**UNIT 1: RESERCH SKILLS**

**SOME BIOLOGICAL TERMS USED IN RESEARCH**

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| **Scientific investigation** | * This refers to activities that scientist carry out when they want to discover more about something they are curious |
| **Plan** | * It is a written account of what one intends to do |
| **The aim of the**  **experiment** | * This refers to the reason why a person wants to carry out an investigation |
| **Hypothesis** | * It is a suggested possible explanation of the observation. It can be improved to be true or false by the results obtained after carrying out the investigation. |
| **Variable** | This means anything that can vary.  **Types of variables**   1. **Independent or input variable**   This is the variable that is altered or changed during the investigation   1. **Dependent variable or outcome variable**   This is the variable that changes due to changes in the other variable. Therefore it depends on another variable for it to change**.**   1. **Control variable**   This is the variable that is kept constant or the variable that is not allowed to change. |
| **Designing an experiment** | * This is the process that involves listing activities to be carried out in order to get results from the investigations. * A design includes what to do, how to do it, what to observe and how the observation will be handled. |
| **Magnification** |  |
| **Description** | * It is the statement the shows what was observed. It may be presented in form of words. |
| **Explanation** | * This shows why a given observation was made. |
| **Factual statements** | * This refers to the statement that contains information which is clear and true. |
| **Opinion statements** | * This refers to personal statements explaining an event or situation |
| **An assertion** | * This is a positive statement usually made without an attempt at furnishing evidence. |
| **Conclusion** | * This involves making deductions from explanations on the observations made. It is used to show whether the aim of the experiment was met or not**.** |
| **Report** | * It is a written record on all that was done during the investigation * The report should have the following information  1. A title- this is derived from the aim of the experiment 2. Statement of the aim of the experiment 3. Statement of hypothesis. 4. Description of the procedure used. 5. Results obtained. 6. Presentation of the results in form of tables and graphs. 7. Conclusions from the data. |

**UNIT 2: PLANT BIOLOGY**

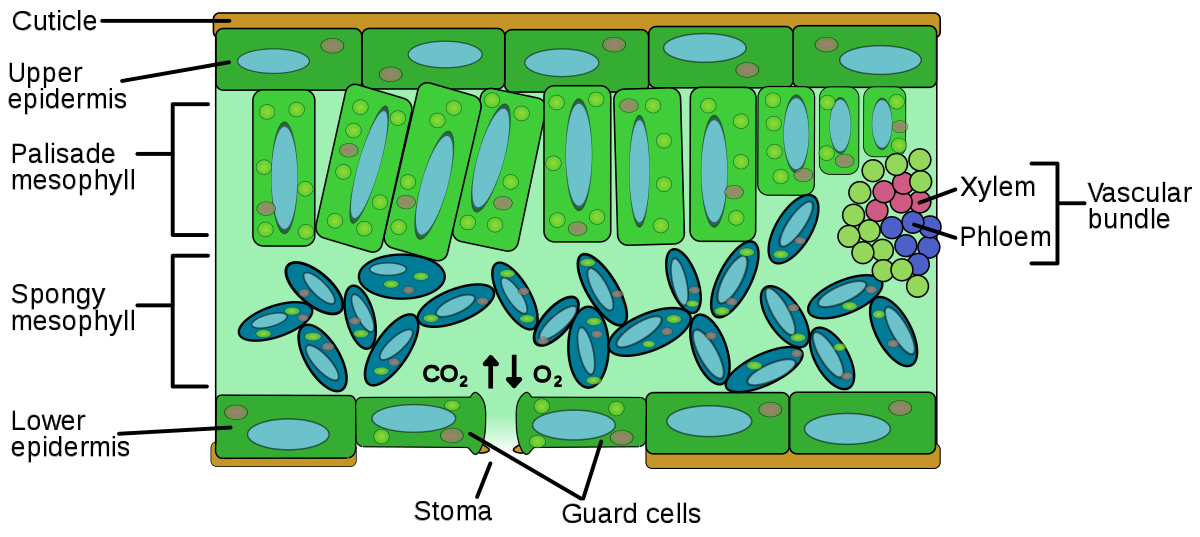
**The external structure of the leaf**

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| The diagram below shows the external structure of a leaf.  The leaf has a leaf blade and a stalk or petiole as shown below    Petiole joins the leaf to the stem |

**THE INTERNAL STRUCTURE OF A LEAF**

The internal structure of the leaf is composed of the following





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| **Parts** | **Adaptation for photosynthesis** | **FUNCTIONS** |
| **Cuticle** | * It is a thin waxy layer found on both the upper and lower surface of the leaf. * It is transparent to allow light into the leaf | * It prevents excessive loss of water through evaporation from the leaf * It also protects the leaf from attack by pests |
| **Epidermis** | The cells do not have chloroplasts | It covers the surface of the leaf for protection |
| **Palisade mesophyll cells** | * It contains numerous chloroplasts that are involved in photosynthesis. * They are closely packed together to increase the surface area for photosynthesis process | It is a site for photosynthesis process. |
| **Spongy mesophyll cells** | * They contain few chloroplasts for photosynthesis process. * They have big air spaces for gas exchange or aeration. | It is the site for photosynthesis process |
| **Guard cells** | They have spaces between them called stomata  They have chloroplast for photosynthesis  The figure below shows the guard cells and the stomata | The functions of guard cells in stomata are as follows   * They **open and close the stomatal pore** .They swell when water flows into them, causing the stomatal pore to open .Similarly the pore closes if the guard cells shrink. * They protect the stomatal pore. * They help to **regulate transpiration** |
| **Stomata** | They are tiny pores within the guard cells and are found on both upper and lower leaf epidermis.  In most plants growing on land, the number of stomata on lower leaf surface are always higher than the number of stomata on the upper leaf surface. This is important because it ensures that the plant loses less water through the upper side that directly facessunlight. | * They are used for gas exchange between the leaf. They allow entry for carbon dioxide for photosynthesis   They allow elimination of oxygen during the day and carbon dioxide during the night.   * They are used for transpiration. They eliminate water from the leaf through the process called **transpiration.** |
| **Veins** | They contain phloem and xylem tissues which are involved in the transport of substances to and from the leaves. | * They are conducting water and minerals salts or food substances. * The phloem contained in the veins transports food substances away from the leaves while xylem tissues transports water to the leaves. |

**GUARD CELLS AND STOMATA**

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| **Guard** **cells** are **cells** surrounding each stoma. They help to regulate the rate of transpiration by opening and closing the stomata. They help to regulate the rate of transpiration by opening and closing the stomata |

**THE CHLOROPLASTS**

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| The chloroplasts have **grana which trap light energy from the sun**. They have photosynthetic enzymes inside the stroma for photosynthesis.  The chloroplasts have grana which trap light energy from the sun.  They have photosynthetic enzymes inside the stroma for photosynthesis.  The diagram below shows parts of the chloroplasts.  http://3.bp.blogspot.com/_FLSPZURcXIQ/TIfCswCmXWI/AAAAAAAAANQ/iUlQZBRAc0E/s1600/structureofchloroplast.gif |

**MODIFIED LEAVES AND THEIR FUNCTIONS**

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| 1. **Leaf tendril**   Some leaves have parts of their leaves modified into slender, twining tendrils.  The figure below shows leaf tendril     1. **Spines**   Some plants such as cacti have leaves modified into slender, sharp spines or hooks for defence against grazing animals and reduce water loss.  The figure below shows Cactus which has leaves modified into sharp spines for defence.  http://myarizona.org/wp-content/uploads/2011/08/img003.jpg   1. **Pitcher**   A pitcher is a leaf modified into a hollow jug structure. Such leaves serve as traps of insects or small animals which decay and provide nutrients to the plant.  The figure below shows a leaf of saracenia (pitcher plant) modified to a pitcher to trap insects.  http://2.bp.blogspot.com/-BJniD-mOnS8/UXca_YAqF_I/AAAAAAAALEg/jswuHrLDE4Y/s1600/ppleaves.jpg |

**ARRANGEMENTS OF LEAVES ON THE STEM**

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| The following are the three different arrangements of leaves on the stem   1. Some are arranged around the stem to form a whorl 2. Some alternate along the stem 3. Others are arranged opposite each other on the stem.   These arrangements of leaves are shown below  http://orbisec.com/wp-content/uploads/2014/10/Leaf-Arrangement.gif |

**ARRANGEMENT OF THE VEINS**

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| http://www.cactus-art.biz/note-book/Dictionary/aaa_Dictionary_pictures/Venation_parallel_reticulated.jpg  In dicot plants the leaves form a network pattern while in monocot plants the veins run parallel to each other.  http://www.crossscience.com/plants/plants_vein_structures.gif |

**Functions of the leaves**

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| These include   1. They are sites of photosynthesis. They absorb sunlight and use it in making food. 2. Succulent leaves are used in storage of water and food substances. 3. In some plants leaves are involved in reproduction. 4. They are in involved in respiration. |

**INTERNAL STRUCTURE OF A DICOTYLEDONONUS STEM**

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| In dicotyledonous stem, the veins or vascular bundles are arranged to form a ring as shown below  http://science.halleyhosting.com/sci/ibbio/plants/pics/intstemnotes.gif  Functions of the parts labelled in the diagram above  **Phloem-** Transport food substances away from the leaves.  **Xylem** – Transports water and mineral salts to the leaves  **Epidermis**- It is the outer protective tissue  **Cortex or ground tissue** – Store water and other substances  **Pith-** Store water and other substances. |

**INTERNAL STRUCTURE OF THE MONOCOTYLEDONOUS STEM**

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| The veins or vascular bundles in the monocotyledonous stem are just scattered anyhow as shown in the diagram below |

**TYPES OF STEMS**

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| **http://i.ebayimg.com/images/i/351719179078-0-1/s-l1000.jpg**  **Succulent stem of cactus**  http://slideplayer.com/4207850/14/images/66/Axillary+bud+Leaf+scars+Corm+%28modified+stem%29+Old+corm+%28last+year%E2%80%99s%29.jpg  **Corm of Antheridium**    **Sweet potato vine**  http://balconygardenweb.com/wp-content/uploads/2016/02/tuber-in-potato.jpeg **Stem tuber of an Irish potato**  http://1.bp.blogspot.com/-RX9p0PrvBdc/Th4N8AqcVHI/AAAAAAAABLg/kea2Z7nPld4/s1600/OW%2BOnion%252C%2BDesert%2BSunrise%2B062911%2B%25286%2529.JPG **Stem of An Onion**  http://slideplayer.com/4207850/14/images/69/New+Scale+leaf+shoot+%28at+node%29+Stolon+%28runner%29+Adventitious+roots.jpg  **Oxalis runner** |

