Telematic Schools Project



2022 SUBJECT WORKBOOK
Grade 10

LIFE SCIENCES

A joint initiative between the Western Cape Education Department and Stellenbosch University.

Western Cape Government
Education

Stellenbosch
UNIVERSITY
IYUNIVESITHI
UNIVERSITEIT

forward together
sonke siya phambili
saam vorentoe

BROADCAST SESSIONS

GRADE 10 **LIFE SCIENCES**

Grade	Date	Time	Topic
10	16/02/2022	16:00-17:00	The chemistry of life
10	14/04/2022	16:00-17:00	Support and transport in plants
10	11/10/2022	16:00-17:00	History of life on earth

WHAT YOU SHOULD KNOW

Revise the topics atoms and compounds in grade 8 and 9 Natural Sciences

Organic molecules are made up of carbon (C), Hydrogen (H) and oxygen (O) and some contain other elements, such as nitrogen (N) and phosphorous (P)

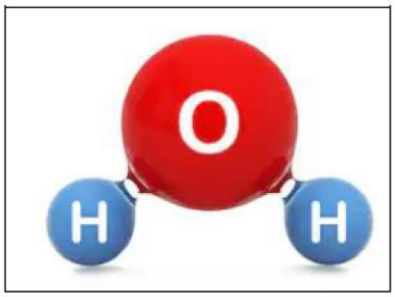
Cells are made up of proteins, carbohydrates, lipids, nucleic acids and vitamins

INORGANIC COMPOUNDS

Inorganic compounds do not contain the element carbon and are not produced by living organisms e.g., water, gases and minerals.

Water:

- Water is the most important inorganic compound that is essential for life.
- Water molecules consist of one oxygen (1 O) bonded to two hydrogen molecules (2 H).
- The formula for water is H_2O.



Functions of water:

- Water is a solvent for both organic and inorganic compounds
- It is the medium in which all chemical reactions in living organisms occur
- It is required for transportation of nutrients and waste products in plants and animals
- Water is required for photosynthesis
- It helps to regulate the body temperature as the human body loses water through sweat

Minerals:

- Minerals are inorganic substances that are essential for chemical activities in living organisms.
- Plants absorb minerals from the soil and humans and animals obtain minerals from the food that they eat.
- Minerals can be divided into two groups i.e. macro elements and micro elements.
- Macro elements are nutrients that are needed in large quantities
- Micro elements are nutrients that are needed in small quantities.

- Nitrates and phosphates are minerals.
- Nitrate ions are the main source of the element nitrogen (N) that is needed for protein synthesis. Nitrogen is also needed for the synthesis of chlorophyll in plants
- In humans a lack of nitrogen -containing protein results in the deficiency disease kwashiorkor (stunted growth).
- In plants a lack of nitrate ions causes the deficiency disease called chlorosis.

Macro elements		
Element	Function	Deficiency disease
Sodium (Na)	• Important for maintaining of water balance in the body • Required for functioning of nerves and muscles	• Muscular cramps in humans
Potassium(K)	• Required for functioning of nerves and muscles • Needed to activate plant enzymes	• Poor heart and muscle function in animals • Chlorosis (leaves become yellow because of a shortage of chlorophyll) in plants
Calcium (Ca)	• Required for formation of bones and teeth in animals • Functions in blood clotting • Plays a role in the permeability of cell membranes	• Rickets in humans • Poor root growth in plants
Phosphorus(P)	• Required for formation of bones and teeth in animals • Component of cell membranes and nucleic acids	• Rickets in humans • Stunted growth in plants

Micro elements		
Element	**Function**	**Deficiency disease**
Iron (Fe)	· Required in synthesis of haemoglobin · Helps to form chlorophyll in plants	· Anaemia in humans · Chlorosis in plants
Iodine(I)	· Component of the hormone thyroxin which is secreted by the thyroid gland in humans	· Goitre (swelling of neck or larynx) in humans

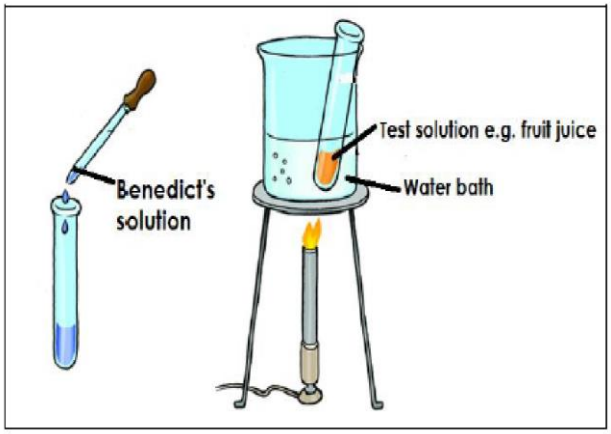
Organic compounds

Carbohydrates

- Carbohydrates are made up of the elements carbon (C), hydrogen (H) and oxygen (O).
- The ratio of H atoms to O atoms is 2:1
- Carbohydrates are made up of smaller units called, saccharides
- Carbohydrates are divided into three groups according to the number of saccharides they contain:
- Monosaccharides (single sugars) e.g. glucose, fructose and galactose
- Disaccharides (double sugars) e.g. maltose, sucrose and lactose. Disaccharides are formed when two monosaccharides are joined.
- Polysaccharides (many sugars) e.g. starch, glycogen and cellulose.

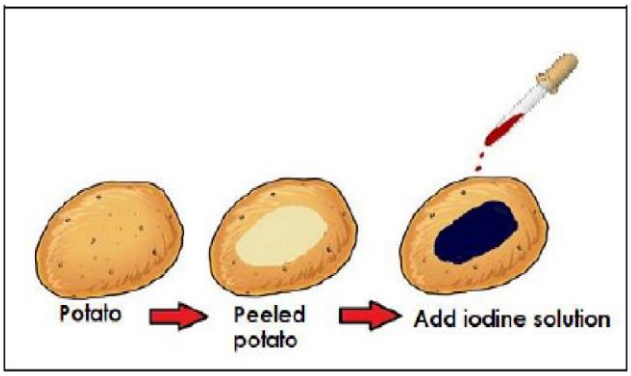
Test for carbohydrates:

- **Test for glucose**: ***Benedict solution*** (a blue liquid) is used to test for glucose.



- Prepare a water bath and heat the water.
- Pour 5cm^3 of Benedict's solution in a test tube
- Add a few drops of the test solution e.g. fruit juice to the Benedict's solution
- Place the test tube into the water bath and observe the colour change after a few minutes
- An **orange-red** colour change in the test tube indicates a high concentration of glucose present.

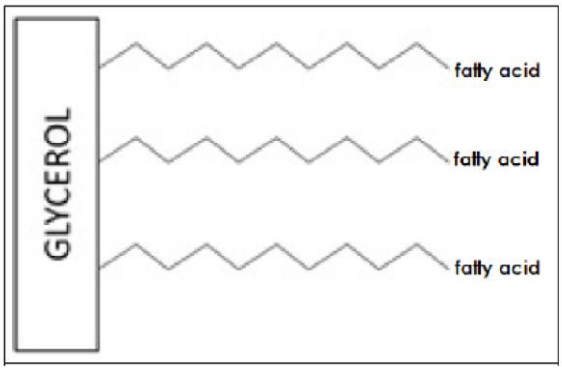
- **Test for starch:** ***Iodine solution*** (a brown liquid) is used to test for starch



- Place a potato or piece of bread in a dish.
- Place a few drops of iodine solution on the peeled potato.
- The potato turns **blue-black** in the presence of iodine solution.

