GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	1	TOPIC	Subject orientation	Lesson	1

		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 22 (CAPS) How science works:

- **Fundamental knowledge based on scientific evidence and verifying findings (articles are published in journals or at conferences: peer review)**
- **Observing**
- **Investigating**
- **Understanding the limitations of scientific evidence**
- **Identifying patterns and relationships in data**
- **Communicating findings**
- **Societal aspects of scientific evidence**

The learners must be able to:

- **Observe a teacher demonstration**
- **Design an investigation based on the demonstration**
- **Identify the steps that occur in the scientific process**
- **Select and identify the different variables**
- **Formulate hypotheses based on observations**
- **Construct a scientific report**
- **Access scientific journals/articles**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
1. Introduction • Mark and recap previous day's work. • Establish links with GET Natural Science. Discuss the scope of Life Sciences in regard to the study of the natural world and all its interactions. • Describe the levels of organisation that occurs from molecules to Biomes • Explain that: The organisation of living things. "Atoms of elements make molecules of compounds".	1. Copy the "Organisation of living things" into their notebooks.	15 min	"The Elephant Poem" on the powers of observation. 2 Soluble Aspirin (or other) tablets. 1 glass of hot water. 1 glass of iced water. Macmillan "Life Sciences for all" p. 16 (2007). Pulse "Understanding Life Sciences" P. 13 (2008).

Molecules→ Organelles→ Cells → Tissues→ Organs → Systems→ Organisms →Populations → Communities → Ecosystems → Biomes/Biospheres **2. Main Body (Lesson presentation)** Explain to learners that all scientific discoveries are based on observation. Then ask them to carefully observe a demonstration: - Place the two glasses of water in clear view of all the learners. - At exactly the same time, drop an aspirin tablet into each glass. - Ask learners to observe. On the chalkboard/OHP, present the flow diagram of the scientific method. Discuss their observations and assist them in postulating a hypothesis and identifying the variables (with reference to the demonstration). When explaining the concept of a **hypothesis**, the "if" and "then" method may be used e.g. IF the temperature of the water is increased, THEN the aspirin will dissolve faster OR the higher the temperature, the faster the aspirin will dissolve. (To clarify the meanings of the variables, suggest that the **independent** variable is also called the **manipulated** variable and that the **dependent variable** is also referred to as the **responding** variable. Also make reference to **fixed/controlled** variables. Clarify the difference between a controlled variable and a **control** in an experiment. Also clarify the difference between a result (based on what we see, hear, smell, touch and taste) and a conclusion. Discuss the communication of findings and the best way to present them. Provide the format of a scientific report as a handout.	2. Observe the demonstration and discuss it with the educator. Explore concepts that would lead them towards an understanding of the scientific method. 3. Copy the flow diagram from the board into their notebooks. 4. Provide at least three further examples of hypotheses based on everyday observations. For each of these, they must record all of the different variable types. 5. Brainstorm the best possible ways to present the data collected from the demonstration. 6. Cut and paste handout into notebook.	5 min 10 min 5 min 10 min	Kagiso "Senior Secondary Life Sciences" p. 9 (2008). • OBE for FET Life Sciences (2008) p. 8. Focus on Life Sciences Maskew Miller (2008) p. X. OBE for FET Life Sciences (2008) p. 10. Kagiso "Senior Secondary Life Sciences" p. 22 (2008). SBA guideline Kagiso "Senior Secondary Life Sciences" p. 10 (2008). SBA guideline document for format of assessment and assessment tools. Website: www.biologycorner.com. For creative ideas on identification of variables and controls. Copies of scientific journals e.g. obtained from the internet or library.

Compile a match the column activity that has the terms: Aim, results, conclusion, independent variable etc. in the one column and the relevant definitions in the second column. ASSESSMENT OPPORTUNITIES: Provide learners with a list of observations. E.g. Apples soaked in lemon juice do not turn brown. Enrichment: learners are given copies of scientific articles/journals to peruse to identify the stages of the scientific process.	7. Homework: Learners to complete the match the column activity Learners must formulate a hypothesis based on one of the observations from the list. They must follow the scientific method and compile a scientific report.		

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE		SUBJECT	Life Sciences	WEEK	1	TOPIC	Subject orientation	Lesson	2

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 22 (CAPS) Scientific skills: COMMUNICATING FINDINGS

- **Biological principles such as relationship between surface area and volume. Relationship between structure and function**
- **Biological drawings and the importance of scaling**
- **Translating 3D objects to 2D drawings**
- **Transverse and longitudinal sections**
- **Introduction to range of skills outlined in specific aims**
- **Collecting and presenting data in the form of drawings ,written descriptions, tables and graphs**
- **Introduction to graphs .Different types of graphs and when to use them, interpreting graphs**
- **Calculating**

The learners must be able to:

- **Observe a teacher demonstration and predict an outcome**
- **Do a calculation based on surface area and volume**
- **Describe the nature of the relationship between structure and function: understand the concept of structural suitability**
- **Translate a 3D object into a 2D diagram**
- **Complete activities that include the following**
  - **a) Drawings**
  - **b) Tables**
  - **c) Graphs (Line graphs , Bar graphs , Histograms and Pie charts)**
  - **d) Essays (descriptions)**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Demonstration Brainstorming Learner activities Explanation **1. Introduction** • Mark and recap previous day's work. • Quiz learners informally on the steps in the scientific process (Baseline assessment).	1. Answer questions on the scientific process.	5 min	

• Describe the context of the lesson, by explaining that this is a continuation of "communication of findings" in a scientific investigation. • Remind learners of the demonstration conducted in Lesson 1. **2. Main Body (Lesson presentation)** **Surface area to volume ratio** • Place two glasses in clear view of the learners. Explain that in the first glass, the tablet will remain whole, whereas in the second glass, it will be broken in half. Now place the full tablet in glass A and the second tablet in glass B. Ask learners to predict the outcome before adding equal volumes of water to each glass. • Brainstorm the possible causes of the broken tablet dissolving faster than the whole tablet. Ask learners to indicate which tablets have a greater surface area (they will correctly answer- the broken tablet). • Enquire as to which tablet has the greater volume (they should answer that they both have the same volume. Point out that the smaller tablet pieces have a greater surface area to volume ratio. Indicate that this ratio is key to many physiological processes like thermoregulation. • *The bigger the organism, the smaller its surface area to volume ratio.* • *The larger the organism, the greater the surface area to volume ratio.* **Drawings** Place actual objects (blackboard duster, apple, banana, cool drink can etc.) in clear view of the learners. Ask them to draw a transverse/cross section of the objects and a longitudinal section of the objects. Explain: *A transverse or cross section is made along the width of the object.* *A longitudinal section is a cut along the length of the object.* (diagrams of objects can also be used) Select any diagram from the learner's text books and ask them to draw it into their books as homework. They must follow all the rules as prescribed in the SBA guidelines whenever drawings are made.	2. Learners to write down their predictions. 3. Verbal answering of questions. 4. Calculate the actual surface area to volume ratios of cubes (of agar) as a whole block (4cm x 4cm x 4cm) and after cutting. (2cm x 2cm x 2 cm) Learners to draw the cubes into their books. First the larger cube is drawn, then a line of dissection is drawn horizontally and vertically to divide the block into four smaller, equal cubes. 5. Draw both transverse and longitudinal sections into the notebooks, labelling them as "*transverse section through a banana*" for e.g. 6. Homework: draw, label and caption a structure from the textbook into the notebook.	10 min 10 min 10 min	2 Soluble Aspirin (or other) tablets. Identical glasses of tepid water. (equal volume). *www.teachers.net* *www.practicalbiology.org* *(for SBA practical based on surface area to volume ratio)* Random selection of objects to be drawn OR diagrams of objects. Kagiso "Senior Secondary Life Sciences" p. 20 (2008) Macmillan "Life Sciences for all" p. 12(2007) SBA guideline gr. 10

Structure and function Structural suitability (relationship between a structure and its function) is best described as it is encountered in the scope of work e.g. structural suitability of xylem; leaf for photosynthesis etc.) **Data tables** – Give learners groups of data and ask them to construct a table of the information. The table should have: *A Title /Caption* *Table format* *Row and /or column headings* *Correct entry of data* *(write the above criteria on the board)* *The first column generally contains the independent variable.* *Units appear in Row and Column headings, not in the body of the table.* As tables are encountered in other sections, learners must tabulate them into the notebooks, following all the rules of drawing. **Graphs** Explain the types of data that would best be presented in each of the different graph types. *<u>Bar graphs and pie charts</u> – One set of values is not continuous. E.g. glass, metal, paper, and is not always a series of numbers. There are spaces between the bars.* *<u>Line graphs</u> – Both sets of values are continuous (and are usually numbers).* *<u>Histograms</u>- No spaces occur between the bars, because the X-axis is continuous (usually indicating a range)* Present learners with an assignment that contains at least one example of each graph type. These may be sourced from past matric papers, (see attachment below) and can be utilised for SBA tasks.	7. Learners construct a table into their books, these are peer assessed.	10 min	*Gauteng Prep Exam P1 2009. Q 2.3.3.* *Gauteng Prep Exam P2 2009 Q1.5.5.* *Refer to SBA guideline for assessment tools on data tables, drawings and graphs.* *Memoranda of National Examinations.* *(See attached list below)* *Past matric (NSC) question papers and memoranda, obtainable from:* *www.gpg.gov.za* *Only Preparatory examinations of Gauteng have been listed.*

	Learners to complete an assignment with at least one of each type of graph represented (Criteria for assessment will be included) Peer assessment – so learners can see what markers are looking for		

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

SOURCES OF THE DIFFERENT TYPES OF GRAPHS FROM PAST MATRIC (NSC) PAPERS

TYPE OF GRAPH	SOURCE	PAPER	QUESTION
2X Bar graphs on one system of axes	Feb/Mar 2011	1	4.2.2.
	Feb/Mar 2010	1	4.2.1.
	Nov 2010	1	4.2.3.
	Feb/Mar 2009	1	4.1.2.
2X Line graphs on one system of axes	Feb/Mar 2011	2	4.1.1.
	Prep 2009	1	4.2.1.
	Nov 2009	2	4.1.4.
Pie Charts/graphs	Prep 2010 (with calculations)	2	3.2.5.
	Feb/Mar 2009	2	3.2.
	Prep 2009	2	2.1.1.
	Nov 2009	1	4.1.2.

GRADE	10	SBJECT	LIFE SCIENCES	WEEK	1	TOPIC	Subject orientation	Lesson	3

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 22 (CAPS) Organisation of learning and rules:

- **Using equipment and other resources**
- **Laboratories, classrooms, procedures, apparatus, chemicals, safety**
- **Working in groups**
- **Assessment requirements**
- **Very brief mention of careers and subject combinations for entrance to higher education**

The learners must be able to:

- **Identify selected (common) pieces of laboratory equipment**
- **Associate each piece of equipment with its most obvious use**
- **Handle the apparatus and conduct a group presentation**
- **Work effectively in groups with guided delegation and role appointment**
- **Establish an agreed-upon set of laboratory/classroom rules when equipment is being handled**
- **Understand the programme of assessment for Life Sciences**
- **Research possible careers that can be followed in Life Sciences**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Drawing Problem solving Group activity (delegation of duties) Brainstorming **1. Introduction** • Mark and recap previous day's work. • Explain to learners that working in the laboratory or with laboratory equipment is a special privilege that carries a great responsibility. **2. Main Body (Lesson presentation)** Identify certain key pieces of equipment that will be used in the course of the Life Sciences programme. These may include: *Beakers (all sizes)* *Measuring cylinders*		5min	Macmillan "Life Sciences for all" p. 2 (2007). Laboratory equipment as listed.

Test tubes *Test tube holders* *Petri Dishes* *Droppers* *Bunsen burners* *Funnels* *Tripod stands* *Pestle and Mortar* *Thermometers* *Hand lenses* Bring out all the apparatus and display them on the educator's table. Name each piece of apparatus for the learners as a group (Learners to informally record these). Ask the learners to form groups. Depending on the number of groups, distribute selected pieces to each group. The group must discuss amongst themselves: *1) The name of the apparatus* *2) Use of the apparatus* 3) *Care and special precaution with the apparatus* Select a spokesperson who will present to the class. Once the group has completed the presentation, the rest of the class may provide feedback where necessary. At the end of each presentation, correct any misrepresentations that may have occurred. Allow learners to draw and label the apparatus into their notebooks. Opportunity for informal assessment: Compile a worksheet with three columns. Column A showing the diagram of the apparatus, column B giving its name and column C its most obvious use. The names and functions will be in an incorrect order. Learners can then match column A to B to C. Discuss with learners that during the course of the group work, they had incidentally selected certain role-players. Explain that this is an integral part of group work, not only in the classroom but also in the workplace. Roles may include: • Spokesperson • Scribe • Discipline monitor • Timekeeper etc.	1. Observation of apparatus and recording of the names. 2. Learners (in groups) to brainstorm, record and present the required information. 3. Informal selection of role-players in a group. 4. The rest of the class to follow presentation and provide feedback where required. 5. Draw and label apparatus into notebook. 6. Homework: Learners to complete match the column activity.	15min	

Also point out that although it is best to appoint a person to what he is best suited, it is also important to afford all members of the group to develop by giving each an opportunity to play a different role. Show learners the storage area for the apparatus and make each group responsible for returning the apparatus to its correct place.	7. Learners to pack away the apparatus.	10min	
Discuss with learners the need for the establishment and enforcement of laboratory/classroom rules. Brainstorm possible rules with learners. Guide the brainstorm session, by suggesting that it encompasses: *-Physical safety of learners and educators* *-Fair treatment of all learners* *-Sustainable use of materials* *-Protection and care of the classroom environment* Select from the brainstorm, rules that will be used. Learners to transcribe these. Select a scribe, who will make a poster of the rules for the class.	8. Brainstorm safety rules. 9. Transcribe safety rules into notebooks.	10min	Macmillan "Life Sciences for all" p. 4 (2007). Poster paper.
Conclude the lesson by discussing the integral role played by practical work in the assessment syllabus. Provide learners with a copy of the programme of assessment for the year and discuss its details.	10. Paste /File the programme of assessment.		Format of programme of assessment from SBA guideline document.
Enrichment: Career opportunities in Life Sciences.		5min	Catalogues, Prospectus of universities, presentations by professionals. Pulse "Understanding Life Sciences" P. 14 (2008).

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	2	TOPIC	MOLECULES FOR LIFE	Lesson	1

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 23 (CAPS) MOLECULES FOR LIFE: Organic and inorganic compounds

- **Distinguish between organic and inorganic molecules**
- **<u>Organic molecules</u> are made up of C,H,O and N and P in some cases**
- **Cells are made up of proteins, carbohydrates, lipids, nucleic acids and vitamins**
- **<u>Inorganic compounds:</u>**
  Water : 2H and 1O
  Minerals : e.g. Na, K, Ca, P, F , I and nitrates and phosphates

The learners must be able to:

- **Recall basic knowledge of the molecules of life from GET (revise food groups)**
- **Understand the context of the study of biological compounds in the scope of the Life Sciences syllabus**
- **Distinguish between organic and inorganic compounds**
- **Know the different types of organic compounds**
- **Identify organic and inorganic compounds from food product labels**
- **Communicate findings in the form of a data table and graph**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Discussion Brainstorming (onto chalkboard/OHP) Facilitation of group work Facilitation of peer assessment **1. Introduction** • Mark and recap previous day's work. • Establish links with GET Natural Science. Ask learners to recall the different food groups studied in grade 9. • Recall the "organisation of living things" with learners. (Week 1 lesson 1) and contextualise the need to study basic chemical compounds in Life Sciences. Conduct a baseline assessment by asking learners: "What is the difference between an atom and a molecule?" "What is the difference between an element and a compound?" Discuss and elaborate on the answers to these, by explaining that "Atoms of elements make molecules of compounds" or that **1 Atom** of the **element** Oxygen combines with **2 atoms** of the element hydrogen to produce **1 molecule** of the **compound** water. Ask learners to give more examples. **2. Main Body (Lesson presentation)** Explain when certain elements (of the periodic table) combine in unique ways, they produce what we refer to as ORGANIC COMPOUNDS. These organic compounds form the basis of all cells and hence, of all life forms. The unique way in which they combine is that the CARBON and HYDROGEN form long chains. OXYGEN, NITROGEN and PHOSPHORUS may also be present. In contrast to this, INORGANIC COMPOUNDS may be made up of a combination of any other elements of the periodic table and do not contain carbon and hydrogen in long chains. Consolidate the explanation by asking learners to draw a mind map of organic and inorganic molecules into their notebooks, giving examples of each.	1. Answer questions on food groups studied in grade 9. 2. Provide more examples of atoms, elements, molecules and compounds. 3. Tabulate the differences between organic and inorganic compounds (with examples).	5 min 5 min	Criteria for mind map, SBA guideline. OBE for FET Life Sciences Teacher's Guide

Obtain feedback from the learners regarding the examples they used for their tabulation activity. Use these to construct a flow chart on the board/OHP. **BIOLOGICAL COMPOUNDS** ORGANIC • Carbohydrates • Lipids • Proteins • Nucleic acids • Vitamins INORGANIC * Water * Carbon dioxide * Minerals (calcium, iron etc)	4. Copy the flow chart into the notebooks.	5 min	(2008) p. 145. VIVA Life Sciences Viva Teacher's guide (2008) p. 22.
Learners divide into their respective groups. Each group must analyse the label of a food product. In the analysis, they must establish which are organic and which are inorganic compounds. (Screen the labels beforehand or provide copies of suitable labels, to ensure that it contains the necessary compounds).	5. Access data in groups.	5 min	Food product label (brought in by learners or copies of an ideal one made by the educator. OBE for FET Life Sciences Teacher's Guide Nasou (2008) p. 140. VIVA Life Sciences Teacher's guide (2008) p. 21.
Ask learners to construct a table, showing the respective amounts (in grams) of: Proteins Carbohydrates Fats(Lipids) Water (Note: Fibre is classified as a carbohydrate because it is a derivative of plant cellulose)	6. Tabulate data.	5 min	OBE for FET Life Sciences Nasou Teacher's Guide (2008) p. 139. VIVA Life Sciences Teacher's guide (2008) p. 21.
They must now convert the data in the table into a suitable graph type. (Note: This type of data is best represented as a bar graph or pie chart). Provide the criteria for assessment of the data table and relevant graph.	7. Convert the data to a suitable graph type. 8. The data table and graphs is peer assessed.	15 min 5 min	

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	2	TOPIC	Molecules for life	Lesson	2

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 23 (CAPS) Inorganic compounds:
Minerals: e.g. Na, K, Ca, P, F , I and nitrates and phosphates
Macro-and Micro-elements and deficiency diseases
Need for fertilisers and potential problems (pollution, eutrophication)

The learners must be able to:

- **Understand why minerals may be classified as micro-elements or as macro-elements**
- **Establish the conditions that arise in both plants and animals due to the deficiency of these elements**
- **Establish the role of fertilisers in providing minerals (inorganic molecules) for plants**
- **Identify the negative effect that chemical fertilisers may have on the environment**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Group work Brainstorming **1. Introduction** • Mark and recap previous day's work. • Remind learners of the periodic table and its contents from grade 9. • Explain that minerals are actually just elements of the periodic table, except that some of them occur with other elements and then are referred to as salts. • Reinforce that these elements are in fact inorganic. **2. Main Body (Lesson presentation)** Explain that the minerals may be divided as follows: Draw the following planogram onto the chalkboard/OHP. **MINERALS (INORGANIC NUTRIENTS)** MACRONUTRIENTS — Required by organisms in large quantities MICRONUTRIENTS — Required by organisms in small quantities. Also called trace elements	1. Answer questions based on the periodic table. 2. Copy the planogram into their notebooks. 3. Cut and paste hand-out into notebook.	5 min 5 min	Understanding Life Sciences. Pulse Education (2008) p.152. OBE for FET Life Sciences (2008) Nasou p. 175. Kagiso "Senior Secondary Life Sciences" p. 129 (2008). VIVA Life Sciences Viva (2008) p. 140.

Present learners with a handout showing a table of the macro-and micro-elements, their functions and the conditions that arise due to their deficiency. Discuss all the elements by making reference to the table, quoting examples and providing pictures where available (Specifics of which are micro-elements and which are macro-elements in plants and animals are not required). Divide learners into groups and present each group with a copy of a label from a fertiliser pack. Ask learners, in their groups, to isolate the possible minerals that occur in the given fertiliser. In a table format, learners are to explain what contribution each element makes to the overall growth of the plant. Discuss the need for the use of fertilisers that arises from poor farming methods, which lead to overutilization of the soil. Describe the negative effect of fertilisers on ecosystems when they wash into rivers and cause eutrophication (decrease in oxygen levels). The following flow diagram may be given to learners as a summary of the process. (See below)	4. Contribute to educator explanation, by posing questions and suggestions 5. Study the fertiliser label and identify the elements required by plants for different aspects of plant growth. Note these into their books in table form. 6. Copy the flow diagram into notebooks.	15min 15 min 5 min	Labels of plant fertiliser packs. VIVA Life Sciences (2008) p. 142. Kagiso "Senior Secondary Life Sciences" p. 131 (2008). Understanding Life Sciences. Pulse Education (2008) p. 151.

