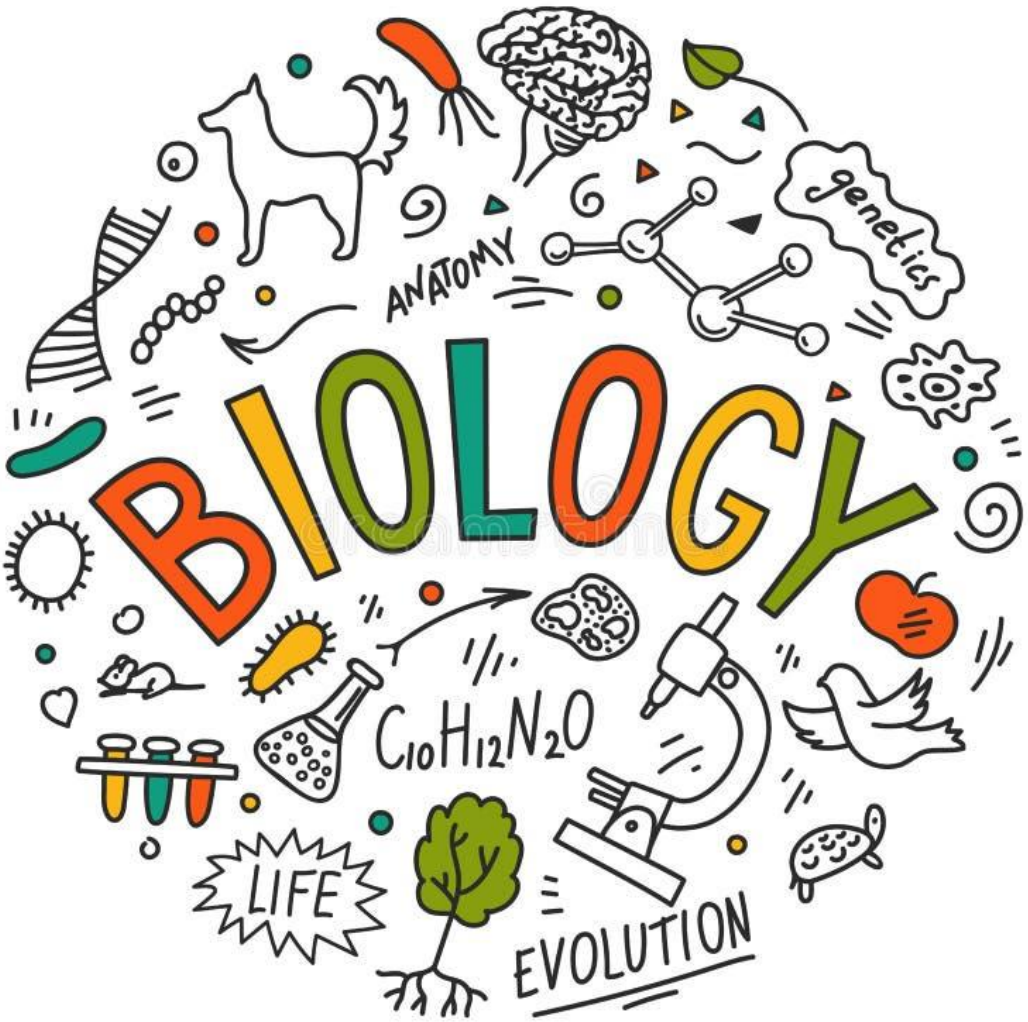
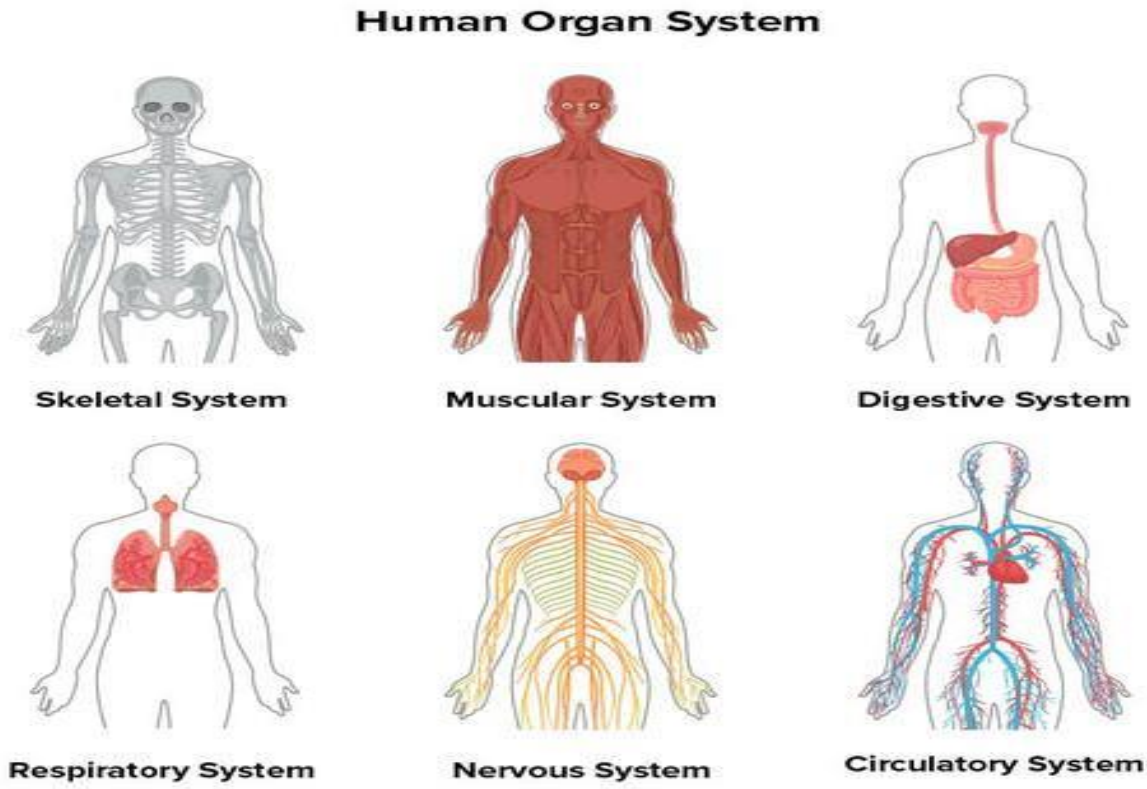
GRADE 9
NATURAL SCIENCE

LIFE AND LIVING
(BIOLOGY)



CONTENTS



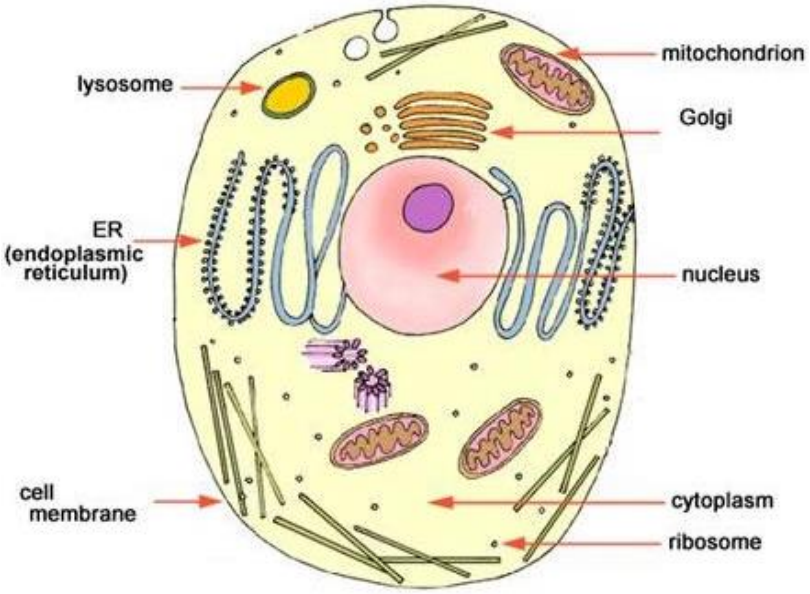
TOPIC 1 - CELLS AS THE BASIC UNITS OF LIFE

1. CELL STRUCTURE

CELL

DEFINITION it is the basic functional and structural unit of the cell
NOTES Cells can be seen under a microscope i.e. are microscopic

DIAGRAM



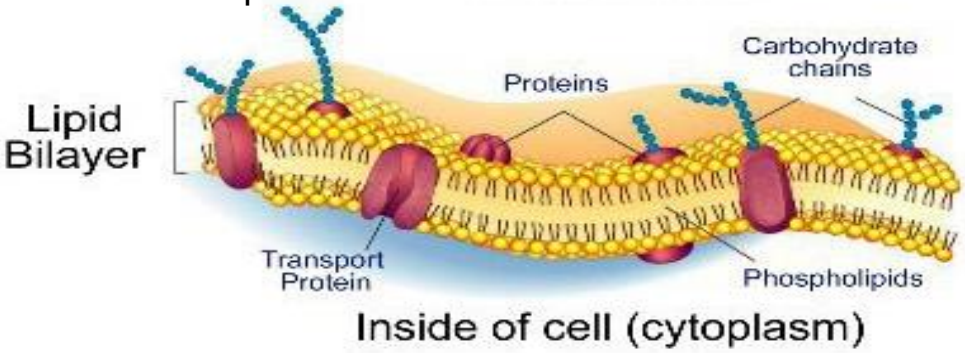
ORGANELLES

DEFINITION **Are small structures found within a cell**
EXAMPLES Cell membrane, cytoplasm, nucleus, mitochondria, vacuoles and chloroplasts
* These can be found in PLANTS and ANIMALS

CELL MEMBRANE

DEFINITION **It is a semi-permeable membrane that surrounds the cytoplasm of the cell**
FUNCTION It encloses the contents of the cell
Also allows specific substances to pass into and out of the cell
i.e. it is semi-permeable

DIAGRAM



CYTOPLASM

DEFINITION **It is the jelly-like medium (substance) within the cell**

FUNCTION It is where all chemical reactions take place within a cell
All organelles float within the cytoplasm

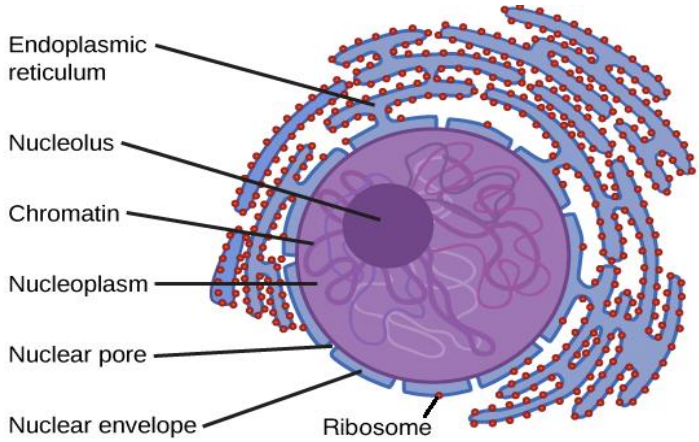
NUCLEUS

DEFINITION **It is the "brain" of the cell as it contains all of the hereditary information for an organism**

FUNCTION It controls all of the cells activities
It contains DNA – which contains all of the inherited characteristics e.g. eye colour, height and hair colour
DNA (deoxyribonucleic acid) is unique to each person (this variation is why there is such diversity in species)

NOTES The nucleus is enclosed by a nuclear membrane

DIAGRAM



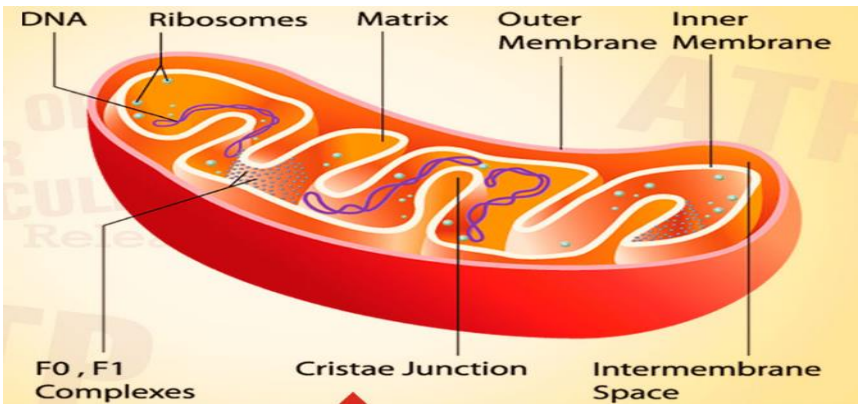
MITOCHONDRIA

DEFINITION **It is the powerhouse of the cell in which the process of cellular respiration occurs.**

FUNCTION It breaks down glucose (from food), in the presence of oxygen, to make energy for all body cells i.e. Cellular Respiration