**Functions of the stems**

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| 1. They support the leaves enabling them to be exposed to light for efficient photosynthesis. 2. They store food substances in their cortex in form of starch and sucrose. 3. They transport substances from the roots to the leaves and from the roots to the leaves to all other parts of the plant. 4. They hold and support flowers and fruits exposing them to agents of dispersal respectively. 5. Some stems have thorns that protect the plant from grazing animals. |

**INTERNAL STRUCTURE OF THE DICOTYLEDONOUS ROOT**

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| In the dicotyledonous roots, the phloem alternates between the radiating arch of the xylem.  The diagram below shows the transverse section of the dicotyledonous root.  http://www.sliderbase.com/images/referats/1020b/(5).PNG |

**INTERNTAL STRUCTURE OF THE MONOCOTYLEDONOUS ROOT**

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| In the monocotyledonous root, the xylem and phloem are arranged to form a ring in which xylem tissue alternates with the phloem tissue.  The diagram below shows the transverse section of the monocotyledonous root. |

**TYPES OF THE ROOTS**

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| http://cdn.differencebetween.net/wp-content/uploads/2018/01/Difference-between-Taproot-and-Fibrous-root.jpg  There are two types of roots and these include   1. **The tap root system**   In this system, one primary root develops from the stem and grows straight downwards. The root can then develop branches that are referred to as secondary roots. It is mainly found in dicots.   1. **The fibrous root system**   In this system, many primary roots develop from the base of the stem. The stems are almost of the same length. They form a mass of roots and each can form branches.  The diagram below shows the fibrous root system: |

**MODIFIED ROOTS**

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| The following are the modified roots   1. Prop roots 2. Buttress roots 3. Cassava root tubers 4. Climbing roots 5. Aerial roots 6. Pneumatophores 7. **Prop roots** are adventitious roots which grow from the stem down into the soil. They provide additional anchorage to plants. 8. **The buttress roots** also provide additional anchorage to the plant. 9. **Climbing roots** are adventitious roots that hold the plant to a solid support. 10. **Aerial roots** absorb moisture from the air. 11. **Pneumatophores** are the breathing roots of mangrove plants. |

**FUNCTIONS OF THE ROOTS**

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| 1. They anchor or hold the plant firmly into the soil. 2. They absorb water and mineral salts from the soil for use by the plant. 3. Some roots store food substances for the plant. |

**Explain the difference in the distribution of the stomata on the upper and lower surface of the leaf.**

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| * There are more stomata on the lower surface than on the upper surface of the leaf. * Plants growing on land always have more stomata on the lower surface. This is important because it enables them to minimise loss of water by exposing only few stomata on the side that faces the sun directly. The side that is hidden from the sun has more stomata. * In plants growing in water such as water lily, they have very many stomata on the upper surface and few stomata or none lower leaf to eliminate excess water absorbed. * Number of stomata in a leaf also indicates where a plant is grown. Plants grown in areas with adequate water have leaves with many stomata while plants in dry areas have few stomata. |

**PHOTOSYTHESIS**

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| Photosynthesis process is defined as the process by which green plants make glucose from water and carbon dioxide using light energy.  During photosynthesis process, **oxygen** is released as by- product while **glucose** is produced as the first product and the main product. |

**Word equation for the photosynthesis process**

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| http://biology-igcse.weebly.com/uploads/1/5/0/7/15070316/3296223_orig.png |
| **Glucose** is the ***first and main product*** of the photosynthesis process.  **Oxygen** is produced as the ***by-product*** of photosynthesis process.  **Chlorophyll** is used to absorb light energy from sunlight while light energy is used to split water to hydrogen and oxygen atoms.  **Oxygen** is released to the atmosphere as the **by-product** of photosynthesis process while ***hydrogen is used to combine with carbon dioxide to produce glucose***. |

**What are the raw materials for photosynthesis process?**

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| Raw materials refer to the substances that are used in the process to form a particular product.  Therefore, the raw materials of photosynthesis process include the following:   1. Water 2. Carbon dioxide   Water and carbon dioxide are combined through a series of reactions to form glucose |

**STAGES OF PHOTOSYNTHESIS PROCESS**

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| 1. **Light stage or light dependent stage**   **C:\Users\new\AppData\Local\Temp\WPDNSE\{00000008-0001-0001-0000-000000000000}\small (1).png**  During this stage, light energy absorbed by chlorophyll from sunlight splits water into oxygen gas and hydrogen atoms in the process known as photolysis and light energy is converted to form ATP **(Adenosine Trisphosphate). ATP** is used in the dark stage of photosynthesis**.** Therefore, **photolysis** is the splitting of water molecules by sunlight energy to form oxygen gas and hydrogen atoms.  The **oxygen** produced during light stage is ***released as a by- product*** and some is used by the same plant ***for respiration.***  The hydrogen produced in the light stage is used in the dark stage of photosynthesis. This stage occurs in the grana of the chloroplast during the day.   1. **Dark stage/light independent stage**   **C:\Users\new\AppData\Local\Temp\WPDNSE\{00000008-0001-0001-0000-000000000000}\small (2).png**  During this stage, **hydrogen** produced in the light stage **reacts** with **carbon dioxide i**n the presence of **ATP molecules** to form **glucose.** The end product of the dark stage is **glucose**  Dark stage occurs in the **stroma** of the chloroplast **during the night.** |

**AN EXPERIMENT TO SHOW THAT OXYGEN IS PRODUCED DURING THE PROCESS OF PHOTOSYNTHESIS**

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| http://toscanyacademy.com/blog/wp-content/uploads/2015/02/photosynthesis.jpg  The plant was placed in bright sunshine. The aim of placing one set-up in the ***bright light was to allow the water weed to photosynthesis as it receives sunlight*** .**Sodium bicarbonate** was added in the water in the beaker ***in order to enrich or to produce extra carbon dioxide in the water.***  **RESULTS**   1. It was observed that there were bubbles of gas rising in the funnel in the set- up that was placed in the bright sunshine and nothing was observed in the set-up that was placed in the cup-board. 2. When the glowing splint was exposed to the gas collected in the test-tube B, it relit. This showed that oxygen that oxygen gas was being produced. |

**CONDITIONS NECESSARY FOR PHOTOSYNTHESIS PROCESS**

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| There are four conditions which are necessary for photosynthesis process. These include   1. Water 2. Carbon dioxide 3. Chlorophyll 4. Sunlight |

**An experiment to show that light is necessary for photosynthesis**

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| http://cdn.biologydiscussion.com/wp-content/uploads/2016/09/image_thumb1_thumb_thumb.png  After testing the first leaf for starch, the shape that was cut out or not covered by aluminium foil or paperappears as **a blue-black** coloured shape on the leaf. This is because light reached this part of the leaf, causing photosynthesis to take place. The starch changed colour of iodine solution from brown to **blue-black**. The area under the carbon paper or aluminium foil remained brown. It ***did not change colour to blue-black indicating that no starch was present.*** Since light could not penetrate the foil or paper to reach this part of the leaf, no photosynthesis occurred. Therefore, no starch was formed.  The part of the plant not covered with foil had all conditions needed for photosynthesis. Therefore, on testing with iodine, it appeared blue-black. This is because starch was present. This part of the leaf acted as a control set-up. |

**An experiment to show that carbon dioxide is necessary for photosynthesis process**

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| **Materials**   1. **Two potted plants** kept in the dark for 24 hours. The purpose of keeping the potted plant in the dark for 24 hours in order to destarch the plant 9to remove the starch from the leaves) 2. **Transparent plastic bags** to allow light to pass through. 3. **Sodium hydroxide or potassium hydroxide solution** to remove or absorb carbon dioxide from the bag. This would make the leaves to deprived of carbon dioxide.   http://oldschool.com.sg/modpub/44797840243b0d1e5a6148  **Procedure**   1. **Plant in Flask x**   Put some sodium hydroxide or potassium hydroxide into the small plastic container and the plant should be covered with transparent polythene bag as shown below**.**  The purpose of sodium hydroxide solution is to absorb carbon dioxide from the bag. This would deprive the plant of carbon dioxide.   1. **Plant in Flask y**   Repeat the procedure but place sodium bicarbonate solution/limewwater in the soil holding the plant. The purpose of sodium bicarbonate solution is ***to produce extra carbon dioxide*** for the plant.  The two plants must be left in sunlight for 5-7 hours to allow photosynthesis to take place. Then one leaf from plant A and one leaf from plant B must be plucked and test for starch.  **Discussion**  Sodium hydroxide ***absorbs carbon dioxide from air*** in the bag. Photosynthesis will ***not take place without carbon dioxide***. As a result, ***no starch*** is formed in the leaves of ***plant A.*** When the leaves from plant a are tested for starch they ***give a brown colour.***  On the other hand, set-up B has a container with **sodium bicarbonate**. This chemical **produces extra carbon dioxide into the air** in the polythene bag. This allows photosynthesis to take place in the leaves of plant B**.** When the leaves from plant B are tested for starch they change to ***blue-black colour indicating presence of starch***. This activity shows that carbon dioxide is needed for photosynthesis to take place.  Set-up B acts as the control experiment. |

**An experiment to show that chlorophyll is necessary for photosynthesis process**

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| Variegated leaf is used to investigated the importance of chlorophyll in the process of photosynthesis. Variegated is one whose surface shows green and non-green colours.  The ***green part*** has ***cells with chlorophyll*** so they ***carry out photosynthesis*** and ***form starch***. This part will ***turn blue-black*** to show ***presence of starch*** when iodine is applied.  The **non-green part** has cells that do not have chlorophyll. These ***cells will not carry out photosynthesis***, so ***no starch will be formed***. Starch test will give a ***brown colour***.  The green part of the leaf acts as a control experiment.  http://www.indiastudychannel.com/attachments/Resources/168990-1-A-variegated-leaf-plant-taken-to-prove-chlorophyll-is-necessary-fo.gif |

**UNIT THREE- BLOOD DONATION**

**What is blood transfusion?**

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| It is a process whereby a patient is given blood that has been donated by another person. |

**State five reasons why blood transfusion is necessary**.

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| 1. Due to excessive loss of blood by mothers at child birth. 2. Excessive loss of blood due to an accident or an injury. 3. Patients undergoing surgery that leads to excessive blood loss. 4. Children suffering from acute anaemia. 5. Patients undergoing surgery that leads to excessive blood loss. |

**What is blood donation?**

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| It is a process whereby a healthy individual gives some amount of blood for use in blood transfusion to a patient.  During blood donation, the blood is collected by qualified medical staff under the Ministry of Health, the Red Cross and the officers of the blood transfusion services. |

**What are blood banks?**

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| These are where the blood is stored in hospitals which are kept at cool temperatures and chemicals are added to it to ensure it does not clot. |