Lipids (fats and oils):

- Lipids contain carbon (C), hydrogen (H) and oxygen (O).
- The ratio of H to O is greater than 2:1
- Examples of lipids include cooking oils e.g. sunflower oil, butter and margarine.
- One lipid molecule consists of one glycerol molecule and three fatty acid molecules.



- **Saturated fats –** have single bonds in the fatty acid chain and are mainly derived from animals. Saturated fats are mainly solids at room temperature e.g. butter and cheese.
- **Unsaturated fats** – have one or more double bonds in the fatty acid chain and are mainly derived from plants. Unsaturated fats are liquids at room temperature e.g. olive oil, canola oil and sunflower oil.

Cholesterol and heart disease:

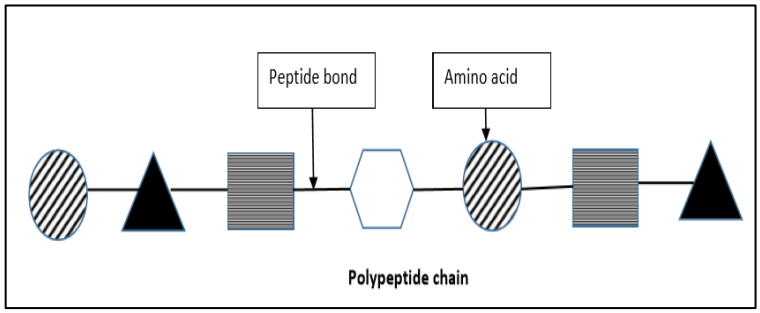
- Cholesterol is a lipid and a white, wax-like substance that is found in the human body and is part of cell membranes.
- Excessive intake of saturated fats leads to high cholesterol levels in the blood.
- High cholesterol levels cause fatty deposits in arteries thereby narrowing the arteries
- This interferes with the transport of blood and can lead to a heart attack.

Test for fats:

- Grind the test material (e.g. peanuts)
- Place a small amount of the test material in a test tube and add about $5cm^3$ of **ether or ethanol.**
- Shake the test tube and let it stand for a few minutes
- Filter the test solution and place a few drops of the filtrate (liquid that filtered through) on a clean filter paper
- The ether or ethanol will evaporate, and a **translucent fatty stain** will form on the filter paper.

Proteins:

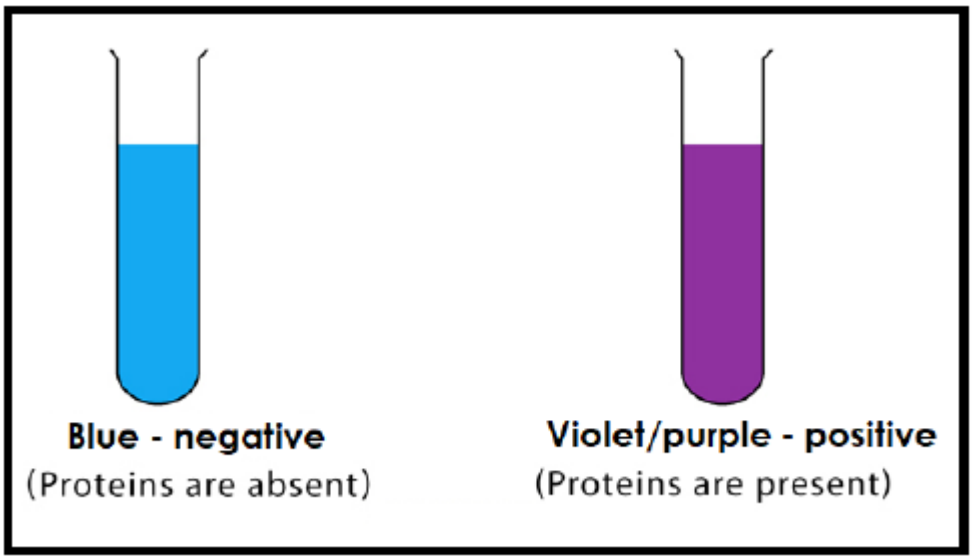
- Proteins are large molecules (polymers) and are made up of the elements carbon(C), hydrogen(H), oxygen(O) and nitrogen(N). Some proteins also contain phosphorous (P), sulphur (S) and iron (Fe).
- Proteins are made up of long chains of **amino acids** which are the building blocks (monomers) of proteins.
- There are about 20 different amino acids.
- The sequence and type of amino acids determine the type of protein.
- The bond that form between two amino acids is known as a **peptide bond**.
- A **dipeptide** is formed when two amino acids combine, and a **tripeptide** is formed when three amino acids combine. A **polypeptide** is a long chain of amino acids linked by peptide bonds.



- A protein consists of a chain of at least 50 and more amino acids.
- Proteins are sensitive to temperature and pH and will **denature** (protein loses its shape and can no longer perform its function) at high temperatures and extreme pH levels.

Test for proteins:

- **Test for proteins**: The ***Biuret test*** is used to test for proteins.
- Grind the test material (beans) and add a little water.
- Boil the test material until it forms a thin soup
- Pour about 5 cm^3 of the soup into a test tube and add a few drops of dilute **copper sulphate solution** to the test tube.
- Add 5 cm^3 of **sodium hydroxide solution** to the mixture
- Shake the test tube and heat the mixture
- A **violet (purple)** colour indicates the presence of proteins.

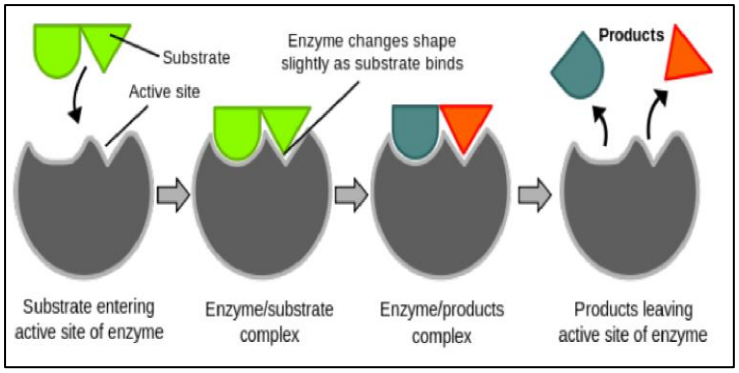


Enzymes

- Enzymes are proteins.
- Enzymes are **biological catalysts** that speed up the rate of a chemical reaction without being used up in the chemical reaction itself.
- Chemical reactions that take place in living cells are known as **metabolic reactions.**
- Enzymes may be involved in two types of metabolic reactions i.e. **anabolic** and **catabolic** reactions.
- During an **anabolic reaction** a complex molecule is **built up** from simple molecules.
- During a **catabolic reaction** a complex molecule is **broken down** into simple molecules.
- During the digestion of food, complex molecules are broken down into smaller molecules. These reactions cannot take place without the help of enzymes.