EQUATION Glucose + Oxygen → Energy + Carbon Dioxide + Water

DIAGRAM



VACUOLES

DEFINITION **Are sac-like structures surrounding by a membrane called the tonoplast that stores water and minerals**

FUNCTION It is used for water control (osmoregulation)
Storage of water and minerals
For turgor pressure in plants to maintain their structure

DIAGRAM

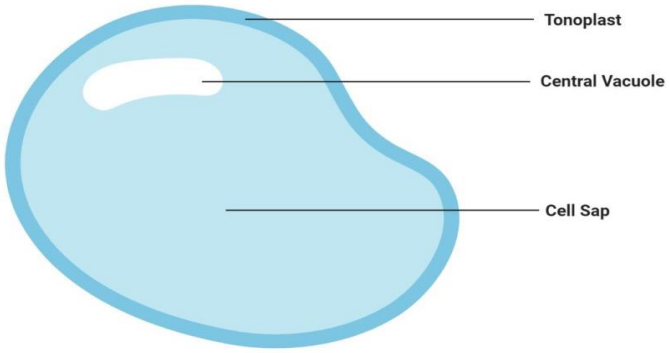


Figure: Vacuole, Image Copyright © Sagar Aryal, www.microbenotes.com

CHLOROPLAST

DEFINITION **A membrane-bound organelle that absorbs sunlight to produce food during the process of photosynthesis**

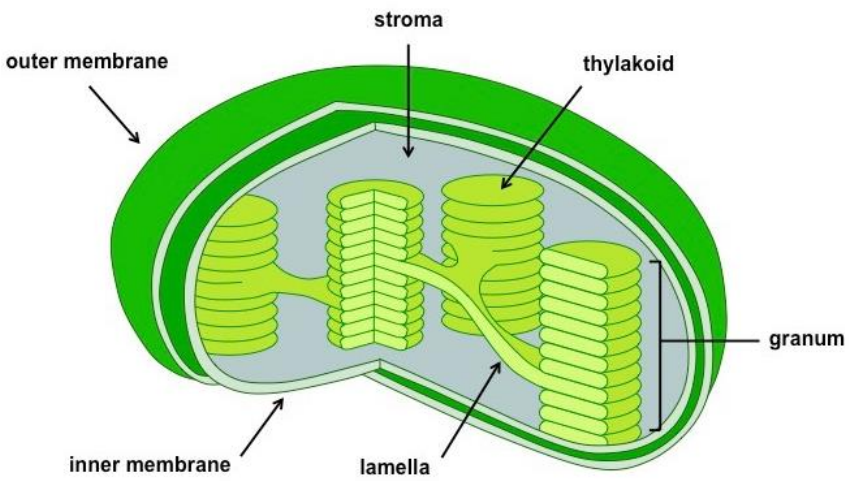
FUNCTION It contains chlorophyll that absorbs the UV radiation to produce carbohydrates and oxygen during the process of photosynthesis

Chlorophyll – is the green pigment in plants that absorbs light energy from the sun and helps with the formation of energy rich glucose (photosynthesis).

EQUATION

$$\text{Carbon Dioxide + Water} \xrightarrow[\text{chlorophyll}]{\text{sunlight}} \text{Glucose + Oxygen}$$

DIAGRAM

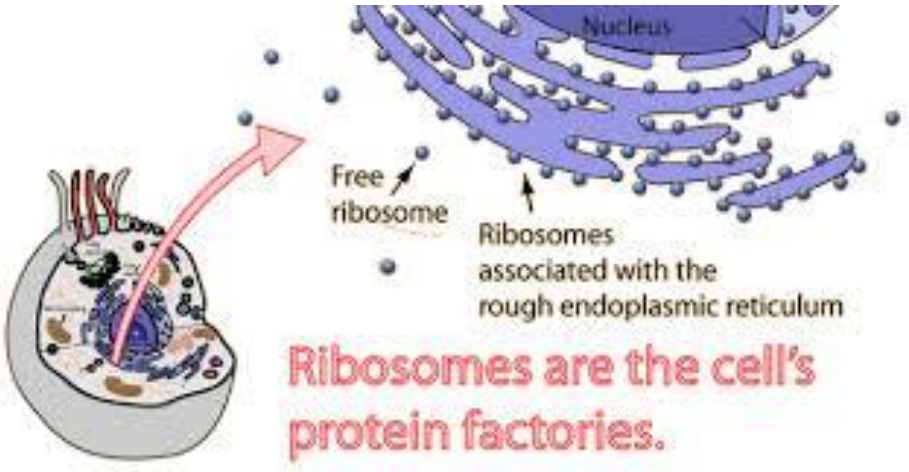


RIBOSOMES

DEFINITION **Are small round structures usually associated with the endoplasmic reticulum, but can be found floating freely within the cytoplasm**

FUNCTION Are the sites of protein synthesis (the process of manufacturing proteins)

DIAGRAM

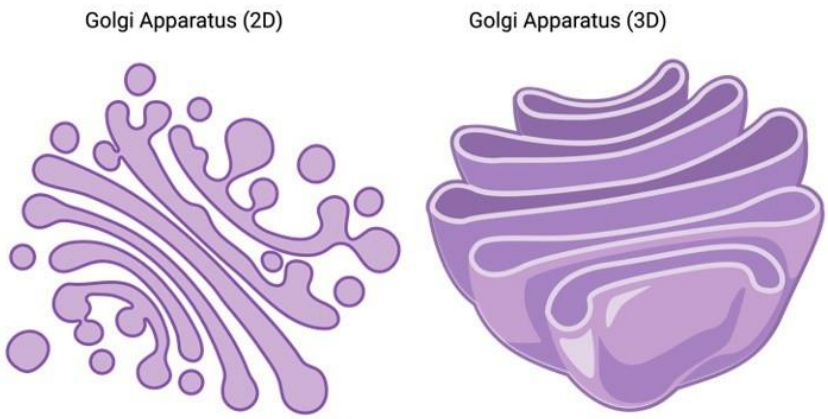


GOLGI BODY

DEFINITION **Folded membranes within the cytoplasm that are involved in secretion and intracellular transport**

FUNCTION The process, package and transport proteins from the endoplasmic reticulum and transport these proteins around the cell

DIAGRAM

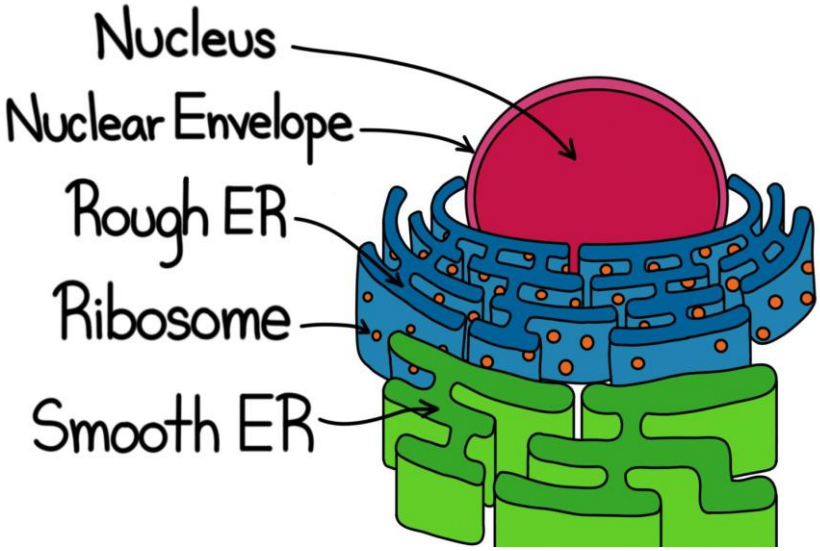


ENDOPLASMIC RETICULUM (ER)

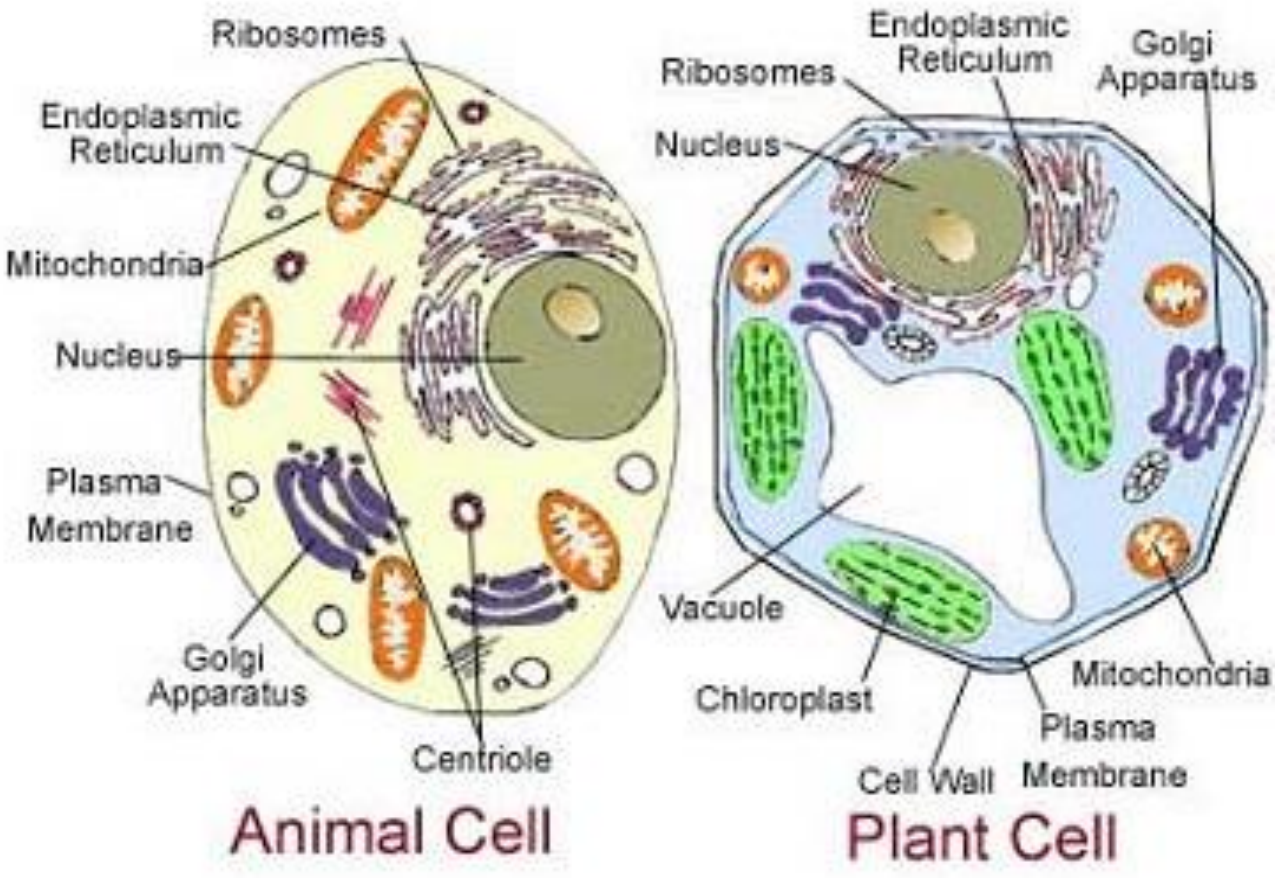
DEFINITION **This is a series of membranes associated with the nucleus for transport of substances between the nucleus and golgi body**

FUNCTION Involved in protein synthesis (Rough ER) and lipid synthesis (Smooth ER) and transport them from the nucleus to the golgi body

DIAGRAM



2. DIFFERENCES BETWEEN PLANT AND ANIMAL CELLS



DIFFERENCES BETWEEN PLANT CELLS AND ANIMAL CELLS

Plant cell	Animal cell
Has chloroplasts	No chloroplasts
LARGE vacuole	Small or no vacuoles
Cell wall present	Cell wall absent
Regular shape	Irregular shape

SIMILARITITES BETWEEN PLANT CELLS AND ANIMAL CELLS

The following organelles are the same for both plants and animals

cell membrane, cytoplasm, nucleus, mitochondria, endoplasmic reticulum, golgi apparatus, ribosomes

Activity

Complete Activity 4 (pg 6 in textbook)

numbers 1 a to c & 2 a to f in your notebook.

3. MICROSCOPE

MICROSCOPE **Is an instrument that contains one or more magnifying lenses.**
We commonly use a compound light microscope in biology.

