

BROMLEY TRUST ACADEMY

Science department

Year 9 revision:



Name:

In Biology, we often need to look at very small things using the piece of equipment shown below called a

Label all of the parts and say what they are used for.



Describe how this piece of equipment is useful in Biology

.....
.....

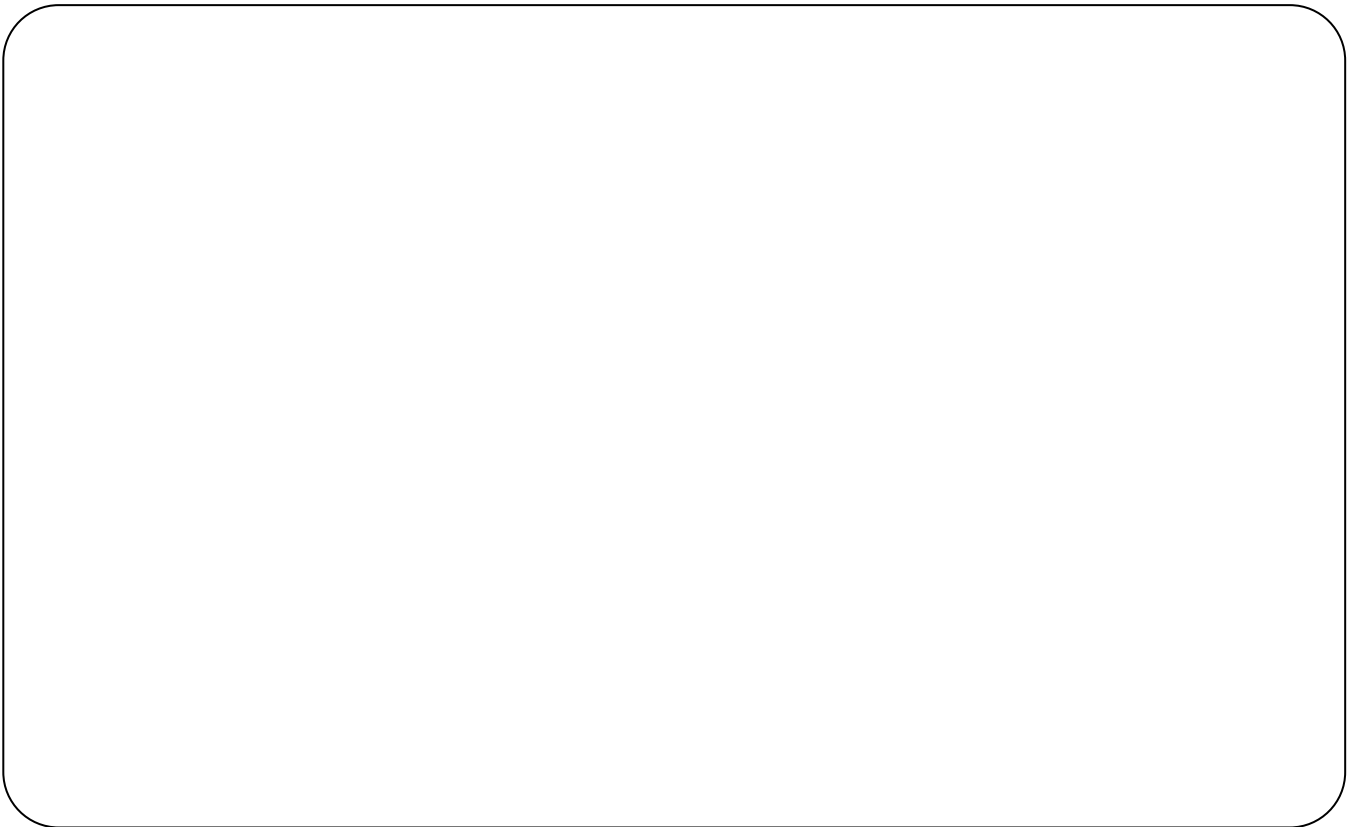
Cells

The smallest units of life are called cells. Some plants and animals have only 1 cell but most are built up of many cells joined together.


Animal and plant cells have many similarities and some differences.

In the spaces below, draw and label a plant and an animal cell.

Plant cell



Animal cell



Cells

Often in Biology we look at pictures that are not the same size as they are in real life. In order to make accurate statements, we need to know how many times the picture has been magnified.

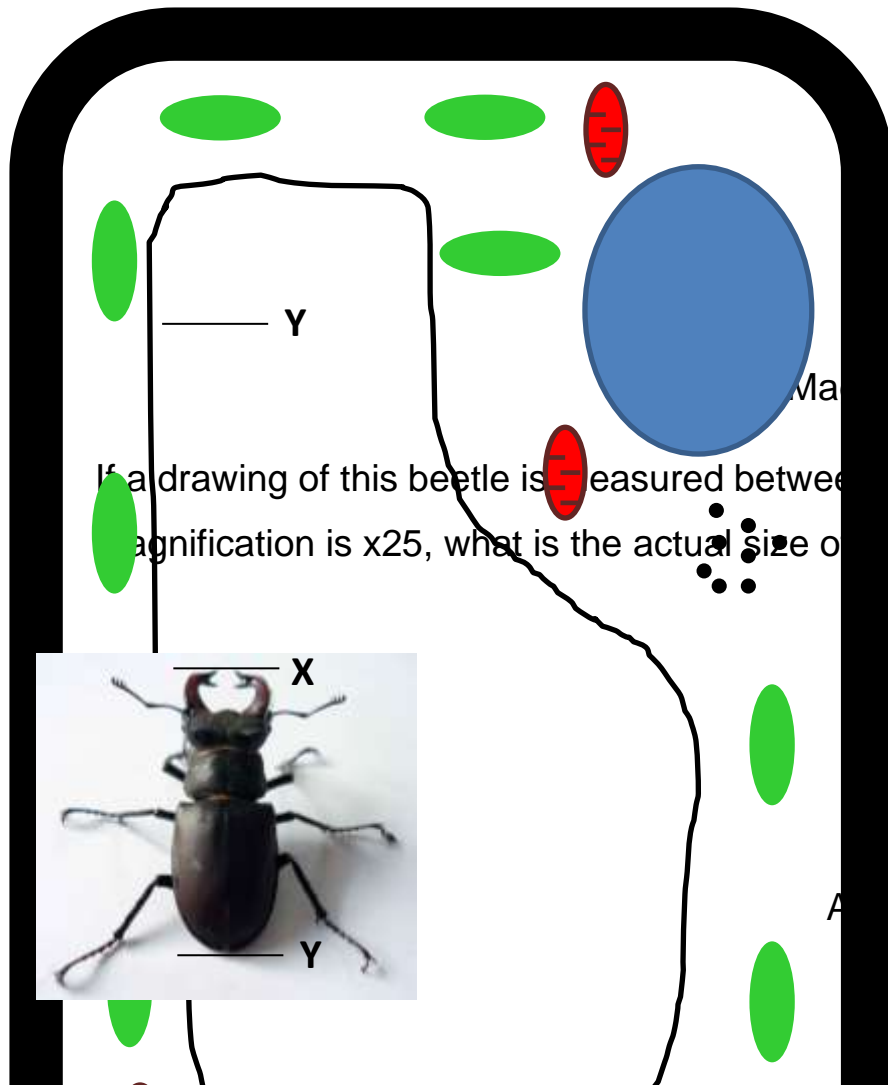
This is done with the following calculation:

$$\text{Magnification} = \frac{\text{measured size}}{\text{actual size}}$$

Calculate the magnification of your drawing of a plant cell compare to this diagram below. (show your working)

What is the **actual size** of the diagram below between X-Y:.....

