BASIC SCIENCE JS 3

WEEK ONE

GENETICS

Genetics is defined as the scientific study of heredity and variation in all living things. The word genetics was coined by Dilliam Bateson in 1906.

Heredity/Inheritance is the transmission and expression of inherited characters or traits from parent to offspring.

Variation is the differences that exist among individuals of the same species such that no two individual members are exactly alike.

Types of variation

There are two types of variations, they are:

1. Continuous / Morphological variation.
2. Discontinuous / Physiological variation.

**Continuous / Morphological variation:** this is a type of variation that shows a gradual change in a character or trait, from one extreme to the other. It deals with physical appearance. Examples of characters that show continuous variation are height, weight, skin colour, fingerprint, shape, size etc.

**Discontinuous / Physiological variation:** this is a type of variation in which some features show no intermediate forms. It has to do with functioning of the body and not physical appearance. Example of character that shows discontinuous variation are ability to roll the tongue, ability to taste Phenylthiocarbamide (PTC), colour blindness, blood group, ability to twitch the ear, ear lobes, sex in man etc.

Definition of some genetics terms

1. Traits or character: is a distinct structural feature of an organism. E.g. skin colour, weight, shape etc.
2. Gene: This is the basic unit inheritance responsible for the transmission of characters from parents to their offspring. Genes are located on chromosomes.
3. Chromosome: These are thread like structures found in the nucleus of a cell on which the genes are located.
4. Dominant character: This is a character that continues to express itself in the offspring in the presence of its recessive character. Dominant character is controlled by dominant gene. E.g. red colour in pea plant, tallness in man.
5. Recessive character: This is a feature or character from one parent which does not produce its effect in the presence of dominant character. E.g. gene for shortness in man, White colour in pea plant. Recessive character is controlled by recessive gene.

Note: When dominant and recessive genes are inherited together, the dominant gene will dominate and suppress the recessive gene.

1. Genotype: this is the genetic makeup of an organism or sum total of all the genes contained in an organism that are inherited from parents.
2. Phenotype: this is the physical appearance of the character of an organism resulting from the interaction between the gene (genotype) and environment.
3. Homozygous : This is when an individual is having two similar genes for the same character. E.g. TT representing genes for tallness.
4. Heterozygous: This is when an individual is having two unlike genes for the same character e.g. Tt for tallness. In this case, capital T is the dominant gene and it will be expressed physically.
5. Filial generation: These are the offspring of the parents. The immediate a parent are the first filial generation (F1), while the grandchildren are the second filial generation (F2).
6. Haploid number (n): This is the number of chromosomes in the gamete. It is 23 chromosomes.
7. Diploid number (2n): This is the total number of chromosomes in a cell. It is 46 chromosomes or 23 pairs of chromosomes.

MENDEL LAWS OF INHERITANCE

The study of genetics was first started by an Austrian Monk called Gregor Mendel. He carried out many experiments using garden pea (Pisum sativum) and Fruit fly (Drosophila melanogaster) to study how hereditary characteristics are transmitted from parent to offspring. Based on his experiment results, Mendel propounded two laws known as Mendel’s laws of inheritance.

Mendel’s first law:

This is known as Law of Segregation of Gene. It states that the character/ traits of an organism are controlled by genes occurring in pairs which segregate independently during gamete formation without undergoing alteration from generation to generation.

Mendel’s second law:

This is known as the law of Independent Assortment of genes. It states that each character behaves as a separate unit and is inherited independently of any other character.

Examples of crossings:

**LEAVE 10 LINES SPACE FOR DIAGRAM**

Sex Determination

Sex is determined by the sex chromosomes. In human, there are 23 pairs of chromosomes which occur in diploid condition (i.e. 46 no. of chromosomes) The first 22 pairs are autosomal chromosomes (Autosomes) and a pair called sex chromosomes. We have two set of sex chromosomes, X chromosomes and Y chromosomes.

In male human, we have both sets of chromosomes, X and Y chromosomes while in female we have only one set of chromosomes, X chromosomes. Therefore, the sex chromosomes of the male are XY while that of female is XX.

The sex of a child is determined by the sex chromosomes. If an egg X is fertilized by a sperm carrying X chromosome, the offspring will be a female, but if an egg X is fertilized by a sperm carrying Y chromosome, the child will be a male.

**LEAVE 5 LINES SPACE FOR DIAGRAM**

Family tree

Pedigree or family tree refers to lines of generation of parent to offspring which trace the descendants of a man and his family.

