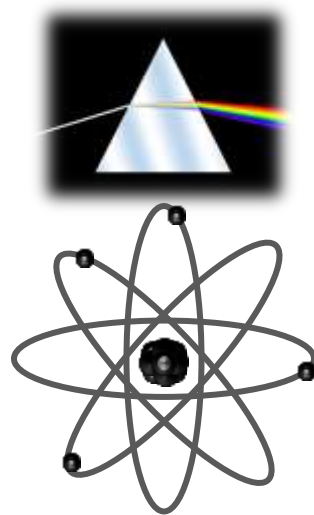




Biology



MANDATORY KEY AREA 1.

- CELLS, TISSUES AND ORGANS.



Cells, Tissues and Organs

LEARNING OUTCOMES:

- To identify some of the specialised cells found in the bodies of multicellular animals and plants
- To demonstrate that this specialisation of cells leads to the formation of a variety of tissues and organs in the body of the organism
- To understand that the structure of a cell is related to its function
- To understand that cell specialisation makes the cell more efficient at performing that function

What to do:

COPY the note on Cells, Tissues and Organs into your jotter.
LOOK at the diagrams at the bottom of the page. Are they tissues or organs?



Human Body Tissues and Organs

- **In pairs:**
Write down the names of some tissues and organs found in the human body.

Human Body Tissues

Muscle tissue

Nerve tissue

Bone tissue

Epidermal tissue

Blood tissue

Epithelial tissue

Human Body Organs

Eye

Ear

Heart

Brain

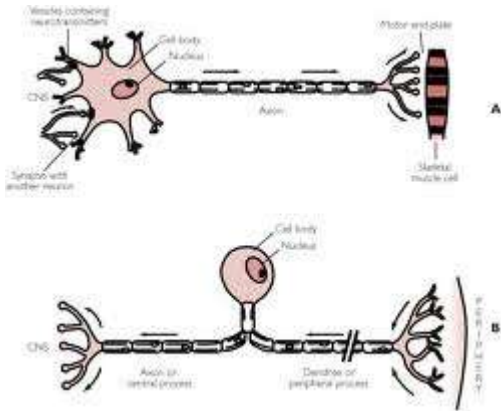
Skin

Gall Bladder

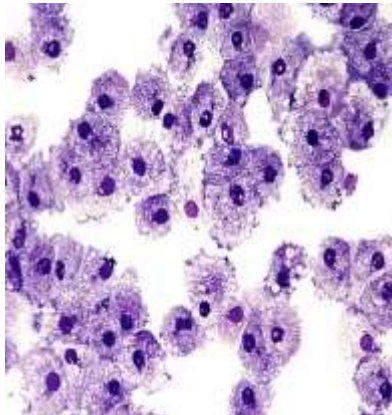
http://www.bbc.co.uk/science/humanbody/body/factfiles/organs_anatomy.shtml



Animal Tissues



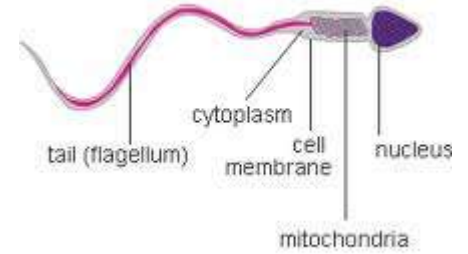
Nerve Cells



White Blood Cells



Red Blood cells



Sperm cell



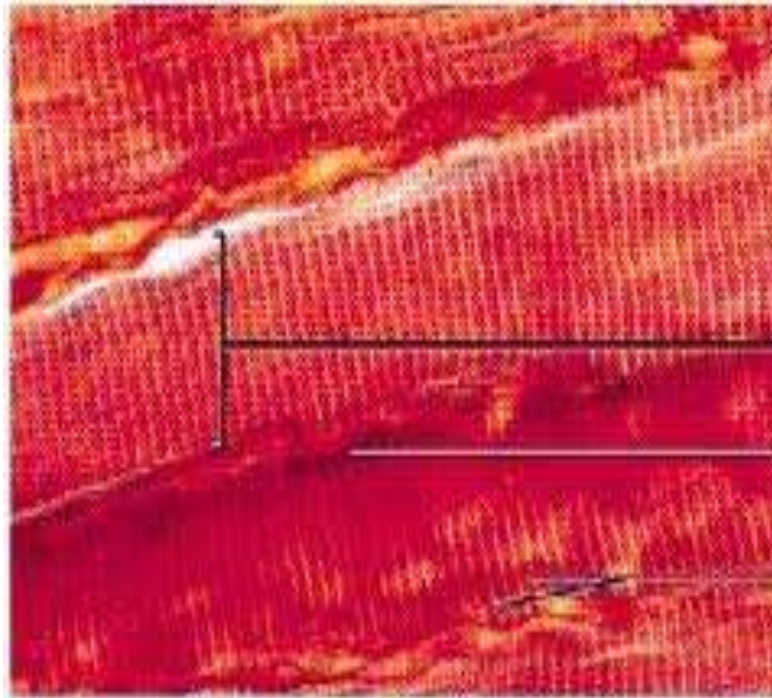
Animal Cell Types

- **Nerve Cells** - have long fibres for the transmission of nerve impulses
- **Red Blood Cells** - have a biconcave shape to present a large surface area for the uptake and transport of oxygen
- **White Blood Cells** - are able to change shape or produce antibodies to destroy invading pathogens such as bacteria
- **Sperm Cells** - have a tail (flagellum) so that they can swim towards the egg



Practical Work

- Look at some prepared slides of animal tissues under the microscope or using a BIOVIEWER
- Look at some muscle tissue under the microscope by squashing a thin piece of muscle between two slides



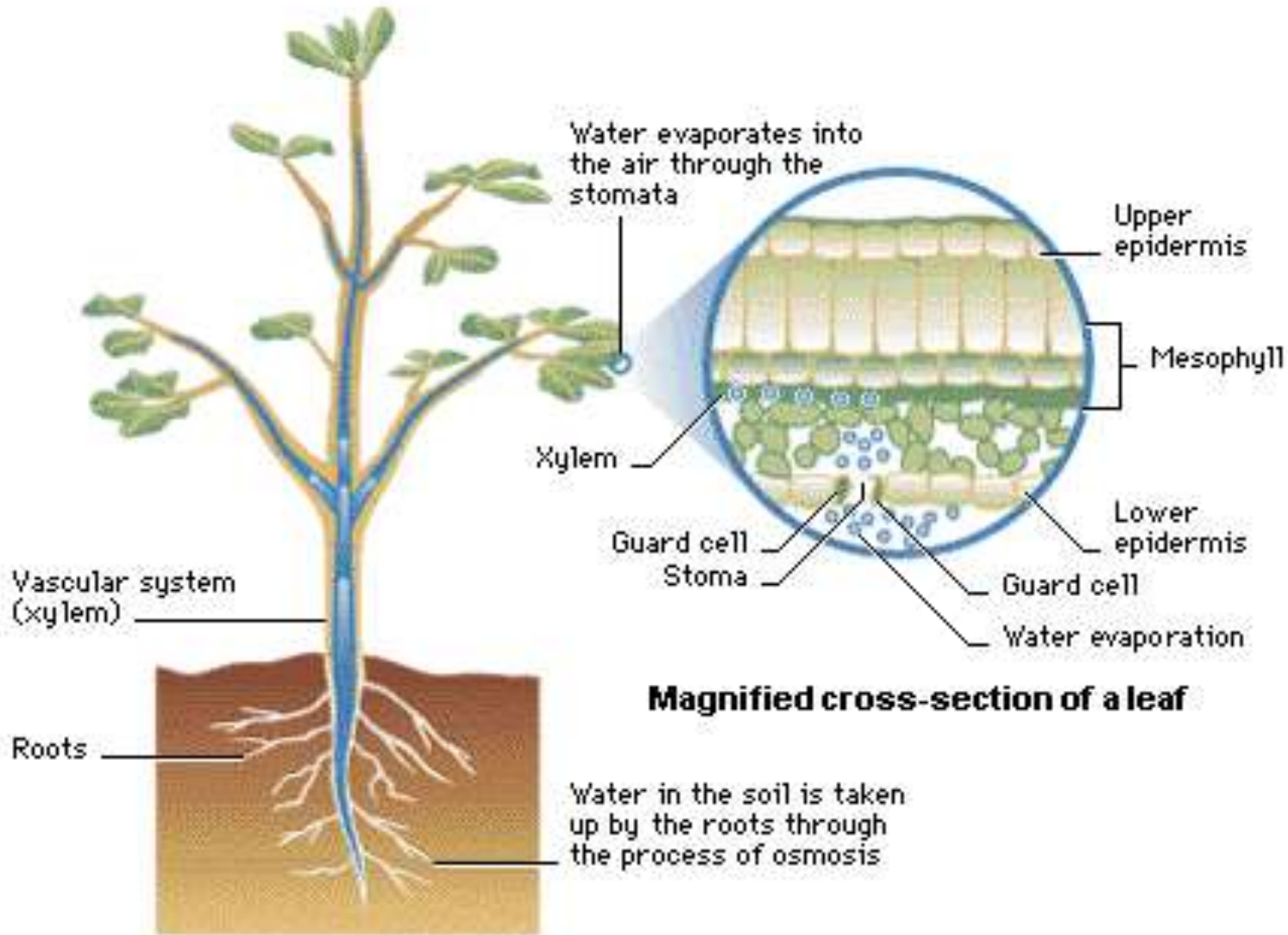
Muscle Fibre

Nucleus

Striations



Plant cells, Tissues and Organs



Plant Cells Tissues and Organs

- **In your group:**
Discuss the structure of a plant.
Write down the names of some organs found in the plant's body.

PLANT TISSUES

Epidermal tissue

Xylem

Phloem

Mesophyll

PLANT ORGANS

ROOT

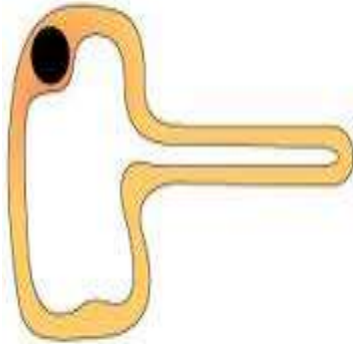
STEM

LEAF

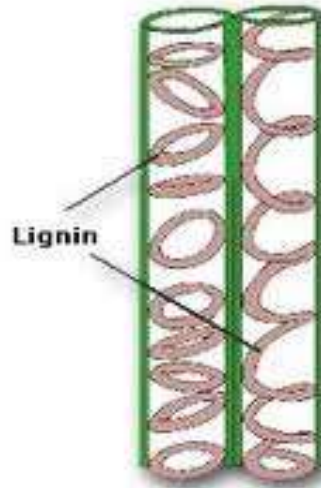
FLOWER



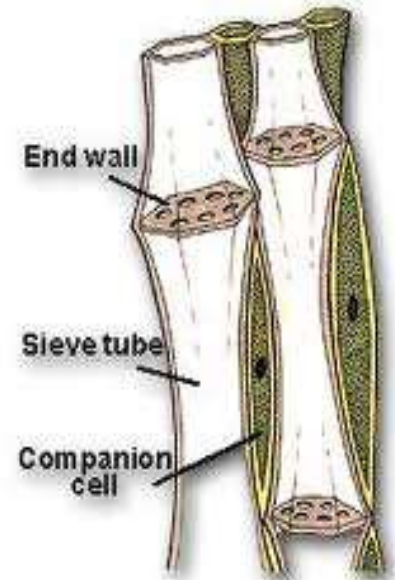
PLANT TISSUES



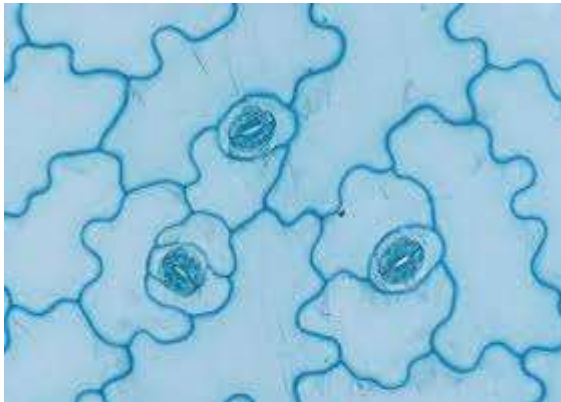
Root Hair Cell



Xylem Vessels



Phloem

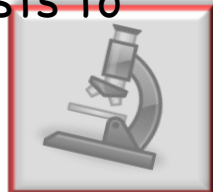


Lower Leaf Epidermis



PLANT TISSUES

- **Root Hair Cells** - have a long extension to present a large surface area to absorb water and mineral salts from the soil
- **Xylem Vessels** - are hollow tubes with walls strengthened by lignin to transport water and give support
- **Phloem:**
 - **Sieve Tube Cells** - have sieve plates and cytoplasmic strands to transport food
 - **Companion Cells** - have a large nucleus to control the transport of food in the sieve tube cells
- **Lower Leaf Epidermal Cells** - have an irregular shape so the cells can fit together to form a protective layer
- **Guard Cells** - are "sausage- shaped" and contain chloroplasts to control the opening and closing of the stomata



PRACTICAL WORK

- View prepared slides of plant tissues under the microscope, or using a bioviewer
- Make a leaf print of leaf lower epidermis cells using nail varnish

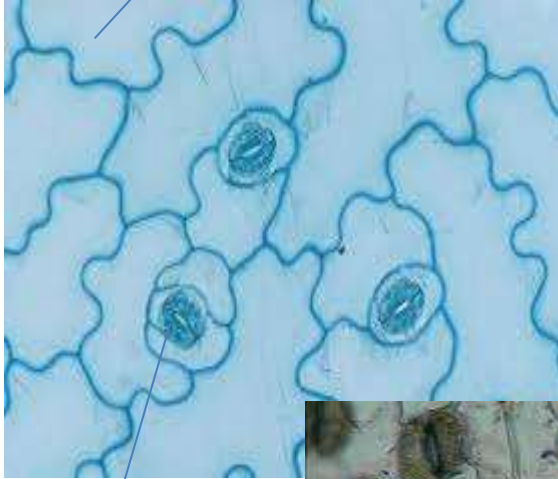
Procedure:

- Paint a thin layer of nail varnish over a small part of the lower side of a leaf and let it dry
- Press a piece of sellotape over the varnished area and pull it off
- The varnish will have formed a print of the leaf cells
- Stick the sellotape on to a microscope slide and view it under the microscope at low and high power
- Draw what you see

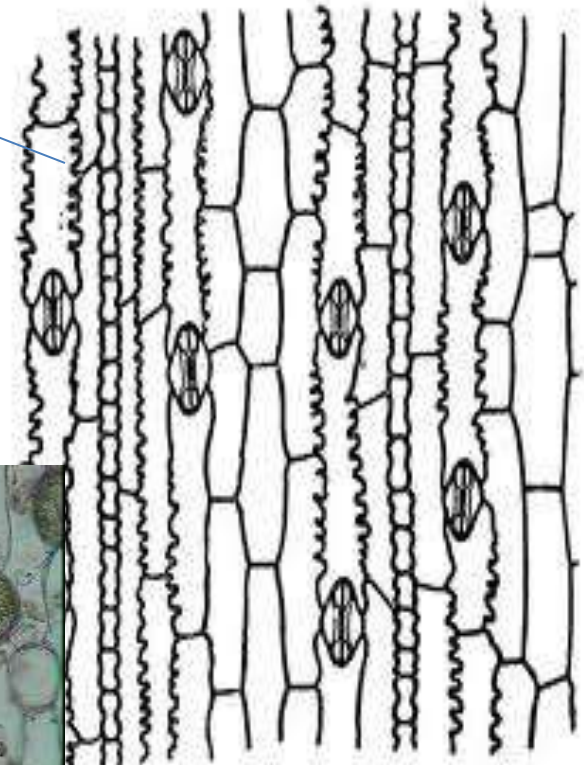


LEAF LOWER EPIDERMIS

Epidermal cells



STOMA



Success Criteria

- I can identify some of the specialised cells found in the body of a multicellular animal
- I can identify some of the specialised cells found in the body of a multicellular plant
- I can explain how the structure of these cells relate to their function
- I understand that this specialisation allows each type of cell to carry out its function more efficiently



MANDATORY KEY AREA 2.

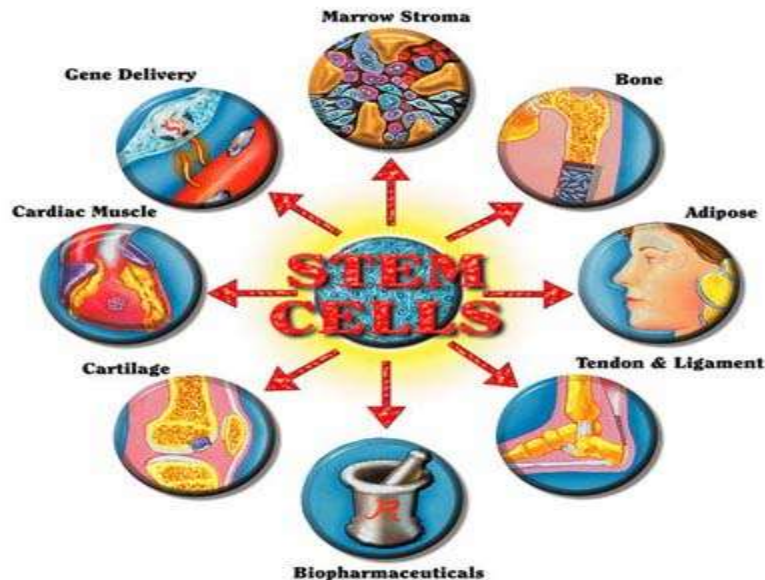
- STEM CELLS AND MERISTEMS



STEM CELLS

LEARNING OUTCOMES:

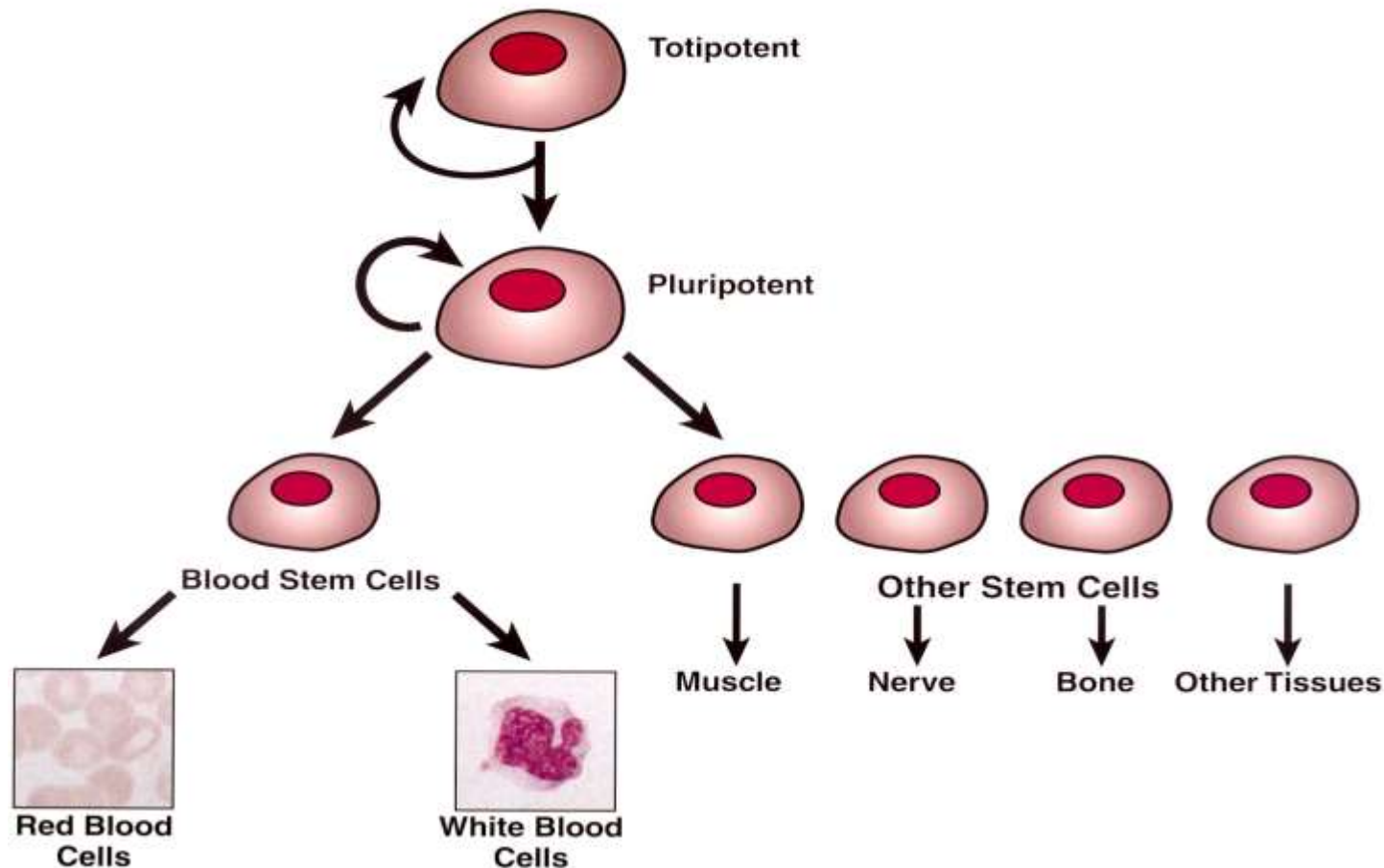
- To understand that stem cells are animal cells that have the potential to become different types of cell
- To understand that stem cells are involved in the growth and repair
- To investigate the potential uses and ethical issues of stem cells



TISSUE STEM CELLS

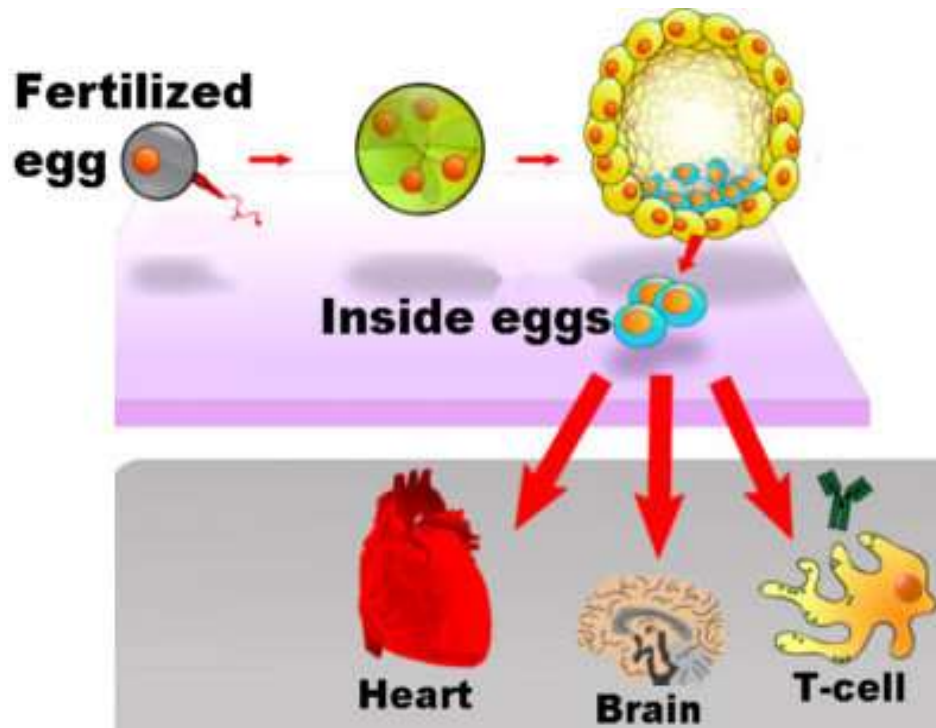
- Stem cells are unspecialized animal cells that have the potential to become different types of cell in the animal's body.
- They are involved in the growth and repair.