What is the **measured size** of your diagram between the same points:.....



Magnification =

If a drawing of this beetle is measured between X-Y and is 12.5cm and the magnification is x25, what is the actual size of the beetle?

Actual size =

Cells

Cells have many important features.

Complete the table below to describe the job that each part does and say if it is found in plant or animal cells (or both!).

Part	Job	Plant or animal
Nucleus		
Cytoplasm		
Cell membrane		
Mitochondria		
Cell wall		
Ribosomes		

Plant cells have some features that animal cells do not have, name two:

1)

2)

Cells

In both plants and animals there are specialist cells that carry out very specific jobs and have very specific shapes.

Complete the table below with a diagram of each cell type and what special features it has to do its job.

Cell	Diagram	Special features
Sperm cell		
Red blood cell		
Epithelial cell		
Root hair cell		

Use this page to produce a poster or mind map about cells

Moving through membranes

Membranes are very important to cells and they control the movement of certain molecules in and out of the cells.

Many molecules are able to cross the membrane by **diffusion**.

What does diffusion mean?

.....

.....

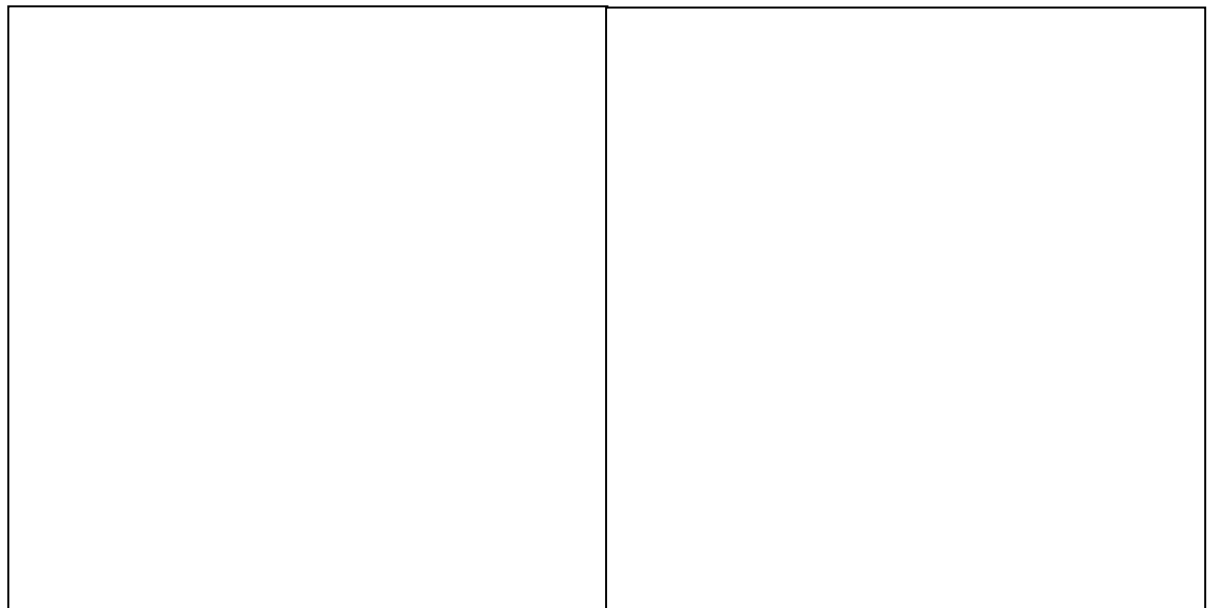
.....

.....

In order for molecules to move by diffusion, there must be a **concentration gradient**. In the boxes below, draw circles to represent glucose (sugar) molecules in a concentrated and dilute solution.

Concentrated solution

Dilute solution



Draw an arrow to show which way diffusion will occur.

Moving through membranes

Diffusion can occur in both liquids and gases but at different speeds.

In which state does diffusion happen faster and explain why?

.....
.....
.....
.....

Osmosis is similar to diffusion but only involves.....
and a special type of membrane.

Describe osmosis:

.....
.....
.....

Osmosis is very important to both plant and animal cells but if animal cells take in too much water they burst.

Why do plant cells not burst when they take in lots of water?

.....

When plant cells are completely swollen with water they are

When plant cells have shrunk because they do not have enough water they become

Moving through membranes

Sometimes molecules are needed inside cells even though there are already a lot of them in the cells. In order to get the molecules into the cells, energy must be used.

This process is called:

This process uses special proteins in the cell membrane called **carrier proteins**.

Using the space below, draw a diagram of a cell membrane showing the carrier proteins and describe how they work.