FUNCTION It allows us to look at things that are too small to see with the naked eye (i.e. microscopic)

DIAGRAM **See page 7 of your textbook for the labels of the LIGHT MICROSCOPE below**

Provide the functions for the following parts	
Body tube	Contains the lenses that magnify the object
Rotating nosepiece	Structure that rotates to allow one of three lenses to be used to view the specimen
Objective lenses	Lenses closest to the specimen. There are usually 3 of them.
Stage clip	Holds the microscope slide in place
Mirror	Directs light up through the microscope
Base	Supports the lenses and the stage
Diaphragm & condenser	Diaphgram - Adjusts amount of light passing through the microscope Condenser – focuses the light onto the specimen
Stage	Platform that the slide is placed on
Arm	Connects the body tube to the base & used to carry the microscope
Fine focusing knob	Turning the knob changes the distance between the stage & objective lense SLOWLY – for image clarity
Course focusing knob	Turning the knob changes the distance between the stage & objective lense QUICKLY – for rough image focus

ACTIVITY

Read page 8 of your textbook for **how to use a light microscope**

DEMO

Your teacher will demo the use for you

And you will have a chance to study an onion cell under the microscope – through your own creation of a wet mount slide

ACTIVITY

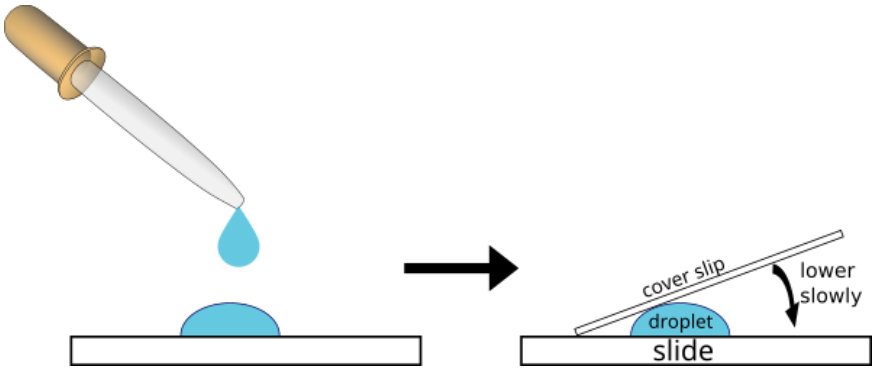
Read page 10 of your textbook for how to **make a wet mount slide**

DEMO

Your teacher will demo the making of wet mount slide

WET MOUNT SLIDE

A glass slide holding a specimen suspended in a drop of water and covered with a cover slip



Magnification on objective lenses

This is the magnification number on the objective lens.

- sometimes it is printed in a larger size font than the other numbers (it can be the number alone or with an X next to it)

- sometime it is printed in the same size font as the other numbers followed by an X

40 X

4 X

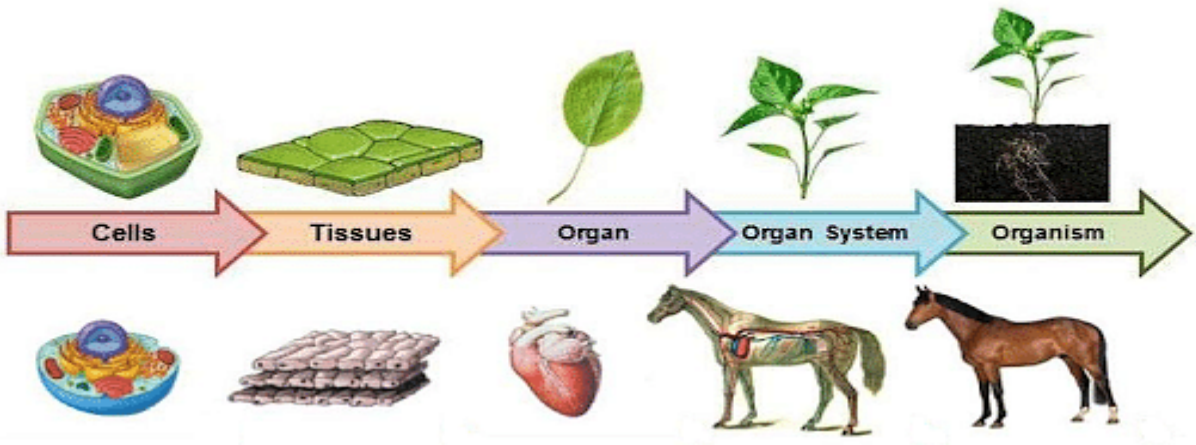
Calculating the magnification of a microscope

Magnification = magnif of eyepiece (ocular lens) x magnif of objective lens

ACTIVITY

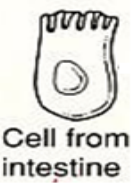
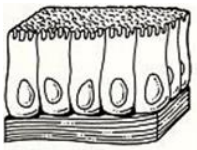
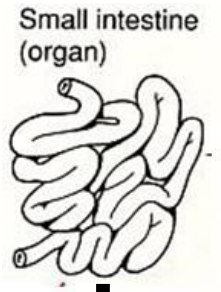
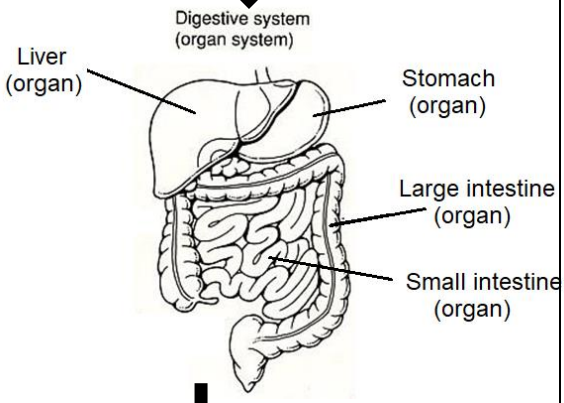
Calculate the magnification of the object if the eyepiece has a magnification of 10 X and the objective lens has a magnification of 40 X.

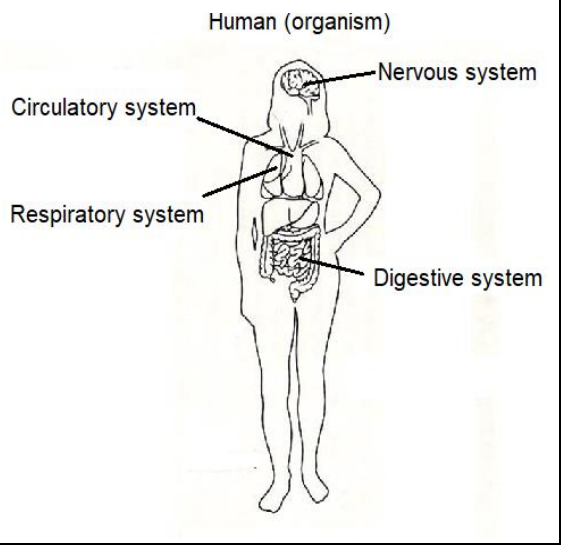
4. CELLS IN TISSUES, ORGANS AND SYSTEMS



ACTIVITY

For the table that follows on terms, definitions and diagrams, make use of page 13 of your textbook to find the definitions

Term	Definition	Diagram
Cells	_____ _____ _____ _____ _____	 (only visible under a microscope)
Tissue	_____ _____ _____ _____ _____ _____	 (microscopic)
Organ	_____ _____ _____ _____ _____ _____ _____	
System	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____	

Organism	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	

The following terms are also important:

Unicellular	Consisting of 1 cell e.g. An amoeba
Multicellular	Consisting of many cells e.g. Human beings
Macroscopic	Large enough to see with the naked eye e.g. Liver tissue
Specialise	To take on a particular function & only perform that function NB – Form/structure of the cell determines the function of the cell e.g. muscle cells, kidney cells etc

STEM CELLS

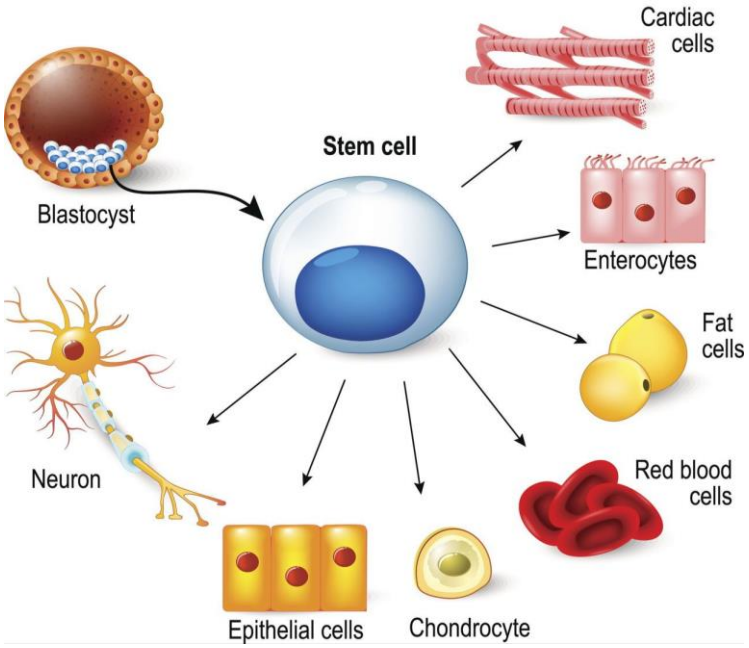
What are stem cells?

Stem cell are cells that are undifferentiated. (<u>Undifferentiated</u> - means that the cells have not yet developed into any specific cell in the body.)
They are able to become specialised to form almost any specialised cell in the body.

A stem cell can become a liver cell, or a blood cell, or a nerve cell or any other type of cell in the body.

Stem cells can be harvested from

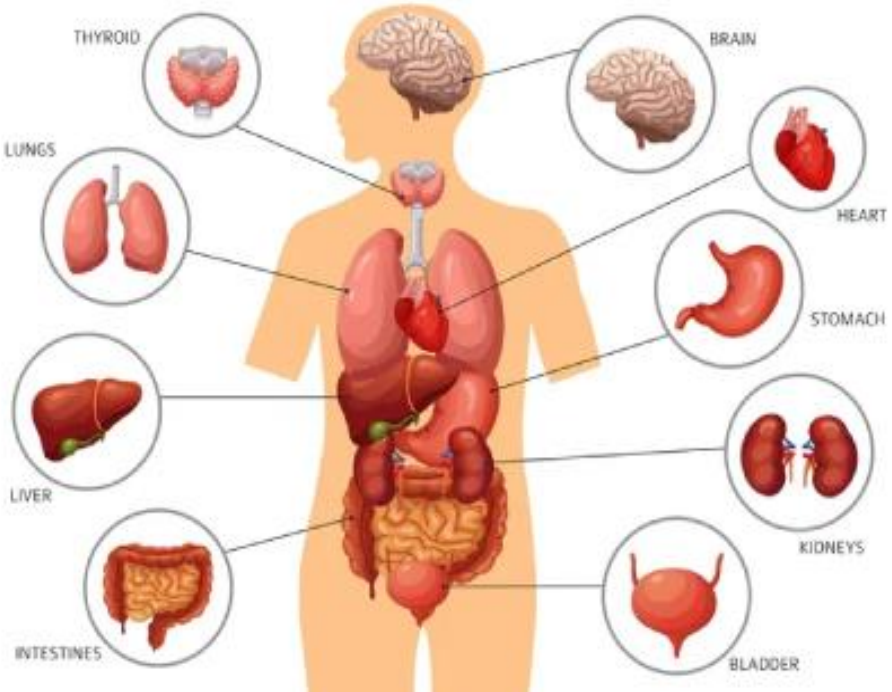
1 → embryo's (this is very controversial as it kills the embryo)
2 → stem cells can also be harvested from the blood in the umbilical cord.
3 → adult stem cells are harvested from bone marrow and from blood.