**Explain two types of blood donors.**

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| 1. **Family replacement donors**   These are family members of a patient who are requested to donate blood to replace the one the patient used from the blood bank. This is done to make sure that another patient visiting the hospital with a need of blood will also be assisted.   1. **Voluntary non-remunerated donors**   These are individuals who freely donate blood at any time with a motive to save lives. This is done to ensure the blood banks will always have sufficient blood.  **Voluntary** means that the giving is done out of one’s will without being forced or enticed.  **Non- remunerated** means that the person does not ask for payment. The act is done for free. |

**Explain the steps that are involved in the blood donation process.**

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| * **Pre-donation counselling** * Before donation of blood, the volunteers are taken through a session where they are taught about the importance of blood donation and the requirements for blood donation. * At this session the donors are allowed to ask questions about their fears and the things they may not be sure of about blood donation. * It is also used to teach the donors on who should donate blood and who should not. At the same time the donors are informed that after the donation, their blood would be screened and they would be given results of the tests. The results are confidential and can only be revealed to the donor after the tests. The results include t***he blood group, presence of any disease pathogens, and the health status of the donor*** * **Venipuncture** * This is where the blood transfusion services help the donors in determining whether they are suitable to donate blood. * The following criteria is used * The age of the donor- not too young and not too old. The donor should be between 16 and 65 years old. * Donor must be healthy at the time of donation to ensure there are no disease causing pathogens in his/her blood. * Donor must not be suffering from diseases such as HIV and AIDS, syphilis and hepatitis B and C. These are diseases that are easily transmitted through blood. * After answering the questions, a brief medical examination is done on the donor. The blood pressure is first checked to make sure it’s at normal level. Then a drop of blood is taken from the donor and then tested by the technicians for haemoglobin content. The tests will show whether the donor is eligible to donate the blood or not depending on his/her haemoglobin content. * Venipuncture is a procedure where a needle is inserted into a vein to obtain blood. * A person donating the blood is made to be very comfortable by reclining on blood donor chair. * The chair is designed to ensure a comfortable position during blood donation. * The technician identifies a vein on the arm to carry out venipuncture. A needle is inserted direct into the vein. An elastic band may be used to elevate the blood pressure in the veins of the arm. It is tied on the upper part of the arm in order to ease and speed up the process. Sometimes the donor is given an object to squeeze repeatedly in order to increase blood flow to the targeted vein.  1. **Post-donation counselling**  * This done after blood donation where blood is taken to the blood transfusion laboratories where each individual blood is screened. * Blood screening means carrying out tests on the donated blood to determine its suitability for transfusion. * The tests in the blood transfusion laboratories include  1. The blood groups 2. HIV tests 3. Hepatitis B and C 4. Tests for pathogens 5. Rhesus factor tests  * The results of the tests are confidential and are then communicated to the donor. * In case the blood is free of any problem, the donor is counselled on how to maintain health. * In case there is a problem such as the blood testing positive for HIV virus or Hepatitis B and C viruses, the patient is counselled on steps to take to live positively and to seek appropriate medication. All this information is always held confidentially. |

**MALAWI BLOOD TRANSFUSION SERVICES**

**State three objectives of the Malawi Blood Transfusion Services established by Malawi government with the help of the European Union in 2003.**

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| 1. To reduce the incidence of HIV and AIDS and other diseases transmissible by blood and blood products. 2. Provide a safe and adequate blood supply to all health care facilities. 3. To provide adequate supplies of safe blood and blood products to meet the needs of all patients in all hospitals in Malawi. |

**State four activities that are carried out by Malawi Blood Transfusion Services that was established in 2003.**

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| 1. To collect blood from donors 2. To process the collected blood 3. To test and screen the collected blood 4. To supply safe and adequate blood products to all authorised hospitals in Malawi. 5. To encourage blood donation amongst school students, university students, youth groups and communities etc. 6. To encourage establishment of club 25 whose members assist the national blood transfusion services in encouraging others to do donate blood.   The club has elected national and provisional administrative committees to organise activities.  The MBTS assists the ‘ Malawi Club 25 in supporting and facilitating regular meetings, providing secretarial services and promotional activities. |

**UNIT FOUR- HUMAN RESPIRATORY SYSTEM OF THE HUMAN**

**THE RESPIRATORY SYSTEM OF HUMAN BEING**

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**AIR PASSAGE**

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| Air enters the air passages through the nostrils into spaces in the nose. |

**NASSAL PASSSGE**

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| The diagram below shows the crops-section of nasal membrane showing cilia and mucus secreting cells  http://2.bp.blogspot.com/-9dkHQY5qeBI/UhXMjLmV48I/AAAAAAAACZI/olqObimFNuc/s1600/mucus+and+cilia.png  **Function of mucus**  The function of the Mucus is that it traps dust and other particles that may be inhaled with the air.  **Function of the cilia**  Cilia move the mucus with trapped dust out of the nasal cavity. |

**Importance of breathing air through the nasal passages than through the mouth.**

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| This because the air is filtered, warmed and moistened in the nasal passage than in the mouth. |

**FUNCTION OF PLEURAL MEMBRANE**

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| * Theses membranes cover the lungs * The function of the pleural membrane is that it secretes pleural fluid |

**FUNCTION OF PLEURAL FLUID**

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| It acts as a lubricant and allows the lungs to move freely in the chest during breathing. |

**FUNCTION OF NASAL CAVITY**

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| It is the air passage leading to the lungs which allows air to move from the environment to the respiratory surface on the lungs. |

**FUNCTION OF THE DIAPHRAGM**

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| * It is the sheet of muscle that separate chest cavity from abdominal cavity. * It contracts and relaxes to bring about changes in the volume of chest cavity and inhalation. |

**ADAPTATIONS OF ALVEOLUS FOR GASEOUS EXCHANGE.**

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| **Adaptation features** | **Importance** |
| Alveoli are one cell thick | The gases travel or diffusion very fast |
| They are thin and moist | For fast diffusion of gases. |
| They are surrounded by a rich network of blood capillaries | They transport oxygen away from the alveolus and takes carbon dioxide towards the alveolus. |

**Explain the composition of gases in the exhaled air?**

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| **Gas** | **% in exhaled air** |
| Oxygen | 16% |
| Carbon dioxide | 4% |
| Nitrogen | 79% |
| Water vapour | Saturated |

**TRACHEA**

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| * The trachea is lined with the rings of cartilage.   **Function of the rings of cartilage that line trachea**   * The function of rings of cartilage that line the trachea is that they keep trachea is open. * The diagram below shows rings of cartilage of the trachea   http://humanhealthlink.com/wp-content/uploads/2016/05/Trachea-C-Rings.jpg  The trachea is also ciliated and mucus secreting cells  **Function of the cilia hairs**   * The function of the cilia found in the trachea is that they move mucus and trap foreign matter to the pharynx   **Function of the trachea**   * The function of the trachea is that it acts as the passage of air leading to the lungs. * The trachea is divided into two cartilage ringed tubes called bronchi in the middle of the chest.   **Function of the bronchi**   * The function of the bronchi is to still to act as the passage of air to the lungs. |

**BRONCHUS**

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| They are two and they branch from the trachea and are lined up with cartilage to keep the bronchi always open.  **Function of bronchi**  They help in delivering air from trachea to bronchioles. |

**BRONCHIOLE**

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| * The bronchial tubes are further divided into bronchioles which end up in a space called alveolus. * They do not have cartilage.   **Function of bronchiole**   * They help deliver air to alveoli. |

**ALVEOLUS OR AIR SACS IN THE LUNGS**

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| **C:\Users\new\Desktop\DOWNLOADS\gas.jpg**  **Functions of the alveolus or air sacs**  This is where gas exchange occurs in the lungs  **Adaptations of alveolus/air sacs for gas exchange**   1. The walls of the alveolus are one cell thick which enable fast diffusion of gases. 2. They contain firm of moisture that dissolve gases for fast diffusion 3. They are surrounded by a rich network of capillaries which take the oxygen away from the lugs and bring carbon dioxide to the lungs for exhalation. |

**Figure below shows the lung model. Use it to answer the questions that follow.**

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| http://oldschool.com.sg/modpub/31663952651c98e5cd20a7  **C:\Users\new\Desktop\DOWNLOADS\print-138417377.jpg** |

**State the following parts represent in the human respiratory system.**

|  |
| --- |
| 1. **Bell jar/Plastic bottle**   The bell jar represents the chest wall or rib cage   1. **Balloon**   The balloon represents the lungs   1. **Rubber sheet**   The rubber sheet represents the diaphragm |

**WHAT ROLE DOES THE LUNG MODEL ILLUSTRATE?**

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| --- |
| * The lung model illustrates the role of diaphragm during the breathing. It shows how the lungs represented by the balloons fill with air as a result of the contraction of the diaphragm represented by the rubber sheet. * When the rubber sheet is pulled down, diaphragm contracts, it increases the volume in the bell jar and reduces pressure in it * Since the outside air pressure is higher than the pressure in the bell jar, air rushes into the balloons and the swell. This is what happens during **inhalation.** * When the rubber sheet is pushed up, the diaphragm relaxes; it reduces the volume of the bell jar and increases the pressure inside it. This is what happens during exhalation. |

**THE LIMITATION OF A LUNG MODEL**

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| The bell jar is rigid it represents the rib cage but cannot move upwards or downwards or inward and outward to change the volume of the thoracic cavity. |

**INHALATION MECHANISM AND EXHALATION MECHANISM**

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| http://microbiologynotes.com/wp-content/uploads/2016/09/Mechanism-of-Breathing.jpg  Inhalation is the active phase of breathing which draws air into the lungs.  **Inhalation**  **During this phase,**   * The diaphragm muscles contract causing it to flatten. * The external intercostals muscles in the rib found in region relax. This cause the rib cage to move upwards and outwards. * The contraction of the diaphragm and the external intercostals muscles increases the volume in the chest cavity but causes a decrease in the pressure of air compared to atmospheric air. Then air rushes through the air passages into the lungs, forcing them to expand.   **Exhalation**  Exhalation is the phase of breathing which expels air out of the lungs.   * During exhalation, the diaphragm muscle relaxes making it to move upwards to become dome shaped. * The external intercostals muscles relax and the internal intercostals muscles contract. This cause the ribcage to move downwards and inwards. The volume of the chest cavity decreases and the pressure increases compared to the atmospheric air. Increased pressure forces air out of the lungs which becomes deflated. |

**AIRTIFICIAL VENTILATION/ARTIFICIAL RESUSCITATION**

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| It is a First AID practice carried out on a person who is having difficulties in breathing due to an accident, fainting or health complications. Artificial ventilation is done by blowing air using one’s mouth of the patient. The person carrying out the First Aid places his mouth onto the mouth and blows in air into the patient. This makes artificial ventilation to be referred to as the Kiss of life.  The figure below shows the kiss of life |