Moving through membranes

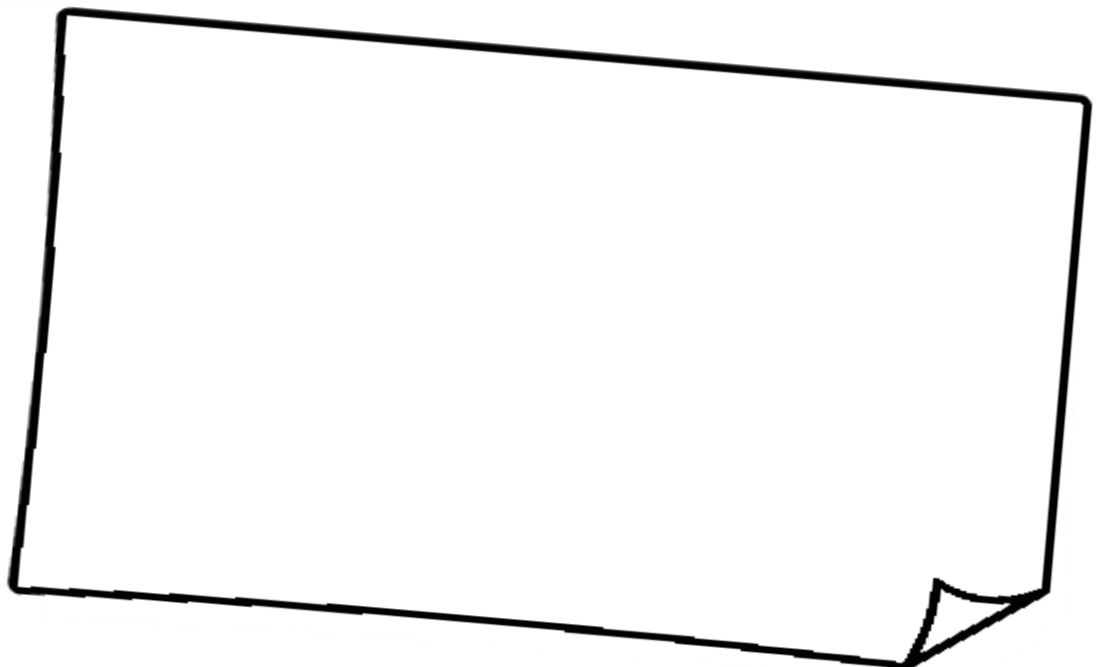
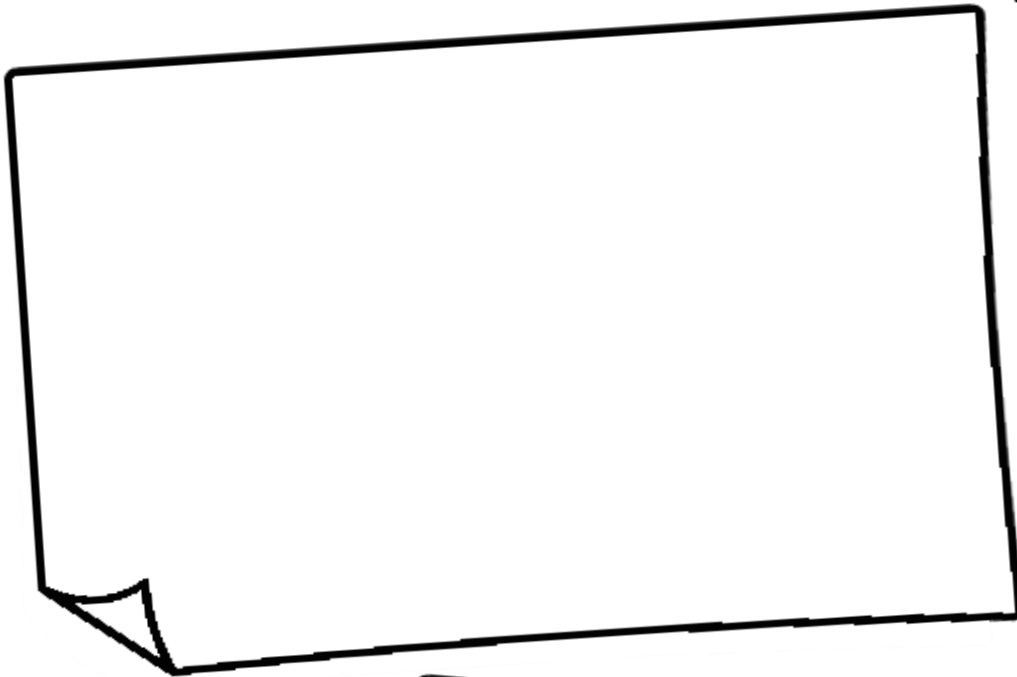
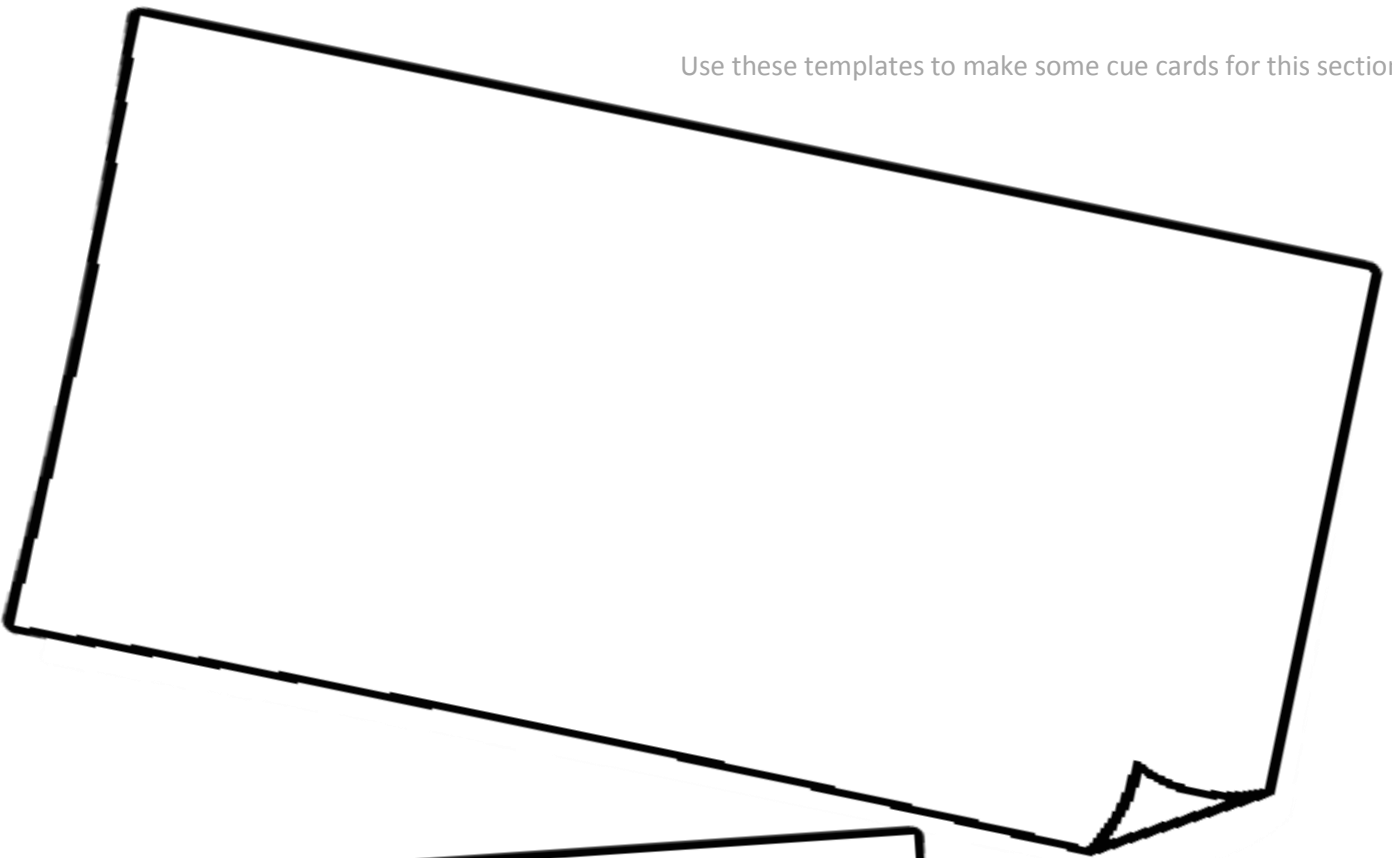
All of these ways of getting across cell membranes are very important.

Complete the table below to compare the different types of movement and give an example for each type.

	Diffusion	Osmosis	Active transport
Up or down a concentration gradient			
Requires energy			
Requires a membrane			
Movement of water molecules			
Example			

Have you checked out BBC bitesize yet? www.bbc.co.uk/bitesize/ks3/

Use these templates to make some cue cards for this section



Proteins and DNA

Proteins are a very important type of molecule and have many essential jobs to ensure that organisms can survive.

