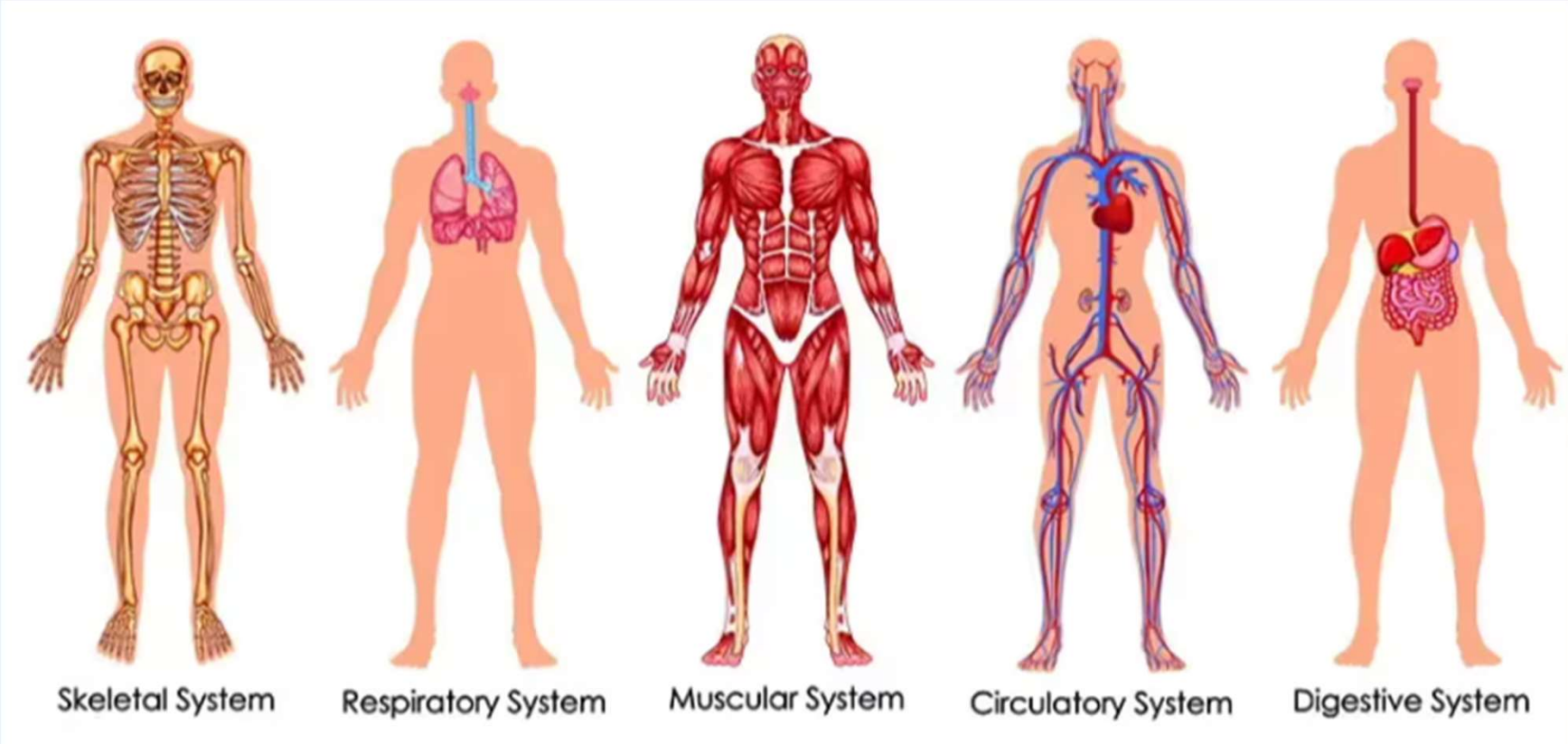
Body Systems



KHS S2 Science

Cell Organisation

26/03/2025

Page 4

Starter

How many body systems do you know of? List as many as you can.

_____

_____

Cell Organisation

26/03/2025

Page 4

Learning Intentions:

- To be able to describe how the body is organised.
- To be able to give examples of the main organs and systems of the body.

Cell Organisation

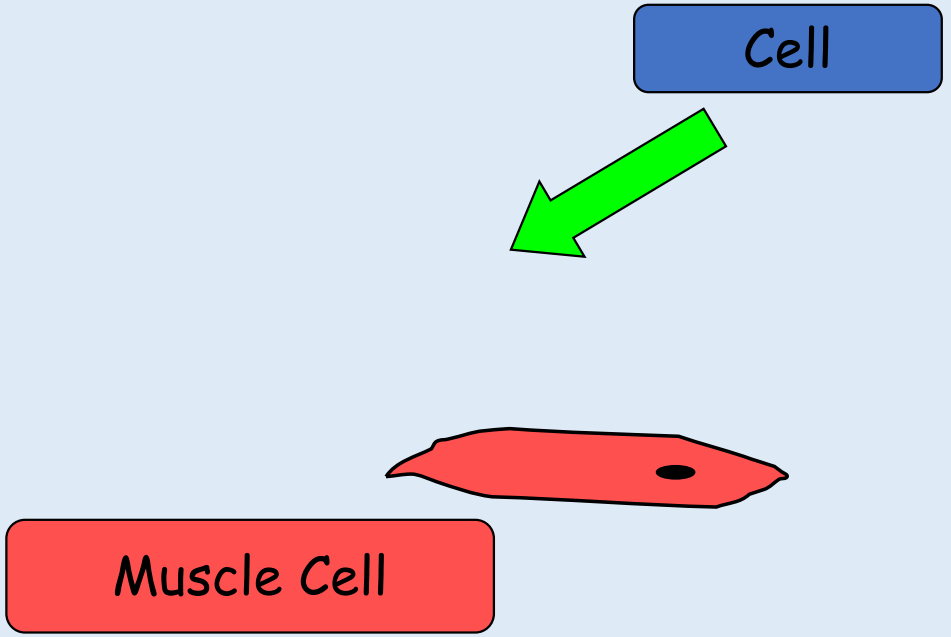
26/03/2025

Success Criteria

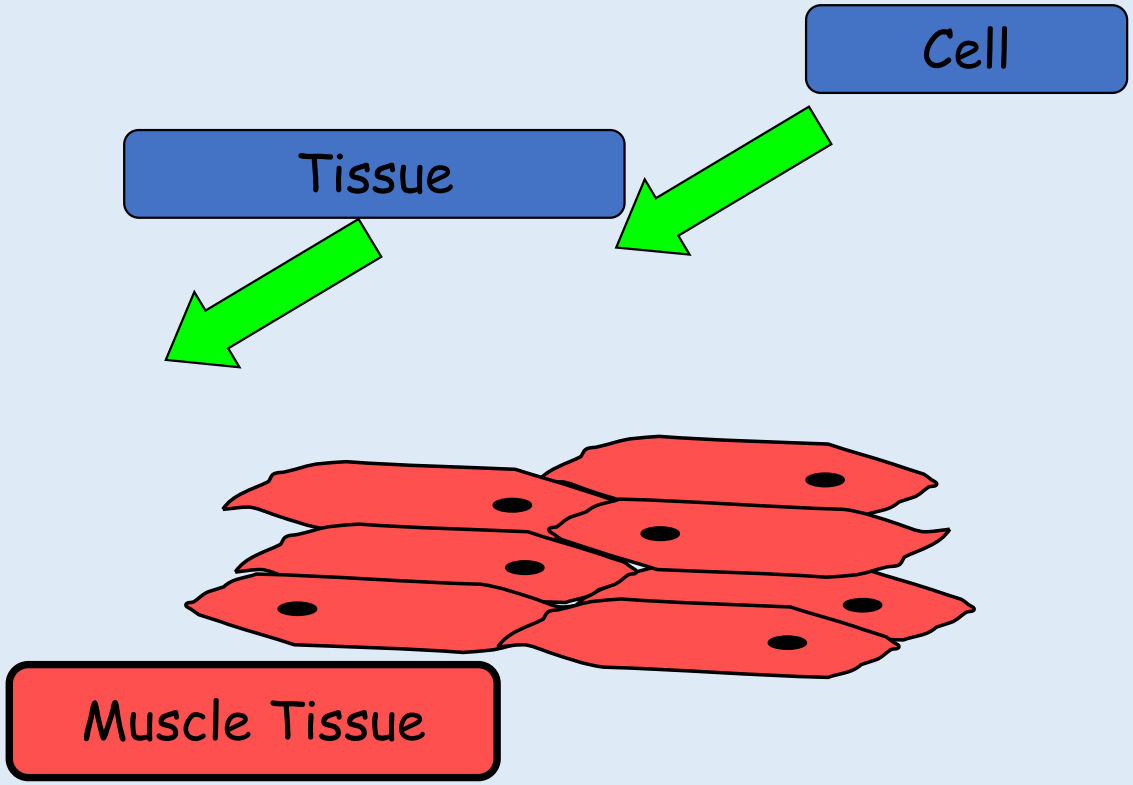
- ❑ I can describe how the body is organised.
- ❑ I can give examples of the main organs and systems of the body.

The cell is the basic unit in the bodies of living things.

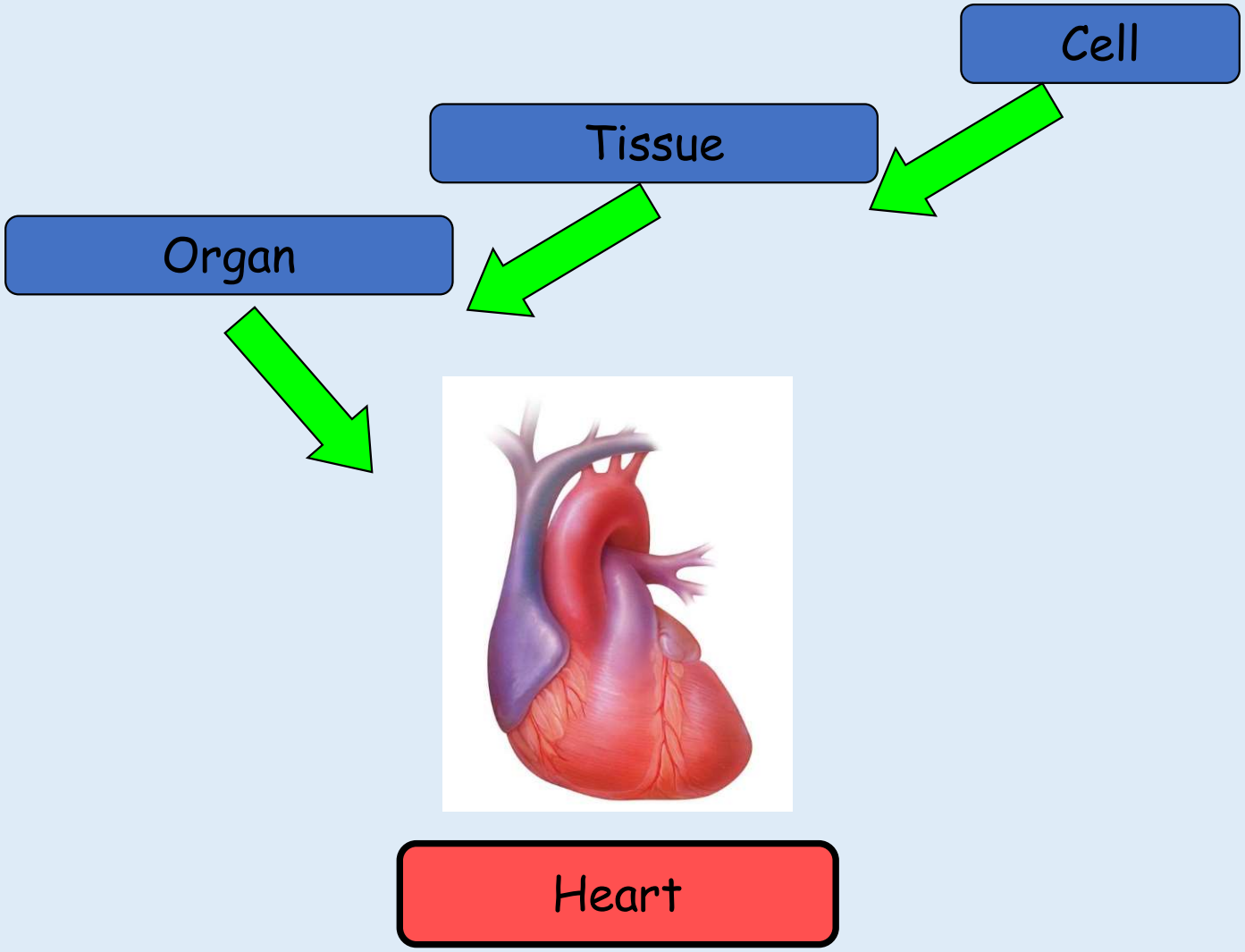
These living things are made up of a variety of different cell types - specialised cells that have a particular jobs.



In a large organism, like a mammal, the specialised cells have to group with other cells of the same type – tissues.



A body organ is made up of several types of tissue.
The heart is an organ made up of muscle tissue.



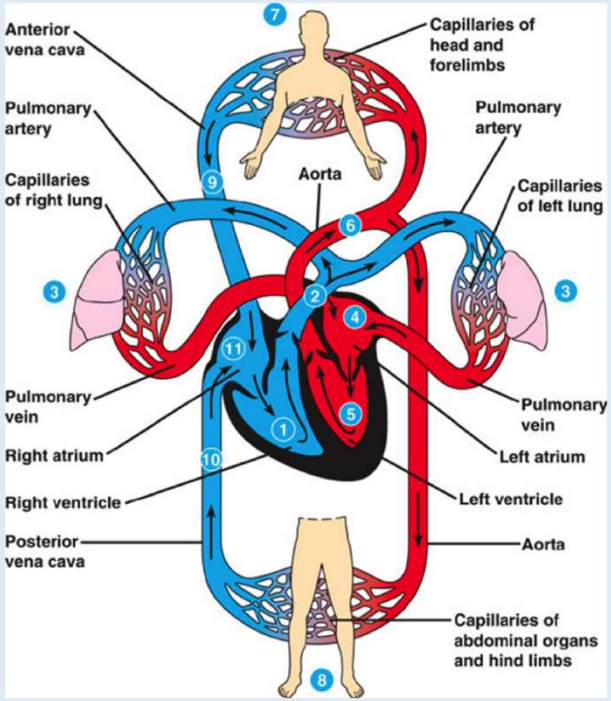
Several organs working together can be arranged into a body system. Each system has a specific job to do.

Cell

Tissue

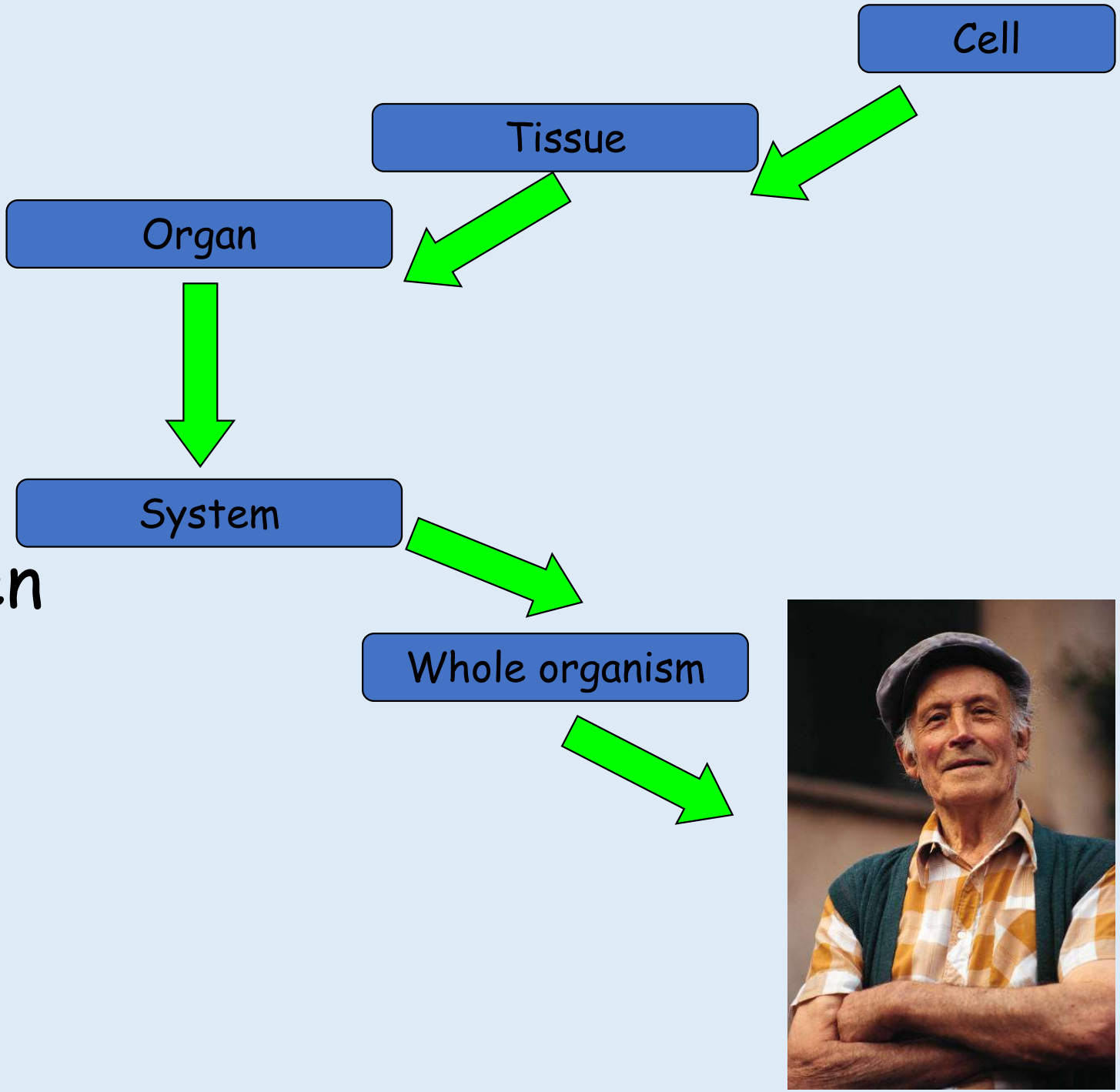
Organ

System



Circulatory System

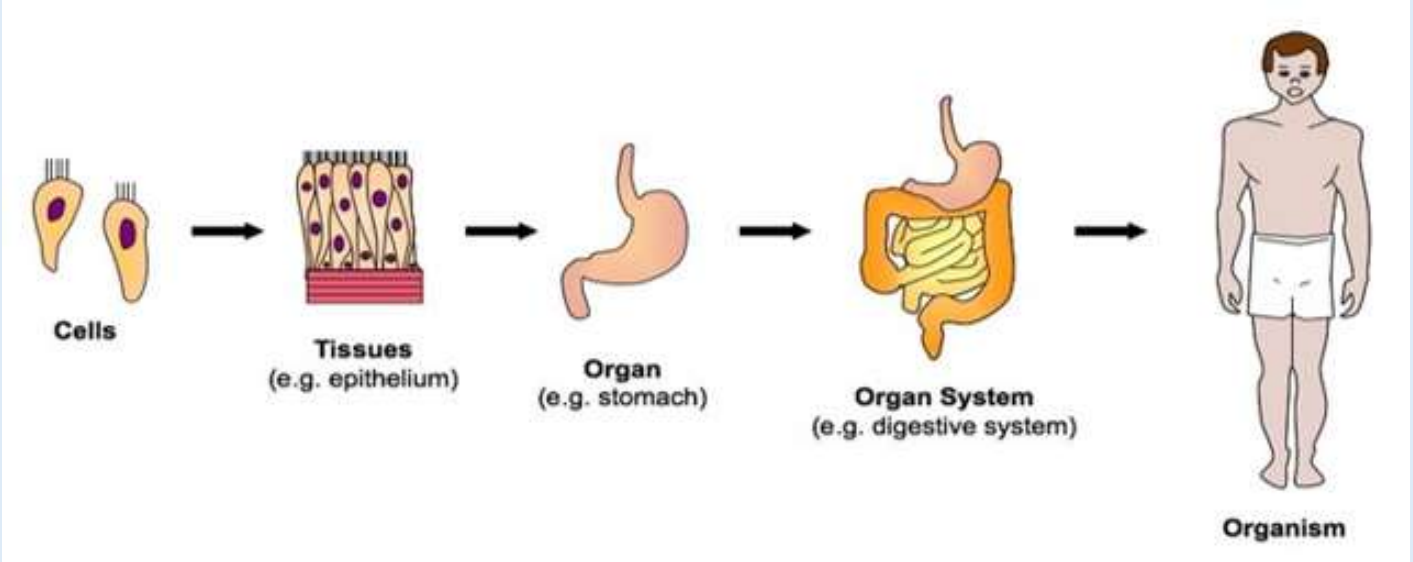
All systems form the complete organism when working together.



Cell organisation

Page 4

Cells which carry out similar roles join together to make tissues which build up into organs. Groups of organs work together to form organ systems.