**Explain the procedure for carrying out artificial resusspectible**

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| --- |
| 1. Let the patient lie on his/her back on a mat soft material 2. Close the patient’s nose and pull the headache 3. Take a depth then place your mouth onto the mouth of the patient covering it completely 4. Breathe out heavily forcing the air into the lungs of the patient. 5. Remove your mouth and gently press the chest of the patient to force air out. 6. Repeat procedures 4 to 6 until the patients start to breathe without help.   Should the breathing fail after 2o trials, rush the person to the nearest healthy facility. |

**UNIT 5: HUMAN NERVOUS SYSTEM**

**Define Stimuli.**

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| It is the change in the environment that can lead to a change in activity of part or whole of an organism’s body |

**Explain two types of stimuli**

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| --- |
| 1. **External stimuli**   These are changes in the external environment of an organism which are perceived by the organism.  Examples include sound, light, temperature, touch and smell   1. **Internal stimuli**   These are changes within the body of an organism. For instance body temperature, salt concentration, carbon dioxide concentration and blood sugar that can lead to a change in activity of part or whole of an organism |

**Define response**

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| --- |
| It is a reaction of part or whole of an organism to a stimulus.  Examples of responses include   1. The rapid blinking of the eyes 2. The movements of the ants away from naphthalene. |

**NERVOUS SYSTEM**

|  |
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| It is the system of specialised cells known as nerve cells or neurones which are linked to each other and to different sensory cells and effectors in the body. |

**THE COMPONENTS OF THE NERVOUS SYSTEM**

1. **The central Nervous System**

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**The brain**

|  |
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| **It is made up of**   1. **The brain**  * The brain is made up of two halves known as hemispheres which are the right hemisphere and the left hemisphere. * The two hemispheres are interconnected by a group of nerves called **corpus callosum** * The function of the right hemisphere is that it controls activities of the left side of the body. * The function of the left hemisphere is that it controls activities of the right side of the body. * The outermost part of the brain is called the **grey matter.** * The inner larger part of the brain is called the **white matter.** |

**Draw the diagram of the section through the head to show the brain and label all the parts.**

|  |
| --- |
| http://what-when-how.com/wp-content/uploads/2012/08/tmp696735_thumb2.png   * **The cerebrum is the largest part** * **The cerebellum** below the rear part of the cerebrum * **The medulla oblongata is located beneath the cerebellum** |

**Explain the functions of the following parts of the brain the brain**

1. **Cerebrum**

|  |
| --- |
| * **It** is the largest part of the human brain * **It perform the following functions**  1. It is the thinking centre 2. It is involved in learning 3. It is involved in imagination and creativity 4. It is the memory centre 5. It is the intelligence centre 6. It is responsible for personality/character 7. It is responsible for emotions such as joy and sorrow 8. It is involved in voluntary of body movements such as walking, dancing and jumping 9. It receives and interprets impulses from the sense receptors |

1. **Cerebellum**

|  |
| --- |
| **It performs the following functions:**   1. Coordination of body movements 2. Maintaining body balance and posture 3. Ensuring dexterity in fine movements like using hands and fingers to carry out skilful tasks such as playing a guitar, sewing and typing. |

1. **Medulla oblongata**

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| The function of the medulla oblongata is to control involuntary responses such as breathing, blood circulation, heart, digestion and swallowing |

1. **Hypothalamus**

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| --- |
| * It controls secretion of hormones by pituitary glands and so involved in homeostatic processes * It also controls hunger, thirst and sleep |

**Spinal cord**

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| * The spinal cord is the extension of the brain * The outer parts of the spinal cord contain the **white matter** and the inner part contains **the grey matter** * There is a narrow canal called **the central canal** which runs down the spinal cord.   The spinal canal contains the fluid called **cerebro-spinal fluid**.  **Functions of the spinal cord**   1. Linking the nerves of the peripheral nervous system with the brain 2. Co-ordinating certain automatic responses   **Diagram showing the transverse section of a spinal cord and all the parts.** **C:\Users\new\AppData\Local\Temp\WPDNSE\{00000008-0001-0001-0000-000000000000}\Figure_35_04_04 (1).jpg**  **Differences between the brain and spinal cord**  The difference between the brain and the spinal cord is that the grey matter is on the outer surface in the and the white matter is in the inner surface while in the spinal cord the grey matter is in the inner surface while the white matter is on the outer surface. |

1. **The peripheral Nervous System**

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| * The peripheral Nervous System- made up of the peripheral nerves. * This is the system of nerves that connect the spinal cord and the brain to all other parts of the body. * The nerves that connect the brain to surrounding parts in the head such as the ear and eyes are known as **cranial nerves.** * The nerves that connect the spinal cord to surrounding parts of the body such as hands, legs, ribs and abdomen are known as the **spinal nerves.** * The peripheral nervous system connects the receptors to the central nervous system * It also connects the central nervous system to the effectors. |

1. **The automatic nervous system**

|  |
| --- |
| * It is part of the peripheral nervous system * It constitutes part of the motor neurones. * It involves responses that you do not have any control * It influences organs, glands and smooth muscles * Some examples of response of the automatic nervous system include  1. Beating of the heart 2. Narrowing and dilating of the pupil 3. Swallowing 4. Vomiting 5. Sneezing 6. digestion |

**List the effects of alcohol on the brain.**

|  |
| --- |
| 1. It brings about depression. It does this by slowing down the speed of activity of the brain 2. it affects the cerebrum such that judgement is impaired 3. it affects the cerebellum so that balance of the body is lost |

**Explain the effects of the Indian hemp**

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| --- |
| 1. Cannabis makes one to have a false sense of well being. This makes the person fail to respond to the stimulus on time 2. An individual attains a sense of hopelessness and fear leading to depression 3. Smoking marijuana reduces the strength and speed of communication between the mind and the body, the brain takes time to send impulses for a given activity to be carried out 4. It makes someone to loses memory 5. Makes the person to feel drowsy with relaxing effect even in times when one is supposed to be active. |

**State any four effects of drug abuse.**

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| --- |
| 1. Some drugs cause a person to hallucinations which leads to depression. Hallucination is caused by drugs such as cocaine and heroine. 2. Some drugs affect the brain cells involved in sleep. This makes a person to lose sleep for example caffeine. 3. Some drugs like valium are sedatives. They affect the brain making a person to feel sleepy. 4. Smoking cigarettes introduces nicotine into the blood. Nicotine makes blood vessels to be narrow. In a narrow vessel, blood pressure increases hence rapid transmission. |

**UNIT 6: SENSE ORGANS- THE EYE**

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| Function of the eye- It enables us to see objects. |

**EXTERNAL PART OF AN EYE SHOWING MUSCLE ATTACHMENT ON THE EYEBALL**

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| **[Structure Eye External and Internal Structure of the Eyes](http://waiyiptat.com/draw-and-label-a-human-eye-best-of-structure-eye-external-and-internal-structure-of-the-eyes-image)**  http://rag3dviz.com/wp-content/uploads/2015/11/Eye-Fuction-1024x687.jpg  http://www.sciencehub4kids.com/wp-content/uploads/2015/08/The-Human-Eye-and-Its-Function.gif |

**INTERNAL PARTS OF THE EYE**

|  |
| --- |
| http://www.pharmacologyeducation.org/sites/default/files/EYE.jpg  **Related image** |

**PARTS OF THE EYE AND THEIR FUNCTIONS**

|  |  |
| --- | --- |
| **Parts** | **Function** |
| **Eyebrows** | * Prevents fluid from entering the eye |
| **Eye lashes** | * Trap dust particles preventing them from entering into the eyes |
| **Tear glands** | * They secrete tears that keep the eye moist * They wash away dust particles or irritating materials * They contain antiseptic properties that kill pathogens |
| **Tear duct** | Drains away excess tears into the nasal activity |
| **Eyelids** | They cover and protect the eye from physical damage |
| **Muscle attachment to skull** | They control the movement of the eyeball in the orbit |
| **Pupil** | Regulates the amount of light entering the eye, becomes smaller under bright light and enlarges under dim light |
| **sclera** | Protects the delicate parts of the eye |
| **cornea** | Allows light to pass to the inside of the eye |
| **choroid** | Supplies blood to the eye.  Pigment prevents reflection of light within eyeball |
| **Ciliary body** | Produces aqueous homour that maintains the shape of eyeball ball, ciliary muscle is involved in accommodation |
| **Iris** | Regulates the size of pupil.  Melanin gives the eye its colour |
| **Lens** | Involved in accommodation by change in thickness.  Refracts light onto the retina |
| **Suspensory ligament** | Holds the lens in position |
| **Aqueous humour** | Concerned with nutrition and metabolism of lens and cornea which have no blood supplies.  It maintains the shape of the eyeball |
| **Vitreous humour** | Fills eyeball and maintains its shape  Involved in refraction of light |
| **Retina** | Rods sense dim light, cones sense colour and bright light |
| **Conjunctiva** | Protection of the eyeball |

**Explain the adaptations of the following parts of the eye for their functions**

|  |  |
| --- | --- |
| **Part of the eye** | **Function** |
| **Sclera** | Tough , white opaque |
| **Cornea** | It is transparent layer of sclera |
| **Choroid** | It contains cells that have melanin, arteries and veins |
| **Ciliary body** | It is a ring of thickened tissue which is continuous with choroid and contains ciliary muscle |
| **Iris** | It contains melanin, circular and radial muscles |
| **Pupil** | Hole at the centre of the iris |
| **Lens** | It is transparent, biconvex disc |
| **Suspensory ligaments** | Fibrous ligament attached to ciliary body |
| **Aqueous humour** | It is transparent , watery fluid |
| **Vitreous humour** | It is transparent jelly |
| **Retina** | It is transparent, contains light sensitive cells -the rods and cones |
| **Conjunctiva** | It is a thin smooth membrane |
| **Tear glands** | It secretes tears |

**THE BLIND SPOT**

|  |
| --- |
| * It is the point where the optic nerve leaves the eye. * It is not sensitive to light because there are no photoreceptor cells, rods or cones located here. * Any image falling on the blind spot is not seen because it does not cause generation of an impulse. * The blind spot has only blood vessels |

**How the eye works**

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| * An object reflects light rays to the eye. * Light rays enter the eye through the cornea * The cornea refracts light to the pupil. * Iris regulates the amount of light entering the eye. * The light rays then pass through the pupil into the aqueous houmour which refracts the rays towards the lens. * The lens focuses the rays of light onto the retina through the vitreous homour. * On the retina, an upside down image is formed. The cons and rods in the retina are stimulated. * An impulse is generated and sent to the brain through the optic nerve. * The brain interprets the impulse to an actual image of what was observed. |