We are able to build our own proteins but to do this we must eat proteins from other organisms. List 3 sources of protein in our diet;

1)

2)

3)

Proteins are made of lots of smaller molecules joined together in long chains. We say that proteins are **polymers**.

The smaller molecules are called.....

Using different shapes, draw some of these small molecules below



Now draw a chain of 15 of your shapes all joined together in any order.



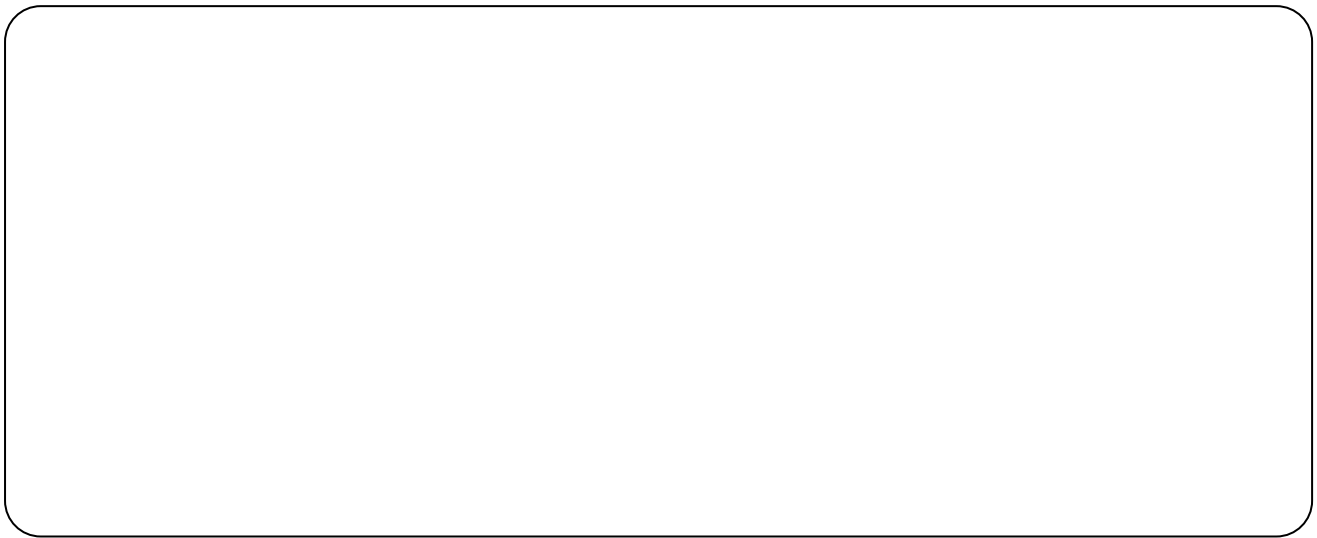
This is a protein!

Proteins and DNA

Some of the amino acids in the protein chain, form bonds between each other which makes the chain fold up and change shape.

This shape is very important as it allows the protein to do it's job.

Using the same protein that you have already drawn, show how bonds between the amino acids cause the protein to change shape.



In reality, proteins are very complex and they form 3D shapes based on the order of their amino acids. The sequence of amino acids is coded in our DNA.

Complex proteins have very important jobs in both plants and animals.

List 3 types of proteins and the jobs that they do:

Type:

Job:

Type:

Job:

Type:

Job:

Use this page to make a cartoon strip all about proteins!

Enzymes and digestion

Without **enzymes**, the chemical reactions that are essential for life would be too slow and organisms would die.

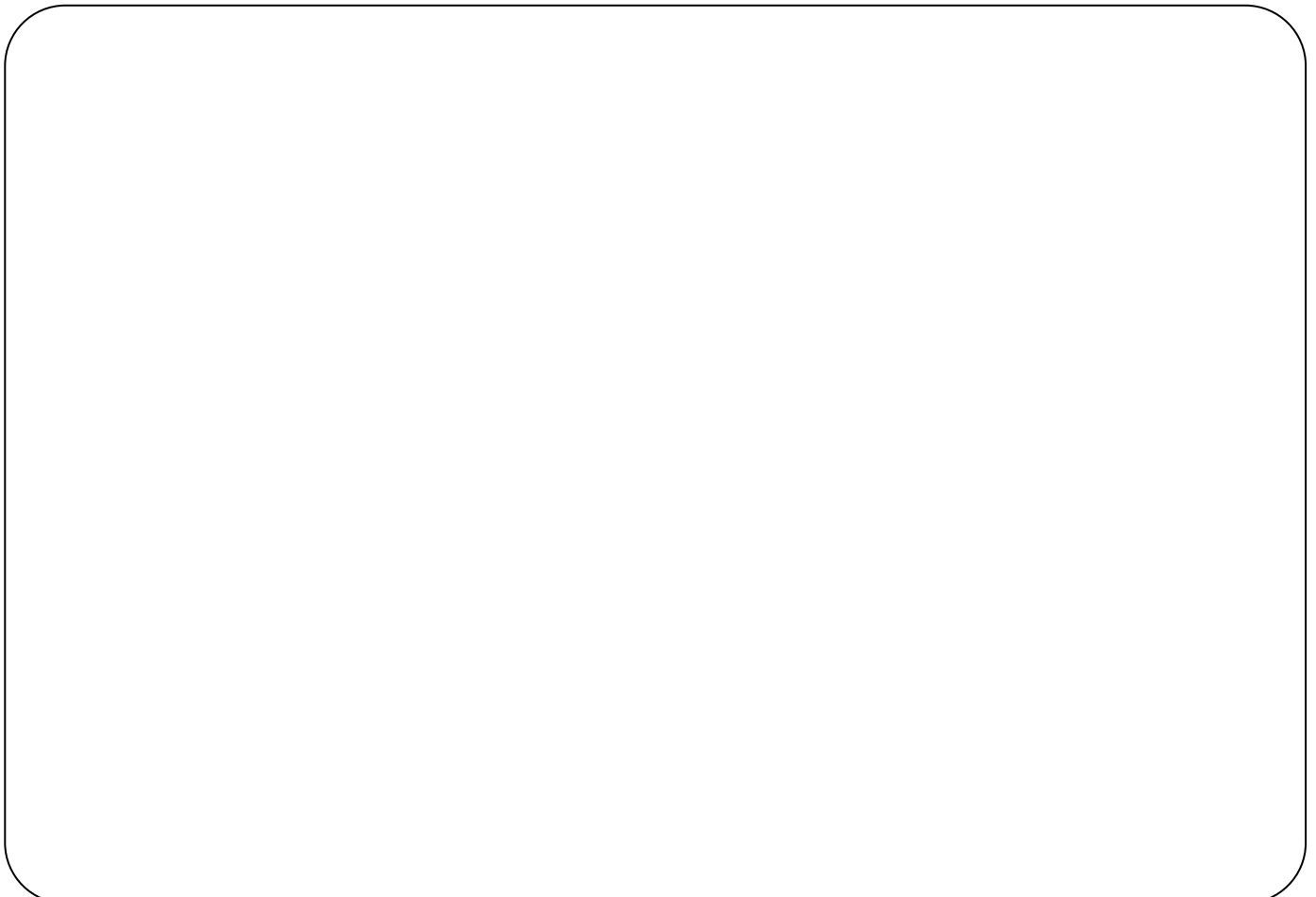
The name for these reactions is our

We say that enzymes are biological catalysts, what does this mean:

.....
.....
.....