Uses of family tree

1. It can be used to study how a particular trait in family is transmitted from one generation to another.
2. Diseases that runs in a family can be easily detected through pedigree
3. Tracing family genealogy
4. Blood transfusion

Key to pedigree tree

Squares represent male

Circles represent female

Short horizontal line represents relationship by marriage

Long horizontal line represents sibling or children born of the same parent

Vertical line connects marriage line to generation line

A pedigree chart

**OJO**

**TITI**

**YEMI**

**TUNDE**

**PATRICK**

**LUCIA**

**SANDY**

**ROSE**

**GRACE**

**JOHN**

**DAVID**

**BISI**

**PETER**

**MARY**

Factors affecting development of organism

1. Heredity: children of the same parents may be tall or short, thin or fat. All the same due to heredity.
2. Glandular function: growth hormones secreted by the pituitary gland control the growth. Over secretion leads to gigantism while under secretion leads to dwarfism.
3. Environment: It influences growth the environment refers to any influence an individual has been received. Those that affect the heredity development include
4. Food/ Diet especially during pregnancy and during the process of growth.
5. Diseases
6. Climate
7. Health facilities
8. Topography

WEEK TWO

ENVIRONMENTAL HAZARDS

Environmental hazards are events or occurrences that have the potential of causing damage to man, other organisms and the environment. They include:

1. Erosion
2. Deforestation
3. Drought
4. Ozone layer depletion
5. Flooding
6. Desertification
7. Bush burning
8. Hurricane
9. Volcanic eruption

10. Tsunami

Bush burning

This is the setting of fire on the bush in order to clear the farmland or vegetation. it can be deliberate or accidental.

Human activities that influence bush burning are:

1. Farming: Clearing of an area by burning the bushes in preparation for planting season.
2. Hunting
3. Smoking of cigarette
4. Accidents

Effects of bush burning

1. Destroys soil microorganisms.
2. Causes soil erosion and leaching.
3. It reduces the soil fertility by leading to low mineral salt content (like potassium and phosphorus) in the soil.
4. It reduces the soil fertility thereby leading to low crop yield and food shortage.
5. It reduces wild life population.
6. It causes air pollination.
7. It leads to loss of infrastructure.
8. It contributes to global warming.
9. It destroys forestry, e.g. cocoa, palm tree and coffee which are of high economical importance.

Control of bush burning

1. Public enlightenment to sensitize people on the danger of bush burning.
2. Proper road maintenance to prevent road accident.
3. Smokers should put off stump of cigarette before throwing them away.
4. Legislation against burning of bushes.

The agencies that make laws and regulations against bush burning in Nigeria include:

1. FEPA – Federal Environmental Protection Agency or State Environmental Protection Agency.
2. NAFCON- National Forest Conservation Council of Nigeria.
3. Federal and State Ministries of Environment.
4. Local Governments.

**Forest**

Forest is large area of an ecosystem which is covered by many varieties of trees, shrubs, herbs, animals and also microorganism.

Importance of Forest

1. Wood or trees like Iroko, Teak and Mahogany are used for making Furniture, Canoes, Paper, etc.
2. It serves as wind breakers against wind erosion.
3. It serves as sources of revenue to the government.
4. It serves as a source of tourist attraction.
5. Some of the product of forest are medicine e.g. cocaine, quinine

**Deforestation**

This is the indiscriminate cutting or felling of trees without planting of new trees to replace the cut ones.

Reasons for deforestation

1. For production of timber, furniture, and paper.
2. Use of firewood for cooking.
3. Farming activities.
4. Road construction, industrialization and urbanization.

Effect of deforestation

1. It leads to soil erosion which may lead to flooding
2. It may lead to global warming by the abnormal building up of carbon dioxide in the air.
3. It leads to extinction of some wildlife due to the destruction of their natural habitat; while some became endangered species.
4. Valuable trees species may become extinct leading to high cost of wood.
5. It encourages desertification.
6. It reduces amount of annual rainfall which can lead to drought.

Control of deforestation

1. Public enlightenment on the dangers of deforestation.
2. Legislation should be made to check the indiscriminate felling of trees.
3. Encouraging afforestation (i.e. planting of trees where trees are not in existence before) and re-afforestation (i.e. planting new trees where they are cut for timber or firewood).
4. Establishment of forest reserve.
5. Alternative source of fuel like solar and gas should be used or encouraged.
6. Paper should be recycled to save trees.

**Desertification / Desert Encroachment**

This is the process by which forest are converted into deserts through bad agricultural practices like overgrazing, deforestation and bush burning. All these activities lead to desert encroachment or the beginning of deserts.

A desert is a land mass where there is little or no vegetation but dry soil and high temperature. Examples of deserts are Kalahari desert, Namib desert, Atacama desert, Gobi desert and Sahara desert. In Nigeria, the Northern states are prone to desertification, e.g. Yobe, Jigawa, Kastina, Sokoto, Zamfara, Kano and Borno states.

Causes of desertification

The causes of desertification could result to any of these two major types of desertification;

1. Natural desertification.
2. Human / artificially induced desertification.

Causes of Natural desertification

1. Absence of rainfall for a long time, this is called drought.
2. Continuous erosion, which makes the soil to lose its fertility, hence supporting little or no vegetation. This makes the land become desert as a result of long exposure to sunlight.

Causes of Human/ artificially induced desertification

1. Overgrazing by animals.
2. Bush burning.
3. Deforestation.
4. Continuous / prolong farming on a piece of land.
5. Change in weather.