Hierarchy of Stem Cells



EMBRYONIC STEM CELLS

- Stem cells are also present in human embryo tissue.
- Researchers have been able to isolate these cells from human embryos.
- The embryonic cells are destroyed after use.
- Some see this as unethical.



http://www.youtube.com/watch?v=2-3J6JGN-Y&feature=player_detailpage



Uses of Stem Cells

- Stem cells are being used to:
 1. treat diseases such as Alzheimer's;
 2. repair damaged tissues;
 3. replace damaged organs.



Ethical issues

- For - Researchers believe stem cells offer great promise for new medical treatments.
- Against - The stem cells used for these treatments are likely to come from embryos this is unethical as they are destroyed after use.



STEM CELLS

Success criteria:

- I can explain what a stem cell is
- I can identify some of the sites in an animal's body where stem cells are made
- I understand that stem cells are involved in growth and repair of body tissues and organs
- I can identify some of the different types of cell that stem cells can become
- I can name some of the diseases which could be cured by the use of stem cells
- I can discuss some of the ethical issues associated with the use of stem cells in medical research



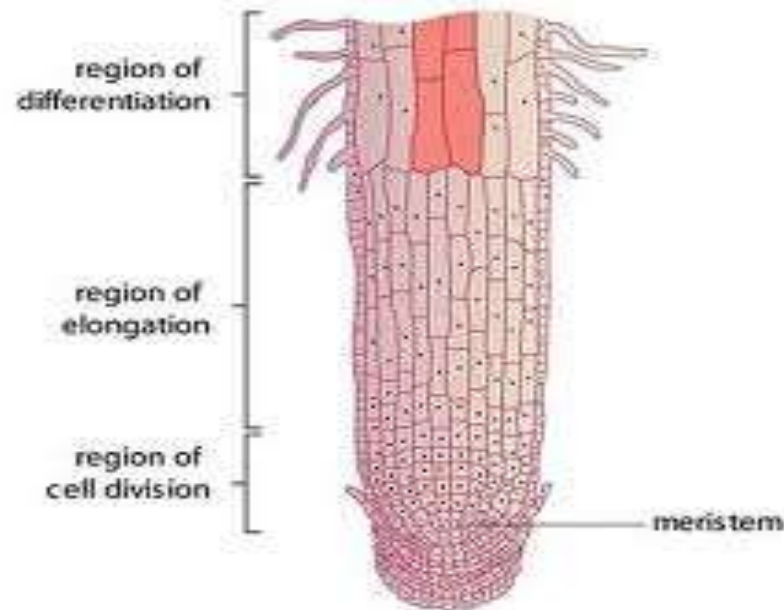
MERISTEMS

LEARNING OUTCOMES:

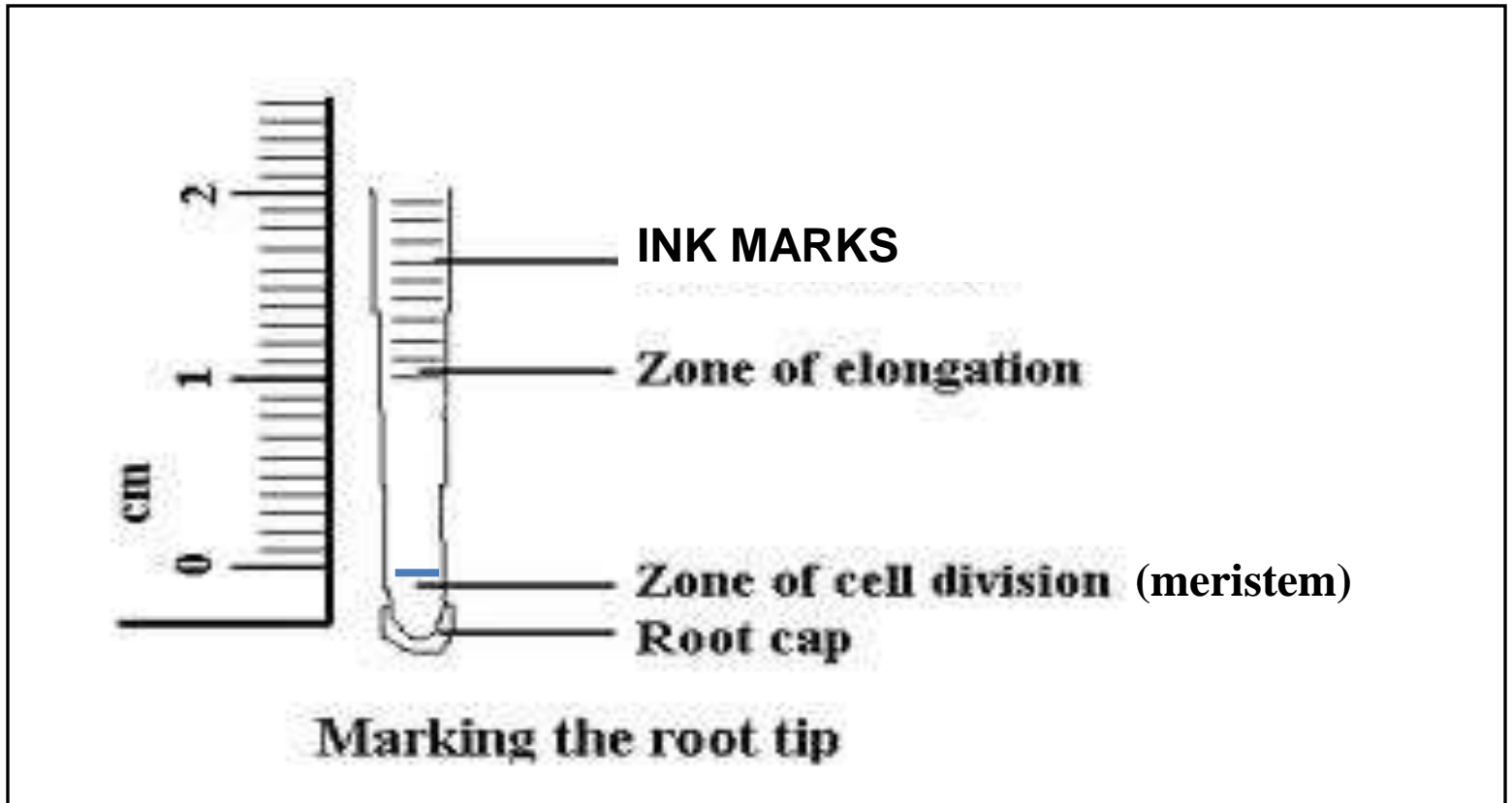
- To understand that in plants growth by cell division only occurs at special sites called MERISTEMS
- These are found in the ROOT TIP and SHOOT TIP of the plant
- These unspecialised cells have the potential to become any type of plant cell.



- **MERISTEMS** are the only areas in a plant where cell division can take place.
- The new cells produced in the meristem can then increase in length to contribute to plant growth - the root and shoot elongate and get longer
- These cells then become specialized into the permanent plant tissues - xylem, phloem, root hair cells.



ZONE of ELONGATION



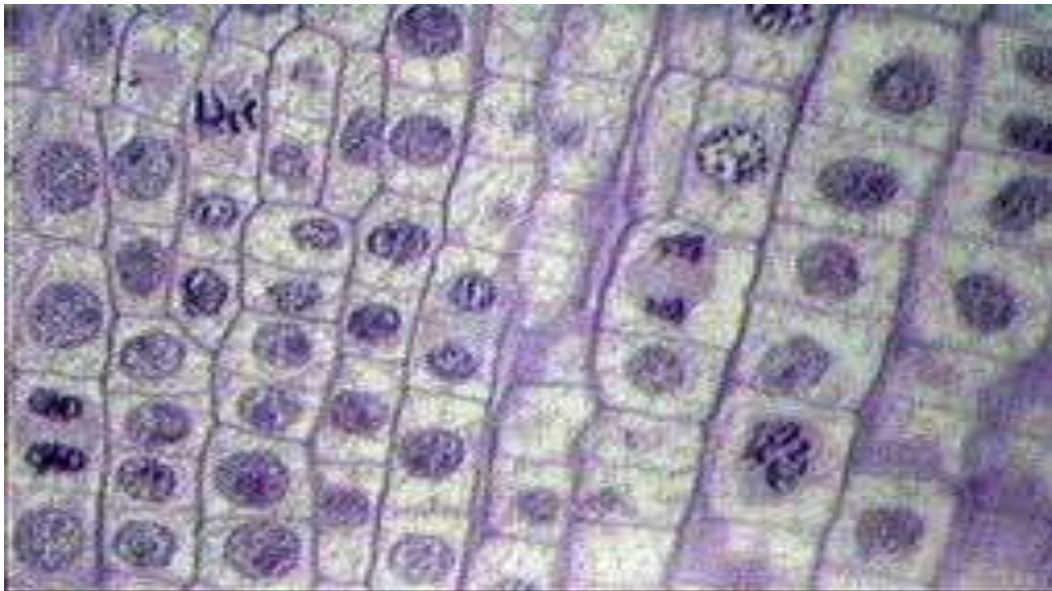
The section of the root where the marks are now more than 2mm apart show where **GROWTH** has taken place.



If time allows - EXPERIMENT 2

AIM: To show that the root tip contains a meristem where new cells are produced

Carry out the experiment and then write up an **EXPERIMENTAL REPORT** - *Title, Aim, Method, Results, Conclusion, Evaluation of Procedures*



- Now complete the **PROBLEM SOLVING EXERCISE**
 - Page 16 and 17 pupil booklet



MERISTEMS

Success Criteria:

- I can explain what a meristem is.
- I can identify sites in the plant's body where meristems are found.
- I know that the non-specialised cells produced in the meristem can become specialised into any type of plant cell.
- I understand that the cells produced in the meristem contribute to the growth of the plant.

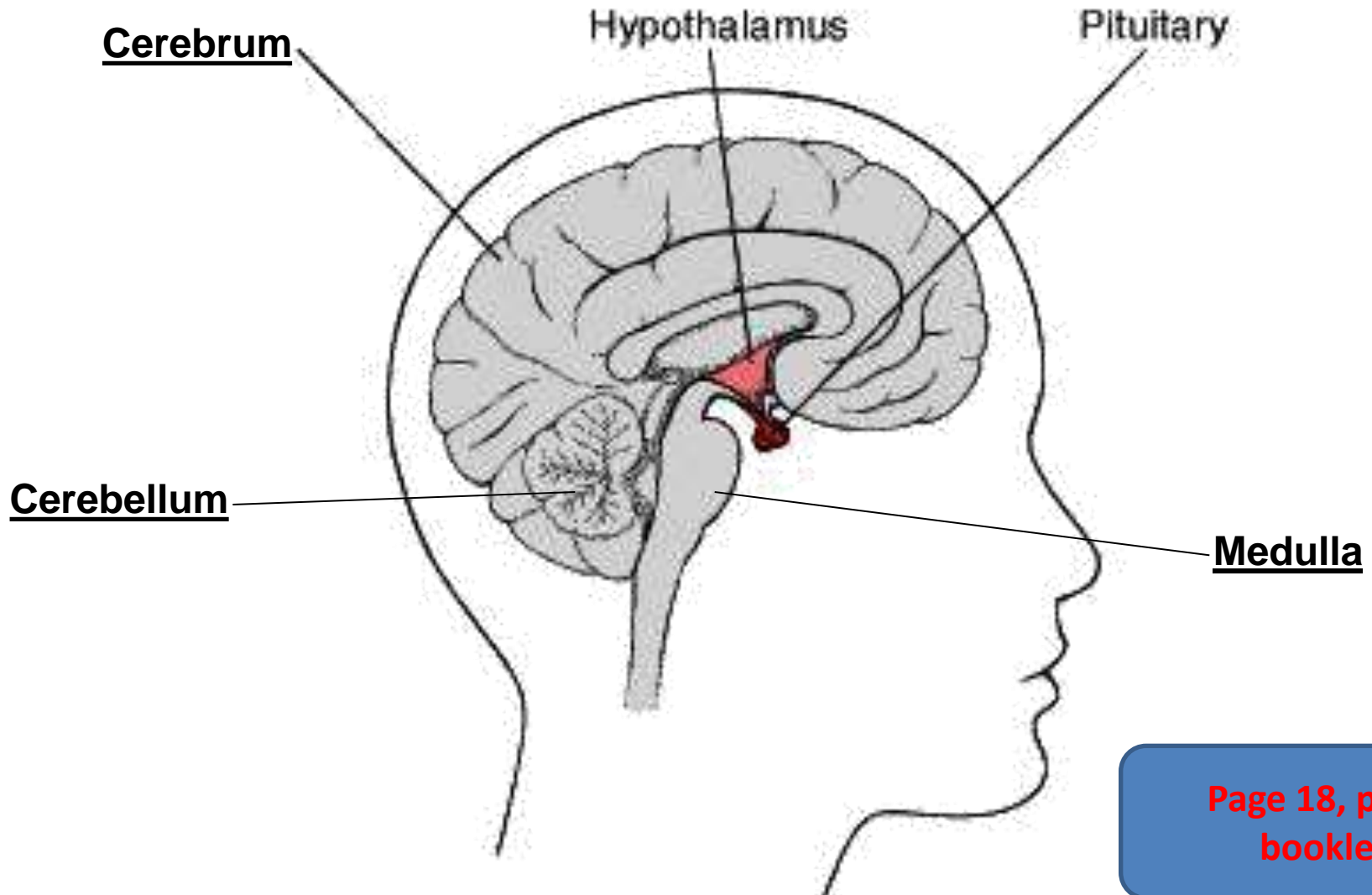


MANDATORY KEY AREA 3.

- CONTROL AND COMMUNICATION.
 - The brain and nervous system
 - Hormones
 - Hormones in Action - the control of blood sugar



1. Structure of the Brain



**Page 18, pupil
booklet**

THE FUNCTIONS OF THE PARTS OF THE BRAIN

Part	Function
Cerebrum	
Cerebellum	
Medulla	



The human nervous system

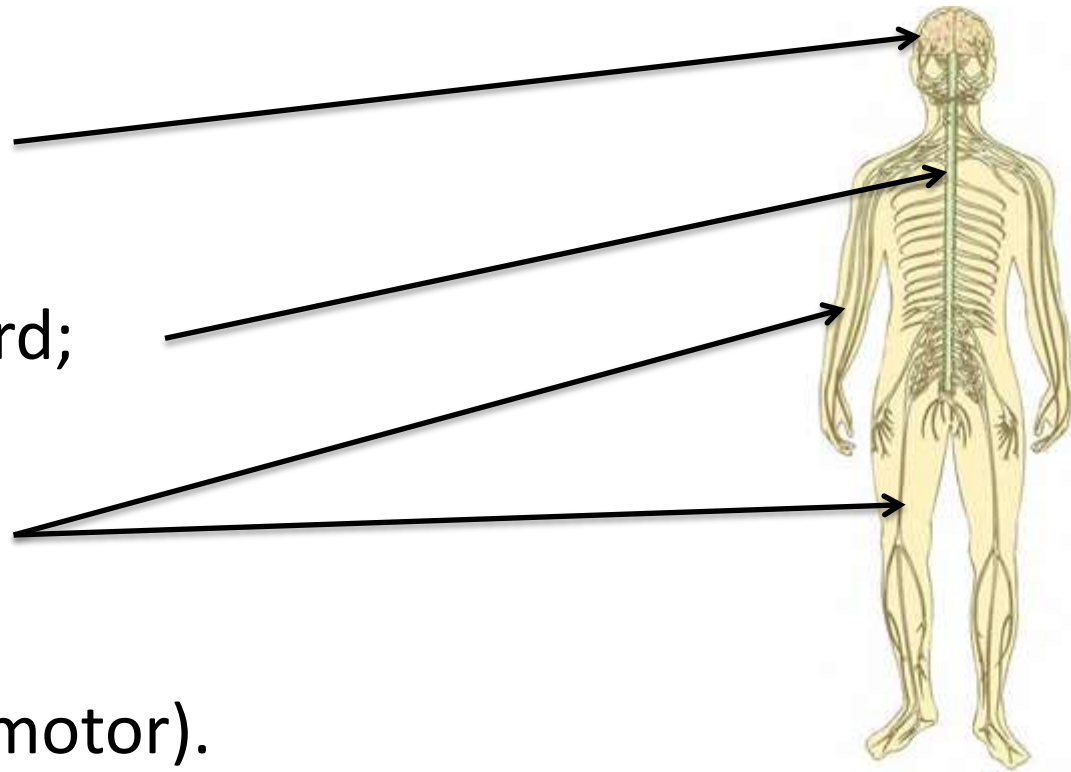
- Composed of 3 parts:

1. Brain;

2. Spinal cord;

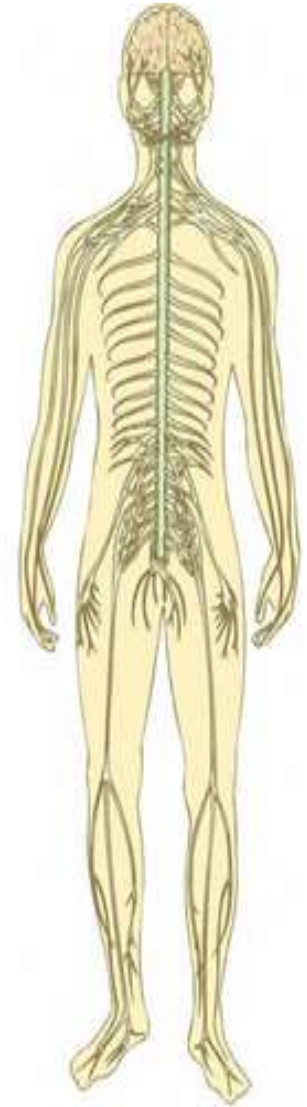
3. Nerves:

(sensory, motor).