Enzymes can either break molecules apart or build molecules up. In order to do this the enzyme and the substrate (the name of the molecule being catalysed), must have shapes that fit each other.

This is called the lock and key model. Draw a diagram to show this model.



Enzymes and digestion

Enzymes work best in particular conditions and if the conditions change too much, their shape changes and they can no longer do their job.

The shape changes because the bonds holding the amino acids together start to break, this is called.....

The enzymes in the human body work best at°C

In the space below, draw a graph to show how enzyme activity changes as the temperature increases.

Why is enzyme activity low at low temperatures?

.....

.....

.....

.....

Enzymes and digestion

In order for us to absorb nutrients from our food, we have lots of enzymes that break down different types of food at different stages in our digestive system.

Write a definition of digestion:

.....

.....

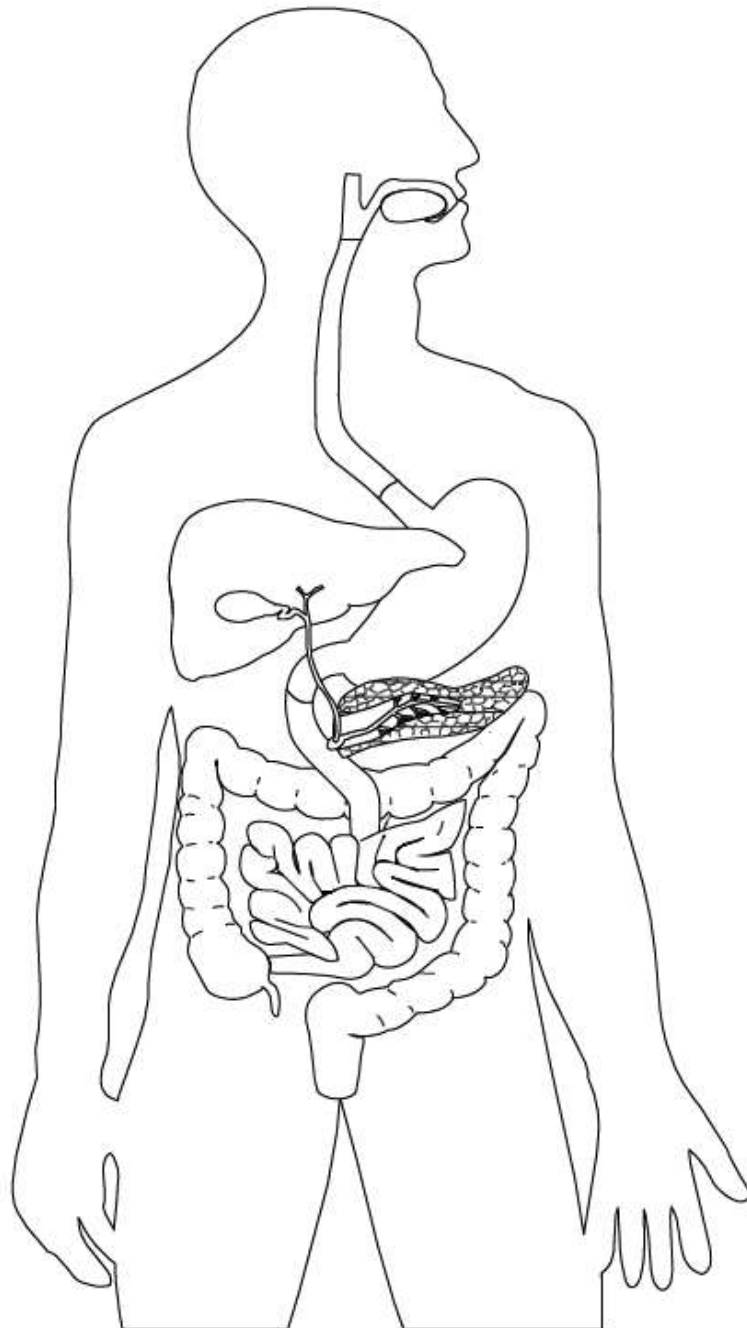
.....

Complete the table to show the different types of enzymes, the substrates they digest and the products that are made.

Enzymes	Substrate	Products
	Starch	
Carbohydrase		
	Protein	
		Fatty acids Glycerol

Enzymes and digestion

Label this diagram of the digestive system



Complete the key below with different colours and then indicate on the diagram where each enzyme is produced in the body:

Amylase		Protease	
Carbohydriase		Lipase	



Make a quick quiz to test your friends.



Quick fire quiz

1).....

.....

2).....

.....

3).....

.....

4).....

.....

5).....

.....

6).....

.....

7).....

.....

8).....

.....

9).....

.....

10).....

.....

.....



**KEEP
CALM
AND
DO THE
TEST**

Respiration

Respiration is one of the 7 key process of life, what are the other 6?

M.....

Respiration

S.....

G.....

R.....

E.....

N.....

What does respiration actually mean?

.....

.....

.....

.....

Respiration happens inside all living cells.

Where inside cells does respiration happen?

.....

.....

Respiration

There are different types of respiration. When oxygen is present respiration is called

We can write what happens during respiration like an equation.

Using words, write out the equation for this type of respiration:

The products of respiration are considered to be waste and need to be excreted from the body.

What test can we do to see the waste products of respiration?