TOPIC 2: SYSTEMS IN THE HUMAN BODY

There are 7 major integrated (i.e. working together) systems in the human body

1. Digestive system
2. Circulatory system
3. Respiratory system
4. Musculoskeletal system
5. Excretory system
6. Nervous system
7. Reproductive system



1. DIGESTIVE SYSTEM

FUNCTION Breaks down food into soluble nutrients that can be absorbed into the bloodstream

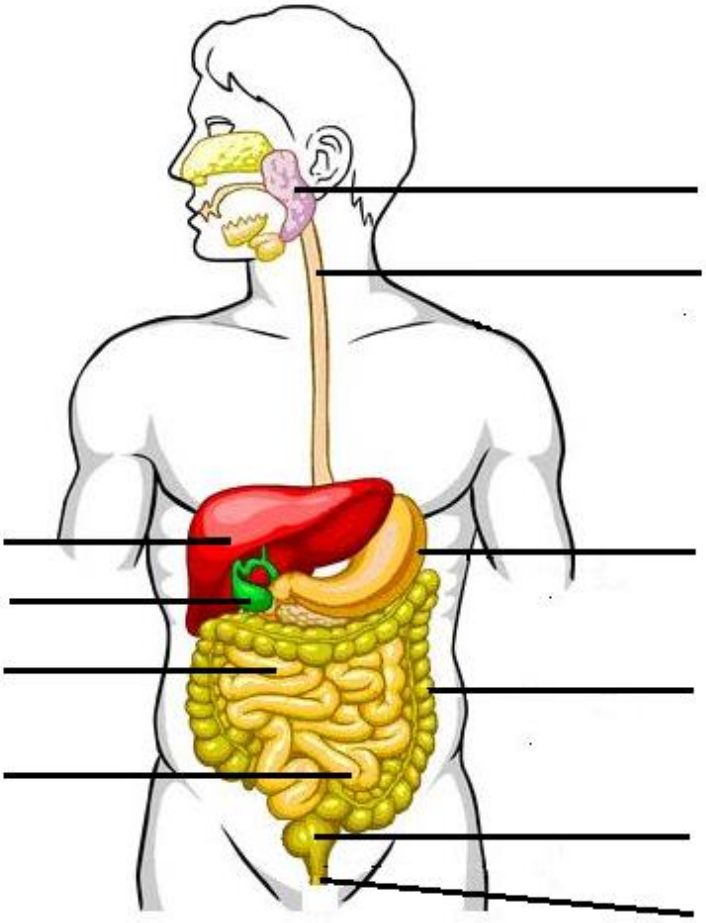
Large insoluble pieces → much smaller soluble molecules

MAIN COMPONENTS Mouth, Oesophagus, Stomach, Intestines and Liver

MAIN PROCESSES

- **Ingestion** – intake of food (biting, chewing, swallowing)
- **Digestion** – Conversion of insoluble food into soluble molecules.
- **Absorption** - soluble nutrients taken up by blood stream
- **Egestion** – elimination of undigested material (faeces)

DIAGRAM **Identify the parts of the digestive system by labeling the drawing below**



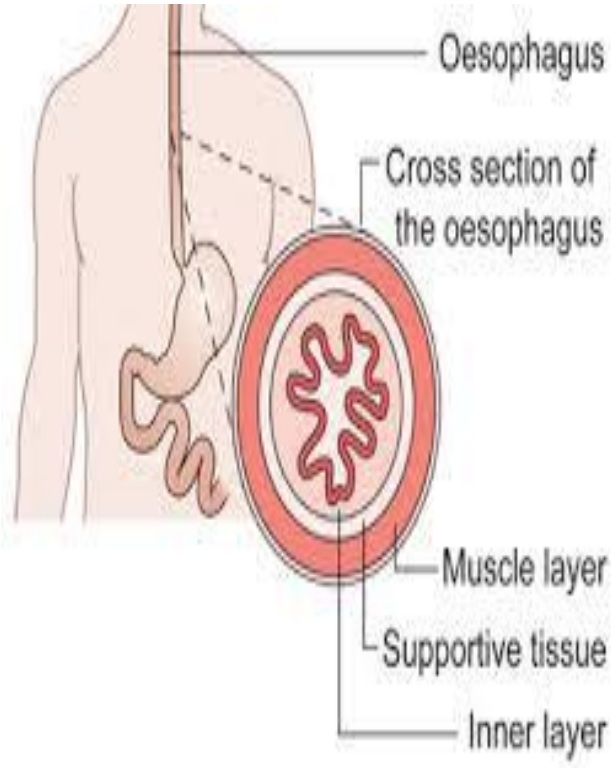
DIVIDED INTO 2 PARTS
1 – Alimentary Canal
2 – Associated organs

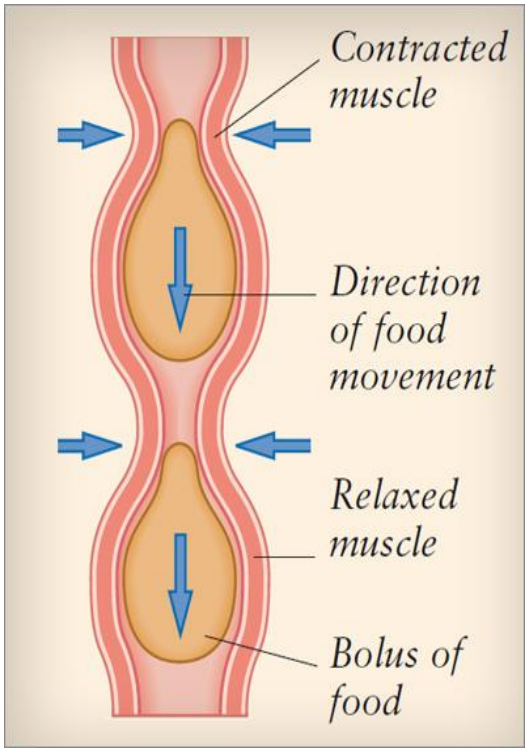
ALIMENTARY CANAL

MOUTH Ingestion takes place here.

OESOPHAGUS The walls of the oesophagus consists of <u>muscles</u> (2 layers) The muscle layers contract to push food down the oesophagus and the rest of the alimentary canal.

The movement of food down the oesophagus and alimentary canal is called **PERISTALSIS.**

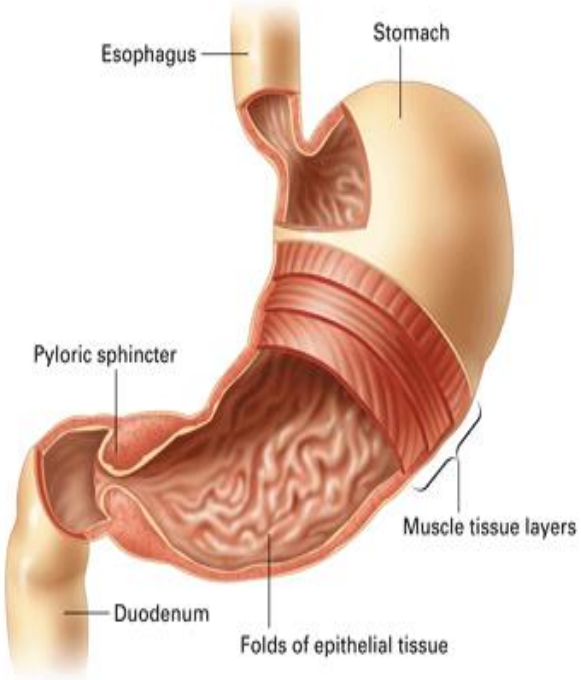




STOMACH Has thick muscular walls that **churn** (mixes) the food in the stomach.This breaks the food into smaller particles.

Enzymes then break down the food chemically into smaller molecules. The enzymes are secreted by the lining of the stomach.

An enzyme is a protein that speeds up the rate of a chemical reaction (ie. It speeds up the breakdown of food).

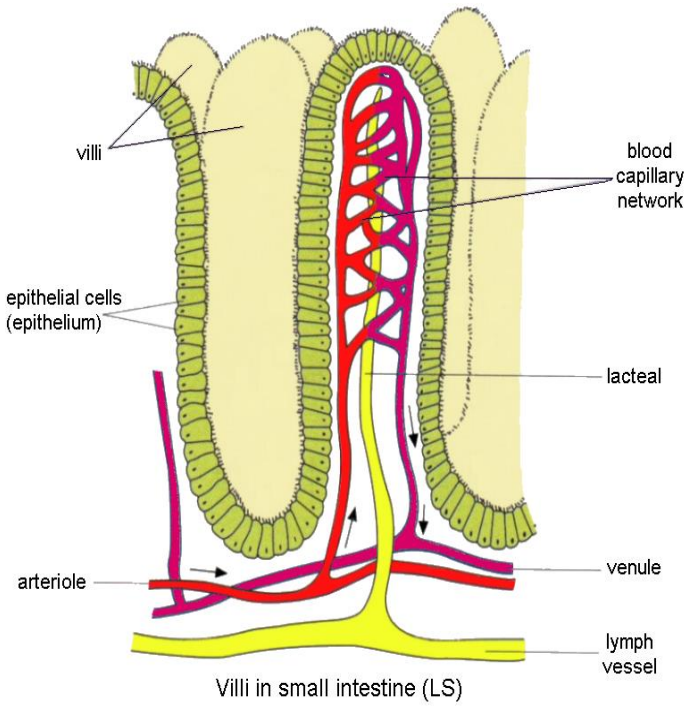


SMALL INTESTINE

Th that can break food do

The walls of the small intestine contain millions of tiny **VILLI.** (villus – singular). The villi are responsible for absorption of digested food.

Digested food that is **absorbed by the villi** ends up in the **blood stream.**The bloodstream carries the digested food to the **cells.**



Villi in small intestine (LS)

LARGE INTESTINE

The large intestine **absorbs water** back into the blood. The undigested waste that's left becomes more compact and forms stools or faeces.

RECTUM	Stools (faeces) are temporarily stored in the rectum.
ANUS	The end opening of the digestive system through which waste is egested.

ACCESORY ORGANS

LIVER	Is the largest gland in the body. **Function**: Forms **bile.** Bile assists in the **digestion of fats.**
OTHER ORGANS	**Teeth:** Helps to chew and break down complex food molecules before it moves down the oesophagus **Tongue:** The tongue helps to mix the food with saliva. This aids swallowing after the food has been chewed. **Pancreas:** Aids in blood sugar control – via hormones INSULIN and GLUCAGON Also aids in digestive by releasing DIGESTIVE JUICES into the small intestine **Gall Bladder:** Bile is stored in the gall bladder.

TYPES OF DIGESTION

MECHANICAL DIGESTION	chewing in the mouth and churning movements of the stomach break large food particles down into smaller pieces, (this increases surface area to speed up chemical digestion).
CHEMICAL DIGESTION	involves enzymes. Small food particles are broken down chemically to even smaller soluble molecules (that can be absorbed).

DIGESTIVE DISORDERS AND DISEASES

ULCERS	are sores on the inside of the stomach and intestine.

ANOREXIA	is a disorder where people fear gaining weight so they starve themselves excessively to lose weight.
DIARRHOEA	is a condition where a person has more than five bowl movements or watery stool per day.
LIVER CIRRHOSIS	is a disease of the liver (often caused by excessive use of alcohol).
CONSTIPATION	occurs when stools become too hard and difficult to pass. Occurs if we do not eat enough fibre. Chronic constipation can lead to colon cancer and haemorrhoids.
OBESITY	is a condition where the person involved consumes more food than the body for normal daily functioning. As result they become overweight.
DIABETES	occurs when the body is not able to control the amount of sugar in the blood.

WHY IS WATER IMPORTANT IN YOUR DIET?

Most of your body consists of water

Water's importance:

***** All chemical reactions take place in water.
* serves as a solvent for nutrients, waste and gases.
* transports nutrients and waste products in the body.
* plays a role in digestion.

WHAT IS MEANT BY A BALANCED DIET?

a diet that contains adequate amounts of all the necessary nutrients from all of the food groups required for healthy growth

COMPULSORY ACTIVITIES
To be done in your workbooks
Page 21 – Activity 3.2. a – d
Page 69 – Activity 4.1. to 4.2.
Page 71 – Activity 5.1 – 5.7.

2. CIRCULATORY SYSTEM

FUNCTION

The circulatory system transports substances around the body.

SUBSTANCES TRANSPORTED

Blood carries:

* oxygen and nutrients to cells
* waste products and carbon dioxide away from cells for excretion.
* waste products are transported by the blood to excretory organs like the kidneys and the skin.

3 MAIN COMPONENTS

1) **Heart** pumps blood to the lungs and the rest of the body.

2) **Blood vessels** transports blood around the body.
   * Arteries carry blood away from the heart
   * Veins carry blood towards the heart.
   * Capillaries are very small blood vessels that are found between arteries and veins.

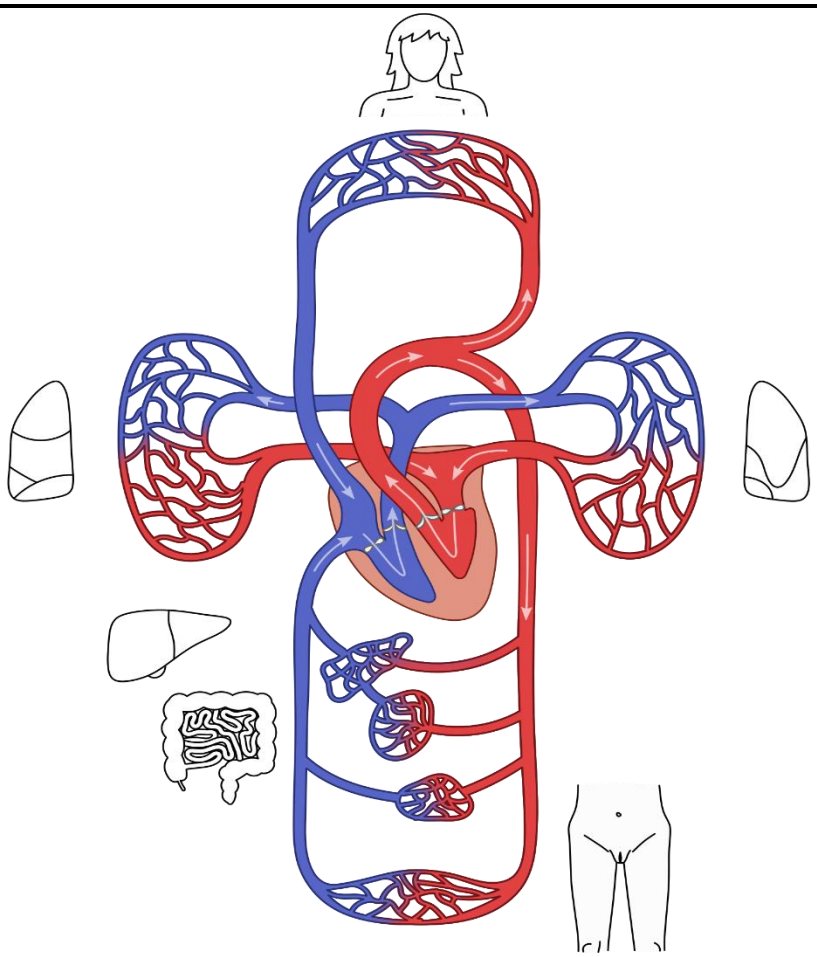
3) **Blood** carries and oxygen and nutrients to the cells. It also carries carbon dioxide and waste products from cells.