LOW CHART SHOWING CAUSE OF EUTROPHICATION Nitrates & Phosphates wash into rivers ⇩ Cause algal growth (bloom) on the surface ⇩ Blocks out the sunlight ⇩ Plants deeper down cannot photosynthesise ⇩ Decreased levels of Oxygen in deeper water ⇩ Fish die – due to lack of Oxygen ⇩ Causes further decrease in Oxygen levels due to decomposition ⇩ Eutrophication (decreased Oxygen) of the river has occurred			

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	2	TOPIC	Molecules for life: Organic compounds	Lesson	3

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 24 (CAPS): Carbohydrates

Carbohydrates

- **Monosaccharides (single sugars) e.g. glucose and fructose**
- **Disaccharides (doubles sugars) e.g. sucrose and maltose**
- **Polysaccharides (many sugars) e.g. starch, cellulose, glycogen**
-

The learners must be able to:

- **Appreciate that a carbohydrate is a polymer made up of monomers**
- **Understand that the monomer of all carbohydrates is the monosaccharide**
- **Have a brief understanding of the molecular structure of a monosaccharide**
- **Identify which monosaccharides combine to produce which disaccharides**
- **Give the basic characteristics of carbohydrates**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Brainstorming, resulting in planogram construction **1. Introduction** • Mark and recap previous day's work. • Remind learners of a prior activity where they encountered the word "carbohydrates" on a food product label. Play a word association game with learners. Ask them when the word "carbohydrate" is mentioned, what word comes to mind. Most of the learners will give the names of starchy food types like pasta, potatoes, rice and bread.	1. Partake in a word association game.	10 min	

2. Main Body (Lesson presentation)

Point out that the word "carbohydrate" actually refers to the fact that it is derived from "carbon"and "hydra" for hydrogen (carbohydrates contain the elements carbon and hydrogen in addition to oxygen).

Assure learners that although they are correct in their original perception of carbohydrates, they would be surprised to find that carbohydrates also occur in milk, sweets and even carrots!

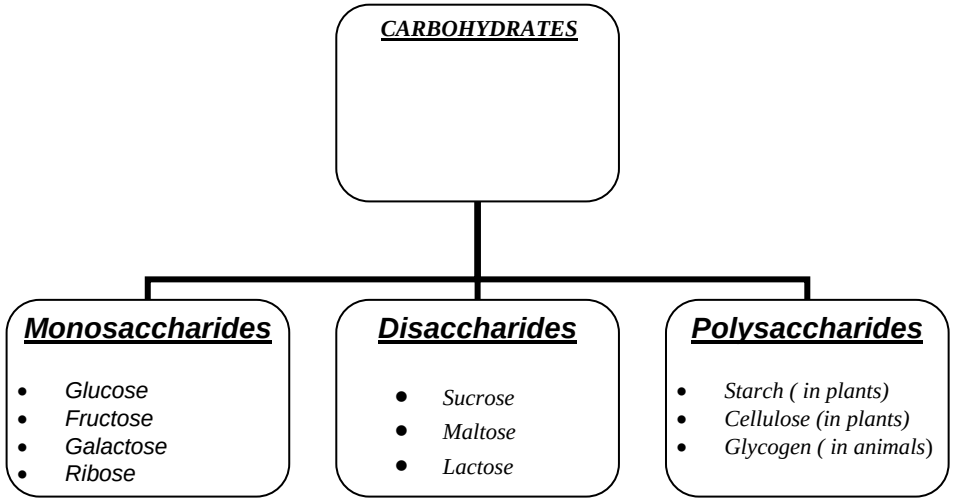
Explain carbohydrates include all starches, sugars, fibre, and some storage forms of carbohydrates.
Brainstorm "types of carbohydrates" and produce a planogram on the chalkboard/OHP as learners present their ideas.

2. Contribute ideas to the brainstorm, giving different examples of carbohydrates.

20 min

3. Copy the planogram into their notebooks.

TYPES OF CARBOHYDRATES



(Note: although knowledge of ribose as a sugar is not required here, it is best to mention it, as it will be encountered in the grade 12 syllabus)

In order to reinforce the idea of monomers combining to produce polymers and that two monosaccharides produce one disaccharide, write the following on the chalkboard/OHP :

Glucose + Glucose → Maltose
Glucose + Fructose → Sucrose
Glucose + Galactose → Lactose

Long chains of glucose produce starch which is the storage form of glucose in plants whereas, glycogen is the storage form of glucose in animals.

VIVA Life Sciences (2008) p. 144.

Kagiso "Senior Secondary Life Sciences" p. 117 (2008).

(This will be recalled in the section Digestion) Since glucose is the essential monomer of all carbohydrates, learners can be introduced to the structure of a molecule of glucose. There is no need to know the actual structure, but at least recognise: a) It's ring structure b) The carbon hydrogen backbone c) The presence of oxygen d) A disaccharide has **two** ring-like structures. Provide learners with a copy of the molecular structure of glucose (and possibly of a disaccharide showing two rings). <u>Optional activity</u> [To reinforce the structural formula of glucose, learners can build a model using toothpicks (depicting the bonds) and Jelly tots for the atoms. Use a different colour for each element. E.g. all carbon will be green, hydrogens pink and oxygen, orange]. Enrichment Homework: Many sugars have "everyday" colloquial names, find the names given to: a) Glucose b) Lactose c) Maltose d) Sucrose e) Fructose {Answers: a) Grape sugar b) Milk Sugar c) Malt Sugar d) Cane sugar e) Fruit sugar	4. Copy the molecular structure into their books. 5. Homework: Find the common names for the carbohydrates given.	15 min	Understanding Life Sciences. Pulse Education (2008) p. 132. OBE for FET Life Sciences (2008) Nasou p. 164. Focus on Life Sciences Maskew-Miller (2008) p. 96. Life Sciences for all. Macmillan (2008) p. 182.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	2	TOPIC	Molecules for life: Organic compounds	Lesson	4

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 24 (CAPS) Carbohydrates: Practical
Testing for the presence of starch in a food substance. Demonstration, followed by hands on practical

The learners must be able to:

- **Follow instructions**
- **Work in groups and allocate responsibilities to each member**
- **Work systematically and orderly**
- **Adhere to time frames**
- **Record results and communicate findings**
- **Follow safety regulations**
- **Write up a scientific/experimental report**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Pre lesson planning: Learners are asked, prior to the lesson, to bring in at least three samples of food types that they suspect may contain starches. Demonstration: Group work (Practical). Teacher observation (for teamwork). **1. Introduction**			Understanding Life Sciences. Pulse Education (2008) p.139. Kagiso "Senior Secondary Life Sciences" p. 118 (2008).
• Mark and recap previous day's work. • Conduct a baseline assessment. • Ask learners: a) What type of carbohydrate is a starch? (Answer: polysaccharide) b) Describe the role of starches in plants. (Answer: storage of glucose) c) Give the storage form of glucose in animals (Answer: glycogen)	1. Answer questions posed.	5 min	VIVA Life Sciences (2008) p. 147. Life Sciences for all. Macmillan (2008) pp. 189-190.

d) What other polysaccharide may be found in plants? (Answer: cellulose) e) What role do starches play in nutrition? (Grade 9 (Answer: provide energy) **2. Main Body (Lesson presentation)** Contextualise the practical, explaining the role of food tests in the food industry. (These tests serve to confirm what manufacturer's claim may be present in their products) Introduce learners to the apparatus, writing the names down on the board as you do so. (This practical is based on observation by the learners, and no written hand out of the procedure is given to the learners. It is therefore imperative that before you begin the demonstration all learners have a clear view and are ready to observe). Have a pen and paper ready to record your own results (learners will mimic this practice). 1. Place three (open) Petri dishes side by side. 2. Place one of each sample in each dish. 3. Take up the dropper containing Iodine solution. (As you do so, explain that this solution is poisonous and also a very strong staining agent.) Ask learners to observe the colour of Iodine as an amber/Orange coloured liquid. 4. Explain that, in the presence of starch, iodine turns blue-black in colour. This is called a positive result. (Note: Select at least one sample that would give a negative test result e.g. chalk dust) 5. Place a few drops of the Iodine onto sample 1. Pause and observe the result. Record what you see. 6. Repeat for samples 2 and 3. 7. Complete your practical by clearing up and washing up the apparatus. 8. Make a clear point of washing your hands. Divide learners into groups and ask each group to conduct the practical as demonstrated to them. Learners are expected to submit an experimental report by the next morning. . (Provide Criteria for assessment to learners). **Opportunity for SBA:** This constitutes a hands on practical. Learners will be assessed on: a) Teamwork b) Guided practical investigation c) Written Experimental report	2. Name apparatus. 3. Observe the teacher demonstration and make notes where necessary. 4. Check the colour of Iodine. 5. Ask questions if not clear. 6. Work in groups to complete the practical. 7. Note the results. 8. Clear up and replace all apparatus. 9. Homework: Complete a written scientific report on the practical.	5 min 10mins 25 min	3 Petri dishes (or saucers). Medicine Dropper. Iodine solution . 3 sample food types. Pen and paper. FOR RUBRICS: VIVA Life Sciences Teacher's guide (2008). OBE for FET Life Sciences (2008) Nasou Teacher's guide. Life Sciences for all. Macmillan (2008) Teacher's guide.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	2	TOPIC	Molecules for life: Organic compounds	Lesson	5

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 24 (CAPS) Carbohydrates: Practical Testing for the presence of glucose (or other reducing sugar) in a food substance

The learners must be able to:

- **Follow instructions**
- **Work in groups**
- **Work systematically and orderly**
- **Adhere to time**
- **Observe precautions and follow safety regulations**
- **Record results and communicate findings (in tabular format)**
- **Assess the work of peers**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Pre lesson planning: Learners are asked, prior to the lesson, to bring in at least two samples of food types of which they are unsure of the glucose content. Demonstration Group work (Practical) Teacher observation (for teamwork) **1. Introduction** • Mark and recap previous day's work. • Remind learners of the starch test. Ask which other carbohydrate can be tested for in foods (The answer being sugars).	1. Answer questions posed.		Understanding Life Sciences. Pulse Education (2008) pp. 139-140. Kagiso "Senior Secondary Life Sciences" pp. 118-119 (2008). VIVA Life Sciences (2008) p. 147. Life Sciences for all. Macmillan (2008) p. 189-190.

2. Main Body (Lesson presentation)

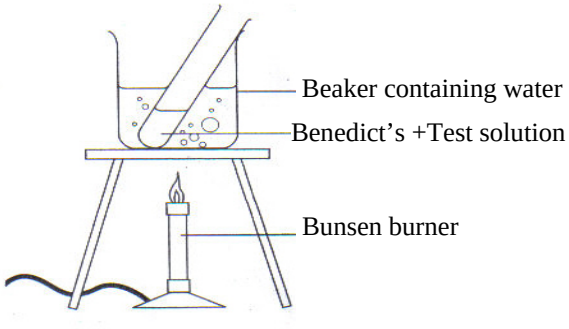
Provide a hand out to each learner/refer to relevant textbook page, outlining the format of the practical.
Explain to learners the format of this practical, by reading through the hand out/textbook and provide explanations.
Proceed to demonstrate the practical.

Have a pen and paper ready to record your own results (learners will mimic this practice).

Note:

- This test can be conducted using Benedict's solution OR equal quantities of Fehling's A and Fehling's B.
- The test will be conducted on pure glucose powder first (to observe a positive result) and then on the two test samples.

1. Set up 3 test tubes into a test tube rack.
2. Dissolve 5ml of glucose powder into 15ml of water into test tube 1.
3. Using a dropper add a few drops of Benedict's solution till it becomes deep blue in colour.
4. Heat the test tube in a boiling water bath (as shown in the diagram).



5. Observe for a colour change.
6. Record your observation.
7. Place a small measure of each of the test samples into separate test tubes 2 and 3. (Note: if it is a solid, it should be ground, crushed or grated). This step can only be done by learners and not form part of the demonstration.
8. Repeat the procedure (steps 3-6) for test tubes 2 and 3.
9. Complete your practical by clearing up and washing up the apparatus.
10. Make a clear point of washing your hands.

2. Refer to relevant text.

3. Name apparatus.

4. Observe the teacher demonstration and make notes where necessary.

5. Follow the demonstration.

6. Ask questions if not clear.

5 min

15 min

Focus on Life Sciences. Maskew Miller (2008) p. 97.

3 Test tubes (heat resistant)
Test tube rack
Boiling water
Beaker/water bath
Bunsen burner
Tripod stand
Asbestos gauze plate(for burner)
Medicine Dropper
Benedict's solution/ Fehling's A and Fehling's B
Glucose Powder
(water for dissolving)
2 sample food types
Pen and paper

FOR RUBRICS :

Note: Colour change to orangey-red (brick red) implies high levels of reducing sugar present in sample. Colour change to greenish yellow implies lower levels of reducing sugar. No colour change means there is no reducing sugar present. Divide learners into groups and ask each group to conduct the practical as demonstrated to them. The completed table of results will be assessed by peers. Provide Criteria for assessment to learners which should include: - A heading or caption - A column for colour change observed - A column indication the presence or absence of glucose/reducing sugar - Rows showing the different samples tested - Correct format of the table. (this is an informal assessment) Opportunity for SBA: This could also constitute a hands on practical. Learners will be assessed on: a) Teamwork b) Guided practical investigation c) Format of the table of results	7. Work in groups to complete the practical. 8. Note the results. 9. Clear up and replace all apparatus. 10. Proceed to complete the table of results 11. Peer assessment	25 min	VIVA Life Sciences Teacher's guide (2008). OBE for FET Life Sciences (2008) Nasou Teacher's guide. Life Sciences for all. Macmillan (2008) Teacher's guide.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	3	TOPIC	Molecules for life: Organic compounds	Lesson	1

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 23 (CAPS): Lipids (fats &oils)

- **Types of lipids**
- **Structure of lipids (Monomers)**
- **Unsaturated and saturated fats**
- **Cholesterol & Heart disease**
- **Properties of lipids**

The learners must be able to:

- **Appreciate that a lipid can be a fat or an oil**
- **Understand that the monomer of all lipids are 3 fatty acids and 1 glycerol**
- **Know what saturated and unsaturated lipids are and provide examples of these**
- **Realise the link between high cholesterol levels and a diet high in saturated fats**
- **Understand how high cholesterol levels may be a cause of heart attacks**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Transcribing of notes/diagrams Brainstorming, resulting in planogram construction			
1. Introduction • Mark and recap previous day's work. • Ask learners what type of food group each of the following belong to: • Sunflower oil • Butter	1. Answer questions.	5 min	

- Margarine
- The fat on a piece of chop

As learners answer the questions fat or oil, explain that both fats and oils belong the food group/biological molecules referred to as lipids.

2. Main Body (Lesson presentation)

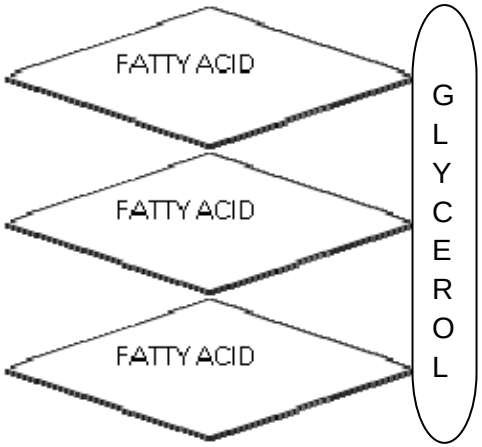
Explain to learners that although all of the examples mentioned in the introduction are lipids, what classifies them as fats or oils is their phase of matter at room temperature.

-All oils are liquid at room temperature.
-All fats are solids at room temperature.

Remind learners of the concept monomers and polymers. Ask learners to recall what the monomers of carbohydrates were. Explain that unlike other polymers, lipids are made up of TWO different monomers. These being **Fatty acids** and **glycerol** (make reference to this in the text book).
Also, like carbohydrates, lipids are made up of **carbon**, **hydrogen** and **oxygen.**

Show that ONE lipid molecule is made up of THREE fatty acid molecules and ONE glycerol molecule, with each fatty acid forming a bond with the glycerol molecule.
Draw the following diagrammatic representation on the chalkboard/OHP

3 Fatty acids + 1 Glycerol → 1 Lipid + 3 water
molecules molecule molecule molecules



2. Write the note into notebooks.

3. Follow explanation by making notes where necessary.

4.Copy the diagrammatic representation into notebooks.

10 min

10 min

Understanding Life Sciences. Pulse Education (2008) p.135.

VIVA Life Sciences (2008) p. 143.

Kagiso "Senior Secondary Life Sciences" p. 119 (2008).

OBE for FET Life Sciences (2008) Nasou p. 167.
Focus on Life Sciences Maskew-Miller (2008) p. 98.

Explain to learners that lipids in our diet come from either plant or animal sources. -The lipids from plant sources have **unsaturated fatty acids** in their molecules and form **unsaturated oils.** -The lipids from animal sources have mainly **saturated fatty acids** in their molecules and form **saturated fats.** -Cholesterol is a fatty molecule normally found in the human body and has certain functions, however when a person's diet is too high in saturated fats, this leads to an increase in cholesterol levels. The excess cholesterol blocks arteries. If arteries leading to the heart are blocked, this leads to heart disease. saturated fats => cholesterol => blocked arteries => heart disease (diet) **Enrichment** Brainstorm with learners the different food types that may contribute to elevated cholesterol levels (ensure that answers are animal sources, since lipids from plant sources do NOT cause high cholesterol levels). Also note (and point out to learners) that oily fish (e.g. Salmon, Tuna etc.) are rich in Poly-unsaturated fatty acids which actually help reduce blood cholesterol levels.	5. Transcribe notes from OHP /dictation 6. Homework: Research the functions of fats in the human body.	15 min 5 min	Website for animations (cholesterol and others) www. learnerstv.com

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	3	TOPIC	Molecules for life: Organic compounds	Lesson	2

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 24 (CAPS) Lipids (fats &oils)

- **Classification of lipids**
  - **Plant or animal derived**
  - **Fat or oil**
- **Test for lipids**
  -Emulsion test
  -Grease-spot test

The learners must be able to:

- **Establish the source of different lipids**
- **Identify whether a lipid sample is classified as an oil or a fat**
- **Follow instructions in testing two food samples (for lipid content) in two stages:**
  -Emulsion test
  -Grease-spot test
- **Observe for a test-positive result**
- **Record information in the most appropriate form (composite table)**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Set up of material/apparatus Explanation Monitoring and facilitating **1. Introduction** • Mark and recap previous day's work. • Set out any selection of lipids from the following: ➢ Sunflower oil ➢ Peanut butter ➢ Butter ➢ Olive Oil ➢ Lard (Holsum)	1. Sort out the samples according to the requested criteria.		

➢ Pieces of biltong/meat fat ➢ Sesame oil ➢ Margarine • Ask learners to sort out the samples (in tabular form) according to: a) Fat or oil. b) Plant derived or animal derived. • Ask learners to reach a conclusion about the source of oils and fats. [With the exception of margarine, all plant derived lipids (oils) are liquid at room temperature and animal derived lipids (fats) are solid at room temperature]	2. Establish a relationship between the type of lipid and its source. 3.Follow explanation making notes where necessary.	5 min	Understanding Life Sciences. Pulse Education (2008) p. 139. VIVA Life Sciences Vivlia (2008) p. 145 Life Sciences for all. Macmillan (2008) p. 189. Kagiso "Senior Secondary Life Sciences" p. 121 (2008).
2. Main Body (Lesson presentation) Provide learners with a hand-out/textbook reference on carrying out the lipid test. Provide samples like : • Biscuits • Peanuts • Banana • Apple • Sesame seeds • Sunflower seeds Explain to learners the format of this practical, by reading through the Hand out/textbook and providing explanations. Divide learners into groups and ask each group to conduct the practical (a copy may be made of the instructions below). Learners to select two samples from those provided. ***A) EMULSION TEST*** 1. Pour 5ml of ethanol (or other solvent) into a test tube. 2. Add one drop of cooking oil or a small piece of fat to the ethanol in the test tube. 3. Cover the open end of the test tube with your thumb and shake the test tube thoroughly to mix the contents.	4. Work in groups to complete the practical. -Note the results. -Clear up and replace all apparatus.	20 min	OBE for FET Life Sciences (2008) Nasou p. 168. Focus on Life Sciences Maskew-Miller (2008) p. 98. Ethanol(or other solvent). Lipid sample (fat or oil). 2xTest tubes. Water. 2x Droppers. Funnel. Filter paper/news paper/unwaxed brown paper.

4. Pour the mixture into the second test tube containing about 5ml of water. 5. Note the appearance of the mixture when shaking ethanol with oil, and after adding this mixture to water. a) What happened to the cooking oil: (i) As soon as it was added to the ethanol? (ii) After shaking with the ethanol? b) What was the appearance of the mixture on adding the contents (mixture) to water? Answers: a) i) It floated on the surface of the ethanol. ii) It dissolved into the ethanol. b)It became "milky" in appearance. <u>Note</u>: Ether, ethanol, chloroform or carbon tetrachloride are all lipid solvents and can be used to dissolve the fat. The fat dissolves into the ethanol. When added to water, the fat will form an emulsion (tiny globules of fat suspended in the water), causing the water to appear "milky". If the water appears milky, then fat is present.	5. Answer the questions.		
B) <u>THE GREASE SPOT/TRANSLUCENT STAIN TEST</u> 1. Add about 5ml of ethanol (or other solvent) into a test tube. 2. Add the sample to the test tube and shake vigorously. 3. Filter the solution into another test tube. 4. Place a drop of the filtered fat solution onto a clean piece of filter paper (or unwaxed brown paper). 5. Place a drop of pure ethanol on another part of the filter paper (as a comparison).	6. Work in groups to complete the practical. -Note the results. -Clear up and replace all apparatus. 7. Answer the questions.		