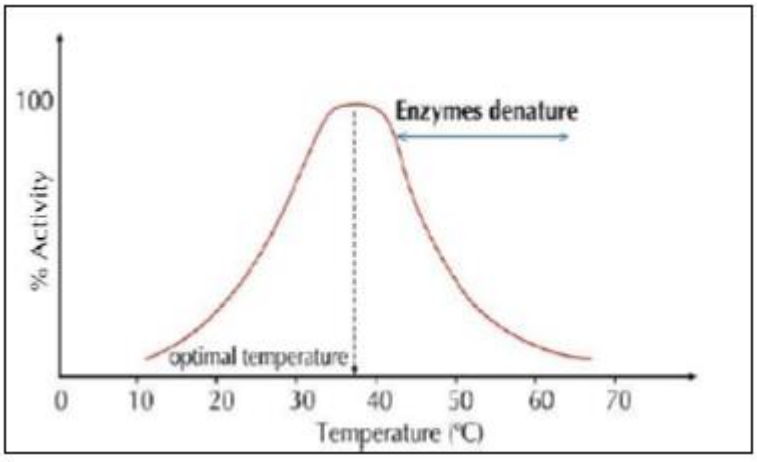
Lock-and-key model of enzyme action:

- The substance on which an enzyme acts is known as the **substrate.**
- The substance that is formed during the reaction is the **product.**
- Enzymes are substrate-specific i.e. a specific enzyme can only act on a specific substrate e.g. the enzyme sucrase will only react with sucrose etc.
- The substrate fits into the enzyme's **active site** as a key fit into a lock and an **enzyme-substrate complex** is formed.
- The reaction takes place and the substrate becomes the product which leaves the enzyme.
- The enzyme is now free to react with other substrate molecules.



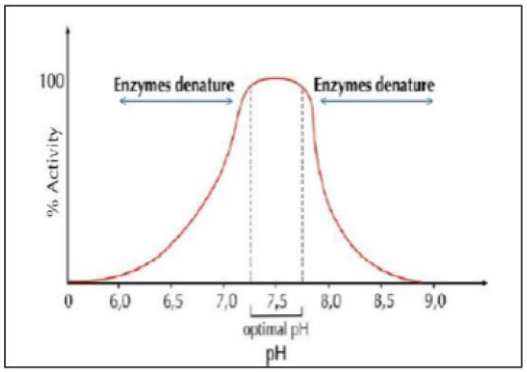
Effect of temperature on enzyme activity:

- Enzymes are sensitive to changes in temperature.
- Most enzymes are inactive at low temperatures
- The temperature at which enzymes work the best is known as their **optimum temperature** e.g. 35 ºC - 40 ºC.
- An enzyme loses its shape and function and **denatures** at temperatures above the optimum temperature.



Effect of pH on enzyme activity:

- Enzymes are sensitive to changes in pH.
- Every enzyme has a pH range within which it can function. This is known as the **optimum pH.**
- Enzymes denature at extreme pH levels.



Enzymes in everyday life:

- Biological washing powders contain enzymes e.g. lipase and protease that can break down stains.
- The enzyme protease breaks proteins down into smaller soluble molecules that can be removed by cleaning agents in the washing powder.

Nucleic acids:

- Nucleic acids are made up of the elements carbon (C), hydrogen (H), oxygen (O), nitrogen (N) and phosphorous (P).
- There are two types of nucleic acids i.e. DNA (deoxyribonucleic acid) and RNA (ribonucleic acid)
- DNA is found in the nucleus of a cell and it carries the hereditary characteristics.
- RNA is found in the nucleus and cytoplasm of a cell and plays a role in protein synthesis.

Vitamins:

- Vitamins are organic compounds and are required in small quantities by animals.
- Vitamins are essential for normal metabolism, growth and development of the human body.

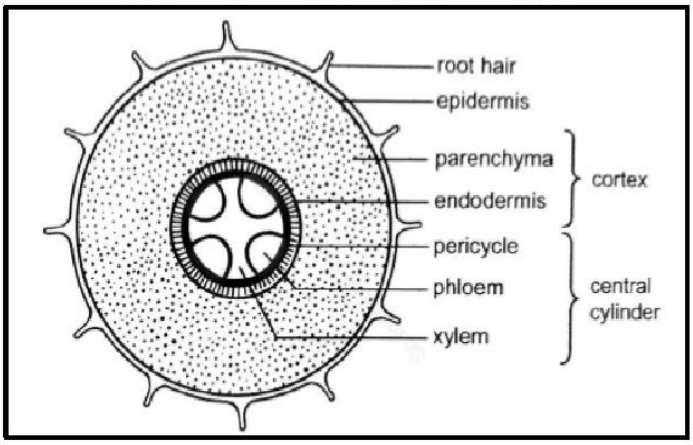
Vitamin	Source	Deficiency disease
A	Yellow vegetables, liver	Night-blindness
B_1	Brown rice, wholegrain bread, legumes	Beri-beri
C	Citrus fruit, tomatoes	Scurvy
D	Oily fish, milk	Rickets
E	Spinach, lettuce	Poor nerve conduction, anemia

SESSION 2: SUPPORT AND TRANSPORT IN PLANTS

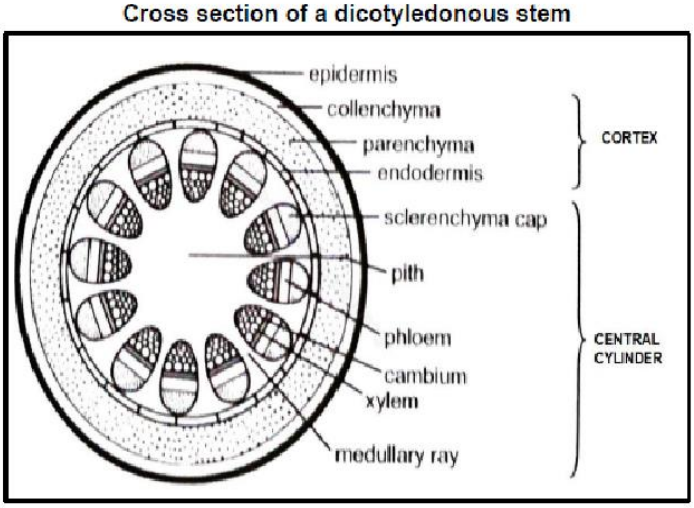
WHAT YOU SHOULD KNOW

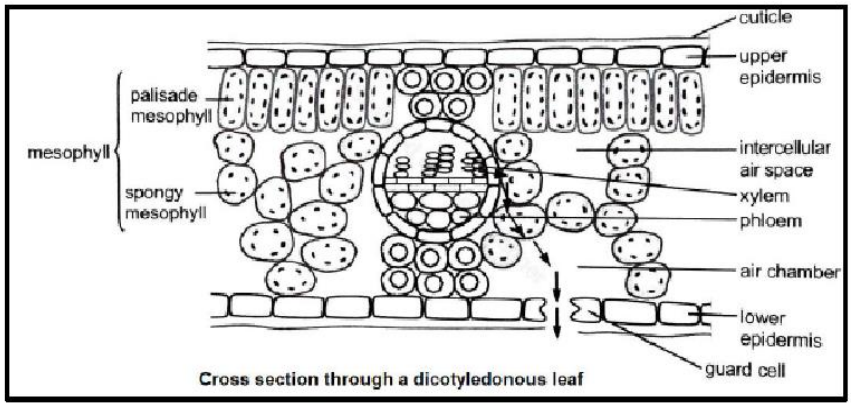
Revise plant tissues, leaf structure and anatomy of a dicotyledonous root and stem in grade 10.