Cell organisation

System

Tissue

Whole organism

Organ

Sort these from simplest structure to most complicated

Cell

Learning Check

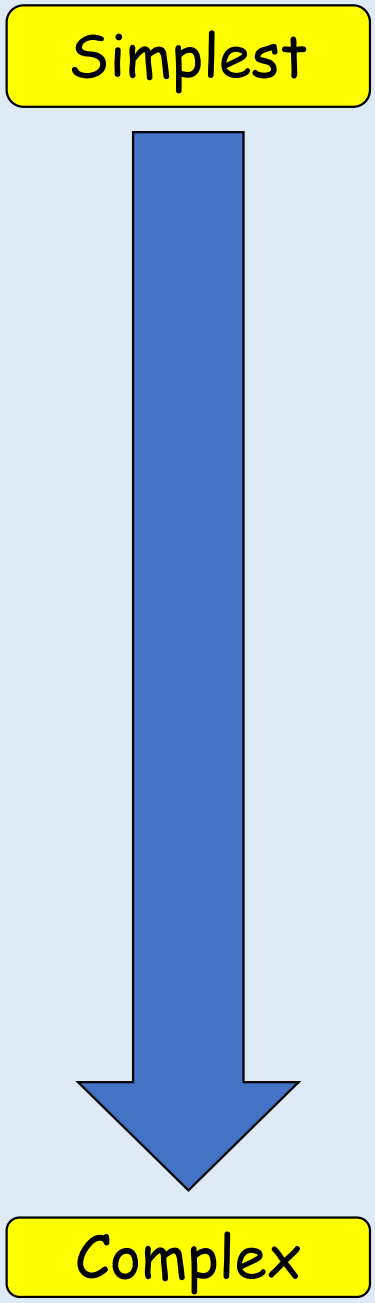
Cell

Tissue

Organ

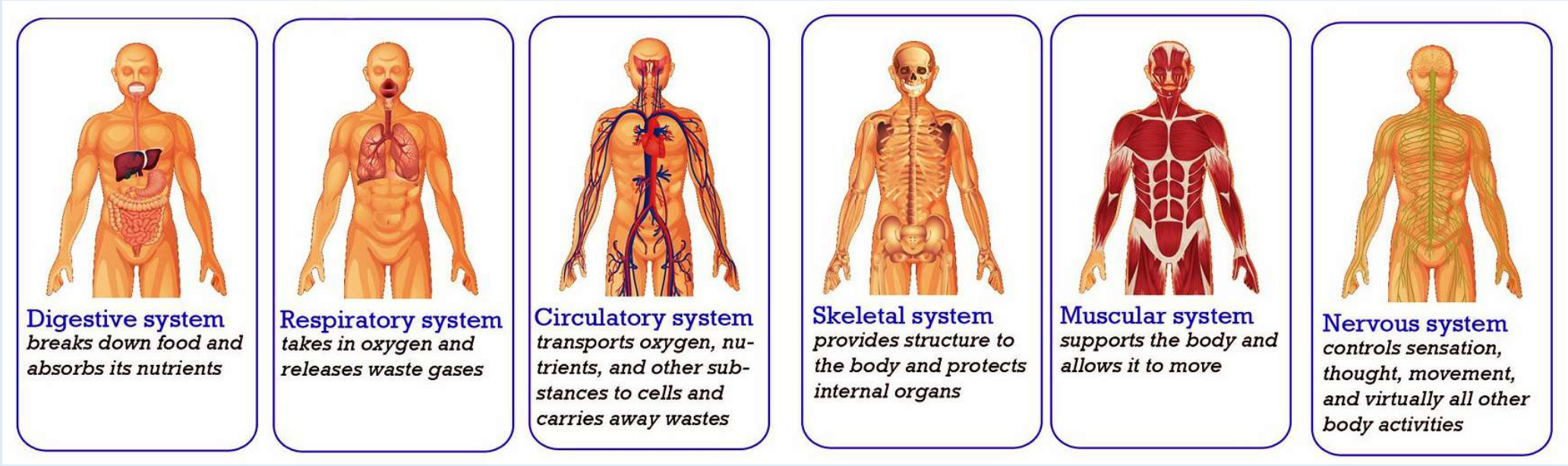
System

Whole organism



Body Systems

- Examples of body systems are circulatory, respiratory, digestive, skeletal, nervous and reproductive.
- Later in this unit you will learn more about some of these systems.



Build a Body Game

- Arrange yourselves into teams of 4.
- Collect a Pupil Game Sheet per player, a dice and a team set of Build a Body Game Cards.
- The youngest player rolls the dice first, each number represents a different body system:

1. Digestive system
2. Respiratory system
3. Circulatory system
4. Skeletal system
5. Muscular system
6. Nervous system

- Add the correct system to your game sheet, the first person to build a complete organism wins!

Plenary

Can you name 5 keywords from today's lesson?

Blood

26/03/2025

Page 6

Starter

Write down three different cell types and describe their structure.

_____

_____

Blood

26/03/2025

Page 6

Learning Intentions:

- I am learning about blood.

Cell Organisation

26/03/2025

Success Criteria

- ❑I can state the components of blood.
- ❑I can describe the function of our blood.

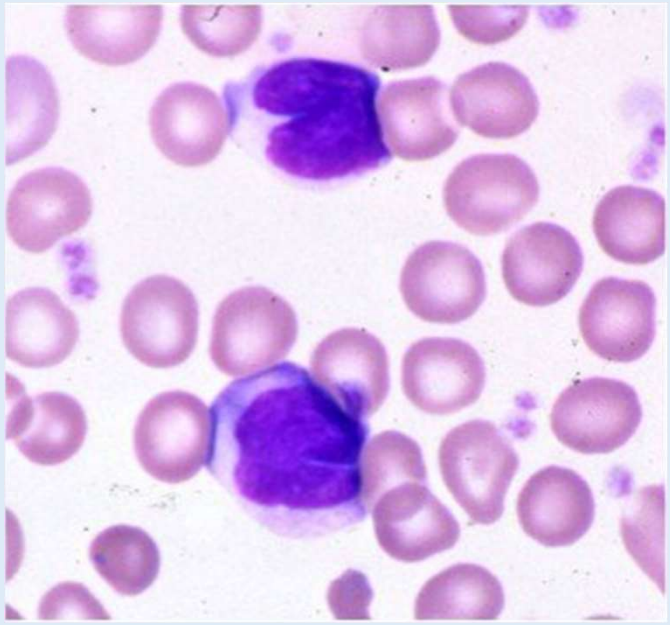
Blood

- Your blood contains red blood cells, white blood cells and plasma.

Red blood cells carry oxygen around your body.

Plasma is mainly water with dissolved food, waste materials and other chemicals in it

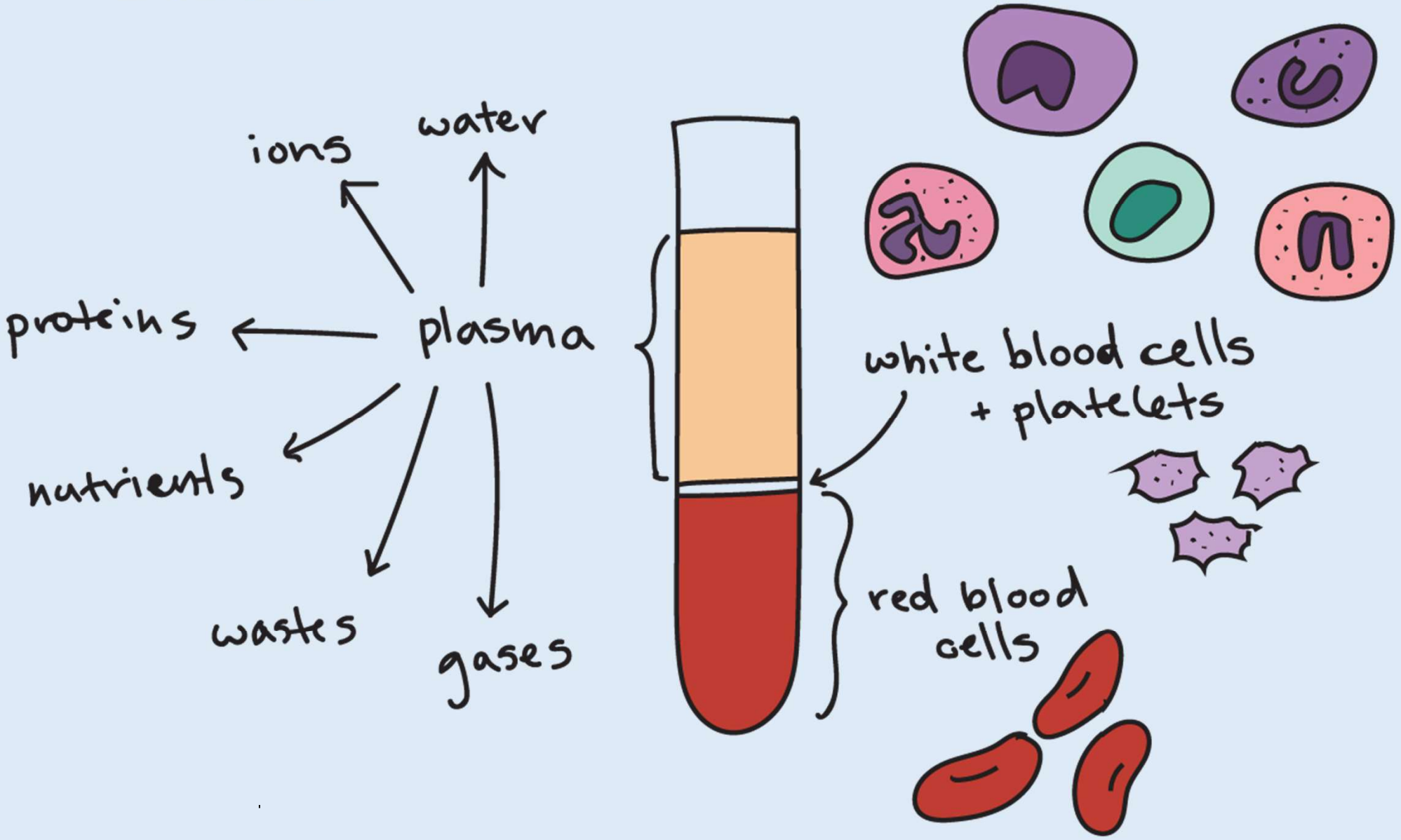
Blood



Some of your white blood cells produce 'antibodies' which stick to **antigens** on microbes and stop them from working and making you ill.

Other white blood cells do 'phagocytosis' which means that they can engulf (eat) microorganisms.

Blood


ions
water
proteins
plasma
nutrients
wastes
gases
white blood cells
+ platelets
red blood
cells

Blood

Page 6

Red blood cells carry oxygen around the body.

Plasma is mainly water with food and waste materials dissolved in it.

White blood cells play a key role in the immune system.

Blood Tests

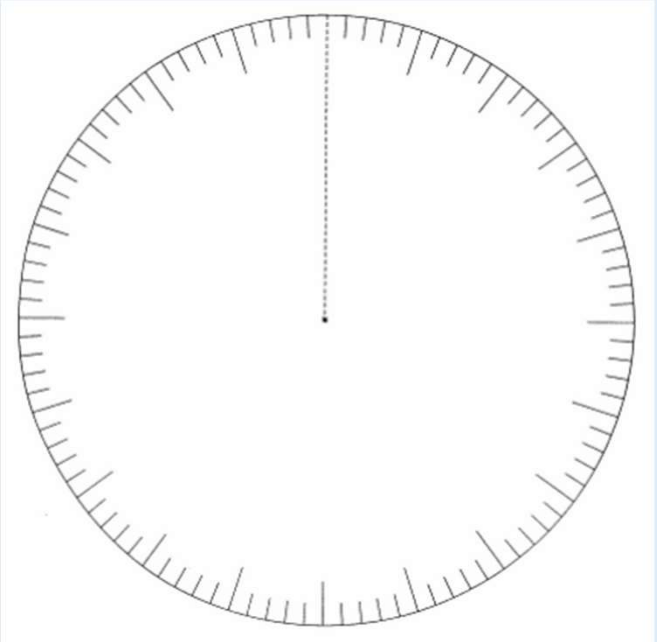
- Sometimes your doctor might want to take a blood sample.
- This blood sample would then be sent to a lab and tested by various different scientists to check for microorganisms, chemicals, and its composition.

Blood Cell Basics - Activity

Page 7

Remember that blood is made up of 4 different components:

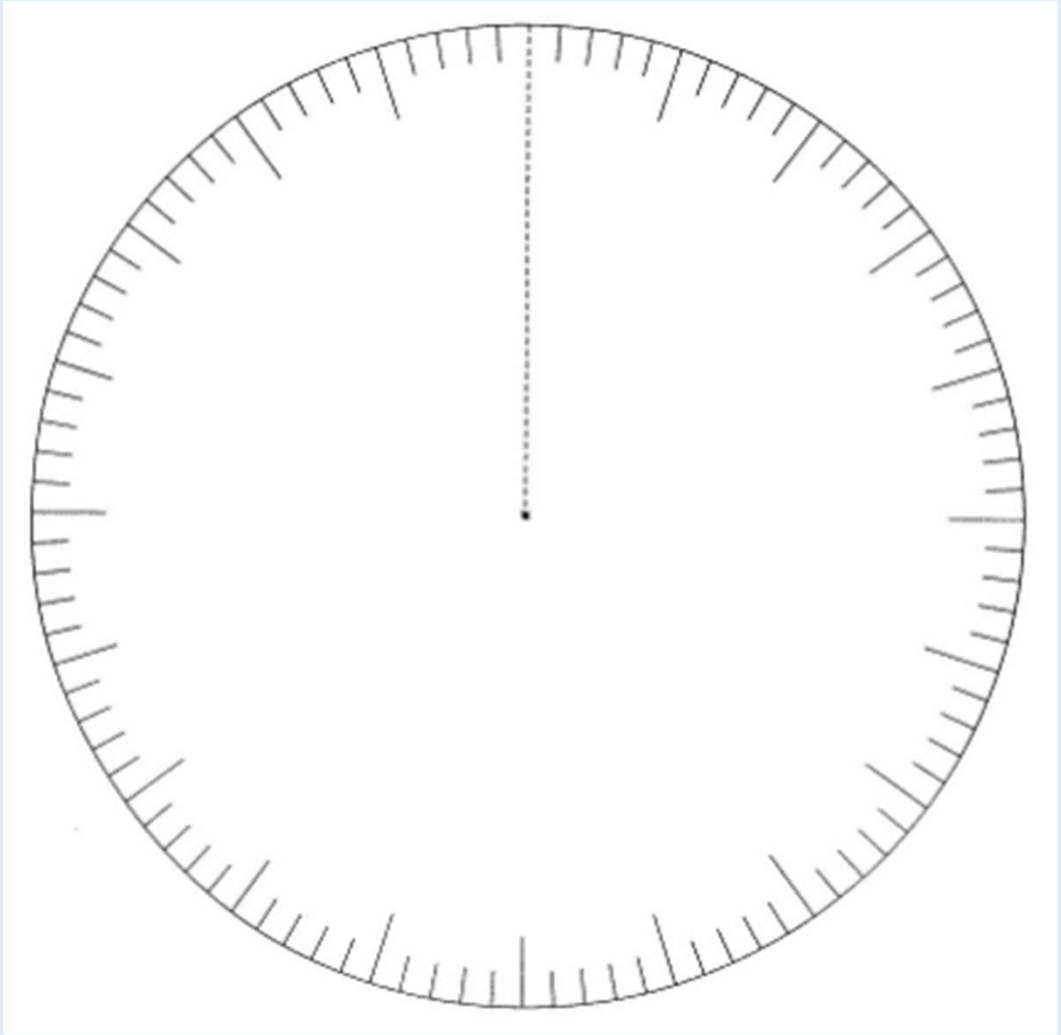
- Plasma – 55%
- Red blood cells – 43%
- White blood cells – 1%
- Platelets – 1%



Using this information, complete the pie chart in your booklet.

- Plasma – 55%
- Red blood cells – 43%
- White blood cells – 1%
- Platelets – 1%

Page 7



Plenary

Extension:

Write down three things you have learned about blood today.

_____

_____

Write down one question you now have.

_____

_____

CHALLENGE QUESTION

For next lesson, try to find out what vaccinations you have had! When did you have them? What were they for? **How do they work?**

Have you heard of **anti-vaxxers?** What do they believe?

The Heart

26/03/2025

Page 8

Starter

Rearrange the following anagrams and write down the definitions. (hint: they all relate to the blood and heart!)

1. Corbel Dolled	2. Decibel Howl Lot	3. A Lamps

_____

_____

_____

Blood

26/03/2025

Page 8

Learning Intentions:

- I am learning about the heart.

Cell Organisation

26/03/2025

Page 8

Success Criteria

- ❑I can describe the role of the heart.
- ❑I can label a diagram of the heart.

Think-Pair-Share

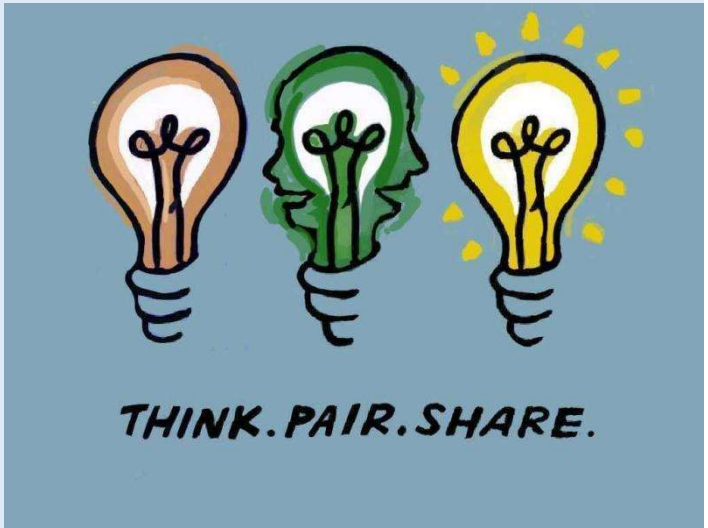
- In the first lesson, we learned about organs and body systems.

Page 8

Think-Pair-Share

Can you think which components of the body make up the circulatory system?

The heart and blood vessels containing blood



The Heart

- The heart is a muscular pump

- It sits in a cavity in your chest and is about the same size as a fist
    - Look at your fist… that's around the same size as your heart!

- Your heart's job is that it pumps blood from the lungs (where it collects oxygen) to the rest of your body tissues.

The Heart

- Video

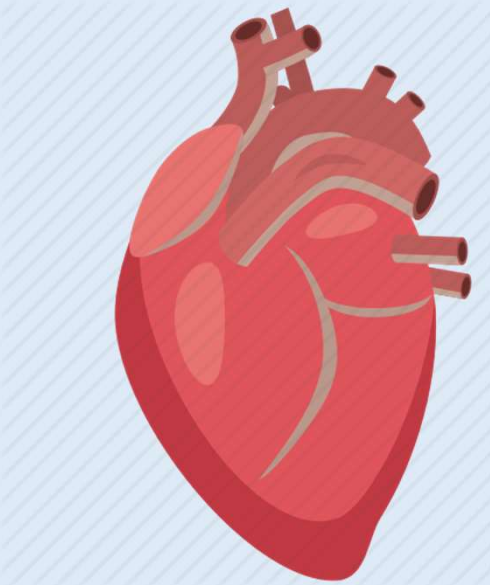
Page 8

Video

Write down three things that you have learned from the Circulatory System video.

_____

_____



The Heart

Page 8

The heart is a muscular organ that pumps blood around the body to deliver oxygen.

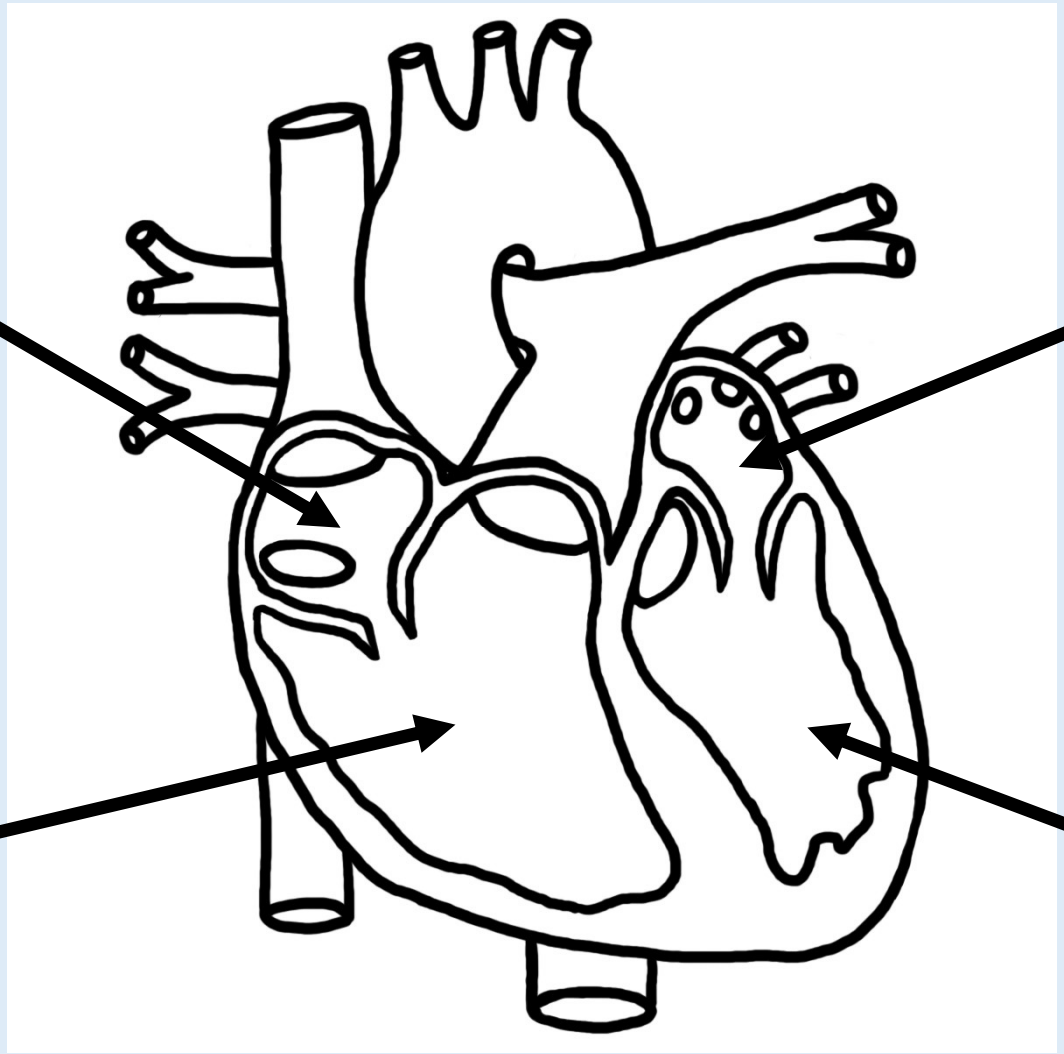
It contains four chambers and is connected to the rest of the body via blood vessels called arteries and veins.