Activity

- Collect Diagram
- Complete page 19 pupil booklet

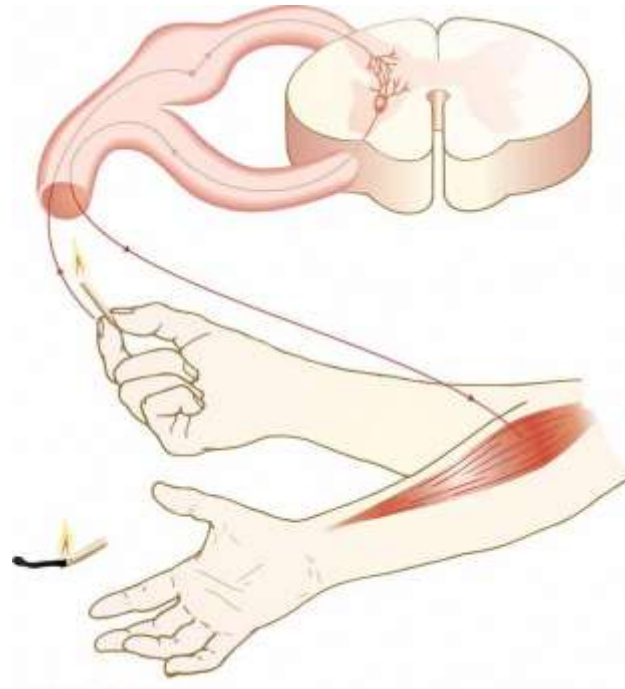
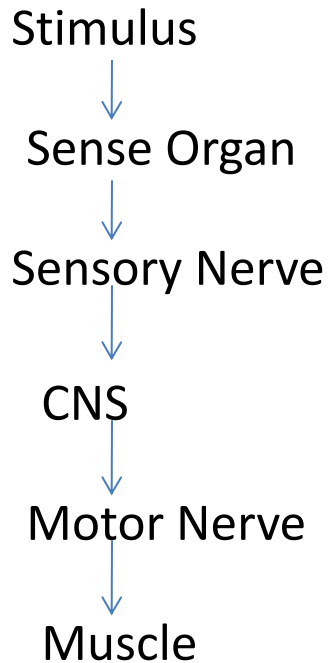


3

The flow of information through the nervous

By the end of this lesson you should be able to:

- To find out how information is passed through the nervous system



Page 21, pupil
booklet



3

The Nervous System and Reflex Actions

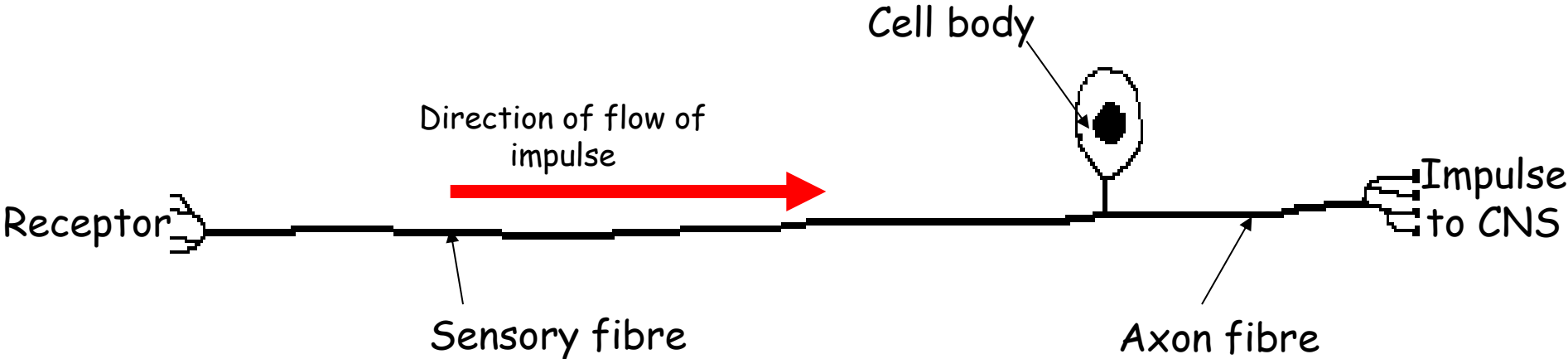
http://www.bbc.co.uk/bitesize/standard/biology/the_body_in_action/coordination/revision/4/



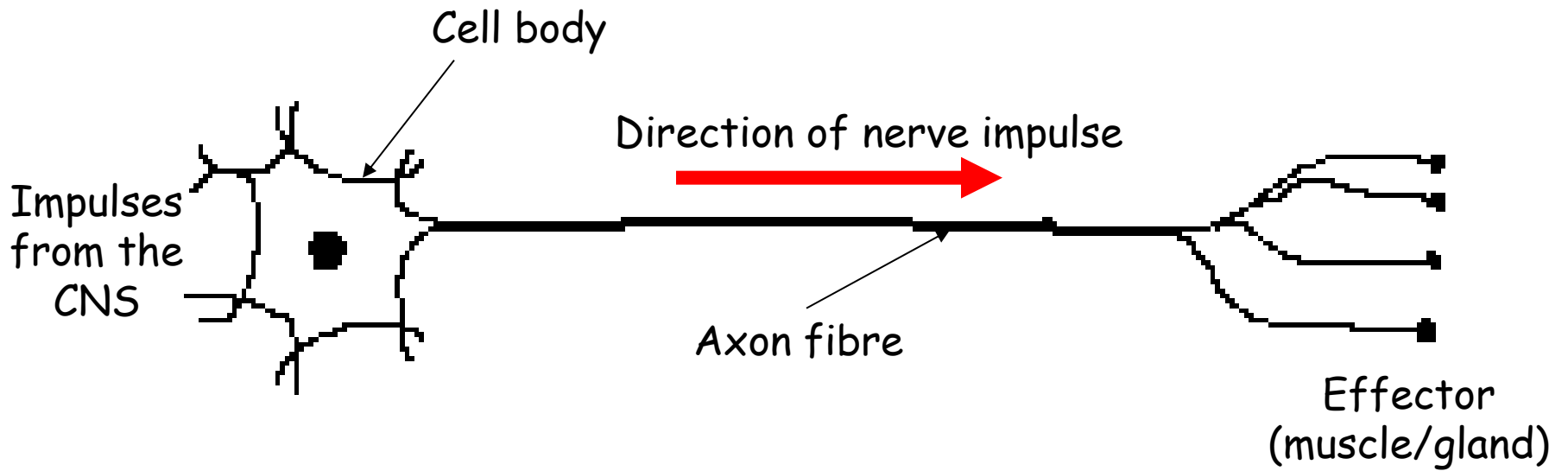
Nerves

- Impulses are brought to the brain by the **sensory nerves**.
- Impulses leave the brain in the **motor nerves**.
- NERVES are called neurones.
- They contain dendrites, a cell body and an axon.

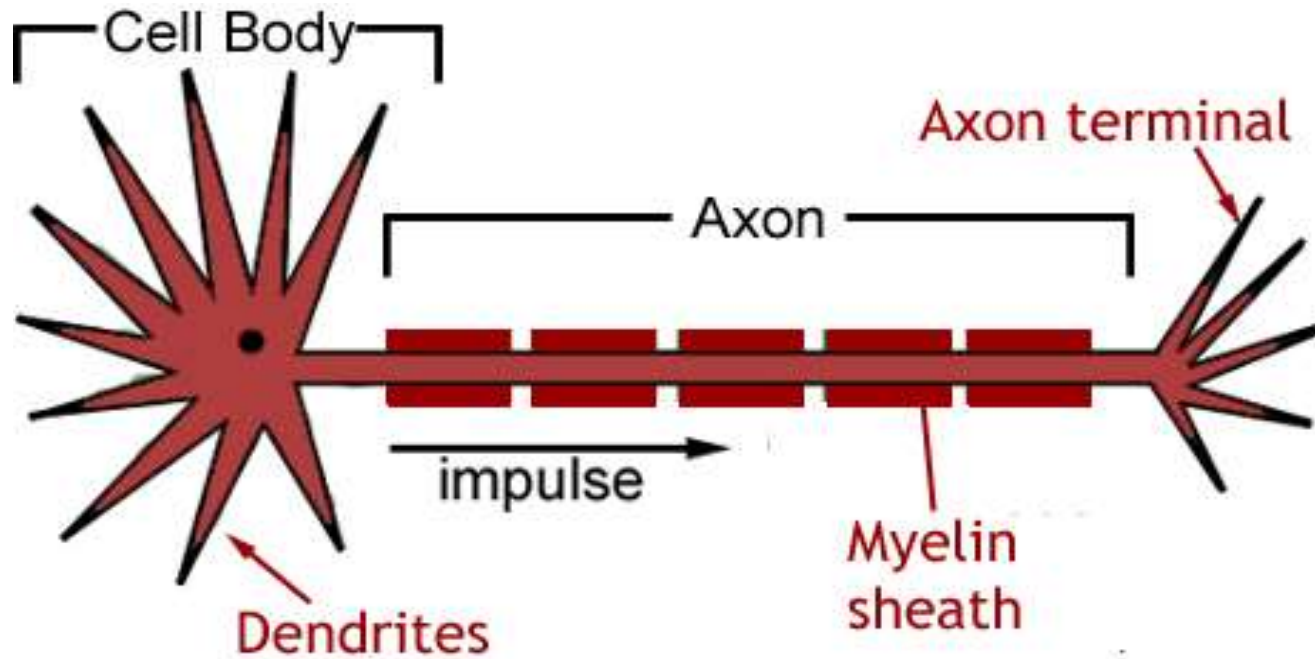
Sensory Nerve



Motor Nerve



Copy



Synapses and Neurotransmitters

- When the nerve impulse reached the end of an axon it has to cross a gap called a synapse, to reach the next neurone.
- To do this the axon releases a chemical called a neurotransmitter which crosses the gap and triggers a response in the next neuron in the chain.
- This can be seen in the short animation
- <https://www.youtube.com/watch?v=YwN9aCobCy8>



What is a hormone? "Hormones" are important chemical messengers in the body that effectively transfer signals and instructions from one set of cells to another.

What is endocrinology? "Endocrinology" is traditionally defined as the branch of biological science that concerns itself with the actions of hormones and the organs in which hormones are formed. A doctor who specializes in the function of hormones is called an "endocrinologist."

Where do hormones come from and what do they do? Hormones are secreted (usually into the bloodstream) by a collection of glands inside the body referred to as the "endocrine system." (A "gland" is a group of cells that produces and secretes chemicals into the body.) The major glands that make up the endocrine system include the hypothalamus, the pituitary gland, the thyroid and parathyroids, the adrenals, the pineal body, and the ovaries and testes (the "gonads").



Over fifty different hormones have been identified in the bodies of humans, and more are still being discovered. Hormones influence and regulate practically every cell, tissue, organ, and function of our bodies, including growth, development, metabolism, maintenance/balance of our internal environment ("homeostasis"), and sexual and reproductive function.



How do hormones cause their effects? Most hormones circulate via the blood, thus coming into contact with all kinds of cells throughout the body. However, a given hormone usually affects only a limited number of cells, which are called "target cells" for that hormone. A target cell responds to a hormone because it bears "receptors" for that hormone. Hormones, like all molecules, have a specific molecular shape, and thus will fit into certain receptors but not others.



How are hormones regulated in the body? The production of hormones in the body is almost always regulated by a delicate set of feedback relationships, or "feedback loops." Most (but not all) hormone secretion is governed by "negative" feedback loops, wherein the amount of a substance in a system regulates its own concentration. When concentration of a hormone rises to above desired levels, a series of steps is taken within the system to cause the concentration to fall. Conversely, steps are taken to increase concentration when the level is too low.



- <http://www.ftmguide.org/hormonebasics.htm>
|

Hormones in action – control of blood

sugar

Blood sugar
increases

Sugar
eaten

Between
meals

Blood sugar
decreases

Blood sugar in
blood normal

Glucagon
(hormone)
produced
in
pancreas

Insulin
(hormone)
produced in
pancreas

Moves to liver and
helps convert glucose
to glycogen.

Moves to liver and
helps convert
glycogen to
glucose.

Insulin and glucagon are two hormones produced in the pancreas which help to control blood sugar levels.

Do you know what illness someone has if they have sugar in their urine?

Diabetes.

There are two types of diabetes: Type 1 and Type 2.

Watch the following video clip which explains the differences between the two and gives some additional information.

<http://www.youtube.com/watch?v=WPvgmWOYft4>



Your task is to produce a leaflet which includes the following information:

The difference between type 1 and type 2 diabetes.

Statistical information showing the number of people in Scotland who suffer from each type.

What the symptoms are.

How doctors know if you have it.

What can happen to people if they do not control their diabetes.

Advice on ways in which people can control their diabetes.

Acknowledge the sources where you got your information from.



The following websites may help but feel free to use your own.

<http://www.cyh.com/HealthTopics/HealthTopicDetailsKids.aspx?p=335&np=285&id=1722>

<http://www.aboutkidshealth.ca/En/ResourceCentres/Diabetes/Pages/default.aspx>

http://www.diabetes.org.uk/About_us/News_Landing_Page/The-number-of-patients-diagnosed-with-diabetes-in-Scotland-continues-to-grow/

<http://www.diabetesinscotland.org.uk/>



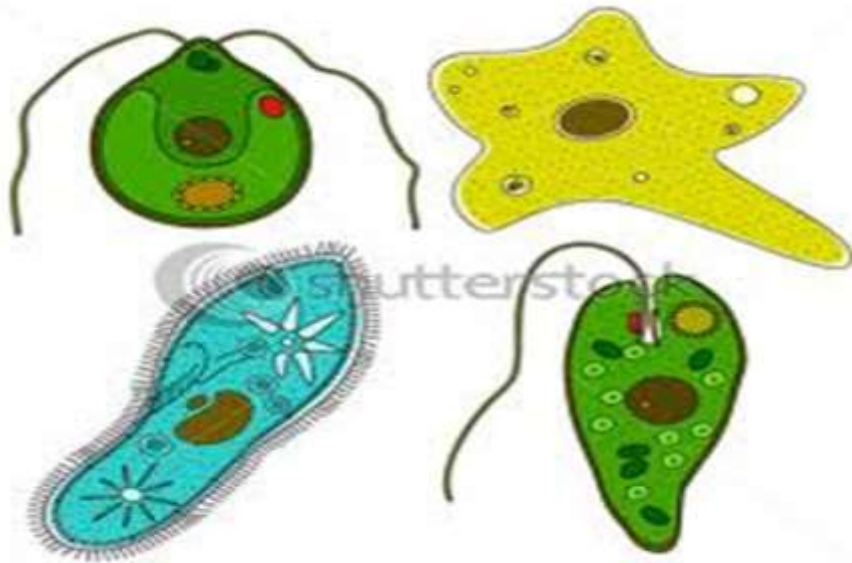
MANDATORY KEY AREA 6.

- THE NEED FOR TRANSPORT



By the end of today's lesson you should be able:

- To understand why animals and plants have transport systems
- In order to make energy for growth, repair etc, animals and plants need food and oxygen to enter their cells and need waste products to be removed.



www.shutterstock.com - 92432695

In unicellular organisms that have only one cell e.g Amoeba and Euglena, these substances enter and leave the cell by the processes of diffusion and osmosis.



The need for transport (continued)

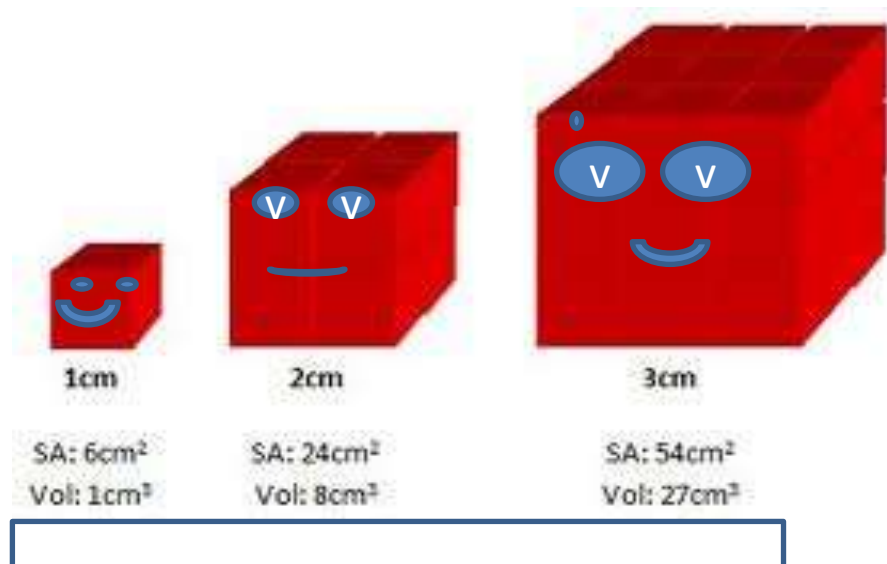
Multicellular organisms e.g. man, contain millions of cells and have a much bigger volume to the area of their surface and therefore substances such as food and oxygen are not able to diffuse directly into their bodies and water and waste out.

i.e. They have a small

surface area : volume ratio

<http://www.youtube.com/watch?v=xuG4ZZ1Gbzl>

Use the 'animals' below to calculate their surface area to volume ratios.



The need for transport (continued)

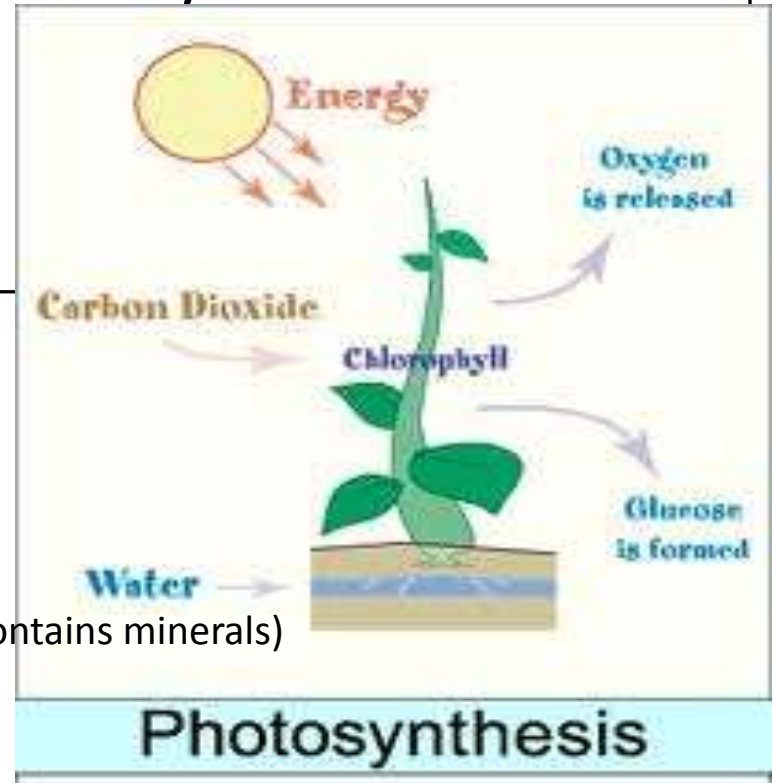
- You have now shown from your calculations that when an animal or plant increases in size that:

- **Their surface area to volume decreases.**
- This means that multicellular organisms require special transport systems so that substances such as oxygen and food can be distributed around all parts of the organism.



Plant transport systems

- Green plants produce food by photosynthesis.
- They need water and carbon dioxide for this process.



- Listen to your teacher explain.

Carbon dioxide + water → glucose + oxygen

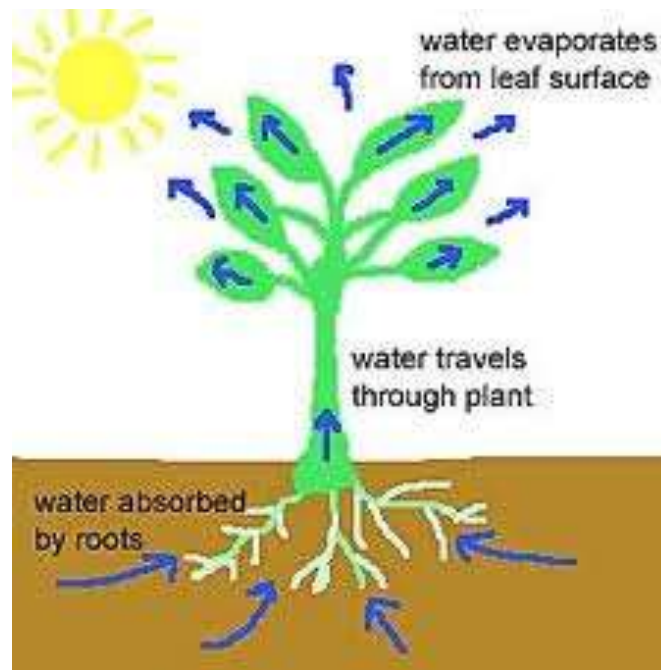
**(stored as starch in leaves
& used to make cellulose)**



Plant transport systems (contd)

Multicellular plants require a system to transport water and minerals to the leaves for photosynthesis as well as for transporting other substances around the plant.