6. If fat is present in the test sample, then a translucent stain will remain on the filter paper. Questions: a) What difference do you note between the drop of cooking oil and drop of ethanol when added to the pieces of paper? b) Did the mark/grease formed by the cooking oil allow you to see through? c) What is such a mark called? Answers: a) The ethanol dries almost immediately. b) Yes. c) A translucent stain.	8. Complete a composite table of results for the two experiments.	20 min	

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	3	TOPIC	Molecules for life: Organic compounds	Lesson	3

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content : CAPS pp. 24

- **Proteins Amino acids (C,H,O and N and some have P, S, Fe)**
- **Proteins are sensitive to temperature and pH: Loss of structure and function.**

The learners must be able to:

- **Establish the elements that make up protein molecules**
- **Identify the monomers of proteins as amino acids**
- **Understand that there are twenty different types of amino acids**
- **Recognise that when two amino acids combine, a dipeptide is formed; three make a tripeptide and more than three constitute a polypeptide. The bond that links two amino acids is a peptide bond**
- **All enzymes and hormones are protein**
- **Know that a protein molecule is a macromolecule comprising at least 50 amino acids**
- **Know that proteins are denatured and show altered function when exposed to high temperatures and different pH values**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Conduct a simulation activity as to how proteins are made up Construction of flow diagrams and mind maps (chalkboard/OHP)		5 min	

1. Introduction • Mark and recap previous day's work. • Recall the food groups learnt in grade 9 and the possible food types that constitute the group proteins. • Remind learners of the concept of monomers and polymers (conduct a baseline assessment by asking questions). • Recap what the monomers of carbohydrates and lipids are. • Explain that the monomers of proteins are amino acids. **2. Main Body (Lesson presentation)** Construct the following representation on the chalkboard/OHP and ask learners to copy it into their notebooks. Amino Acid + Amino Acid → **Dipeptide** Amino Acid + Amino Acid + Amino acid → **Tripeptide** More than three amino acids → **Polypeptide** (but fewer than 50) 50 or more amino acids → **Protein** - *There are 20 different types of amino acids* - *The bond between amino acids are called **peptide bonds*** - *The sequence of amino acids determines which protein is formed* - *All enzymes and hormones are protein in nature* Explain that 26 letters of the alphabet make up thousands of words, so to do 20 amino acids make up hundreds of different proteins, depending on the order in which they are placed. To reinforce the concept of polymerisation of proteins, conduct the following demonstration: 1. Take up the string and select a bead explaining that it represents an amino acid. 2. Now take a different bead, emphasising that it represents also an amino acid, but another type. 3. In this way fill up the string with 50 amino acids (beads).	1. Answer questions based on grade 9 material and the concepts of monomers and polymers. 2. Follow the explanation. Copy the diagrammatic representation into their notebooks. 3. Follow the demonstration. 4. Conduct the simulation activity.	10 min 15 min	20 different beads (different colours, materials, sizes) Length of string about 30cm in length, knotted at one end. Understanding Life Sciences. Pulse Education (2008) p. 137.

Obviously, since there are only twenty types of beads (amino acids), some will be repeated. 4. Explain to learners that if the sequence of beads were changed, a different necklace would result, in the same way, if the sequence of amino acids were changed, a different protein would result. (Note: if time and resources permit, each learner can produce their own string of beads, further emphasising the fact that the different sequences would result in different proteins). Ask learners to provide examples of proteins. In all likelihood they will mention meat, eggs and fish. Ask them to picture what happens when egg white is heated. Reinforce that *"it changes its very nature i.e. it changes form translucent liquid to an opaque solid. We say the protein has become* ***denatured.*** *Heat has the ability to denature a protein".* Take a small piece of raw fish and squeeze the juice of half a lemon onto it. Ask learners to observe very closely, the subtle change in appearance of the fish flesh. *There will be a change from translucent to opaque.* *Again we say that the acid (low pH) has* ***denatured the protein****. The acid has "cooked "the fish.* Note: this is the basis of Sushi preparation. Ask learners if the egg and fish can be returned to their original state. Emphasise that protein denaturation is irreversible and that due to this fact, proteins that are denatured will not be able to function as they normally do (refer later to active sites on enzymes). **Enrichment:** Types of proteins that occur in the human body (apart from hormones & enzymes) - Keratin – in hair and nails. - Myosin – in muscle. - Hemoglobin – in Red Blood cells. - Melanin – in the skin. Ask learners to research other proteins occurring in the body.	5. Answer questions. 6. Observe the demonstration and note results.	15 min	VIVA Life Sciences Vivlia (2008) p. 145 Life Sciences for all. Macmillan (2008) p. 188. Kagiso "Senior Secondary Life Sciences" p. 122 (2008). OBE for FET Life Sciences (2008) Nasou pp. 168-169. Focus on Life Sciences Maskew-Miller (2008) p. 99.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	3	TOPIC	Molecules for life: Organic compounds	Lesson	4

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	
LESSON OBJECTIVES	**Content: p. 24 (CAPS) Test for Proteins: Practical** **Testing for the presence of protein in a food substance. Demonstration, followed by hands on practical** **The learners must be able to:** • **Follow instructions** • **Work effectively in groups with guided delegation and role appointment** • **Work systematically and orderly** • **Observe time frames** • **Record results and communicate findings** • **Observe precautions and follow safety regulations** • **Complete a worksheet based on the practical**		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Demonstration Group work (Practical) Teacher observation (for teamwork) Facilitation of practical work Completion of worksheet by learners **1. Introduction** • Mark and recap previous day's work. • Recall the tests that were conducted to determine if foods contained:		5 min	Understanding Life Sciences. Pulse Education (2008) p. 139. Kagiso "Senior Secondary Life Sciences" pp. 122-123 (2008). VIVA Life Sciences Vivlia (2008) p. 147

➢ Starch ➢ Glucose ➢ Lipids • Explain that a test would now be conducted to establish the presence of proteins and that the test is referred to as the Biuret test. Note: Millon's reagent could also be used in tests for proteins. It is, however, **highly poisonous** and should be used with caution (wear gloves). If Millon's reagent is used, it is best that it be presented as a teacher demonstration as it also requires heating.			Life Sciences for all. Macmillan (2008) pp. 189-190. Focus on Life Sciences. Maskew Miller (2008) p. 100.
2. Main Body (Lesson presentation) 1. Present learners with a write up of the practical procedure (attached). 2. Show learners the location of the necessary apparatus and chemicals. 3. Explain that they are expected to conduct the experiment themselves (in groups). 4. Provide each group with a sample of the test substances. 5. *Present* learners with a worksheet with questions that will assess the outcomes of this practical. Learners to complete the worksheet and submit before leaving. ***THE BIURET TEST FOR PROTEINS*** *1. Place about 10 ml of NaOH (caustic soda) into three test-tubes.* *2. Using the dropper, add about 5-6 drops of the Copper Sulphate solution to each of the three test-tubes (it should turn blue).* *3. Add:* *- a small volume (5ml) of milk to the first test-tube* *- a few drops of egg white to the second test-tube* *- some orange/apple juice to the third test-tube.* *4. Observe for a colour change.* *5. If the mixture turns violet, this is a positive result for protein (indicating that protein is present). If the mixture turns rose-pink, it indicates the presence of polypeptides.* *6. Record results on the test sheet provided.* *7. Clean up apparatus and materials.*	1. Read through the practical procedure. 2. Follow instructions. 3. Receive test samples. 4. Conduct experiment in groups 5. Observe for results. 6. Clear up the apparatus. 7. Complete the worksheet.	15 min 25 min	Hand-out/OHP transparency of the practical format. Test-tubes. Test-tube rack NaOH (caustic soda) solution. Copper Sulphate ($CuSO_4$) solution. Dropper. Test samples - Milk - Egg white - Orange/Apple juice.

THE MILLON'S TEST FOR PROTEIN 1. *Place the test samples and a few drops of water into separate test-tubes.* 2. *Add a few drops of Millon's reagent to each test-tube (**use rubber gloves!**)* 3. *A white precipitate should form.* 4. *Holding the test-tube with a test-tube holder, gently heat each of the test-tubes, (ensuring that the mouth of the test-tube is positioned away from yourself and others).* 5. *Observe for a colour change.* *(If protein is present, the mixture would turn brick-red in colour).* 6. *Record results.* 7. *Clean up apparatus and materials.* ***QUESTIONS FOR THE WORKSHEET*** 1. *Suggest a hypothesis for this investigation. (2)* 2. *Give the:* a) *Independent (manipulated) variable.* b) *The dependent (responding) variable. (2)* 3. *Draw a table of results showing the absence or presence of proteins in the test samples. (7)* 4. *In the biuret test, describe:* a) *The colour of NaOH.* b) *The colour of CuSO4.* c) *The combined colour.* d) *The colour produced for a positive result. (4)*			Hand-out/OHP transparency of the practical format. Test-tubes. Test tube rack. Millon's reagent. Dropper. Bunsen burner/hotplate. Tripod stand. Asbestos gauze. Test-tube holders. Test samples: - Milk - Egg white - Orange/Apple juice.

5. *Give ONE precaution to take when conducting this test.* *(1)*

6. *Explain the difference between a result and a conclusion by using this experiment as an example.* *(4)*

ANSWERS TO PRACTICAL WORKSHEET

1) Milk and egg white contain protein and fruit juice does not.

2) a) The test sample (egg white/milk/fruit juice)

b) The presence/absence of protein

3)

TABLE SHOWING RESULTS OF A TEST FOR PROTEIN ON THREE TEST SUBSTANCES

TEST SAMPLE	COLOUR CHANGE	PROTEIN PRESENCE
Egg White	Blue → Violet/Purple	Present
Milk	Blue → Violet/Purple	Present
Fruit juice	No colour change	Absent

4) a) Clear

b) Light blue

c) Dark blue

d) Violet /Purple

5) Use a clean dropper for each different test sample (prevents cross-contamination). [Million's: Use gloves when handling Millon's reagent (it is poisonous). - Hold the test-tube away from yourself and others when heating its contents] 6) A result is simply what is observed or seen. In this experiment, the result is the colour change observed. A conclusion is the confirmation of the hypothesis. In this experiment, the conclusion would be which foods contained protein and which foods didn't. **Enrichment:** Research the names of the proteins found in: a) Egg white (*Albumen)* b) Milk *(Casein)*	8. Homework: List the functions of proteins in the human body.		

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	3	TOPIC	Molecules for life: Organic compounds	Lesson	5

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 24 (CAPS) Proteins Enzymes: Introduction
Role of enzymes in breaking down/synthesising molecules
Influence of temperature and pH on enzyme action
Lock and key model of how enzymes work

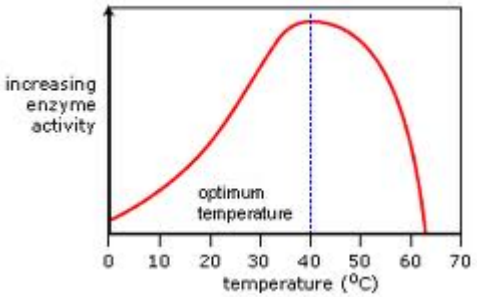
The learners must be able to:

- **Understand that all enzymes are proteins, hence their inclusion in this section**
- **Define proteins as biological catalysts (and understand their role in facilitating reactions)**
- **Know that, as proteins, enzymes become denatured by heat**
- **Realise that enzymes work best at a specific:**
  - **temperature**
  - **pH**

  (by interpreting graphs)
- **Identify the lock and key model of enzyme action**

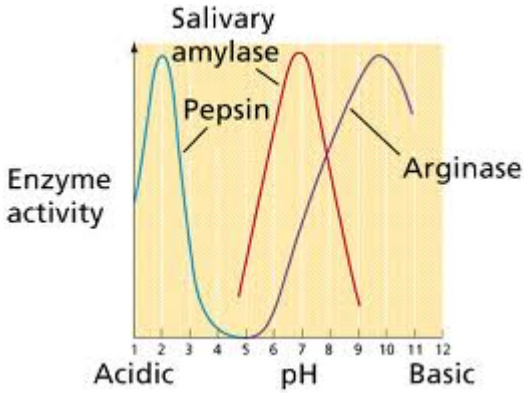
TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Analysis of graphs **1. Introduction** • Mark and recap previous day's work. • Explain to learners that the section on enzymes is included at this point, because they are important biological molecules, but also because they are protein in nature.		5 min	

2. Main Body (Lesson presentation) Explain the following points: Ask learners to take down the points from the chalkboard/OHP. <u>Properties of enzymes.</u> 1. All enzymes are **protein** 2. Enzymes are **catalysts** that speed up biological reactions, but are themselves not involved in the reactions. 3. Enzymes speed up chemical reactions by reducing the **activation energy** required for the reaction (Refer to graphs on activation energy). 4. Once they have catalysed a reaction, they can be used over and over again. 5. They can catalyse **anabolic** (building up) or **catabolic** (breaking down) reactions. 6. They are **specific** as to the type of reaction they will catalyse e.g. proteases only break down proteins and amylase only break down starch. 7. Enzymes are sensitive to **temperature.** 8. Enzymes are sensitive to **pH.** 9. Enzymes operate according to the **lock-and-key theory.** Show learners different graphs of enzyme activity at: - Different temperatures - Different pH values (provide copies for learners or ask them to copy them from their textbooks into their notebooks). Ask learners to draw conclusions from these graphs. Discuss the graphs and guide the learners' interpretation of the graphs, so that they conclude the following: **<u>GRAPH SHOWING ENZYME ACTIVITY AT DIFFERENT TEMPERATURES</u>** - As the temperature increases, so too does the enzyme activity. - The enzyme activity is the highest around a particular temperature, called the **optimum temperature.** - If the enzyme is one found in the human body, then the optimum temperature would be 37°C (normal body temperature). - At very low temperatures, enzyme activity is low, because enzymes are **inactive** at low temperatures. - At very high temperatures, enzyme activity is low, because enzymes become **denatured** at high temperatures.	1. Follow the teacher explanation. 2. Write down the properties of enzymes into notebooks. 3. Copy the enzyme activity graphs into their books. 4. Study and interpret the graphs. 5. Draw and write down conclusions derived from the graphs.	10 min 20 min	Kagiso "Senior Secondary Life Sciences" p. 124 (2008). Understanding Life Sciences. Pulse Education (2008) p.142. Kagiso "Senior Secondary Life Sciences" p. 125 (2008). VIVA Life Sciences Vivlia (2008) p. 151. Life Sciences for all. Macmillan (2008) p. 194. Focus on Life Sciences. Maskew Miller (2008) pp. 102-103.



GRAPH SHOWING ENZYME ACTIVITY AT DIFFERENT pH VALUES

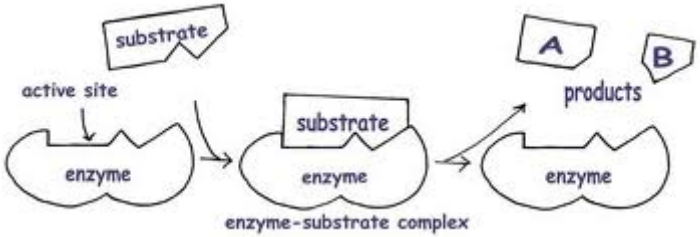
- *Different enzymes have different optimum pH values.*
- *Some enzymes (Pepsin) have high enzyme activity at low (acidic) pH.*
- *Some enzymes (Amylase) work best at neutral pH values and other enzymes (Sucrase) have optimum activity at high (alkaline) pH values.*



(These graphs on pH values can later be linked to the digestive system showing that the stomach has an acidic pH, the mouth a neutral pH and the small intestine an alkaline pH).

Explain to learners that enzymes function according to the lock and key theory.

10 min

THE LOCK-AND-KEY THEORY OF ENZYME ACTION - *Just as a specific key will only fit a specific lock, so too does an enzyme molecule only connect with a particular* ***substrate.*** - *The enzyme has an* ***active site*** *that fits exactly to the shape of the substrate molecule. This explains enzyme-substrate specificity.* - *Once the enzyme has catalysed the particular reaction (catabolic or anabolic), it will leave the substrate and move off to catalyse another reaction.* Provide learners with diagrams, which are the only way to understand this theory. Diagrams can be accessed from textbooks or copied from the chalkboard/OHP.  	6. Draw labelled diagrams explaining the lock-and key theory of enzyme action. 7. Homework: Explain which properties of enzymes are shown in a graph: a) Depicting enzyme activity versus temperature. b) Enzyme activity versus pH. Answers: a) - Enzymes are temperature sensitive. - Enzymes work best at the optimum temperature of 37°C. - Enzymes are inactive at low temperatures. - Denatured at high temperatures. b) - Enzymes are substrate – specific. - Different enzymes work at different optimum pH values.		OHP transparency of lock-and-key theory diagrams.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	4	TOPIC	Molecules for life: Organic compounds	Lesson	1

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 24 (CAPS) Enzymes in everyday life: Practical. Hypothesis Testing.

- **Enzymes in everyday life**
- **Role of enzymes in breaking down molecules**
- **Proteins are sensitive to temperature: loss of structure and function**

The learners must be able to:

- **Make the necessary link to the theory of enzymes**
- **Appreciate the use of enzymes in everyday life**
- **Understand which substances of the practical constitute the enzyme and which is the substrate**
- **Postulate a hypothesis based on an observation**
- **Identify variables**
- **Establish a control**
- **Follow instructions**
- **Work effectively in groups with guided delegation and role appointment**
- **Work systematically and orderly**
- **Observe time frames**
- **Record results and communicate findings**
- **Observe precautions and follow safety regulations**
- **Complete a report based on the practical**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
• Pre-Lesson Prep: (can be done the previous day). • Prepare Gelatine in Petri dishes (3 Petri dishes per group). 1. Dissolve 10g gelatine powder in 150 ml boiling water and gently stir until all the gelatine has completely dissolved. 2. Add 300 ml of cold water to the gelatine mixture. 3. Refrigerate for 2 to 3 hours. (Note: If pure gelatine is not available, use a packet of flavoured jelly, but ensure that it is not an agar jelly, but a gelatine jelly). Explanation (background information). Facilitation (of forming a hypothesis). Group-work (Practical). Facilitation of practical work.			10g powdered gelatine/jelly. Petri dishes (3 per group). 150ml boiling water. 300 ml cold water.

1. Introduction
• Mark and recap previous day's work.
• Conduct a baseline assessment by enquiring from learners about the relationship between polymers and monomers. Establish the following:
  • *Biological molecules are essentially monomers that combine to form polymers.*
  • *Monosaccharides → Disaccharides /Polysaccharides*
  • *Fatty acids & glycerol → Lipids*
  • *Amino acids → Proteins*
 	
Inform learners that:
  • *Polymers can be broken down to form monomers.*
  • *Enzymes help to break down polymers to monomers.*
  • *An example of such an enzyme may be found in fresh pineapple.*
  • *This enzyme (bromelain) is a proteolytic enzyme that breaks down protein.*
	1. Answer Questions.
	
	2. Copy summary into notebooks.
		5 min	

2. Main Body (Lesson presentation) Present learners with an observation made. When fresh pineapple is placed in jelly, the jelly becomes liquid and does not set. Cooked/canned pineapple does not have the same effect (the jelly sets) It is suspected that perhaps the fresh pineapple may contain an enzyme which breaks down the protein gelatine. Ask learners to form a hypothesis based on this observation. Answer: Fresh pineapple contains an enzyme that breaks down the protein gelatine/cooked or canned pineapple does not break down the protein in gelatine). Ask learners to state the different variables: (Answer: Independent variable – Type of pineapple (fresh or cooked). Dependent variable – The liquefaction of the gelatine. Controlled variables – Amount of pineapple used. Temperature. Amount of jelly. Quality of jelly. (any other factors that may influence the results) Brainstorm with learners a possible experimental design to test this hypothesis. Present leaners with the practical format and ask them to conduct the experiment. ***Aim**: To investigate the effect of fresh and canned pineapple on gelatine/ protein.*	3. Formulate and record the hypothesis and the variables.	10 min	Practical format on hand out/OHP transparency.

Apparatus: • 3 petri dishes containing equal quantities of gelatine in refrigerator. • 1 slice fresh pineapple (skin removed). • 500 ml measuring cylinder. • 300 ml cold water. • 250 ml glass beaker. • 150 ml boiling water. • Bunsen burner, tripod and asbestos gauze mat. • Knife and saucer. **Method:** 1. Grate/finely chop the fresh pineapple. 2. Boil one half of the chopped pineapple in a beaker of water (75ml) above the Bunsen burner and cook until the pineapple is soft. 3. Remove the cooked pineapple from the beaker, drain and allow to cool (failure to cool would cause the gelatine to melt, thereby causing invalid results). 4. Remove petri dishes from refrigerator. 5. Place the raw pineapple pieces in the first gelatine dish and the cooked piece on the second gelatine dish. The third gelatine dish serves as a control. 6. Place the dishes in a cool place for 24 hours. 7. Examine the dishes every few hours and note any changes in the gelatine texture and record these. 8. Construct a table of results showing the change in gelatine texture for each of the three dishes over the period of observation. 9. State a conclusion. 10. Answer the questions based on the practical. ***QUESTIONS*** *1. Why is gelatine used?* *2. In this experiment, which substance represents:* *a) The enzyme* *b) The substrate* *3. Explain the significance of grating/chopping the pineapple into small pieces.* *4. Why was half of the pineapple boiled?* *5. What is the purpose of the control?* *6. Give one precaution of this experiment.* *7. To which group of biological compounds do enzymes belong?*	4. Verbal feedback on possible experimental designs. 5. Read through the practical format and compare to their own plan. 6. Work in groups to conduct the practical.	30 min	3 Petri dishes containing equal quantities of gelatine. 1 slice fresh pineapple (skin removed). 500 ml measuring cylinder. 300 ml cold water. 250 ml glass beaker. 150 ml boiling water. Bunsen burner, tripod and asbestos gauze mat. Knife and saucer. Worksheet/OHP with questions.

8. *What effect would using refrigerated pineapple have on the gelatine? Explain.*  **ANSWERS** 1. Gelatine is a protein (collagen) derived from the skin and bones of animals. In this experiment it is the protein substrate. 2. a) Contained in the pineapple. b) The gelatine. 3. It increases the surface area for reaction (of the enzyme and the gelatine). 4. To denature the enzyme, thereby showing that it is in fact the enzyme that cause the liquefaction of the gelatine and not some other factor in the pineapple (like the acid). 5. It acts as a comparison to show that no other factors caused the results shown. 6. Cool down the boiled pineapple before placing on the gelatine. 7. Proteins. 8. There would be no change in the appearance of the gelatine. Low temperatures inactivate enzyme **Enrichment:** • Research the applications of this experiment in the culinary industry. • Research the effect of eating fresh pineapple on the digestive system.	7. Homework : Complete the practical report and answer the questions.		