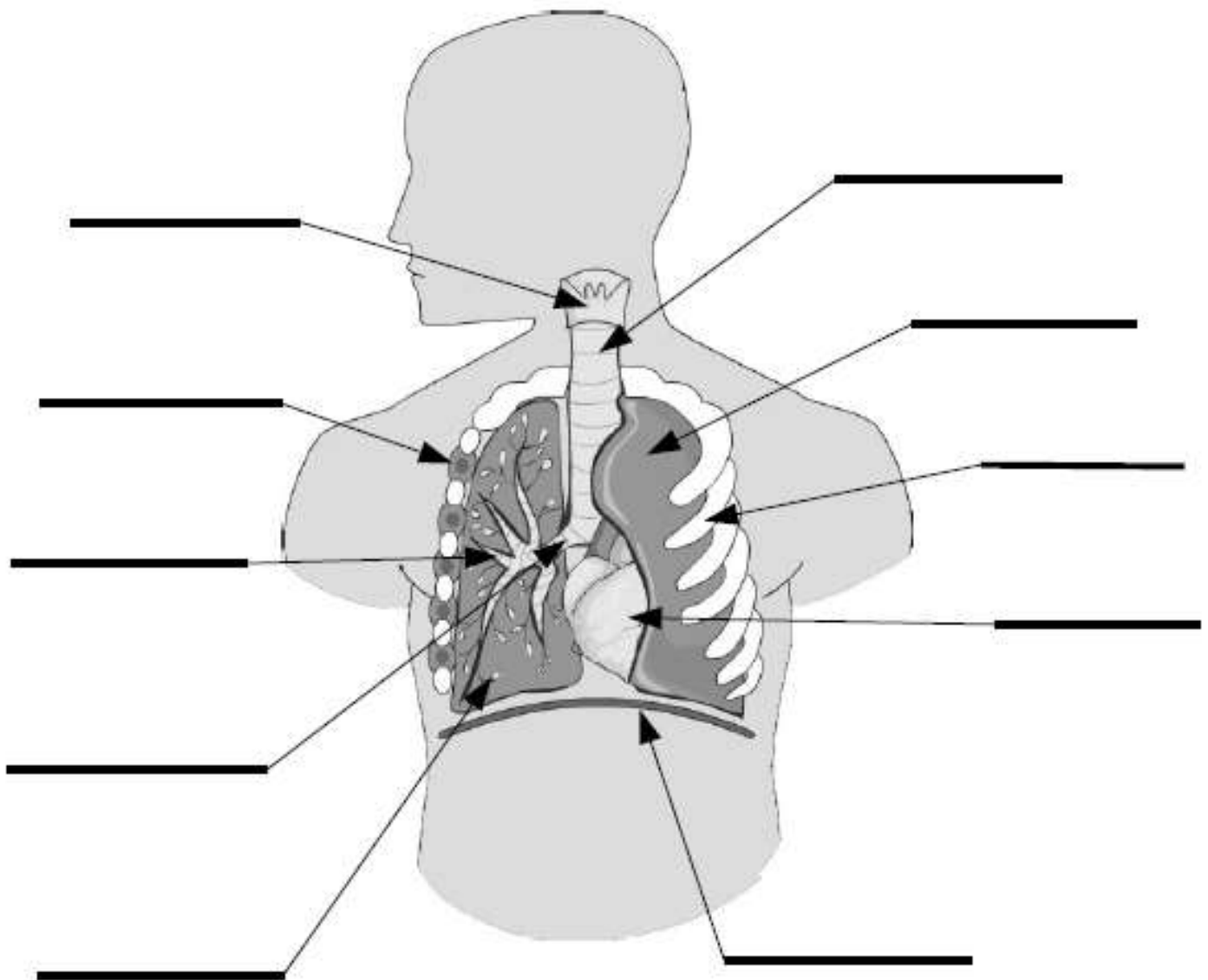
Water:

Carbon dioxide:

Respiration

We get the glucose for respiration from the food that we eat but in order to get the oxygen we must take air into our bodies using specialist structures.

Use the labels to complete the diagram



larynx	trachea	intercostal muscle	alveolus (air sac)	diaphragm
heart	rib	lung	bronchus	bronchiole

Respiration

Breathing involves several different sets of muscles working together.

Explain what happens when we inhale and exhale using as many of the words from the previous page as possible.

.....

.....

.....

.....

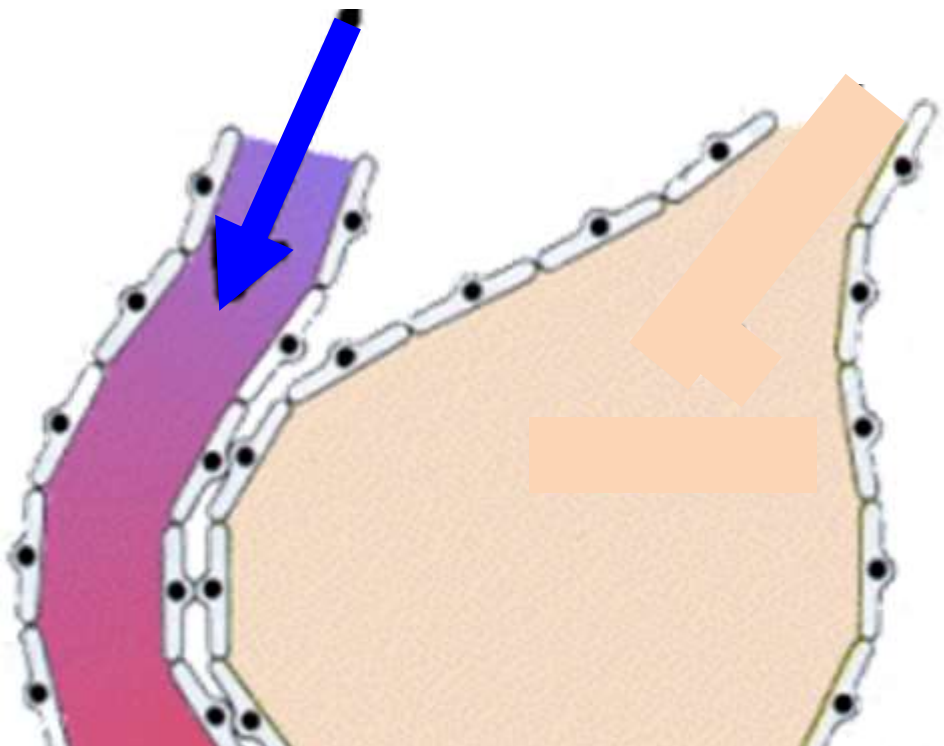
.....

.....