Effect of desertification

1. Wide spread of malnutrition and diseases due to shortage of food.
2. Migration from desert to areas with favourable weather condition.
3. Drought.
4. Global warming.
5. Poor socio-economic life due to low crop yield and water shortage.

Control of desertification

1. Introduction and improvement of proper irrigation method.
2. Legislation and strong control against bush burning, overgrazing and deforestation.
3. Afforestation and reafforestation programmes should be encouraged.
4. Public enlightenment, especially to Nomads on the effect of desertification.
5. Use of alternative fuel to reduce cutting down of trees for firewood.

**Ozone layer**

Ozone layer is an area in the atmosphere where ozone is highly concentrated.

The earth crust has three parts. They are:

1. Atmosphere is a gaseous part of the earth.
2. Hydrosphere is the part of the earth occupied by water.
3. Lithosphere i.e. the solid part of earth.

The atmosphere surrounds the earth. It contains the air we breathe and it is also made up of five layers.

1. Troposphere
2. Stratosphere
3. Mesosphere
4. Thermosphere
5. Exosphere

The troposphere is nearest to the earth (from the surface of the land to a height of about 8 to 14km). Cloud, rain, lightening, dust, moisture and other features of the atmosphere occur in this layer. From the base of troposphere to a height of 50km is the stratosphere. This layer contains ozone. Ozone is manufactured naturally in the stratosphere when U.V radiation strikes oxygen molecules, which absorbs high energy protons in the radiation and then splits into two atoms. The highly reactive oxygen atom combines with oxygen molecules to form ozone.

(O+ O2 = O3)

The splitting of oxygen molecule to its atom by ultra violet ray of the sun is called photodissociation.

In summary, ozone is formed by combination of single atom of oxygen (O) with a molecule of oxygen (O2). The symbol for ozone is O3 ,i.e. three atoms of oxygen.

The ozone layer was discovered by Charles Fabry and Henri Buisson in 1913. Ozone was discovered by Chritian Friedrich Schonbein in 1839.

Importance of Ozone layer

The sun emits ultra violet rays which get to the earth by radiation. The ozone in ozone layer acts as a shield to the earth by absorbing most of the harmful ultra violet rays (Uv B), which can harm human beings, other animals and plants; thereby preventing them from reaching the earth.

Note: The sun emits three types of rays. These are

1. Infrared ray: It produces heat which keeps the earth and all things on earth warm.
2. Visible ray: which enables us to see things around us. Plants also use it for photosynthesis.
3. Ultraviolet ray (Uv)- Which are not visible to human being and can be harmful.

There are three types of ultraviolet rays, they are :

1. Uv –A
2. Uv – B
3. Uv – C

Uv- A are not dangerous to life, Uv-C do not get to the earth at all. But Uv –B is dangerous, it has high penetrating power to reach the earth surface. Ozone in ozone layer acts as a shield to the earth thereby absorbing most of Uv-B from the sun from reaching the earth.

Depletion of the ozone layer

Ozone depletion is the reduction of ozone in the ozone layer. The main cause of ozone layer depletion is the accumulation of chlorofluorocarbon (CFC) ( a gas formally used in refrigerators and air conditioning systems) in the atmosphere. Other causes include:

1. Hydrocarbons released into the atmosphere from car engines. (chlorine, radical, bromine radical and other halogen).
2. Some compounds used as agricultural fumigants like methylbromide.
3. CO2 can also cause depletion of ozone layer

Effects of depletion of the ozone layer

1. Skin burn and skin cancer due to increase in ultraviolet radiation.
2. Green- house effects – A green house is a specially built house which permit heat to enter it but does not permit heat to go out of it. Some gases behave like the green house, in the sense that the heat from the sun can pass through them to the earth but they do not allow radiation from the earth to leave. Examples are carbon (iv) oxide, methane, halogen gases like chlorofluorocarbons (CFCS), etc. The radiation which is supposed to go into the space is re-radiated into earth. This is known as ‘Green House Effect’.
3. Global warming: As a result of green house effect, there is abnormal building-up of heat in the atmosphere resulting in increase in the atmospheric temperature of earth. This process is known as global warming.
4. Polar ice melting and flooding: Due to global warming, ice caps deposit around the world will begin to melt, and the water will find their way into water bodies. This will bring about increase in the sea and ocean level; hence, the water bodies overflow their banks, leading to flooding.
5. Reduction in crop yield.
6. Deformation of DNA of living things
7. Demodification of immune system

Control measures to reduce depletion of ozone layer.

1. Montreal protocol: this is a global regulation to reduce and eliminate the use of threatening Organo-halogeno compounds and other ozone depleting substances (ODS)
2. Public enlightenment on the dangers of depletion of the ozone layer especially in the activities of bush burning and deforestation.
3. Improvement of machinery so as to have more efficient fuel combustion.

WEEK THREE AND FOUR

DRUG ABUSE

A drug is any substance other than food that by its chemical or physical nature can affect the structure or function in the body of living organisms.