MAIN PROCESSES

1) Circulating blood between the heart and lungs.
   This is called **PULMONARY CIRCULATION.**
   The blood that returns to the heart from the lungs is rich in oxygen (we say that it is **oxygenated**).

2) Circulating blood between the heart and cells of the body.
   This is called **SYSTEMIC CIRCULATION**.
   The heart pumps oxygen rich blood from the lungs to every cell in the body.

DIAGRAM



HEALTH ISSUES

HIGH BLOOD PRESSURE

Condition when the force at which blood is pushed against the walls of the artery is abnormally high – makes the artery walls push back harder against the internal forces.
This makes the artery walls thicker & there is then less space for blood to flow through them.

HEART ATTACK

Occurs when a blood clot blocks the flow of blood to the heart muscle – causes the heart muscle to die or get damaged.

STROKE

Occurs when the blood flow to the brain is stopped – happens when blood vessel bursts / blocked by a clot. The brain cells can die due to lack of oxygen.

COMPULSORY ACTIVITY

To be done in your workbook

Page 23 – Activity 5.1 – 5.4.

3. RESPIRATORY SYSTEM

BREATHING, GASEOUS EXCHANGE, CIRCULATION AND RESPIRATION

RESPIRATORY SYSTEM The respiratory system is responsible for breathing, gaseous exchange and respiration.

BREATHING Process involved in getting air into and out of the lungs via:

i) Inhalation (process that gets air into the lung)

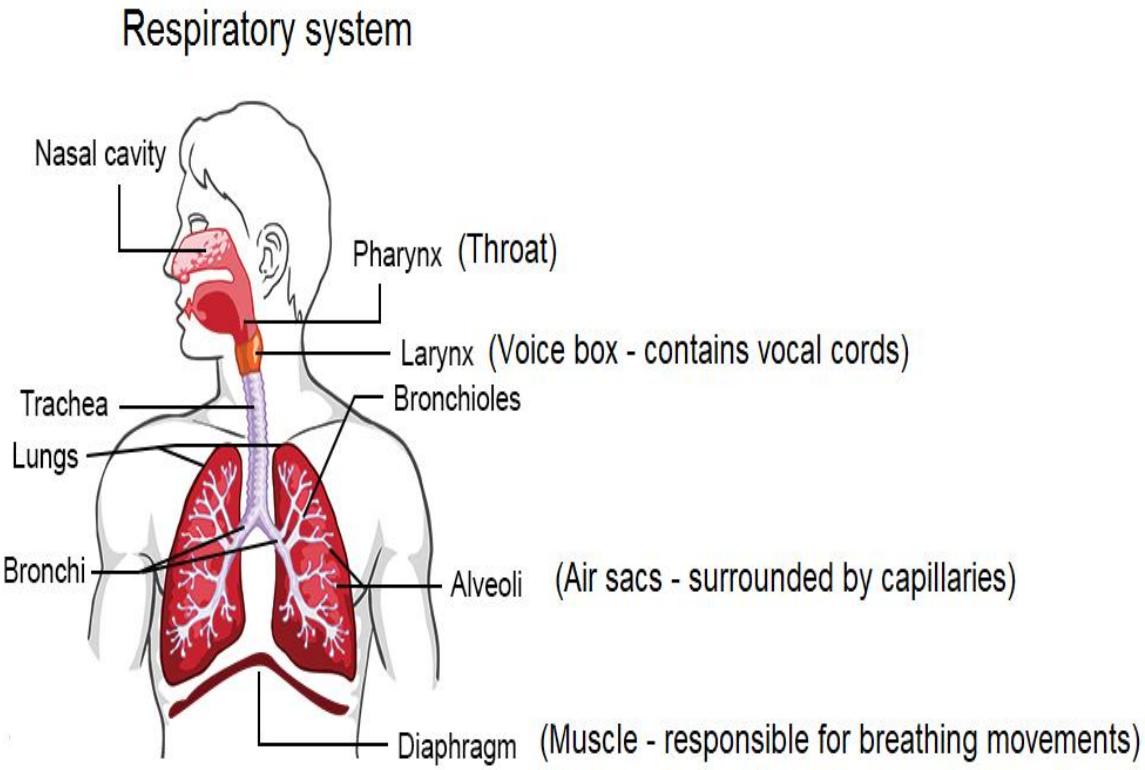
ii) Exhalation (process that gets air out of the lung)

GASEOUS EXCHANGE (process where gases diffuse from a region of high concentration to a region of low concentration)

Occurs in two places (1) the lung and (2) the body cells

RESPIRATION Is a chemical reaction that occurs in the mitochondria of cells

DIAGRAM



MAIN COMPONENTS nose, mouth, trachea, other air passages, lungs and blood

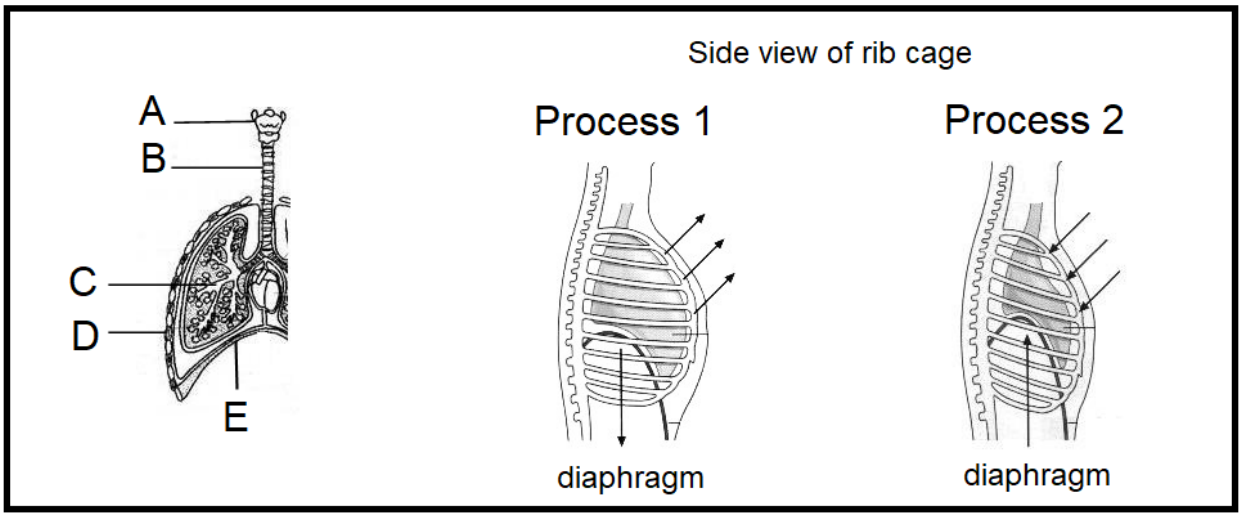
BREATHING MECHANISM – INHALATION VS EXHALATION

(Table: Differences between inhalation & exhalation)

Inhalation **(how air enters lungs)**	**Exhalation** **(how air leaves the lungs)**
▪ Diaphragm contracts, which causes diaphragm to move downward. ▪ Intercostal muscles contract. ▪ This causes the rib cage to expand (upwards and outwards) ▪ Volume of chest cavity increases ▪ Pressure in the chest decreases. ▪ Air rushes in from a high pressure (outside the lung) into the lung (lower pressure) down the air passages.	▪ Diaphragm relaxes, which caused the diaphragm to move upward. ▪ Intercostal muscles relax. ▪ This causes the rib cage to o return to its original position. ▪ Volume of chest cavity decreases ▪ Pressure in the chest increases. ▪ Air rushes in from a high pressure ▪ (inside the lung) to a lower pressure outside via the air passages.

ACTIVITY
(EXAM-TYPE QUESTION)

Study the diagrams below that deal with the respiratory system and answer the questions that follow in your notebooks.

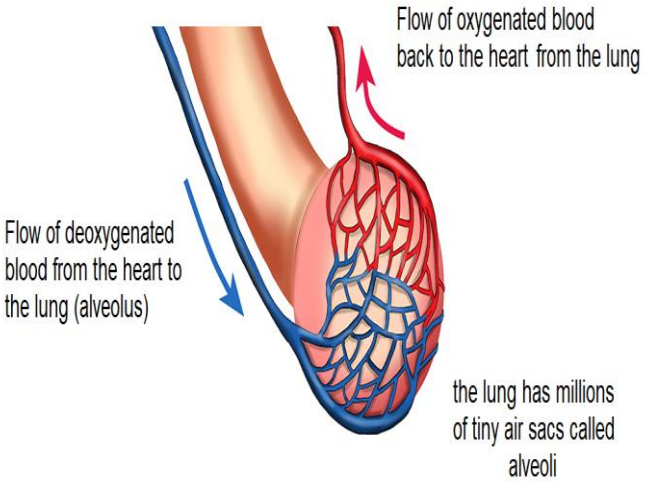


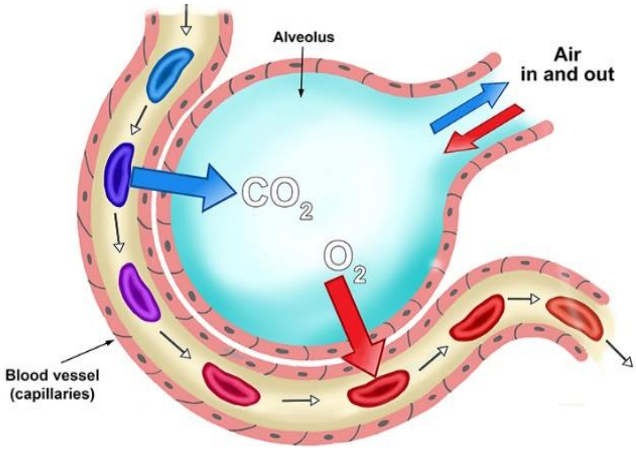
1. Identify the parts labeled A to E. (5)
2. Which of the labeled parts are air passages? (2)
3. Which process (process 1 or process 2) represents exhalation? (1)
4. Provide 2 reasons for your answer to Q.3 (2)

GASEOUS EXCHANGE – 2 LOCATIONS

(A) AT THE LUNGS

- Blood coming towards the alveolus from the heart is deoxygenated, it has a high[CO_2] and a low [0_2] (because of cellular respiration)
- The air that is breathed in has a low [CO_2] and a high [0_2]. It is oxygenated.
- Gaseous exchange happens along the respective concentration gradients at the lung.
- O_2 diffuses into the capillaries from the alveolus.
- CO_2 diffuses into the alveolus from the capillaries.
- The capillaries now contain oxygenated blood.
- The blood leaving the alveolus has higher [CO_2] and a lower [0_2] than the blood coming towards the alveolus.