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

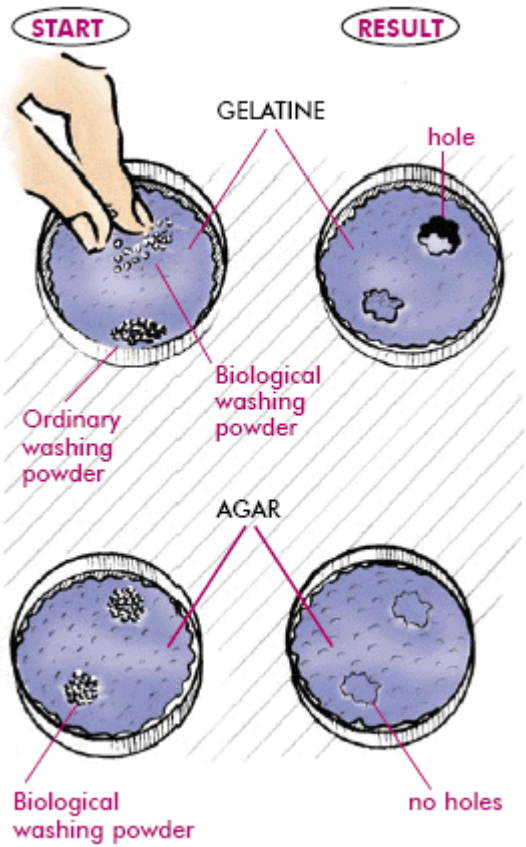
GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	4	TOPIC	Molecules for life: Organic compounds	Lesson	2

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES	**Content: p. 24 (CAPS) Enzymes in everyday life: Practical** • **Enzymes in everyday life** • **Role of enzymes in breaking down molecules** • **Lock and key model of how enzymes work (enzymes are specific as to the substrate they work on)** **The learners must be able to:** • **Recall that enzymes break down polymers** • **Understand that stains on clothes can actually be biological compounds** • **Make the necessary link to the theory of enzymes** • **Appreciate the use of enzymes in everyday life** • **Understand which substances of the practical constitute the enzyme and which is the substrate** • **Read and follow instructions from a hand out** • **Conduct an experiment independently**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Pre-Lesson prep: Learners may prepare the gelatine and agar plates the day before. **1. Introduction** • Mark and recap previous day's work. • Remind learners of the practical conducted with the pineapple and gelatine (see lesson plan 14). • Introduce learners to the concept of "biological washing powders".		5 min	

These are detergents that contain enzymes that catabolise (break down) the biological molecules that cause stains. e.g. A blood or egg stain is actually a protein substrate that a protease (protein-digesting enzyme) can break down. Similarly a fat stain can be removed by a lipase enzyme. (This reinforces the concept of enzyme acting only on a specific substrate). Also point out to learners that not all washing powders are biological. • The practical "hole in the jelly" is a relatively simplistic and cost efficient practical and can be conducted by each learner independently. Saucers may be used as an alternative to petri dishes and a gelatine based flavoured jelly may be used instead of the gelatine. **2. Main Body (Lesson presentation)** Learners are given the procedure for the practical and are expected to work independently to carry out the investigation. The format of the practical can be placed on an OHP transparency or provided as a hand out. **Hole in the jelly** **Aim:** To see how an enzyme can break down proteins, and at the same time see if the claims of manufacturers of washing powders are true. **Apparatus:** • Two small plastic dishes/petri dishes/saucers • Gelatine (protein-based jelly) • Agar (starch-based jelly) • An ordinary washing powder • A biological washing powder **Method:** 1. Read the instructions on the packets carefully and prepare two dishes of clear jelly, one of gelatine, and the other of agar. (Note: In order to set, agar has to be boiled) 2. On each jelly, put a small pinch of an ordinary powder detergent, and of a so-called biological washing powder.	1. Read through the procedure. 2. Ask questions if necessary.		www.saasta.ac.za SBA guideline document. Practical format on hand out/OHP transparency. 2 Petri dishes: one with gelatine and one containing agar. An ordinary washing powder. A biological washing powder. Worksheet/OHP with questions.

Observations/Results:  **RESULTS.** Compile a table of the results. **Discussion:** The biological powder is supposed to contain an enzyme which "removes difficult stains like egg, gravy and blood". These contain proteins.	3. Work individually to conduct the practical. 4. Whilst waiting for a reaction to occur answers the questions based on the practical.	25 min 5 min	

If this is a true claim, we would expect to find the gelatine (a protein) dissolved away under the"'biological" washing powder, but not under the ordinary powder. The agar (not a protein) should not be dissolved by either. The jelly might soften a little for many reasons, but do not be misled by this. Look for a great hole in the jelly. **Conclusion:** State the conclusion you reached based on the results obtained. **QUESTIONS** 1. List TWO controlled variables for this experiment. 2. What does the biological washing powder contain that the ordinary washing powder doesn't? 3. Why would the washing powder only work on protein-based stains? 4. Explain the reason why a protein-digesting enzyme would not be able to break down a starch. 5. Suggest a way that the manufacturers could make their biological washing powder more effective against all stains. 6. Washing powders containing enzymes work best at 40°C. Explain: a) Why this is so. b) What advantage does this have for the consumer. **ANSWERS** 1. Temperature, amount of washing powder used, thickness of gelatine (any other factor that may affect results). 2. (Note: Do not accept factors like type of gelatine etc. as the same plate is used for both washing powders). 3. Enzymes. 4. The enzyme contained in the biological washing powder is a protease and will therefore only break down proteins. 5. Enzymes are specific as to the substrate they will break down. This is due to the shape of the **active site** on the enzyme that will only fit a specific substrate. 6. They could include an enzyme that also breaks down fats, e.g. lipase. 7. a) This is the optimum temperature for protease enzymes. b) It is more economical, since water does not need to be heated to very high temperatures.	5. Compile a report by completing the: - table of results - conclusions - questions. 6. Check their answers against those given by the educator.	10 min	

Enrichment: Research the enzyme practical using the enzyme catalase in liver and potatoes to break down hydrogen peroxide (an exciting reaction producing bubbles of oxygen).			

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	4	TOPIC	Molecules for life: Organic compounds	Lesson	3

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content :CAPS p. 24

- **Nucleic acids: DNA and RNA consisting of C, H, O, N and P.**
- **Vitamins e.g. A, one of B vitamins, C,D and E**

The learners must be able to:

- **Establish the elements that make up nucleic acid molecules**
- **Identify the two types of nucleic acids**
- **Recognise the monomers of nucleic acids as nucleotides**
- **Identify the location of nucleic acids**
- **Provide the basic functions of the nucleic acid DNA**
- **Recall that vitamins are organic molecules**
- **Identify the vitamins listed**
- **Provide the dietary source of the named vitamins**
- **Identify the conditions that results from specific vitamin deficiencies**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation (with reference to hand outs) Discussion Construction of flow diagrams and mind maps (chalkboard/OHP) Use of pictures/photographs to identify deficiency diseases **1. Introduction** • Mark and recap previous day's work. • Contextualise nucleic acids by reminding learners of the other major biological molecules encountered thus far.	1. Answer questions based on grade 9 material and the concepts of monomers and polymers.	5 min	

• Recall the structure of a cell and the location and function of the nucleus learnt in grade 9 and conduct a baseline assessment by asking question on location, structure and function of the nucleus. • Identify the nucleus as the structure where most nucleic acids are located. • Remind learners of the concept of monomers and polymers, (conduct a baseline assessment by asking questions) and establish that the monomers of nucleic acids are nucleotides. Recap what the monomers of carbohydrates, lipids and proteins are. • Explain that the monomers of nucleic acids are **nucleotides.**	2. Follow the explanation. (Copy the information into their notebooks)		
2. Main Body (Lesson presentation) Explain to learners that there are in fact two types of nucleic acids: - DNA **D**eoxyribo **N**ucleic **A**cid and - RNA **R**ibo **N**ucleic **A**cid (Note: although learners do not need to know what DNA and RNA stand for, giving them this information helps them to understand that both DNA and RNA are nucleic acids) Like the other biological molecules these molecules are also made up of elements of the periodic table. The elements found in nucleic acids are: C, H, O, N and P Identify the main functions of DNA as follows: -It contains the genetic/hereditary information of the organism in the form of genes. -It controls the synthesis (making) of proteins by each cell. The main function of RNA is in the process of protein synthesis.	3. Contribute to discussion and pose questions when necessary.	10 min	Chalkboard/OHP.
VITAMINS Remind learners that vitamins are also a group of biological molecules that are made up of elements. There are many vitamins but only 5 are in the scope of the grade 10 syllabus. Refer learners to the table of vitamins available in the various textbooks, and discuss the vitamin, its source, the effect that its deficiency has on the body.	4. Paste pictures into notebooks and label them.		Understanding Life Sciences. Pulse Education (2008) p. 148. VIVA Life Sciences Vivlia (2008) p. 149. Life Sciences for all. Macmillan (2008) p. 192. Kagiso "Senior Secondary

Show learners the pictures of the various deficiency conditions and ask them to identify the condition according to the description given (provide learners with copies of the pictures of the different deficiency diseases). Ask learners to construct a mind map, that includes the following: a) The vitamin name b) Its dietary source c) The effect of its deficiency d) Graphics, pictures diagrams where possible. (Provide learners with the rubric/criteria for mind map assessment) Use these to assess the task.  Xerophthalmia	5. Start the construction of the mind map in class. 6. Homework: Complete the mind map for submission.	15 min 10 min 5 min	Life Sciences" pp. 127-128 (2008). OBE for FET Life Sciences (2008) Nasou p. 171. Focus on Life Sciences Maskew-Miller (2008) p. 106. Pictures/photographs of vitamin deficiency diseases. Pictures : Google search : "Vitamin deficiency diseases images".


Pellagra


Rickets

 Scurvy			

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	4	TOPIC	Molecules for life: Organic compounds	Lesson	4

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content :CAPS pp. 24

- **Inorganic molecules**
- **Carbohydrates**
- **Lipids**
- **Proteins**
- **Nucleic acids**
- **Vitamins**

The learners must be able to:

- **Recognise what an inorganic molecule is**
- **Identify the different types of organic molecules as:**
  - **Carbohydrates**
  - **Lipids**
  - **Proteins**
  - **Nucleic acids**
  - **Vitamins**
- **For each of the above organic molecules (except vitamins), recognise the:**
  - **Monomers**
  - **Examples**
  - **Brief role**
  - **Tests for**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
This lesson serves as a consolidation and revision of the past 13 lessons (molecules for life). Discussion Question and answer sessions Brainstorming Construction of flow diagrams and summary tables (chalkboard/OHP) **1. Introduction** • Mark and recap previous day's work. • Recall the course of study over the past two and a half weeks. Establish that this lesson serves as a revision and consolidation of the entire section.		5 min	

2. Main Body (Lesson presentation) Give learners approximately 10 to 15 minutes to skim read through their notebooks, getting an overview and reminding them of the sections covered. Ask them to construct a table into their notebooks with the following heading: Table showing a summary of the major organic molecules. Column headings should be: o Carbohydrates o Lipids o Proteins o Nucleic Acids o Vitamins Row headings should be: o Monomers o Basic shape o Examples o Formation of larger molecules (polymerisation) o Bonds formed o Biological importance (basic) o Chemical test for: Facilitate the filling in of details in the table, by asking questions, brainstorming and discussing each of the aspects required in the table. As learners come up with correct answers, ask them to fill in the details in their tables. Note: Answers should not be given to learners, if they fail to come up with answers, allow them to page through their texts/notes to get the solution. Write down key words/concepts on the chalkboard/OHP. The format of the table is given below. (Columns and rows would be much wider than shown, to include all the detail)	1. Peruse the notes in both textbook and notebook, gaining an overview of the section. 2. Construct the table into notebooks, preferably over a double page. (The table will be blank and will be filled in as the discussion and brainstorm proceeds)	15 min 25 min	Chalkboard/OHP VIVA Life Sciences Vivlia (2008) pp. 143 to 146.

	ORGANIC MOLECULES			
	CARBO HYDRATES	LIPIDS	PROTEINS	NUCLEIC ACIDS
Monomers				
Basic shape				
Examples				
Polymerisation				
Bonds formed				
Biological importance				
Test for -				

Note: Remind learners that although not included in the table, vitamins are also organic molecules

3. Homework: Complete a similar table summarising the vitamins and the conditions caused by the deficiency of each.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	4	TOPIC	Cells : The basic units of life	Lesson	5

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: CAPS p. 24

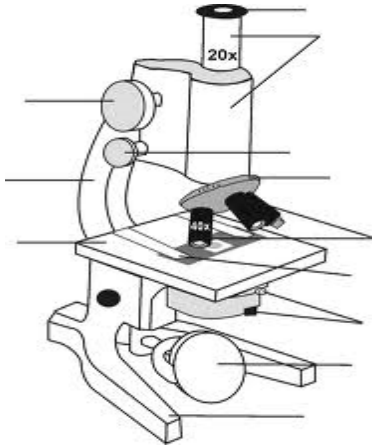
- **Molecular make up (Cells are mostly made up of proteins, carbohydrates, lipids, nucleic acids and water)**
- **Brief overview of the history of microscopy from lens to light to electron microscopy, leading to the cell theory**
- **Revision of grade 9 work**

The learners must be able to:

- **Understand that cells are essentially a collection of different organic molecules**
- **Review the historical development of the microscope**
- **Know the basic differences between the light and electron microscope**
- **State the cell theory**
- **Identify the different parts of the microscope**
- **Recognise the functions of the different parts of the microscope**
- **Handle the microscope in the appropriate way**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Facilitation of timeline construction Demonstration Chalkboard summary **1. Introduction** • Mark and recap previous day's work. • Recall the basic biological molecules. Also recap the cell theory from grade 9 (GET). Explain that cells are made up of these compounds. Remind them that: Atoms→ Molecules → Organelles → Cells • Recall the microscopic nature of cells and establish the need for microscope work in any study of cells.		5min	

2. Main Body (Lesson presentation) *Cells are made up of the following molecules (organic and inorganic)* o *Carbohydrates* o *Lipids* o *Proteins* o *Nucleic Acids* o *Vitamins* o *Water* o *Salts* (Learners to write next to each whether the molecule is organic or inorganic) Obtain a paragraph (from a textbook) on the historic development of the microscope. Ask learners to extract from the paragraph a timeline (the timeline may read left to right or top to bottom). Demonstrate the handling of the microscope and its care. - Use of a dust cover. - Handling the microscope with one hand holding the arm of the microscope and the other hand beneath the base. - Always packing the microscope away with the lowest objective in place. Place one demonstration microscope in clear view of all learners. If resources allow, let learners also have access to microscopes. Name and indicate all the parts of the microscope to learners. Divide the parts as follows: (On chalkboard/OHP for learners to transcribe). Briefly describe the functions of the various parts. Note: Emphasise that the objectives come in different magnifications as do the eyepieces and that: Total Magnification = Objective magnification x Eyepiece magnification e.g. 40x 10x Total magnification of object is 400 times its actual size. <u>PARTS OF THE MICROSCOPE</u> a) The optical parts: (contain lenses) - The eyepiece (ocular) - The objectives b) The mechanical parts (support and movement) - The stage clips - The base - The arm	1. Copy the list and identify each as organic or inorganic. 2. Construct the timeline into notebooks. 3. Locate the various parts and name them. 4. Copy the names of the parts into notebooks.	5 min 10 min	Chalkboard/OHP Extract from textbook or hand out from: VIVA Life Sciences Vivlia (2008) p.160. Kagiso "Senior Secondary Life Sciences" p.132 (2008). OBE for FET Life Sciences (2008) Nasou p. 184. Life Sciences for all. Macmillan (2008) p. 202. Focus on Life Sciences Maskew Miller (2008) p. 109.

- The focussing knobs - The body tube c) The illuminating parts (focuses light) - The mirror (or other light source) - The diaphragm - The condenser  	5. Homework: Provide an unlabelled diagram of a microscope (as a hand out). Learners to complete the labels.	25 min	

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	5	TOPIC	Cell : The basic units of life	Lesson	1

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 25 (CAPS) Microscopic observation: Practical

Observe and record (draw) the structure of a:

- **Plant cell (wet mount of onion epidermis)**
- **Animal cell (cheek cells) using the light microscope**
- **Calculate magnification of drawing by measuring the field of view under a microscope**
- **Calculate the size of a specimen on a micrograph using the scale line provided**

The learners must be able to:

- **Prepare (and stain) a wet mount of onion epidermal cells**
- **Prepare a microscope slide of cheek (squamous) epithelium**
- **Draw what is seen in microscopic field (following all the rules of diagrams)**
- **Recognise micrographs**
- **Calculate:**
  - **Total magnification**
  - **Actual size given magnification (from a micrograph)**
  - **Apparent size.**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Rapid fire questioning Demonstration -Use of microscope -Preparation of wet mount Facilitation of Practical Observation Explanation			

1. Introduction • Mark and recap previous day's work. • Quiz learners (rapid fire) on the different parts of the microscope. • Observe learners' handling of the microscope. • Briefly explain the difference between magnifying instruments: - *Lens (Hand lens) 10 times magnification* - *Light microscope 100 to 1500 times magnification* - *Electron (scanning) microscope high magnification(40 000 to 250 000) and microscopic photography* (learners need not know details of these) **2. Main Body (Lesson presentation)** <u>ONION EPIDERMIS</u> Demonstrate the preparation of a wet mount using onion epidermis. (Give learners the practical procedure in the form of a hand out or as a textbook reference). Allow learners to prepare their own slides, observing and facilitating as they do so. They must then set up the microscopes to view the slides. (If sufficient microscopes are not available, every learner must have at least one opportunity to set up the microscope for view.) (Note: Learners have sufficient knowledge of cells from grade 9 to label the diagram correctly). <u>DRAWING</u> Learners to draw what they see. Emphasise to learners that they must only draw what they see, and not what they expect to see and to include the magnification in the caption of the diagram. Get the learners to answer the question on the practical from the SBA guideline. <u>CHEEK CELLS</u> If time permits, learners are to take a scraping of the inside of the cheek to make a slide displaying animal cells. Alternatively half the class can do the plant cells and the other half could do the human cell.	1. Name the parts of the microscope. 2. Observe teacher Demonstration. 3. Prepare microscope slides. 4. View the Specimen. 5. Draw and label what is seen in the field of view. 6. Answer questions into notebook. 7. View cheek cells.	5 min 5 min 20 min	Hand out of procedure from SBA guideline document. Microscope. Microscope slides. Cover slips. Dissecting needles. Scalpels. Onion. Forceps. Dropper/ straw. Tissue paper. Iodine solution (for staining). Compound microscope. Microscope slides. Cover slips. 1% Methylene blue stain. Sterile toothpick. Beaker of water. Micrographs or pictures of micrographs.

Introduce learners to micrographs as photographs taken from a microscope, show them examples of micrographs. **CALCULATION** As an introduction to calculations of apparent and actual size, familiarise learners with measurements smaller than one millimetre, which are used to measure the size of cells. *1mm = 1/1000 of a m* *1 micrometre or micron (µm) = 1/1000 of a mm* *1 nanometre (nm) = 1/1 000 000 of a mm* In order for learners to appreciate the miniscule measurements, ask them to measure 1mm onto a page using their rulers. Now in order to get a micrometer, ask them to divide that 1mm into 1000 parts or for a nanometre, to divide it into 1 000 000 (1 million parts)! **MEASURING ACTUAL SIZE** IF A SCALE LINE IS GIVEN: Provide learners with micrographs that show a scale line. The following measurements are required: • The size of the cell in the diagram in mm (measured using a ruler). • The measurement of the scale line (in mm). • The value of the scale line (usually in µm). • The logic behind the calculation is that if: 10mm → 0.001 µm ,(on the scale line) and if the cell is measured to be 15mm in the diagram, then the actual size of the cell would be $\frac{15mm \times 0.001\ \mu m}{10\ mm}$	8. Take down measurements and conversions into notebooks. 9. Follow explanation.	15 min	OBE for FET Life Sciences (2008) Nasou p. 189 Kagiso "Senior Secondary Life Sciences" p. 136 (2008)

OR Actual size = Measurement of diagram x distance represented by scale line Measurement of scale line **IF MAGNIFICATION IS GIVEN** : E.g. on a diagram a cell is measured (with a ruler) to be 20 mm. The magnification given is x2200, then: Actual size = Measured size = 20mm = 0.009mm Magnification 2200 Provide learners with a number of micrographs. Some that has the magnification given and some that have scale lines. They must complete the calculations as homework.	10. Homework : Do the calculations of actual size.		

Reflection/Notes:

Name of Teacher:		**HOD:**	
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GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	5	TOPIC	Cells : The basic units of life	Lesson	2

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 25 (CAPS) Cell structure and function: Role of organelles

- **Cell wall, support structure in plant cells only**
- **Cell membrane, fluid mosaic model, boundaries and transport**
- **Movement across membranes**
  -Diffusion
  -Osmosis
  -Active Transport

The learners must be able to:

- **Understand the structure, function and location of the cell wall**
- **Know the chemical composition of the cell wall**
- **Recognise the difference between a cell wall and a cell membrane (in structure ,function and location)**
- **Understand the structural components of the fluid mosaic model**
- **Recognise the need for movement of substances in living systems**
- **Identify that different substances will move in different ways across different surfaces**
- **Establish the three modes of movement of substances as**

a) Diffusion
b) Osmosis
c) Active transport

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Drawing onto chalkboard/OHP Brainstorming Demonstration **1. Introduction** • Mark and recap the previous day's work. • Recall that cellulose is a structural polysaccharide (see carbohydrates). • Remind learners that only plant cells have cell walls, but that both plant and animal cells have cell membranes.		5 min	

• Introduce the analogy of a cell representing a factory; that each organelle/structure has a specific role to play. **2. Main Body (Lesson presentation)** Explain the comparison of a factory to a cell. Cells are very similar to factories. To stay alive and function properly, cells have a division of labour similar to that found in factories. Here, we will examine cells as protein producing factories. Factories have exterior walls that protect and support them and interior walls that create separate work areas. They usually have some kind of production line where a product is assembled and an executive department that decides what product is made. A finishing department processes and prepares the product for shipping, and a packaging department wraps the product. In addition, a factory has a receiving department that brings in the components it needs to make its product, a communications department that allows it to contact suppliers, and a power plant that provides the energy it needs to run. Finally, custodial staffs keep everything clean and in good working order. Ask learners, that if the cell were compared to a factory, what part of the factory would be represented by the: a) Cell wall? b) Cell membrane? Brainstorm the learners' suggestions and give them feedback as to whether their suggestions are acceptable or not by referring to the basic functions of the cell wall and the cell membrane. **CELL WALL FUNCTION** It provides: • Strength • Shape • Protection • Communication and transport with external environment	1. Follow the explanation and ask questions. 2. Answer the Questions.	10 min	

CELL WALL STRUCTURE Incorporate the following: • Primary cell wall (cellulose) • Secondary cell wall (lignin) • Middle lamella • Pits • Plasmodesmata Suggest to learners that perhaps the cell wall would represent the boundary wall and the cell membrane regulates what enters or leaves the cell. It is analogous to the shipping and receiving department of a factory. The cell membrane also functions as the communications department because it is where the cell contacts the external environment. Show learners a model or poster of a plant cell, pointing out the various structures. Put up a labelled diagram on the chalkboard/OHP, showing the location and function of each of the parts above. (Note: the primary cell wall is toward the outside and the secondary cell wall is closer to the cytoplasm) **CELL MEMBRANE** Give learners the alternative names for the cell membrane e.g. plasma membrane or plasmalemma. Discuss the concept of the use of a model to represent a structure. Explain that the structure of a cell membrane can be represented by the **Fluid Mosaic Model.** Give the learners an unlabelled diagram showing the fluid mosaic model of the cell membrane. Provide a colour key and ask learners to colour in the following (each a different colour): • Phospho-lipid bi-layer • Proteins - Channel protein - Carrier protein • Hydrophobic tails (lipid) • Hydrophilic (phosphate) heads TRANSPORT ACROSS MEMBRANES Introduce the concept that substances need to move across membranes in both directions and that this can happen in one of three ways:	3. Observe teacher demonstration. 4. Copy the annotated diagram into notebooks. 5. Colour in diagram according to the colour key. 6. Label the diagram.	5 min 10 min	Plant cell model/poster. Chalkboard/OHP Hand-out with unlabelled diagrams from: VIVA Life Sciences Vivlia (2008) p. 165. Life Sciences for all.