The Heart Diagram

On the diagram below, your teacher will help you to:

1. Draw arrows and label the chambers
2. Colour in the chambers red and blue to show areas of high oxygen and low oxygen
3. Add a key

Page 9



Right atrium

Left atrium

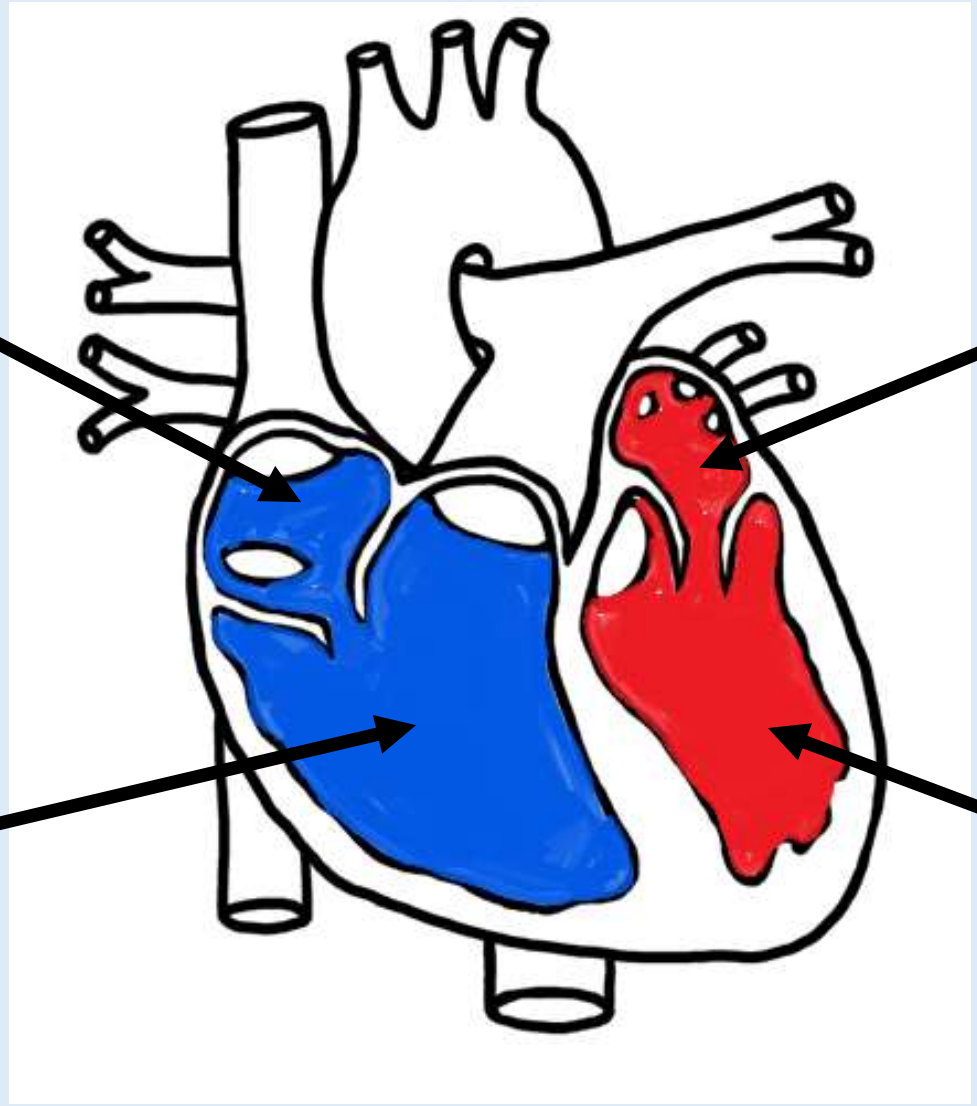
Right ventricle

Left ventricle

The Heart Diagram

On the diagram below, your teacher will help you to:

1. Draw arrows and label the chambers
2. Colour in the chambers red and blue to show areas of high oxygen and low oxygen
3. Add a key



Right atrium

Left atrium

Right ventricle

Left ventricle

The Heart Diagram

On the diagram below, your teacher will help you to:

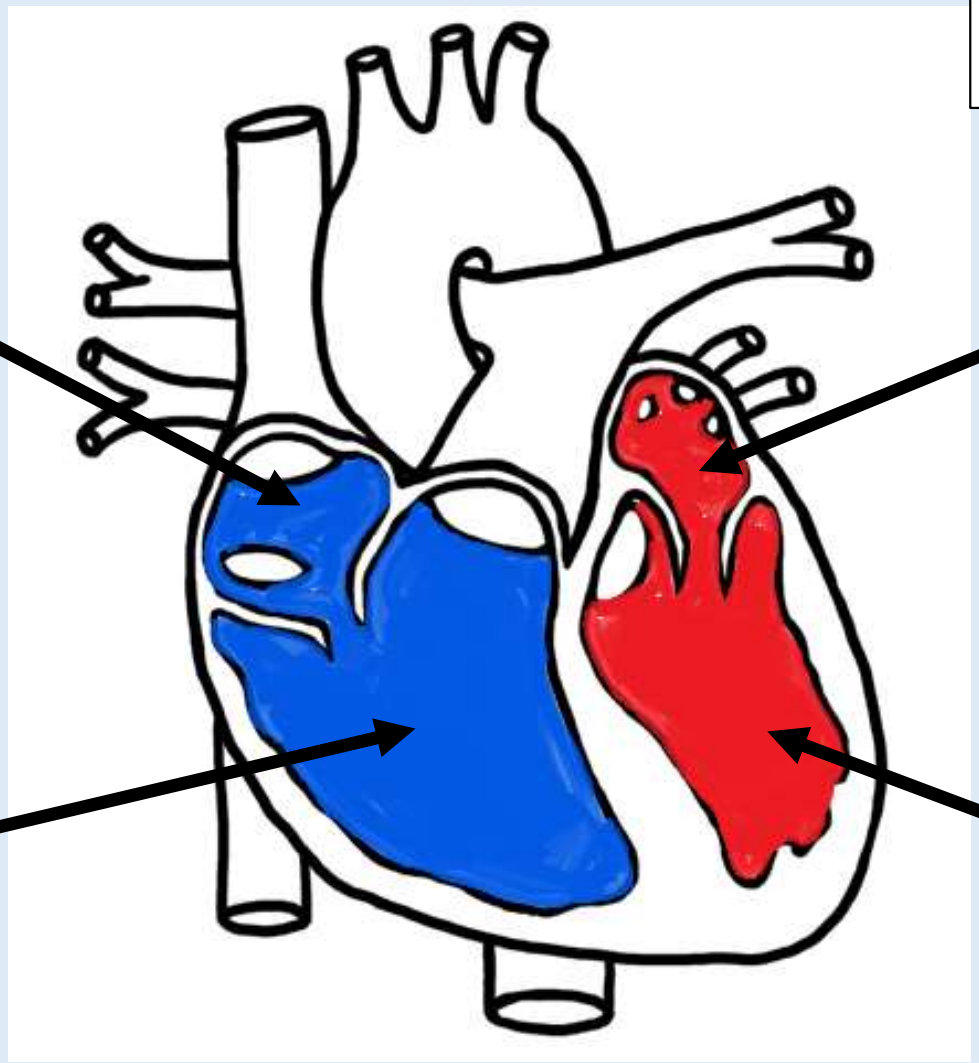
1. Draw arrows and label the chambers
2. Colour in the chambers red and blue to show areas of high oxygen and oxygen
3. Add a key

Page 9

Key:

= high oxygen

= low oxygen



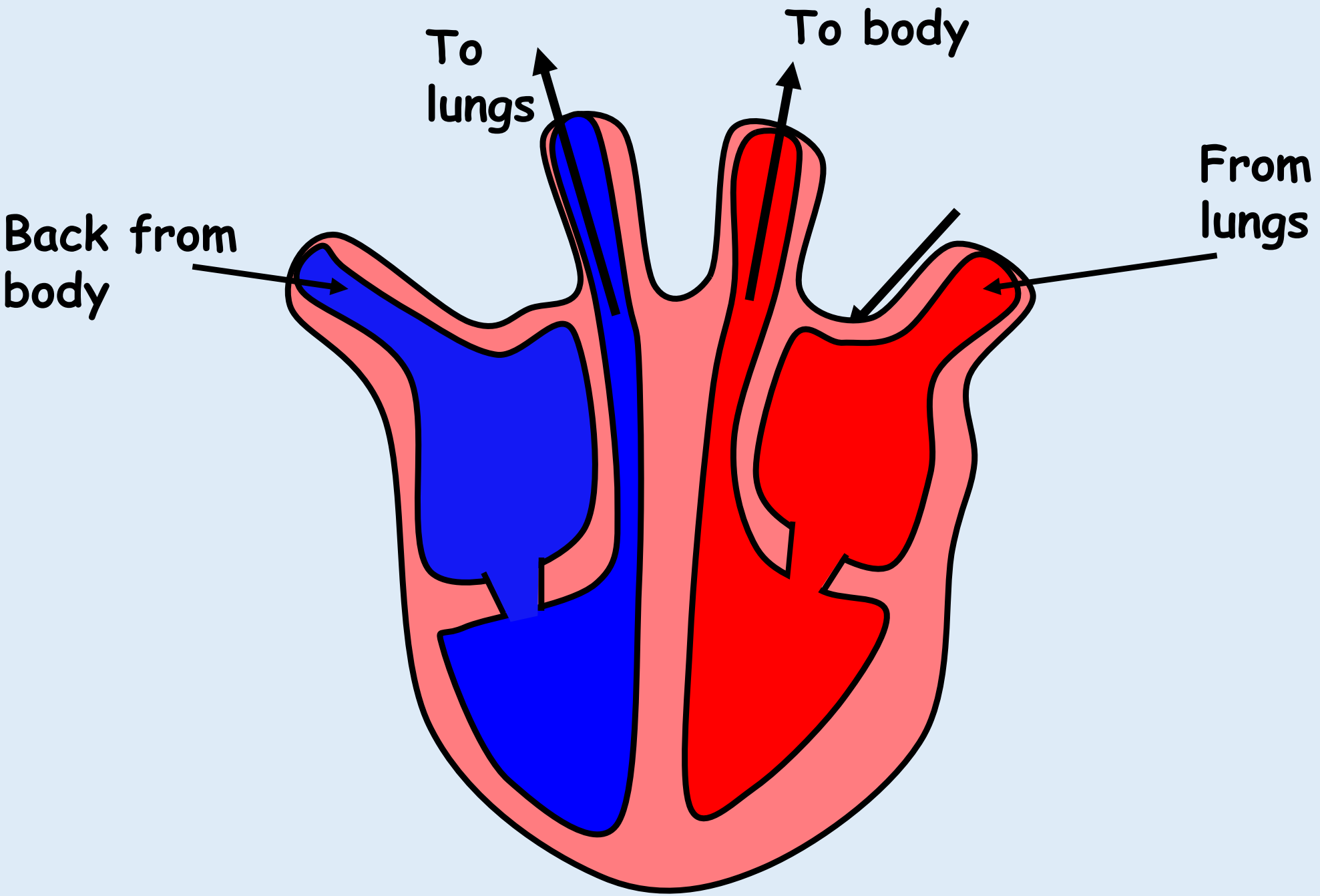
Right atrium

Left atrium

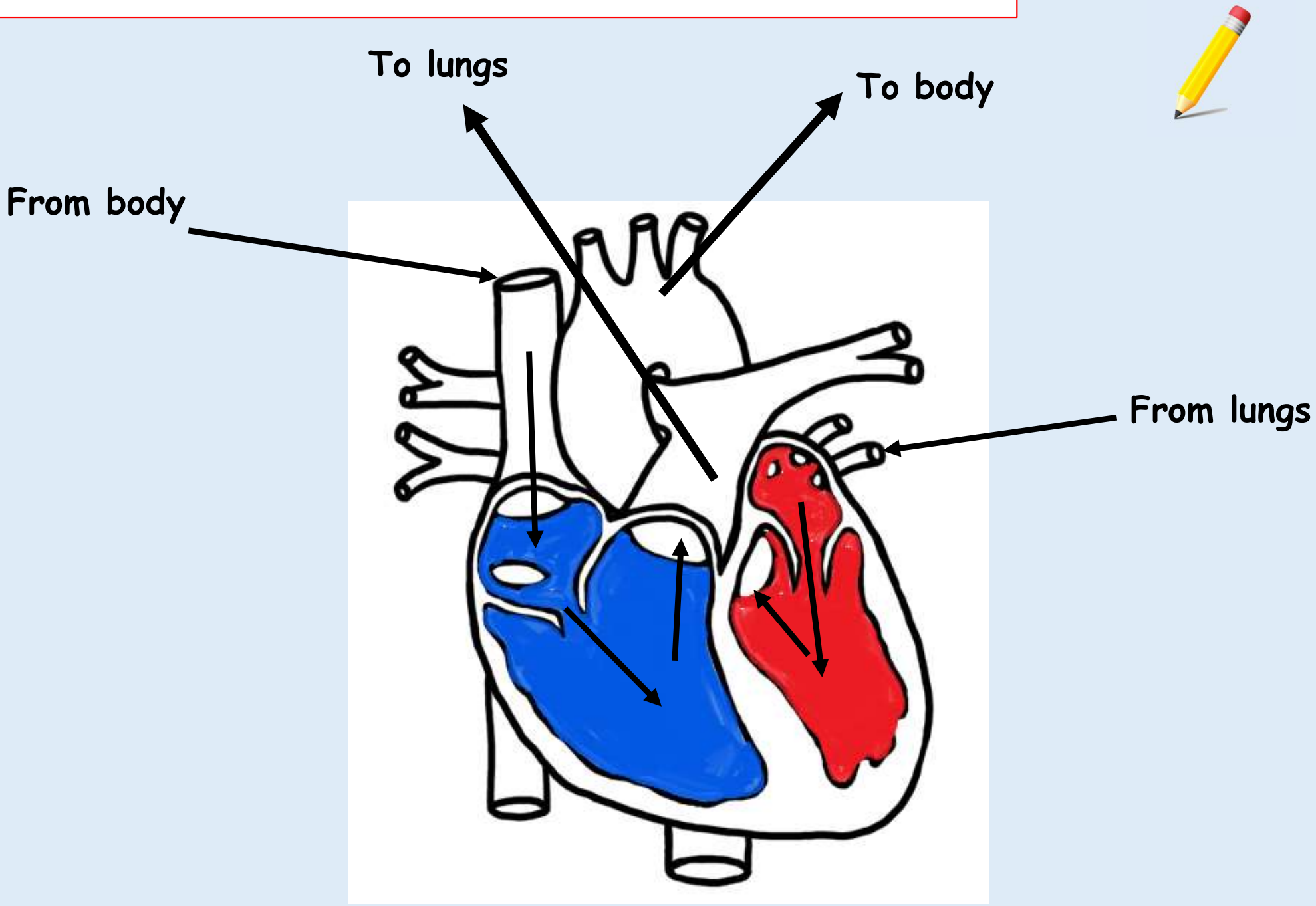
Right ventricle

Left ventricle

Direction of blood flow



Extension task: Add labels to show the direction of blood flow.



Plenary – Spot the mistake!

Copy and complete the sentences by fixing the errors:

- The body system which transports blood carrying useful substances around the body is the digestive system.
- The function of the heart is to help you breathe.

CHALLENGE ACTIVITY

For next lesson, check out the 'Microbe Magic' website to explore the Circulatory System!

The Flow of Blood

26/03/2025

Page 10

Starter

1. Name the four chambers of the heart.

---

2. Explain why we coloured in the right side of the right side of the heart blue and the left side of the heart red.

The Flow of Blood

26/03/2025

Page 10

Learning Intentions:

- I am learning about the flow of blood.

The Flow of Blood

26/03/2025

Page 10

Success Criteria

- ❑I can describe the flow of blood through the heart.
- ❑I can explain how oxygen travels around the body.
- ❑I can take part in a heart dissection.

Flow of Blood Through the Body

Rearrange the boxes

a. The blood delivers oxygen to the body tissues to allow them to have enough energy.

b. It then flows back into the left side of the heart where it is pumped out again to the rest of the body.

c. The blood flows into the lungs from the right side of the heart and collects oxygen (from the air we breathe).

Flow of Blood Through the Body

Page 10

The blood flows into the lungs from the right side of the heart and collects oxygen (from the air we breathe).

Flow of Blood Through the Body

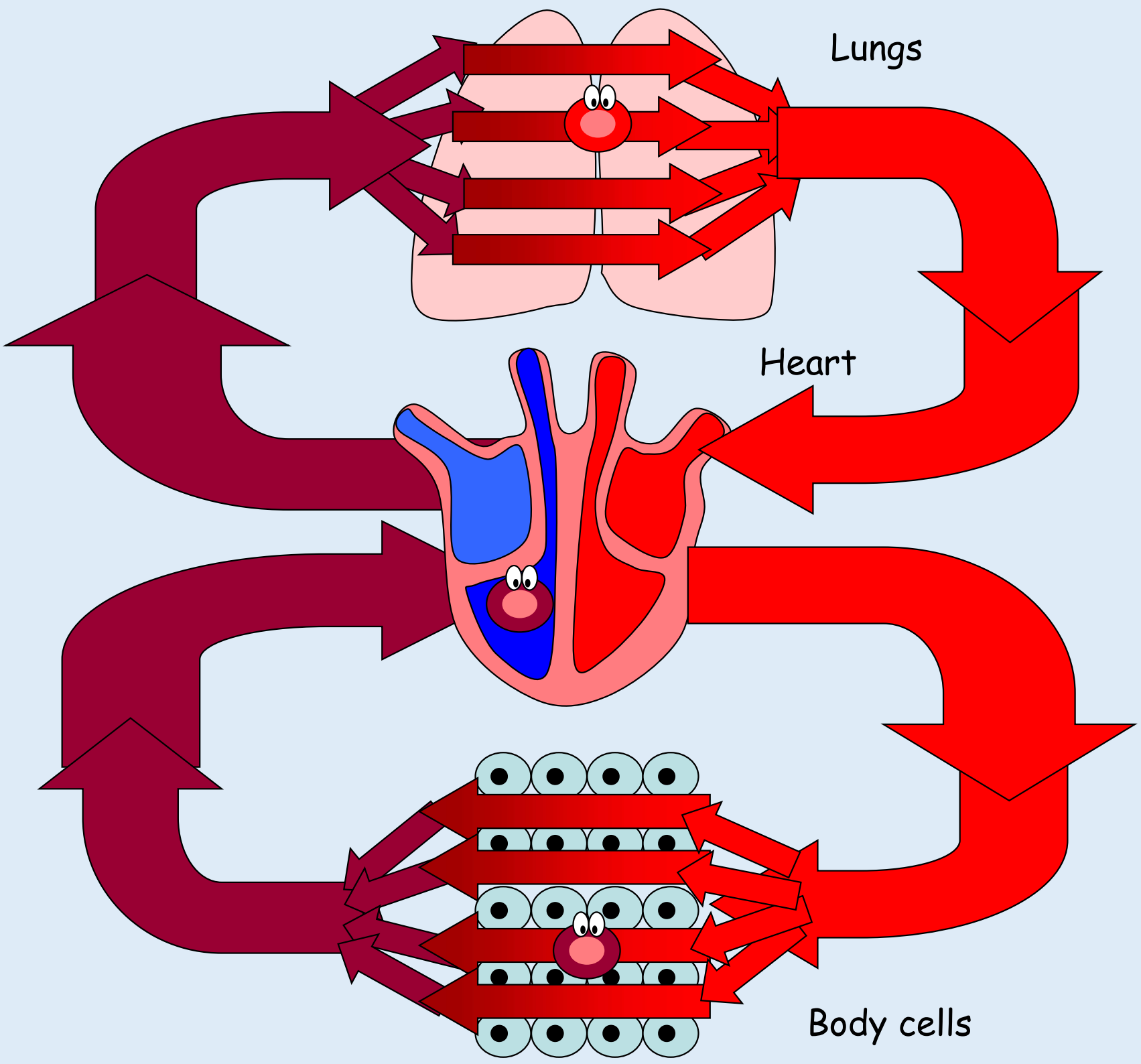
Page 10

It then flows back into the left side of the heart where it is pumped out again to the rest of the body.

Flow of Blood Through the Body

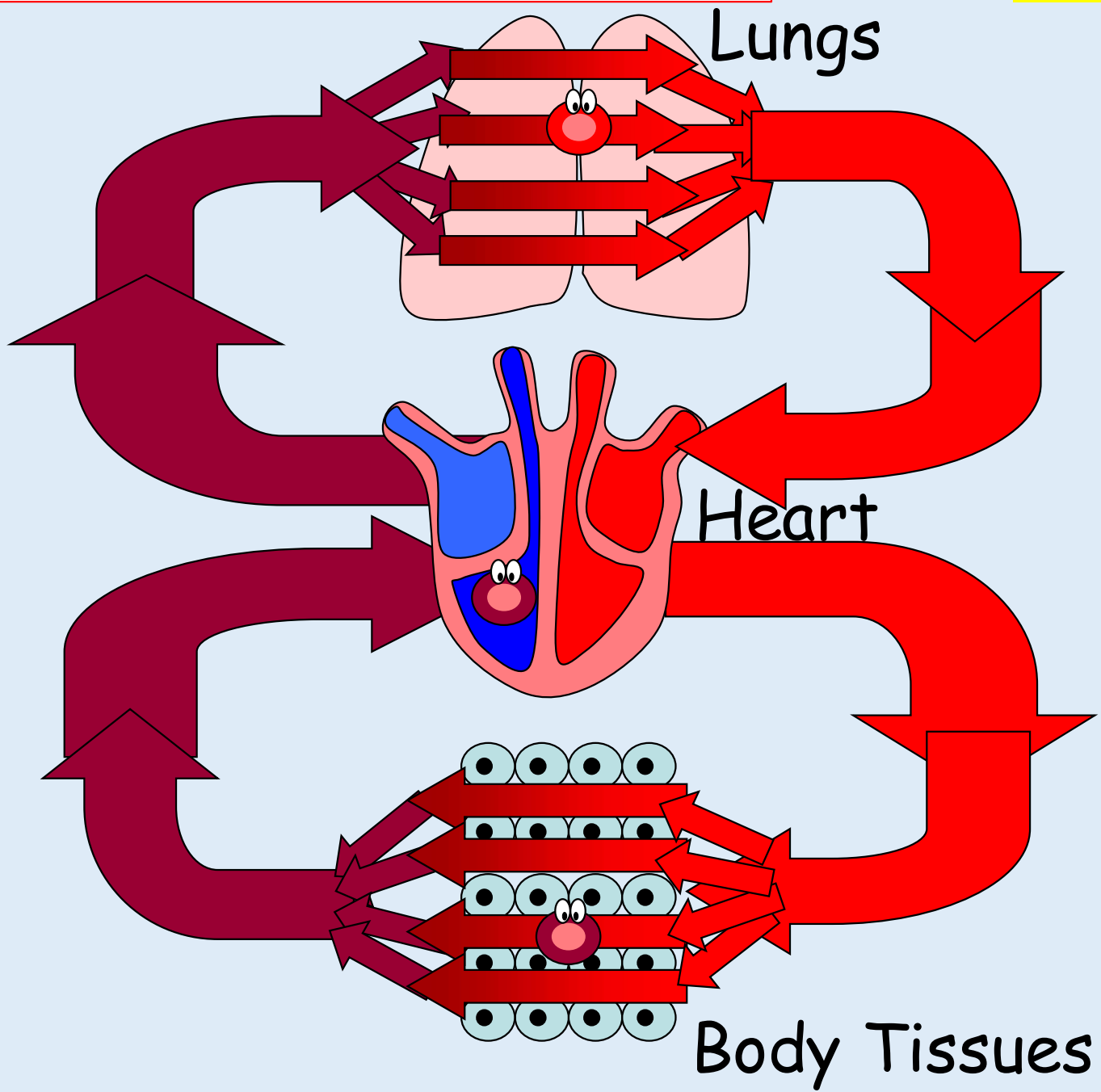
Page 10

The blood delivers oxygen to the body tissues to allow them to have energy.


Lungs
Heart
Body cells

Flow of Blood

Label the lungs, heart and body tissues on the diagram below.



