following aspects of solid waste disposal: <ul style="list-style-type: none"> <li>✓ The dangers associated with open dumpsites</li> <li>✓ Ways in which dumpsites can be managed for rehabilitation and prevention of soil and water pollution.</li> <li>✓ The use of methane from dumpsites for domestic use such as heating and lighting.</li> <li>✓ The need for recycling waste.</li> <li>✓ The need for safe disposal of nuclear waste.</li> </ul> </li> </ul>			
<b>LESSON 16</b>			
<ul style="list-style-type: none"> <li>Analyse the solid waste degenerated in the household in one week including paper, metals and plastic. <ul style="list-style-type: none"> <li>✓ Estimate the percentage that could be recycled or reused.</li> </ul> </li> <li>Visit a municipal landfill site or a local refuse dump to observe rehabilitation or lack thereof in practice and assess the effectiveness of waste management.</li> </ul>			

### ACTIVITIES/ ASSESSMENT

- Describe ways of managing the disposal of solid waste
- Draw/interpret information on all aspects of "Human Impact" in the form of tables and different types of graphs
- Practical observation of ONE example of human influence on the environment in local area: (write a report)
- Conduct a solid waste analysis
- Interpret articles e.g. rhino poaching

### SUMMARY

- Alien invasive species- organisms that do not occur naturally in a country out-competing the natural species of the country
- Poaching- illegal killing/ capture/ removal of animals/ plants
- Purpose of rehabilitation of the land: remove the danger of water and soil pollution, land can be used for sports fields and parks
- Ways of reducing the volume of waste: reuse, recycle and reduce