**State and explain the defects of the eye and their corrections**

1. **Short-sightedness or myopia**

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| * It is caused by a long eye ball. People with such eye defect can only clearly see objects that are near.   C:\Users\new\Desktop\DOWNLOADS\shortsightedness-myopia-vs-normal-vision-8058ef.jpg    Short- sightedness causes light to focus in front of the retina instead of on the back of the eye causing distant objects to appear blurred. Close objects appear normal, headache and eye strain  **Symptom**   * Inability to see distant objects   **Correction**   * It can be corrected by wearing concave or diverging lens in spectacles |

1. **Long-sightedness**

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| --- |
| * It is caused by a short eyeball.   **Symptom**   * Inability to see near objects. People with this defect cannot clearly see the objects that are near.   **Correction**   * It can be corrected by fitting spectacles with a convex lens in front of the eyes. * Figure showing convex corrects long sightedness |

1. **Astigmatism**

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| --- |
| * It is caused by uneven surface of lens or cornea   **Symptom**   * Parts of the image is blurred   **Correction**   * It can be corrected by using lens that had been ground unequally to compensate for the irregularities of the cornea. |

1. **Cataracts**

|  |
| --- |
| * It is caused by opaque lens   **Symptoms**   * The person with this defect as poor vision   **Correction**   * It can be corrected by surgery to remove defective lens and replace it with an artificial lens. |

1. **Old sight**

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| --- |
| * It is caused by inelastic lens.   **Symptoms**   * Short and long-sightedness   **Correction**   * It can be corrected by bi-focal lens in spectacles |

**State and explain five things that should be observed when taking care of our eyes.**

|  |
| --- |
| 1. Always eat diet of fruits and vegetables that contain vitamin A for proper eye vision 2. Avoid looking at very bright light since strong rays of light damages the retina of the eye. 3. Avoid working or reading in dim light as dim light causes strain to the eye. 4. Have regular eye checkup by optician 5. Always wash your eyes with clean warm water. 6. If an object enters into the eyes, do not rub the eye. Flush the object out of the eye using clean slightly warm water. 7. When using a computer, take a break after every 40 minutes to take the eyes from the computer screen 8. Wear glasses only after recommendation by a doctor. |

**THE EAR**

**Function of ears**

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| 1. For hearing 2. For maintaining body balance or maintaining posture   The ear has sensory receptors that detect sound and others that detect movement and position. |

**A LONGITUDINAL SECTION THROUGH THE EAR**

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| --- |
| **[Functions of the Ear](https://pixfeeds.com/images/7/318422/1280-ear-diagram.png)**  **FIGURE SHOWING OUTER EAR**  **Outer Ear**  **FIGURE SHOWING OSSICLES IN THE MIDDLE EAR**  **Tiny bones in ear** |

**PARTS OF THE EAR AND THEIR FUNCTIONS**

**The ear has three main chambers**

1. **The outer ear**

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| * The outer ear is made up of the pinna (earlobe), auditory canal (ear tube) and the eardrum(tympanic membrane) * The function of the pinna is that it receives or collects sound waves and directs them into the auditory canal * The auditory canal or ear is the passage between the pinna and eardrum * The ear tube or auditory canal is line with cells that secrete wax. * The function of the wax found in the auditory canal is to keep the eardrum soft and traps dusts. * The eardrum is a thin flexible sheet-like membrane. * The function of the eardrum is that it passes sound vibrations from the outer ear to **ossicles** in the middle ear. |

1. **The middle ear**

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| * The middle ear is separated from the outer ear by **eardrum** and from the inner ear by the **oval window** and **round window**. * The middle ear contains three ossicles namely **hammer(malleus), anvil (incus) and stirrup(stapes)** * The functions of the ossicles (tinny bones) are to receive vibrations from the eardrum and then amplify the vibrations and pass them to the oval window**.** * The middle ear also opens to into throat through **Eustachian tube**. * The function of the Eustachian tube is that it ensures equal air pressure on both sides of the eardrum in the middle ear and the external air pressure. * The functions of the oval window and round window which are thin flexible membrane is that they are involved in the transmission of vibrations to the cochlea in the inner ear. |

1. **The inner ear**

|  |
| --- |
| * The inner ear is made up of the semicircular canal\*vestibular apparatus) and the cochlea. * The semicircular canal or vestibular apparatus is responsible for maintaining balance and posture. * The function of the cochlea is that it is responsible for hearing. |

**HEARING PROCESS**

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| --- |
| * Vibrations of sound cause hearing. These vibrations pass through air in the form of sound waves. On reaching the ear, the sound waves are directed by the pinna into the ear tube. * On reaching the eardrum, sound waves cause it to vibrate. The vibration of the eardrum causes the hammer in contact with it to vibrate. The hammer in turn causes the anvil to vibrate which in turn causes the stirrup to vibrate. As these vibrations pass through the ossicles, they are amplified. The last ossicle, the stirrup causes the oval window to vibrate. The vibrating oval window causes the fluid inside the cochlea to vibrate accordingly. * Vibration of fluids in the cochlea stimulate sensory cells in cochlea to generate nerve impulses which are transmitted to the brain via the auditory nerve. On reaching the brain, the impulses are interpreted into sound. |

**EAR DEFECTS**

**Define the term deafness.**

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| Deafness is a condition whereby an individual is unable to hear. |

**Explain two types of deafness.**

1. **Absolute/nerve deafness**

**Briefly explain the causes and correction of absolute defeaness.**

|  |
| --- |
| This a condition where the sound impulses are not able to reach the brain.This may due to   1. Damaged auditory nerve 2. Damaged cochlea 3. Damaged brain cells that are involved in sound reception   **Causes of absolute/nerve deafness**   1. Hereditary- child is born with some parts of the inner ear either missing or functionless. 2. Infections of the inner ear   **Correction of absolute deafness**  Nerve deafness cannot be treated but affected individuals can be assisted to live normal lives by   1. Use of visual signs during speech 2. Learning skills of lip reading.   In this way, they can be able to communicate with other individuals. |

1. **Conductive deafness**

**Briefly explain the cause and correction of conductive defeaness.**

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| --- |
| This is a condition whereby a person is partially unable to hear due to problems of relaying of sound waves to the inner ear. This may due to:   1. Failure of the eardrum to vibrate 2. Failure of ossicles to amplify and pass sound waves to inner ear   **Causes of conductive deafness**   1. Accumulation of wax in the ear canal 2. Damage of the eardrum by objects, blows on the head and loud sounds. 3. Ear infections leading to production of pus that reduces sound movement in the ear. 4. Use of certain drugs such as chloroquine in some individuals   **Correction of conductive deafness**  It can be corrected by   1. Treatment of ear infections by specialists (audiologist) 2. Use of hearing aids. These are devices that are fixed in the auditory canal to enhance sound transmission in the ear. 3. Learning lip reading skills and use of visual signs in speech. |

**Explain three ways of proper caring the human ear.**

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| --- |
| 1. Clean the outer ear with a clean soft cloth with warm water and soap. 2. Do not insert swab or sticks or matchsticks into the ear. The ear produces wax that cleans the inner ear. If the wax clogs the ear canal see a medical doctor for treatment. 3. Protect your ears from loud sounds or noises. This is by lowering the volume f all sound equipment around you. 4. Avoid use of earphone with amplified sound. Continuous use of earphones damages the eardrum |

**THE SKIN**

**FUNCTIONS OF THE SKIN**

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| 1. It regulates body temperature 2. It provides protection against external physical forces 3. It acts as water proof thereby preventing unnecessary water entering the skin. |

**A SECTION THROUGH THE MAMMALIAN SKIN**

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| **Illustration of human skin anatomy. - csp38555031** |

The skin has two main layers: the epidermis and dermis.

1. **EPIDERMIS**

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| * This is the upper layer of the skin. * It is made up of three layers of cells which are the **cornified layer,** the **granular** layer and the **malphighian l**ayer. |

1. **THE CORNIFIED LAYER**

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| --- |
| It is the outmost layer in the epidermis.  It is made up of dead cells which form a tough protective outer layer  **Functions of cornified layer**   1. It acts as a barrier against entry of micro-organisms 2. It reduces loss of water 3. It protects the inner cells from mechanical damage. 4. The cells in this layer produces large amount of tough waterproof protein called **keratin** which strengthen them |

1. **THE GRANULAR LAYER**

|  |
| --- |
| * It is made of living cells which eventually form the cornified layer. * It is the middle layer of cells in the epidermis**.**   **Functions**   * Formation of cornified layer |

1. **THE MALPIGHIAN LAYER**

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| --- |
| * It is the innermost layer of cells of the epidermis. * It is made up of actively dividing cells which are responsible for the renewal of the epidermis * The cells in this layer contain melanin pigment which contributes to the skin colour * Melanin protects against ultra violet light from the sun which can damage the skin cells beneath it.   **Functions of malpighian layer**   1. It produces cells that are responsible for the renewal of epidermis 2. It contains melanin pigment that protects against ultra violet light from the sun which can damage the skin cells beneath it. |

1. **THE DERMIS**

|  |
| --- |
| * This is thicker than epidermis and is located below it * It contains the following structures  1. Hair follicles 2. Sweat glands 3. Blood capillaries 4. Nerve endings 5. Lymph vessels hair erector 6. Muscle sensory organs 7. Sebaceous glands |

**STRUCTURES FOUND IN THE DERMIS**

1. **SWEAT GLANDS**

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| --- |
| * These are tinny coiled tubes which secrete and release sweat through the pores on the surface of the skin. * Sweats consist of **water** and **mineral salts** such as sodium chloride and traces of **urea** and **lactic acid**. * The liquid that forms sweat is absorbed by sweat glands from the blood capillaries supplied to each gland. It reaches the surface of the skin through the pore and water in it evaporates into the air.   **Functions of sweat glands**   * They produce sweats that consist of water, mineral salts, urea and lactic acid. |

1. **BLOOD CAPILLARIES**

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| --- |
| * The function of the blood capillaries in the skin is that they supply the cells in the skin with oxygen and nutrients and take away carbon dioxide and waste substances. |

1. **HAIR FOLLICLES**

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| --- |
| These are tiny pits in the dermis.  **Function of the hair follicle**   * This is where the hair grows inside the follicle due to addition of cells to it at the bottom of the pit.   Hair is made up of a protein called **Keratin.** |

1. **SEBACEOUS GLANDS**

|  |
| --- |
| **These are small glands which open into the hair follicle.**  **Function of the Sebaceous glands**   * They produce an oily secretion called sebum which keeps the skin soft and has antiseptic properties to kill bacteria on the skin. |

1. **HAIR ERECTOR**

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| --- |
| * The erector muscle is attached between the bottom part of the hair and the epidermis. * When the erector muscle contracts, the hair fibres stand upright and very small pimples or swellings appear on the skin. When it relaxes, the hair lies flat on the skin. |

**SUBCUTANEOUS FAT LAYER**

|  |
| --- |
| * This is a layer of cells in which fat is stored.   **Function of subcutaneous fat layer**   * It acts as a heat insulator. |