Feel the beat

Before we look at the structure of the heart, lets check to see if those tickers are ticking!

You should do an activity for 30 seconds (try hopping on the spot) then check your arteries for a pulse.

Try holding your radial artery (inside your wrist) or carotid artery (on the neck) for 30 seconds.

- What does your heart sound like?
- How fast is it beating?
- What's the pattern?

Heart Dissection

You will now have the chance to watch a heart being dissected.

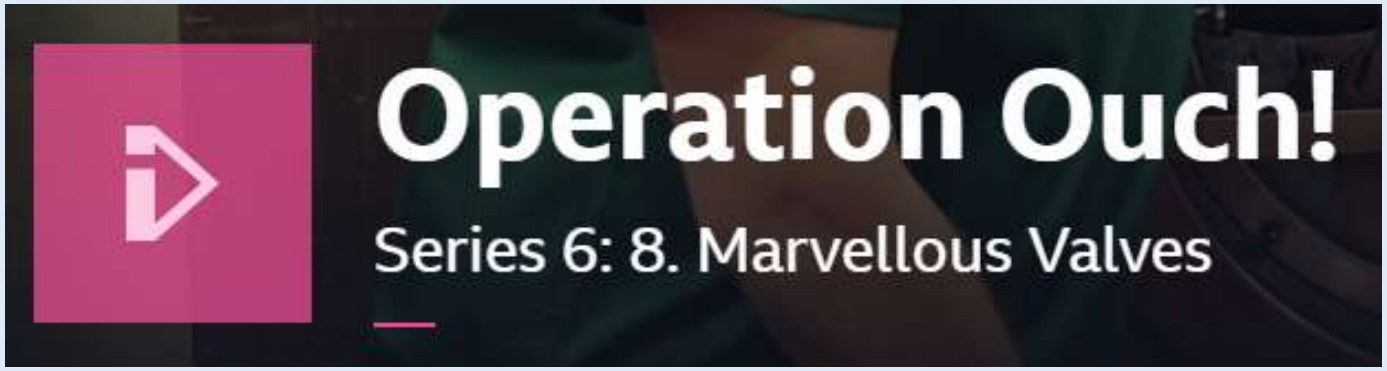
You should pay close attention to:

- The chambers of the heart
- The valves
- The blood vessels

Heart Dissection

Describe what you saw in the heart dissection and draw a diagram in your booklet.

Heart Dissection



https://www.bbc.co.uk/iplayer/episode/b09d4vx2/operation-ouch-series-6-8-marvellous-valves

28 mins

26/03/2025

Blood Vessels - Extra

Page 12

Starter

Use the word bank to complete the sentences below.

Word bank: blood, lower, upper, contracts

Blood enters the _____ chambers of the heart. The muscle tissue in the upper chambers _____ and pushes the blood into the _____ chambers. The lower chambers then contract and push the _____ out of the heart.

- Optional lesson

Blood Vessels

26/03/2025

Page 12

Learning Intentions:

- I am learning about the structure and function of blood vessels.

Blood Vessels

26/03/2025

Page 12

Success Criteria

- ❑I can describe the structure of blood vessels.
- ❑I can describe the function of blood vessels.

The Path of Blood Round the Body

Can you correct this?

- Blood comes back from the body into the right atrium, up into the right ventricle which pumps it to the body to pick up oxygen and drop off carbon dioxide.

- It comes back into the right atrium, down into the left ventricle which pumps it round the body to all the cells. The right ventricle wall is much thicker as it has to pump blood much further.

The Path of Blood Round the Body
The corrected version!

- Blood comes back from the body into the right atrium, **down** into the right ventricle which pumps it to the **lungs** to pick up oxygen and drop off carbon dioxide.

- It comes back into the **left** atrium, down into the left ventricle which pumps it round the body to all the cells. The **left** ventricle wall is much thicker as it has to pump blood much further.

Blood Vessels

Arteries carry blood away from the heart.

Veins carry blood to (in to) the heart.

Capillaries connect veins to arteries. They are also very thin which allows materials to pass between the blood into tissues.

Blood Vessels

Complete the table below in your booklet.

Blood Vessel	Function	Example
Artery	Carry blood **AWAY** from the heart	Aorta, pulmonary artery
Vein		
Capillary		

Blood Vessels

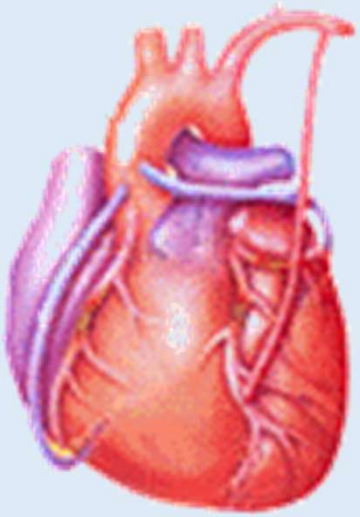
Complete the table below in your booklet.

Blood Vessel	Function	Example
Artery	Carry blood **AWAY** from the heart	Aorta, pulmonary artery
Vein	Carry blood back **IN** to the heart	Vena cava, pulmonary vein
Capillary		

Blood Vessels

Complete the table below in your booklet.

Blood Vessel	Function	Example
Artery	Carry blood **AWAY** from the heart	Aorta, pulmonary artery
Vein	Carry blood back **IN** to the heart	Vena cava, pulmonary vein
Capillary	Connects arteries to veins, and exchange of materials between the blood and tissue cells	



For children of ages 6 to 15,
the **normal** resting **heart rate** is between 70 and 100 beats per minute (bpm) and for adults it is between 60 and 100 bpm.

If someone's average heart beat was 80 bpm for their whole life and they lived to be 85, how many times would their heart beat in their lifetime?

Beats per minute = 80
beats per hour = 80 x 60 = 4800
beats per day = 4800 x 24 = 115 200
beats per year = 115 200 x 365 = 42 048 000
beats over 85 years = 42 048 000 x 85 = 3 574 080 000

Over 3.5 billion times in their lifetime!!

Heart Rate Investigation

What do you think happens to your heart rate when you exercise?

Why?

When you exercise your muscle cells need lots of **energy**.

The heart and lungs therefore work more to get the oxygen and glucose to the muscles.

You are going to investigate the effect of **exercise** on **heart rate**.

How can you measure how fast your heart is beating?

<u>How to measure heart rate (**pulse**):</u>

Find the position on your neck or wrist where you can feel your pulse.

Count the number of times you feel the pulse in 20 seconds and multiply this by 3.

This will give you the value for beats per minute (bpm)

e.g. 26 (in 20 seconds) x 3 = 78 bpm

Heart Rate Investigation

Heart Rate Investigation

Aim (What do you hope to find out?):

_____

_____

Materials & method:

- What will you do?

_____

_____

_____

- What equipment will you need?

_____

_____

- What is the independent variable? (The variable you are changing)

_____

- What is the dependent variable? (The variable you are measuring)

_____

- What variables will you keep the same?

_____

Heart Rate Investigation

Hypothesis (What do you predict will happen?):

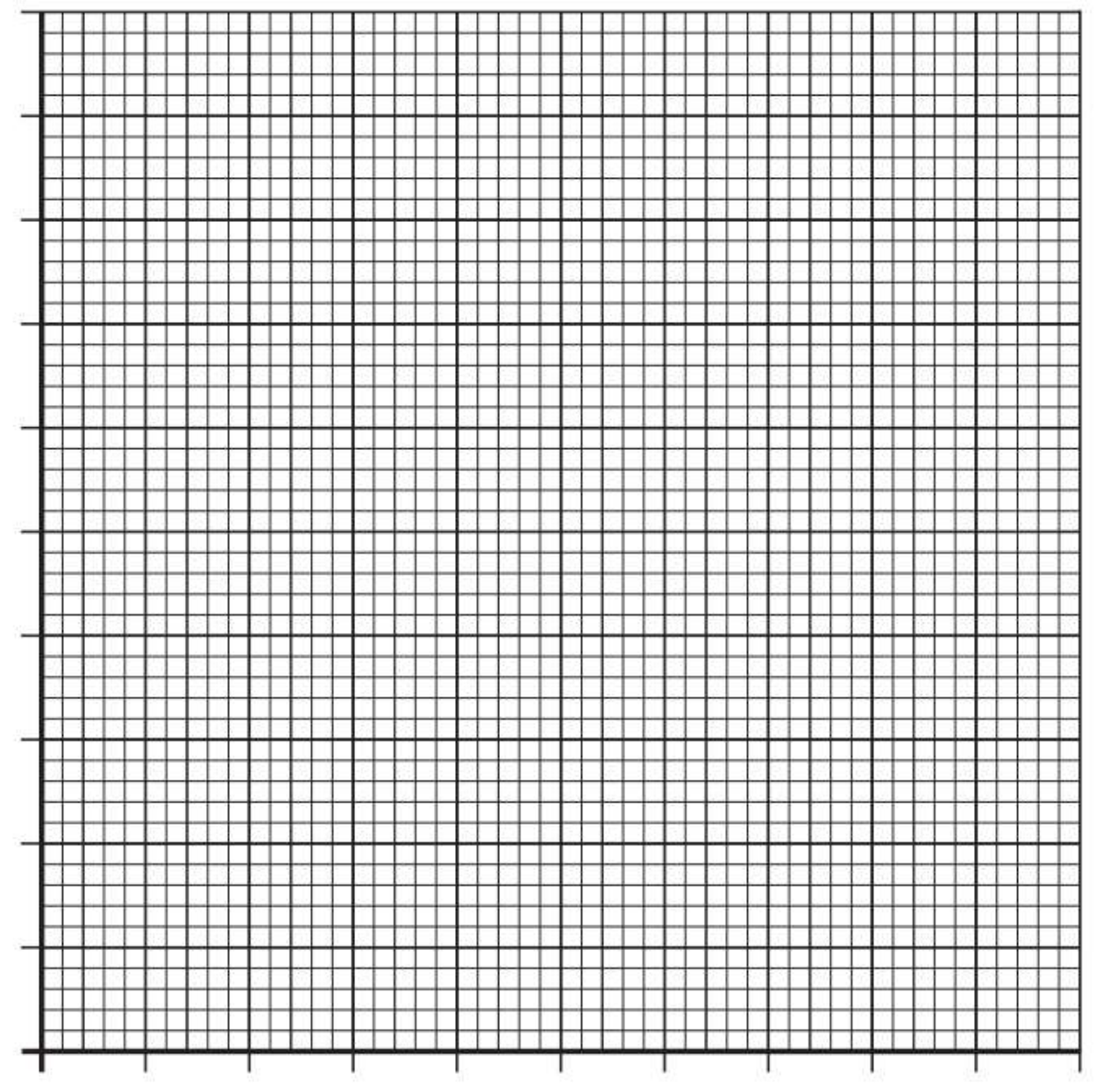
_____

_____

Results:

Type of Exercise	Heart Rate (Beats in 20 seconds)	Heart Rate (Beats per minute)

Graph:
Draw a bar chart to show how the type of exercise affects your heart rate (bpm).



Heart Rate Investigation

Conclusion:

_____

_____

Evaluation (If you were to do the investigation again, how could you improve your results?):

_____

_____

Plenary

- Write on a post-it note 3 things you have learned today about the heart.

26/03/2025

The Lungs

Page 16

Starter

Did you know….your nostrils take turns breathing air in and out?

Prove it!!

STARTER-Lesson 1

Did you know…your nostrils take turns taking breathing air in and out?

- **Prove it!** - breathe down gently once onto a small mirror placed just above your upper lip.
- The moist breath will cloud up the mirror making an area of condensation for each nostril.
- Amazingly, one area will be larger than the other, indicating that more air is coming out of one nostril than the other.
- If you were to repeat this exercise in several hours you will find that the nostrils have reversed themselves.

The Lungs

26/03/2025

Page 16

Learning Intentions:

- To learn about the respiratory system
- To learn about how we breathe

The Lungs

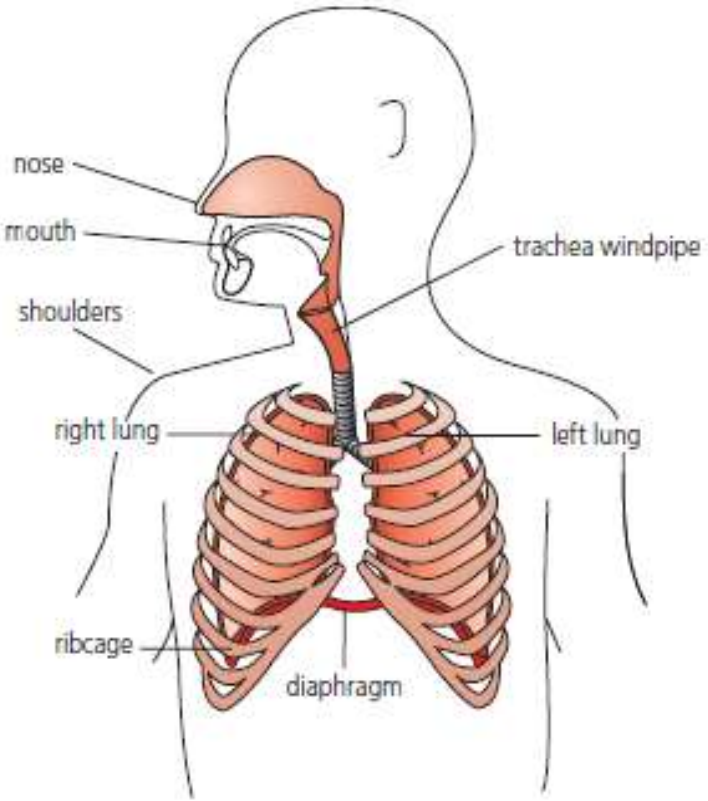
26/03/2025

Page 16

Success Criteria

- ❑I can state the parts of the respiratory system.
- ❑I can explain how air enters the lungs.
- ❑I can explain how air enters the blood.
- ❑I can describe the function of each part of the respiratory system.

Something about the respiratory system



What does it do?

The respiratory system allows you to breathe.

What is in it?

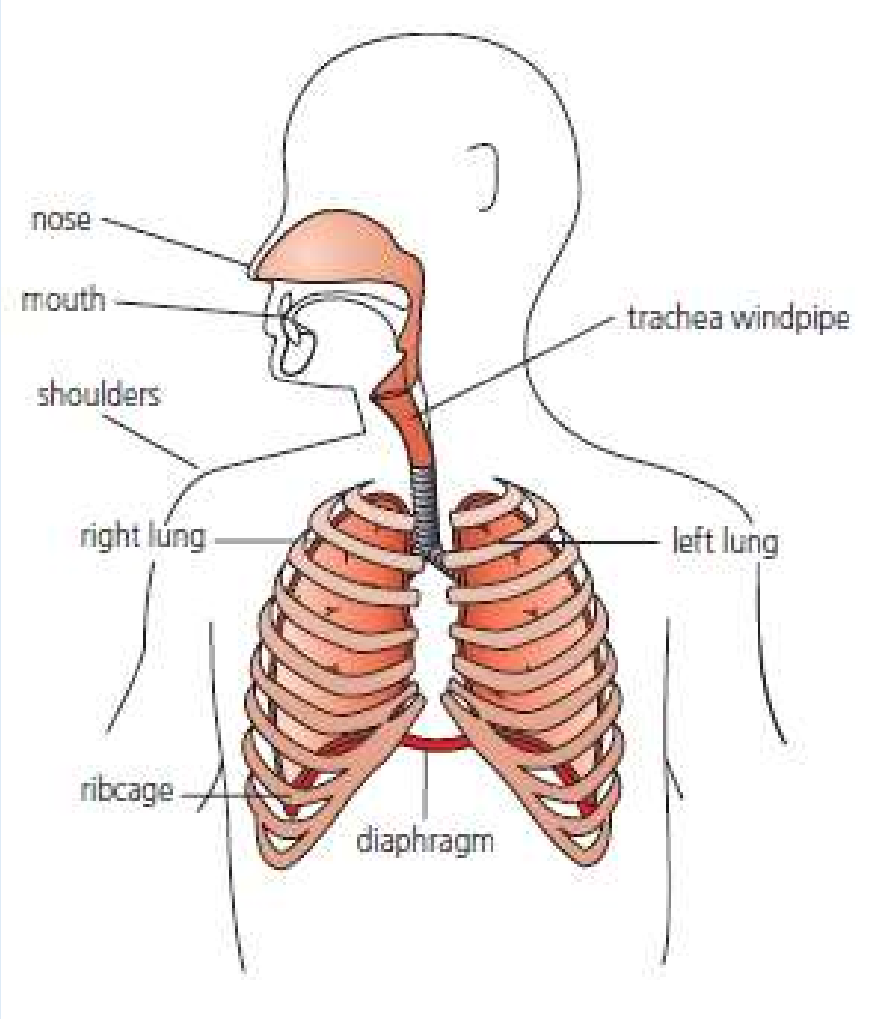
The respiratory system includes your nose, mouth and windpipe. This system carries air in and out of your lungs. The respiratory system also includes the muscles that surround your lungs – the diaphragm on the chest floor and the shoulders and ribs that surround it.

What other systems does it work with?

The respiratory system helps oxygen to enter your bloodstream as well as removing carbon dioxide from your lungs (carbon dioxide removal is essential to prevent the blood pH changing). The muscular system makes the chest move air in and out of the lungs. The skeleton protects the chest.

The Respiratory System

Page 16

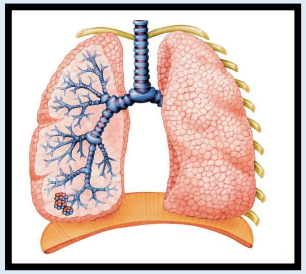


The lungs are the organs of gas exchange.

Our cells need the oxygen from the air and we must get rid of the waste product carbon dioxide.

Air enters the breathing system by the nose or mouth.

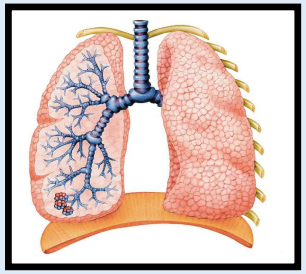
Structure of the lungs



Click on the TV screen to watch the video clip about "What do the lungs do?"

https://www.youtube.com/watch?v=8NUxvJS-_0k

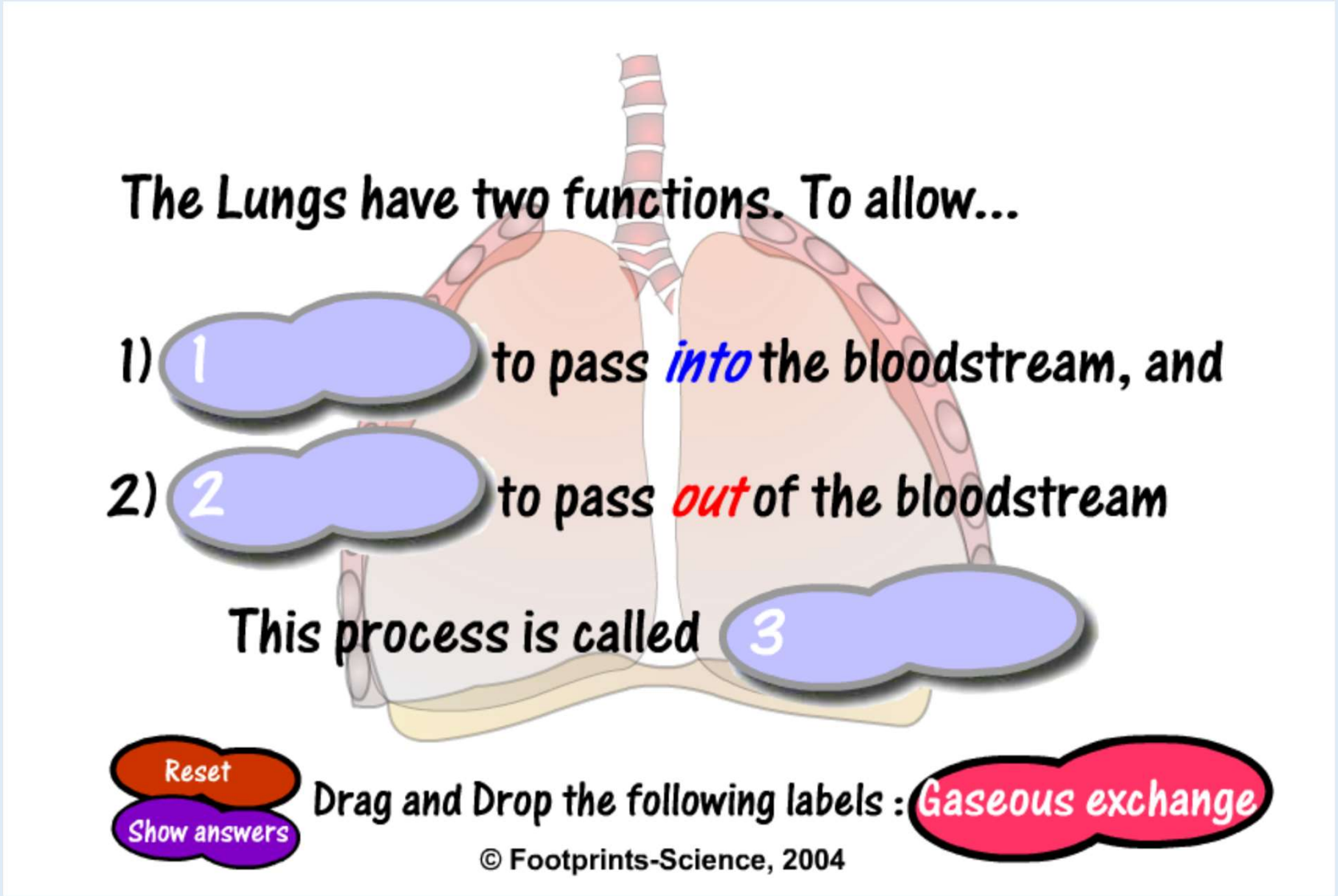
Bronchoscopy



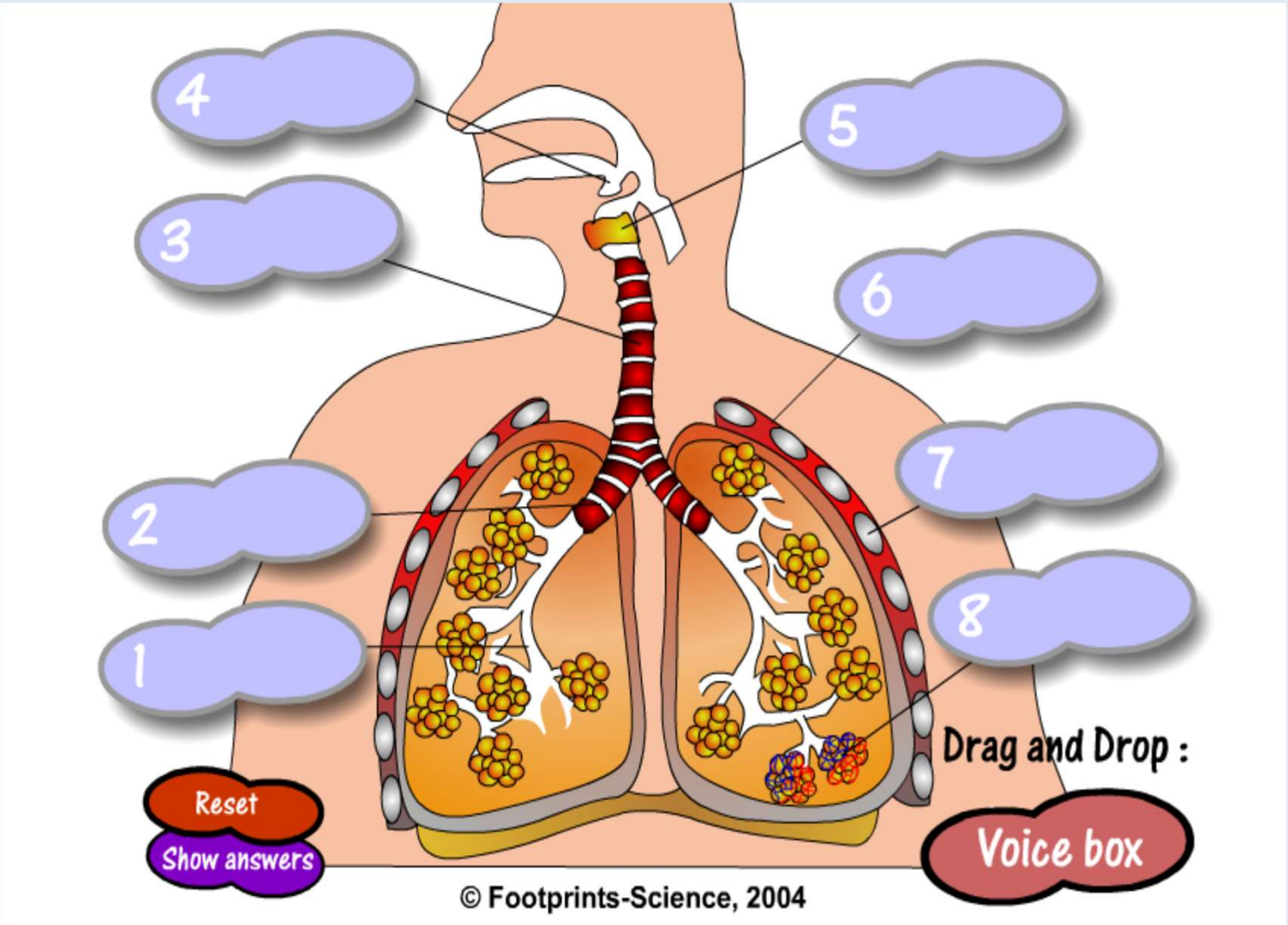
Click on the TV screen to watch the video clip where a camera is sent down into a person's lungs.