1. Diffusion 2. Osmosis 3. Active transport Provide brief definitions of each as follows: 1. The movement of substances from an area of higher concentration to an area of lower concentration. 2. The movement of water across a semi-permeable membrane. 3. The energy required for transport of substances from an area of lower concentration to an area of higher concentration. (Demonstrations of these processes to follow in the next lesson)	7. Write the definitions into notebooks.	10 min 5 min	Macmillan (2008) p. 210. Focus on Life Sciences. Maskew Miller (2008) p. 119. Via Afrika Life Sciences. Via Afrika Publishers (2011) p 58. Chalkboard/OHP

Reflection/Notes:

Name of Teacher:		**HOD:**	
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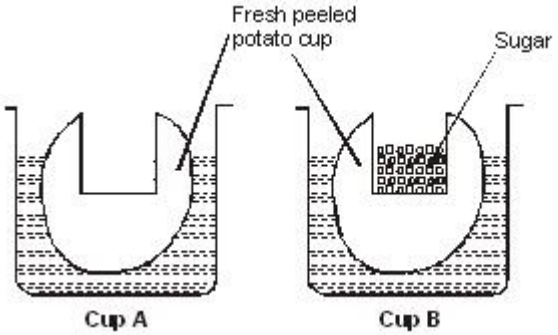
GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	5	TOPIC	Cells: the basic units of life	Lesson	3

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	
LESSON OBJECTIVES	**Content: p. 25 (CAPS) Practical Demonstration** • **Movement across membranes** - **Diffusion** - **Osmosis** **The learners must be able to:** • **Follow a teacher demonstration** • **Understand what concept/process each demonstration is showing** • **Realise that these processes occur in non-living systems as well** • **Comprehend the relationship between these processes and the cell membrane** • **Differentiate between diffusion, osmosis and active transport**		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Demonstration Explanation Consolidation **1. Introduction** • Mark and recap previous day's work. • Contextualise the demonstration by explaining that the movement of substances occur through a cell and into a cell across cell membranes.	1. Observe the demonstration and ask question.	10 min	2x 100 ml beakers/glasses. Fruit juice concentrate (or other solute). Tablespoon. Teaspoon.

• Conduct a baseline assessment to establish the learners' understanding of the concept "concentration" If it appears that learners do not understand the concept, conduct a small demonstration using "Oros" or other fruit squash. Place a tablespoonful of the fruit squash in one beaker and a teaspoonful in the other. Now top up both beakers to the 100ml mark. Explain that although they both have the same volume, there is a difference. They should respond that the difference is in the amount of squash (solute) used. Confirm that the beaker with more solute is in fact more "concentrated". **2. Main body (Lesson presentation)** **DIFFUSION (GASES)** Stand at one corner of the classroom and spray a liberal amount of air freshener into the air. Ask learners to raise their hands as they get a whiff of the fragrance. (You should note that the fragrance travels gradually across the class starting from where it was sprayed the highest concentration). Explain the trend to the learners. Ask learners to answer the questions on the worksheet in the SBA guideline. **DIFFUSION (LIQUIDS)** Drop a crystal of Potassium Permanganate into a glass beaker of cold water. Ask learners to observe what happens after: 10 minutes 30 minutes 24 hours. Ask learners to draw their observations. (As required by the SBA worksheet)   	2. Participate in activity by raising hands as they get the smell. 3. Complete the worksheet. 4. Observe the demonstration. 5. Complete the drawings and answer the questions on the SBA worksheet.	10 min 15 min	Air freshener /perfume SBA guideline (copy of worksheet). Glass beaker. Potassium Permanganate crystals. Cold water (200 ml). Worksheet from SBA guideline document. 2 x medium sized potatoes (peeled). Sugar. Water . 2x 500 ml Glass beakers. Stirring rod. Scalpel/Knife.

Explain the trend of the movement of colour through the water as the movement of the Potassium salt from an area of higher concentration to an area of lower concentration. Define this movement as "Diffusion" **OSMOSIS** Explain to learners the procedure for setting up the osmosis experiment using peeled potato cups. (potatoes act as living "membranes") See SBA guideline document.  Assist in preparation of the solutions. Prepare the apparatus and set up as indicated in the diagram. Ask learners to record the levels of the water and the solution in both set-ups. Leave the apparatus overnight and observe the liquid levels the next day. **Enrichment** : Explain the concepts **endosmosis** and **exosmosis** An explanation of the concept "**water potential"** may better faciliatate the understanding of osmosis. Also, the terms **isotonic, hypertonic** and **hypotonic** may be introduced.	6. Set up the experiment and control. 7. Record liquid levels. 8. Homework: Draw the experimental set-up, predicting the change in levels of the liquids, and give possible explanations for the predictions.	10 min	

3. Conclusion Remind learners that the transport of substances was studied in order to understand the movement of substances through cells. Give different scenarios and ask learners to establish whether they represent diffusion or osmosis. E.g. a gas leak; a tea bag in boiling water; salad leaves wilting in salad dressing; dehydration of biltong when salted etc.			

Reflection/Notes:

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GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	5	TOPIC	Cells: the basic units of life	Lesson	4

		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 25 (CAPS) The nucleus:

- **Chromatin material**
- **Nuclear membrane**
- **Nucleopores/Nuclear pores**
- **Nucleolus**
- **Control centre**
- **Heredity**

The learners must be able to:

- **Recognise the nucleus as the control centre of the cell (analogy to main office of factory)**
- **Identify the nucleus in photomicrographs**
- **Identify the different structures of the nucleus; their location and functions**
- **Make a link to the section on nucleic acids to establish that the chromatin material is made up of DNA and the nucleolus of RNA**
- **Recognise the need for a nuclear membrane and nuclear pores**
- **Understand the basics of why the nucleus (specifically DNA) is responsible for heredity**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Discussion Brainstorming Drawing an analogy Informal assessment **1. Introduction** • Mark and recap previous day's work. • Establish links with the nucleus as encountered in Grade 9 (GET), by asking learners to recall structure, function and location of the nucleus. • Remind learners of the analogy of the cell to a factory. Ask learners what role they would expect the nucleus to play in the analogy. • Listen to learners' responses and confirm that the nucleus would be the head office/executive department/control room etc.	1. Answer questions.	5 min	www.biologycorner.com www.sciencenetlinks.com you tube : (video) bestfactorycellanalogy

The **NUCLEUS** (or the executive department) runs the cell factory and controls all cell activity. It determines what proteins are to be made and stores *all the plans for any proteins that the cell currently makes or has made in the past.* • If the cell is compared to a biscuit factory, (where the biscuits are proteins) then the recipe (blueprint) for the biscuits is contained (in the form of DNA) within the nucleus. Explain that because DNA is such a large molecule, it does not leave the nucleus. (The recipe is "top secret" and cannot leave the main office!)			
2. Main Body (Lesson presentation) **LOCATION** Provide learners with micrographs of tissues, and ask them to identify the nucleus in each cell. Establish that in animal cells the nuclei are centrally located and in plants cells, due to the presence of a large vacuole, may be displaced from the centre.	2. Locate nuclei in micrographs /pictures of cells.	10 min	Micrographs/pictures of tissues.
STRUCTURE Place a diagrammatic representation of the nucleus on the chalkboard/OHP or chart. Use this opportunity to reinforce the rules of drawing. Ensure that the drawing clearly shows: Chromatin network (Double) Nuclear membrane Nuclear pores Nucleolus Nucleoplasm (Continuity with the Endoplasmic Reticulum may be shown)	2. Transcribe drawing into Notebooks.	15 min	OHP. Transparency. Chalkboard.
FUNCTION Write down the following functions on the chalkboard/OHP and ask learners to match them up with the structures: *a)* Encloses and protects the chromatin material. b) Allows the movement of substances to and from the nucleus c) A fluid making up the body of the nucleus d) An RNA containing structure in the nucleus e) The DNA containing strands of hereditary material	3. Match the terms to their descriptions.	10 min	

Answers should be as follows : **a) (double) nuclear membrane** **b) Nuclear pores** **c) Nucleoplasm** **d) Nucleolus** **e) Chromatin material /network** **3. CONCLUSION** Note: these terms (a to d) are often confused with each other and misspelt. Give a small informal test to reinforce this. Include the word Nuclei (as the plural for nucleus). **Enrichment:** Establish a link between chromatin and chromosomes, by expressing that chromatin is the form of DNA in a non-dividing cell and that during cell division, the strands shorten and thicken to become chromosomes.	4. Write the test. 5. Homework: Research which human cells do NOT contain a nucleus. **(Answer: Red Blood Cells)**	5 min	

Reflection/Notes:

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GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	5	TOPIC	Cells: The basic units of life	Lesson	5

		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 25 (CAPS) Cytoplasm:

- **Storage and circulation of materials**
- **Relate structure and location to function**

The learners must be able to:

- **Identify the cytoplasm as the fluid part of the cell**
- **Appreciate the viscous nature of cytoplasm**
- **Realise that the cytoplasm is the suspension medium for all the other organelles**
- **Differentiate between:**
  - **Protoplasm**
  - **Nucleoplasm**
  - **Cytoplasm**

- **Realise the composition of cytoplasm (mostly water and other organic and inorganic components)**
- **Understand that cytoplasm is dynamic, constantly moving and changing**
- **Identify the two states that cytoplasm may occur in e.g. sol and gel**
- **Establish the functions of cytoplasm**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Discussion Brainstorming Drawing an analogy **1. Introduction** • Recap and mark previous day's work. • Remind learners that the ground substance of the cell that is jelly-like in consistency is called the cytoplasm. • Recall for learners the analogy of the cell to a factory. Ask learners what role they would expect the cytoplasm to play in the analogy.	1. Answer questions.	10 min	www.biologycorner.com www.sciencenetlinks.com

• Listen to learners' responses and confirm that the cytoplasm would most probably be the factory floor. *The **CYTOPLASM** includes everything between the cell membrane and the nucleus. It contains various kinds of cell structures and is the site of most cell activity. The cytoplasm is similar to the factory floor where most of the products are assembled, finished, and shipped.* • Clarify the misconception that the cell is two dimensional. Explain that it is in fact more like a sphere (quite similar to an orange). The flesh of the orange would then represent the cytoplasm and the seeds the various organelles. **2. Main Body (Lesson presentation)** Clarify the difference between protoplasm and cytoplasm by presenting the following diagrammatic representation on the chalkboard. LOCATION PROTOPLASM CYTOPLASM — Occurs between the cell membrane and nuclear membrane NUCLEOPLASM — occurs within the nuclear membrane STRUCTURE Describe the two consistencies of cytoplasm as: *Sol: a more fluid or liquid state* *Gel: a more jelly-like, viscous medium* Explain that cytoplasm may revert from one state to the other, depending on the circulation requirements of the cell. At this point, introduce the concept of **cytoplasmic streaming** or **cyclosis** as: *The autonomic (spontaneous) movement of the cytosol. In some plant cells and protozoans, cyclosis occurs regularly. These cells are large and as such diffusion will not be sufficient to distribute the materials. The cytoplasmic streaming serves to overcome this problem.* Composition: Describe the composition of cytoplasm as 90% water and dissolved organic and inorganic substances. FUNCTIONS Given the nature and location of the cytoplasm, ask learners to brainstorm the possible	2. Transcribe into notebooks.	15 min	you tube : (video) bestfactorycellanalogy OHP. Transparency. Chalkboard.

functions that cytoplasm/cytosol may have in the cell. Confirm that the functions of cytoplasm are: • *It is the seat of all metabolic and bio-chemical processes taking place in a cell.* • *It is involved in the storage of raw materials or reserve food required by the cell.* • *It brings about exchange of materials between the cell organelles.* • *It exchanges materials with the surrounding environment such as extra cellular fluid.* RELATING STRUCTURE TO FUNCTION Ask learners to analyse each of the four functions mentioned above and comment on which property of cytoplasm allows it to best perform that function e.g. the function: "seat of all metabolic activities" is suited to the property that the cytoplasm is 90% water and water is the medium for most chemical reactions. **3. CONCLUSION** Consolidate the structural suitability of cytoplasm by briefly recapping its function and location. **Enrichment:** Learners can research the difference between a **suspension**, **emulsion** and **colloidal** solutions and link these to the properties of cytoplasm. Learners can research the term **hyaloplasm**	3. Brainstorm functions of cytoplasm. 4. Transcribe functions into notebooks. 5. Provide links between structure and function.	10 min 10 min	

Reflection/Notes:

Name of Teacher:		**HOD:**	
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GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	6	TOPIC	Cells: The basic units of life	Lesson	1

		DATE COMPLETED:	

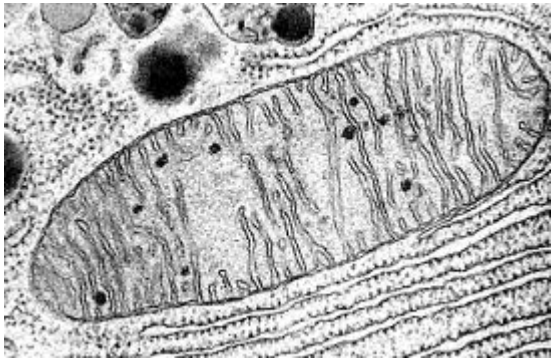
LESSON OBJECTIVES

Content: p. 25 (CAPS) Mitochondria: Release of energy during cell respiration

The learners must be able to:

- **Recognise the mitochondria from micrographs**
- **Draw the mitochondria from micrographs**
- **Locate mitochondria in models/charts**
- **Calculate the size of mitochondria from micrographs**
- **Understand the function of mitochondria as cellular respiration**
- **Make the link between cellular respiration and energy production**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Drawing (facilitation) Self-assessment Model reference **1. Introduction** • Recap and mark previous day's work. • Recall for learners the analogy of the cell to a factory. • Explain that all factories require a source of energy. • Refer to the mitochondria as the "powerhouse" of the cell (grade 9).		5 min	

2. Main Body (Lesson presentation) **MITOCHONDRIA** Structure Place a micrograph of a mitochondria on the OHP (if an OHP is not available, refer learners to a copy of a micrograph in a textbook /provide copies to learners) Have learners convert the micrograph to a line drawing into their notebooks. Provide a rubric/memo for drawings. Ensure that the following are represented in the diagram: - Outer membrane - Inner membrane, thrown into folds called cristae - Matrix Refer learners to the rubric and have them assess their own drawings. Structural suitability Given that the function of the mitochondria is to provide energy for the cell, ask learners how the structure best suits this function. Facilitate the discussion, so that the following list is derived: -The smooth outer membrane allows easy movement of the mitochondria through the cytoplasm - The folded cristae provide an increase in surface area for chemical reactions (like cellular respiration) -The matrix may contain enzymes and other chemicals for the process of cellular respiration Refer to the model/chart of a plant and animal cell and ask learners to locate the mitochondria.  	1. Draw and label the mitochondria. 2. Learners assess their drawings. 3. Answer questions. 4. Transcribe into notebooks. 5. Locate mitochondria on model/chart. 6. Homework: Provide learners with a copy of a micrograph showing a scale line and ask them to calculate the size of a mitochondrion.	20 min 5 min 10 min 5 min	OHP transparency /micrographs of mitochondria. Via Afrika Life Sciences .Grade 10. Via Afrika Publishers (2011) pp. 63-64. Senior Secondary Life Sciences. Kagiso (2008) p. 139. Copy of rubric. OHP. Transparency. Chalkboard. Chart/Model of animal and plant cell. Micrograph of a mitochondrion showing a scale line.

Enrichment: • The more energy a cell requires, the more mitochondria will be present e.g. a muscle cell contains more mitochondria than a blood cell. • DNA is also found in mitochondria. **3. CONCLUSION** Consolidate the location, structure and function of the mitochondria. Emphasise what are to be found in both plant and animals cells in quantities relating to the energy requirements of the cell.			

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
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GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	6	TOPIC	Cells: The basic units of life	Lesson	2

		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 25 (CAPS) Endoplasmic Reticulum(ER) and Ribosomes:

- **Endoplasmic reticulum (rough and smooth) transport systems**
- **Protein synthesis (not the actual process)**

The learners must be able to:

- **Recognise the endoplasmic reticulum from micrographs**
- **Realise that the ER is a membrane continuous with the nuclear membrane**
- **Differentiate between rough ER and smooth ER**
- **Identify the function of the ER as that of transport**
- **Link the structure and location of the ER to its transport function**
- **Realise the structure and location of ribosomes**
- **Know the function of ribosomes (as protein synthesis)**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Demonstration Drawing **1. Introduction** • Recap and mark previous day's work. • Check and correct homework of previous lesson (calculation of organelle size) do remediation if necessary. • Recall for learners the analogy of the cell to a factory. Also remind learners that the purpose of the cell "factory" is the production of proteins and this is exactly the purpose of ribosomes. The products in the "factory" and its waste products also need to be transported, this is the function of the endoplasmic reticulum.		10 min 5 min	

2. Main Body (Lesson presentation) ENDOPLASMIC RETICULUM "Endoplasm" means inside the cytoplasm and "reticulum" means a network. The ER is therefore a network of membranes located within the cytoplasm. Refer to a chart/model of an animal and plant cell. Show learners that the ER is a network of membranes that is continuous with the nuclear membrane and sometimes may extend to the cell membrane. On the model/chart, differentiate between rough and smooth ER. -Rough ER has ribosomes attached -Smooth ER has no ribosomes attached Ask learners to refer back to the micrograph of the mitochondrion and to locate the ER (both rough and smooth) in the micrograph. RIBOSOMES Refer back to the factory analogy. Explain that: The "business" of a cell is to make proteins. The site of protein synthesis is the ribosome. Ribosomes are suitably attached to the ER so that the proteins can be transported to other parts of the cell or to the Golgi body (see later) for packaging. Some ribosomes are found in the cytoplasm. Ribosomes are made up of some protein and RNA. Based on the explanation and prior knowledge, ask learners to summarise the location, composition and function of ribosomes. Ribosomes are also located on the ER which is continuous with the nuclear membrane. The "recipe" or code for the protein to be produced comes from the DNA that is contained within the nucleus. **3. Conclusion** Recap the analogy of the factory and do a quick quiz on the structures encountered thus far and the roles that each represent in the factory analogy. Cell wall Cell membrane Nucleus Cytoplasm Mitochondria Ribosomes Endoplasmic Reticulum	1. Follow the demonstration. 2. Locate ER on micrograph. 3. Summarise into notebooks. 4. Homework: Discuss the relevance of the ribosomes being in such close proximity to the ER and the nucleus.	10 min 10 min 10 min	Model/Chart of plant and animal cells. OHP transparency /micrographs of mitochondria.

Reflection/Notes:

Name of Teacher:		**HOD:**	
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GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	6	TOPIC	Cells: The basic units of life	Lesson	3

		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 25 (CAPS) Golgi apparatus and plastids

- **Golgi – assemble secretions**
- **Plastids – production and storage of food and pigments**

The learners must be able to:

- **Identify the Golgi apparatus in micrographs and line drawings**
- **Understand the role the Golgi plays in cell functioning**
- **Differentiate between:**
  - **Chloroplasts**
  - **Leucoplasts**
  - **Chromoplasts**
- **Recognise that plastids occur in plant cells only**
- **Know the role that each plastid plays in the cell**
- **Draw and label the structure of a chloroplast**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Discussion Brainstorming Drawing an analogy Facilitation (of drawing activity) **1. Introduction** • Recap and mark previous day's work. • Remind learners that the cell has ribosomes that produce proteins. • These proteins need to be transported to other parts of the cell or out of the cell (if the cell has a secretory function). • In order to be effectively transported, the proteins must be packaged (into vesicles). • This "packaging" function is carried out by the Golgi apparatus/body.	1. Answer questions.	10 min	

Introduce plastids as those organelles that occur in plant cells only and have functions related to food production and storage and providing colour.

2. Main Body (Lesson presentation)

GOLGI APPARATUS

Function
Refer to the analogy of the factory and ask learners the role that the Golgi apparatus would play. Listen to their responses and confirm that the Golgi apparatus would be represented by the packaging part of the factory.

The proteins produced by the ribosomes arrive at the Golgi. Here they are packaged into vesicles (which can be likened to little bubbles). The vesicles are then transported away from the Golgi, either to be secreted by the cell or used by the cell itself.