Drugs administered in the correct and prosper way are meant to:

1. Relief suffering
2. Combat diseases
3. Serve as food supplements e.g. vitamins
4. Save life

DRUG ABUSE: is the taking of drugs without the doctor’s advice or prescription.

Other substances can also be abused, when it becomes an addition and a person cannot do without it. Scuh substances include Kolanut, alcohol, coffee etc.

Causes of drug abuse

1. Lack of self confidence.
2. Bad peer groups / friendship.
3. Frustration and stress
4. Trying to have a grown-up feeling.

Types of drugs

Drugs can be classified into two ways:

1. According to their functions
2. Recreational drugs: They are drugs such as alcohol, Narcotics, cannabis etc,
3. Therapeutic or curative drugs: These are drugs to cure illness. They are antibiotics, pain relievers etc.
4. According t their effects on the users
5. Narcotics: They relieve pain and induce sleep. Other examples are morphine and opium.
6. Sedatives e.g. Barbiturates
7. Hallucinogens e.g. Cannabis
8. Stimulants e.g. Cocaine, Caffeine etc.

Sources of drugs

1. Parts of plants like leaves, flowers, tree barks e.g cannabis.
2. Microorganisms e.g. Penicillium species use in the manufacture of penicillin.
3. Inorganic materials e.g. metals
4. Hormones and alkaloid
5. Fruits

Effects of drug abuse

1. Cigarette smoking can cause cancer of the lips, lungs and heart attack.
2. It can result in mental disorderliness e.g. hard drugs like cocaine, heroin etc.
3. Alcohol can cause cancer of the liver, ulcer and loss of memory.
4. Sleep disorder (insomnia) may be caused by drugs like caffeine etc.
5. It spreads diseases like HIV / AIDS, STDs due to the fact that abusers share unsterilized needles and are not selective in their choice of sexual partners.
6. It makes the abusers become social nuisance.
7. It leads to death.
8. It brings about criminal tendency.

Prevention of Drug abuse

1. Public enlightenment campaign on Television, radio, newspaper against drug abuse.
2. Positive social interaction, i.e. we need to be mindful of the type of friends we keep.
3. Drug abuse education should be included in the educational curriculum.
4. Parents and guardians should always try to monitor the type of life and group their children keep
5. Stiff penalty should be recommended to punish drug abuses.
6. Youths can have a healthy drug free lifestyle if they are fully engaged in positive and interesting activities like sports, debating, drama, and music group.

DRUG CONTROL AGENCIES

The two major drug control agencies in Nigeria are:

1. National Agency for Food and Drug Administration and Control (NAFDAC). They wage war against fake and substandard drugs and food.
2. National Drug Law Enforcement Agency (NDLEA). They monitor the transporting, trafficking and use of illegal or illicit drugs.

BODY METABOLISM

Digestion is the breaking down of complex food substances with the help of digestive enzymes into simpler forms which can be absorbed into the blood stream.

Part of the alimentary canal

1. Mouth
2. Gullet/ oesophagus
3. The stomach
4. Small intestine (duodenum, ileum)
5. Large intestine
6. Anus

End product of digestion

|  |  |  |
| --- | --- | --- |
|  | Food class | End product |
| 1 | Carbohydrates | Simple sugars e.g. glucose |
| 2 | Proteins | Amino acids |
| 3 | Fats and oils | Fatty acids and glycerol |

NOTE:

Water, Mineral Salt and Vitamins do not pass through digestion. They absorbed directly into the blood stream.

Table showing summary of digestion and the enzymes involved

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Enzyme | Source | Location | Medium | Food acted on | End product |
| 1 | Ptyalin | Saliva | Salivary gland (mouth) | Alkaline | Cooked starch | Maltose |
| 2 | Rennin | Gastric juice | Gastric gland (stomach) | Acidic | Milk protein | Coagulate or curdles milk |
| 3 | Pepsin | Gastric juice | Gastric gland (stomach) | Acidic | Proteins | Peptones |
| 4 | Lipase | Pancreatic juice | Duodenum  (pancreas) | Alkaline | Emulsified fats and oils | Fatty acid and glycerol |
| 5 | Amylase | Pancreatic juice | Duodenum  (pancreas) | Alkaline | Starch | Maltose |
| 6 | Trypsin | Pancreatic juice | Duodenum  (pancreas) | Alkaline | Peptone | Polypeptides |
| 7 | Erepsin | Intestinal | Ileum | Alkaline | Polypeptides | Amino acids |
| 8 | maltase | Intestinal | Ileum juice | Alkaline | Maltose | Glucose |
| 9 | Sucrose | Intestinal | Ileum juice | Alkaline | Sucrose | Simple sugars |
| 10 | Lactase | Intestinal | Ileum juice | Alkaline | Lactose | Simple sugars |
| 11 | Lipase | Intestinal | Ileum juice | Alkaline | Fats and oils  Emulsified | Fatty acid and glycerol |

**Bile**

Bile is not an enzyme, but it aids digestion of fats and oils. It is a green alkaline liquid which is secreted by the liver and stored in the gall bladder.