https://www.youtube.com/watch?v=KqZc1JqArco

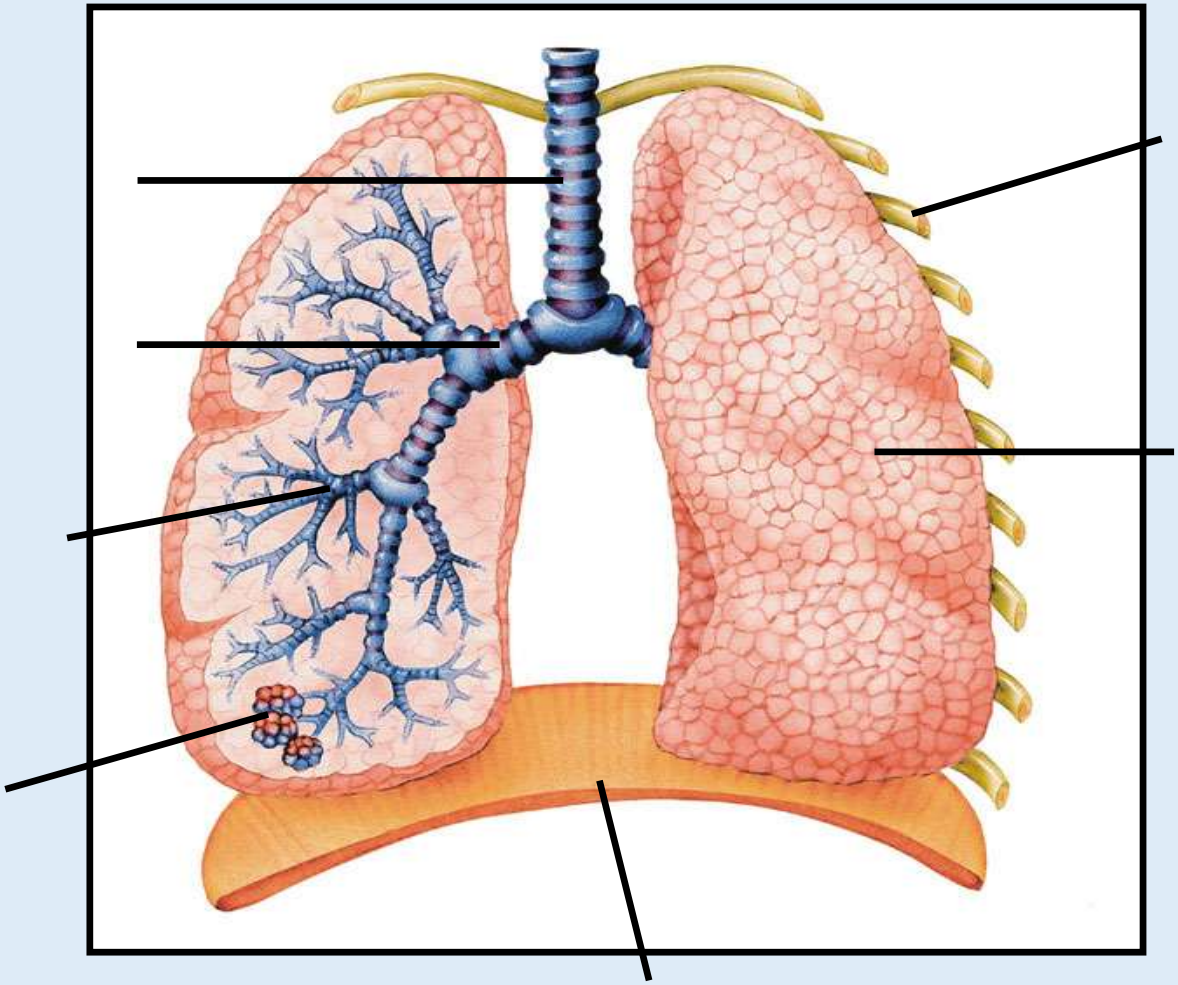
The Lungs


The Lungs have two functions. To allow...
1) 1 to pass into the bloodstream, and
2) 2 to pass out of the bloodstream
This process is called 3
Reset
Show answers
Drag and Drop the following labels :
Gaseous exchange
© Footprints-Science, 2004

The Lungs


4
5
3
6
7
2
8
1
Drag and Drop :
Voice box
Reset
Show answers
© Footprints-Science, 2004

Structure of the lungs

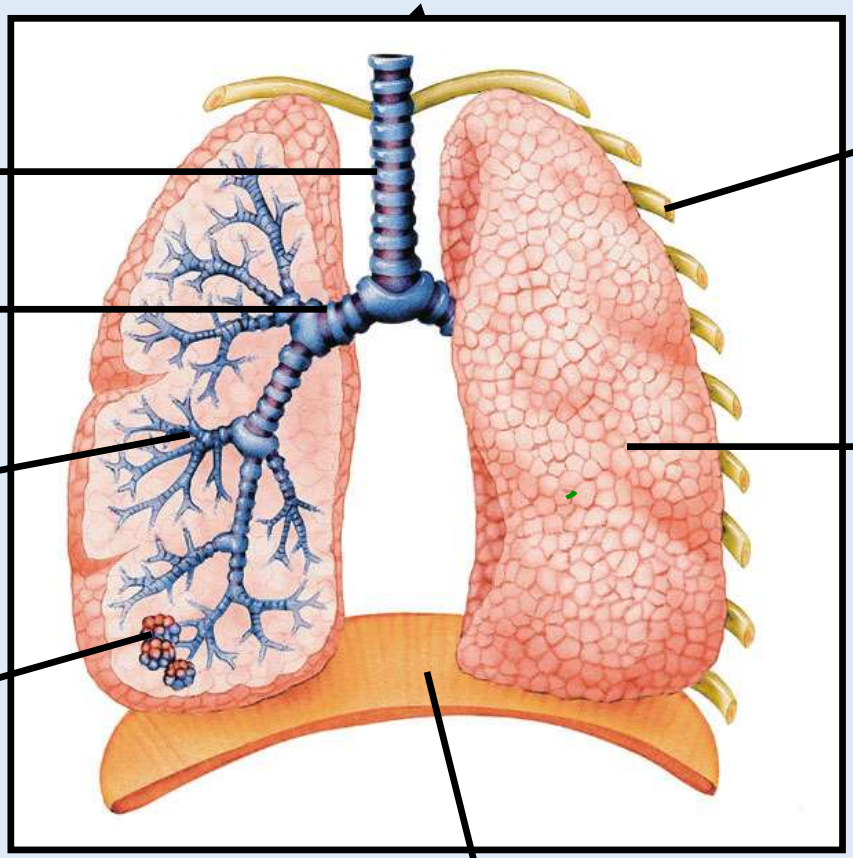


Page 17

Label the diagram of the lungs in your workbook.

Your teacher will help you.

Check your labels!



Windpipe

Bronchus

Bronchioles

Air Sacs (Alveoli)

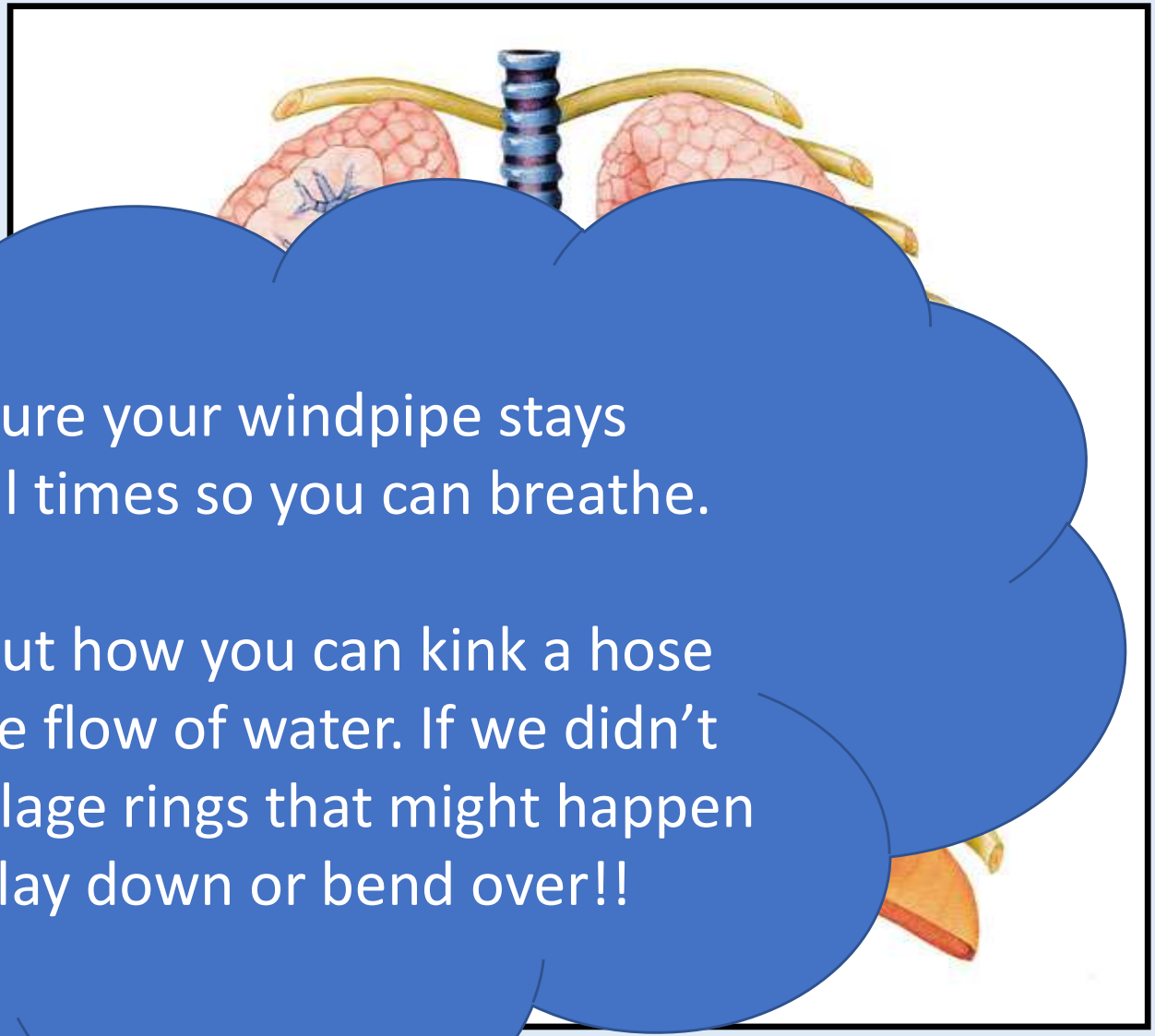
Ribs

Lung

Diaphragm

Cartilage rings

The windpipe is made up o
of carti
you thi



To make sure your windpipe stays open at all times so you can breathe.

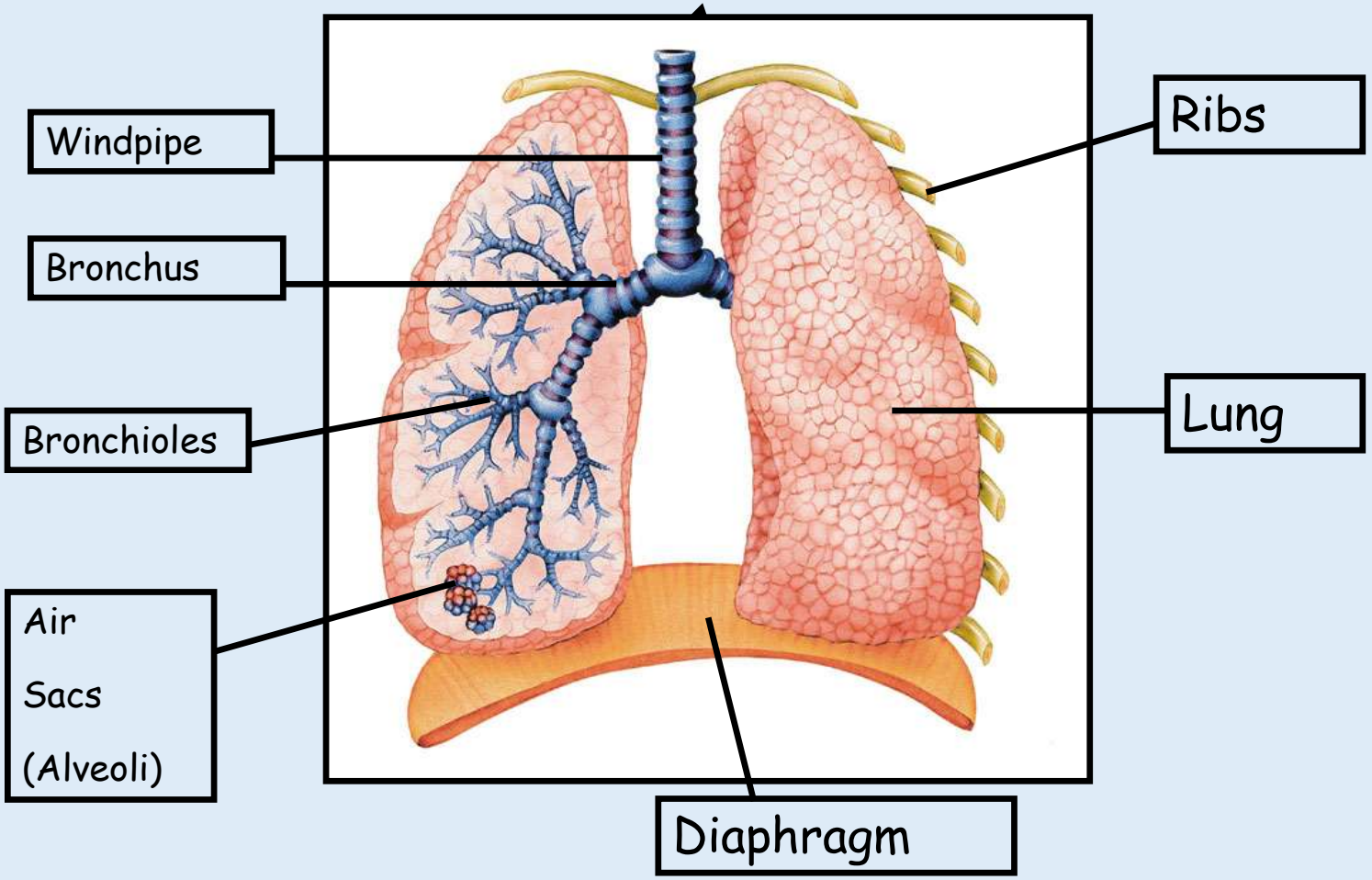
Think about how you can kink a hose to stop the flow of water. If we didn't have cartilage rings that might happen when we lay down or bend over!!

Page 17

The windpipe and the bronchi have rings of cartilage in them. This makes sure that they stay open at all times.

Use the information on page 17 to help you answer the questions below

STARTERS : Name the structures…

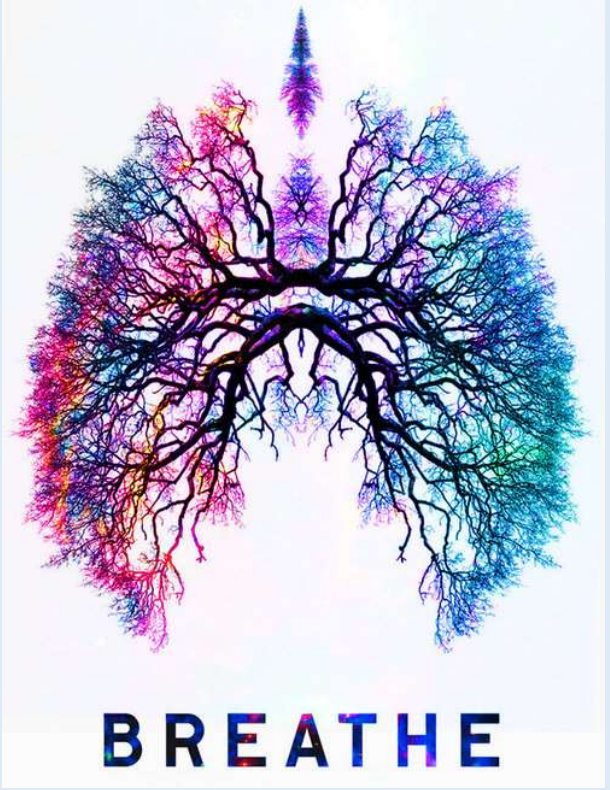


Why do the windpipe and the bronchi have **rings of cartilage** in them?

To keep them open when they bend.

How does the air get into and out of our lungs??

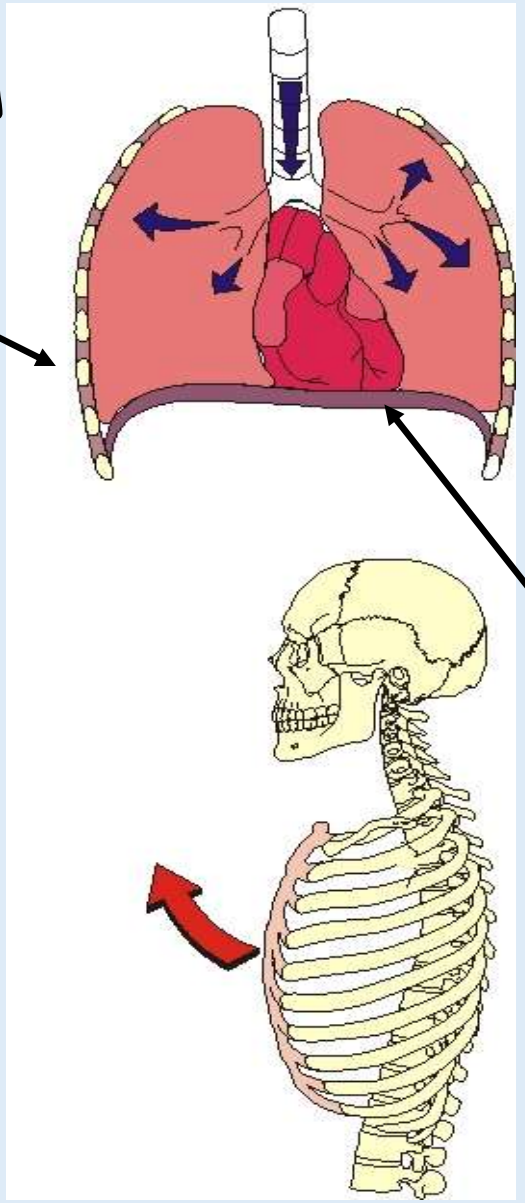
- Breathing of course!
- But what makes us breathe??



- Our intercostal muscles (muscles in between our ribs) and our diaphragm work together to cause us to breathe.
- It is a common misconception that our lungs inflate and deflate causing our chest to rise and fall.
- It is in fact the chest being made bigger or smaller that forces our lungs to inflate/deflate causes us to inhale/exhale.