**Briefly explain four ways proper caring of the skin.**

|  |
| --- |
| 1. Clean your skin every day using clean water and soap. This helps to open the pores of the skin. 2. Protect your skin from direct sun by wearing protective clothing. 3. Take food rich in vitamin C to keep the skin soft and pliable. 4. If your skin is dry, apply moisturiser creams but if always oily wash regularly to remove the dirt that is attracted by the oil. |

**UNIT 7: LOCOMOTION**

**What is locomotion?**

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| * It is the movement of the whole organism from one place to another. * In other words, locomotion is the change in position of the whole organism from one place to another. |

**THE HUMAN SKELETON**

**Name the two main regions of a human skeleton**

|  |
| --- |
| 1. **Axial skeleton**  * It is arranged along the axis of the endoskeleton. * It is made up of the bones of  1. The skull - forming the bone of the head 2. Vertebral column - bones of the backbone 3. Rib cage 4. **Appendicular skeleton**  * This refers to parts of endoskeleton that join to the axial skeleton. * It consists of the bones of the  1. Pectoral girdle- bones at the shoulder region 2. Pelvic girdle - bones of the hip region 3. Paired limbs |

**FUNCTIONS OF THE DIFFERENT PARTS OF THE SKELETON**

|  |  |
| --- | --- |
| **PART** | **FUNCTION** |
| Skull | It protects the brain, nasal organs, eyes, middle and inner ears |
| Vertebral column | It protects the spinal cord  Supports the head and provides points of attachment for the pelvis and the ribcage |
| Rib cage | It protects the lungs, heart, liver and other internal organs. |
| Girdle | It gives attachment to the forelimbs.  It absorbs stress from limbs |
| Pelvic girdle | It gives attachment to the hind limbs.  It absorbs stress from limbs. |
| Paired limbs | It enables locomotion to take place and provides an attachment for the muscle tissue. |

**State and explain the functions of the human skeleton.**

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| --- |
| 1. **Support**   The bones offer support of tissues in the body   1. **Protection**   Bones provide protection for certain delicate internal organs like the brain, the heart, the lungs and the spinal cord from mechanical injury.  They also protect parts of the ear (inner ear) and the eyes.   1. **Muscle attachment**   Bones provide surfaces for attachment of muscles.   1. **Movement**   Bones work together with muscles to produce movement. The movement of the whole body is known as locomotion.   1. **Shape**   The skeleton gives the body its shape.   1. **Formation of blood cells**   Bones are important in the formation of blood cells. Red blood cells are formed in the bone marrow of short and long bones.   1. **Storage of minerals**   Bones store calcium and phosphorous |

**STRUCTURE OF THE BONE**

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| * The bones consist of a hard outer part of the **compact bone**. The inner part has spongy bone. * **Compact bone** is dense and strong. It provides an attachment site for muscles. * **Spongy bone** is light in weight, it is rich in blood vessels, it is very porous. * Spongybone has spaces called cavities, filled with a material called **bone marrow.** * Bones are living tissues, made up of cells like any other body tissue. * The figure below shows the cross-section of the bone   http://www.bbc.co.uk/schools/gcsebitesize/pe/images/bone_anatomy.gif |

**A JOINT**

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| * A joint is a place where two or more bones meet. * There are two main types of joints  1. **Movable(synovial) joints**   These are joints in the endoskeleton where movement occurs.   1. **Immovable joints**   These are joints where movements does not occur |

**MOVABLE JOINTS**

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| * These are joints that allow free movement of bones to occur. * Examples of movable joints are  1. Hinge joint 2. Ball and socket joint 3. Gliding joint 4. Peg and socket joint |

**HINGE JOINT**

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| * **A hinge joint is movable joint which allows movement in one plane only just like a door allows movement in one plane only.** * **In other words, hinge joint allows only.** * **Examples of hinge joints include**  1. **A knee joint**  * The figure below shows a hinge joint at the knee joint     **Function of the Tendon**   * It attaches muscles the bones   **Function of the Synovial membrane**   * It secretes synovial fluid   **Function of the Synovial fluid**   * It act as lubricants at the joints   The function of Ligaments  They hold bones together at the joint.   1. **Elbow joint**  * The figure below shows a hinge joint at the elbow joint   http://handtherapy.com.au/wp-content/uploads/2016/09/Elbow.jpg |

**BALL AND SOCKET JOINT**

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| * These are joints that can move in all planes. * They can rotate at their respective joints. * Examples of ball and socket joints  1. Hip joints  * Bones at the hinge joint and ball-and-socket joint are held in place by ligaments which joint are held in place by ligaments which joint them together. * Figure below shows the hip joint which is an example of ball and socket joint.   http://www.escbreederinfo.com/wp-content/uploads/2015/09/chd1insidejoint.jpg  C:\Users\new\Desktop\DOWNLOADS\665765_628769_ans_5471da8dc86b4ffe8eea38e9476ee059.gif   1. **Shoulder joint**   Figure below shows shoulder joint formed by humerous, shoulder blade and scapula bones at shoulder joint.  C:\Users\new\Desktop\DOWNLOADS\Figure_38_03_10.jpg  C:\Users\new\Desktop\DOWNLOADS\ShowImage.jpeg |

**GLIDING JOINT**

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| * These are joints that allow slight movements of the bones. They are found in between the vertebral bones. * They allow slight bending of the backbone. * They are also found in the carpals of the palm and the tarsals of the foot. |

**PED AND SOCKET JOINT- PIVOT JOINT**

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| * It is found between the first and the second vertebrae in the neck. * It allows rotation of the bend. |

**IMMOVABLE JOINTS**

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| * These are joints that do not allow movement of bones to occur. They are also called **fixed joints.** * They join bones that form the cranium. * Figure below shows sutures in the human skull, an example of the immovable.   C:\Users\new\Desktop\HARRY DOWNLOAD\figure-38-03-01.jpe |

**PARTS OF THE JOINT**

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| http://1.bp.blogspot.com/-GXZnvUOl8r8/UYQVB9QjesI/AAAAAAAABwY/phN36QKmAb4/s1600/2-synovial_joint.gif | |
|  | **Function** |
| Ligaments | They hold bones together at the joint |
| Synovial membrane | They produce or secrete synovial fluid |
| Synovial fluid | They act as lubricant at the joints |
| Tendons | They attachment muscles to the bones |

**MUSCLES**

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| * Muscle tissue is an elastic tissue.It works by contracting. * A muscle is made up of thousands of small fibres. |

**THREE DIFFERENT TYPES OF MUSCLES**

**Name three types of muscles in the human body.**

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| 1. **VOLUNTARY MUSCLES**  * These are muscles in the body that you can consciously control. * These are muscles which are made to contract or tighten by the conscious control of the brain. * They contract suddenly and powerfully, but they get tired quickly. * The contraction of voluntary muscles will lead to the movement of the skeleton and therefore cause locomotion. Examples of such activities are running, jumping, walking among others  1. **INVOLUNTARY MUSCLES**  * These are muscles that are not under our will control. They are muscles that contract involuntarily. * Examples of involuntary muscles in the body are  1. Muscles of the alimentary canal 2. The blood vessels 3. Bladder 4. The iris in the eyes 5. **HEART MUSCLES**  * This is type of the muscle that is found in the heart. * It works by contracting and relaxing to pump the blood around the body. |

**ANTAGONISTIC MUSCLES**

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| * These are voluntary muscles that work in pairs such that when one pair contracts, the other relax causing the movement of the limbs. * Examples of antagonistic muscles are biceps and triceps. * There are two sets of muscles on each side of the humerous, some on the inner side and others on the other side. Those on the inner side of the upper arm are the **biceps**. The muscles on the outer or backslide of the arm are the **triceps**. * Figure below shows the extended arm showing biceps and triceps   C:\Users\new\AppData\Local\Temp\WPDNSE\{000030F6-0001-0001-0000-000000000000}\download.jpeg   * The biceps and triceps are referred to as **antagonistic muscles**. This means that they never contract or relax at the same time. When one contracts, the other is relaxed. When the lower arm is straightened at the elbow, we say that the arm is **extended**. When the arm is bent at the elbow, we say the arm is **flexed.** * The figure below shows the flexed arm and contracted arm   **Contract**  **Extends**  http://1.bp.blogspot.com/-MJdK6jhFnzU/T5sGIWH_JuI/AAAAAAAABDE/Nll7Ka6pSR8/s1600/Antagonistic+Muscles+-+Resistance+Training+-+Fitness+for+You.png   * When the arm is **extended,** **the triceps muscles are in contracted state** and so they are tight and short in length. The biceps muscles on the other hand are **relaxed and therefore stretched.** * In order for the arm to be flexed, the biceps muscles contract, therefore shortening. This causes them to pull against the radius. This action raises the lower part of the arm. The triceps must relax and stretch to allow the movement of the arm to take place. |

**INJURIES TO BONES**

**Define the term fracture.**

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| * A fracture is a broken or cracked bone which occurs as a result of a heavy impact against the body. |

**Explain two types of fractures.**

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| **http://www.gizoffer.com/wp-content/uploads/2018/09/compund-fracture.jpg**   1. **Simple fractures or closed fracture**   This fracture where the broken bone remains beneath and does not pierce through the skin.   1. **Compound fractures**   This is the type of fracture where the broken bones pierce through the skin. This causes the wound to bleed and swell. |

**Describe how to perform the First Aid for fractures.**

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| * Before taking an injured person to hospital, a straight or smooth piece of wool called a splinter can be placed next to the injury and tied along to prevent further movement of the bones which can make the wound worse. * Then support the injured part with a sling. |

**INJURIES TO JOINTS**

**Explain two types of injuries which occur at joints.**

1. **Sprains**

**Describe how the sprain is brought about.**

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| * Sprains are injuries that occur at joints and they occur when a wrist or an ankle is suddenly twisted. * The joint is suddenly pulled or twisted which causes a tear or injury to the ligaments that help keep the joint in place. They can be very painful |

**Describe how to perform the First Aid for sprains.**

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| * Ice or cold water can be applied to a sprain to reduce pain, swelling or bleeding of tissue * A sprain is taken care of by carefully applying a supporting bandage at the joint and giving it enough rest so that the damaged tissue can heal. |

1. **Dislocations**

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| * This is the type of injury that occurs when a bone moves out of its position at a joint. It usually occurs at the shoulder or knee joint. |

**Describe how to perform the First Aid for dislocations.**

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| * A dislocated joint is usually managed by carefully and skilfully pushing the dislocated bone back into position. It is best done by a qualified First Aider. A sling can also be tied along the area to support the weight away from the joint. |

**DIARRHOEAL DISEASES**

**What is diarrhoea?**

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| * Diarrhoea is condition whereby an individual passes out loose watery stool frequently due to an infection of the alimentary canal. Diarrhoea is a symptom of diseases that affect the alimentary canal. |