It helps in emulsification of fats i.e. breaking down fats into tiny oil droplets by bile so as to increase the surface area and tension, to allow the enzyme lipase to convert the emulsified fats and oil into fatty acid and glycerol.

**Absorption of digested food**

Absorption is the movement of the end products of digestion across the lining of small intestine i.e the villi into the blood stream.

The villi are numerous fingers-like structures found in the small intestine. They increase the surface area of the small intestine so as to make absorption of digested food more efficient. The villi are also highly supplied with blood capillaries so that digested food can be easily transported into the blood stream.

Fatty acid and glycerol recombine and diffuse through the lacteal vessels.

Longitudinal section of a villus

**LEAVE 8 LINES**

**STORAGE OF DIGESTED FOOD**

The liver stores sugar (i.e. glucose) by converting them, into glycogen, so glucose is stored in the liver as glycogen. Some are also stored in the body tissue like the muscles.

The body does not store excess amino acids, they are broken down in the liver (deamination) and converted to urea which is then excreted by the kidneys.

Fatty acid and glycerol are carried away from the ileum in the lymph, they are stored as fat tissues found in the stomach, buttocks, cheeks e.t.c.

Undigested food are sent to the large intestine(cold) where excess water is absorbed and then the undigested food is sent out as faeces through the anus.

**SENSE ORGAN**

Sense organs are organs that have specialized cells that receives stimulus and transmits the impulse to the central nervous system.

There are five sense organs

1. Eye \_\_\_\_organ of sight
2. Ear\_\_\_\_\_ organ of hearing and balancing
3. Skin \_\_\_\_ organ of touch
4. Tongue \_\_ organ of taste
5. Nose \_\_\_\_ organ of smell

**ORGAN OF SIGHT**

The eye is found in the eye sockets in the skull. It is spherical in shape and attached to the eye sockets by six muscles, these muscles contract and relax to bring about the rotation of the eye in the socket.

The upper and lower eyelids protects the eyes from mechanical injury. The eye lashed also protects the eye.

The tear gland secretes tear which washes away dust and also destroy most bacteria because of the presence of lysozyme which is antiseptic.

The wall of the eye ball is made up of three layers:

1. Sclera or sclerotic layer
2. Choroid layer
3. Retina

**STRUCTURE OF THE EYES**

Sclerotic layer: it is the white part of the eye. It gives shape to the eye and it also protects and supports the inner parts of the eye.

Cornea: it is the continuation of the sclera in front of the eye. It admits light into the eyes and also protects the eyes.

**DRAW THE DIAGRAM**

**Longitudinal section of the human eye**

Choroid layer: this is the middle layer of the eye. It has several blood capillaries (i.e. it is highly vascularised). The capillaries supply food and oxygen to the cells of the eye. It has a black pigment which prevents internal reflection of light rays.

Retina: it is the innermost layer of the eyeball. Images are formed on it. The image formed are always converted (upside down) and smaller than the real object but when it gets to the brain, the brain gives the correct interpretation.

There are two sensory cells on the retina, they are;

1. Cones: these are sensitive to colour vision and high light intensity.
2. Rods: they are sensitive to both bright and dim light. They can only distinguish black and white colours

Yellow spot (Fovea centralis): It us the most sensitive part of the retina where the fullest images are sent to the brain.

Lens: It is a transparent bi-convex structure. It focuses light rays on the retina and it is held in place by suspensory ligaments.

Vitreous humour: It refracts the light rays that enter into the eye. It also maintains the spherical shape of the eye. It is a jelly-like liquid that is transparent.

Aqueous humous: It also refract light rays that enters into the eyes. It is a transparent watery liquid which fills the space between the lens and the cornea.

Optic nerve: it transmit sensory impulses to and from the brain

Pupil: This is an opening in the iris through which light enters the eye.

Iris: It controls the amount of light entering the eyes.

**Functions of the eyes**

1. Image formation
2. Accommodation

**HOW THE EYE SEES OBJECTS**

When the eye look at an object, the light rays from the object enters into the eyeball. All the transparent parts of the eye e.g. cornea, aqueous humour, lens, vitreous humour help to refract the light rays so that it will be brought to focus on the retina to form the image of the object.

The nerve impulse is set up by the sensitive cells on the retina which travels through the optic nerve to the brain for interpretation. The brain then tells us what we see.

When the two eyes work together we see things properly. This is called binocular or stereoscopic vision.

**DRAW THE DIAGRAM**

**Normal sight**

**ACCOMMODATION**

This is the ability of eye to adjust the thickness of the lens in order to focus near or far object on the retina.

When a distant object is focused the lens becomes thinner and longer

When a near object is focused the lens becomes thicker and shorter.

When the eye cannot form proper image on the retina, the eye has a defect. An ophthalmoscope is used by an optician or ophthalmologist to examine the eye.