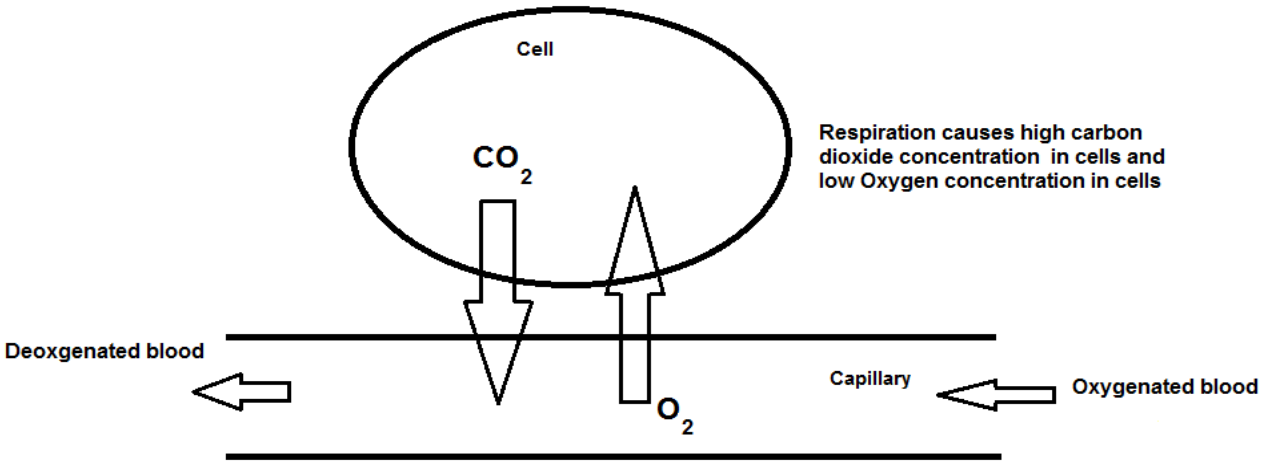




(B) AT THE BODY CELLS

- oxygenated blood leaves the heart through the aorta
- the aorta branches to form smaller and smaller arteries and eventually form
- capillaries which run past body cells - this blood has a higher oxygen concentration and a lower carbon dioxide concentration than the body cells
- because of cellular respiration.
- oxygen therefore diffuses down its concentration gradient from the capillary to the body cell.
- carbon dioxide diffuses down its concentration gradient from the body cell to the capillary.
- The blood that is transported back to the heart has a higher carbon dioxide
  concentration and a lower oxygen concentration
  than the blood that was carried towards the body cells.

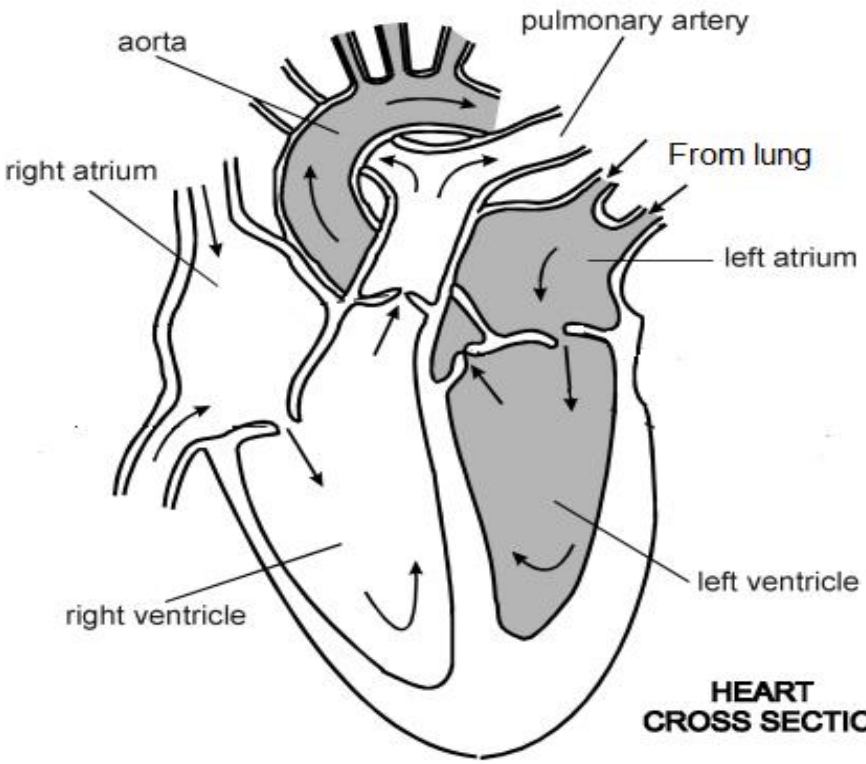
Internal gaseous exchange



CIRCULATION OF OXYGENATED AND DEOXYGENATED BLOOD

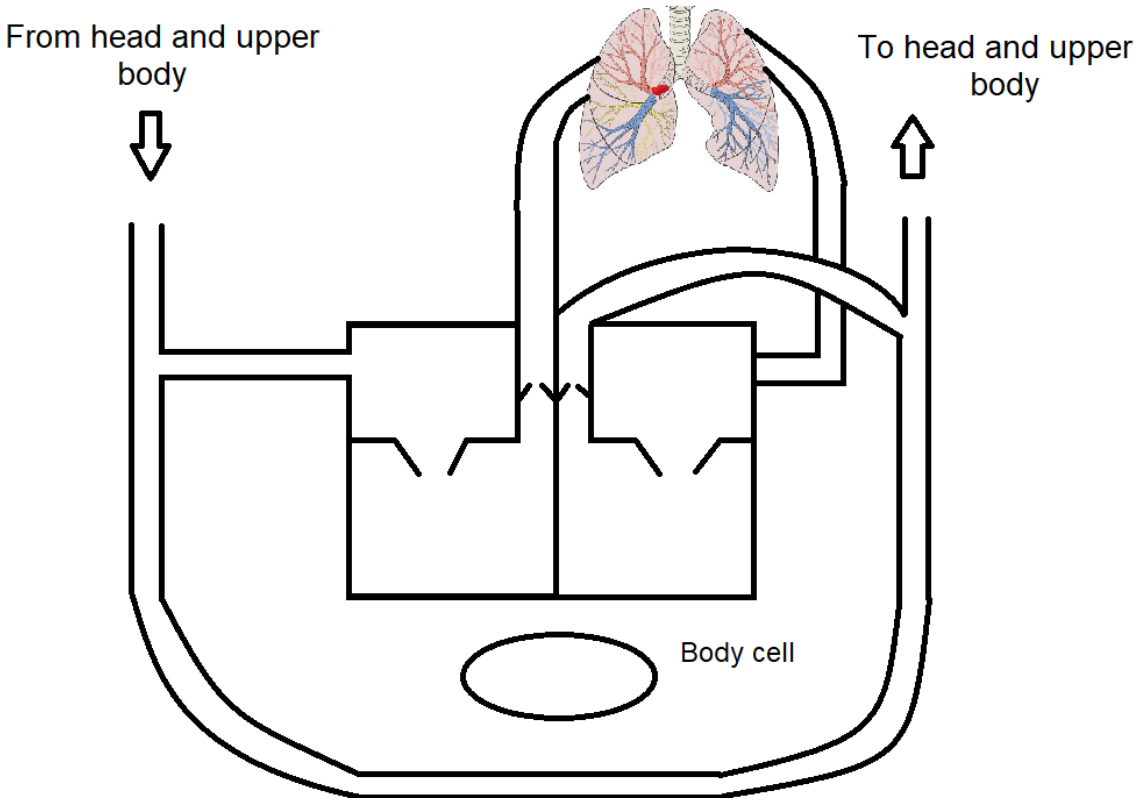
- deoxygenated blood enters the heart at the right atrium.
- it passes into the right ventricle.
- the right side of the heart then pumps the deoxygenated blood to the lungs where gaseous exchange takes place.
- The oxygenated blood from the lungs return to the heart and flows into the left atrium.
- from the left atrium, it gets pumped to the left ventricle.
- the oxygenated blood then gets pumped from the left ventricle through the aorta to the body through a network of arteries.

DIAGRAM OF BLOOD CIRCULATION WITHIN THE HEART



ACTIVITY
Diagram showing blood flow through the heart.

Colour in the deoxygenated blood (right side of heart up to lung) and the oxygenated blood (from lung through the right side of the heart) in two different colours.



THE ROLE OF THE CIRCULATORY SYSTEM AND RESPIRATORY SYSTEM (ARE INTEGRATED SYSTEMS)

- These systems work together
- Deoxygenated blood (blood with a low O_2 concentration and a high CO_2 concentration) flows from the cells of the body to the heart.
- The heart pumps the deoxygenated blood to the lungs.
- Oxygen is inhaled by the lungs during breathing
- Oxygen diffuses into the bloodstream (External gaseous exchange)
- Carbon dioxide diffuses from the bloodstream to the lungs.
- Oxygenated blood leaves the lungs and returns to the heart.
- Heart pumps oxygenated blood to the body cells.
- Oxygen diffuses from bloodstream into the body cells.
- Carbon dioxide diffuses from the body cells into the bloodstream.
- Deoxygenated blood is transported back to the heart.
- Heart pumps deoxygenated blood to the lungs.

The cycle then repeats

ACTIVITY

Complete the following table using information from pg.55 of the textbook.

	Arteries	Veins	Capillaries
Direction of blood flow	away from heart	towards heart	from arteries to veins
Type of blood transported	oxygenated (except pulmonary artery)	deoxygenated (except pulmonary vein)	changing from oxygenated to deoxygenated
Thickness of walls	Thick	thin	very thin
Blood pressure in vessels	High	low	low

ACTIVITY **Define the following terms (pg.52) in your notebook**	
Gaseous exchange Diffusion gradient Deoxygenated blood Oxygenated blood	Circulation Atrium Ventricle

HEALTH ISSUES OF RESPIRATORY SYSTEM

ACTIVITY
FIND THE DEFINITIONS OF THE FOLLOWING HEALTH ISSUES – PAGE 25 OF YOUR TEXTBOOK

ASTHMA	
LUNG CANCER	
BRONCHITIS	
ASBESTOSIS	

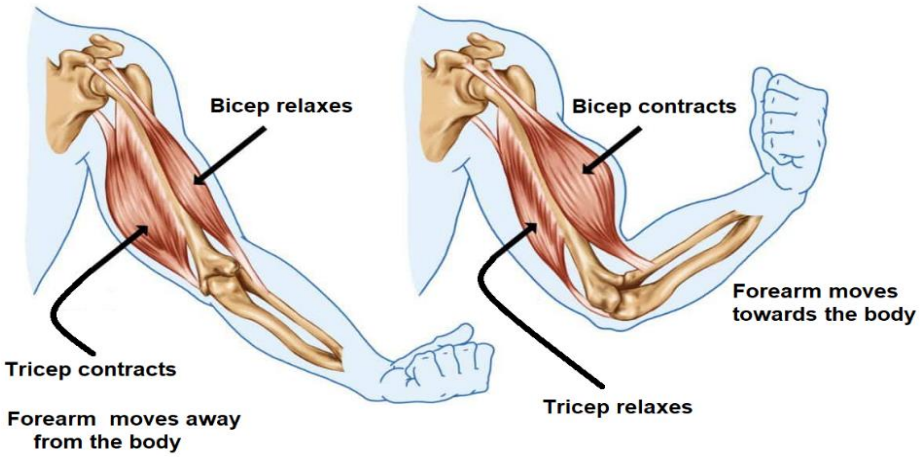
4. MUSCULOSKELETAL SYSTEM

FUNCTIONS

- The muscles are used to move the bones, which acts as levers.
- The musculoskeletal system provides support to the body and brings about movement.

MAIN PROCESSES

- Contraction and relaxation of muscles attached to bone brings about movement - known as locomotion.
- Some muscles work in pairs.
- While one contracts the other relaxes.
- Eg. When bicep contracts, tricep relaxes in order to raise the forearm.



COMPONENTS (WITH THEIR SPECIFIC FUNCTIONS)

Consists of bones (skeleton) and muscles.

- **Muscles** – move bones.
- **Bones** – act as levers.
- **Ligaments** – connect bone to bone (like the ligaments in the fingers) They're elastic. Can be over stretched (sprained) or torn. Never quite shrink back to original length thus putting the joint more at risk of injury again.
- **Tendons** – connect bone to muscle. Non-elastic
- **Cartilage** – covers the ends of bones. The cartilage prevents friction between bones.

DIAGRAM

HEALTH ISSUES

RICKETS

- Is a disease which leads to softening and weakening of bones - due to a lack of calcium and vitamin D in the diet of young children.
- It can affect the bones of the legs, pelvis and spine of young children.

ARTHRITIS is caused by inflammation of the joints. It is caused by the breakdown of cartilage in the joint (painful!).

OSTEOPOROSIS is a disease where bones become very brittle in old age. This leads to an increase in risk of bone fractures.

ACTIVITY **Using page 26 of your textbook – provide the definitions of the following**
1. Ligaments **2. Tendons** **3. Cartilage** **4. Locomotion**

5. EXCRETORY SYSTEM

FUNCTION Removal of waste products as a result of metabolic activities

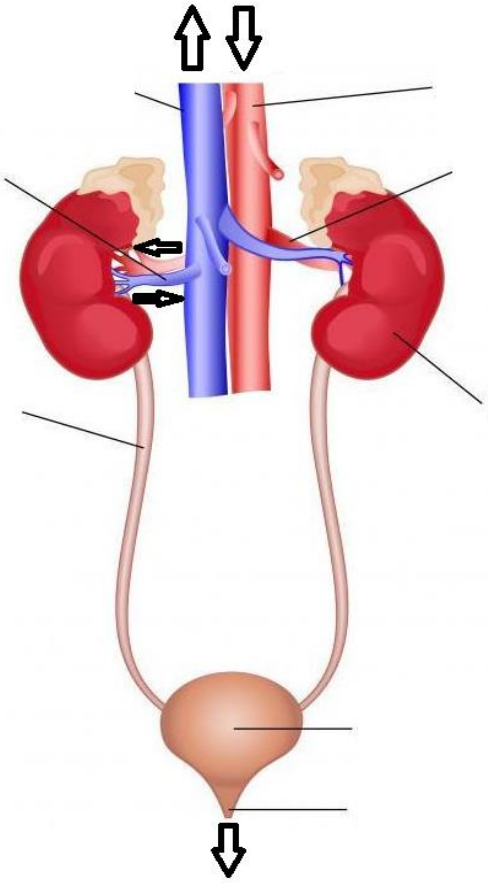
COMPONENTS

- kidney, ureter, bladder and urethra.
- **Kidney** → separates waste substances from useful substances (like glucose and nutrients).