**Describe main diarrhoeal diseases.**

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| **CHOLERA**  **Causative agent**   * It is an acute infection of the intestinal tract caused by bacterium called Vibro cholera   **Transmission of cholera**   1. Drinking untreated water contaminated by faeces 2. Transmitted by houseflies from faeces to food 3. Eating uncooked food, fruits and vegetables if they are washed in contaminated water.   **Effect of the parasite (Vibro cholera) on the host**   * Once food contaminated and is ingested, the bacterium undergoes an incubation period of one to six days. They then multiply rapidly in the small instestine and produce highly poisonous substances. These substances are responsible for the severe symptoms of cholera which occur suddenly.   **Symptoms of cholera**   1. Watery stool that looks like rice water. 2. Severe diarrhoea. 3. Nausea 4. Severe vomiting and abdominal pain 5. Acute thirst and muscle and muscle clamps. 6. Severe dehydration occurs due to loss of water from the body   **Methods of controlling cholera**   1. Infected patients should be isolated and they, together with people they are in contact with should be given the appropriate medication. 2. All infected people should be isolated and vaccinations given to those under threat of possible infection.   **Prevention of cholera**   1. Construction of proper toilets, or pit latrines especially in crowded areas. 2. Discouraging the practice of flying toilets. Flying toilets refers to defecation in plastic bags which are then thrown into waste dumps or roof tops by the inhabitants of slum areas where the toilets are far or few. 3. Education and awareness campaigns on proper use of latrines, importance of washing hands after defecation and visiting a toilet. 4. Boiling water or simple measures of treating water with chlorine tablets to ensure water is safe for drinking. |

**DYSENTRAY**

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| * Dysentery is an intestinal inflammation especially in the colon that can lead to severe diarrhoea with mucus or blood in the faeces. * Types of dysentery include  1. **Bacillary dysentery**   **Causative agent of Bacillary dysentery**  It is caused by a bacteria called Shigella  **Mode of transmission**  One may be infected by ingesting contaminated food and drinks.  **Symptoms**   1. Diarrhoea 2. Fever 3. Nausea 4. Vomiting 5. Stomach cramps 6. Flatulence 7. Stool may contain blood, mucus or pus   **Treatment**   1. Giving oral rehydration 2. Administering antibiotics 3. **Amoebic dysentery**  * It is caused by amoeba called Entamoeba histolytica   **Mode of transmission**   * One may be infected with Entamoeba histolytica by drinking water or eating food that is contaminated by the parasite.   **Effects of the parasite**   * It destroys the gut epithelium and the blood capillaries and causes formation of ulcers. This leads to the release of blood into the intestine. The parasite then feeds on the red blood cells.   **Symptoms**   1. The patient has diarrhoea that comes and goes. 2. The patient gets cramps in the bell and the need to have frequent bowel movements 3. The patient produces many loose stools with a lot of mucus sometimes stained with blood. 4. Blood appears in the faeces of the patient in severe cases. 5. In chronic cases , the patient suffers from anaemia   **Prevention and control**   1. Drink boiled or treated water 2. Good hygienic practices like washing hands properly after visiting the toilet. 3. Thorough cooking of food to kill the amoeba 4. Proper medical treatment by infection by qualified doctor in the case of infection by the disease. 5. Proper sewerage treatments should be done to kill bacteria |

**TYPHI TYPHOID**

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| * It is caused by bacteria called Salmonella typhi   **Mode of transmission**  The bacteria is spread through poor sanitation which leading to contaminated water and food.  **Symptoms**   1. Fever 2. Headache 3. Abdominal pain 4. Diarrhoea.   **Prevention and control**   * Isolation of the patients to avoid spread of the disease by contact. * Sterilising clothes that the patient has used using disinfectants. * Food handlers in institutions like hospital like hospitals, schools and restaurants. * Proper disposal of faeces in the toilet. * Thorough water teatmess and purification in town or city water. |

**Discuss ways of preventing and controlling diarrhoeal disease.**

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| 1. Drink safe water 2. Avoid eating food sold in open places. 3. Wash fruits and vegetables with cleaning running water. 4. Wash hands after visiting latrines and toilets 5. Use toilets and latrines to dispose wastes 6. Report cases of diarrhoea to health workers as soon as possible to enable the government control the spread of the diseases. |

**Discuss the home treatment for diarrhoeal diseases.**

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| Giving oral rehydration solution to the patients. The fluid enhances faster absorption of water into the body. It also helps the body to replace fluids lost during diarrhoea. |

**UNIT 9: SEXUALLY TRANSMITTED INFECTIONS**

**What is Sexual Transmitted Infection?**

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| Sexually transmitted infection (STI) is an infection that can be transferred from one person to another through sexual contact. |

**State the common examples of Sexually Transmitted Infections (STIs).**

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**HIV and AIDS**

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| **Causes of AIDS**  It is caused by a virus called HIV(Human Immuno - deficiency Virus)  **H- Human -** This means that the virus affects human beings  **I - Immuno- deficiency-** This refers to the fact that the virus destroys the body’s immune system allowing the individual to become infected by germs which normally the body could resist  **V-Virus** - The germ that infects people is of a special type called  virus. |

**AIDS**

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| 1. **Acquired** | This means anything that is got from another person |
| 1. **Immune** | This refers to the body’s defence system which protects us from diseases |
| **D- Deficiency** | This refers to the fact that the immune system is not functioning properly thus reducing the body’s ability to fight diseases. |
| **S- Syndrome** | This is a group of signs and symptoms which are found together in a person who has a particular disease. |
| **AIDS** | It is the result of a person’s immune system becoming so weak that the person is no longer able to fight diseases. The person becomes ill with one or more diseases like pneumonia, tuberculosis among others. |

**Mode of transmission of HIV**

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| HIV is transmitted through the following ways   1. Sexual intercourse with infected person 2. Blood transfusion using infected blood 3. From infected mother to child during pregnancy, birth or breastfeeding 4. By use of unsterilized surgical or piercing instruments such as syringes, blades, needles and scissors. |

**SIGNS AND SYMPTOMS OF HIV and AIDS**

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| **Effect of HIV and AIDS**   * Loss of immunity which leads to death |

**CONTROL AND PREVENTION OF HIV and AIDS**

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**What are the misconceptions about HIV and AIDS?**

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| * Others believe that the disease is as a result of witchcraft. * Others believe when they cannot get the disease * Others believe that when they contract the disease seek help from witchdoctor. * Some people believe that the virus can spread by mosquito bites. * Some people believe that use of protected can kill a woman or make her infertile. * Some people believe that HIV is contracted by people who are not faithful and trustworthy |

**State and explain the effects of the sexually transmitted diseases, HIV and AIDS.**

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| **On the individual** | 1. Loss of body weight 2. Can lead tSTIs can leade to dear./o madness 3. Sterility low productivity |
| **On the family** | 1. **Loss of income** 2. **Loss HIV and A** |
| **On the nation** | 1. HIGH OF LI 2. LOW **PRODUCTIGY** |

**GONORRHOEA**

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| * It is caused by a bacteria known as Neisseria gonorrhoea * The bacteria affect urethra in males and vagina in females. |

**MODE OF TRANSMISSION OF GONORRHOEA**

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| * Sexual intercourse with infected persons * At birth, for newborn babies, if the mother is suffering from the disease |

**SIGNS AND SYMPTOMS OF GONORRHOEA**

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| **In females**   * Pain in the lower abdomen * Menstrual problems * Discharge of pus from vagina   **In Males**   * Yellowish discharge from urethra * Pain while passing out urine |

**EFFECTS OF GONORRHOEA**

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| 1. Blockage of sperm ducts or oviducts which leads to sterility 2. Destruction of red blood cells thereby causing anaemia 3. Destruction of liver cells causing yellowish of eyes and skin |

**CONTROL AND PREVENTION OF GONORRHOEA**

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| 1. Abstaining from sex before marriage 2. Early diagnosis and treatment using antibiotics 3. Health education to the community to avoid its spread 4. Engaging in safe sex through the use of condoms. |

**SYPHILIS**

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| **Causes of syphilis** | It is caused by a bacterium called Treponema pallidum |
| **Mode of transmission** | * Sexual intercourse with infected persons * At birth, for newborn babies, if the mother is suffering from the disease |
| **Signs and symptoms** | **First phase**   * Painful sore appear on the cervix or the top of penis.   **Second phase**   * Rashes appear on the skin * Falling of hair * Mild fever * Enlarged lymph nodes   The patient is highly infectious at this stage  **Third phase**   * This is a fatal stage where infection reaches the nervous system and the heart. It destroys them or causes paralysis, blindness and or madness. Death may eventually occur. |
| **Effects of syphilis** | * Heart diseases * Blindness or insanity * Paralysis * Death |
| **Control and prevention** | * Abstaining from sex before marriage * Early diagnosis and treatment using antibiotics such as penicillin * Health education to the community to avoid its spread * Engaging in safe sex through the use of condoms. |

**CANDIDIASIS**

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| **Causes** | It is caused by a fungus called Candida albicans |
| **Types of Candidiasis** | 1. Oropharyngeal candidiasis   This occurs when the fungi attack the mouth. It is commonly known as oral thrush   1. Vaginal candidiasis   This occurs when the fungi occur when the fungi attack the vagina |
| **Mode of transmission** | * Sexual intercourse with infected persons * Kissing can spread Oropharyngeal candidiasis |
| **Signs and symptoms** | * White patches * Red inflamed skin under patches * Itching of the vagina or severe irritation of the vagina * Vaginal discharge |
| **Prevention and control** | * Abstaining from sex before marriage * Treatment with antifungal * Engaging in safe sex through the use of condoms |

**GENITAL WARTS**

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| **Causes** | * It is caused by Human Papilloma Virus |
| **Mode of transmission** | * Sexual intercourse with infected persons |
| **Signs and symptoms** | * Bump-like growths on the genitals and anus. * Itching sensation or discomfort around the genital * Bleeding may occur |
| **Prevention and control** | * Removal of the warts using the liquid nitrogen * Treatment using drugs * Abstaining from sex before marriage * Use of condoms |

**HEPATITIS B**

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| **Causes** | * It is caused by hepatitis virus |
| **Mode of transmission** | * Sexual intercourse with infected persons * Through blood transfusion with infected blood |
| **Signs and symptoms** | * Production of dark coloured urine * Yellow-orange faeces * Jaundice * Inflamed liver which swells and stops functioning * Pain in the stomach * Muscle ache, fatigue, nausea, vomiting and diarrhoea |
| **Prevention and control** | * Treatment using drugs * Abstaining from sex before marriage * Use of condoms |