Cross section of a dicotyledonous root



Cross section of a dicotyledonous stem





Transpiration:

- Transpiration is the loss of water vapour through the aerial parts of the plant mainly through the stomata.

Relationship between water loss and the structure of a leaf:

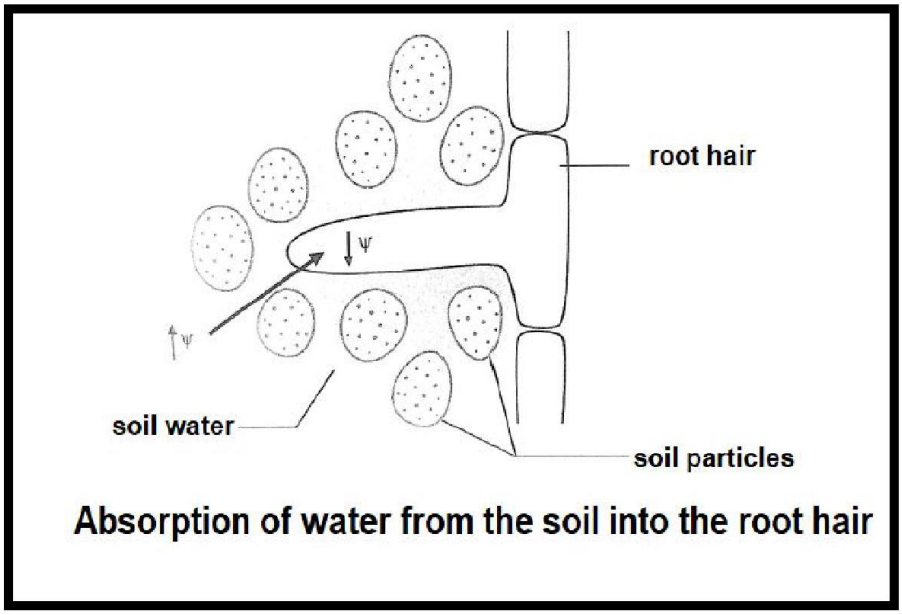
- The smaller the leaves, the smaller the surface area for evaporation.
- Thorns and hairs on a leaf limit transpiration
- Leaves with stomata mainly on the lower side of the leaf or leaves with sunken stomata will limit transpiration

External factors influencing transpiration:

- High temperatures increase the rate of transpiration
- Higher light intensity will increase the rate of transpiration
- High humidity will decrease the rate of transpiration
- Wind will increase the rate of transpiration

Uptake of water and mineral salts by plant roots

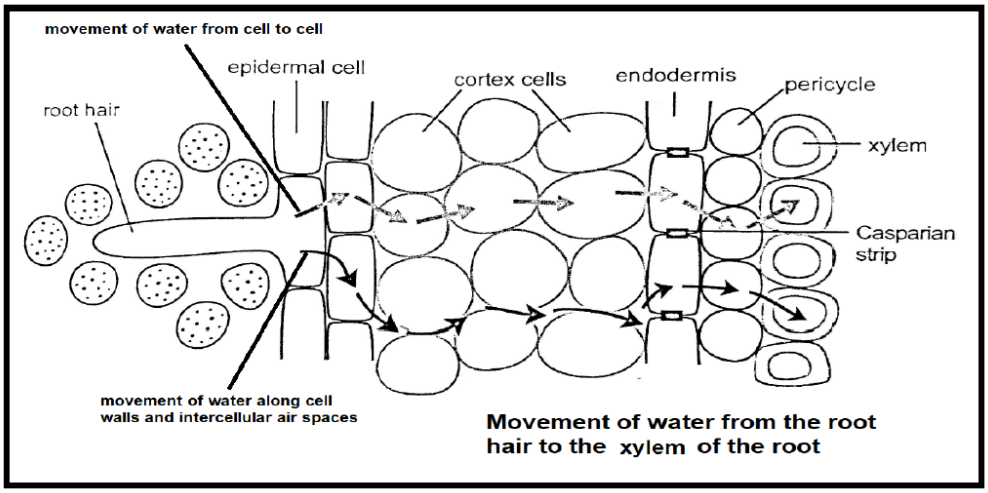
- The **water potential** of the soil water is higher (contains less dissolved substances) than then the water potential of the cell sap in the vacuoles of the root hair
- Water molecules move by **osmosis** through the permeable cell wall, through the selectively permeable cell membrane, cytoplasm and selectively permeable tonoplast into the vacuole of the root hair.
- The vacuole swells and the pressure within the root hair increases. The pressure that builds up in the vacuole is called, **turgor pressure.**



Absorption of water from the soil into the root hair

Movement of water from the root hair to the xylem of the root

- The water potential in the root hair is now higher than in the adjacent parenchyma cells in the cortex of the root.
- Water moves in two ways to the xylem of the root:
- The main route that water takes is from cell to cell by osmosis – this is a slow process
- Water can also move through the cell walls and intercellular air spaces between the cells by diffusion – this is a faster process
- When water reaches the endodermis, with Casparian strips, it cannot pass through the cell walls of these cells. Water now moves through the passage cells of the endodermis through the pericycle to the root xylem.



Movement of water from the root hair to the xylem of the root

Upward movement of water from the xylem of the root to the leaves of the plant:

- ***Revise the cross-section through the leaf.***
- The three forces involved in the upward movement of water in a plant is: **capillarity**, **root pressure** and **transpiration pull**. Transpiration pull is the main force that draws water upwards in a plant.
- The water potential in the intercellular air spaces of the mesophyll cells decreases as water vapour is lost through the stomata of the leaves.
- Water molecules diffuse from the cell walls of the mesophyll cells into the air spaces
- The water potential of the mesophyll cell walls is now lower than that of the cell sap of the mesophyll cells
- This water potential gradient extends back to the leaf xylem.
- Tension builds up and a suction force develops at the top of the stem xylem, which pulls water up from the root xylem. A column of water is pulled upwards.
- Therefore, the water that was lost through the leaves by transpiration is replaced by the absorbed water from the soil through the root hairs.

The translocation of manufactured food from the leaves to other parts of the plant:

- **Translocation** is the movement of substances e.g. sugars (sucrose) that are produced in the leaves during photosynthesis to other part of the plant. These substances are transported by the phloem from the leaves to the stems and the roots.