NOTES **Metabolism = all the chemical reactions that happen in the body (in cells)**

- Waste products produced by these reactions need to be removed from the body.
- The removal of waste products from the body is called **excretion.**
- **Examples of waste products** include urea and uric acid.
- Excess water is also removed from the body.
- The removal of excess water from the body is called **osmoregulation.**

ACTIVITY Provide labels for the diagram below



PROCESS OF EXCRETION

DIVIDED INTO 4 STAGES:

- **1) Filtration:**
  the kidney separates the red blood cells from the liquid part of blood (plasma). The liquid part of the blood after filtration is called the **filtrate**

- **2) Absorption:**
  the filtrate passes into narrow tubes in the kidney and useful substances like glucose are reabsorbed

- **3) Diffusion:**
  waste products which are still in the blood diffuse into the filtrate in the tubes.

- **4) Excretion:**
  once these processes are complete then the fluid in the tubules is called **urine**. The urine is carried by the ureter to the bladder. The bladder stores urine - passes out of the bladder through the urethra.

HEALTH ISSUES

KIDNEY FAILURE

Caused by a sudden loss of the ability of the kidneys to remove waste and concentrate urine without losing electrolytes.

Treatment:
People who suffer from renal failure need dialysis treatment to filter waste from blood.

BLADDER INFECTIONS

caused by bacteria that infect the urinary tract.

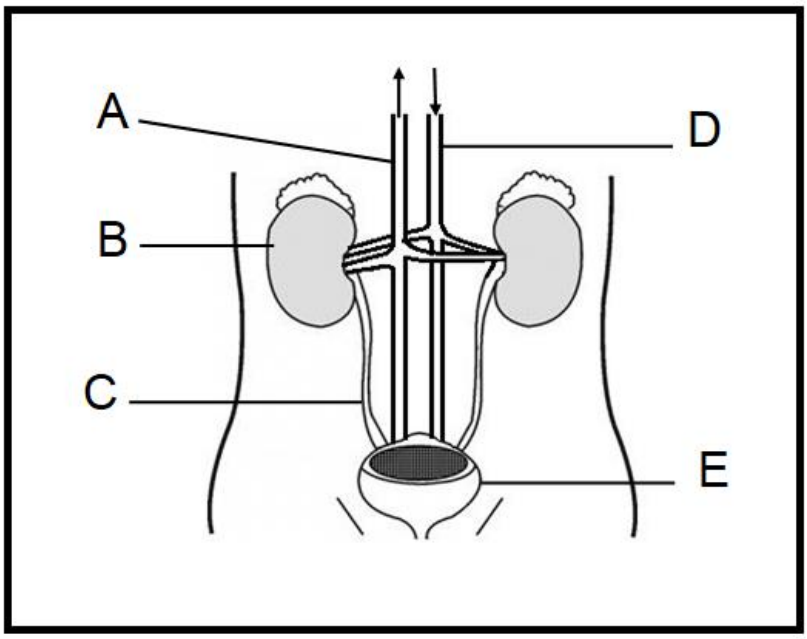
KIDNEY STONES

are solid deposits of minerals and salts that form in the kidneys.

ACTIVITY

EXAM TYPE QUESTION

Study the diagram below that deals with the excretory system and write the answers in your notebook.



1. Identify the parts labelled B, C and E. (3)
2. Compare the blood being carried in A and D with regard to:
   2.1. Oxygen concentration. (2)
   2.2. Concentration of waste products. (2)
3. Describe what is meant by kidney failure. (2)
4. How is kidney failure treated? (1)

6. NERVOUS SYSTEM

FUNCTION The nervous system helps the body respond to stimuli from the environment.

STIMULUS A stimulus is a change in the environment that causes a reaction in living organisms.

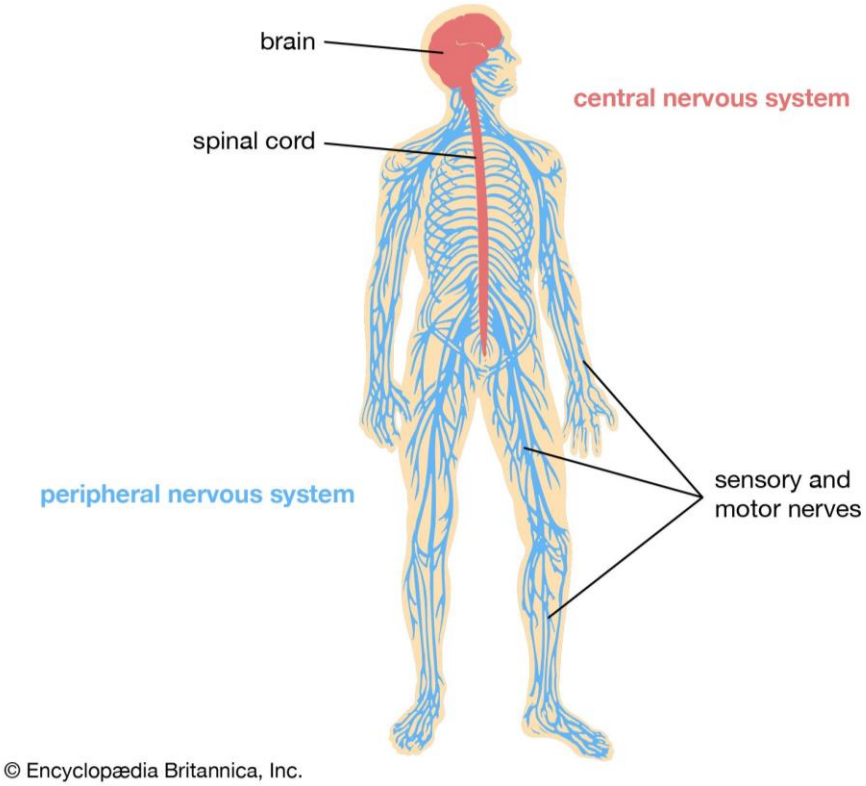
Examples: include change in temperature, light intensity, smells, movement, sound, feeling and chemical

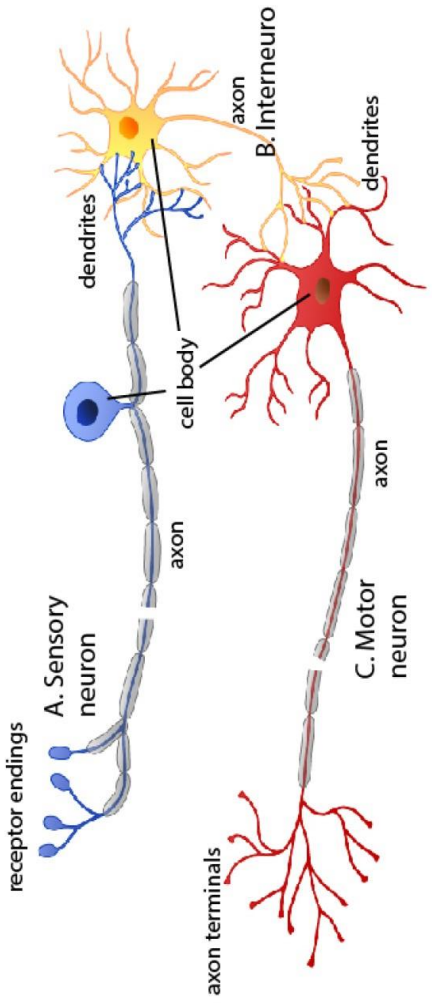
MAIN COMPONENTS Brain, spinal cord, nerves and sense organs (eyes, ears, skin, tongue , nose)

The **spinal cord** is nerve tissue that is encased in the spine. It carries impulses from the brain to the body

The sense organs have specific cells called **receptors**
The receptors convert stimuli to **electrical impulses**

DIAGRAM





ELECTRICAL IMPULSES

The electrical impulses are weak electrical currents

These electrical impulses are carried by nerve cells called **neurons.**

THREE NEURON (NERVE CELL) TYPES

A) The electrical impulses are transported to the central nervous system (the spinal cord) by a **sensory neuron.**

B) The sensory neuron passes the electrical impulse to a **connector neuron.**

C) The connector neuron passes the impulse to a **motor neuron.**

ACTIVITY **DEFINE THE FOLLOWING TERMS** **Use page 30 of your textbook** **Complete it in your notebooks**	
Stimulus	Nerve cells
receptors	Spinal cord
impulses	

HEALTH ISSUES **ACTIVITY** **Using page 30 find the definitions for the following health issues**	
Deafness	Blindness
Short-sightedness	

7. REPRODUCTIVE SYSTEM

FUNCTION

- reproductive system produces sex cells for the continuation of the species.
- male sex cells (also known as gametes) are called **sperm cells**
- female sex cells (or gametes) are called **egg cells.**
- **these cells need to fuse in order to ensure that the human species continues to live** from generation to generation.

MAIN PROCESSES

COPULATION	The man places his penis inside the woman's vagina (sexual intercourse)
EJACULATION	The penis releases sperm cells into the vagina of the woman
OVULATION	Once a month, an egg cell is released into the woman's fallopian tubes
FERTILISATION	One sperm cell fuses with an egg cell
MENSTRUATION	The lining of the uterus is released through the vagina, if fertilisation has not taken place.
CELL DIVISION	The fertilised egg divides to form more cells.
GROWTH	Cell division continues, more and more cells are formed.
IMPLANTATION	The fertilised egg moves down the tubes and attaches itself to the lining of the uterus.
MATURATION	The baby is born after 40 weeks, it grows and develops into an adult.
PUBERTY	This is the stage in the life cycle when the sexual organs mature for reproduction The changes that occur during puberty are caused by two **hormones** 1) testosterone in boys 2) oestrogen in girls

ACTIVITY

Complete Activity 2 on pg.37 in your notebooks
The answers to the questions can be found on pg.36 - 37

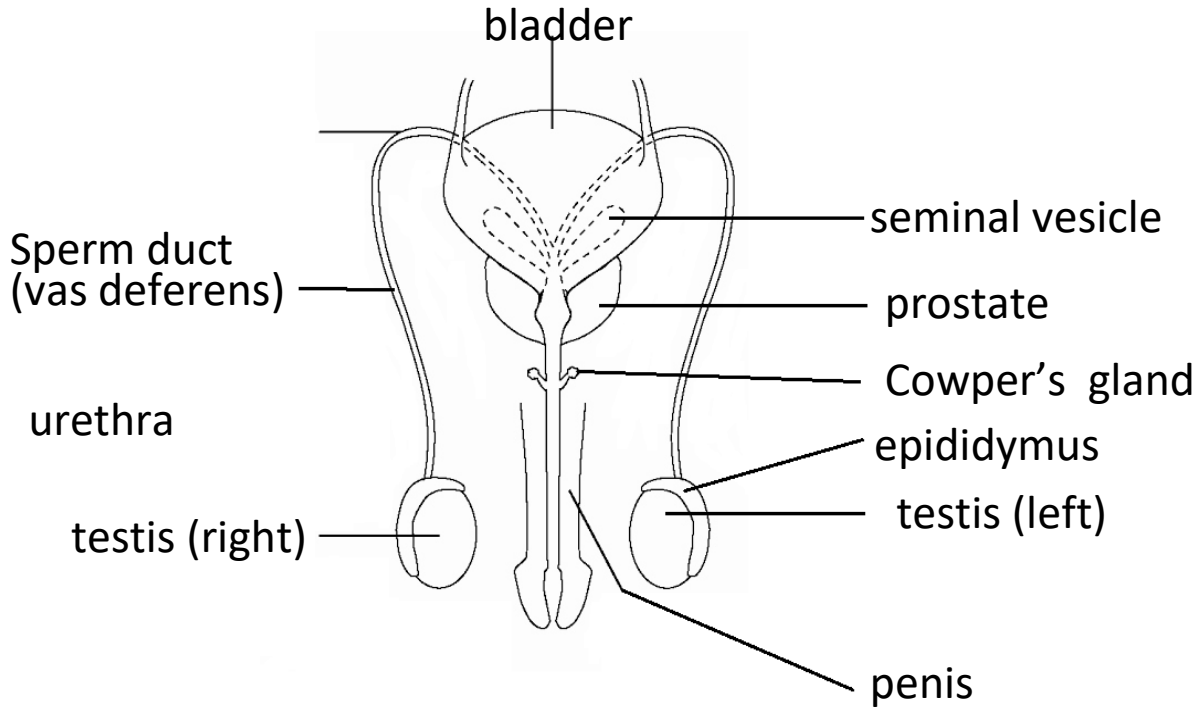
ACTIVITY

Using your textbook page 39 figures 8 and 9 outline the changes that occur in
1) a boy's body during puberty
2) a girl's body during puberty