**GENITAL HERPES**

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| --- | --- |
| **Causes** | * It is caused by Herpes virus |
| **Mode of transmission** | * Sexual intercourse with infected persons * At birth, for newborn babies, if the mother is suffering from the disease |
| **Signs and symptoms** | * Sores on the lips * Painful blisters on the genitals * Genital ulcers which may heal and recur |
| **Control and prevention** | * Treatment using antibiotics * Abstaining from sex before marriage * Use of condoms |

**TRICHOMONIASIS**

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| **Causes** | * It is caused by a protozoan Trichomonas vaginalis |
| **Mode of transmission** | * Sexual intercourse with infected persons |
| **Signs and symptoms** | * Painful sores on the vagina walls * Smelly discharge from the vagina * Burning sensation while passing out urine * Itchy penis with lesions |
| **Control and prevention** | * Treatment using antibiotics * Abstaining from sex before marriage * Use of condoms |

**CHLAMYDIA**

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| --- | --- |
| **Causes** | It is caused a bacteria |
| **Mode of transmission** | * Sexual intercourse with infected persons |
| **Signs and symptoms** | * Inflammation of the pelvis * Pain and discomfort * Infertility * loss of manpower |
| **Control and prevention** | * Treatment using antibiotics * Abstaining from sex before marriage * Use of condoms |

**RISK**

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| A risk is a situation whereby one is exposed to danger. |

**Define risky behaviour**

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| Risky behaviour is any activity that is associated with dangers or has a harmful effect.  **Examples of risky behaviour**   1. Unprotected sexual intercourse 2. Sharing cutting or peaceful 3. Plasticising practice 4. Practising oral sex with infected partner. 5. Unprotected sexual contact with multiple partners. 6. Taking too much alcohol   **Risky Situation**   * This is situation which exposes. * Meeting sugar deedies abd sugar mummies.  1. Accepting with infected a transfusion a with infector. Draw and draw videoed |

**RISKY SITUATION**

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| **Definition** | This is situation which exposes one to danger of getting infected with a disease**.** |
| **Examples** | 1. Meeting sugar daddies or sugar mummies after school 2. The circumstance of a being a pregnant mother infected with HIV 3. Accepting a transfusion with infected blood consumption 4. Receive alcohol consumption peer pressure 5. Poverty |

**List five skills that can help you avoid risky behaviour.**

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| * You should be creative to avoid contracting the disease * You should developed the ability to be able to solve problem * You should develop a critical thinking ability before acting on a problem. * You are required to come with good decisions after analysing a certain issue. * Self-awareness is another skill which one should have * Self-esteem. After knowing yourself, be proud of yourself. * Yu should have communication issues |

**Importance of curative health care for STIs and opportunistic diseases**

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| 1. Early treatment leads to early healing. 2. Early treatment prevents further complications 3. Helps to control the spread of disease. 4. Early treatment prevents the destruction of other internal |

**Discuss the care and support services provided to people living with HIVV and AIDS.**

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| 1. Love and care   This can be done through   * Giving them company and talking to them kindly * Visiting them often * Allowing them talk and express themselves as we listen patiently * Feeding them and keeping them company as they eat. * Encouraging them to continue working  1. Adequate diet   Providing a balanced diet to the patient.   1. Good hygiene  * They should stay in a clean environment * They should take a bath everyday etc  1. Providing medical care  * Ensure that they take their medicine properly  1. Provide counselling   People living with HIV and AIDS patients need counselling   1. Freedom from discrimination |

**EFFECTS OF DISCRIMATION AND STIGMATISATION**

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| 1. Feel isolated 2. Feel deprived of their human results 3. They lack someone to and share problems 4. Feel depressed because they feel unloved. |

**RIGHTS OF PEOPLE LIVING WITH HIV/AIDS**

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| 1. Right to proper medical treatment and care 2. Right to education 3. Right to respect and dignity 4. Right to their job even if they have HIV and AIDS should never be forced to terminate their services 5. Right to keep this knowledge to themselves. |

**UNIT 10: MICRO-ORGANISMS**

**Define the term micro-organism.**

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| * Micro-organisms are organisms that cannot be seen by use of naked eyes. They can only be seen with the help of microscopes. |

**List the different groups of microorganisms**

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**BACTERIA**

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| It is a prokaryote which means that they have no nucleus.  **Figure below shows the bacteria**  http://3ubiostudyguide.weebly.com/uploads/4/4/6/5/44651279/326367547.png  **Features of bacteria**   1. **Has a cell wall that is rigid and porous**   The cell wall gives the bacteria a distinct shape and also allows substances to pass in and out of its body   1. **They have an outer capsule**   The capsule enables the bacteria to stick on surfaces and also protect itself against harm   1. **Some bacteria have long whip-lie projections called flagellum**   The flagellum rotates rapidly to allow the bacteria to move.   1. **They have a fluid filled cytoplasm**   The cytoplasm suspends dissolved substances.   1. **They have a nuclear material**   The nuclear material is made of structures that carry hereditary information. This structure is called chromosome |

**FORMS OF BACTERIA**

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| 1. **Cocci**   http://3ubiostudyguide.weebly.com/uploads/4/4/6/5/44651279/149789285.png  **There are three types of cocci**   1. **Crumps**   These occur in groups clumped together   1. **Diplococcus**   These occur in pairs but joined together within a membrane like in preumoniae which causes pneumonia   1. **Streptococcus**   **These occur in chains like in the bacteria that cause sore throat.**   1. **Bacilli**   **These are rod-shaped bacteria. They may have one or more flagella or may lack flagellum.**  Examples include Bacillus anthracis that causes anthrax or Bacilli typhosus that causes typhoid. Others may be rod-shaped but curved like the Vibrio cholera that causes cholera. Figure below shows Bacilli and Vibrio       1. **Spirillum**  * These are spiral in shape. An example is the Treponema pallidum that causes syphilis. |

**FUNGI**

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| Fungi are composed of whitish body matter and spore producing structure  The fungi has the following characteristics   1. Some fungi like yeast are unicellular. Others like rhizopus and mushrooms are multicellular 2. They do not have chlorophyll in their cells 3. They feed by saprophytic and parasitic feeding. Some are also symbiosis. 4. They have cell walls that are made of substance called chitin 5. They are eukaryotes- that is they have true nucleus surrounded by nuclear membrane. 6. They store sugar in form of glycogen or in form of oil droplets. 7. Some like rhizomes with simple structures. The bodies are made of threadlike structures called hyphae. Hyphae collects together forming a mass of body called mycelium.   Hyphae is involved in feeding, gaseous exchange and reproduction.  The downward hyphae form root like structures for feeding while the upright hyphae forms reproductive structures.   1. They reproduce sexually by conjugation. They also reproduce sexually by fragmentation and by spore formation. Rhizopus, an example of fungi.   **Rhizopus** **fungi** are characterized by a body of branching mycelia composed of three types of hyphae: stolons, rhizoids, and usually unbranching sporangiophores. The black sporangia at the tips of the sporangiophores are rounded and produce numerous nonmotile multinucleate spores for asexual reproduction.  http://www.biology-resources.com/images/fungi-02-rhizopus.jpg |

**VIRUS**

**Viruses are small infections agents that replicate only inside the living cells of other organisms**

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| Viruses are small infections agents that replicate only inside the living cells of other organisms.  The following are examples of viruses  http://2.bp.blogspot.com/-8BIHH-Nm5AM/UMq4Fx_Zl2I/AAAAAAAAAZA/xVMdmuQhrDA/s1600/Shapes+of+Viruses.gif |

**PROTOZOA**

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| * Protozoa are micro-organisms with single celled bodies. They are easily observed through microscope. * They have structures that enable them to move called **flagellum**. * Others use short finger-like structures called **cilia** for movement. * Others like the Amoeba move by forming extensions of their bodies called **pseudopodia.**   **The following are examples of protozoa**  Figure below shows Paramecium, Euglena and Trypanosoma  Euglena  http://sahsrojas.pbworks.com/f/euglena.jpg  http://www.proprofs.com/flashcards/upload/a3576420.jpg  PARAMECIUM |

**ALGAE**

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| * Algae appear as many cells in a thin, thread-like filament. An example of algae is spirogyra which appears as green filaments floating on water. They give the pond water a greenish colour. * Figure below shows Spyrogyra   http://1.bp.blogspot.com/-xdVrb4wR3aY/ToBXQxQGwPI/AAAAAAAAAIo/wV4TpKLaXsk/s1600/spirogyra+%25281%2529.jpg |

**Explain the importance of micro-organisms**

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| 1. Some micro-organisms cause diseases in animals. 2. They are involved in the cycling of materials in nature. They decompose dead and animal matter. 3. Some bacteria such as rhizobium add soil fertility by fixing nitrogen in the root nodules of legumes and the soil 4. Bacteria are used in the treatment of sewage in urban areas. 5. Some bacteria are used in biotechnology to produce medicine and hormones such as insulin. 6. Some bacteria live in the colon of some animals where they assist in the manufacture of vitamins B12 and vitamin K that are useful in animals. 7. They are used commercially to produce alcohol. 8. Fungi and bacteria causes’ food spoiled and damage to wood in buildings. |

**BIOTECHNOLOGY**

**Explain the role of micro-organism in biotechnology**

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| * Biotechnology is the use of microbes or life processes to produce materials and products that are useful to mankind. * Examples of areas where biotechnology is being used today are  1. **Production of insulin hormone by bacteria**. The insulin is used by diabetic patients to lower their blood sugar. 2. **Production of genetically modified organisms.** These are plants and animals whose genes have been altered to produce certain desired characteristics. For example inserting a gene from bacteria in maize to enable the maize produce toxic substances to kill some pests that attack it. 3. **Production of new breeds and types of crops to improve agricultural production.** |

**Explain various ways of controlling micro-organisms.**

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| 1. **Drying of food substances before storage**   This minimises moisture which reduces the activity of fungi and bacteria hence no decay can take place.   1. **Salting**   Salt is applied on food item. Salt causes water to leave the tissues of the micro-organisms and as a result the microorganisms become dehydrated**.**   1. **Canning and bottling**   This involves keeping food in completely closed cans and bottles. The cans and bottles are closed under carbon dioxide to discourage any growth or any entrance of micro-organisms.   1. **Freezing and refrigeration**   This involves storing the food in extremely low temperatures usually and below. At such temperatures micro-organisms become inactive.   1. **Boiling**   High temperatures kill micro-organisms in the food. It destroys their pores.   1. **Sterilisation and disinfection**   This involves applying chemicals on surfaces to kill micro-organisms. This is done on surfaces where food materials are prepared or stored.   1. **Wood treatment and seasoning**   This involves drying the wood to ensure that it is not easily attacked by fungi. Wood treatment involves infusion of chemicals into a wood to prevent rotting due to fungal attack.   1. **Pasteurisation**   This is mainly done for milk where milk is heated to a specific temperature for a short period of time and then it is rapidly cooled. |