**EYE DEFECT AND CORRECTIONS**

1. Short sightedness or myopic: This is when the eyeball is too long and the images are focused in front of retina, the individual will not be able to see distant object clearly.

**DRAW THE DIAGRAM**

Correction: Myopia can be corrected by using concave or diverging lenses.

**DRAW THE DIAGRAM**

1. Long sightedness or hypermetropia: This is when the eyeball is too short and the images are focused behind the retina, the individual will not be able to see nearby object clearly.

**DRAW THE DIAGRAM**

Correction: It is corrected by using convex or converging lenses.

**DRAW THE DIAGRAM**

1. Astigmatism: This is due to the irregular curvature of the lens or cornea. Vertical figures can be seen clearly but a horizontal figure appears blurred.

Correction: It can be corrected by wearing cylindrical lenses.

1. Presbyopia: This is when the lens and the ciliary muscles of the eye lose their elasticity and become hardened. The lens can no longer easily adjust its shape to focus the images of nearby and distant objects clearly on the retina, it is at times due to old age.

Correction: It can be corrected by wearing bi-focal lenses i.e. a combination of concave and convex lenses.

1. Cataract: This is due to formation of cloudy areas in one or both lenses. It causes partial or complete blindness. It can be corrected by surgical operation.
2. Colour blindness: This is when the sufferer cannot distinguish between red, green or blue colours. It is an hereditary disease. It is brought about when the cone in the retina is absent or not properly developed.
3. Night blindness: Inability to see under dim light
4. Conjunctivitis
5. River blindness
6. Strabismus (crossed eye): This is when the two eyes are unable to move synchronously due to defect of the muscles of the eye.
7. Glaucoma: This is when pressure builds up inside the eye due to accommodation of excess fluid

**The differences between The Human eye and the Camera**

|  |  |  |
| --- | --- | --- |
|  | Human eye | Camera |
| 1 | The focal length varies | The focal length is fixed |
| 2 | It adjust the focal length by contraction and relaxation of the ciliary muscles | We adjust its focal length by shifting of lens forward or backward |
| 3 | Images are sent to the brain as impulses through the optic nerve. | Images are recorded in light sensitive salt crystals on the film. |

**Similarities between the human eye and the camera**

1. Both have lens
2. The pupil in the eyes corresponds to the aperture
3. The iris corresponds to the diaphragm
4. The retina corresponds to the film.
5. Both the retina and film are sensitive to light
6. Both iris and diaphragm are used to control the amount of light
7. The image formed in both are real, upside down and smaller in size than the real object (i.e. diminished).

**THE EAR**

The ear is a pair of organ of hearing and balancing. It is divided into three parts;

1. The outer ear: it is made up 0f the pinna( made up of elastic cartilage), ear canal and the ear drum or tympanic membrane.
   1. The pinna collects sound waves and directs them into the ear canal.
2. The middle ear: this is as mall filled chamber in the skull. The outer ear is separated from the middle ear by the ear drum. It is made up of three tiny soft bones calle ear ossicles and the eudtaachian tube.

The ear ossicles are:

1. Malleus or hammer

ii. stapes or stirrup

1. Incus or anvil

The Eustachian tube leads from the middle ear to the pharynx. It equalizes the air pressure on both sides of the ear drum.

1. The inner ear: it consists of three semi-circular canal, sacculus, utriculus and cochlea. The inner ear is filled with fluid called the perilymph. The cochlea is the part concerned with hearing. The three semi-circular canals, utriculus and sacculus are concerned with maintaining balance.

HOW THE EAR HEARS SOUND

The pinna collects sound waves and directs it to the ear canal or ear tube which leads to the ear drum. The ear drum will vibrate when the sound waves stikes it. The ear osssicles also vibrates and they transmit the vibration into the inner ear.

This causes the cochlea in the inner ear to vibrate and the sensory cells in the cocheal set up the nerve impulse that is taken to the brain through the auditory nerve and the brain the interpret the impulse as sound.

**THE NOSE**

The nose is the organ of smell. It is made up of two nostrils and kept wet by a secretion called mucus.

The substance we smell come in the air, it enters the nostrils, dissolve in the mucus to form solution that stimulate the nerve endings which sends impulses through the olfactory nerve to the brain and the brain interprets it as smell.

**THE TONGUE**

The tongue is the organ of taste; it is kept moist by the saliva. The lower surface of the tongue is very smooth but the upper surface is rough due to presence of taste bud on it. There are four different types of taste buds:

1. Bitter –at the back
2. Sour – at the sides
3. Sweet- tip/front
4. Salty – in front (side)

Below are their locations on the tongue

**DRAW THE DIAGRAM**

The substances tasted are in solution. The stimulus is received by cells in the taste bud. From the taste buds, the stimulus is passed to the nerve which carries it to the brain then identifies it as a bitter, sour, sweet or salty taste.

The stimulus of taste is a chemical stimulus.