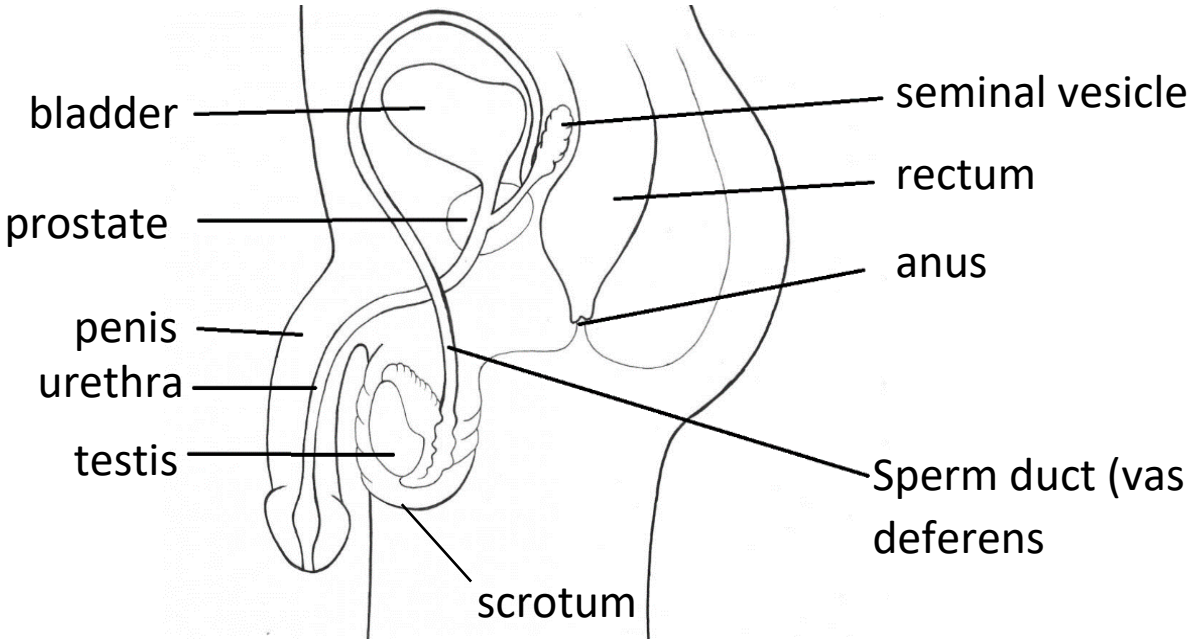
MALE REPRODUCTIVE SYSTEM – PARTS AND FUNCTIONS

BLADDER	Stores urine
PROSTATE GLANDS AND VESICLES	Prostate gland, Cowper's gland and seminal vesicle: • secrete seminal fluid for nutrition for the sperm • that is alkaline to neutralise the acid from the female vagina • and it increases the movement of the sperm
URETHRA	Carries: • urine from the bladder to the outside • semen out of the body
SPERM DUCT (VAS DEFERENS)	Pushes semen out of the body through muscular contractions.
EPIDIDYMIS	Final maturation of sperm occurs here. Stores sperm.
TESTES	Produces: • sperm in seminiferous tubules. • testosterone
SCROTUM	Protects the testes
DIAGRAM OF SPERM	Draw the diagram on page 37 figure 5 – sperm cell

MALE REPRODUCTIVE SYSTEM DIAGRAM (FRONT VIEW)
Use page 40 – figure 10 to provide the labels



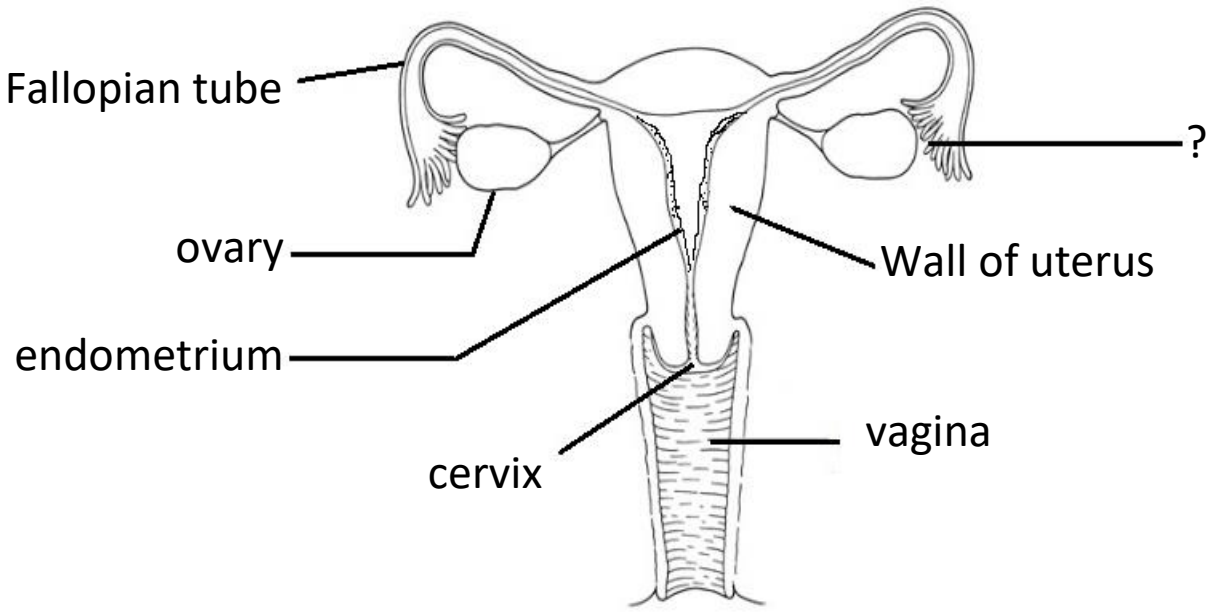
MALE REPRODUCTIVE SYSTEM DIAGRAM (SIDE VIEW)
Label the diagram below



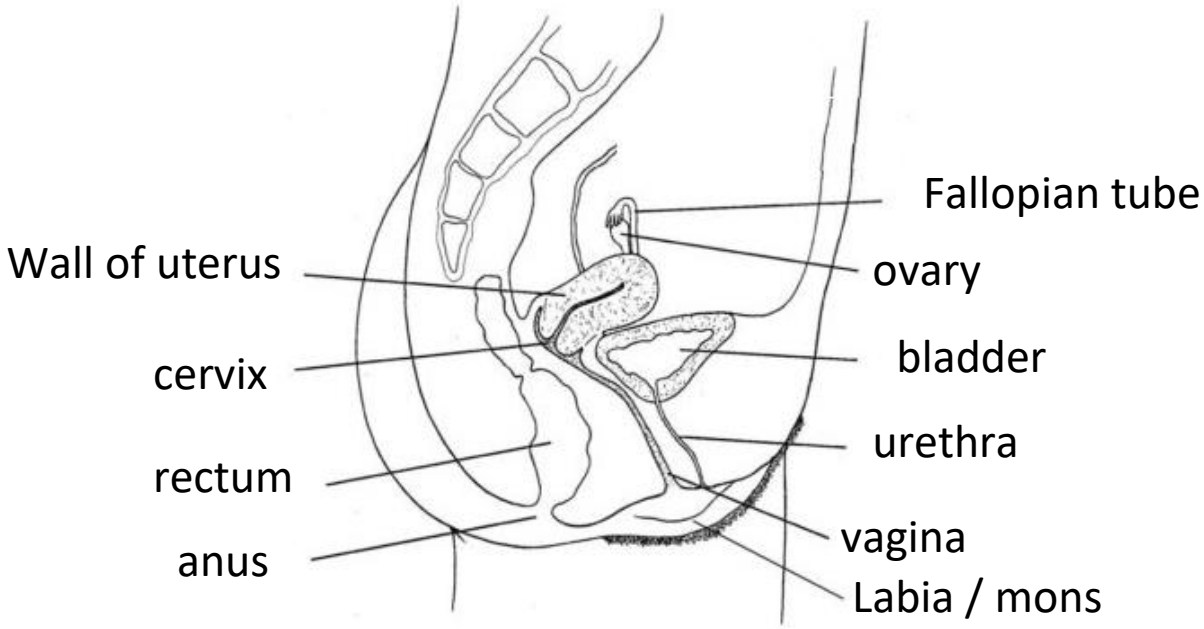
FEMALE REPRODUCTIVE SYSTEM – PARTS AND FUNCTIONS

FALLOPIAN TUBE	Carries egg towards the uterus This is where **fertilisation** occurs (important)
OVARY	Produces: • The egg • Hormones (oestrogen + progesterone).
UTERUS	Baby develops in the uterus.
ENDOMETRIUM	Lining of the uterus. It is the landing ground of the fertilised egg (blastocyst). The endometrium is lost during menstruation.
CERVIX	Opening of the uterus It needs to dilate (open) in order for the baby to be delivered
VAGINA	Birth canal. This is where sperm is deposited during intercourse. (copulation)
EGG CELL DIAGRAM	Draw the diagram on page 37 figure 6 – egg cell

FEMALE REPRODUCTIVE SYSTEM DIAGRAM (SIDE VIEW)
Use page 42 – figure 13 to provide the labels



FEMALE REPRODUCTIVE SYSTEM DIAGRAM (SIDE VIEW)
Label the diagram below



STAGES OF REPRODUCTION

OVULATION

- Females are born with approximately 2 million immature ova.
- Once puberty takes place, an egg grows in one of the ovaries each month.
- This egg is then released into the fallopian tube where fertilisation usually takes place.
- Women are most likely to become pregnant while they are ovulating

MENSTRUATION

- While the egg is developing in the ovary, the soft lining in the uterus grows thicker.
- This lining will remain thick for about a week in case fertilisation occurs.

- If it does not occur, the lining passes out of the body through the vagina during a process called menstruation.
- The menstrual cycle lasts for 28 days (on average).

MENSTRUATION HAS 3 STAGES	
STAGE 1: MENSTRUATION	▪ The lining of the uterus (called the **endometrium**) is needed for an unborn baby to survive. ▪ If a woman falls pregnant (**if fertilisation occurs**) then the endometrium remains intact. ▪ However **if fertilisation does not** take place then the endometrium comes away from the uterus and leaves the body through the vagina. ▪ This is accompanied by bleeding. ▪ The first day of menstruation is considered **Day 1** of the menstrual cycle.
STAGE 2: OVULATION	▪ Menstruation ends by Day 7 ▪ During this period (Day 1 to Day 7) an egg develops in a follicle in the ovary. ▪ This egg is released from the ovary on **day 14**. ▪ The release of the egg from the ovary is called **ovulation.**
STAGE 3: MOVEMENT OF THE EGG ALONG THE FALLOPIAN TUBE	▪ The egg that is released during ovulation travel down the fallopian tube towards the uterus

STAGES OF REPRODUCTION CONTINUED

COPULATION

- Copulation refers to sexual intercourse.
- The penis becomes erect and is placed inside the vagina.
- Sperm made in the testes enters the vagina.

FERTILISATION

- **Important: Fertilisation occurs in the fallopian tube**
- The penis deposits sperm into the vagina.
- The sperm swims up the uterus and into the fallopian tube.
- Most sperm do not survive the journey.
- If there is an egg in the oviduct the sperm may fuse with the egg resulting in a zygote.

IMPLANTATION

- The **zygote** grows and forms a ball of cells.
- It moves from the fallopian to the uterus where it implants itself into the uterine lining.
- It is now called an **embryo.**

PREGNANCY

- The embryo grows and for the last 7 months of pregnancy it is called a **foetus**.
- The pregnancy period is often referred to as **gestation** and lasts for about **40 weeks.**
- After 40 weeks the baby will be born.

CONTRACEPTION = means to prevent fertilisation
(Also called birth control)

CONDOM

- Is a rubber sheath rolled onto the penis BEFORE intercourse
- To act as a barrier to stop sperm entering the female vagina
- Also prevents mixing of fluids → e.g. for people with STI's – sexually transmitted infections (i.e. HIV)

HEALTH ISSUES

See page 33 and find the definitions for the following

INFERTILITY	
FOETAL ALCOHOL SYNDROME	
STDs	

COMPULSORY ACTIVITIES

Complete Activity 2 page 37 numbers 1 and 2

Complete Activity 3 page 39 numbers 1, 2 and 3

Complete Activity 5 page 41 numbers 1, 2, 3 and 4

Complete activity 7 page 45 numbers 1, 2 and 3