Provide a practical example for learners of cells that have a secretory function.

Example: The cells of the salivary glands. The ribosomes of these cells produce the enzyme (which is a protein). The enzyme is then transported to the Golgi where it is packaged for secretion into vesicles. The vesicles are then transported out of the cells.

Consolidate the entire process by asking learners to do the following match the column activity.

COLUMN A	COLUMN B
1.Chromatin material (DNA)	A. Transport the protein
2.Ribosomes	B. Manufactures the protein
3.Endoplasmic reticulum	C. Packages the protein
4.Golgi apparatus	D. Carries the code for the protein

Structure
Provide learners with an electron micrograph of the Golgi apparatus.
Ask them to draw it, following all the rules of drawing.

PLASTIDS
Function
List the three types of plastids and state the occurrence and function of each in the form of a flow diagram.

2. Transcribe into notebooks.

3. Complete the exercise.

4. Draw the Golgi apparatus into their notebooks.

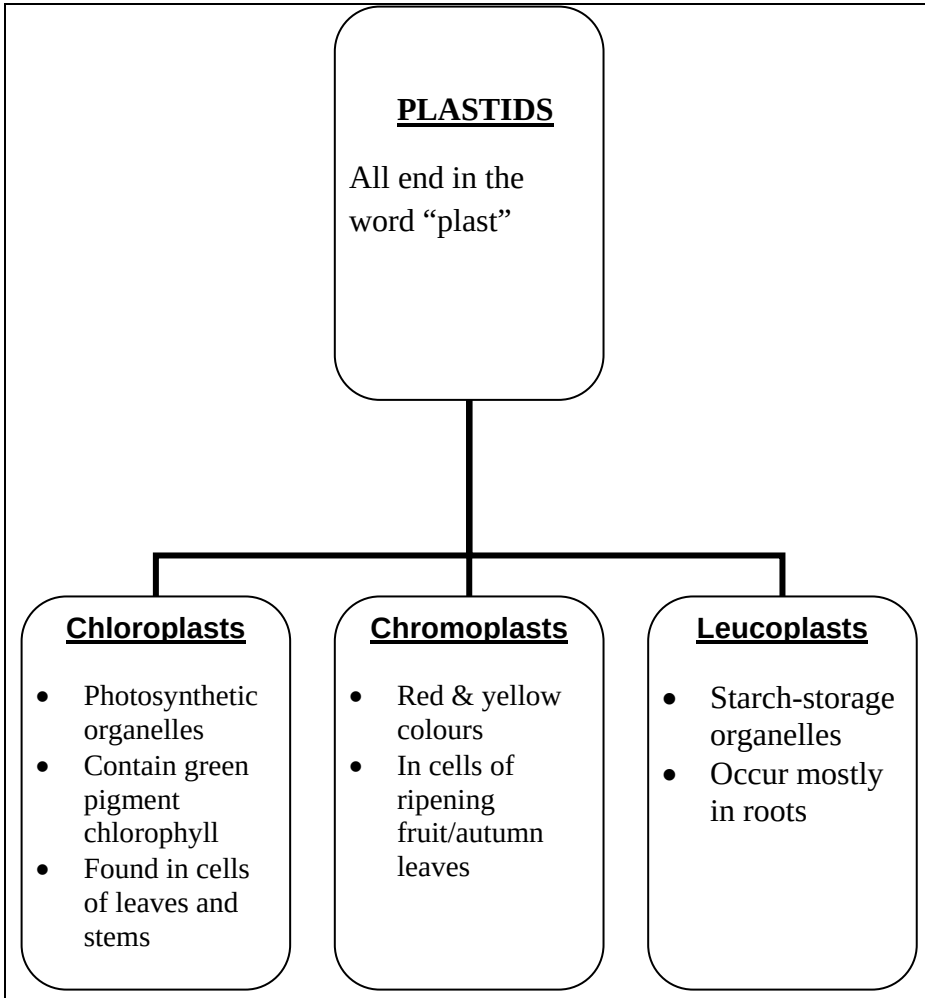
15 min

OHP
Transparency
Chalkboard

Micrograph of the Golgi apparatus.

Via Afrika Life Sciences .Grade 10. Via Afrika Publishers (2011) p. 63.

Life Sciences for all.Macmillan (2008) p. 221
OHP.
Chalkboard.
Transparency/ handout.



Structure
(only the structure of the chloroplast is necessary)
Provide learners with a diagram of a chloroplast and have them transcribe it into their notebooks.
The diagram of the chloroplast must include the following labels:

- Double outer membrane
- Thylakoids
- Grana
- Stroma

5. Transcribe planogram into notebooks.

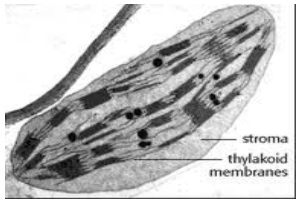
10 min

Micrographs.
Pictures.
Model/chart

6. Draw diagram into notebooks.

10 min

7. Differentiate between the

[Note: the structure of the mitochondria and the chloroplast are very similar. Ensure that learners are able to distinguish between the two in micrographs/models/charts as well as line diagrams.]   MITOCHONDRION CHLOROPLAST **3. CONCLUSION** Recap the functions of the Golgi apparatus and plastids. **Enrichment:** The Golgi apparatus in plant cells is called a dictyosome.	two organelles. 8. Homework: Explain how the chloroplast is structurally suited for its role in photosynthesis.		

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	6	TOPIC	Cells: The basic units of life	Lesson	4

		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 25 (CAPS) Vacuoles, lysosomes, vesicles, centrosome: Plant and animal cells:

- **Storage, digestion, osmoregulation**
- **Cell division structure (centrosome)**
- **Differences between plant and animal cells**

The learners must be able to:

- **Recognise the different types of vacuoles that occur**
- **Understand the essential functions of vacuoles as that of storage**
- **Know the different types of vacuoles that occur:**
  -Food vacuole
  -Contractile vacuole
  -Lysosome
- **Recognise that a vacuole is a type of vesicle (membranous container)**
- **Identify the vacuoles in models and charts**
- **Differentiate between the large, central vacuole in plant cells and the smaller, more numerous vacuoles in animal cells**
- **Recognise the structure of the centrosome**
- **Realise the basic function of the centrosome**
- **Tabulate the essential differences between plant and animal cells**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Explanation Model reference Dictation **1. Introduction** • Recap and mark previous day's work. • Introduce vacuoles as "fluid-filled balloons". • Explain that there are different types of vacuoles with different functions.		5 min	

2. Main Body (Lesson presentation)

VACUOLES

Structure

Explain that essentially vacuoles are membranous structures filled with fluid. Unlike plastids they are enclosed by a single membrane

Show on a chart/model that a plant cell has a large centralised vacuole, compared to an animal cell that has smaller vacuoles.

In plant cells, the membrane is called a **tonoplast** and the fluid is called **cell sap.**

Draw and label a plant cell onto the chalkboard/OHP and indicate a large centralised vacuole. Label the tonoplast and cell sap. Learners to transcribe into their notebooks.

(Dictate the functions of a plant cell vacuole)

Function

Vacuoles in plants have the following functions:

- Storage of water and minerals
- Transport of substances from one part of the cell to another
- Osmosis from one cell to another
- Provides support(turgidity) for the cell

Construct a table, showing the different types of animal vacuoles and the functions they perform.

VACUOLE	CONTENTS	FUNCTION
Lysosome	Digestive enzymes	(intracellular)Digestion
Contractile vacuole	Water	Osmoregulation
Food vacuole	Digested food particles	Distribution of nutrients

Explain the functioning of a food vacuole and that of a contractile vacuole (use an animation).

CENTROSOME

[Note: although the centrosome is not mentioned in the CAPS document, it is useful to introduce it here as it will be mentioned in the section on mitosis].

Structure

Mention that the centrosome is an organelle that is made up of two **centrioles** that lie at right angles to each other and is only found in animal cells.

Function

It is sufficient to mention that the centrosome *plays a role in cell division.*

1. Draw and label the plant cell vacuole.
2. Transcribe functions of plant vacuoles into notebook.
3. Transcribe table into notebooks.
4. Draw centrosome into notebooks.
5. Transcribe into notebooks.

10 min

10 min

5 min

Chart/Model of animal and plant cell.

OHP.
Transparency.
Chalkboard.

Chart/Model of animal and plant cell.

Show learners the structure of the centrosome (and two centrioles) on the OHP/chalkboard /model or chart. PLANT AND ANIMAL CELLS: THE DIFFERENCE Put up a blank table on the chalkboard/OHP. Brainstorm with learners the differences that occur between plant and animal cells. As they provide differences, fill them into the table. **3. CONCLUSION** Recap the different vacuole types. Remind learners of the differences encountered between plant and animal cells. Ask them to revise these for the activity to follow on the next day. Also ask learners to review all the cell organelles encountered so far (their structure and function). Ask learners to bring in scissors and glue for the activity for the next day.	6. Suggest differences between plant and animal cells. 7. Transcribe table into notebooks. 8. Homework: Revise the structure and functions of all the cell components.	15 min	

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	6	TOPIC	Molecules for life: Organic compounds	Lesson	5

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	
LESSON OBJECTIVES	**Content: p. 25 (CAPS) Cell structure and function: Role of organelles** **The learners must be able to:** • **Recognise the basic difference between the outline of a plant cell and an animal cell.** • **Recognise an organelle when given its structure and be able to name it** • **Select the function of each organelle from a list of functions** • **Identify which organelles belong to a plant cell and which belong to an animal cell**		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Facilitation of activity **1. Introduction** • Recap and mark previous day's work. • Remind learners that they were asked to revise the names of all the components of both plant and animal cells. • Explain that they are going to conduct an activity that will require them to put together all they have learnt over the past three weeks.	1. Do remediation, if necessary.	5 min	
2. Main Body (Lesson presentation) 1. Present learners with the outline (on A3 paper) of • A plant cell • An animal cell 2. Give each learner two copies (on A4 paper) of: A) a list of cell component names B) diagrams of individual cell components C) a list of organelle functions (all of these have been provided as an addendum)	2. Establish which is the outline of the plant cell and which is the outline of the animal cell. 3. Cut out the cell component diagrams. 4. Decide which diagram belong to a plant cell and which ones belong in a an animal cell.	40 min	Copies of the worksheets. Scissors. Glue.

The objective of this exercise is for learners to cut out the diagram of the structure and paste it into the cell outline. They must then cut out its name and label it, and then next to each label, cut and paste the associated function. The objective is for learners to select which components belong in a plant cell and which belong to an animal cell.	5. Paste the structures into the cell outline. 6. Cut out the list of component names. 7. Paste the relevant name as a label to its corresponding structure. 8. Find the relevant function/property and paste alongside.		

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

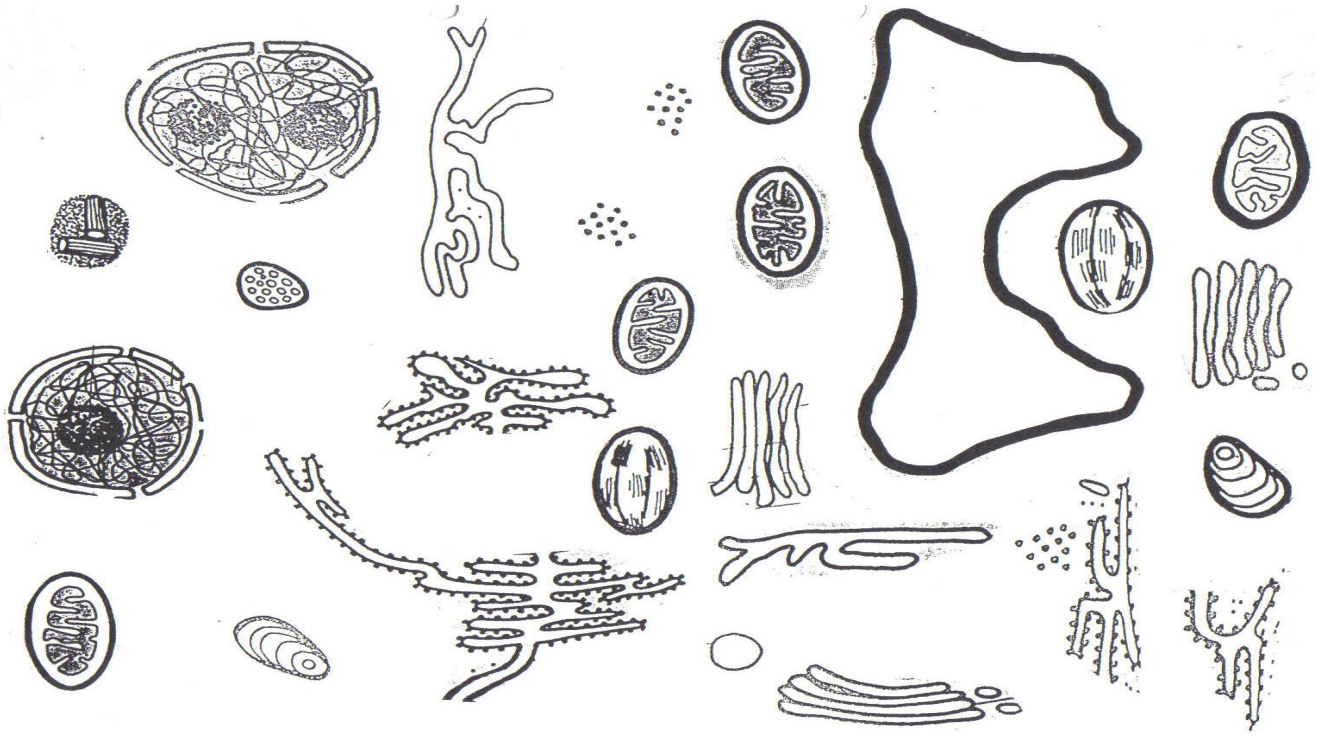
LIST OF STRUCTURES

CYTOPLASM	**CENTROSOME**
NUCLEUS	**LEUCOPLAST**
CELL MEMBRANE	**CONTRACTILE VACUOLE**
PRIMARY CELL WALL	**NUCLEOLUS**
SECONDARY CELL WALL	**NUCLEAR PORES**
CHROMATIN NETWORK	**GOLGI APPARATUS**
NUCLEAR MEMBRANE	**DICTYOSOME**
CHLOROPLAST	**ROUGH ENDOPLASMIC RETICULUM**
MITOCHONDRION	**SMOOTH ENDOPLASMIC RETICULUM**
LYSOSOME	**RIBOSOMES**

LIST OF FUNCTIONS/PROPERTIES

Transparent jelly-like material that contains dissolved substances
Controls substances entering and leaving the cell (fluid mosaic)
Thread-like structures containing DNA

Made up of lignin –serves a strengthening function
Made up of cellulose –serves a supportive function
The control centre of the cell
Allows the entry of substances into and out of the nucleus
Contains the photosynthetic pigment
Involved in cell division
Also called the “powerhouse” of the cell
Contains enzymes used for digestion
Secretes vesicles - a “packaging” function
Protein synthesis
Plastid that stores starch
Contains RNA - located in nucleus
Forms a network in the cell - transport function
“Packaging” structure - in plant cells
Plays a role in osmoregulation
Forms a network in the cell - has ribosomes attached
Surrounds the nucleus

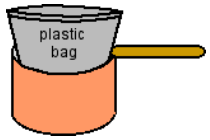
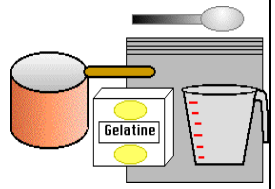


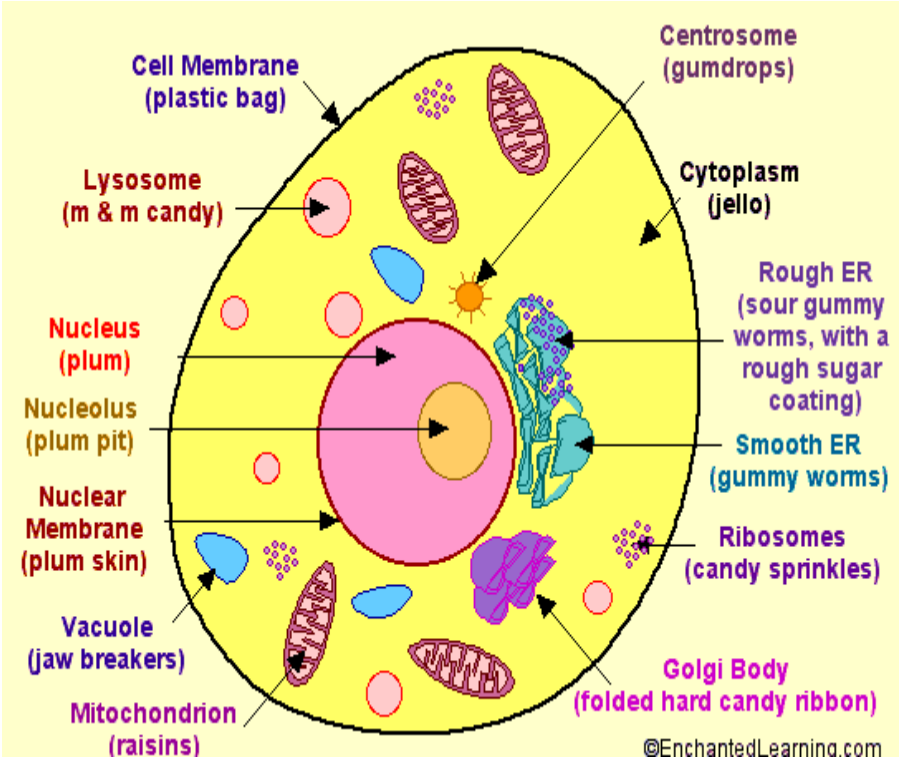
CELL COMPONENT DIAGRAMS

GRADE	10	SUBJECT	LIFE SCIENCES	WEEK	7	TOPIC	Molecules for life: Organic compounds	Lesson	1

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	
LESSON OBJECTIVES	**Content: p. 25 (CAPS) Cell structure and function role of organelles** **The learners must be able to:** • **Identify all the components of an animal cell** • **Understand the concept of a model as a structural representation of a cell** • **Follow instructions to build a model of an animal cell** • **Identify what cell component is represented by each part of the model**		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Facilitation of practical activity **1. Introduction** • Mark and recap previous day's work • Explain to learners that they are going to follow instructions on a worksheet to make a model of an animal cell. • Divide the learners into groups of three to four.			

2. Main Body (Lesson presentation) Make the light-colored Jelly or gelatin, but make it with a bit less water than the instructions call for (this will make the gelatin a little stiffer and will make the cell components stay in place better). The gelatin will represent the cytoplasm of the cell. First, heat the water to boiling  (use about three-quarters of what is called for in the instructions). Dissolve the gelatin in the hot water and carefully stir it. Carefully add the same amount of cold water. Place an open plastic bag inside a sturdy container (like a large bowl or pan) this makes pouring the Jelly easier.  Slowly pour the cooled gelatin into the bag,make sure that there is room in the bag for all the cell components that will be added later. Seal the bag and put it in the refrigerator. When the gelatine is almost set (this takes about an hour and start adding the compc	Follow instructions to build an animal cell.	30 min	Gelatine, either a light-coloured Jelly (like lemon) or unflavoured gelatine with sugar or juice added.  Water. Spoon (to stir the gelatine). Microwave or stove (used to heat the water). A small but sturdy plastic bag to make the gelatine in (we used 1litre ziplock bags). Various fruits and candies used to represent the parts of the cell: raisins, gummy worms (plain and sour), gumdrops, gum ball, jelly beans, grapes, mandarin orange sections, sprinkles, M&M's, jaw breakers, a small stone fruit (like a plum), dried fruit, and/or hard sweets.



Cell components (These are merely suggestions, but any available components may be used):
cell membrane the thin layer of protein and fat that surrounds the cell. It is represented by the plastic bag.
centrosome a small body located near the nucleus. During cell division (mitosis), the centrosome divides and the two parts move to opposite sides of the dividing cell. It is represented by a gum ball.
cytoplasm the jellylike material outside the cell nucleus in which the organelles are located. It is represented by the gelatine.
Golgi body (also called the Golgi apparatus or Golgi complex) a flattened, layered, sac-like organelle that looks like a stack of pancakes and is located near the nucleus. It produces the membranes that surround the lysosomes. The

Learners to produce a key, showing what cell component, each part of the model represents.

15 min

Note: marshmallows will float on top of the gelatine, so they don't work well in this craft.

Refrigerator (used to set the gelatine).

Golgi body packages proteins and carbohydrates into membrane bound vesicles for "export" from the cell. It is represented by folded ribbons of hard sweets. Sour strips may also be used. **lysosomes** (also called cell vesicles) round organelles surrounded by a membrane and containing digestive enzymes. This is where the digestion of cell nutrients takes place. They are represented by M&M's or "Smarties". **mitochondria** - spherical to rod-shaped organelles with a double membrane. The inner membrane is infolded many times, forming a series of projections (called cristae). The mitochondrion converts the energy stored in glucose into ATP (adenosine triphosphate) for the cell. They are represented by raisins. **nuclear membrane** the membrane that surrounds the nucleus. It is represented by the plum's skin. **nucleolus** an organelle within the nucleus - it is where ribosomal RNA is produced. Some cells have more than one nucleolus. It is represented by the plum pit. **nucleus** spherical body containing many organelles, including the nucleolus. The nucleus controls many of the functions of the cell (by controlling protein synthesis) and contains DNA (in chromosomes). It is represented by the plum. **ribosomes** small organelles composed of RNA-rich cytoplasmic granules that are sites of protein synthesis. They are represented by candy sprinkles. **rough endoplasmic reticulum** (rough ER) a vast system of interconnected, membranous infolded and convoluted sacs, that are located in the cell's cytoplasm (the ER is continuous with the outer nuclear membrane). Rough ER is covered with ribosomes that give it a rough appearance. Rough ER transports materials through the cell. It is represented by sour gummy worms. **smooth endoplasmic reticulum** (smooth ER) a vast system of interconnected, membranous infolded and convoluted tubes, that are located in the cell's cytoplasm (the ER is continuous with the outer nuclear membrane). The space within the ER is called the ER lumen. Smooth ER transports materials through the cell. It contains enzymes and produces and digests lipids (fats) and membrane proteins. Smooth ER buds off from rough ER, moving the newly-made proteins and lipids to the Golgi body, lysosomes, and membranes. It is represented by gummy worms. **vacuoles** fluid-filled, membrane-surrounded cavities inside a cell. The vacuole fills with food being digested and waste material that is on its way out of the cell. They are represented by jaw breakers.			