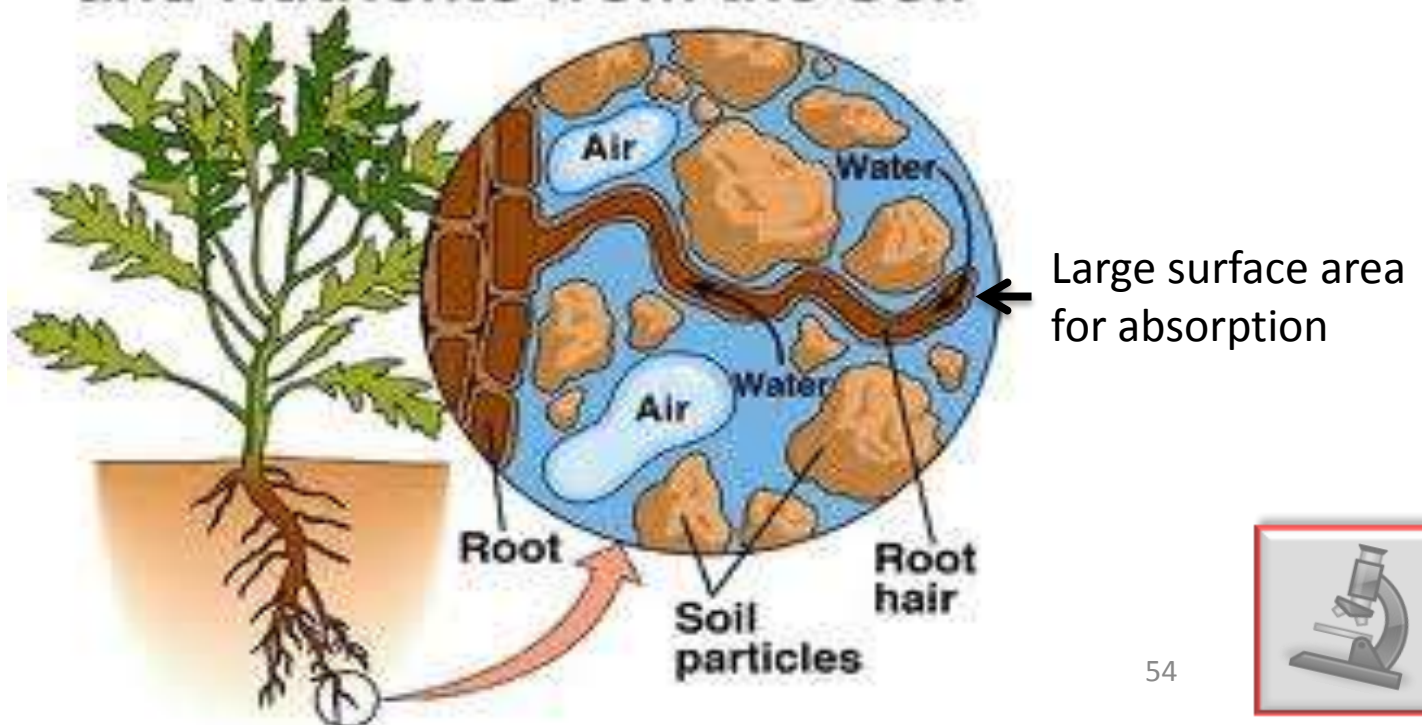
<http://www.youtube.com/watch?v=w6f2BiFiXiM>



Water transport - Roots

- A plant obtains water and nutrients from the soil.
- These enters a plant at the roots where special root hair cells increase the surface area of the root and increase water absorption.
- The water enters by osmosis, from a region of high water concentration in the soil to a region of low water concentration in the root cells.

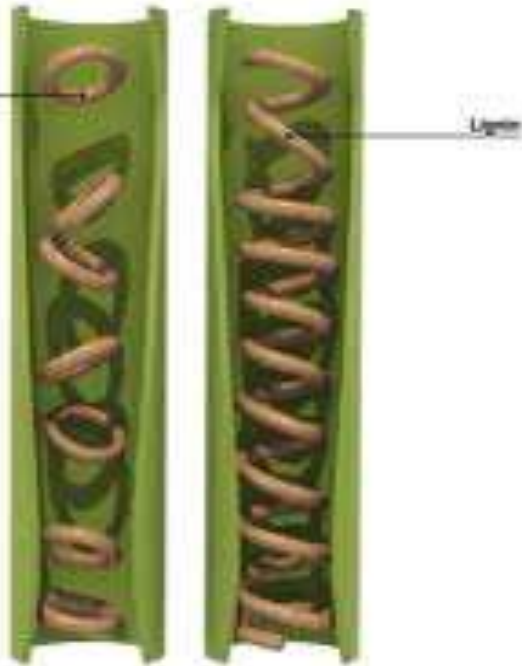
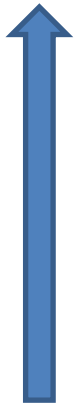
Root Hairs Absorb Water and Nutrients from the Soil



Water transport - Xylem

- The water travels from the root hair across the cortex of the root and into the xylem vessels.
- These are dead cells and are supported by rings of **lignin**.
- Lignin strengthens the xylem and allows them to withstand changes in water pressure in the plant.

Water moves
up through
the plant



You will identify the
xylem in celery next day.



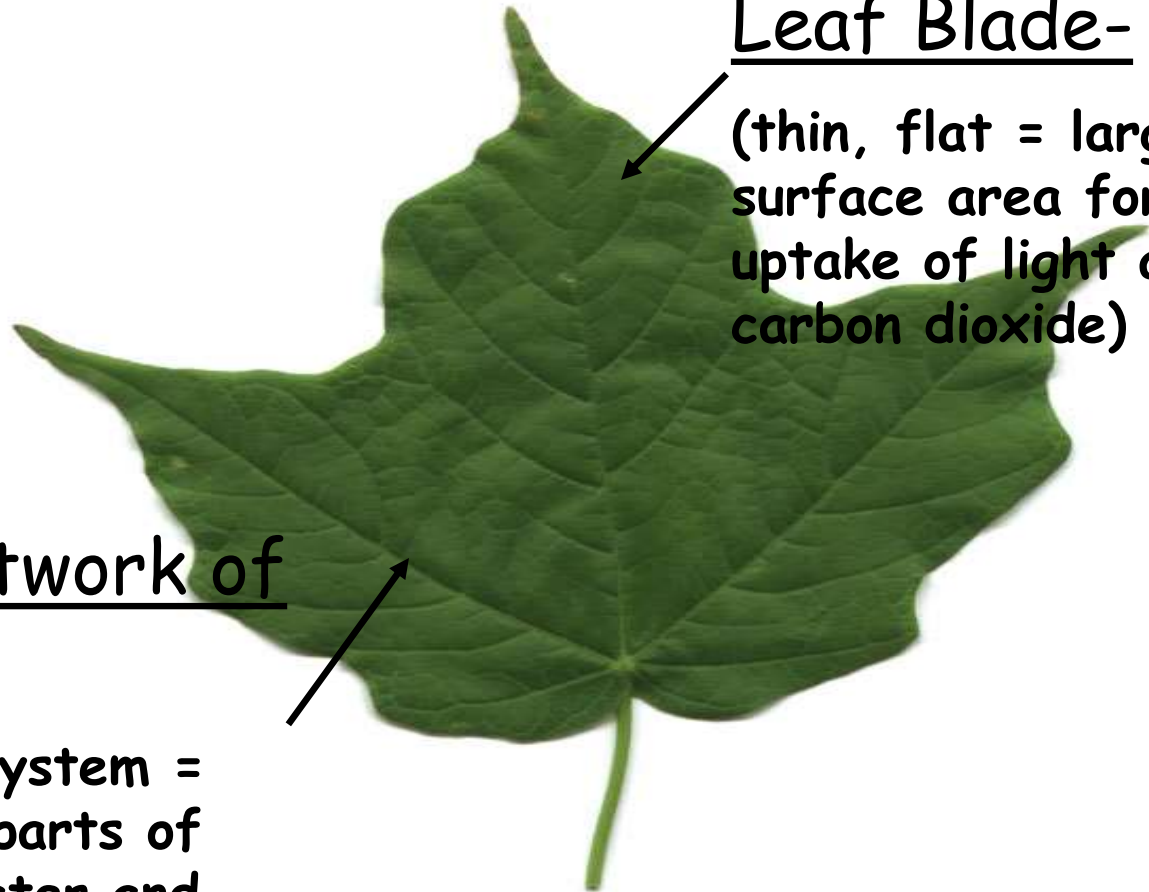
External Structure

Leaf Blade-

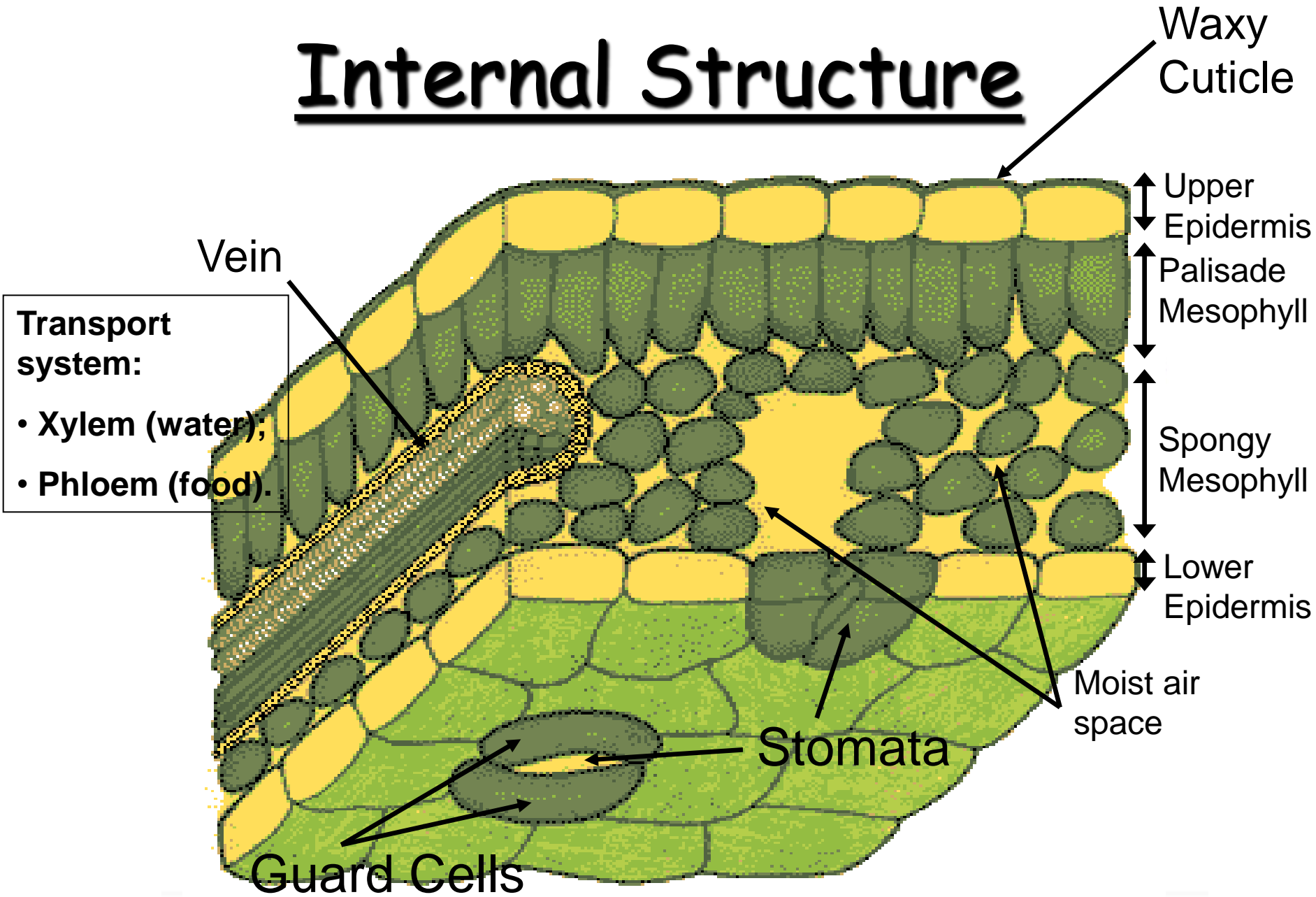
(thin, flat = large surface area for uptake of light and carbon dioxide)

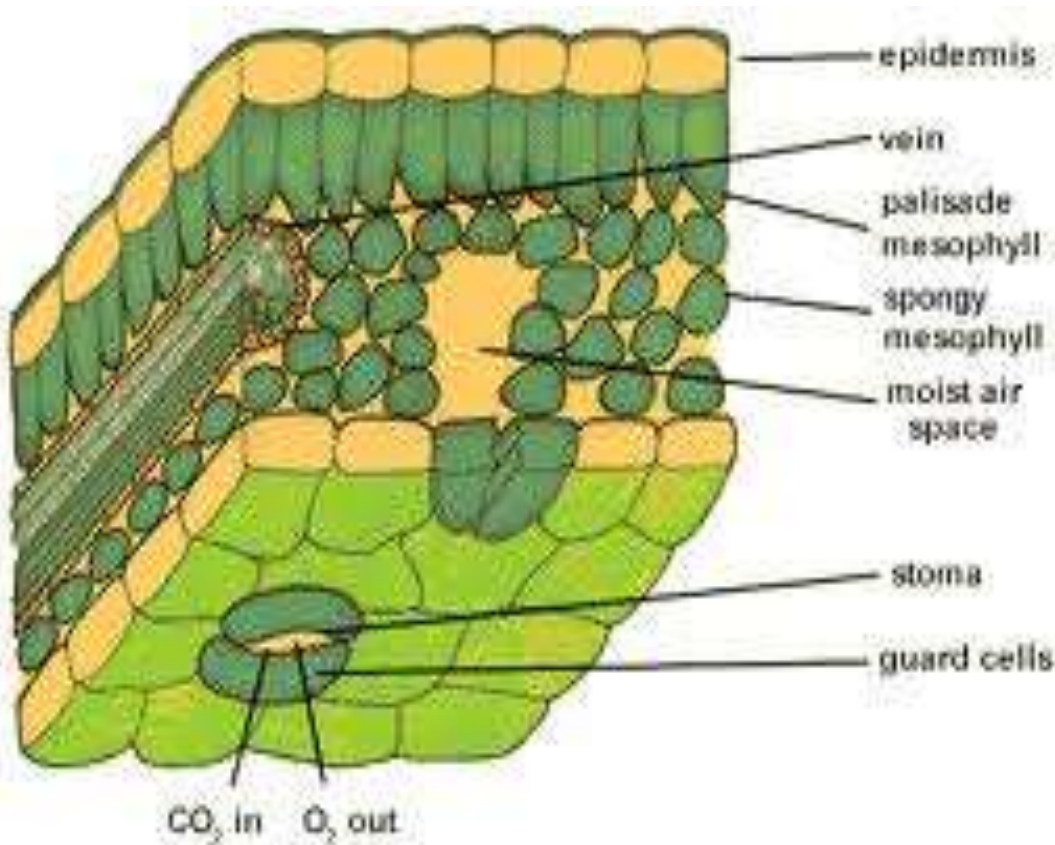
Large network of veins-

(transport system = supplies all parts of leaf with water and food)



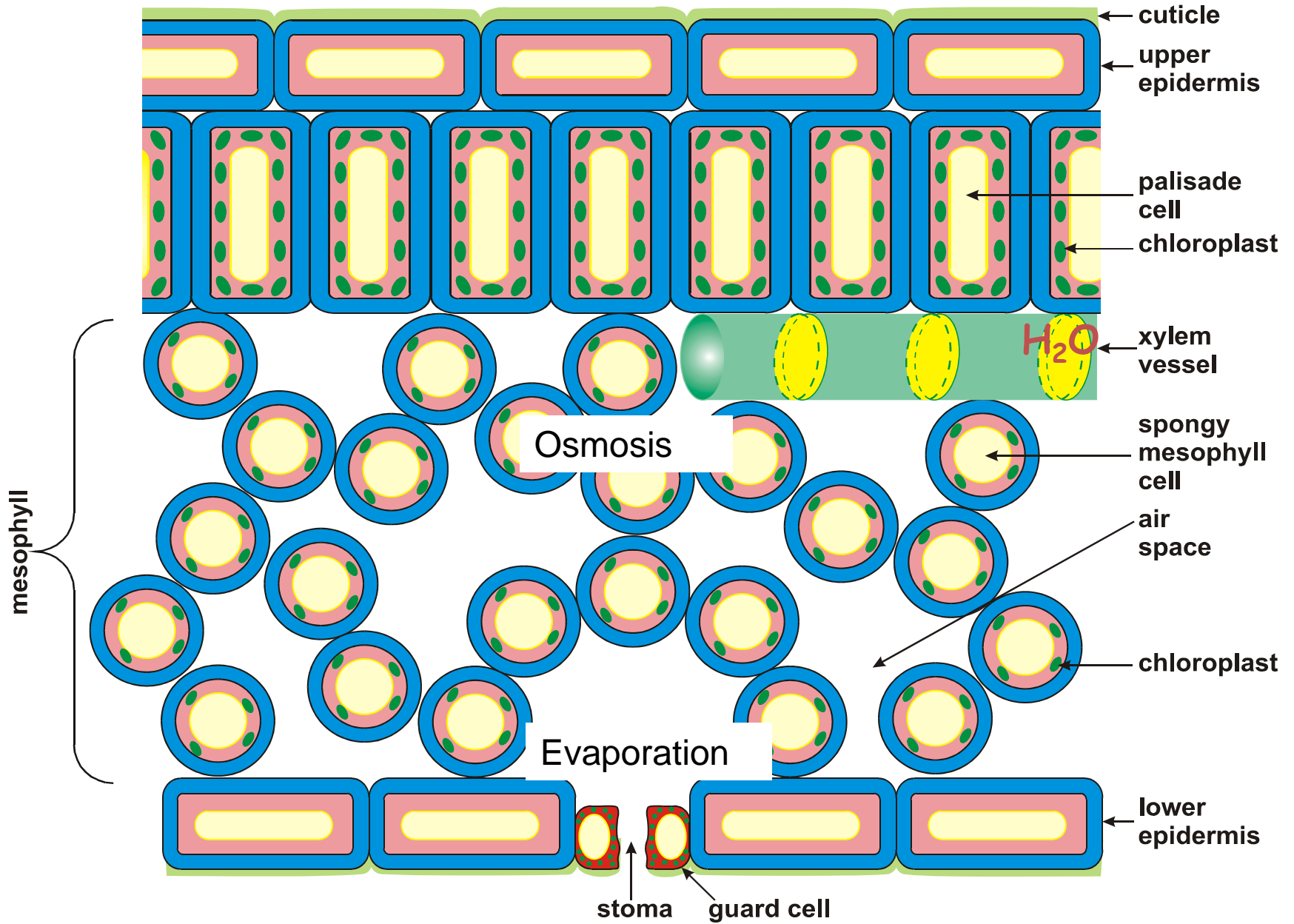
Internal Structure





- Water moves out of the xylem (in the vein) into the mesophyll cells of the leaf.
- Some of the water is used in mesophyll cells for photosynthesis.