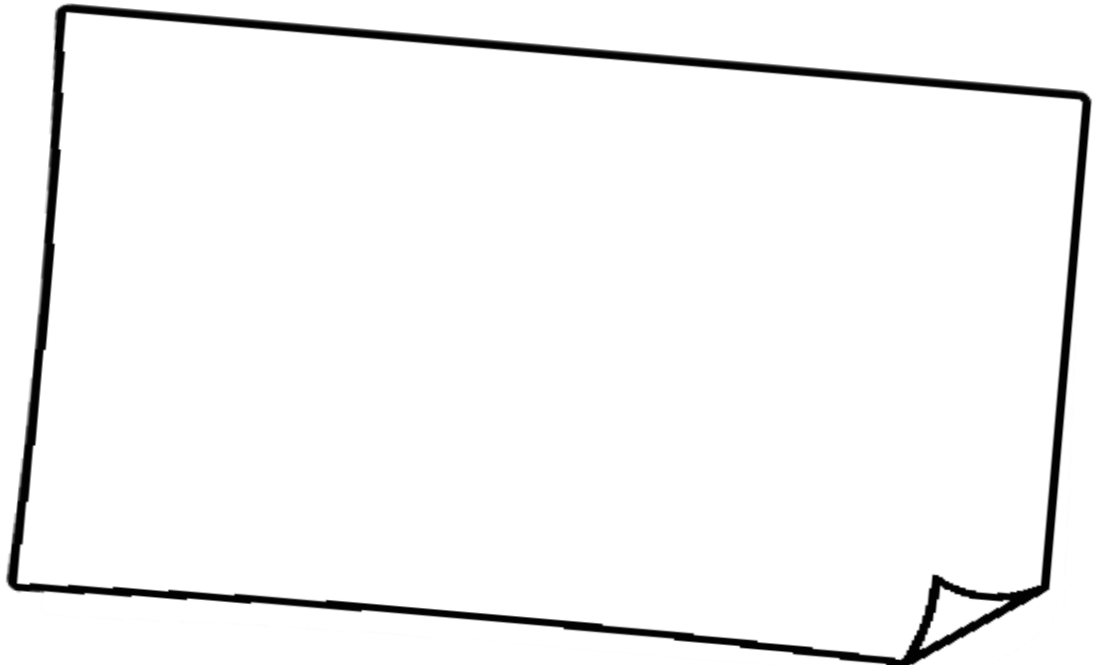
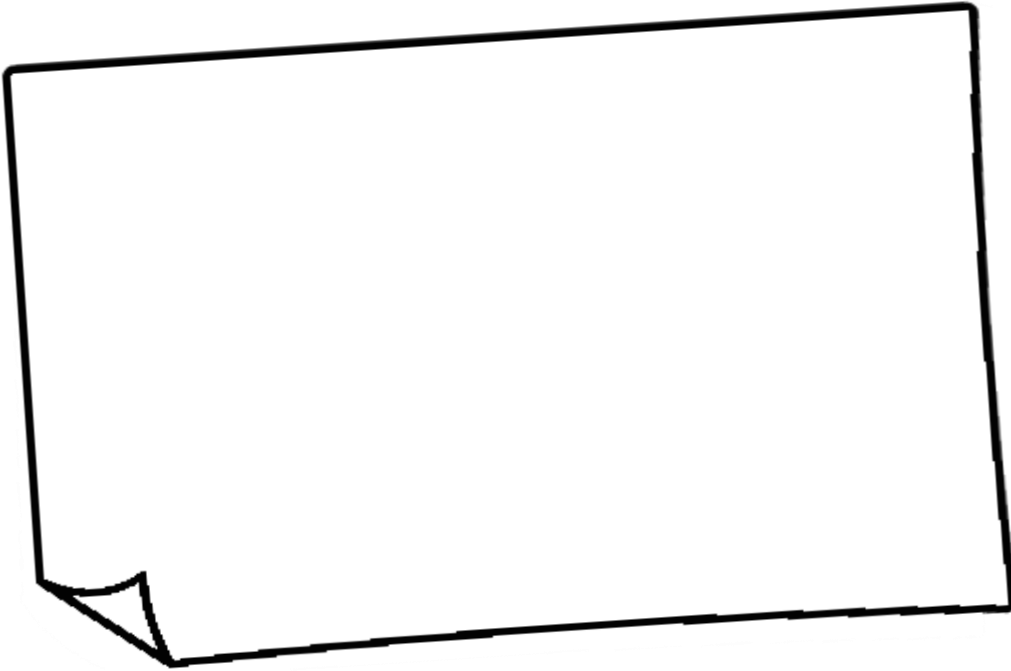
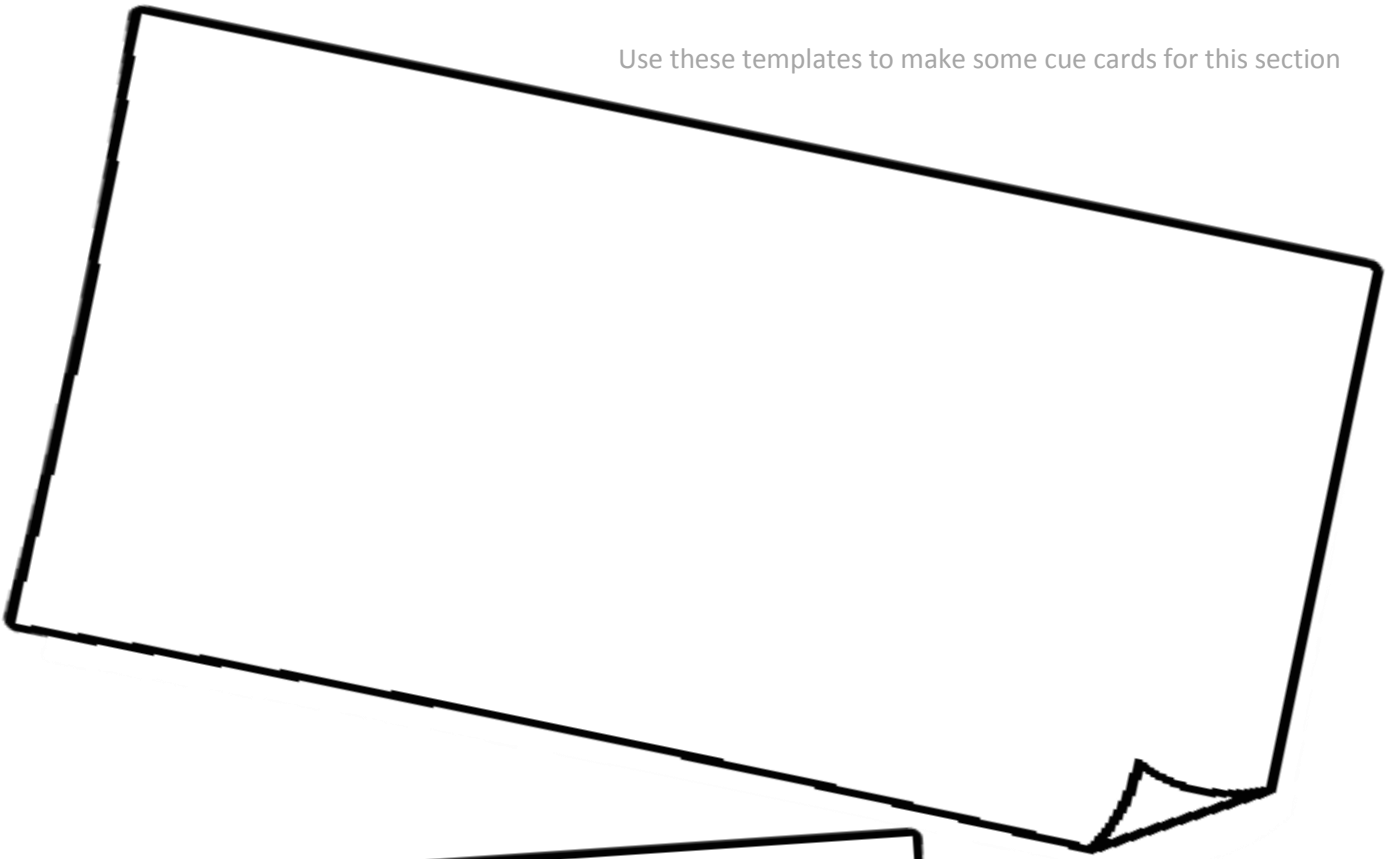
This diagram shows a capillary next to an alveolus but it is incomplete.

Complete the diagram to show how carbon dioxide and oxygen are **exchanged** between the blood and the air in our lungs.

This is an exam



Use these templates to make some cue cards for this section



Exercise

When we exercise we are moving a lot of our muscles which requires a lot of energy which comes from respiration. In order to meet the extra demands for energy during exercise, several changes happen.

Complete the sentences below by stating what the change is and why it happens.

During exercise our breathing rate

.....
.....
.....
.....

During exercise our heart rate

.....
.....
.....
.....

During exercise our skin becomes

.....
.....
.....
.....