Changes in the composition of the atmosphere:

- When the earth formed, oxygen levels in the atmosphere were very low
- Fossil records show that the first living organisms i.e. bacteria (prokaryotes) were anaerobic i.e. they did not need oxygen to survive
- Blue-green bacteria appeared and they used carbon dioxide in the atmosphere and released oxygen i.e. they could produce their own food through photosynthesis
- The levels of oxygen started to increase in the atmosphere and aerobic organisms started to develop
- The increase in oxygen resulted in an increased variety of living organisms on earth

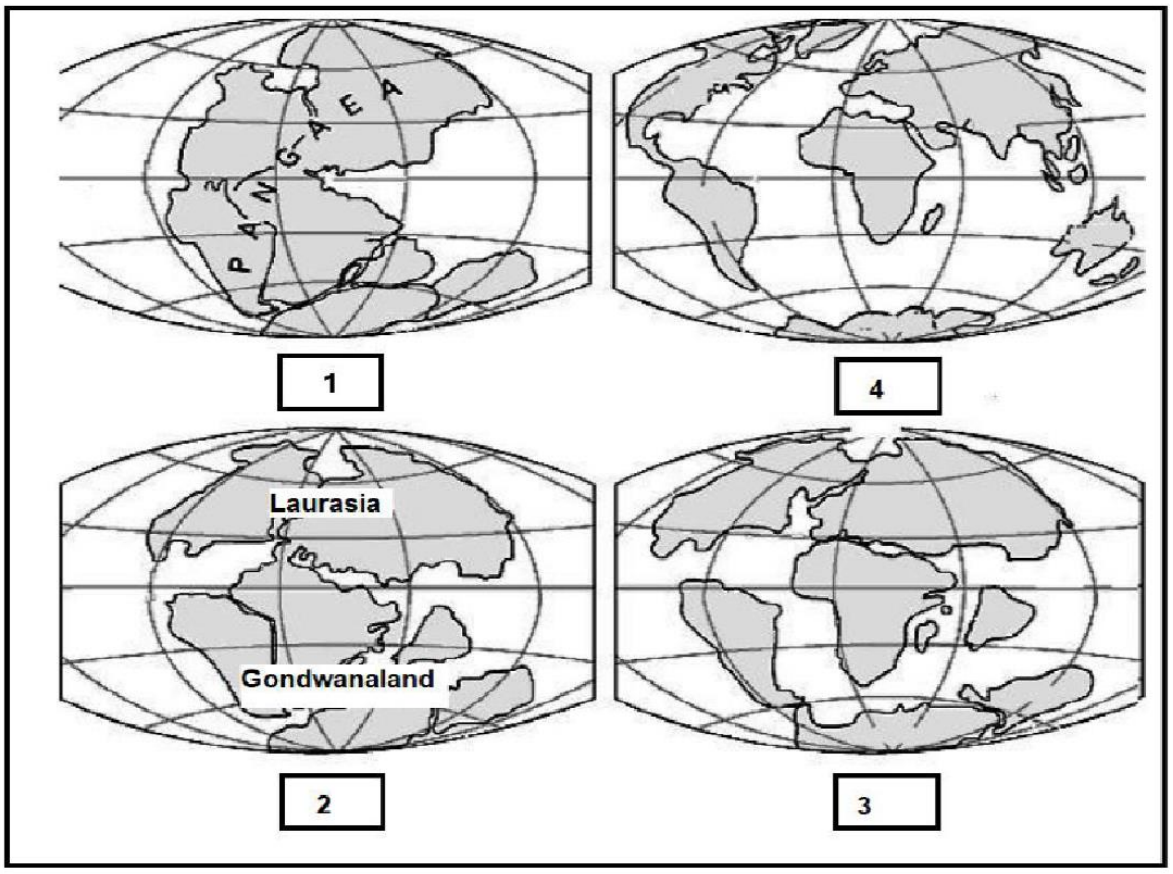
Changes in climate e.g. the ice age:

- An ice age is a long geological period of drastic decrease in temperature of the earth's surface and atmosphere
- Many species died out during the ice ages and some migrated to warmer areas on earth.
- When the ice forms, the level of the ocean will decrease exposing more land
- Ice ages therefore affected life on earth due to the extinction and redistribution of species

Geological events:

- The theory of continental drift proposes that the earth's continents moved and are still moving slowly.
- About 250 million years ago all continents were joined to form one large continent, called **Pangaea**
- Pangaea eventually broke up into two supercontinents i.e. **Laurasia** in the north and **Gondwanaland** in the south
- These two supercontinents eventually broke up further into the continents that we know today.
- The climate and habitats changed because of continental drift
- A large number of life forms became extinct.
- By means of **biogeography** (the study of the distribution of present day and extinct living organisms) evidence has been found that the continents were once joined. Closely related species occurring on different continents probably shared a common ancestor e.g. flightless birds like the ostrich and emu.

Study the diagrams below showing the movement of the continents



<u>The geological timescale:</u>

- Scientists estimate that the earth is about 4,6 billion years old.
- Geologists divide the history of the earth into geological time units
- The purpose of the geological timescale is to represent a timeline of life on earth from the origin of the earth.
- The geological timescale divides the earth's history into three main eras i.e. ***Paleozoic, Mesozoic*** and ***Coenozoic eras.***
- Each of the three eras is divided into periods (*you do not need to memorise the names of the periods*)
- The period that precedes the Paleozoic era is known as the ***Precambrian***.

ERA	PERIOD	MILLIONS OF YEARS AGO (mya)	PLANTS AND ANIMALS
Cenozoic	Quaternary	2	· Modern humans · Modern mammal species evolve · Extinction of large mammals e.g. mammoths
	Tertiary	65	· Birds, mammals and insects · Primates (apes)
Mesozoic	Cretaceous	140-65	• Extinction of dinosaurs • Flowering plants spread
	Jurassic	190-140	· Dinosaurs dominant · First birds evolve
	Triassic	250-190	· First dinosaurs · First mammals · Gymnosperms are the dominant plants
Paleozoic	Permian	280-250	· Increase in reptiles · Gymnosperms
	Carboniferous	345-280	· Increase in amphibians · First reptiles · Ferns dominate
	Devonian	400-345	· First insects · First amphibians
	Silurian	435-400	· First plants and animals on land · Mosses
	Ordovician	515-435	· Algae dominant
	Cambrian	570-515	· Explosion of most animal groups · First vertebrates · Invertebrates
Precambrian		4600-570	· Eukaryotes · Prokaryotes · First invertebrates

Cambrian explosion

- The early forms of most animal groups appeared in the Cambrian period.
- 'Cambrian explosion' refers to the diversity of life forms that appeared in a relatively short period of time.

Mass extinctions:

- A mass extinction occurs when many species disappear over the same period of time.
- There have been five mass extinctions throughout history, two of which are particularly important i.e. the extinction of about 90% of all life on earth (250 mya) and the extinction of many species, including dinosaurs (65 mya)
- The present time has been called the **sixth extinction** because of the negative effect of humans on the environment

Fossil formation and methods of dating:

- A fossil is a complete organism or the remains, imprints or traces of an organism that is usually preserved in rocks.
- Fossils are mainly found in sedimentary rocks.
- Sedimentary rock is formed when clay and sand particles are carried from one place to another by water and wind
- Over thousands of years these sediments pile up, harden and form sedimentary rock.
- Fossils are also found in tree resin, ice and volcanic lava

Ideal conditions for fossil formation (fossilisation):

- The organism must be buried immediately after it dies
- The condition in the sediment need to be acidic and contain no oxygen
- The organism needs to have some hard parts e.g. an exoskeleton, shell, teeth etc.