Breathing In

Page 17

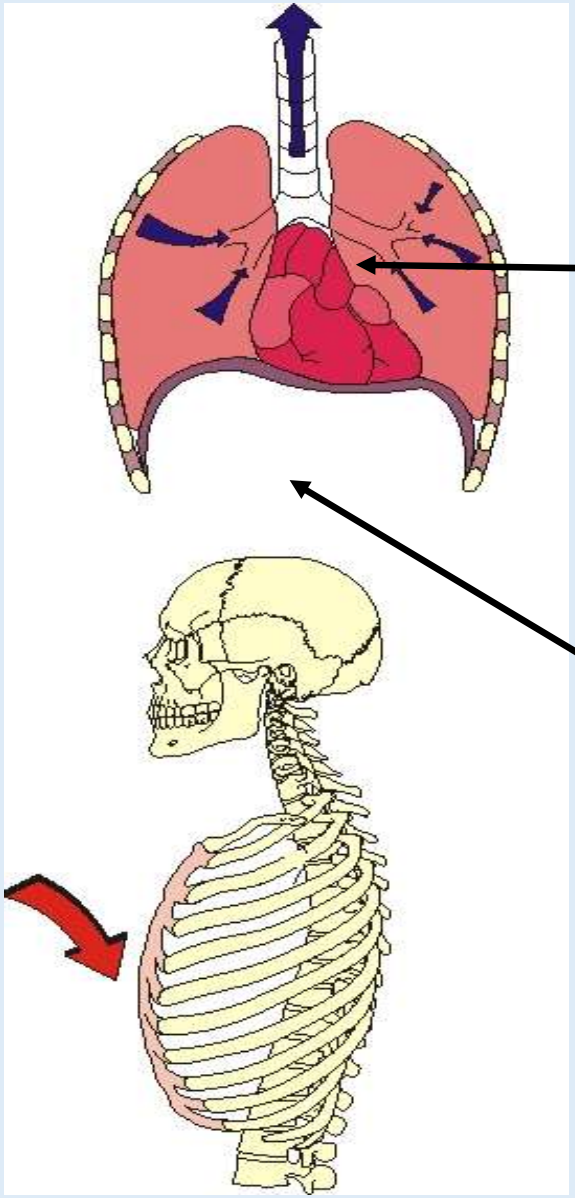


Chest
Volume increases
Pressure decreases
Lungs inflate

Rib cage moves
up and out

Diaphragm
contracts and the
diaphragm
flattens

Breathing Out



Chest
Volume decreases
Pressure increases
Lungs deflate

Diaphragm
contracts and the
diaphragm
rises

Rib cage moves
down and in

Breathing

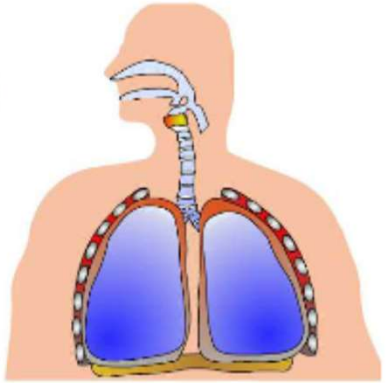
Breathing in (Inhalation)

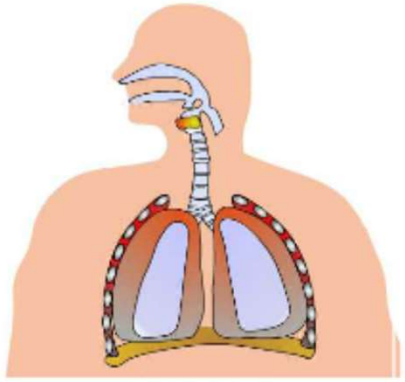
Ribcage muscles and diaphragm 1

The volume of the thorax 2

The pressure inside the lungs 3

Air 4 the lungs





Breathing out (Exhalation)

Ribcage muscles and diaphragm 5

The volume of the thorax 6

The pressure inside the lungs 7

Air 8 the lungs

Reset

Show answers

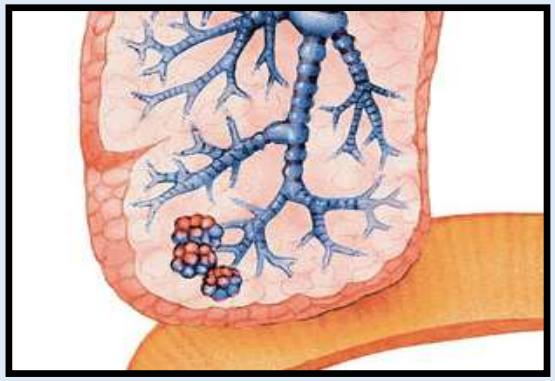
Drag and Drop : relax

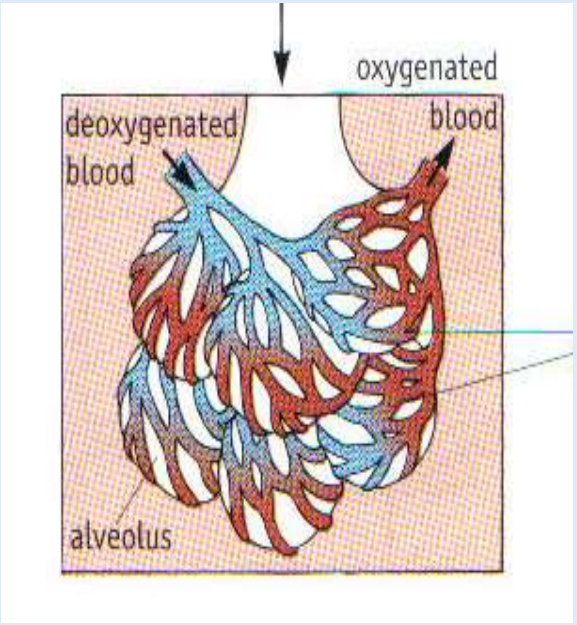
Your teacher may do a lung dissection demonstration with you.

How many of the structures you have labelled on your diagram can you identify?

So we know how air gets in to our lungs (breathing) but how are the gases (oxygen and carbon dioxide) actually exchanged?

The Air Sacs





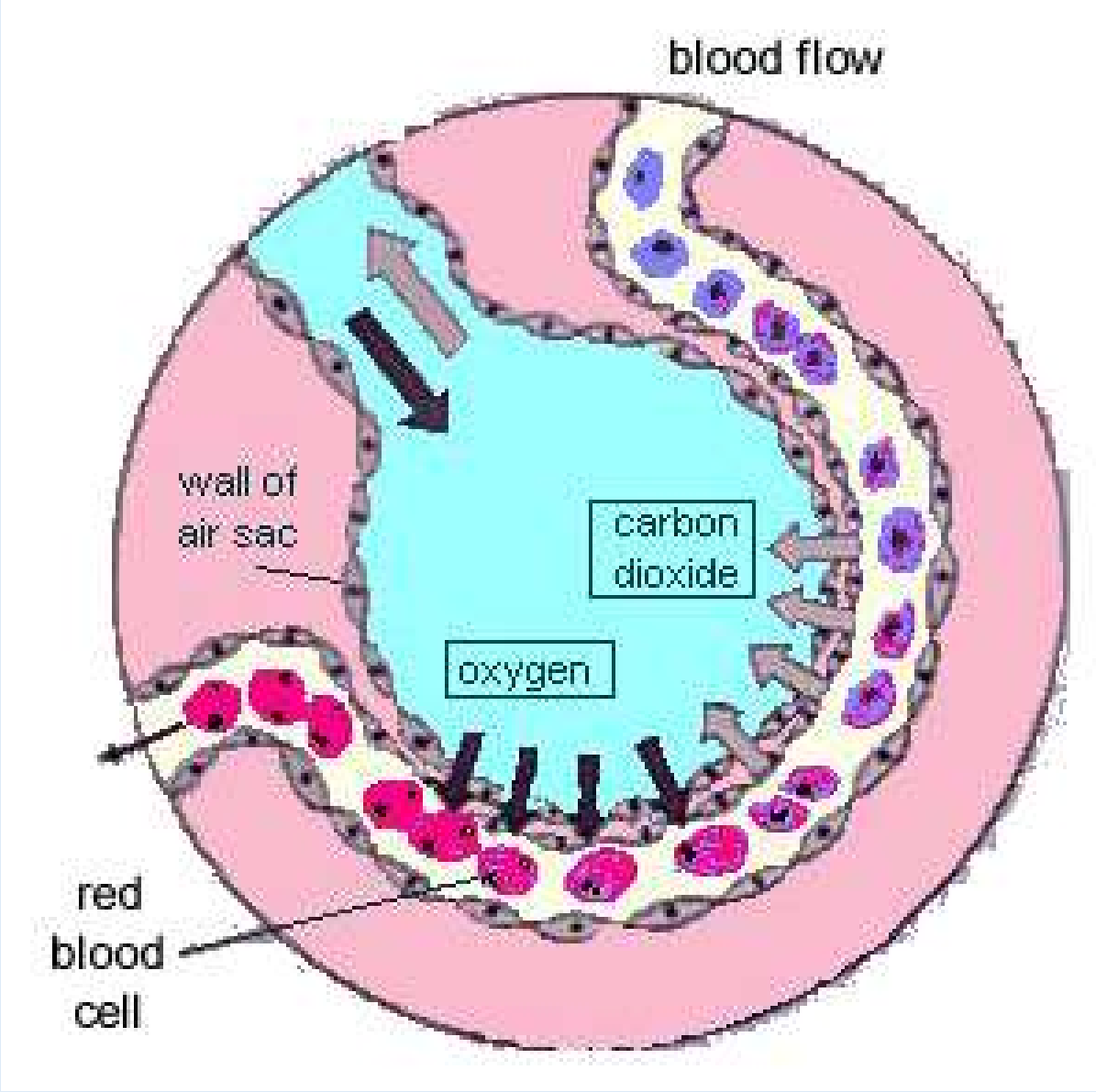
The air breathed in reaches the air sacs and is full of oxygen.

The air sacs are surrounded by blood vessels.

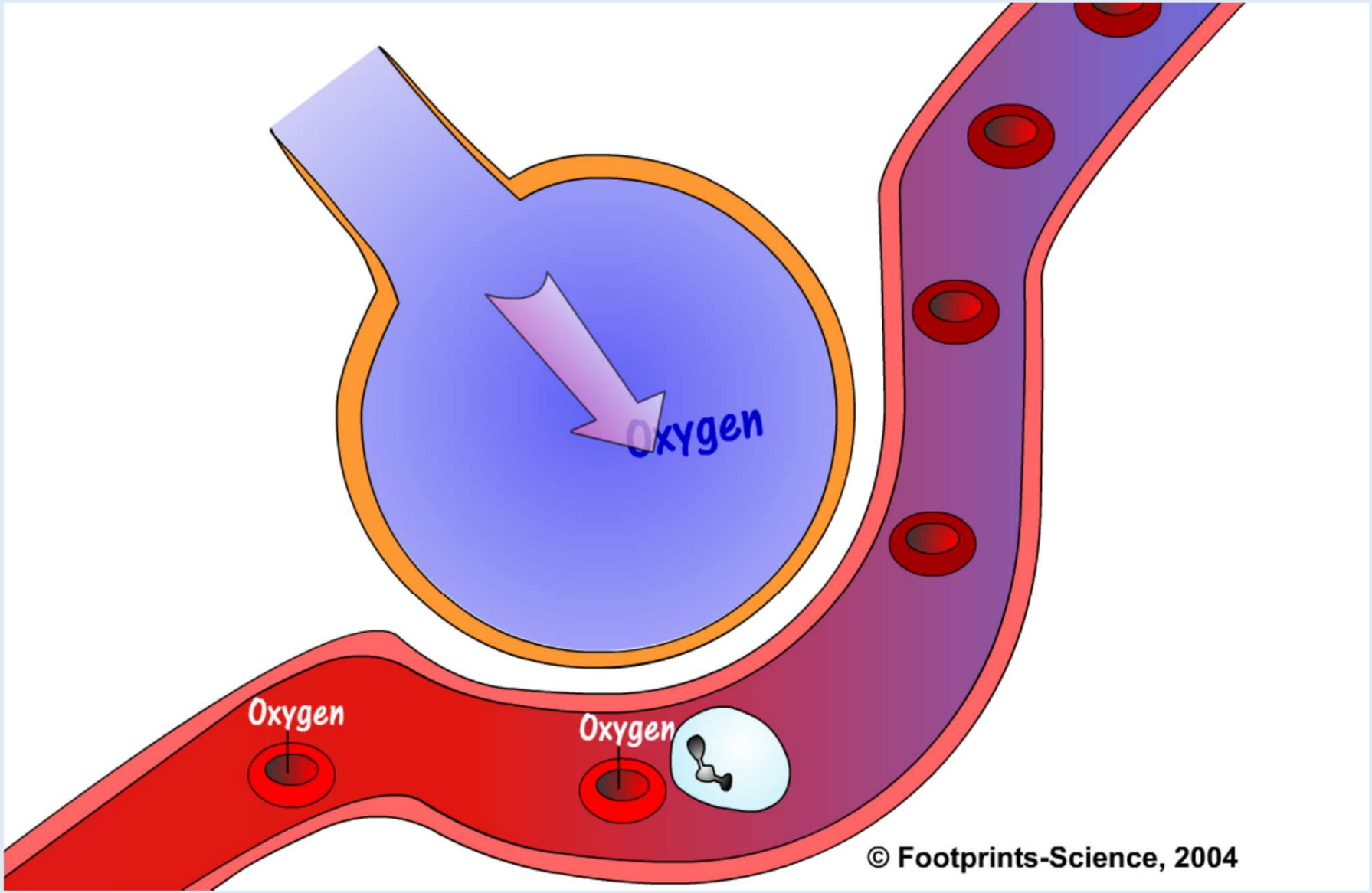
As the blood flows through the vessel:

- Oxygen moves from the air sac to the blood.
- Carbon dioxide moves from the blood to the air sac(so we can breathe it out)

A closer look!



Plenary – On the board, label the diagram and draw arrows to show the direction of movement of oxygen and carbon dioxide.



The Skeleton

Page 19

Starter:
We all have a skeleton, what do you think the job of the skeleton is?

The Skeleton

Page 19

Learning Intentions:

- To find out what the main functions of the skeleton are
- To be able to name some of the main bones of the skeleton

The Skeleton

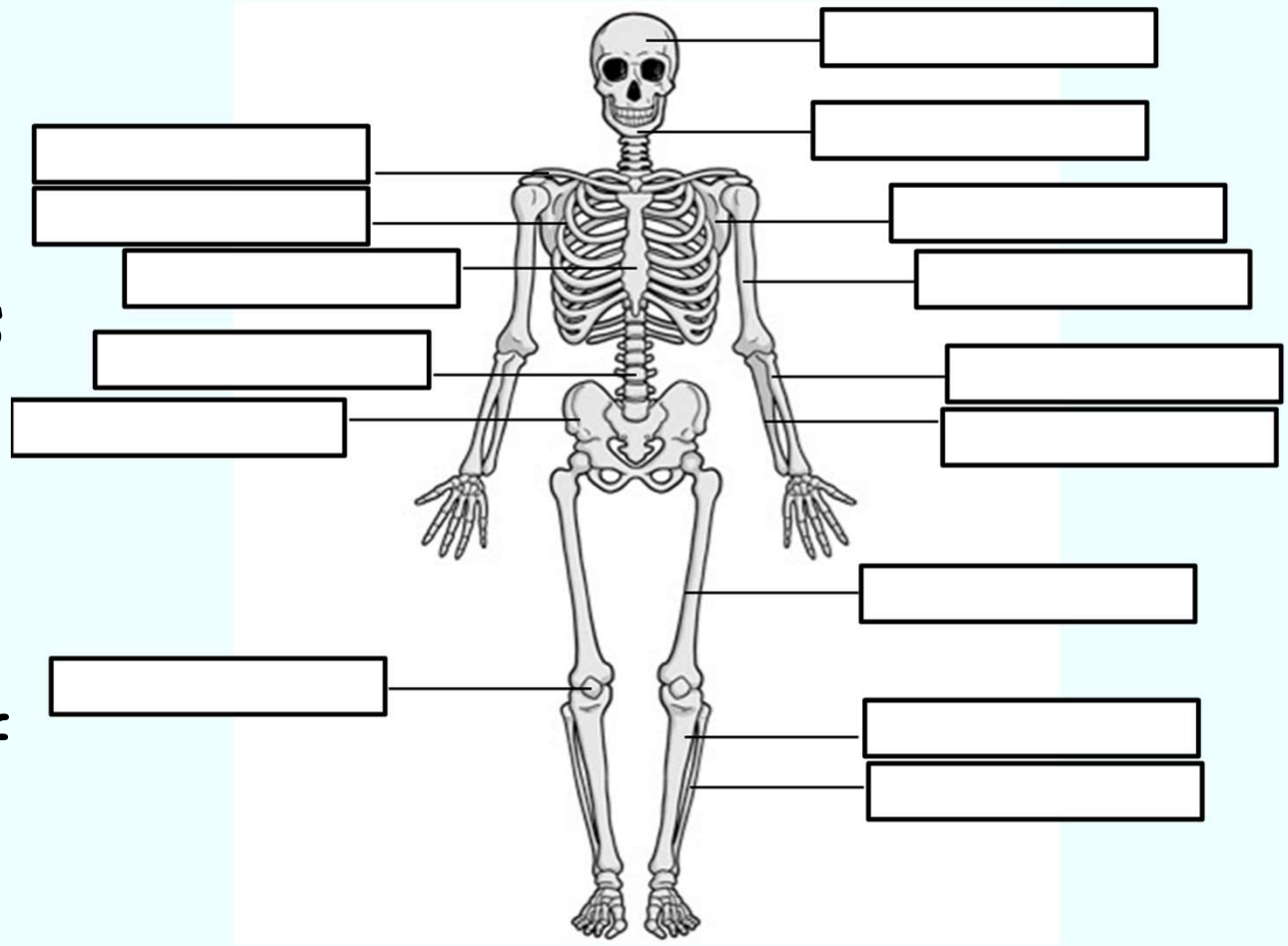
Success Criteria

- ❑ I can state the main functions of the skeleton.
- ❑ I can name some of the main bones of the skeleton.

The Skeleton

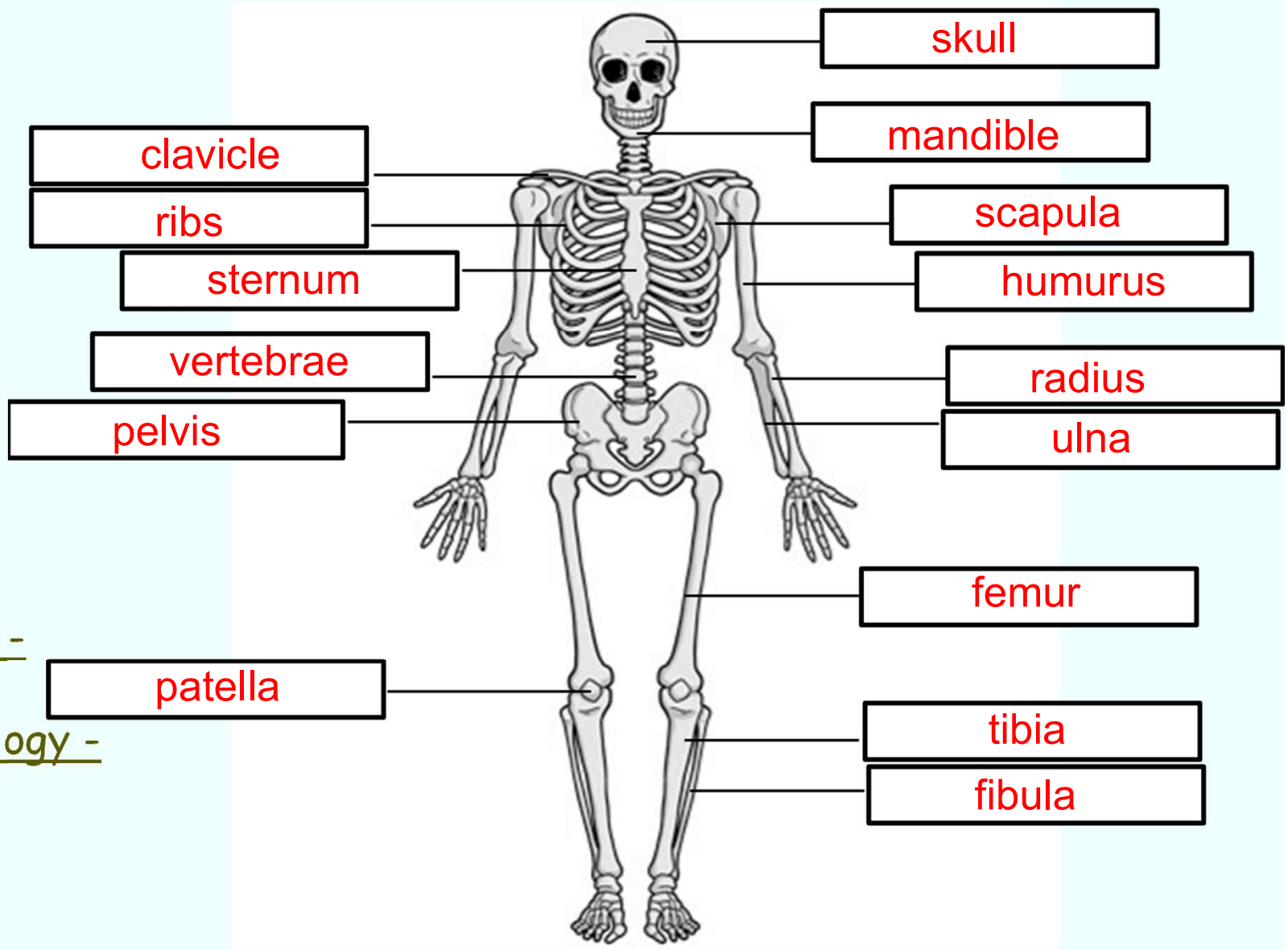
The Skeleton

- Add the names of as many of the bones that you know…
- Check your answers against the names of the bones in the **next** slide.



A picture to check yours against…

How many did you get?