Exercise

If we do hard exercise like sprinting, we can not get oxygen into our bodies fast enough and another type of respiration occurs.

This is called respiration

Write our the word equation for this type of respiration:

The waste produced from this type of respiration causes problems with our muscles and must be removed.

In order to maintain all of the conditions in the body we have special detectors in our brain and throughout the body.

The name for maintaining the internal conditions of the body is

.....

What are the 3 main conditions that need to be maintained:

1)

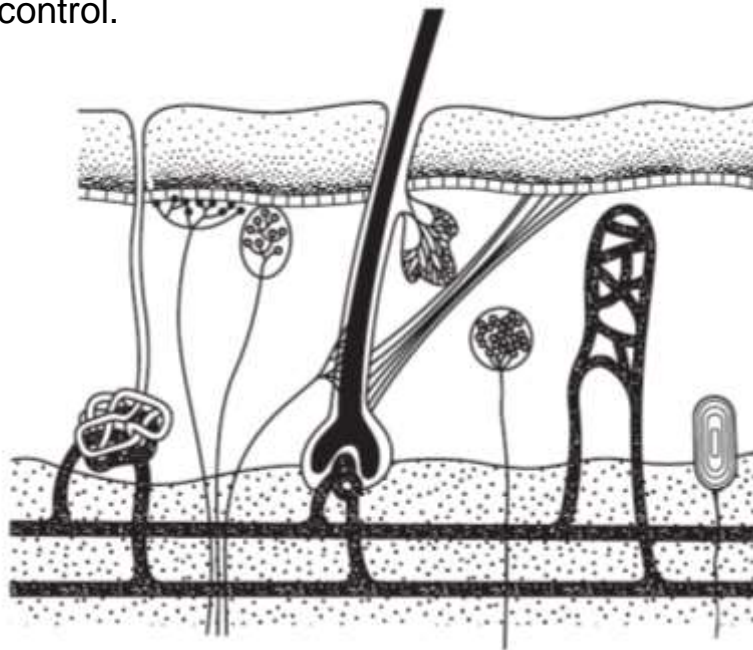
2)

3)

Exercise

When we respire more during exercise, we produce a lot more heat which could effect our metabolism by causing enzymes to change shape.

We have several structures in our skin that help us control our temperature. On the diagram below, label 3 structuresinvolved in temperature control.



How do each of these strucutres change when we are too hot and what effect does the change have?

Structure 1:

.....

Structure 2:

.....

Structure 3:

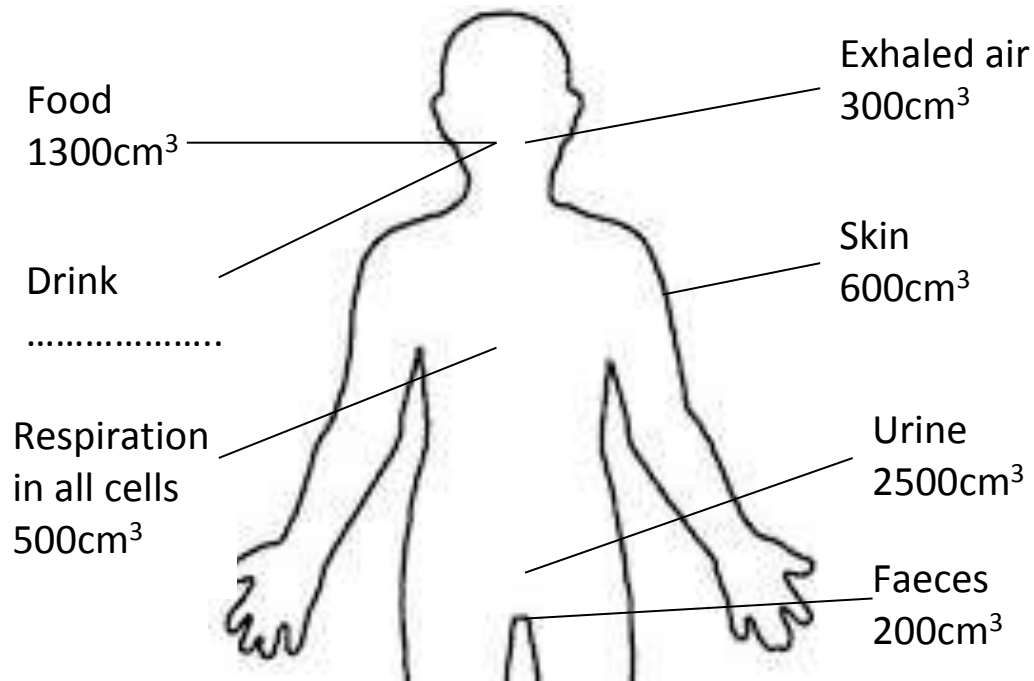
.....

Exercise

One of the ways that we cool the body down is to produce sweat which evaporates on the skin using heat from the body. We need to balance the amount of water that we take in and pass out of our bodies.

Water gain

Water loss



What is the total water loss for this person?

How much water would this person have to drink to balance the amount of water lost?

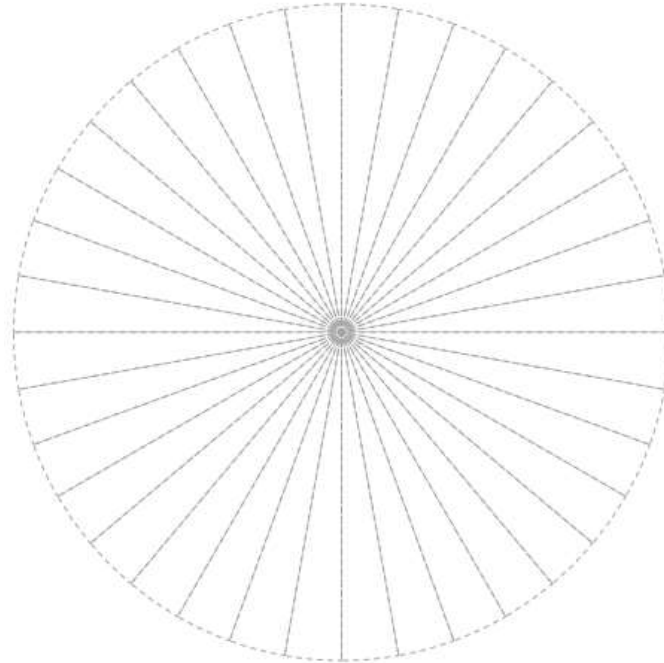
What is the proportion of water lost through the skin?.....%

When a person exercises they lose more water through sweating, what happens to the urine when we are dehydrated?.....

.....

Exercise

Using the data in the previous exercise, complete the pie chart below to show **water loss**. Remember to label the pie chart.



Our blood glucose levels changes throughout the day. When we do lot's of exercise our blood glucose level goes down. When during the day would our blood glucose level be the highest?

.....

What organ in the body detects the blood glucose levels?

This organ produces different hormones which are chemical messengers.

What are the hormones called and what effect do they have?

Hormone 1:

.....

Hormone 2:

.....

Use this page to produce a poster or mind map about exercise and homeostasis.