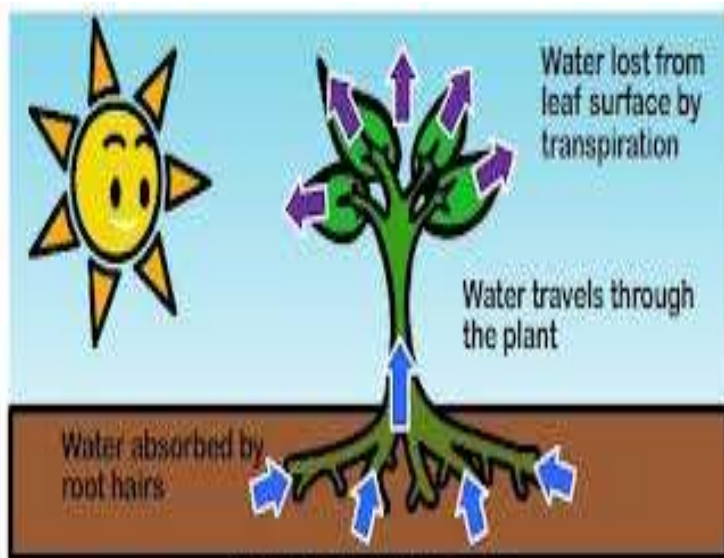


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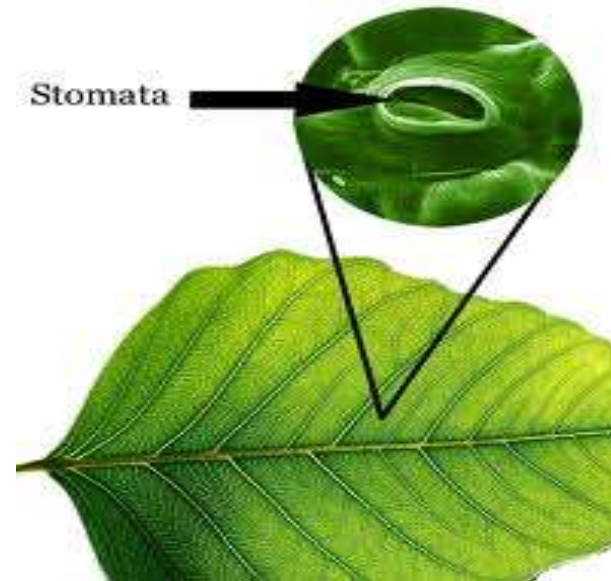
water transport - Stomata

- Most of the water a plant takes up evaporates out of the stomata in the lower epidermis of the leaf.
- This evaporation of water out of the stomata is called transpiration

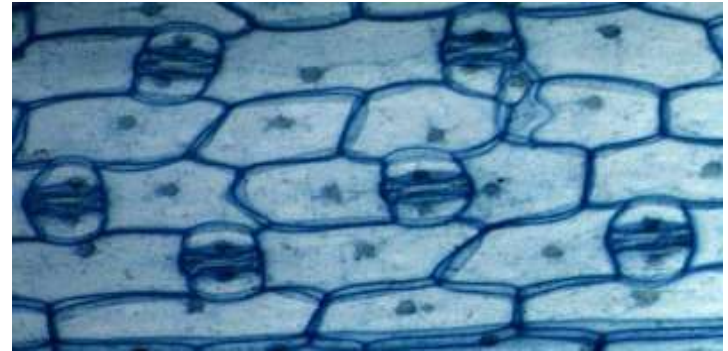
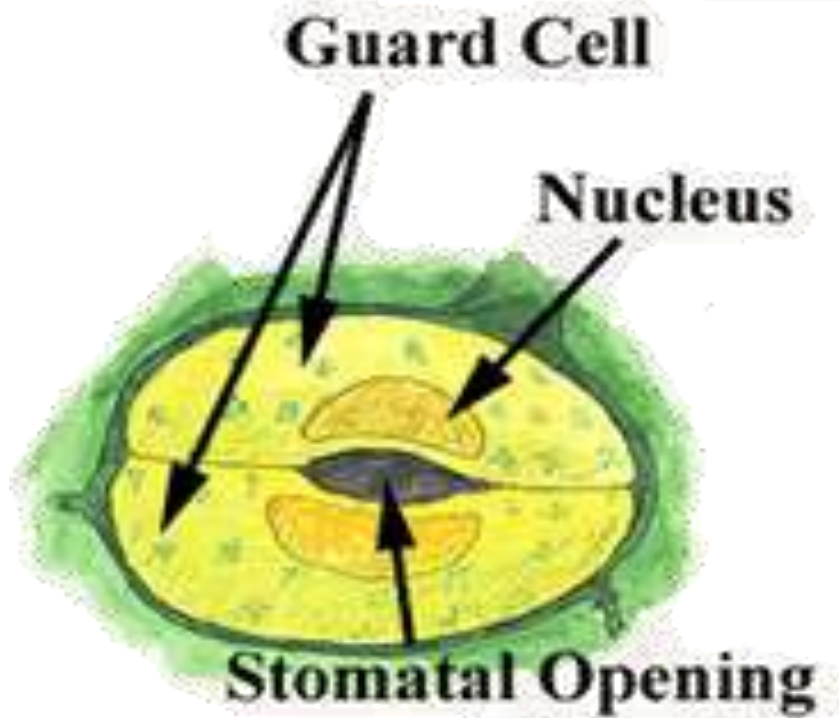
[photosynthesis/10655.html](http://www.bbc.co.uk/learningzone/clips/photosynthesis/10655.html)<http://www.bbc.co.uk/learningzone/clips/adaptations-of-the-leaf-for->



www.sciencewithme.com



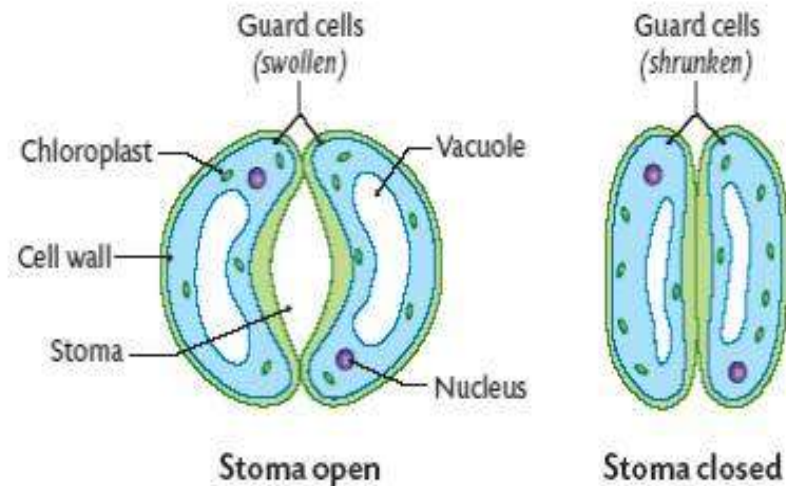
2. Stomata



- Open in light;
- Closed in darkness.

- Carbon dioxide moves into the leaf through stomata
- Oxygen and water move out through stomata.

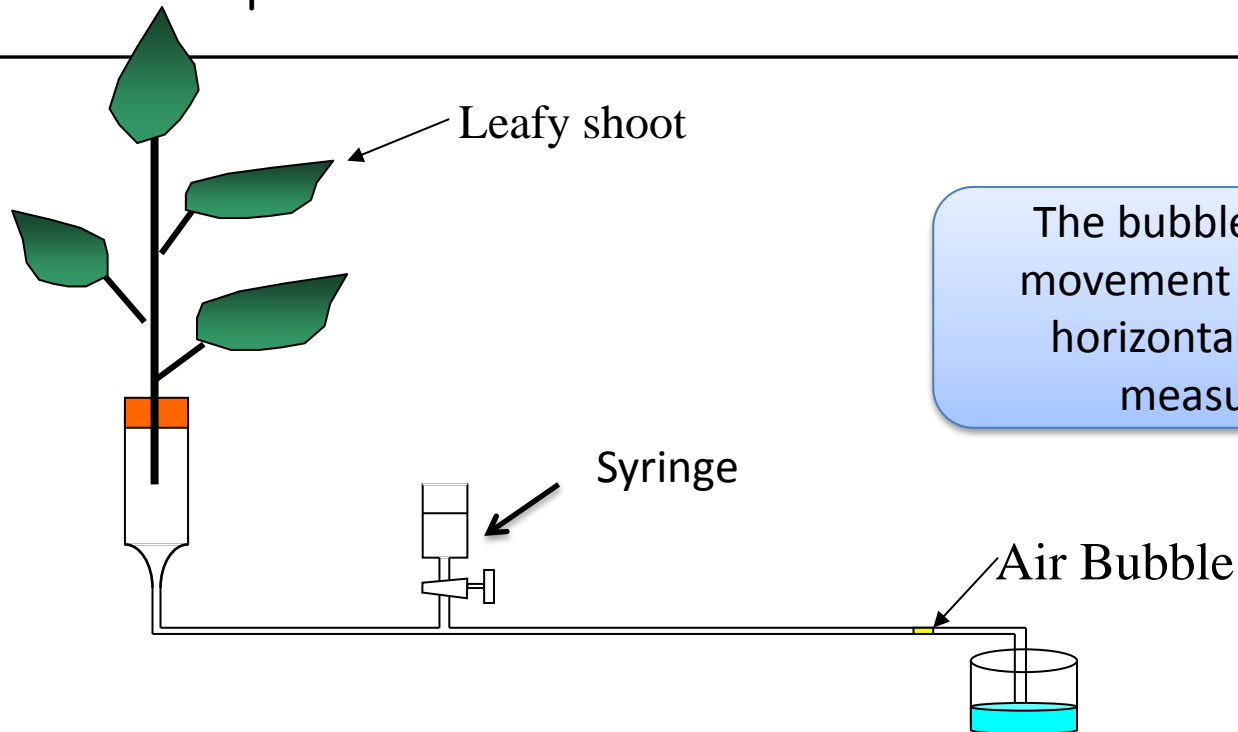
- Guard cells in the leaf epidermis control the opening and closing of these stomata.
- When the guard cells are turgid (full of water), they swell and pull the stomata open.
- When they are flaccid (have little water), they collapse and the stomata close.



5

Measuring Transpiration rate

- The **potometer** is an instrument that measures the rate of transpiration in a plant.



Used to investigate **changes in the rate of transpiration** brought about by changes in external conditions like wind and humidity.

The syringe is used to return the bubble to the start again for a repeated experiment.



Factors affecting transpiration rate

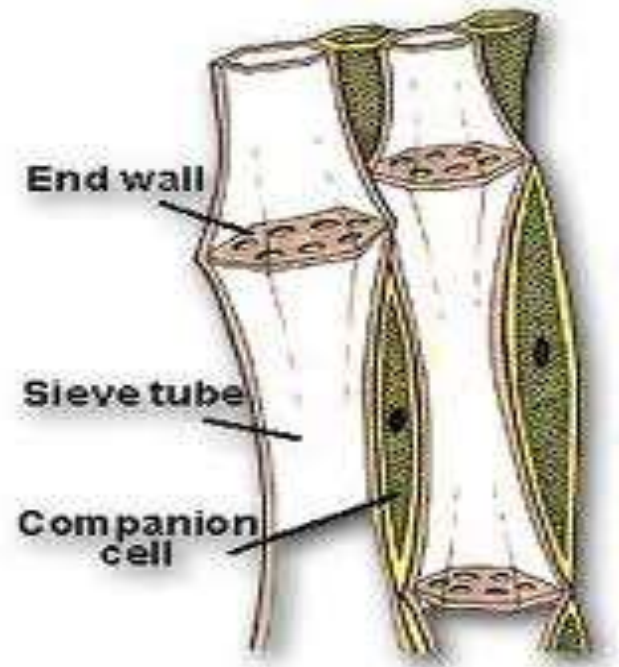
- Increase the rate:
 1. Increased Wind Speed;
 2. Increased Temperature;
 3. Increased Light Intensity;
 4. Decrease in humidity.



Design precautions

Design Feature or precaution	Reason
Stem cut and all connections made under water	To prevent air entering xylem vessels and forming air locks
All seals are tightly fitting	To keep system air tight and stop water leakage
Time allowed for plant to equilibrate between changing environmental conditions	To ensure that results are caused by new conditions being investigated and not the previous one
Repeat measurements and calculate average	To ensure results are reliable
All factors except environmental factor being investigated kept the same	To ensure that the experiment is valid by only altering one variable at a time

- Glucose is transported around the plant in vessels called phloem.
- Phloem cells are living cells.
- They have sieve tubes where soluble sugar moves from cell to cell through the perforated end walls.
- Companion cells, containing a nucleus, are attached to them and control the sieve tubes.



6

Animal transport and exchange systems

By the end of today's lesson you should understand that it is the blood that transports nutrients, oxygen and carbon dioxide in a mammal.

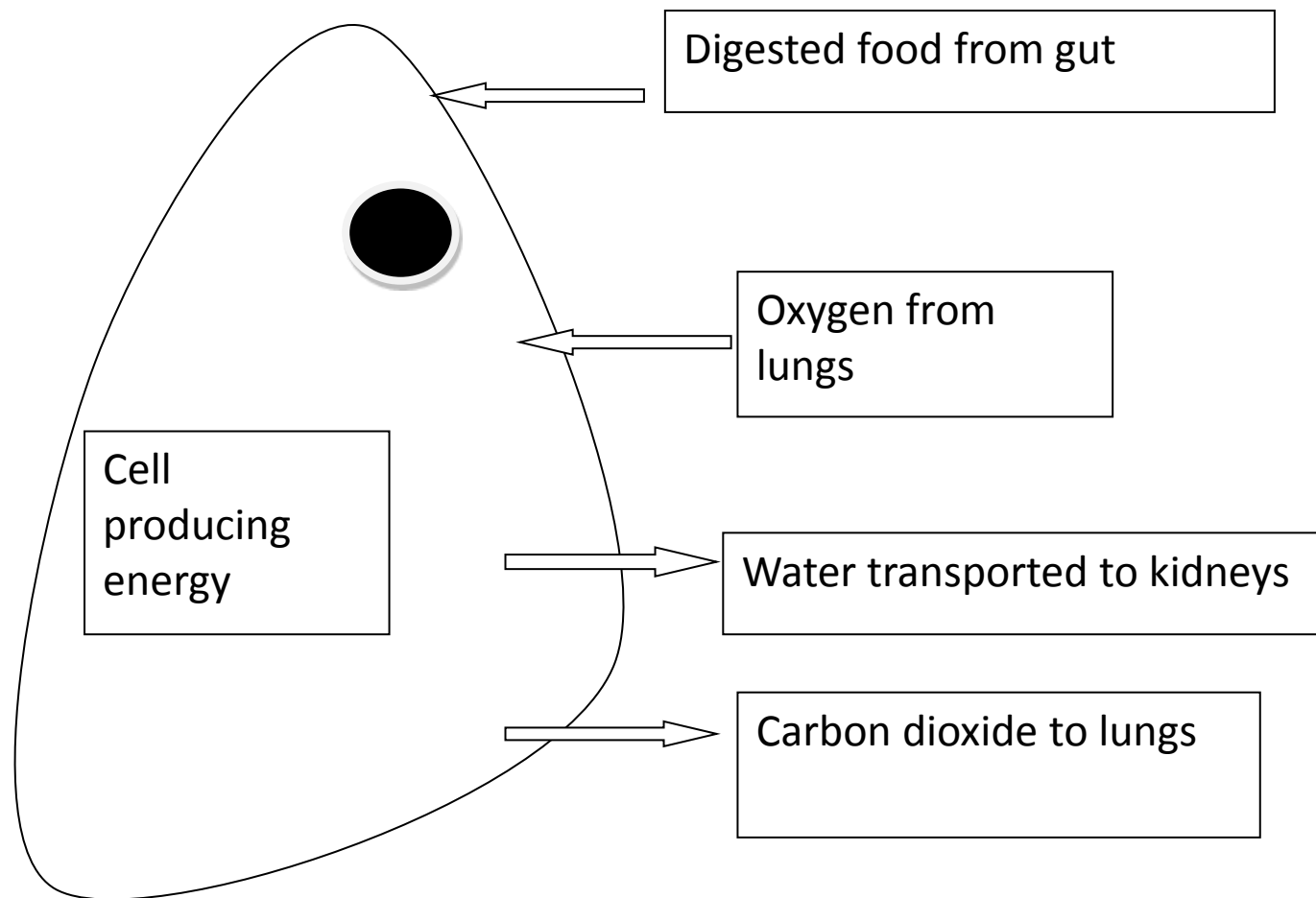
Animals must produce energy.

They do this in their cells by a process called **respiration**.

Respiration requires glucose and oxygen to produce the energy.

Glucose + oxygen \longrightarrow carbon dioxide + water + **energy**





6 Animal transport and exchange systems (contd)

Oxygen is inhaled into the lungs and must be transported to the cells of the body. Furthermore, digested food and nutrients from the gut must also be transported to these cells. Waste carbon dioxide produced in the cells must be transported back to the lungs in order to be breathed out and excess water produced is transported to the kidneys for removal as urine.

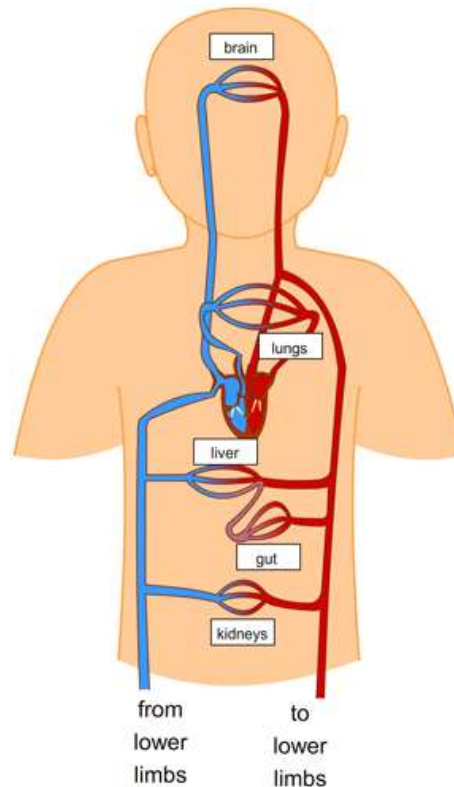
All of these substances are transported **in the bloodstream.**



How blood moves around the body

- Today you will learn that blood has to be pumped around the body, and the organ responsible for this is the heart.
- You will learn how blood passes through the heart and understand the structure and function of the associated blood

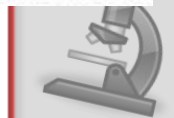
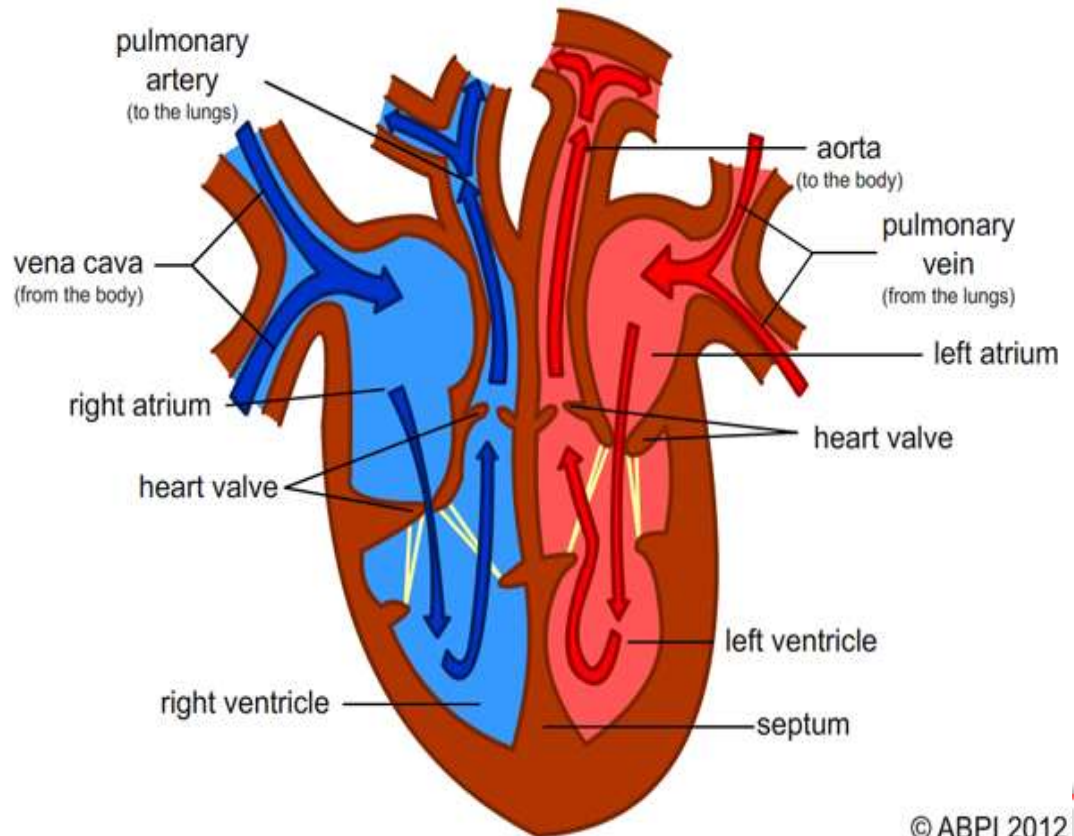
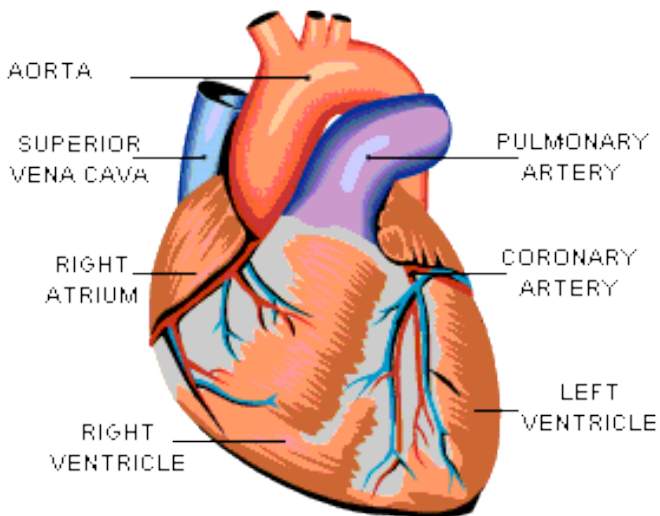
vessels http://www.youtube.com/results?search_query=the+heart+function&og=the+heart+function&gs_l=youtu.be.3..0.7937.14042.0.14384.20.15.0.5.5.0.157.1259.12j3.



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- The heart is a muscular pump, its function is to pump blood to the lungs to gain oxygen and then to pump oxygenated blood around the body. <http://www.abpischools.org.uk/res/coResourceImport/resources04/heart/heart2.cfm>



8

Arteries, veins and capillaries...transport of blood around body.