The skeletal system - Skeleton - Living organisms - KS3 Biology - BBC Bitesize - BBC Bitesize

26/03/2025

FACTS

There are over 200 bones in the human skeleton

Humans are vertebrates – our skeleton is covered by skin and tissues

Bones are strong, but teeth are stronger

The stirrup is the smallest bone in the body

The hyoid bone (which holds your tongue in place) doesn't connect to any other bones

More than half your bones are in your hands and feet

The femur is the longest, largest and strongest of all the bones

Skeleton

Page 20

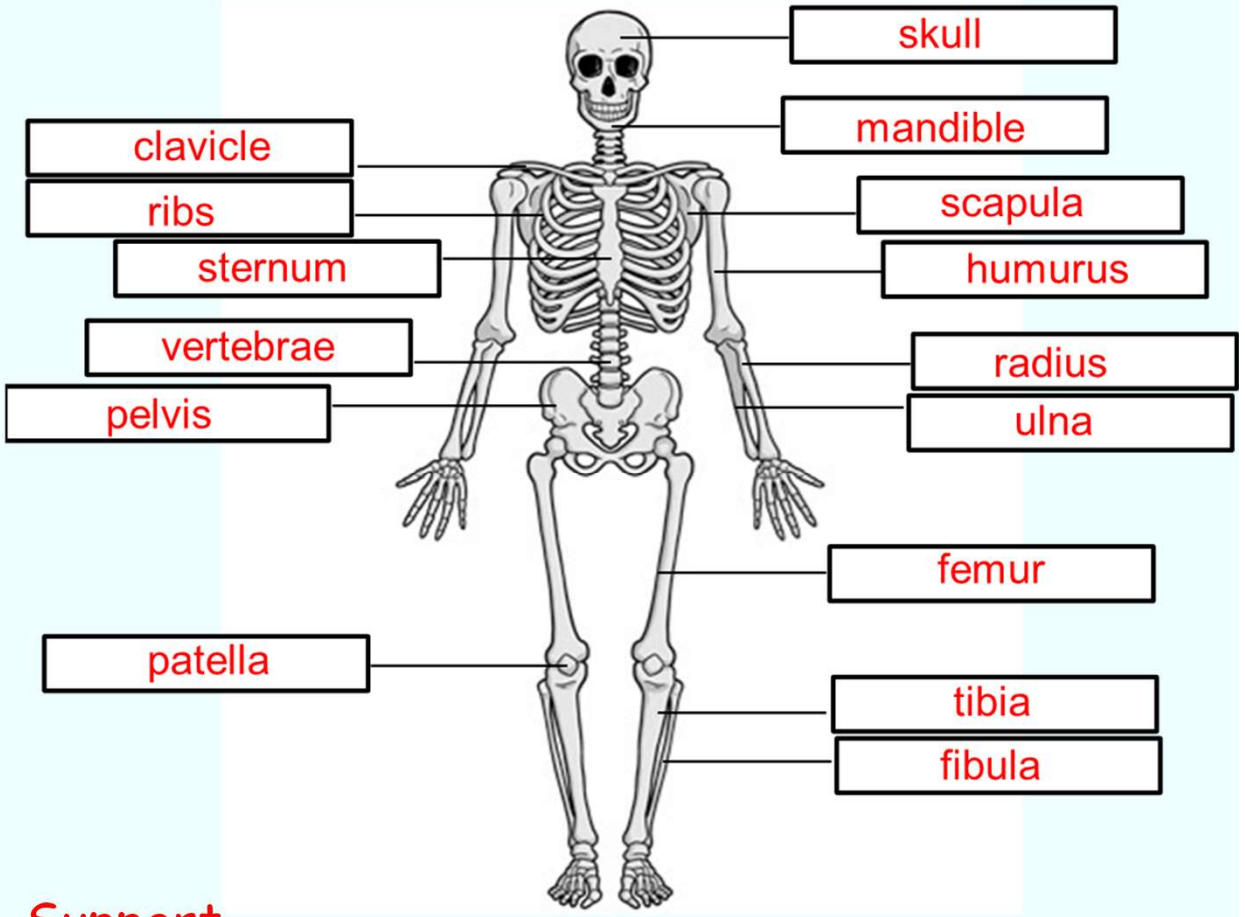
The three main functions of the Skeleton are **Support**, **Movement** and **Protection.**

Skeleton

Page 20

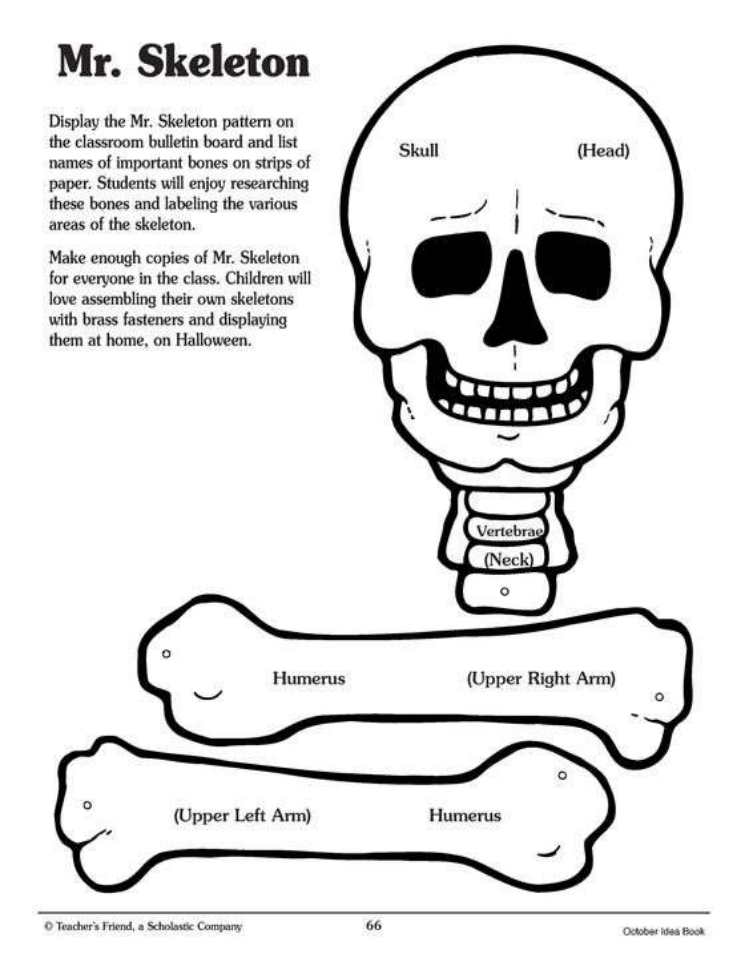
- Now choose 3 colours and shade the bones in our body which provide…

  - Support
  - Protection
  - Movement



Support
Protection
Attachment = SPAMM
Muscles
Movement

EXTRA - Time to move….



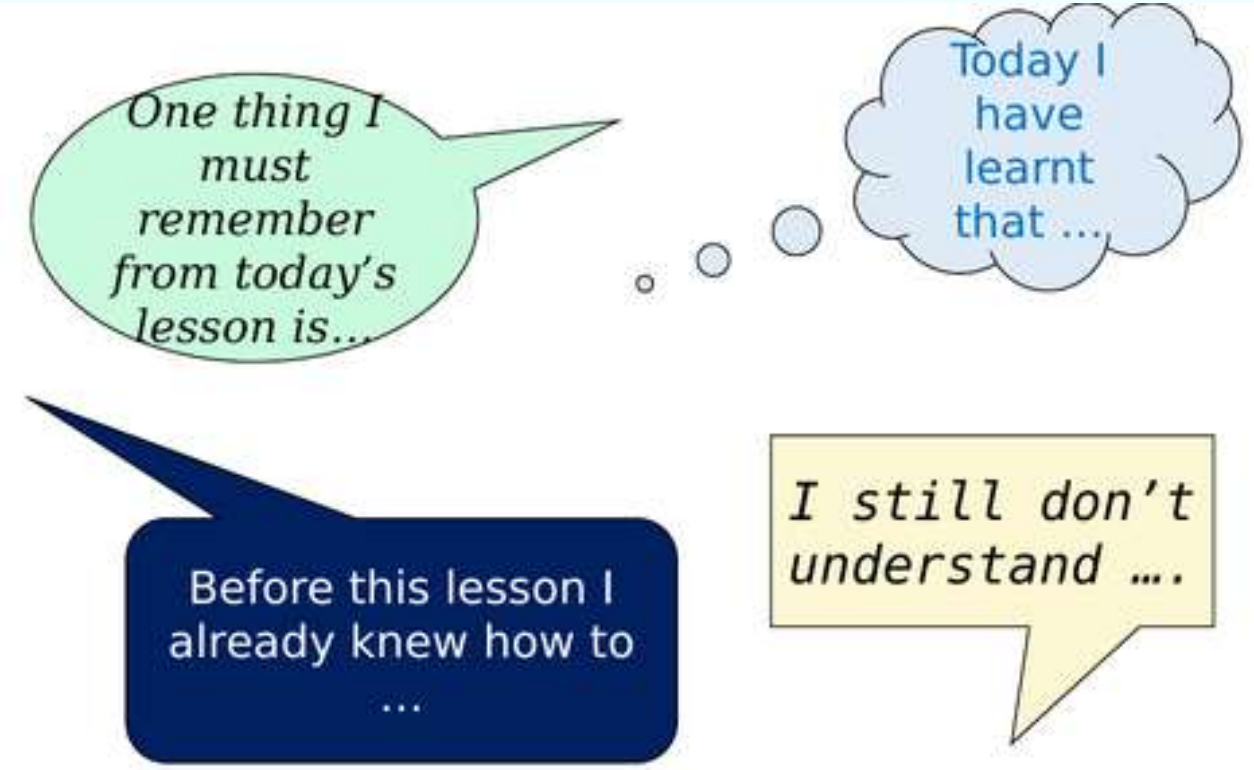
- Mr Skeleton Activity

Now choose 3 colours and shade the bones in our body which provide…

Support
Protection
Movement

Plenary

Copy and complete <u>one</u> of the following sentences…



Joints

Starter:

Can you think of any joints in the body?

Joints

Page 21

Learning Intentions:

- To find out what a joint is
- To find out the different types of joint in the body

Joints

Page 21

Success Criteria

- ❑I can state the names of joints in the body.
- ❑I can state the types of joints in the body.
- ❑I can explain how the types of joints move.

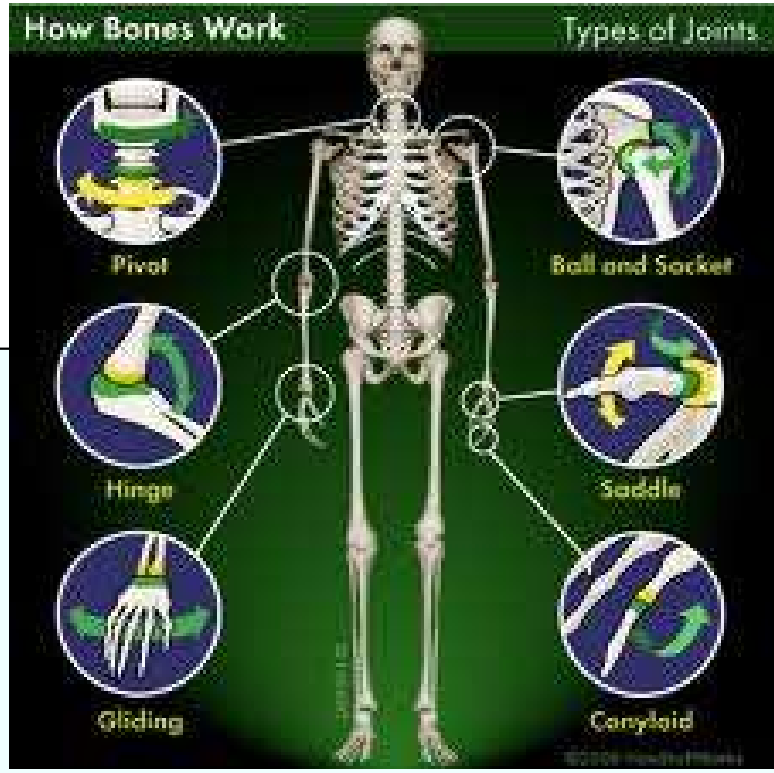
Joints

Page 21

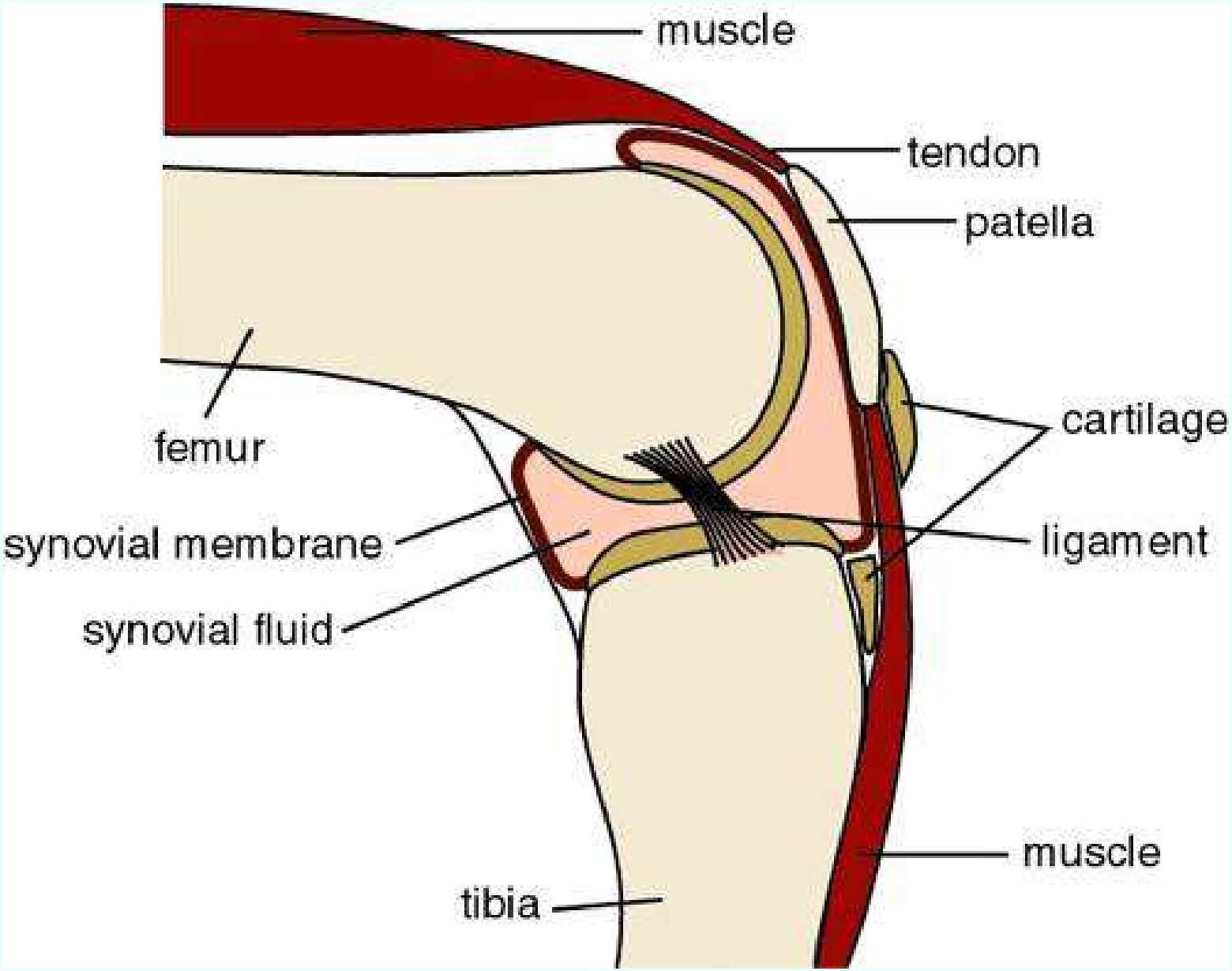
The meeting point between two bones is called a **joint**.

There are two different types of joint

- Hinge Joint
- Ball and Socket

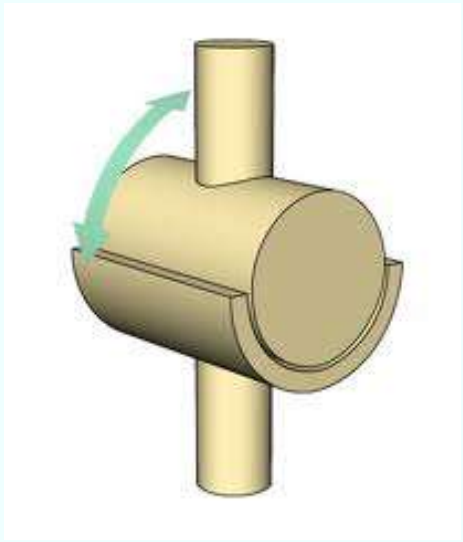


Hinge Joint

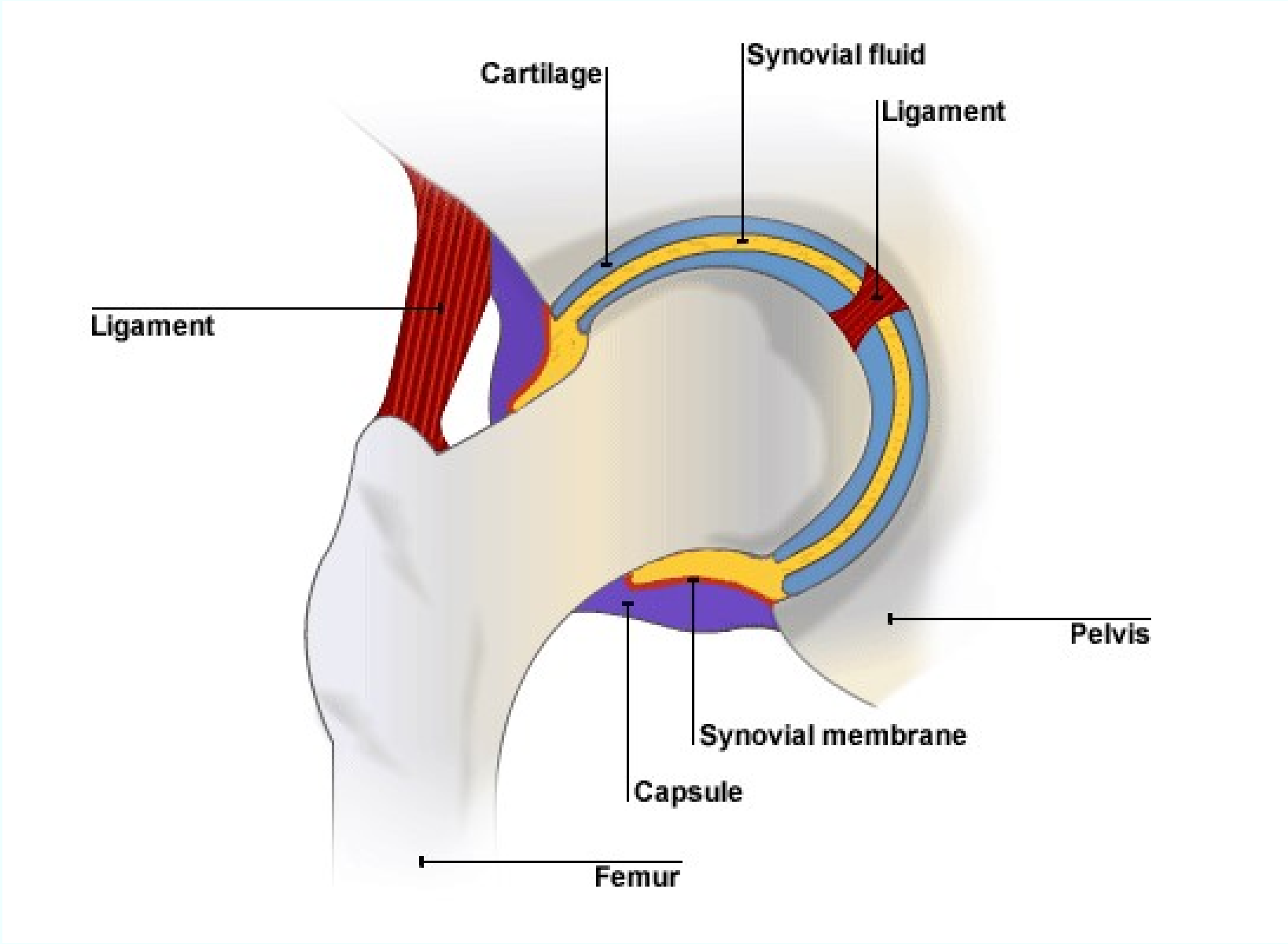

muscle
tendon
patella
femur
cartilage
synovial membrane
ligament
synovial fluid
muscle
tibia

Hinge Joint

- Bones meet together like a hinge and movement is restricted to one plane.

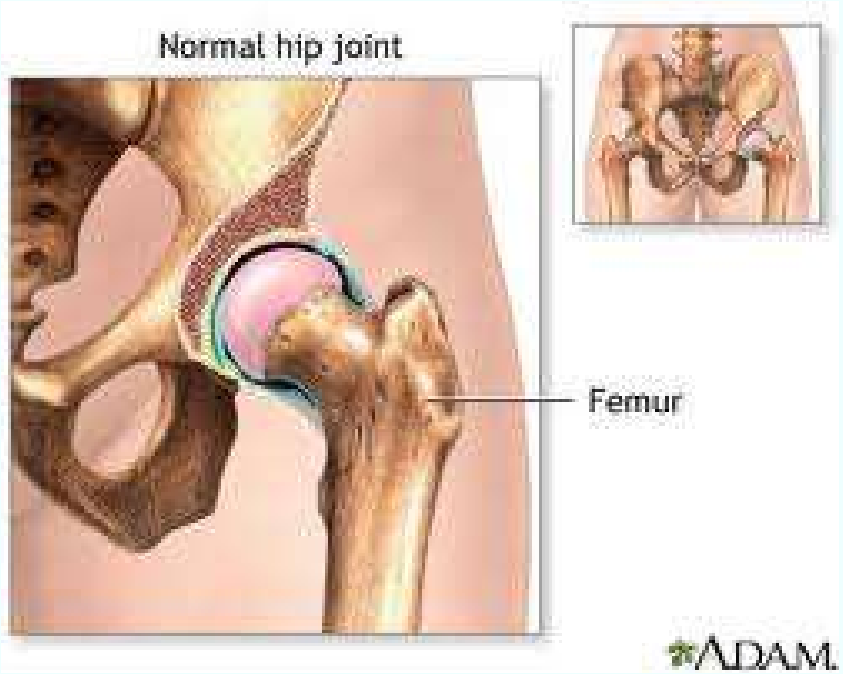


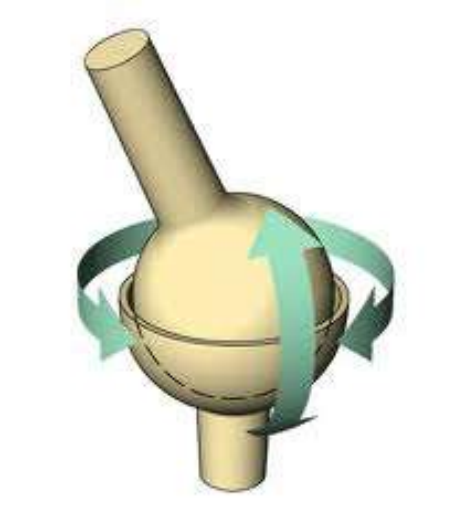
Ball and Socket Joint



Ball and Socket Joint

- At the hip and shoulder, the rounded head (ball) of one bone fits into the socket of another allowing movement in three different planes.





Joints

Page 22

Type of Joint	Movement of Joint	Examples of Joint
Ball and Socket		

Joints

Page 22

Cartilage – covers the ends of bones. It has two functions:

- Acts as a shock absorber in joints
- It is smooth so reduces friction when the joints move.