The formation of fossils in sedimentary rock:

- The plant or animal dies and is rapidly covered with sediment
- Soft tissues decay with the help of bacteria and microorganisms
- Hard body parts remain and the organic material is hardened or replaced by minerals
- More layers of sediment cover the dead animal or plant
- Sediment hardens and the layers become compressed and form sedimentary rock

Fossil dating:

- The age of fossils can be determined through two methods i.e. **radiometric dating** and **relative dating.**

Radiometric dating:

- This type of dating uses different instruments to measure the radioactive elements e.g. uranium, carbon etc. in fossils or rocks.
- The more the radioactive element in a fossil has decayed, the older the fossil.
- For fossils older than 50 000 years the age of the rocks in which the fossils are embedded is determined
- Carbon 14 dating is used to measure the age of fossils that are younger than 50 000 years.

Relative dating:

- As sediment is laid down on top of each other, the oldest rock will be below the upper layers
- Older fossils will occur in sedimentary layers deep down and younger fossils will occur in layers closer to the surface of the earth.

QUESTIONS AND ANSWERS (CHEMISTRY OF LIFE)

1.1 The following information appeared on a box of baby cereal. Use the table below to answer the questions that follows.

Nutrient	Per 450g	Per serving (50g)	Recommended daily allowance (RDA)
Vitamin C	144 mg	16 mg	36 mg
Vitamin B1	2,7 mg	0,3 mg	0,4 mg
Vitamin B2	1,44 mg	0,16 mg	0,8 mg
Niacin (vitamin B7)	19,8 mg	2,2 mg	10 mg
Calcium	2160 mg	240mg	560 mg
Iron	27 mg	3 mg	12 mg
Energy	3150 kJ	350 kJ	3556 kJ

1.1.1 Give the number of servings of cereal that is needed by a baby to obtain the recommended daily allowance (RDA) of vitamin B2?
(1)

1.1.2 Name the deficiency disease that is caused by the lack of Vitamin C.
(1)

1.1.3 Calculate the total amount of Vitamin B that needs to be taken in per day? Show all your working.
(2)

1.1.4 Explain why a 18-year-old boy will need twice the amount of iron if compared to a baby?
(2)

Answers:

1.1.1 5 ✔

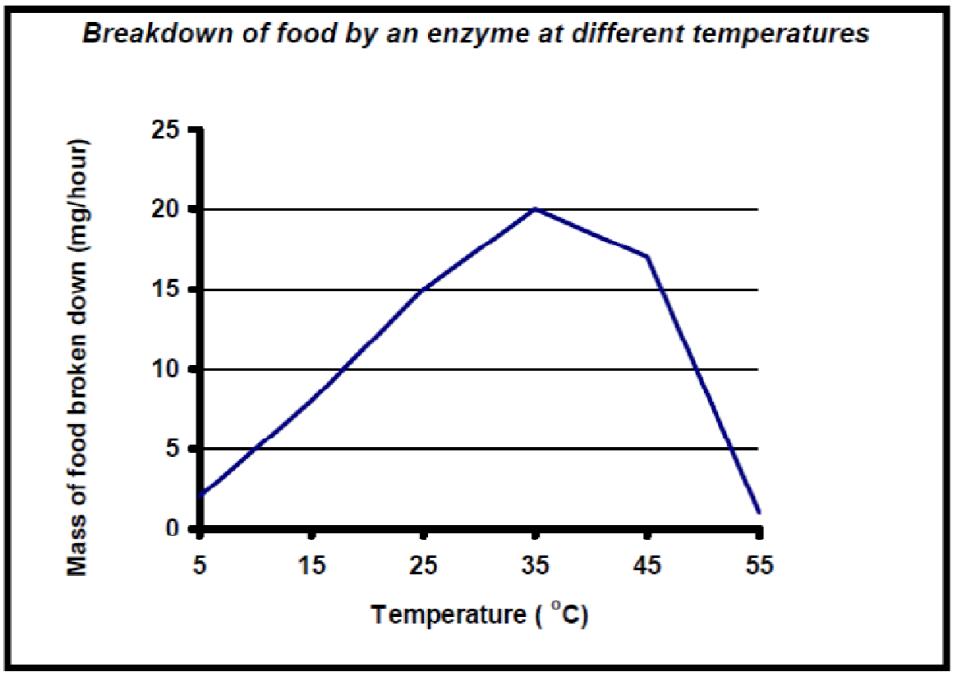
1.1.2 Scurvy ✔

1.1.3 0,4mg + 0,8mg + 10 mg ✔ = 11,2mg ✔

1.1.4 Iron is needed for the formation of haemoglobin ✔ to provide more oxygen to the cells for cellular respiration ✔

QUESTIONS AND ANSWERS (CHEMISTRY OF LIFE)

The graph below shows the breakdown of food by an enzyme at different temperatures.



1.2.1 At which temperature does the enzyme work the **best**?
(1)

1.2.2 What mass of food is broken down at 25ºC?
(1)

1.2.3 Explain the shape of the graph between 5ºC to 35ºC.
(3)

1.2.4 What does the information in the graph suggest about the amount of food that would be broken down at 65ºC? Explain your answer.
(3)

Answers:

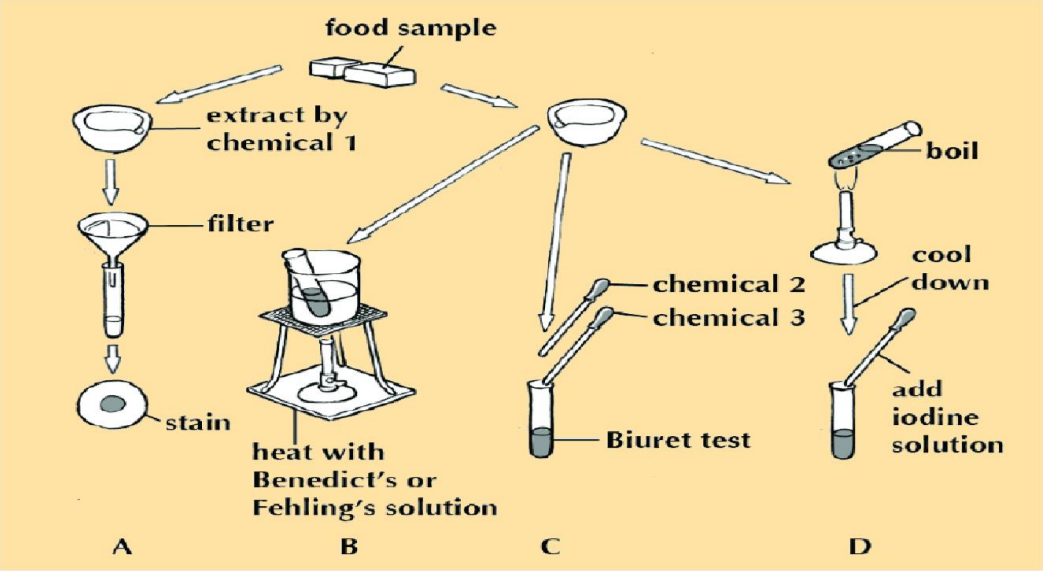
1.2.1 35ºC ✔

1.2.2 15mg ✔

1.2.3 Enzyme activity is slow at lower temperatures ✔
As temperature increases enzyme activity also increases ✔
Maximum enzyme activity at optimum temperature ✔ / 35º C /body temperature

1.2.4 No more food will be broken down ✔
This is because enzymes are denatured ✔ at this temperature and so cannot function ✔

1.3 The diagram shows the apparatus used in various organic food tests.



1.3.1 Name the nutrients tested for in each of the following experiments:

(a) A (1)

(b) B (1)

(c) C (1)