Name of blood vessel?	Direction of blood flow?	Valves present? Reason?	Thickness of wall? Reason?	Do they allow exchange of material with cells and tissues?



- Red blood cells transport the oxygen in the blood and deliver it to cells in the body. They have a biconcave shape that ensures that the cell has a large surface area for the absorption of oxygen.

- Red blood cells carry a dark red pigment called haemoglobin.
- Haemoglobin joins up with oxygen at the capillaries of the lungs to form oxyhaemoglobin which is bright red in colour.
- At the cells/ tissues, the oxyhaemoglobin breaks down to release oxygen to the cells .
- At the lungs:**

Oxygen + haemoglobin \longrightarrow oxyhaemoglobin

- At the cells/tissues:**

Oxyhaemoglobin \longrightarrow oxygen + haemoglobin



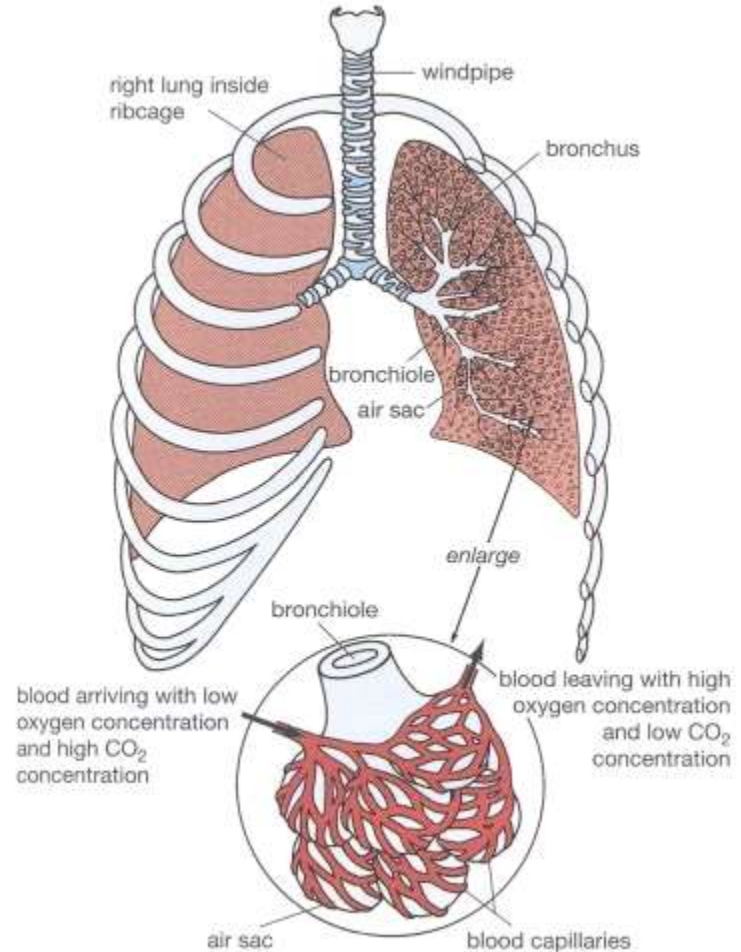
- Organisms take in air using their lungs and the oxygen moves through the air sacs into the blood.

- Watch the video clip:

- <http://www.bbc.co.uk/learningzone/clips/gaseous-exchange-in-the-lungs/10647.html>

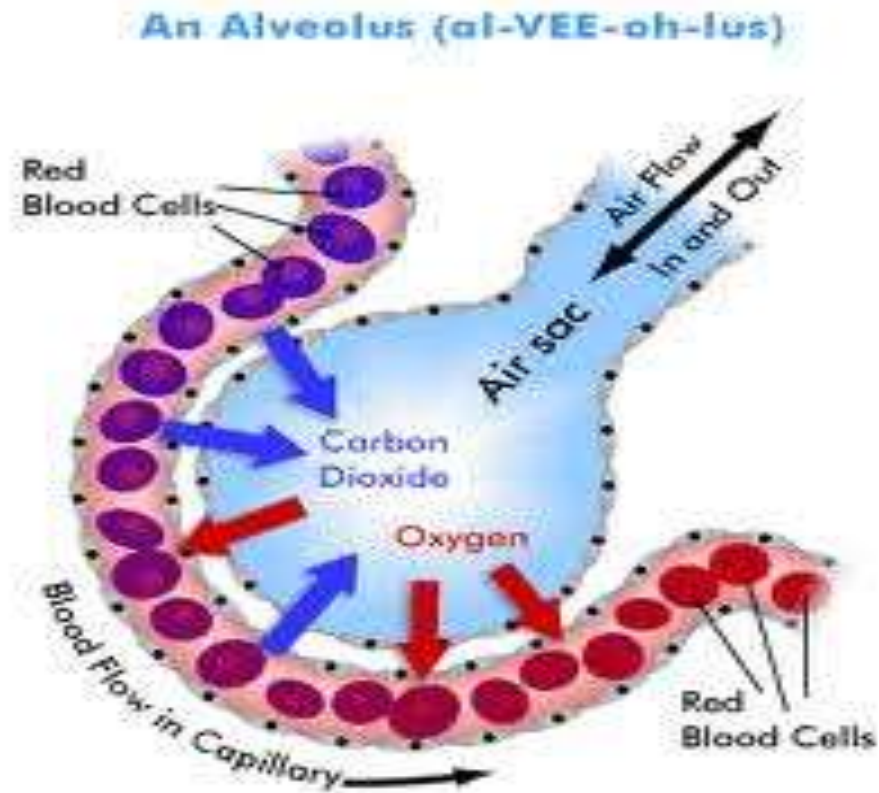
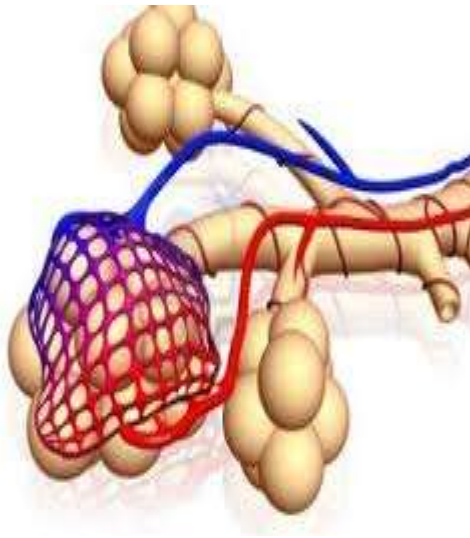


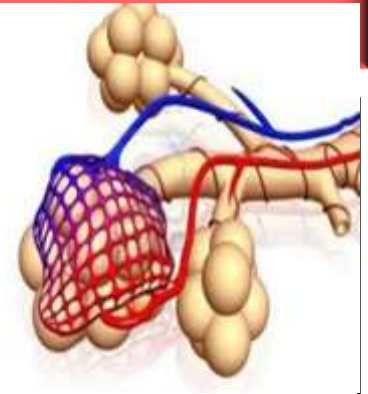
- Parts of the lung:
- Trachea
- Bronchus (bronchi)
- Bronchioles
- Alveoli (air sacs)
- Rings of cartilage
- diaphragm



The alveoli...transport of oxygen into the blood.

- The alveoli/ air sacs are where oxygen passes from the lungs to the blood and carbon dioxide passes from the blood back to the lungs.





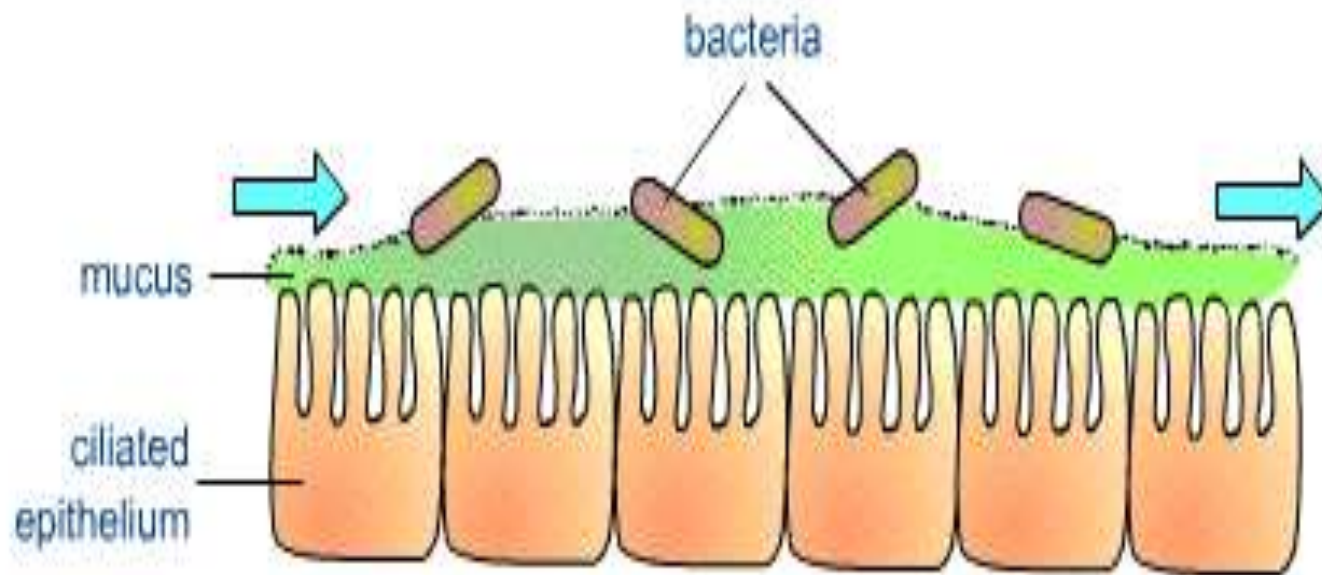
- Why are alveoli so well designed for gas exchange?
- They have a moist surface so that gases are able to diffuse through their walls.
- Their walls are very thin for gases to through.
- There are so many alveoli in the lungs that they provide a huge surface area for gas exchange.
- They are in very close contact with blood to enable gases to move directly in and out of the blood.



9

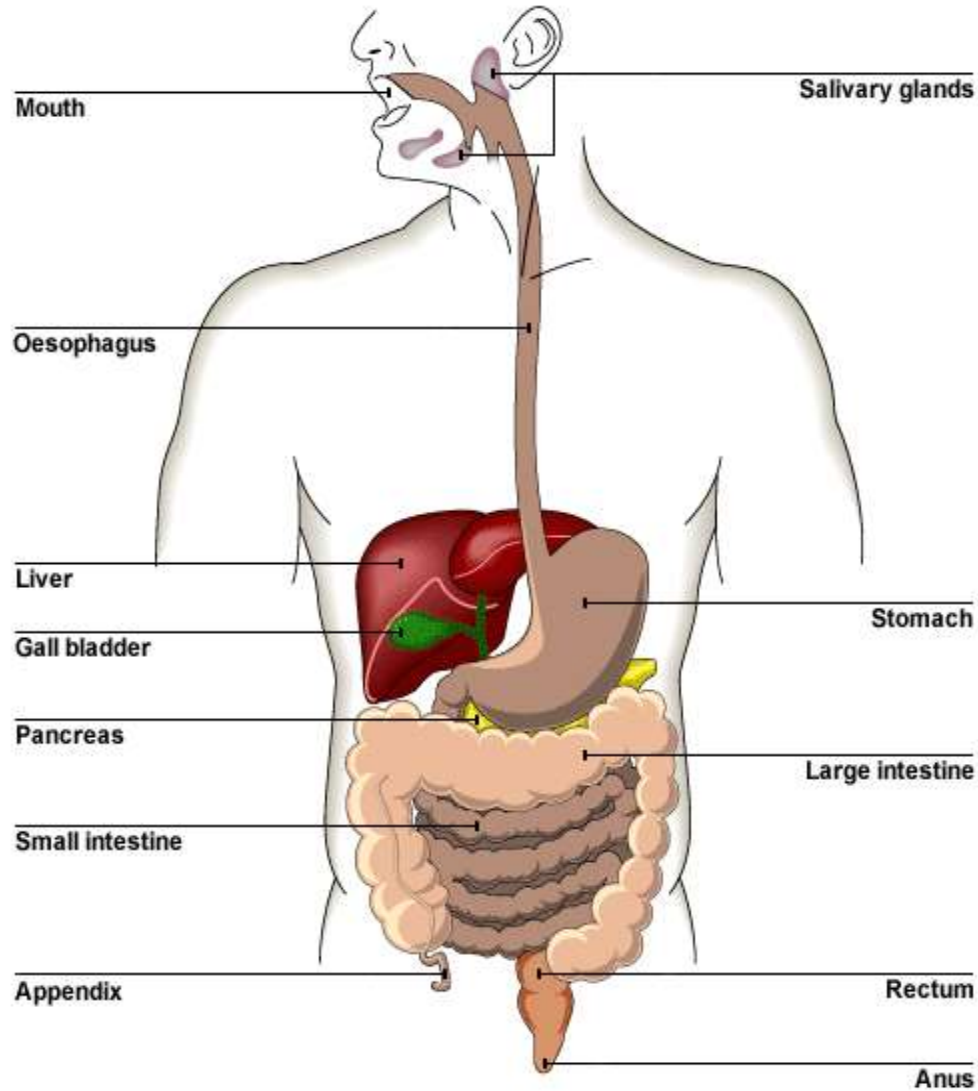
How air is cleaned before entering the lungs

- Mucus traps the dirt and germs and cilia beat the mucus upwards to the throat where it is swallowed.



10

The digestive system...digestion of food as it moves from from mouth to anus.

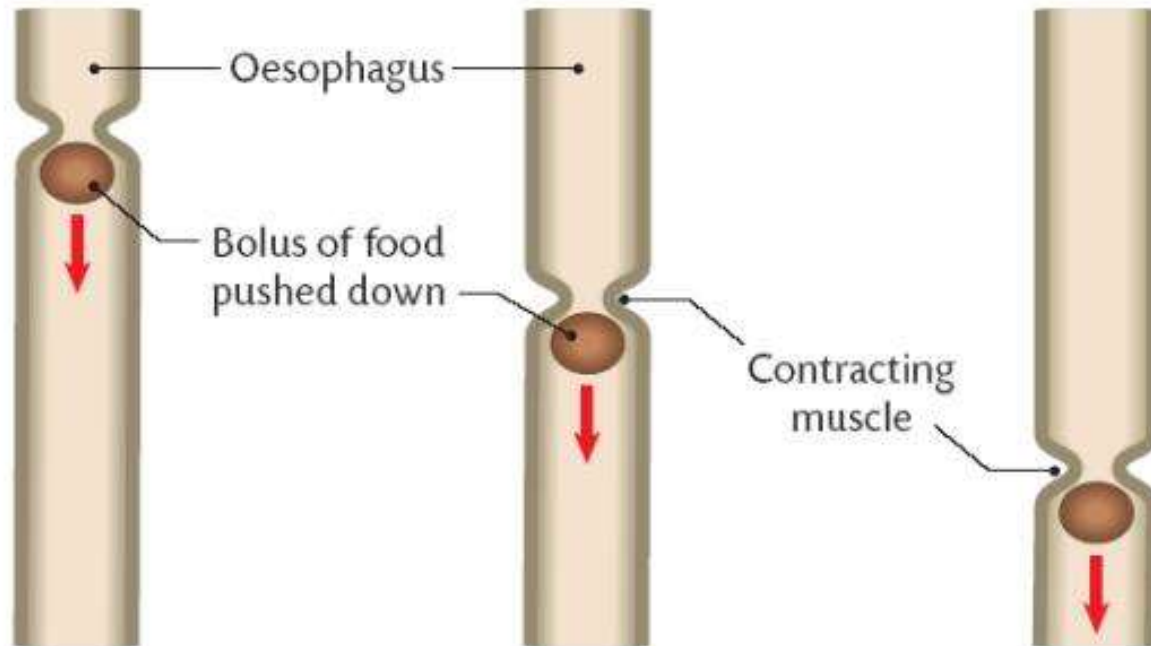


10

Peristalsis ...moving food through the gut.

- Transport of food through the muscular gut is carried out by a process called peristalsis.

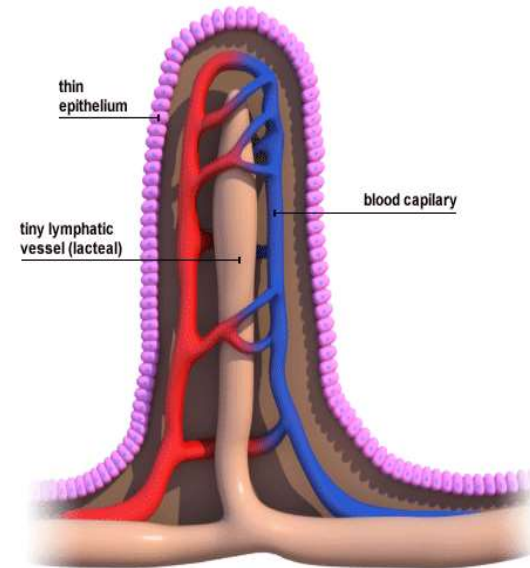
- <http://www.youtube.com/watch?v=rJS-Kh5wCQU>



The small intestine...transport of food into the blood via the villi.

When partially digested food reaches the small intestine, digestion continues. Then, the products of digestion are absorbed into the blood through thousands of villi (singular, villus) that line the intestinal walls. Villi are well-designed for transporting digested food from the gut into the bloodstream:

1. Villi have very thin walls to allow molecules to pass through easily.
2. They also have a very good blood supply so that food moves out of the intestine straight into the blood.
3. In addition, because there are so many of villi, they form a huge surface area for maximum absorption of food.



Glucose and amino acids enter the blood capillary and products of fat digestion enter the lacteal.



MANDATORY KEY AREA 4.

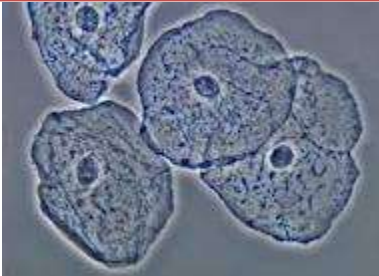
- REPRODUCTION



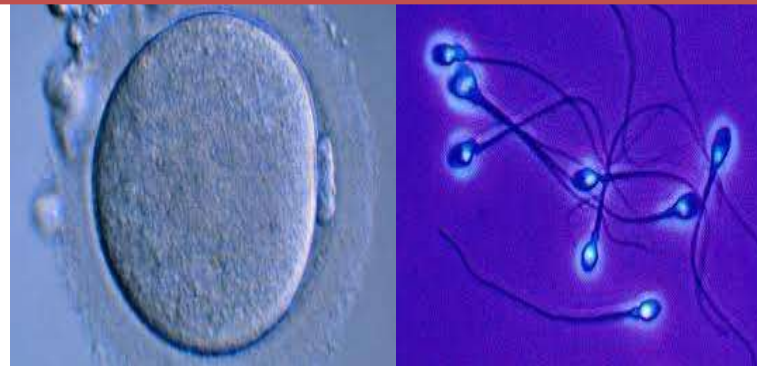
By the end of today's lesson you should be able:

- Explain the terms Diploid and Haploid number of chromosomes
- Know the difference between body cells and gametes

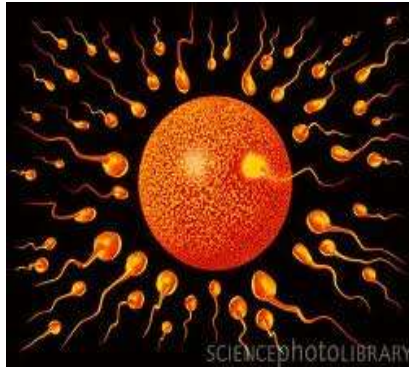
Diploid body cells - nucleus has 2 sets of chromosomes (23 pairs/46 chromosomes)



Haploid Gametes - nucleus of the egg and sperm have 1 set of chromosomes (23 chromosomes)



- Following fertilisation (when the sperm and egg nuclei fuse together) the zygote has 2 sets of chromosomes.
- Zygote is said to be diploid
- In humans, that means 23 pairs/46 chromosomes.