**WEEKS EIGHT AND NINE**

**THE NERVOUS SYSTEM**

Nervous system is the network of nerve cells called neurons which send and receive information from all parts of the body of an organism.

The nervous system is divided into two main parts:

1. Central nervous system: This is made up of the brain and spinal cord
2. Peripheral nervous system: This is made up of the somatic and autonomic nervous system. The peripheral nervous system include all the neurons that carry impulses to and from the brain.

Neurone: It is also known as the nerve cell. it is responsible for the transmission of impulses in the body. A neurone is made up of a cell body (which consist of the nucleus and cytoplasm), the dentrites (which carries towards the cell body and the axon(which carries impulses away from the cell body to their destinations).

DRAW THE DIAGRAM

TYPES OF NEURONE

There are three types of neurone

1. Sensory or afferent neurone: They transmit impulses or messages from the receptors to the brain or central nervous system.
2. Motor or efferent neurone: They transmit interpreted impulses from the central nervous system to the effector which are the muscles and glands
3. Intermediate or associate or relay neurone: This connects the sensory neurone with the motor neurone.

Note: Impulses pass through the neurone in form of electric impulses

Receptors: These are cells that receives stmulaus from the environment and pass it to the sensory neurone e.g. eye, tongue, skin etc

Effectors: These are the muscles or glands that respond to the interpreted messages from the brain.

Response: This is any behavior resulting from stimulus.

Stimulus: Is anything in the environment which starts impulse and provokes a corresponding response e.g. heat, cold etc.

REFLEX ACTION

A reflex action is a fast automatic response to a stimulus by an organ which is not initiated by the brain (i.e. it is an involuntary action) e.g. coughing, sneezing, blinking of the eye, knee jerk etc. The response comes from the cord.

Voluntary actions: These are actions which we intentional carry out. The brain initiated the actions and usually these actions are not fast because it requires a lot of thinking e.g. reading, singing, walking, running eating etc. It controlled by the brain.

DIFFERENCES BETWEEN REFLEX AND VOLUNTARY ACTIONS

|  |  |  |
| --- | --- | --- |
| S/N | Reflex action | Voluntary action |
|  | It is inborn | It can be learnt |
| 2. | It occurs unconsciously | It occurs consciously |
| 3. | Action is initiated by muscle receptor | Action is initiated in the brain |
| 4. | The action is automatic and fast | It is neither automatic nor fast |
| 5. | Nerve impulses do not reach the brain | Nerve impulses always reach the brain. |

A REFLEX ARC

The pathway taken by a reflex action is called reflex arc. In a reflex arc, sensory neurones carry impulses from organs to the spinal cord where the impulses are interpreted. The interpreted messages are then passed through the motor neuron to the effector organ of muscle of the limb which can cause a response.

Reflex actions are important because they protect the body from being harmed by sudden dangers.

**THE CENTRAL NERVOUS SYSTEM (CNS)**

The CNS is made up of the brain and spinal cord.

BRAIN: This is the most highly specialized organ in the animal body and it is protected by the skull.

The brain is made up of 3 parts which are:

1. Forebrain
2. Mid brain
3. Hind brain

Forebrain: This is made up of four (4) main parts:

1. Cerebrum
2. Olfactory lobes
3. Thalami
4. Hypothalamus

The cerebrum is the seat of intelligence reasoning, thinking, memory, learning and all voluntary actions. The olfactory lobes controls the organs of smell.

Midbrain: This connects the forebrain to the hindbrain. It is made up of the optic lobe which controls the organ of sight.

Hindbrain: It is made up of the cerebellum and the medulla oblongata. Cerebellum controls the body posture and balance of the body. Medulla oblongata controls many involuntary actions like the reflex actions, heartbeat, breathing, blood pressure etc.

SPINAL CORD

It is a soft delicate tissue protected by the vertebral column or the backbone. The spinal nerves are concerned with reflex actions and also transmit impulses to the brain.

**WEEK TEN**

**REPRODUCTIVE HEALTH**

Reproductive health is the state of complete mental physical and social well being in all matters relating to the reproductive system.

SIGNIFICANCE OR IMPORTANCE OF REPRODUCTIVE HEALTH

1. It prevents the spread of sexual transmitted diseases like syphilis, gonorrhoea, HIV etc
2. It helps to improve the reproductive health of the youth
3. It increases ability of people to reproduce
4. It reduces the incidence of early marriage and unwanted child bearing
5. It encourages healthy sexual development and maturation
6. It helps people to have a safe sex life
7. It prevents complication and infection during pregnancy and delivery.

THE MALE PRODUCTIVE SYSTEM

The male reproduction system consists of the following structures; (of which the scrotum and the penis are the parts that can be seen externally).

1. Penis: It is a strong erective tissue covered by an elastic skin. A normal penis has a smooth skin; the force skin is removed, and there are no discharge from it.

Functions

It is used to deposit sperm into the vagina of the female vagina during sexual intercourse.