(d) D (1)

1.3.2 Identify the chemicals numbered:

(a) 1 (1)

(b) 2 (1)

(c) 3 (1)

1.3.3 State the colour change for a positive reaction in each of the test tubes used in the experiments numbered:

(a) B (1)

(b) C (1)

(c) D (1)

1.3.4 Which compound (A, B or C)...

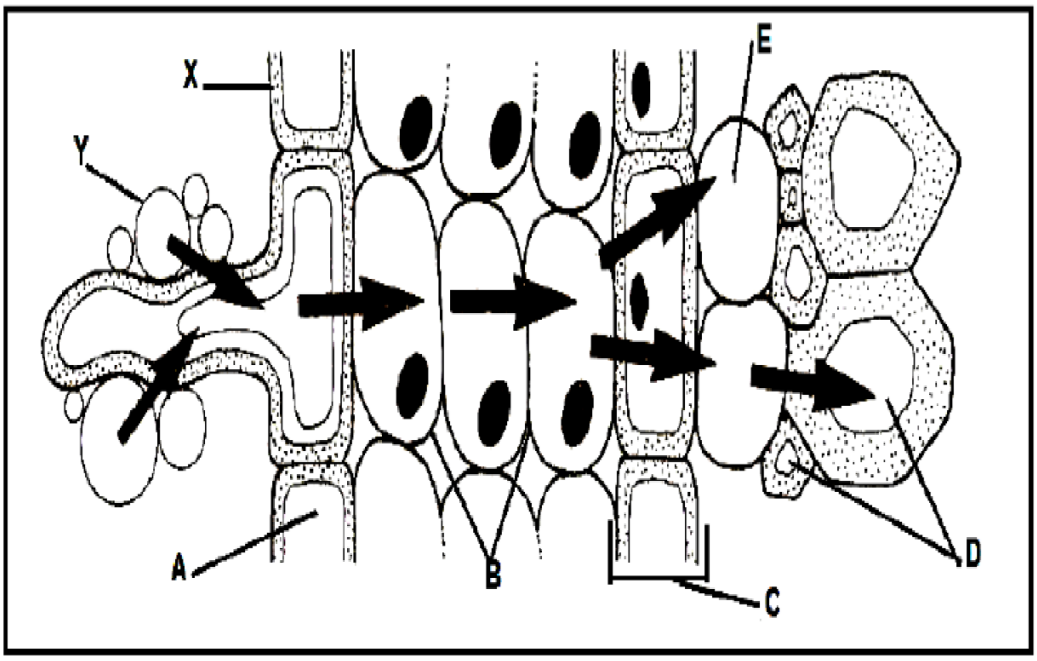
(a) serves as a main source of energy in cellular respiration (1)

Answers:

1.3.1	(a)	Fats/lipids ✔
	(b)	Glucose ✔
	(c)	Proteins ✔
	(d)	Starch ✔
1.3.2	(a)	Ethanol ✔
	(b)	Copper sulphate ✔
	(c)	NaOH ✔ (sodium hydroxide)
1.3.3	(a)	orange- red ✔
	(b)	Violet ✔
	(c)	Blue-black ✔
1.3.4	(a)	B ✔
	(b)	C ✔

QUESTIONS AND ANSWERS (TRANSPORT IN PLANTS)

2.1 .The diagram below represents the pathway of water through the root.



2.1.1 Give the LETTER of the part which represents the endodermis.
(1)

2.1.2 Name THREE forces responsible or the upward movement of water through the tissue labelled **D**.
(3)

2.1.3 Name TWO structural adaptations of the root hair for the function of water absorption.
(2)

2.1.4 Give THREE structural adaptations of the tissue labelled **D**.
(3)

Answers:

2.1.1 C ✔

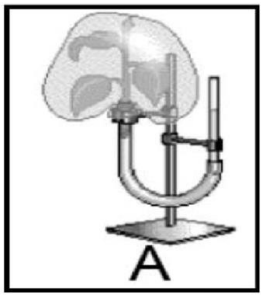
2.1.2 Capillarity ✔, Root pressure ✔ and Transpiration pull ✔.

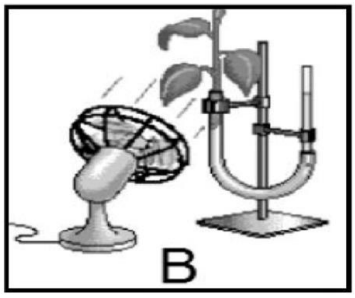
2.1.3 Finger-like protrusions of the epidermis ✔
Thin cell wall and cell membrane ✔
Large vacuole ✔

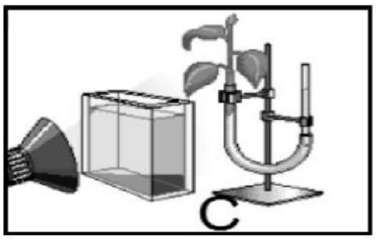
2.1.4 Vessels and tracheids are dead elongated cells ✔
Cell walls strengthened with lignin ✔/thick cell walls
Cell walls are perforated ✔/many pits

2.2 A grade 10 learner investigated the influence of different environmental conditions on the rate of transpiration.

The diagrams below illustrate the different environmental conditions.







The results of the investigation are shown in the table below:

Diagram	Water loss (ml/min/m^2)
A	2,06
B	10,36
C	10,36

2.2.1 Identify the environmental condition illustrated by:

(a) Diagram **A** (1)

(b) Diagram **B** (1)

(c) Diagram **C** (1)

2.2.2 Identify the dependent variable in this investigation. (1)

2.2.3 Identify the independent variable in this investigation. (1)

2.2.4 Explain the results obtained in diagram **A** and **B**. (6)

Answers:

2.2.1 (a) High humidity ✔

(b) Wind ✔

(c) Light intensity ✔

2.2.2 Rate of transpiration ✔

2.2.3 Environmental condition ✔

2.2.4 **A** – High humidity causes the diffusion gradient between the intercellular air spaces in the leaf and the atmosphere to become less steep ✔.

Diffusion takes place slower ✔ and the transpiration rate decreases ✔.

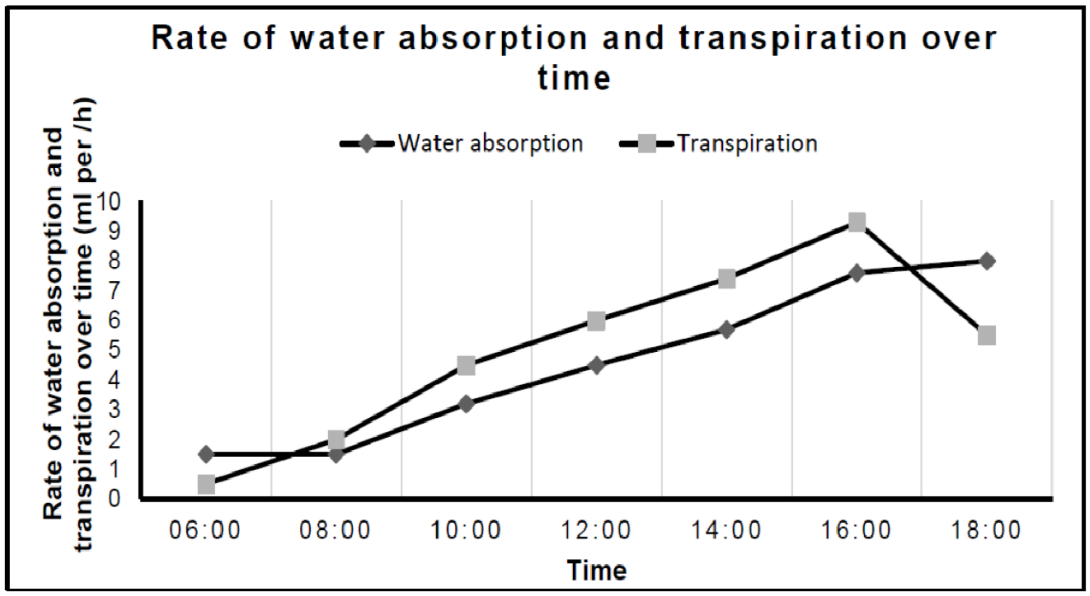
B – movement of air (wind) removes the accumulated water vapour outside the leaf ✔