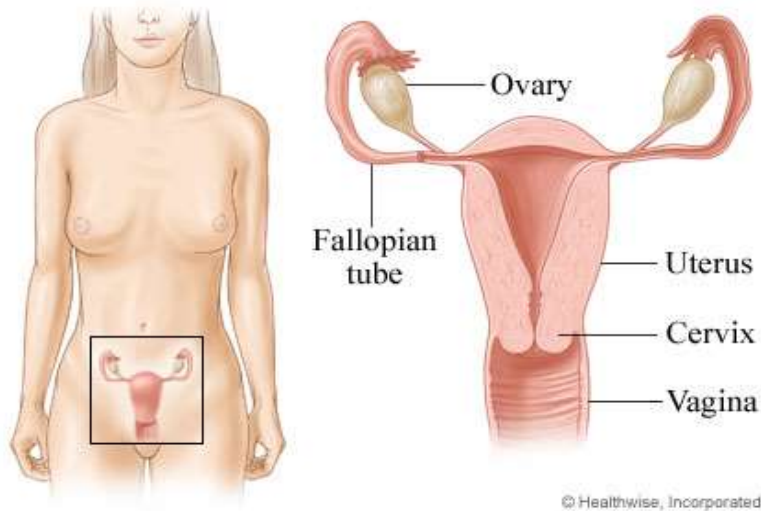


Fertilisation - nuclei from both gametes join to make a fertilised egg containing the **diploid** 23 pairs/46 chromosomes

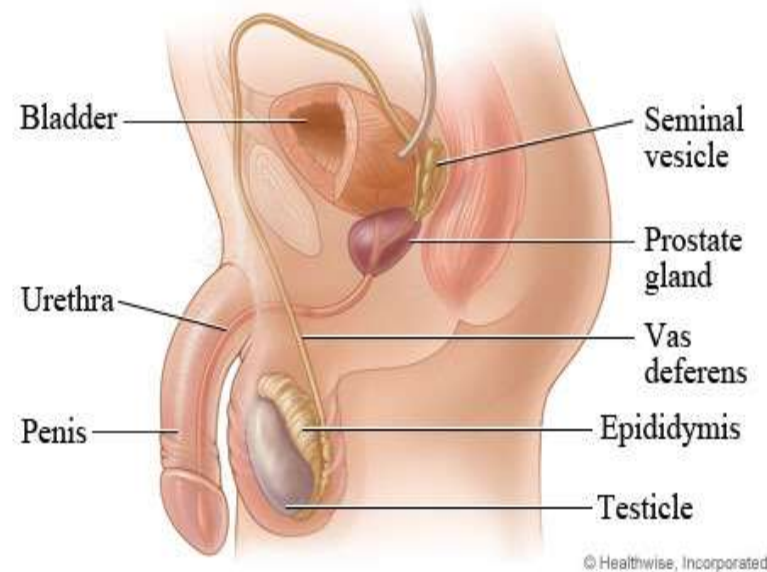


By the end of today's lesson you should be able:

- Compare male and female animal and plant gametes, gonads and organs

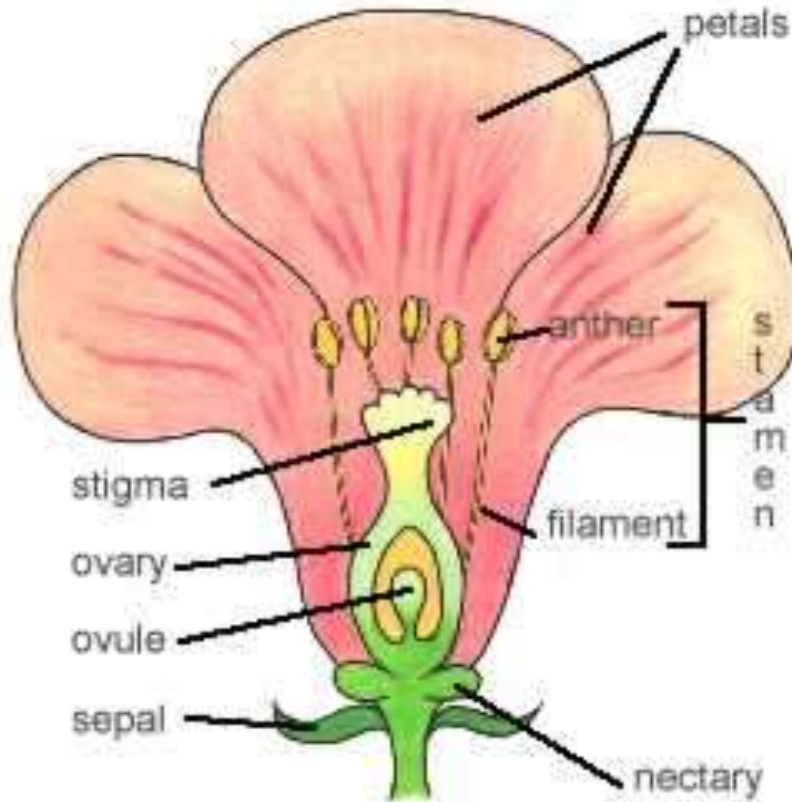


Female gonads are ovaries - ova are produced there. Ovaries produce a few (or even just one) ova at a time. Ova are larger cells than sperm and contain a food store



Male gonads are testes - sperm are produced here. Testes continually produce millions of sperm cells. Sperm are much smaller cells than ova and swim using a tail structure

Plant Reproduction



The female gonad in a flower is the ovary. It can contain just one ovule or many ovules for fertilisation

The male gonads in flowers are the stamen. Pollen grains containing the gamete are produced in the anther at the end of the stamen.



What is Pollination?

- Pollination is the transfer of the pollen (male sex cell)
- From the anther to the stigma on another flower



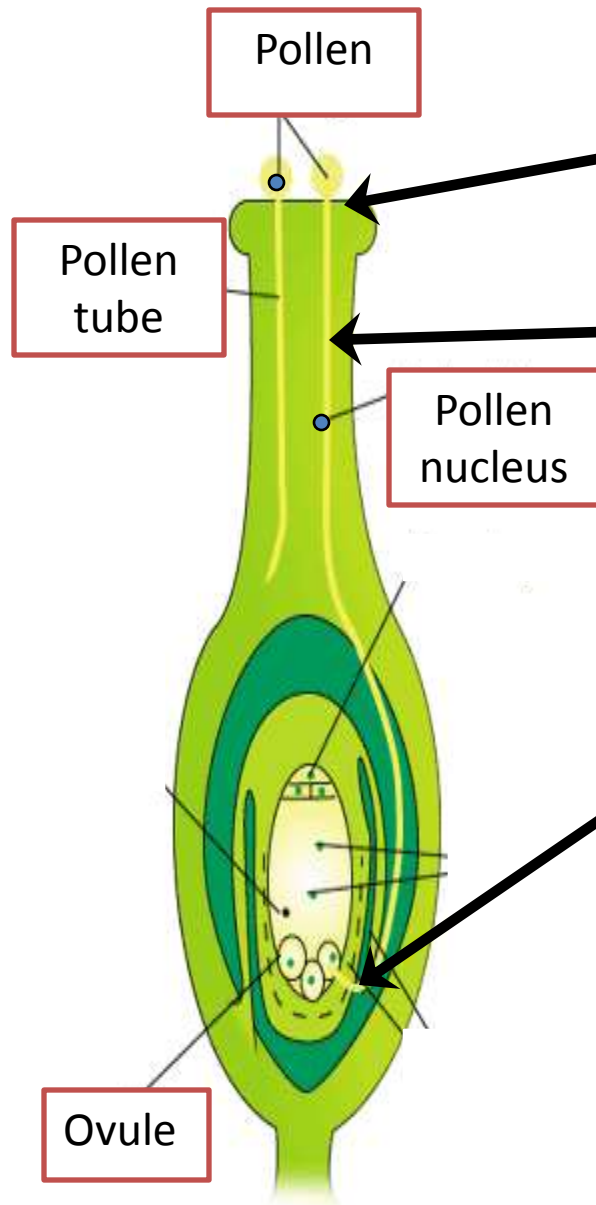
Pollen Tube

pollen grain



pollen tube

Fertilisation - collect diagram



1. The pollen tube forms once it lands on a stigma
2. The pollen tube moves down the style towards the ovary.
3. The pollen tube pierces the ovary wall to reach the egg cell (ovule)
4. The male and female nuclei fuse and fertilisation has been successful

MANDATORY KEY AREA 5.

- VARIATION AND INHERITANCE



Variation

Variation

- Variation is a word used to describe the differences between living organisms
- Today's lesson will be focusing on how members of the same species differ and show variation.



Variation Within a Species

Learning Outcomes:

1. There are two types of variation:
 - Continuous variation
 - Discrete variation
2. To use class data to draw a histogram and bar graph

Arrange the class from smallest to tallest and discuss the next slide.

1. Continuous variation - Examples:

Height

Mass

Weight

Hand span

Length

Continuous variation:

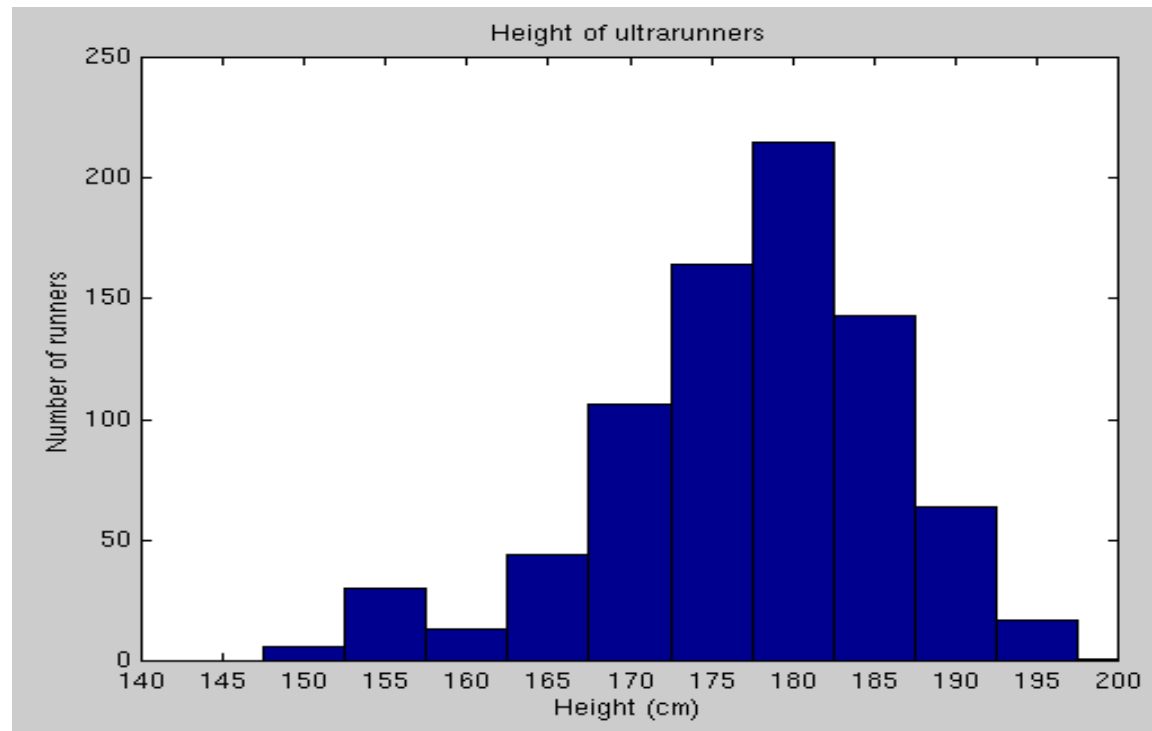
- no distinct groups of variation
- Differences between individuals can be measured
- Characteristics will vary from one extreme (tallest) and another (smallest)
- Examples are height, weight, Hand span, Length.

Continuous variation:

COPY

Results would be presented as a:

- Line graph;
- Histogram (bar graph with NO SPACES)



Arrange the class into groups of different eye colour and discuss the next slide.

2. Discrete variation:

Right/ left handed

Eye colour

Ear lobes

Hair colour

Freckles /no freckles

Discrete variation:

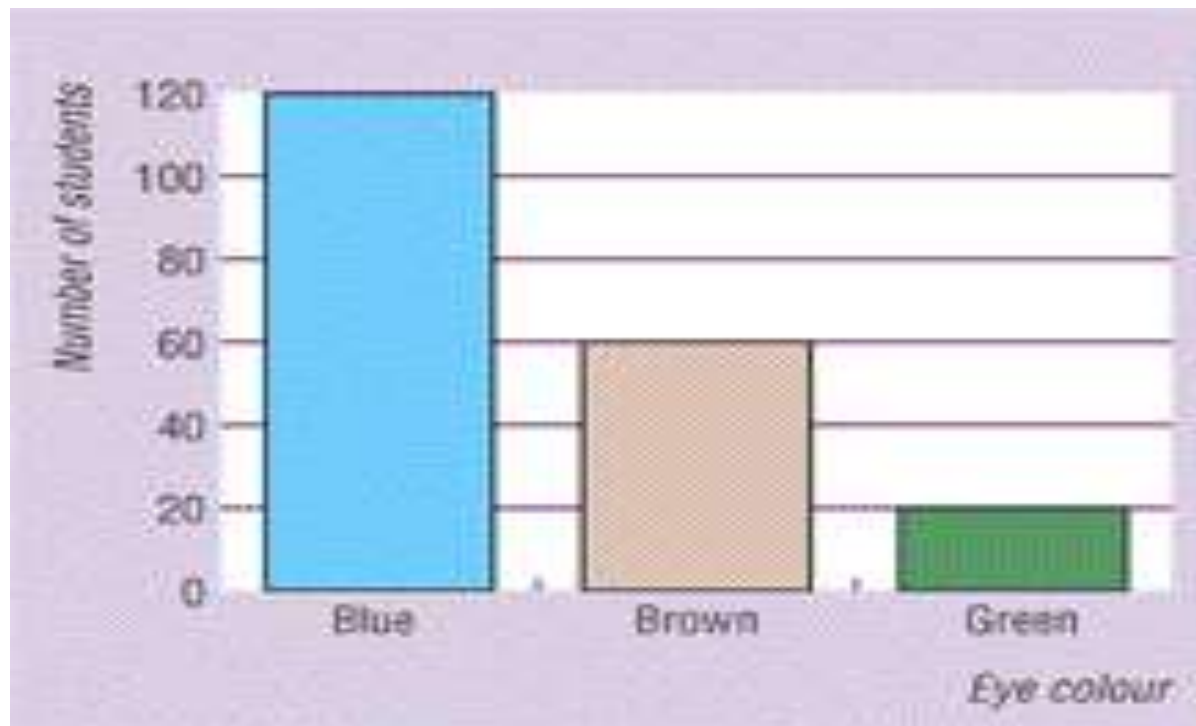
- Individuals can be divided into two or more distinct groups.
- Differences cannot be measured (how could you measure someone's eye colour?)
- Examples are eye colour, hair colour, Ear lobes attached or free, Freckles or no freckles.

Discrete variation:

COPY

Results would be presented as a:

- Bar graph (spaces between bars);
- Pie chart



Collect Class Data

- Hand Span

- 10 - 12
- 13 - 16
- 17 - 20
- 20 and above

Draw a histogram of the results

- Eye Colour

- Blue
- Green
- Brown
- Hazel
- Mixed

Draw a bar graph of the results

Variation

Success criteria

1. I can state that there are two types of variation:
 - Continuous variation
 - Discrete variation
2. I can use class data to draw a histogram and bar graph

Inheritance

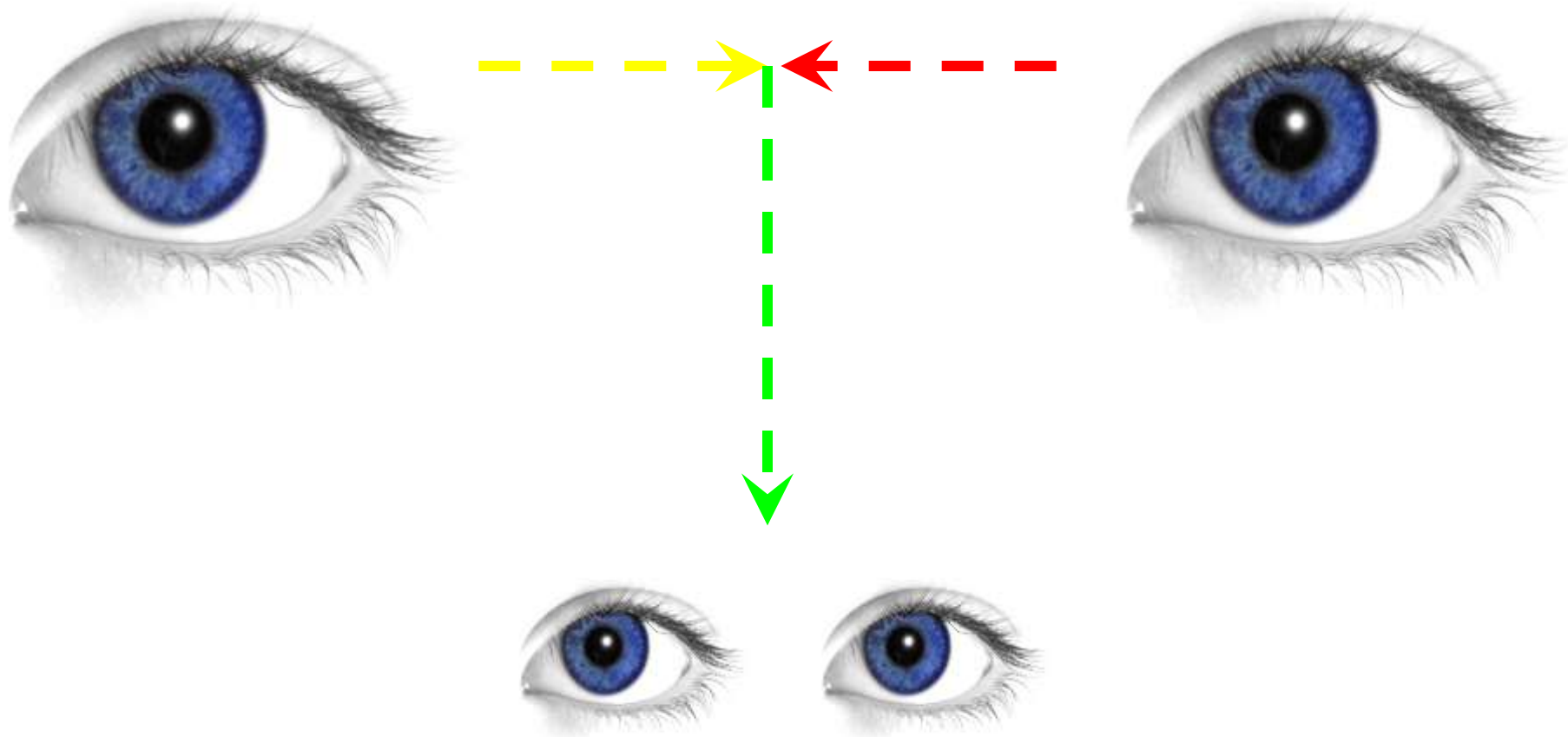
Inheritance

- We inherit our characteristics (genes), like eye colour, from our parents.
- Genes come in different forms called **alleles**.
- In eye colour, for example, there is an **allele** for:
 1. **blue eyes;**
 2. **brown eyes;**
 3. **Green eyes;**
 4. **Grey eyes.**

What if ??????????



What if ????????????



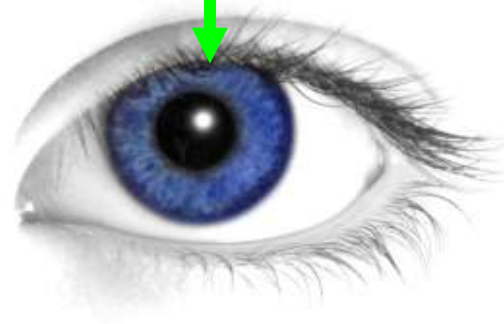
What if.....

(Q) What if you have one allele for blue eyes and one for brown?
What colour of eyes will you be born with?



(A) = Brown Eyes

- The allele for brown eye is "Dominant"
- The allele for blue eye is "Recessive"



Genetic Diagram

- Genes are shown by letters

a, **b**, c, d, e, f, g, h, i, j, k

- Capital letters for the dominant allele

B

- Small letters for the recessive allele

b

Genotype

The genetic makeup of an organism is its **GENOTYPE**.

This is normally shown as letters or symbols

Example: Pea plants can be tall or dwarf plants.

Tallness is dominant over dwarfism.

Therefore:

The allele for tall plants is shown by a T;

The allele for dwarf plants is shown by a t

Homozygous = Individual with the same alleles for a characteristic
Heterozygous = Individual with the different alleles for a characteristic

- A plant had the genotype TT
- Phenotype is a tall plant

Homozygous/truebreeding

- A plant had the genotype Tt
- Phenotype is a tall plant (dominant always wins)

Heterozygous/hybrid

- A plant with the genotype tt
- Phenotype is a dwarf plant

Homozygous/truebreeding

Phenotype & Genotype

- For each inherited characteristic an organism possesses there may be a number of different forms or PHENOTYPES. For example, hair colour- humans may have blonde or red hair.

The phenotype describes the physical appearance of the inherited characteristic.

Practice

- Collect Sponge 1 and Sponge 2 worksheet.
- Answer questions 1, 2, and 3 only!

Monohybrid Cross

Learning Outcome

To find out how to complete a monohybrid cross


Monohybrid cross


Two forms of a particular gene (allele) can be represented by letters.

Remember!