1. Scrotal sac/scrotum: It is a sac that houses and protects the testis. It has a wrinkled skin, no spots, sore or rashes.
2. Testes: These are two oval-shaped structures found in the scrotal sacs

Functions

1. They produce the sperms
2. They also produce the male sex hormone called Testosterone
3. Seminiferous Tubules: These are tiny coiled tubes in the testis. They are the point where sperm are being produced within the testes.
4. Epididymis: This is a long coiled tube also found in the testes

Function: It is used to collect and store sperm temporarily until they are matured.

1. Seminal vesicle: This is a small sac where sperm are stored

Function

1. It stores sperms until ejaculation
2. It also secrete seminal fluid

CARE OF THE MALE REPRODUCTIVE SYSTEM

1. Abstinence from premarital and indiscriminate sexual intercourse
2. Seek medical attention immediately, if any sore or discharge from the penis is noticed.
3. Keep the penis clean and dry

FEMALE REPRODUCTIVE SYSTEM

The parts of the female reproductive system consist of the following structures:

1. Vulva: This is the external part of the female reproductive system.

Function: It allows the passage of penis into the vagina.

1. Clitoris: This is a small rod-like structure, its function is to stimulate the female during sexual intercourse. It is sometimes removed for cultural reasons. This is part of what is known as female genital mutilation.
2. Vagina: This is a muscular tube that leads from the uterus to the outside of the body. The penis is inserted into the vagina during sexual intercourse. The foetus also passes out from the vagina during birth.
3. Cervix: This is a ring of muscle which controls the opening and closing of the uterus, especially during childbirth.
4. Uterus or womb: This is a muscular organ that receives the fertilized egg; care and nourish the developing foetus.
5. Ovaries: they are two in number and are oval in shape. The ovaries produce the eggs or ova and also produce the female sex hormone called oestrogen, which help in the development of secondary sexual characteristics in females. It also produces progesterone, a hormone responsible for maintaining pregnancy.
6. Fallopian tube/ Oviduct: This is a long narrow tube that links the ovary with the uterus. Fertilization of the eggs occurs in the fallopian tube.
7. Fallopian funnel: This is a funnel shaped structure which receives the eggs or ova released by the ovaries.

CARE AND PROJECTION OF THE FEMALE PRODUCTIVE SYSTEM

1. Practice good hygiene
2. Carryout responsible sexual practice
3. Visit a gynaecologist for periodic check up
4. Keep the vagina clean and dry always.
5. Avoid the use of tight pants; use cotton underwear always.
6. If you observe itching or discharge and bleeding from your vagina between menstruation, seek medical attention.
7. Abstinence from premarital and indiscriminate sexual intercourse.

**SAFE MOTHERHOOD**

Pregnancy and childbirth are very important, they carry little or no hazard for women who have good ante-natal. intra-natal (or intra-partum) and post-natal cares.

Women should register for ante-natal care at state or recognized private hospitals.

Ante-natal care is specialized care given to a pregnant woman from the beginning of her pregnancy to the day she will deliver her baby. This care is provided by a specialist doctor that takes care of pregnant women; known as an obstetrician.

The care given to a woman during labour in the hospital is known as intra-natal (or intra-partum) care.

The care given to the mother and her baby from the day of delivery up to six weeks is known as post-natal care.

SEXUAL TRANSMITTED DISEASES (STDs)

These are diseases passed from one person to another through sexual contact either genitally, orally or anally. They include:

1. Gonorrhoea
2. Hepatitis
3. Syphilis
4. HIV/AIDs
5. Genital Herpes
6. Genital Warts

GONORRHOEA

Gonorrhoea is caused by a bacteria called Neisseria gonorrhea.

Symptoms

1. Burning, irritated feelings when passing urine
2. Thick yellowish discharge from the penis
3. Lower abdominal pain in women
4. Eyes sticky with puss in a new born baby

Control

1. Abstinence from sexual intercourse
2. Use of contraceptives during sexual intercourse e.g. Condoms.
3. Seek medical attention if any symptom is noticed.

SYPHILIS

It is caused by a bacteria called Treponema Pallidum

Symptoms

1. Painless sore which may disappear without treatment
2. Swelling of lymph gland
3. Head ache
4. Destruction of skin, muscles, blood vessels, central nervous system with madness.
5. Repeated abortion in women.
6. Still birth.

Control

1. Abstinence from sexual intercourse
2. Seek medical attention

**HIV/AIDS (ACQUIRED IMMUNE DEFICIENCY SYNDROME)**

AIDs is a very deadly disease. It is caused by a virus called Human Immuno virus. the virus destroys the immune system which makes the sufferer open to different types of diseases tuberculosis, malaria, anaemia etc. The virus is found in the blood, semen, breast milk and vaginal secretions of people carrying them.

MODE OF TRANSMISSION

1. Through unprotected sexual intercourse.
2. Mother to child transmission.
3. Transfusion of unscreened or infected blood.
4. Sharing of needles, blades, and other sharp and unsterilized objects.