The diffusion gradient becomes steeper ✔ and the transpiration rate increases ✔

2.3 The table below shows the rate of water absorption through roots as well as the rate of transpiration through leaves.

Time	A Rate of water absorption (ml per hour)	B Rate of transpiration (ml per hour)
06:00	1,5	0,5
08:00	1,5	2,0
10:00	3,2	4,5
12:00	4,5	6,0
14:00	5,7	7,4
16:00	7,6	9,3
18:00	8,0	5,5

2.3.1



Guideline for assessing the graph

Criterion	Elaboration	Mark
Same system of axes	Both line graphs drawn and on the same system of axes	1
Caption	Includes both variables "rate of water absorption and transpiration" and "time"	1
Key for graphs	Key provided for water absorption and transpiration	1
Axes labels	X-and Y axes correctly labelled with units	1
Plotting of points	1 mark: 1-4 points plotted correctly 2 marks: all 7 points plotted correctly	2

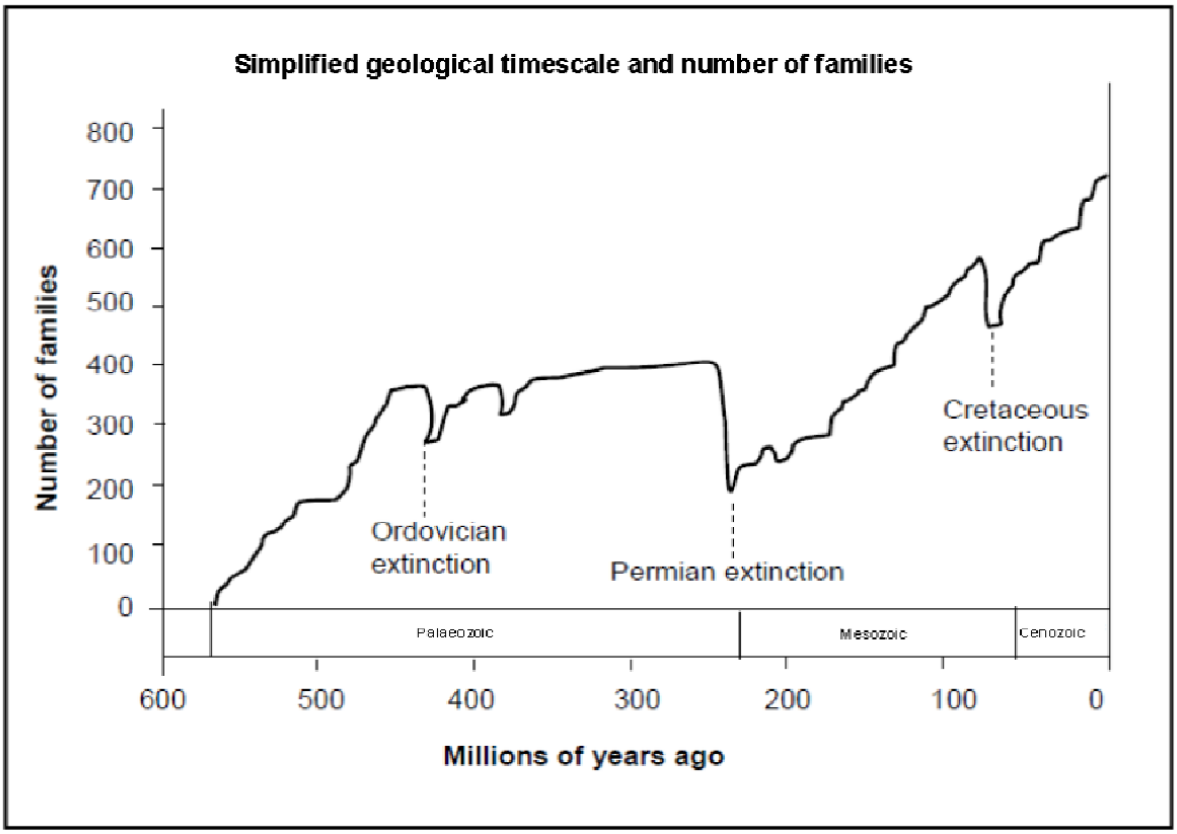
2.5.2 By using the information in the table, indicate the time when the sun rises. Give a reason for your answer.

(3)

06:00 ✔ - The rate of transpiration starts at 06h00 that indicates the stomata is open ✔ and that happens during the presence of sunlight ✔

QUESTIONS AND ANSWERS (HISTORY OF LIFE ON EARTH)

3.1 The graph below which shows the major extinction events.



3.1.1 When did the Cenozoic era begin?

(2)

3.1.2 Which mass extinction took place towards the end of the Palaeozoic era?

(1)

3.1.3 Approximately how many families of species died out at the end of the Palaeozoic era? Show ALL working.

(2)

3.1.4 Explain why the number of families of organisms rapidly increased after each mass extinction.

(4)

Answers:

3.1.1 55 -60 ✔ million years ago ✔ /mya

3.1.2 Permian ✔

3.1.3 400 – 200 ✔ = 200 ✔

3.1.4 The extinction of a large number of families resulted in the availability of empty niches ✔ that could be filled by surviving ✔ species. These species can survive ✔ best in these new niches and form new species ✔

3.2 The table below that shows the decay of carbon-14 over time.

DECAY OF CARBON -14								
Years (mya) from the present	0	5730	11 460	17 190	22 920	**X**	34 380	40 110
Number of half-lives elapsed	0	1	2	3	4	5	6	7
Percentage of original carbon-14 remaining	100	50	25	12,5	6,25	**Z**	1,56	0,78

3.2.1 Name TWO types of methods used to determine the age of fossils.
(2)

3.2.2 Calculate the value of:

(a) **X**
(1)

(b) **Z**
(1)

3.2.3 Explain why it would not be possible to date a fossil which existed 80 million years ago using the decay of Carbon-14.
(2)

Answers:

3.2.1 Radiometric dating ✔

Relative dating ✔

3.2.2 (a) X = 28 650 mya ✔

(b) Z = 3,13% ✔

3.2.3 After 60 million years ✔ there is no more carbon-14 remaining ✔ in the fossil

LINK AND QR CODE

TOPIC	LINK	QR CODE
History of life on earth	https://youtu.be/EZPcEZpkzBs	