Dominant characteristics are capital letters

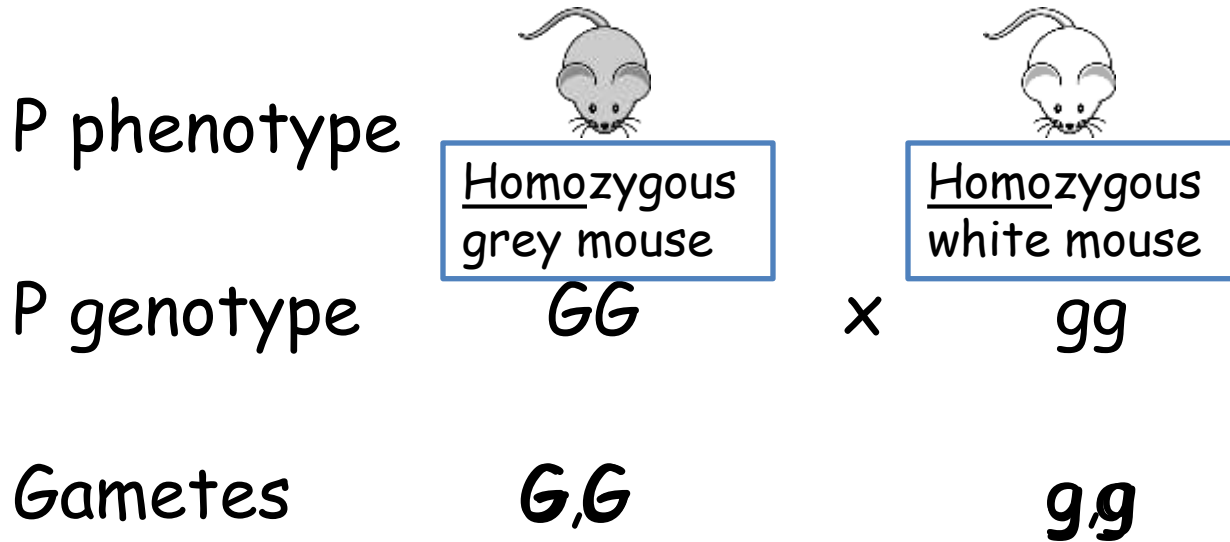
Recessive characteristics are small letters


Grey = G


White = g

Grey is dominant = G White is recessive = g

Lets carry out a Monohybrid cross using a punnet square to help.



Remember
Homo = 2 the same

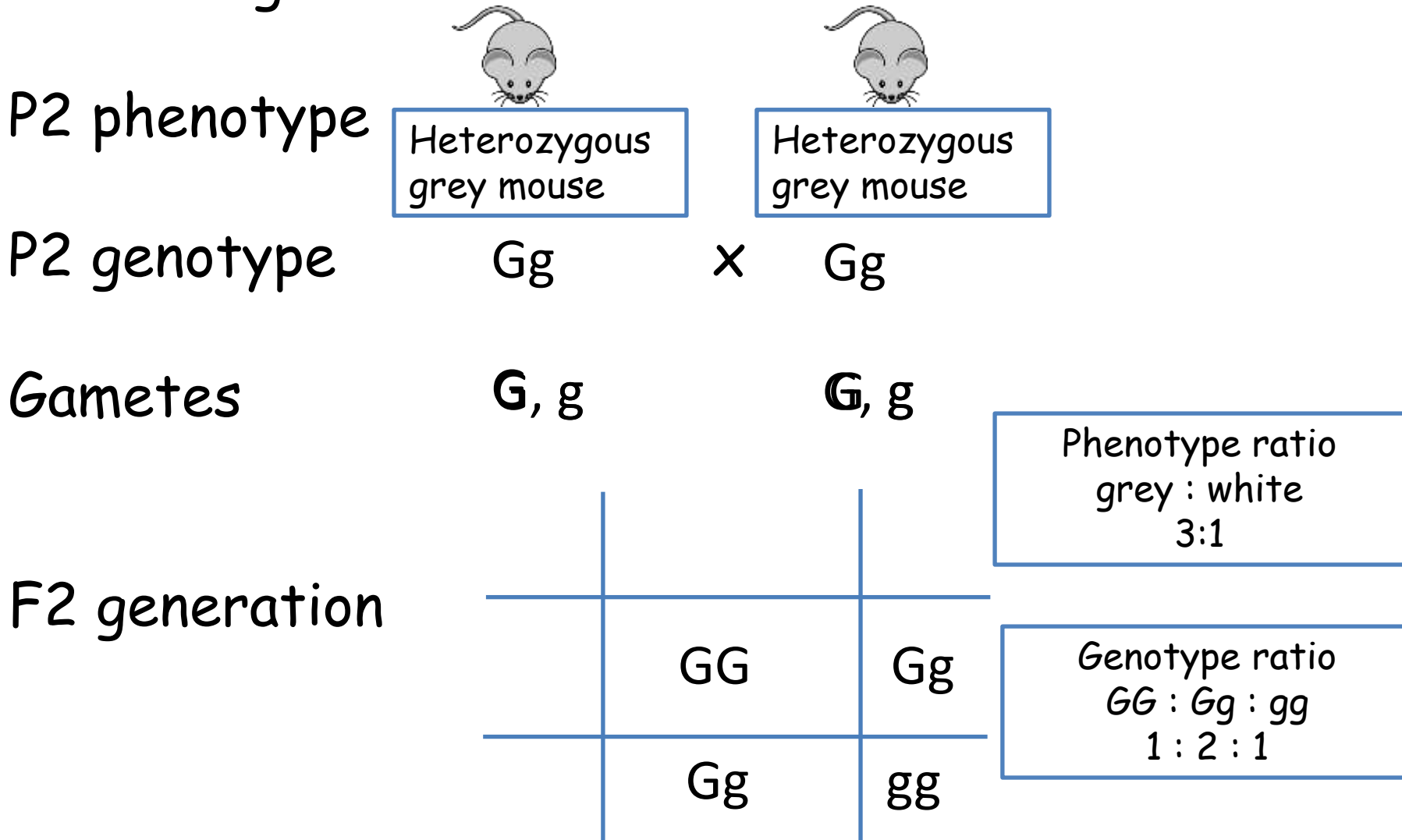
Remember
Hetero = 2 diff

F1 generation

	Gg	Gg
	Gg	Gg

All mice in the F1 generation will be grey

The next step could be crossing two mice from the F1 generation:



Eye colour – Monohybrid Cross

Example 1: A homozygous brown-eyed parent was crossed with and a blue-eyed parent. Follow the cross through to the F2 generation.

P1
genotype **BB** **X** **bb**

Gametes **B , B** **b , b**

F1
generation

P2
genotype

Bb

X

Bb

Gametes

B , b

B , b

F2
generation

Carrying out a Monohybrid Cross To the F₂ Generation

Problem

A true breeding black haired mouse mates with a white haired mouse and all the offspring are black haired. Two of this generation then mate.

- a) State which allele is dominant and which allele is recessive
- b) Give genotype and phenotype of the parent mice
- c) Give genotype and phenotype of F₁ and F₂ generations
- d) Give the phenotype and genotype ratios of the F₂ generation.

Questions

1. In mice, the coat colour black (B) is dominant over brown (b) coat colour. Follow the cross through to the F₂ generation when a homozygous black mouse is crossed with a homozygous brown mouse

Questions

3. In pea plants, the gene for height has two forms - tall and dwarf. A tall plant was crossed with a dwarf plant and the F1 were all tall
- (a) Which gene is dominant? Explain your choice.
 - (b) Using letters of your own choice, give the genotypes of the F1 generation
 - (c) The F1 generation were self pollinated. Using the correct format, work out the genotypes & phenotypes of the F2 generation

In pea plants round seed coat is dominant to wrinkled seed coat.

True breeding plants with round seeds were crossed with true breeding plants with wrinkled seeds. Using a capital letter to represent the dominant allele and the corresponding small letter to represent the recessive allele follow the cross through to the F₂ generation. The framework is set out for you below.

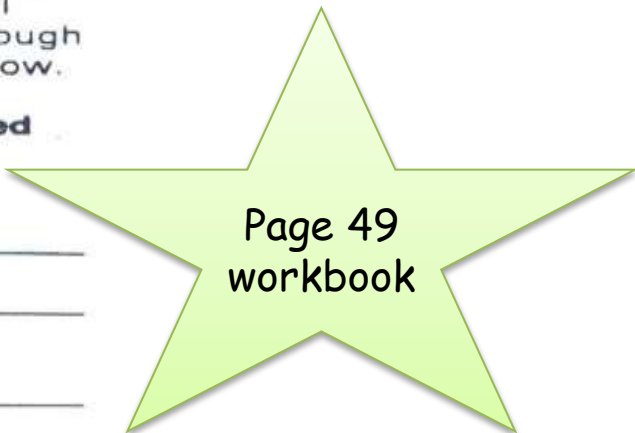
P	Round	X	Wrinkled
phenotype			
P			
genotype	_____		_____
gametes	_____		_____
F ₁	_____		
genotypes			
F ₁	_____		
phenotype			

Cross the F₁ generation

P		
phenotype	_____	_____
P		
genotype	_____	_____
gametes	_____	_____

Punnett Square to show combination of gametes

F ₂	_____	_____	_____	_____
genotypes				
F ₂	_____			
phenotype				



Practice

- Find Sponge 1 and Sponge 2 worksheet.
- Answer questions 4 onwards.

NOTE:



- The predicted ratio isn't always the same as the expected ratio

Why?

Learn this reply:

Fertilisation is a random process involving the element of chance.

Problem Solving

Polygenic Inheritance

Learning Outcome:

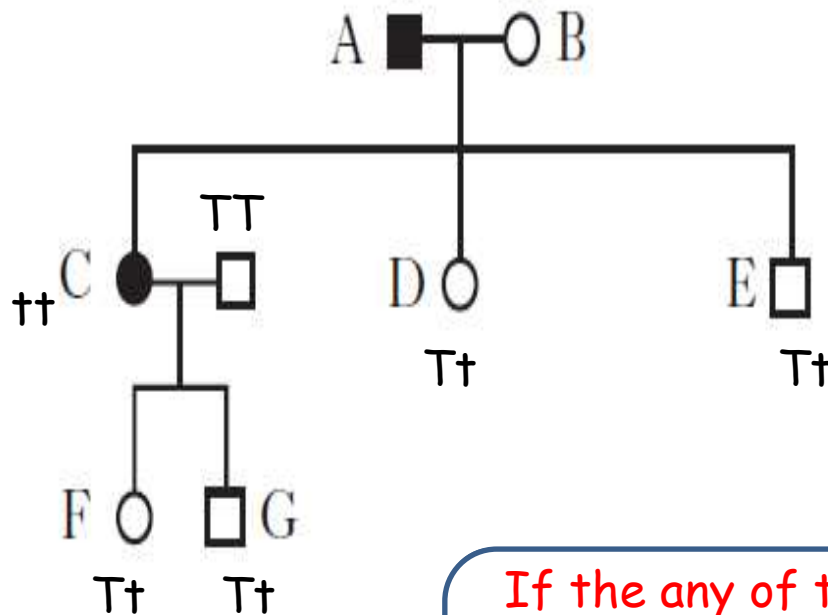
- polygenetic inheritance is
 - be able to give some examples of characteristics of polygenetic inheritance
-
- When characteristics are controlled by the alleles of more than 1(several) gene(s).
 - These genes interact with each other and contribute to the overall expression of the characteristic.
 - This results in a range of phenotypes which show examples of Continuous Variation
 - Examples are: Height, weight, hand span.



Family Tree Tips!!!!

T represents the left thumb form of the gene.
t represents the right thumb form of the gene.

Left thumb = T
Right thumb = t



- left thumb male
- right thumb male
- left thumb female
- right thumb female

If the any of the offspring are showing the recessive characteristic then the dominant parent must be Tt as they get a r from each parent



- Use the information in the diagram to complete the following table.

Person	Genotype
C	
E	
F	

Use the tips to write the genotypes on the following family tree.



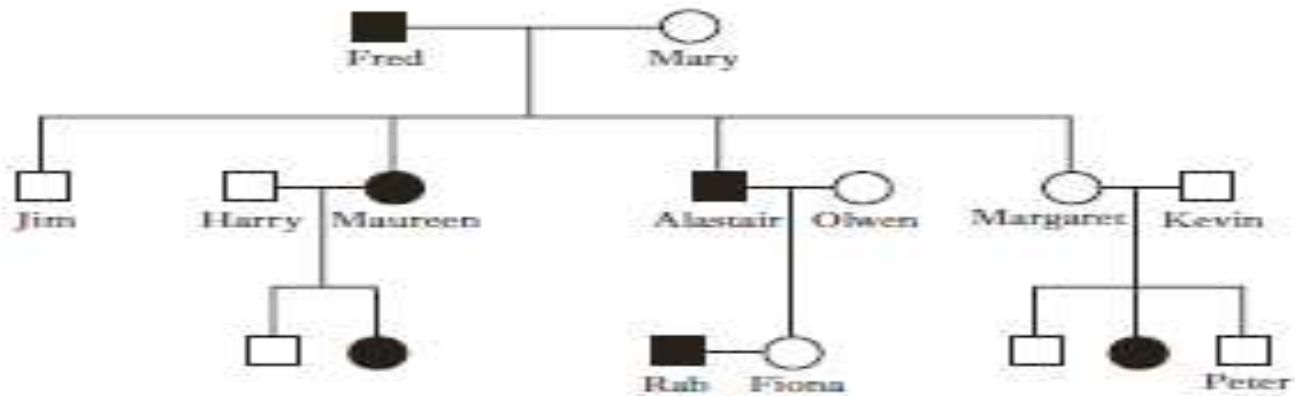
Tongue-rolling is an inherited characteristic. The diagram below shows the pattern of its inheritance in one family.

male roller

female roller

male non-roller

female non-roller



(a) (i) Using **R** for the dominant form of the gene and **r** for the recessive form, state the genotypes of:

1. Maureen _____

2. Jim _____

3. Kevin _____

(ii) If Rab and Fiona have a child, what are the chances of the child being able to roll its tongue?

Space for working

(iii) Which of the original parents could be described as true-breeding?

Tick (✓) the correct box.

Fred Mary

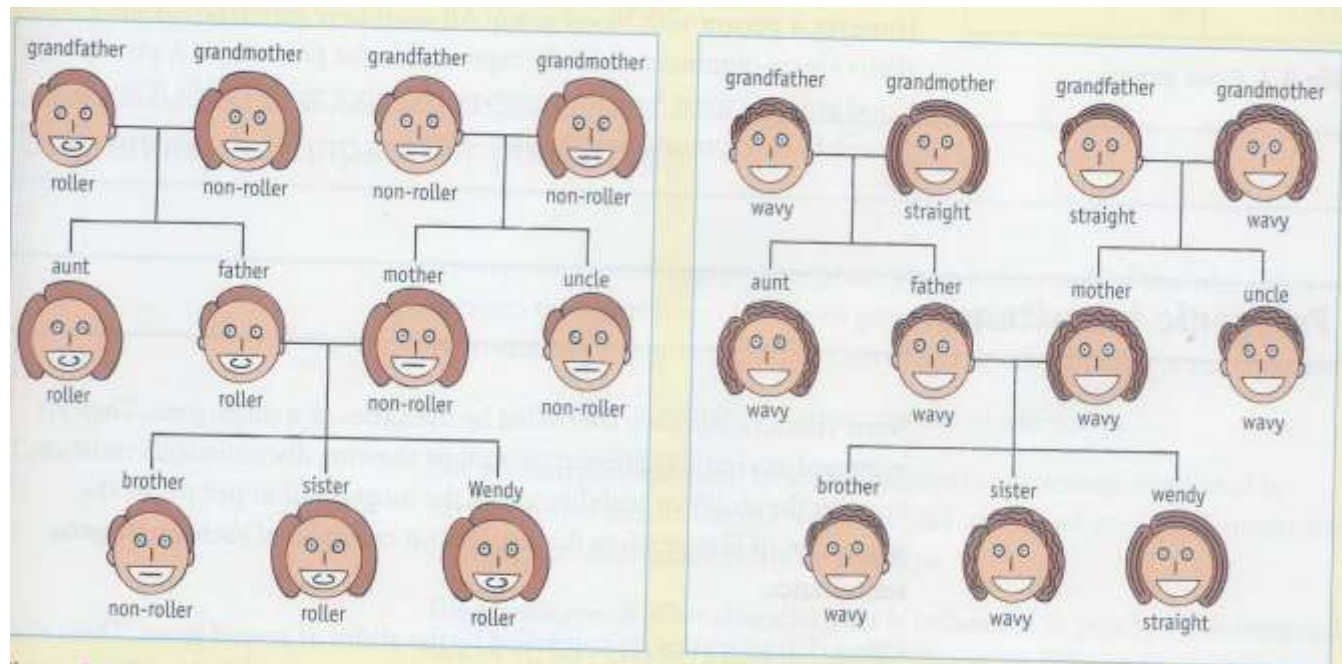
Both Neither

(iv) Name a tongue-roller from the F₂ generation.



Family Trees - used for identifying Individuals

- Use the family trees to answer the questions in the worksheets.



MANDATORY KEY AREA 7.

EFFECTS OF LIFESTYLE CHOICES ON ANIMAL TRANSPORT AND EXCHANGE SYSTEMS.





Effect of lifestyle choices on animal transport and exchange systems



LEARNING OUTCOMES

- To understand what is meant by physical and mental health
- To take physiological measurements and investigate how moderate exercise affects these measurements
- To understand the effects tobacco, alcohol, diet, stress and other environmental factors has on our health.



MENTAL HEALTH

Mental health refers to a person's state of mind or emotional wellbeing.

Working in groups and using the web site -

<http://www.mind.org.uk>



Write a report on a common mental health problem. Describe the symptoms of the condition and any lifestyle changes the person could make to improve their mental health.

DISCUSS your findings with your group and with the rest of your class.



PHYSICAL HEALTH

Physical health means good body health.

1. Regular physical activity (exercise),
2. Balanced diet,
3. Low alcohol consumption,
4. No drug abuse.

Physical health can be measured by taking **PHYSIOLOGICAL MEASUREMENTS**.

Physiological measurements include measuring -

- **BLOOD PRESSURE**
- **PULSE RATE**
- **RECOVERY TIME**
- **REACTION TIME**

Measurements taken can be compared with average values for healthy individuals, giving an unhealthy person the chance to change their lifestyle before it is too late.



Measuring Blood Pressure

- My blood pressure is: _____ mmHg.
- My pulse rate is: _____ bpm.
- My recovery time was: _____ minutes.
- My reaction time was: _____ seconds.
- My peak flow (lung capacity) was: _____

Answer the following questions in your jotter.

1. What effect did exercise have on your pulse rate?
2. If someone has a shorter recovery time than you are they fitter than you?
3. Write down **FOUR** healthier lifestyle choices you could make to reduce your pulse rate and improve your recovery time.

Copy and complete the sentences below:

Reaction rate gets _____ with practice. Drinking _____ slows down your reaction rate.

A low peak flow measurement could indicate the onset of _____.



Activity

- Collect a National 5 textbook
- Read and produce a summary on the following human activities and their affect on the human body

1. High Fat diet;
2. Tobacco;
3. Alcohol;
4. Stress;
5. Lack of Iron in the diet;
6. Toxic heavy metals;
7. Carbon monoxide pollution;
8. Radiation.

- Homework Task:
- Write a short report on the effect of Tobacco **and** Alcohol on the health of the human body



NHS DEBATE

- Read the case study on page 135 of the textbook
- Class Debate/discussion.





Effects of lifestyle choices on animal transport and exchange systems

Success criteria:

- I know the difference between physical health and mental health.
- I can identify some healthier lifestyle choices that will improve the physical and mental health of an individual.
- I can take physiological measurements such as blood pressure, pulse rate and reaction time and describe the effect of moderate exercise on these measurements.



Lifestyle Effects on Health

The Cardiovascular System

Cardiovascular disease means all the diseases of the heart and circulation, including CORONARY HEART DISEASE and STROKES

How the cardiovascular system works:

<http://www.bhf.org.uk>

Using the British Heart Foundation web site

<http://www.bhf.org.uk>

Find out how you can avoid cardiovascular disease(CVD)

- Make a short note on each of the 3 main types of CVD - Angina, Heart Attacks and Strokes
- Find out what atherosclerosis is.
- Make a list of the main factors which increase your risk of CVD.
- Which ones in your list are most important for your lifestyle - discuss this in your groups.



OBESITY

Obesity is one of the major causes of heart disease.

Using the NHS Choices web site:

<http://www.nhs.uk/Pages/HomePage.aspx>

Find out :

- What BMI is and how it can be used to measure obesity
- The health risks associated with being obese
- How your lifestyle choices can increase or decrease your chances of becoming obese, and the effects this will have on society.

WRITE a report of around 100 to 200 words on your findings.

READ the passage "Young at Heart" in your workbook and answer the questions that follow it in your jotter.



LUNG CANCER

Lung cancer is a cancer that arises from the cells in the lungs. It can start in the windpipe, the bronchus or the lung tissue. It can then spread to other body tissues and organs.

WATCH the VIDEO on LUNG CANCER.

www.macmillan.org.uk/lungcancer

WRITE a SHORT REPORT about lung cancer.

Your report should include the following information:

- Symptoms of lung cancer
- Risk factors
- How lung cancer is diagnosed
- How lung cancer is treated