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	7	TOPIC	Cell division	Lesson	2

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 25+26 (CAPS)

- **Nucleus and its structures; focus on chromatin network**
- **Chromosome structure, Chromatids and centromere**

The learners must be able to:

- **Understand that chromosomes are the product of chromatin network**
- **State the differences between chromosome and chromatin network**
- **Draw and label the structure of the chromosome**
- **Understand and apply the skills for life sciences drawings**
- **Build and explain the structure of chromosomes using wool**
- **Answer questions based on chromosomes**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Practical work 02/03/2012 **NB.** Instruct learners to group themselves into groups of 5-7 learners per group and do the following in the school garden**, (two weeks before lesson presentation)**: One member must provide a potato for the group. **The educator** must cut the potato for each group into halves, allow learners to select a spot in the garden, plant it, cover it with soil and water the potato every two days for two weeks. **1. Introduction** • Pre-knowledge: structure of the nucleus. • Mark and recap previous day's work.			

2. Main Body (Lesson presentation) Organise learners into pairs. Educator provides learners with the unlabelled diagram of a plant or animal cell. Review the structure of plant and animal cell with learners, focussing on the nucleus. Allow learners to identify nucleus from plant or animal cell from the unlabelled drawings of plant or animal cell. Ask learners the following questions: ➢ What are the two major functions of the nucleus? (Grade 9 work) **(Controls the activities of the cell and transmit hereditary characteristics)** ➢ Name four structures that form the nucleus. **(nucleolus, double nuclear membrane, chromatin network and nucleoplasm)** Use chart, chalkboard for learners to identify different parts of the nucleus that they have mentioned. ➢ Ask learners if any one of them was told by anybody that she/he looks the same as his/her mother or father. **(yes)** Explain to the learners that for them to resemble their parents, it is because of the nucleus (chromatin network which they have already identified). Indicate to the learners that this involves different stages in which the cell divides. This type of cell division is called MITOSIS. Explain to the learners that before the cell divides, the following must occur in the cell: ➢ Chromatin network threadlike structure (thin) forms. ➢ Chromosomes are now thick. ➢ DNA inside and a piece of this(DNA) form: Genes that control who we are (behaviour and appearance). ➢ Learners must follow the sequence, before (chromatin network) and after (new cells with same genetic material) cell division. Explain the structure of a chromosome: ➢ 2 Chromatids with DNA inside held together by centromere. ➢ Use chalkboard and draw the structure of the chromosome. Show learners different parts of it.	1. Follow instructions. 2. Work in pairs (construction of chromosomes using wool). 3. Drawing the structure of the chromosomes and labelling it. 4. Peer assessment. 5. Respond to the oral questions. 6. Provide feedback to other learners. 7. Class work exercise. 8. Homework: A) Draw a fully labelled structure of the chromosome. State the similarities between chromosome and chromatin network. **(They both transmit hereditary characteristic)**	20 min 10 min	Unlabelled diagram of plant cell or animal cell. Chalkboard or colourful chart of plant or animal cell. Homework books. 4 pieces of 30cm wool, 1 piece of 15cm wool. Paper glue. Understanding Life Sciences grade 10, Learners book p. 145. Via Africa, Life Sciences grade 10, learners book p. 68. Chalkboard. Life Sciences for all, NCS Updated, pp. 221 and

Summarise the structure of the nucleus and explain how chromosomes are formed and their importance in the cell. Give learners homework. Give learners instructions to construct the structure of the chromosome, using 4 pieces 30cm red wool and 15cm white wool. Each pair must draw and label what they have constructed**.** (Consider criteria for life Sciences drawings) Provide rubric for each pair. Let learners exchange their work (pairs). Assist learners on how to mark by using the rubric. **Oral questions:** Why did they use the same colour on the chromatids? (**using same colour on the chromatids represents the same structure and same content)** Why was white wool placed on the middle? **(it represents the centromere)** **3. Conclusion** Use a chalkboard and draw a flow chart to illustrate the relationship between the chromosomes and chromatin network, chromosome and DNA, DNA and genes. Provide notes (understanding Life Sciences grade 10).		10 min 5 min	222, activity 7.7 1 A4 paper per group. Animal and plant cell chart.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	7	TOPIC	Cell division	Lesson	3

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES	**Content: p. 26 (CAPS)** • **Division of the cell to form two identical cells** • **Using diagrams to show arrangement of the chromosomes in the production of identical cells** **The learners must be able to:** • **Answer questions based on production of identical cells** • **Follow instructions** • **Observe how potatoes reproduce** • **Relate the reproduction of potatoes and the development of shoots and roots to mitosis** • **Observe and notice the changes in the potato**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Discovery/research Discussion Teacher direct instruction Quiz			
1. Introduction • Before lesson presentation, ensure that learners are grouped same way when they planted the pieces of potato. • Mark and recap previous day's work.	1. Work in groups (planting potato, identifying observation 20/01/2012).	5 min	School garden.

• Pre-knowledge: The structure of chromosomes. Base line Questions: ➢ What are the functions of chromosomes? **(Transmit hereditary characteristic to the new organism).** ➢ Name the structures of a chromosome. **(chromatids, centromere).** **2. Main Body (Lesson presentation)** Present two pieces of a potato showing the development of roots and shoots. ➢ Ask learners to state their observation. Learners write their observations on the A4 paper, provided by the educator. ➢ Each group must nominate one member to report back on their observations. ➢ After learners' feedback in groups, ask learners the following oral questions: **1.** How many potatoes did each member of the group submit 2 weeks back? **(one)** **2.** How many pieces had each group manage to cut? **(two)** **3.** How many plants of potato will develop from the two pieces? **(two)** 4. From how many potatoes did they develop? **(one)** **5.** What is your conclusion about the number of potato plants? **(they will double/increase, they will be the same)** 6. What do we call the process where organisms increase their numbers to ensure continuity of their species? **(Reproduction)** **7.** Which type of cell division is responsible for the above process? **(mitosis)** 8. How do potatoes reproduce? **(Asexually)** **9.** Will the plants look different? **(No)** 10. Give reason for your answer. **(They were reproduced by mitosis, during this process one cell produces two identical daughter cells)** Give learners other examples of reproduction by mitosis e.g. sugar cane, etc.	2. Drawing the structure of a dividing cell through mitosis. 3. Peer assessment. 4. Respond to the oral questions. 5. Provide feedback to other learners. 6. Brainstorm (feedback given by the groups). 7. Class work exercise.	20 min 10 min	Chalkboard. Potatoes with developing roots and shoots. A4 paper.

Class work: Draw and indicate the number of chromosomes in the daughter cells when a parent cell with 10 chromosomes divides by mitosis. (Consider the following: caption, number of chromosomes in the new cell, number of new cells). **3. Conclusion** Use a chalkboard to draw diagrams of a cell dividing by mitosis, focus on the number of chromosomes inside the parent cell and the new daughter cells. Use charts to summarise how cells divide by mitosis.		5 min	Class work book. Understanding Life Sciences grade 10 p. 185, Life Sciences for all grade 10 p. 224.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	Week 7	TOPIC	Cell division/Mitosis	Lesson	4

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	
LESSON OBJECTIVES	**Content: p. 26 (CAPS) Cell cycle: Growth and division of the cell including interphase** **The learners must be able to:** • **Understand why mitosis occurs in an organism** • **Differentiate between growth and cell division** • **How mitosis occurs in plant and animal cells**		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Demonstration method Question and answer method Brainstorming **1. Introduction** • Pre-knowledge: ➢ The structure of the plant cell and animal cell. ➢ The structure of the chromosome. • Mark and recap previous day's work.	1. Work in groups. 2. Brainstorm. 3. Respond to the questions. 4. Take notes. 5. Write class work.	10 min	Provide each learner with a rubric containing the criteria listed in the homework instruction (self assessment).

Brainstorming questions: Why is it necessary for the cell to be so small? **(To ensure that materials like food and waste products enter and leave the cell faster)** What will happen soon after the cell grows bigger? **(The fully matured cell divides by mitosis to form new identical cells**)			
2. Main Body (Lesson presentation)		10 min	Understanding Life Sciences grade 10 p. 184
Explain to the learners that the cycle of cell division starts when the new cell is formed and ends when matured cell divide into two cells. Explain to learners that the cycle is divided into two parts: **Interphase** (the growth of the cell in preparation for division). **Mitosis** (cell division including the phases/nuclear and cytoplasm division). **INTERPHASE AND CHROMOSOMES** ➢ Takes up to 90% of the cell cycle. ➢ The cell increases in size and carries out its functions. ➢ DNA replicates to produce two sets (of DNA). Remind learners by asking them questions on the chromosomes. Which structure in the cell is responsible to form the chromosomes? **(Chromatin material)** Where in the cell can the chromosomes be found? **(In the nucleus)** **PURPOSE OF MITOSIS** 1 Growth: multi cellular living organisms need cell division to grow; they start as a single cell and divide to form many cells. 2 Repair: worn out or dead cells are replaced through cell division. 3 Reproduction: single celled organisms reproduce by cell division.			Via Afrika Life Sciences grade 10 p. 69

SITES OF MITOSIS IN LIVING ORGANISMS **In Plants:** Mitosis occurs in the **apical meristem** tissues on the tip of roots, stems and buds. In **lateral meristem** tissues underneath the bark. **In Animals:** Mitosis occurs in the specific organs, like **bone marrow** and the **skin** basal layer. Hands on practical (size of the cell and nutrients uptake)			Via Afrika Life Sciences grade 10 p. 69. Via Afrika Life Sciences grade 10 (p. 78) summary on the growth and division of the cell.
3. Conclusion **Summary on how and why the cell has to divide.** The cell consists of the cytoplasm as the internal environment. A cell is a tiny structure. When the cell gets bigger, it becomes harder for the cell to transport nutrients into the cytoplasm, and to get rid of waste. When the cell is unable to pump substances in and out of the membrane fast enough, to keep the internal condition of the cell balanced, it will die. When the cell grows too big, it must divide as a possible solution to the problem. It is important for the cell to divide through mitosis so that damaged cells can be replaced, organisms can reproduce and organisms can grow. Mitosis occurs in apical and lateral meristem in plants, in animals it occurs in bone marrow and the skin.		20min 5 min	

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	7	TOPIC	Cell division	Lesson	5

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	
LESSON OBJECTIVES	**Content: p. 26(CAPS) The cell cycle: Mitosis (prophase, metaphase and telophase including cytokinesis)** **The learners must be able to:** • **Understand the phases of mitosis** • **Differentiate the phases of mitosis in a diagram** • **How mitosis occurs in the plant cell and animal cell** • **Understand nuclear and cytoplasm division** • **Understand the role of centriole in the animal cell**		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Demonstration Questions and answers Independent learning Inclusive teaching and learning			
1. Introduction • Pre-knowledge: Chromosome structure, growth of the cell and cell division, purpose of mitosis in plant and animals, location where mitosis occurs. • Mark and recap previous day's work. **Oral questions:** The cell cycle is divided into how many parts? **(Two parts)** Name the two parts in which cell cycle is divided. **(Interphase and mitosis)** Which of the two parts is regarded as the longest stage? **(Interphase)**	1. Individual work. 2. Respond to the oral questions. 3. Self assessment. 4. Provide feedback to other learners. 5. Homework exercise. 6. Brainstorm.	10 min	4 pieces of 30 cm wool, 1piece of 15 cm wool. Paper glue. 1 A4 paper per group. Structure made up of the wool.

What is the reason for the above mentioned stage to be so long? **(The cell prepares itself for cell division, DNA duplicates)** **2. Main Body (Lesson presentation)** Explain to the learners that DNA duplicates to ensure that the newly formed cells are identical. The stage where the cell starts to divide is called prophase. It is made up of two major divisions: **nuclear division** and **cytoplasm** division. Explain to the learners that mitosis in cell division is made up of four phases, namely: prophase, metaphase, anaphase and telophase. Provide key for the learners to follow the sequence of mitosis phases. E.g. **PROMEANTE** **PRO**- PROPHASE **ME**- METAPHASE **AN**- ANAPHASE **TE**- TELOPHASE Explain to the learners that they should focus on the number of chromosomes in the cell to identify the differences in the phases. **PROPHASE** Cell is ready for division. Nuclear membrane starts to disintegrate. Chromosomes are visible (remind learners the structure of chromosomes). Spindle fibres are formed from the centrosomes. Centrosomes move towards the opposite poles. **Centrosomes only found in the animal cell.**		25 min	Homework book. Provide each learner with a rubric containing the criteria listed in the homework instruction (Self Assessment). Understanding Life Sciences grade 10 p. 184.

METAPHASE Nuclear membrane has disintegrated. Chromosomes line up on the equator. Each chromosome attached on the centromere by each spindle fibre. **ANAPHASE** Centromere of each chromosome split on the centre due to the contraction of the spindle fibres and form the sister chromatids. Sister chromatids move to the opposite poles, and they are then called the daughter chromosomes. Two sets of chromosomes appear. **TELOPHASE** Cytokines starts by the cell membrane which constricts at the equator. Nuclear membrane and nucleolus appear in each daughter cell. Each daughter cell has the same number of the chromosomes as the parent. **Homework:** Use micrographs of the dividing cells and allow learners to rearrange them, from the first phase to the last. Ask them to write reasons next to the identified micrograph. **3. Conclusion:** Use chart or text book with phases of mitosis to summarise the lesson.		10 min	Via Afrika Life Sciences grade 10 p. 71 or 72. Chart or textbook Via Afrika Life Sciences grade 10 p. 71. Understanding Life Sciences grade 10 p. 186.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	8	TOPIC	Cell division	Lesson	1

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	
LESSON OBJECTIVES	**Content: p. 26 (CAPS) The cell cycle: Mitosis (prophase, metaphase and telophase including cytokinesis)** **The learners must be able to:** • **Handle and use a microscope correctly** • **Prepare a wet mount using roots of an onion** • **Build on the knowledge of the structure of plant and animal cells, as well as the need for growth and cell division** • **Outline the places where cell division occurs and how the cell cycle assist in providing growth** • **Outline the process of mitosis and the nature of each of its stages in the plant cell**		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Hands on practical Inclusive teaching and learning Group work **1. Introduction** • **Pre-knowledge**: phases of mitosis, growth of the cell and cell division, purpose of mitosis in plant and animals, location where mitosis occurs. • Mark and recap previous day's work.	1. Individual work. 2. Respond to the oral questions. 3. Self assessment. 4. Provide feedback. 5. Class work exercise.		Onions with 5cm roots, pre-grown for 2 months over water in a jar. Microscope slide, cover slip and water.

INTRODUCTION Practice sessions with orientation of the microscope. Allow the learners to complete the practical investigating of mitosis in onion cells.	6. Brainstorming. 7. Observe the cells through a microscope.	10 min	Pictures, bio viewer slides and prepared onion root meristemetic tissue. Scientific or self made models of plant cells undergoing the stages of mitosis.
2. Main Body (Lesson presentation) METHOD: ➢ Put the base of the onion bulb in a beaker of water. ➢ Put a beaker in a dark cupboard until the roots have grown 30mm. ➢ Cut off 5mm of the root tips and put them in the saucer. ➢ Cover the tips with drops of aceto-orcein solution and a drop of diluted hydrochloric acid. Warm the saucer gently. ➢ Place 1mm of the root tip on the slide. Cover it with the drop of the aceto-orcein. ➢ Cover the tip with cover slip. Gently tap on the cover slip until the tip spreads to form a thin rose-coloured layer. ➢ Remove excess fluid with a paper tissue. ➢ Study the cell under low magnification. Identify chromosomes and try to see the various stages of cell division. Allow the learners to complete the practical investigating of mitosis in onion cells. **Class activity** Draw and label the stages of mitosis you are observing. Explain what is happening to the chromatin material in each of the cells.		25 min	4 pieces of 30cm wool, 1piece of 15cm wool. Paper glue. 1 A4 paper per group. Structure made up of the wool. Homework book. Provide each learner with a rubric containing the criteria listed in the homework instruction. (Self assessment)

3. Conclusion Use transparencies of relevant mitosis phases to clarify and organise concept map. Use flash cards to reinforce: interphase, metaphase, anaphase, cytokinesis and karyokinesis, chromosomes, chromatids, centromere, spindle fibres, centrosome.		10 min	Via Afrika Life Sciences grade 10 p. 73. Class work book. Transparencies, mind map and flash cards.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	8	TOPIC	Cell division	Lesson	2

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES	**Content: p. 26 (CAPS)** • **Nucleus and its structures: focus on chromatin network** • **Chromosome structure, chromatids and centromere** **CONSOLIDATION OF LESSON 1** **The learners must be able to:** • **Understand that chromosomes are the product of chromatin network** • **State the differences between chromosome and chromatin network** • **Draw and label the structure of the chromosome** • **Understand and apply the skills for life sciences drawing** • **Build and explain the structure of the chromosome** • **Answer questions based on chromosomes**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Demonstration Questions and answers **1. Introduction** • Pre-knowledge: The structure of the chromosome. • Mark and recap previous day's work. **2. Main Body (Lesson presentation)** Group learners into pairs. Give learners instructions to construct the structure of the chromosome, using 4 pieces 30cm red wool, 15cm white wool. Each pair must draw and label what they have constructed. (consider criteria for life Sciences drawings)	1. Work in pairs (construction of chromosomes using wool). 2. Draw the structure of chromosomes and label it. 3. Peer assessment. 4. Respond to oral questions. 5. Self assessment. 6. Provide feedback to other learners. 7. Homework exercise.	5min 30 min	4 pieces of 30cm wool, 1piece of 15cm wool. Paper glue. 1 A4 paper per group.

Provide rubric for each pair. Let learners exchange their work (pairs). Assist learners on how to mark using the rubric. **Oral questions:** Why did they use same colour on the chromatids? **(using same colour on the chromatids represent same structure and same content)** Why white wool was placed on the middle? **(it represent the centromere)** Allow learners to brainstorm their answers. **Homework:** Draw a fully labelled structure of the chromosome. Consider the following when completing homework (use rubric): ➢ heading ➢ label lines on the right side of the drawing ➢ no arrows used ➢ no crossing lines ➢ no shading ➢ correct proportion ➢ three labels given State the differences between chromosome and chromatin network. **(Chromatin network is a thin structure, become thick during cell division to form chromosomes).** State the similarities between chromosome and chromatin network. **(They both transmit hereditary characteristic)** **3. Conclusion** Use a chalkboard and draw a flow chart to illustrate the relationship between the chromosomes and chromatin network, chromosome and DNA, DNA and genes. Provide notes.		5 min 5 min	Structure made up of the wools. Homework book. Provide each learner with a rubric containing the criteria listed in the homework instruction (Self Assessment). Understanding Life Sciences grade 10 p. 184.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	8	TOPIC	Cell division	Lesson	3

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES	**Content**: pp. **26 (CAPS) Cancer: Uncontrolled cell division and growth (cause of cancer)** • **Brief discussion of the beliefs and attitude concerning cancer** • **Treatment of cancer** • **Medical biotechnology e.g. radiotherapy, chemotherapy (no detail required)** **The learners must be able to:** • **Differentiate between the media hype and accurate scientific information as well as cultural and personal opinion, misconception, beliefs, attitude and values** • **Correct the beliefs and attitude that may not be valid** • **Fixed ideas which treatment is best** • **Know and understand scientific terms**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Inclusive teaching and learning Independent learning Remedial assistance **Lesson preparation** Take into consideration emotional responds from learners with family members suffering from cancer. **1. Introduction** • Pre-knowledge: Cell cycle: mitosis. Purpose of mitosis in the living organisms. • Mark and recap previous day's work. • Explain to the learners that people have different feelings, attitudes, beliefs and opinions about cancer, its causes and its cures. The media provides many resources, some are factual, some are opinionated and some are misconceptions. • **Base line Questions:** • What is the purpose of mitosis in living organisms? **(Growth, repair and reproduction)** • What will happen if the cells grow uncontrollably? **(Level of the affected tissue/skin will become uneven, tumour development)**	1. Write notes. 2. Answer oral questions.	10 min	Chalkboard.

2. Main Body (Lesson presentation) Explain to the learners that the cell cycle is controlled by signals when body cells divide, when cells gets older and die. However, some cells ignore the signal and they carry on dividing to form a mass of cells. The abnormal development of the cells is known as cancer. They cause different cancers, depending on where they are. Cancer is dangerous because it can spread and affect healthy organs. CAUSES OF CANCER Explain to the learners that cancer starts when the normal cell has genetic change that affects the cell cycle control system. If the cell is not killed normally by the body's immune system, a tumour develops. Explain to the learners that there are two types of tumours. Benign tumours not cancerous, it does not spread. Malignant tumours cancerous it can spread and invade other organs and tissues. Learners should understand that malignant tumours cause cancer. There are three different types of cancer: ➢ Leukaemia cancer of the blood. ➢ Sarcomas cancer of bones, cartilage and muscles. ➢ Carcinomas skin and glands cancer. Explain to the learners the factors that cause cancer is regarded as carcinogens. Give learners examples of carcinogens. Allow them to state how they think the listed carcinogens cause cancer: • Radiation. • Smoking. • Processed food. • Viruses. • Pollutants and pesticides. TREATMENT OF CANCER Explain to the learners that there are more than 200 different types of cancers. Different methods are used to treat cancer, depending where the cancer is:	3. Clear their misconceptions about cancer. 4. Brainstorming: State their views.	30 min	Via Afrika Life Sciences grade 10 pp. 74-78. Potatoes with developing roots and shoots. A4 paper.

Medical biotechnology. Explain to learners: surgery, chemotherapy and radiotherapy. Traditional technology. Explain alternative therapies, herbs, prayer and positive thinking. ASSIGNMENT (ESSAY) **3. Conclusion:** Summarise the lesson using chalkboard outlining the key words and new terminologies. Provide summary notes (text book).	6. Write essay: communicate with parents and relatives. Read more textbooks, visit internet. 7. Highlight key words in the summary provided.	7 days, including weekend 5 min	Via Afrika Life Sciences grade 10 p. 77. Rubric for marking the essay pp. 100-101 teachers guide. Via Afrika, Life sciences grade 10 p. 78, cancer.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	8	TOPIC	Cell division	Lesson	4

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES	**Content: p. 26 (CAPS) 1st Consolidation lesson on phases of mitosis** • **The cell cycle: Mitosis (phases: prophase, metaphase and telophase including cytokinesis)** **The learners must be able to:** • **Know the differences between body cells and sex cell** • **Use diagrams to explain phases of mitosis** • **Understand and know the arrangement of chromosomes in the (2n) and (n) cell** • **Know the product after the fusion of the sex cells** • **Know where the chromosomes are situated in the cell**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Demonstration Questions and answers Independent learning Inclusive teaching and learning Discussion Observation			

1. Introduction • Mark and recap previous day's work. • Pre-knowledge: Chromosome structure, phases of mitosis, location of the chromosomes in the cell. **Oral questions** Chromosomes are formed in which part of a cell? **(nucleus)** Give two examples of animal cells. (body cell/somatic and sex cells/sperm and egg cells) **2. Main Body (Lesson presentation)** Divide learners into groups of 5-7 learners per group. Provide each group with two blue blank chart papers, one red and one yellow chart paper, koki pen and pair of scissors. Instruct learners to draw 6 chromosomes on the yellow and 6 chromosomes on the red chart paper (10cm long chromosomes). Instruct learners to cut chromosomes out of yellow and red chart paper. Remind learners to follow the traces of the drawing when cutting the chromosomes. Instruct learners to draw a circle in the middle of the two blue chart papers. (50cm circle) Let learners divide the chromosomes into 2 groups. One group should be pasted in one circle and the other in another circle. Observe if learners grouped the chromosomes according to colours. Ask learners questions: Are the sperm cells and egg cells consisting of same chromosomes? **(no)** Why are they different? **(chromosomes of the sperm come from male; chromosome of egg cell come from the female).** Explain to the learners that the yellow and red chromosomes represent the male and female chromosomes. Body cells are made up of the two sets of the chromosomes. What is the product when the sperm cell and egg cell fuses?	1. Follow instructions. 2. Work neatly. 3. Work as a group. 4. Respond to the oral questions. 5. Group assessment. 6. Use ruler to measure 7. Use charts to explain the mitosis phases. 8. Brainstorm. 9. Draw chromosomes. 10. Cut out chromosomes.	10 min 30 min Own time	Re- usable adhesive. Two blue chart papers per group. Red and yellow chart papers per group. Pair of scissors. Permanent marker.

(2n zygote, 2 sets of chromosomes, 1 from the male and 1 from the female). Which part in the chart represents the nucleus? **(the circle)** Let each group attach their chart on the wall next to their group. **3. Conclusion** Use their charts to summarise the presence of different colours of chromosomes in the nucleus. Where chromosomes are found in the cell. The product after the fusion of the (n) sperm cell and the (n) egg cell, The reason for different colours of chromosomes in their charts.	Homework: p. 296 question 2.2, Via Afrika, Life Sciences, Learners book.	5 min	Via Afrika, Life Sciences grade 10, p. 296 question 2.2 learners book. Chalkboard. Charts made by learners

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	8	TOPIC	Cell division	Lesson	5

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES	**Content: p. 26 (CAPS) 2nd Consolidation lesson on phases of mitosis** • **The cell cycle: Mitosis (phases: prophase, metaphase and telophase including cytokinesis)** **The learners must be able to:** • **Use diagrams to explain phases of mitosis** • **Understand and know the arrangement of chromosomes in each phase of mitosis** • **Understand the phases of mitosis** • **Differentiate the phases of mitosis presented in the diagram** • **How mitosis occurs in the plant cell and animal cell** • **Understand nuclear and cytoplasm division** • **Understand the role of centriole in the animal cell**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Demonstration Questions and answers Independent learning Inclusive teaching and learning Discussion **1. Introduction** • Mark and recap day's work. • Provide feedback of the homework in the previous lesson p. 296 question 2.2, via Afrika Life Sciences grade 10.	1. Work as a group 2. Respond to the oral questions. 3. group assessment.		

• Pre-knowledge: understanding of the previous consolidation lesson, including the charts created by each group, chromosome structure, phases of mitosis, location of chromosomes in the cell. **2. Main Body (Lesson presentation)** **Oral questions** (Learners still work in groups that they have formed in the previous lesson). **1.** Ask learners to provide the first two phases of mitosis in which the cell starts to divide. **(Prophase and metaphase)** **2.** Let each group summarise the phases of mitosis on a piece of paper. **(prophase, chromosomes visible, nuclear membrane starts to disappear)** **(metaphase, chromosomes align themselves on the equator as singles)** Let each group elect a representative to explain the differences between prophase and metaphase by using their charts. One group to explain the prophase **(six chromosomes scattered in the nucleus, red and yellow. Learners should also explain the disintegration of the nuclear membrane).** Another group to explain metaphase: **(chromosomes align themselves on the equator as singles, both red and yellow).** Allow groups to use a piece of paper to tabulate the differences between prophase and metaphase. Allow learners to provide feedback to the whole class. The groups are requested to write the differences between anaphase and telophase. Allow learners to use their charts to explain the differences between the two phases. **(Anaphase: each chromosome splits at the centromere to form sister chromatids. Spindle fibres contract and sister chromatids are pulled towards the poles. Learners should separate the chromosomes at the centromere. Telophase: Cytokinesis occurs, set of chromosomes to each pole. Nuclear membrane is formed. Two cells separate from each other with same number of chromosomes)** The groups are requested to tabulate the differences between anaphase and telophase. Allow each learner from the group to provide feedback to the whole class.	4. Provide feedback to other learners. 5. Use charts to explain the mitosis phases. 6. Choose the representative to provide feedback. 7. Brainstorm.	5 min 25 min	Re-usable adhesive. Two blank A4 papers per group. Via Afrika, Life Sciences grade 10, learners book, pp. 296, question 2.2

3. Conclusion Use learner's charts to summarise the arrangements of chromosomes in each phase of mitosis. Use four charts and show learners the arrangement of chromosomes in the four phases, prophase, metaphase, anaphase, and telophase.		15 min	Chalkboard. Charts made by learners.

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	9	TOPIC	Plant tissues	Lesson	1

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 26 (CAPS) Introduce concept of a tissue as a group of similar cells adapted for a particular function: Cell differentiation.

The learners must be able to:

- **Understand how cells make up the body forms of living organisms**
- **Know different tissues found in plants, their structure and functions**
- **Observe different cells of plants using microscope**
- **Answer questions related to plant cells, tissues and organs**
- **Tabulate differences between plant tissues**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Demonstration Inclusive teaching and learning **1. Introduction** • Mark and recap previous day's work. • Pre-knowledge: Organisation of living organisms (cells – tissues –organs – system – organism – population – community). • Structure of the plant cell. • Structure of plants. (leaves, stem roots and flowers) • Transport across the membrane. • Use questions to test the understanding of the need for cell modifications to perform functions like storage, support, gaseous exchange, water absorption, food transport and photosynthesis. **Oral questions:** **1.** Give three distinguishing features of the plant cell. **(Large vacuole, chloroplast, cell wall)** 2. State one function of the above distinguishing features.	1. Individual work. 2. Respond to the oral questions. 3. Observe plant organs (pot plant). 4. Brainstorm. 5. Provide feedback to other learners. 6. Class work exercise. a. Draw the structure of a plant cell and label the following parts: vacuole, chloroplast, cell wall (consider the following when marking learners work: caption, large vacuole, chloroplast indicated correctly, cell wall **indicated correctly** and the **correct proportion** of	2 min 8 min 5 min 25 min	Potted plant. Plant cell chart. Class work books. Instruction papers.

(Large vacuole: stores large amount of water, Chloroplast: Assist plants to produce their own food during photosynthesis, Cell wall: ensures the passage of small molecules in and out of the cell) 3. Where do plants obtain water from? **(From the soil)** 4. Through which process does the water reach the stems and leaves? **(Through osmosis)** 5. Where in the plant is food produced? **(In the green leaves)** 6. Food molecules are needed in all other parts of plants. How are food molecule produced in the leaves transported from the leaves to other parts of plant? **(with the aid of the phloem, through diffusion, glucose diffuse from high concentration to low concentration, down the concentration gradient)** 7. What enables the plant to withstand the strong wind? **(Strong/hard stems)** **2. Main Body (Lesson presentation)** Explain to the learners that like all organisms, plants are composed of cells. Plant cells can be distinguished from animal cells because they have the cell wall, central vacuole, chloroplast. Multi-cellular organisms face more complex problems for survival than single cell organisms. Example, there has to be protection, transportation of food and waste, reproduction, support, all these have to take place in the cell. This means that other cells in the multi-cellular organisms have to be directed to perform specialised functions. Special cells for special functions are needed. Many cells specialised for particular purpose become specialised tissues therefore cells form tissues.	the plant cell. b. Provide one function of the labelled parts. **(Large vacuole – stores large amount of water)** **(Chloroplast - Contain chlorophyll for photosynthesis)** **(Cell wall – Permeable and allow the movement of useful and waste products in and out of the cell** 7. Homework exercise. Instruct learners to write one sentence on the following terms in their notes book (vocabulary section). Cell Tissue Meristematic tissue Epidermis Parenchyma Collenchyma Schlerenchyma Xylem Phloem	Own time	Note book. Text books. Flow chart.

3. Conclusion: Conclude the lesson by drawing the flow chart of the organisation of living organisms, from cell to community. Tell learners that tissues are made up of identical cells that share a common function, or different cells that collectively share a common specialised function.		5 min	

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	9	TOPIC	Plant tissues	Lesson	2

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES	**Content: p. 26 (CAPS) Tissues: emphasis on the relationship between basic structure and function.** **Plant tissues: Xylem, phloem, parenchyma, collenchyma, schlerenchyma, epidermis and meristematic tissue.** **The learners must be able to:** • **Understand and learn how cells make up the organs of the living organisms.** • **Know different tissues found in plants, their structure and functions.** • **Answer questions related to plant cells, tissues and organs.** • **Tabulate differences between meristematic tissues.** • **Understand and know relationship between the structure and functions in the tissues.** • **Know where meristematic tissues are found in plants.**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Demonstration method Inclusive teaching and learning **1. Introduction** • Mark and recap previous day's work. • Pre-knowledge: Organisation of living organisms (Cells – Tissues –Organs) • Structure of the plant cell. • Organs of plants. (Leaves, stem roots and flowers) • Transport across the membrane.	1. Work as individuals.		Potted plant.

Oral questions: 1. What is the result when two or more cells are joined together? **(Tissue)** 2. State three major organs of plants. **(Leaves, stems, roots and flowers)** 3. If the above mentioned parts are organs, what do you think they are made up of? **(Organs are made up of tissues)** 4. State the differences between the functions of the root and the function of the leaves. **(Leaves produce food/ responsible for photosynthesis, roots absorb water and mineral salt from the soil and also anchors the plant in the soil)** 5. Do you think the listed organs are made up of the same tissues? Give reason for your answer. **(No, because they are different and they perform different functions)** 6. Why do people have to eat fruit? **(Fruit contain nutrients/food molecules, so that we can sustain life)**	2. Respond to the oral questions. 3. Observe plant organs (pot plant) 4. Brainstorm. 5. Provide feedback to other learners. 6. Class work exercise: Draw a plant and indicate where on the plant the apical meristem would be located. How do they differ from lateral meristems? 7. Homework exercise:	10 min	
2. Main Body (Lesson presentation) Explain to the learners that when cells differentiate in plants they form different tissues. Those tissues form different organs that perform different functions. Example: stem, has different function to the roots. Flowers have different function to the leaves. Although they are found in the same plant, they are made up of different tissues and they perform different functions. Explain to the learners that different organs are made up of different tissues with different structures and functions. Explain to the learners that all plants are made up of two major tissues: **Meristematic** and **permanent tissues**. **Meristematic tissue:** Explain to the learners that meristematic tissues are made up of unspecialised cells that undergo cell division. Meristematic tissues can be found in the **apical meristem** and **lateral meristem.**		15 min	Potted plant Text book Chalk board

Explain to the learners the differences between the apical and lateral meristems. Apical: tissues that make plants grow longer/length from its tip of stem and roots. Lateral, result in an increase in diameter. Explain to the learners the structure and function of the meristematic tissues. **3. Conclusion** Conclude the lesson by using the chalkboard and summarise the position, structure and functions of meristematic tissue. Draw the flow chart of the organisation of living organisms. Use a mind map to assist learners to see the differences between apical and lateral meristems.		10 min 10 min	Via Afrika, Life Sciences grade10 p. 82. Class work book

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	9	TOPIC	Animal tissues	Lesson	3

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	
LESSON OBJECTIVES	**Content**: **p. 26 (CAPS**) • **Tissues: Emphasis on the relationship between basic structure and function.** • **Plant tissues: xylem, phloem, parenchyma, collenchyma, schlerenchyma and epidermis.** **The learners must be able to:** • **Understand the relationship between the structure and functions of plant tissues.** • **Observe different cells of plants using microscope.** • **Answer questions related to plant cells, tissues and organs.** • **Tabulate differences between plant tissues.**		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Demonstration method Inclusive teaching and learning **1. Introduction** • Mark and recap previous day's work. • Pre-knowledge: Organisation of living organisms (cells – tissues – organs) • Structure and functions of the meristematic tissues. **Oral questions:** **1.** Give two types of meristematic tissues. **(Apical and lateral meristem)** 2. State one function of the above mentioned tissues.	1. Work as individuals 2. Respond to the oral questions.	5 min 25 min	

(Apical: responsible for growth in length. Lateral meristem: responsible for growth in width). . **2. Main Body (Lesson presentation)** Explain to the learners that plants are made up of two major tissues: meristematic and permanent tissues. Explain to the learners the differences between the permanent and meristemetic tissues. Meristematic tissue is responsible for lateral and apical growth. (cell division occurs in these tissues) Permanent tissue is responsible to develop special structures for specific functions. (this is tissue that do not divide and grow further). Give learners examples of permanent tissues. Provide the structure and functions of the following tissues: epidermis, parenchyma, collenchyma, scherenchyma, chlorenchyma, xylem and phloem. **Questions:** Why do meristematic cells have large nuclei? **(DNA is replicating and preparing the cell for division)** What does tissue differentiation mean? **(Changing of cells from meristematic to specialised cells in the different tissues to perform different specialised functions)** State the main functions of the following tissues: Meristemetic, Epidermal, Parenchyma, Xylem and phloem. **(Meristemstic- cell division and growth, Parenchyma- storage and packing of food, Epidermal- protection and gaseous exchange, xylem- transport of water and mineral salt, phloem- transport of sugar/ glucose)** What characteristic makes the xylem adapted for strengthen and support? **(Thick secondary cell walls made up of lignin, no inter cellular space)** How are the sieve tube supported and kept alive? **(By connecting cytoplasm from the companion cell)**	3. Highlight key words from the handout. 4. Provide feedback to other learners. 5. Brainstorm.	10 min 10 min	Via Afrika, Life Sciences (grade 10) pp. 82-85. Class work books. Instruction papers. Chalk board

Compare parenchyma and collenchyma in a table. Consider their structures and functions. **3. Conclusion** Conclude the lesson by drawing the flow chart of the permanent and meristematic tissues. Provide learners with notes assist them to highlight the key words from the handout (Structure and functions of different tissues).		5 min	

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	9	TOPIC	Plant tissue	Lesson	4

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES

Content: p. 26 (CAPS)

- **Assessment/ Practical task**
- **Examining plant tissue**

The learners must be able to:

- **Understand how cells make up the body forms the living organisms**
- **Know different tissue found in plants, their structure and functions**
- **Observe different cells of plants using microscope**
- **Follow the procedures**
- **Analyse information from their observations**
- **Answer questions related to plant cells, tissue and organs**
- **Tabulate differences between plant tissue**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Group work Demonstration method/practical Observation Inclusive teaching and learning			
1. Introduction • Mark and recap previous day's work.	1. Work in groups of five. 2. Handle microscope.		Celery. Glass slide.

• Pre-knowledge: Structure and functions of different types of plant tissue. Examples of the cells forming the xylem tissue. Handling of microscope. .			Glass beaker with water. Electron microscope. Sharp knife.
Oral questions: What is the function of the xylem tissue? **(Transport water and mineral salt)** Give two examples of xylem cells. **(Tracheids and vessels)**	3. Respond to the oral questions.	5 min	Plant cell chart.
2. Main Body (Lesson presentation) **Observing:** Plant tissue ➢ pipes are hollow ➢ Their structure or shape allows them to be used efficiently in the transporting water ➢ Plant vascular tissue have this same efficiency in structure **Procedure:** 1. Snap the celery stalk in half and remove a small section of "stringy tissue" from its inside. 2. Place the material on the glass slide. Add several drops of water. Place a second glass slide on top. **Use caution when working with microscope and slides.** 3. Press down evenly on the top glass slide with your thumb directly over the plant material. 4. Remove the top glass slide. Add more water if needed. Add cover slip. 5. Examine celery material under the low and high power magnification. Draw a diagram of what you see. 6. Repeat step 2-5 using some of the soft tissue inside the celery stalk. **Analysis** 1. Describe the appearance of the stringy tissue inside the celery stalk. What may be the function of this tissue? 2. Describe the appearance of the soft tissue inside the celery stalk. What may be the function of this tissue?	4. Observe plant tissue in cerely. 5. Provide feedback to other learners. 6. Practical exercise. 7. Brainstorm.	35 min	Practical work sheet. Instruction papers. Notes book. Text books Life Sciences for all NCS updated grade 10, p. 245.

3. Does the structure of these tissues suggest their functions? **3. Conclusion** Conclude the lesson by summarising the structural adaptation of xylem cells in performing their functions.		5 min	

Reflection/Notes:

Name of Teacher:		**HOD:**	
Sign:		**Sign:**	
Date:		**Date:**	

GRADE	10	SUBJECT	Life Sciences	WEEK	9	TOPIC	Animal tissues	Lesson	5

LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	

LESSON OBJECTIVES	**Content: p. 28 (CAPS) Animal tissues: 4 basic types** • **Epithelial** • **Connective** • **Muscle** • **Nerve tissues** **The learners must be able to:** • **Understand how cells make up the body forms the living organisms** • **Know different tissues found in animals, their structure and functions** • **Observe different organ of animals** • **Follow the procedures** • **Touch and feel different organs** • **Analyse information from their observations** • **Answer questions related to animal cells, tissues and organs** • **Tabulate differences between animal tissues**

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Inclusive teaching and learning. Demonstration Observation Group work **1. Introduction** • Mark and recap previous day's work. • Pre-knowledge: Structure and different organs in animals. Cell division (mitosis). Cell differentiation. Organisation of living organisms (cells- tissues- organ-systems- organisms).	1. Work in groups of five.		Chalk board.

Oral questions: State any two organelles found in the animal cell? **(Nucleus, Vacuole, Mitochondrion etc.)** State two examples of organs responsible for the transportation of nutrients and waste products in human body. **(Heart, blood vessels)** State organs for gaseous exchange in human. **(Lungs, trachea, nose)** **Demonstration** 1. Group learners (5-10 learners per group) 2. Provide 4 hearts and 4 lungs of sheep to the learners. 3. Provide learners with rubber gloves (5 pairs per group). 4. Instruct one learner to take 1 heart per group and place it in a container. 5. Instruct one learner to take 1 lung per group and place it in a container. 6. Allow each learner to touch both the heart and the lung in their groups. 7. Allow learners to write the differences of the two organs after each of them has manage to touch both organs. 8. Each group has to give feedback of the differences after they have touched and handled the organs. Oral questions (based on the observation and touching of the organs). 9. What makes the differences between the two organs? **(they are made up of different cells)** 10. Do the two organs have the same functions? Give reason for your answer. **(No, The heart transport the blood and the lungs transport gases)** **2. Main Body (Lesson presentation)** **Start the main body by introducing the problem to the learners. To move learners to the next level of understanding.** How did they (heart and lungs) became different and perform different specific functions. Explain to the learners that new organisms are the product of reproduction. Two cells fuse(sperm and the egg cell)	2. Respond to the oral questions. 3. Observe animal organs lung and heart of the sheep. 4. Provide feedback to other learners. 5. Brainstorm. 6. Feel and touch the lung and the heart of sheep. 7. Follow instructions	5 min 15 min	4 sheep hearts. 4 sheep lungs. Five pairs of rubber hand gloves.

Result in the new-born animal. The two cells have undergo many cycles of growth (mitosis). During this period of growth the cells produced by mitosis enter different pathways of differentiation. Some become blood cells some become muscle cells These cells are organised in different tissues that make up different organs in various systems Different cells form different tissues, producing different organ with different specific functions. Provide learners with different types of animal tissues and their specific functions ➢ Epithelial: Protection, absorption, Gaseous exchange ➢ Connective: Protection, storage, shape and structure ➢ Muscle tissue: Movement ➢ Nerve tissue: Communication and control. **3. Conclusion** Conclude the lesson by drawing a flow chart from reproductive cell to formation of different tissues. ✓ **Sperm cell + egg cell** ✓ **Fertilisetion** ✓ **Zygote** ✓ **Growth** **(cell cycle, MITOSIS)** ✓ **Cells differentiate** **(red and white blood cells, platelets)** ✓ **Different tissues (connective)** **Different Organs (Blood)** ✓ **Different specific function (Transport)**	**Homework** Draw a mind map to show different type of animal tissues and their functions. Construct a rubric to assess learners)	15 min 10 min Own time	Via Afrika, Life Sciences grade 10 p. 88. Homework book. Chalkboard.

Reflection/Notes:

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