Joints

Page 22

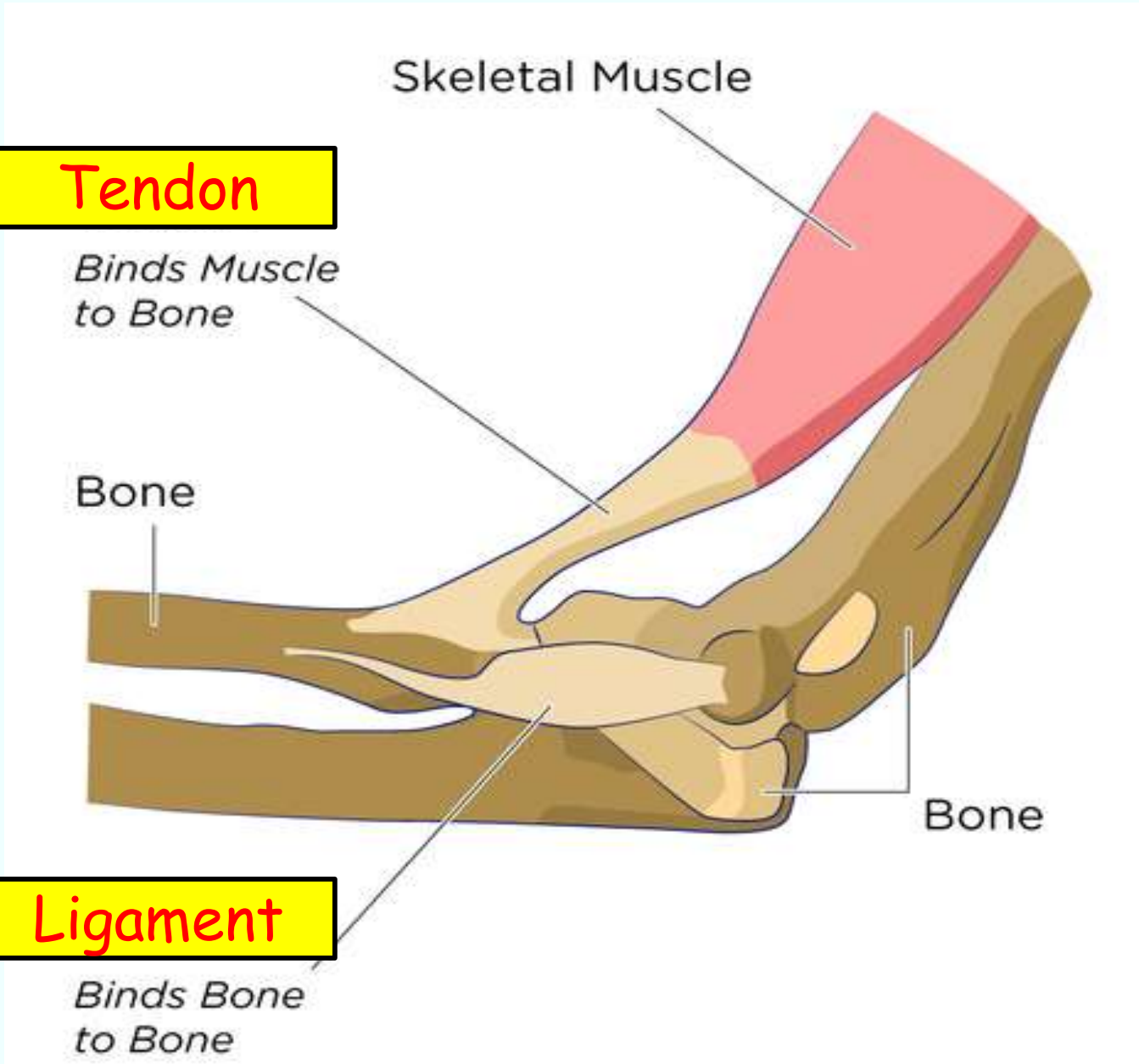
Ligaments - hold bones together at a joint (connects bone to bone).

They hold the joint in place yet allow movement because they are slightly elastic.

Tendon vs Ligament

Tendon

Binds Muscle to Bone



Ligament

Binds Bone to Bone

Plenary

- Write on a post-it 2 things you have learnt from today

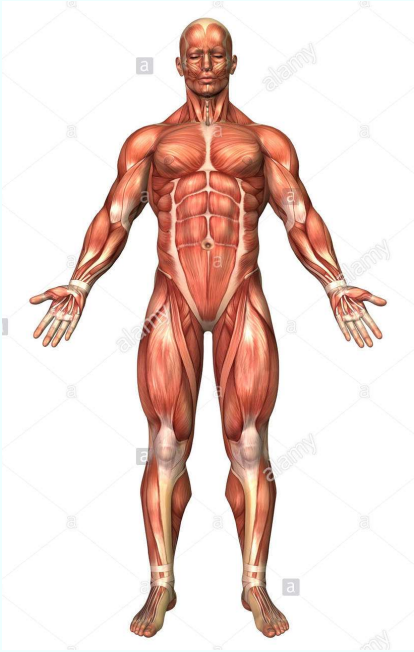
https://www.bbc.co.uk/bitesize/topics/znyycdm/articles/zgbddp3#zt3bydm10 QUIZ (10)

Muscles

Page 23

Starter:

Can you name any of the muscles in the body?



Muscles

Page 23

Learning Intentions:

- To name the 3 types of muscle
- To describe how muscles join to the bone
- To describe how muscles work

Muscles

Success Criteria

- ❑I can define the 3 types of muscle
- ❑I can describe how muscles join to the bone
- ❑I can describe how muscles work

Types of Muscle

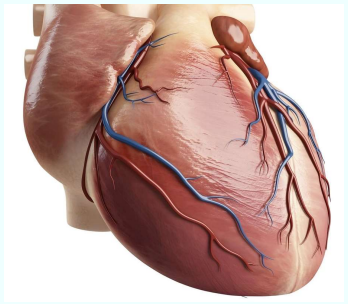
- Watch the video and answer the following questions:

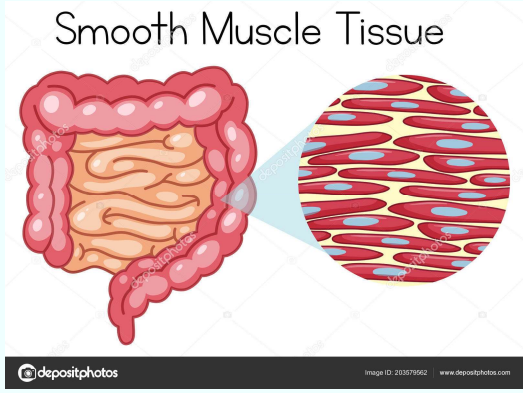
- What are the three types of muscle?
- Give an example of each type of muscle.

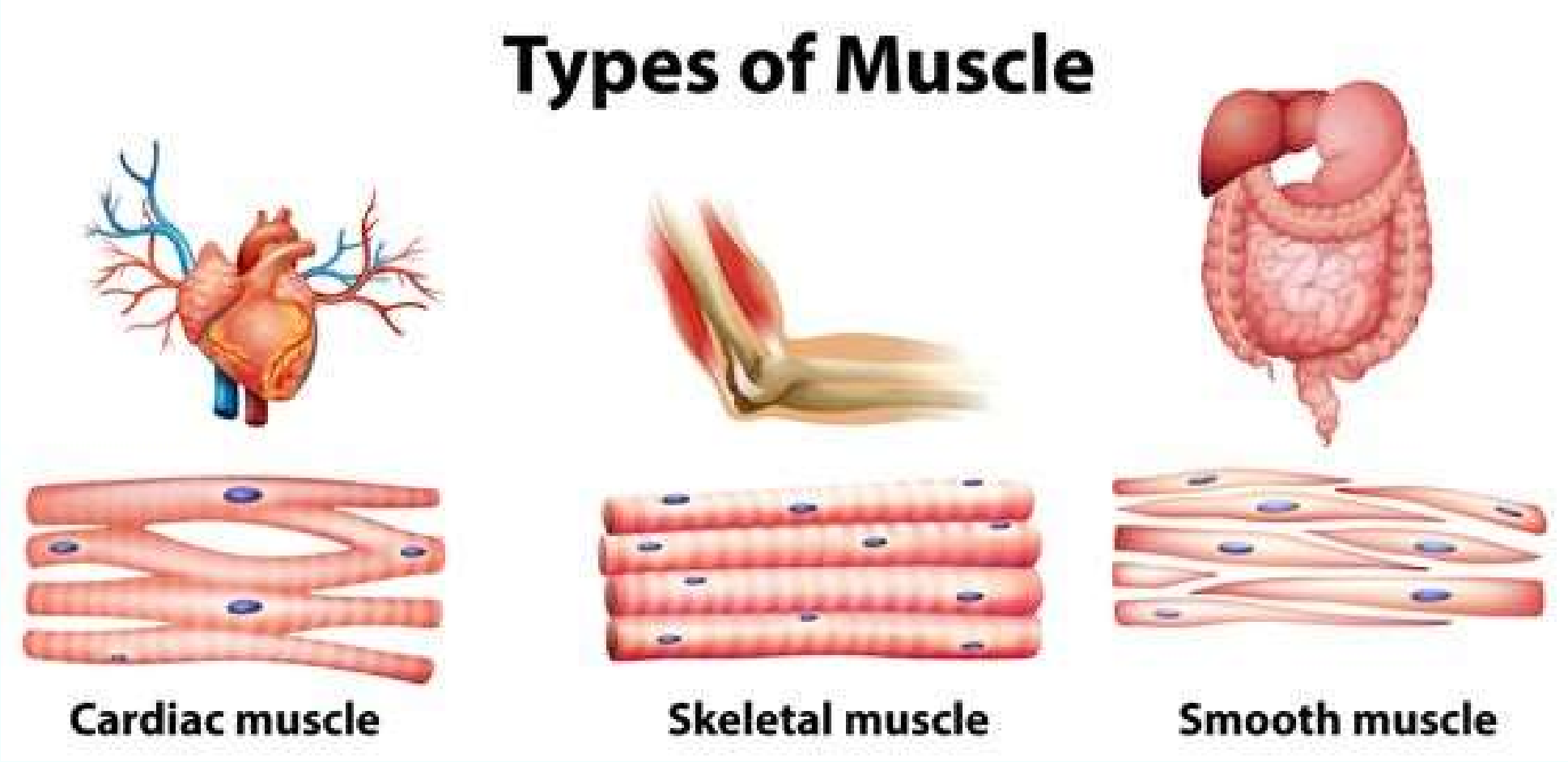
Types of Muscle

Functions of Muscle

- Muscles play a part in every function of the body. The muscular system is made up of over 600 muscles.
- **Cardiac muscles** pushes blood around the body.
- **Smooth muscle** moves food through the body in digestion.
- **Skeletal muscle** is important for movement.






Types of Muscle
Cardiac muscle
Skeletal muscle
Smooth muscle

Types of Muscle

Page 23

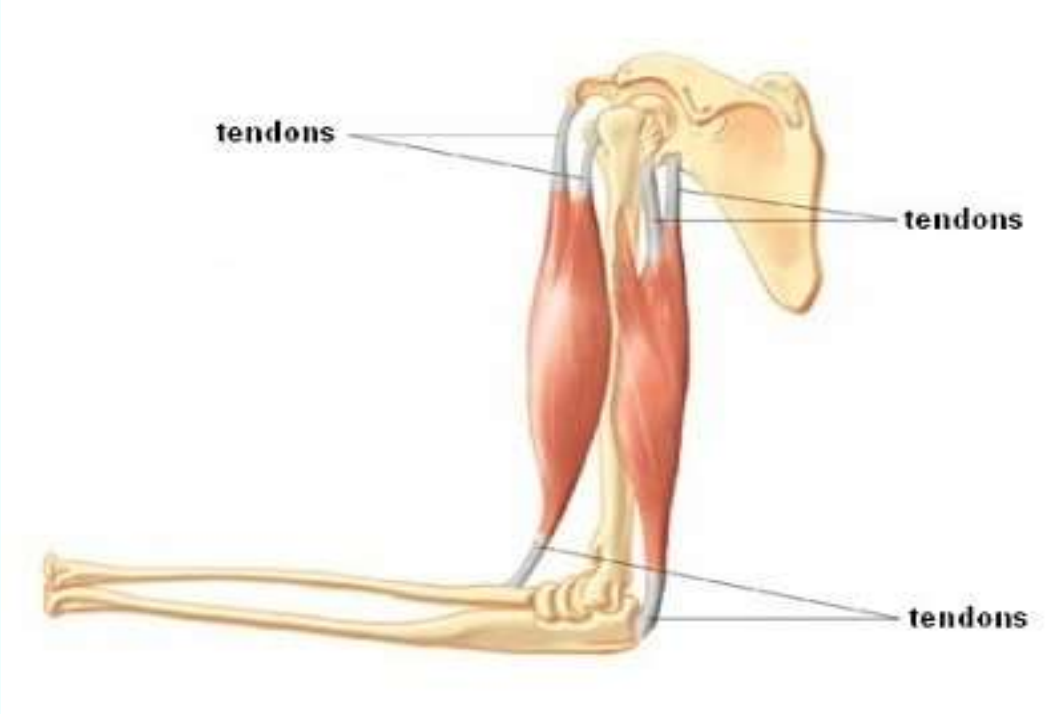
- There are 3 main types of muscle:
  - Smooth muscle (muscles in intestines)
  - Cardiac muscle (heart muscle)
  - Skeletal muscle (muscles that attach to skeleton)

Names of some muscles

- Quadraceps
- Pectorals
- Biceps
- Triceps
- Facial muscles
- Gluteus maximus
- (largest muscle – in hip)
- Stapedius (smallest muscle –
- in the ear)

How do muscles attach to bone?

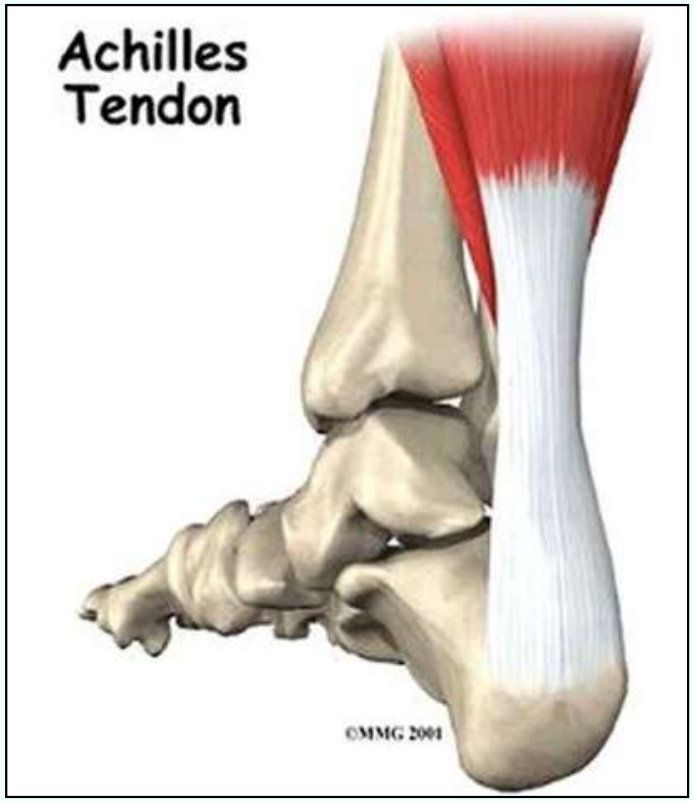
Tendons!



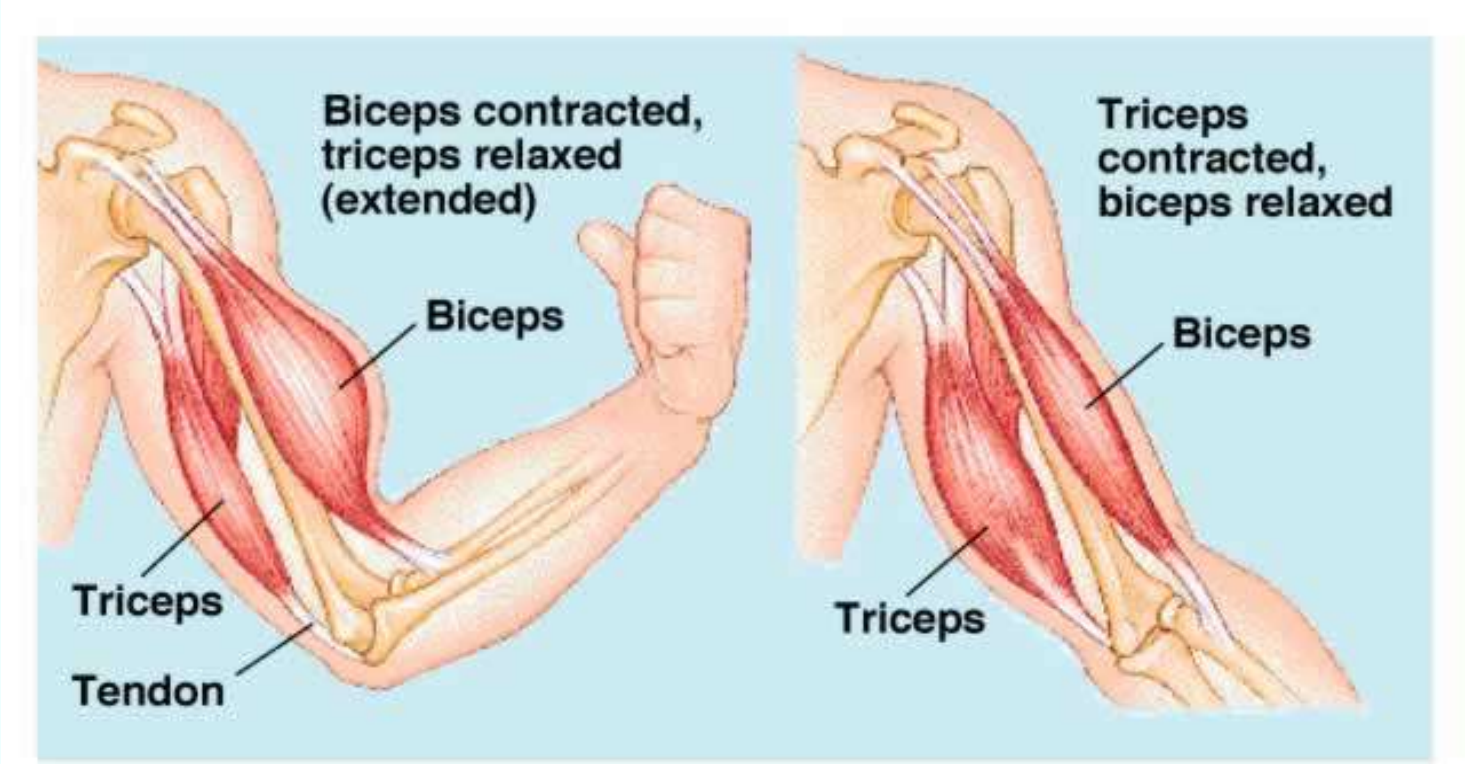
Tendons

Page 23

- **Tendons** join muscle to bone
- Tendons are inelastic (they do not stretch). This means that all the movement of the muscle will be passed on to the bone.

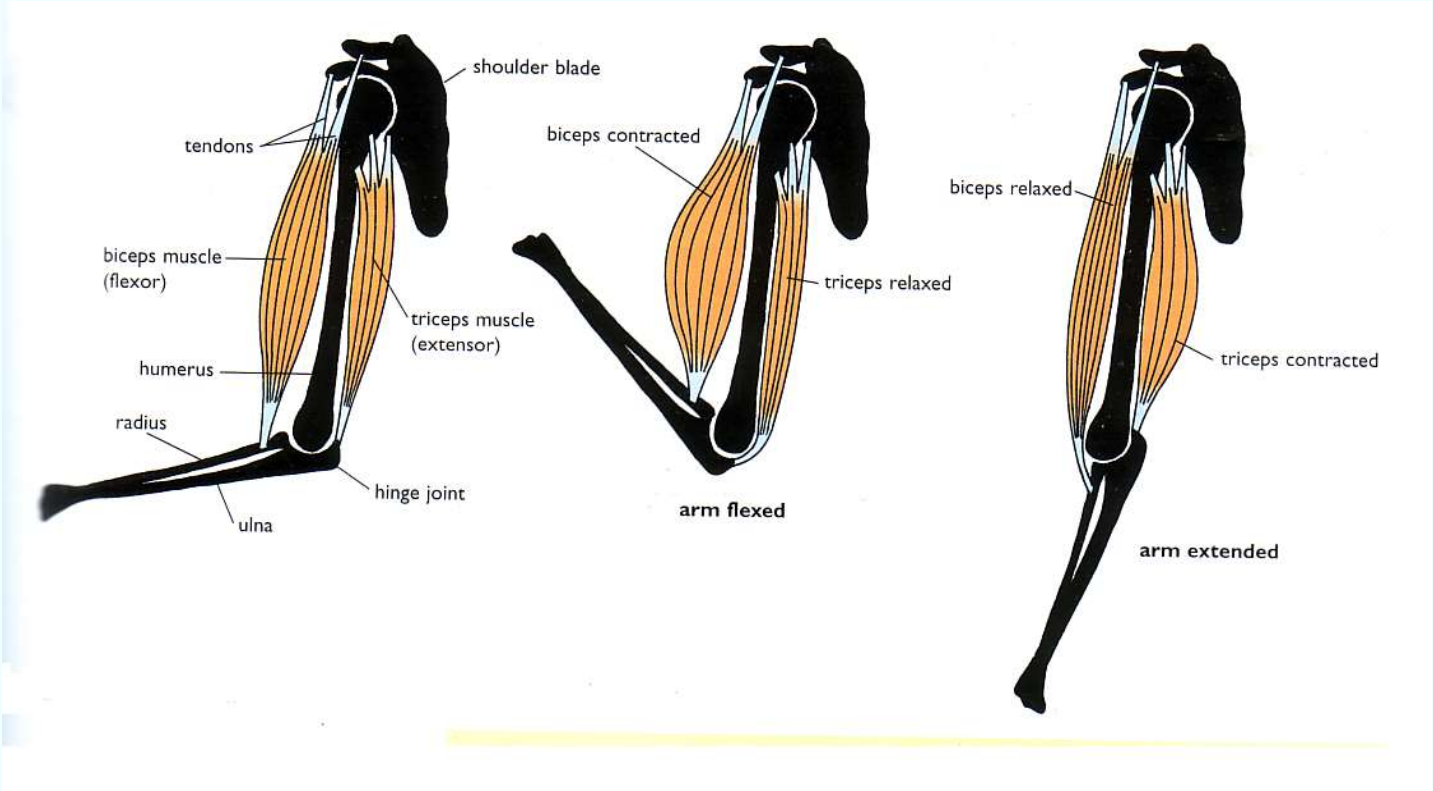


Muscles Working Together



https://www.bbc.co.uk/bitesize/clips/zpp6n39

Muscles Working Together



Antagonistic pairs

Page 24

- Muscles work in opposing pairs. They are said to be antagonistic to one another.
- Muscles contract (get shorter and fatter) and relax (longer and thinner)

Chicken Wing Dissection

Click on picture

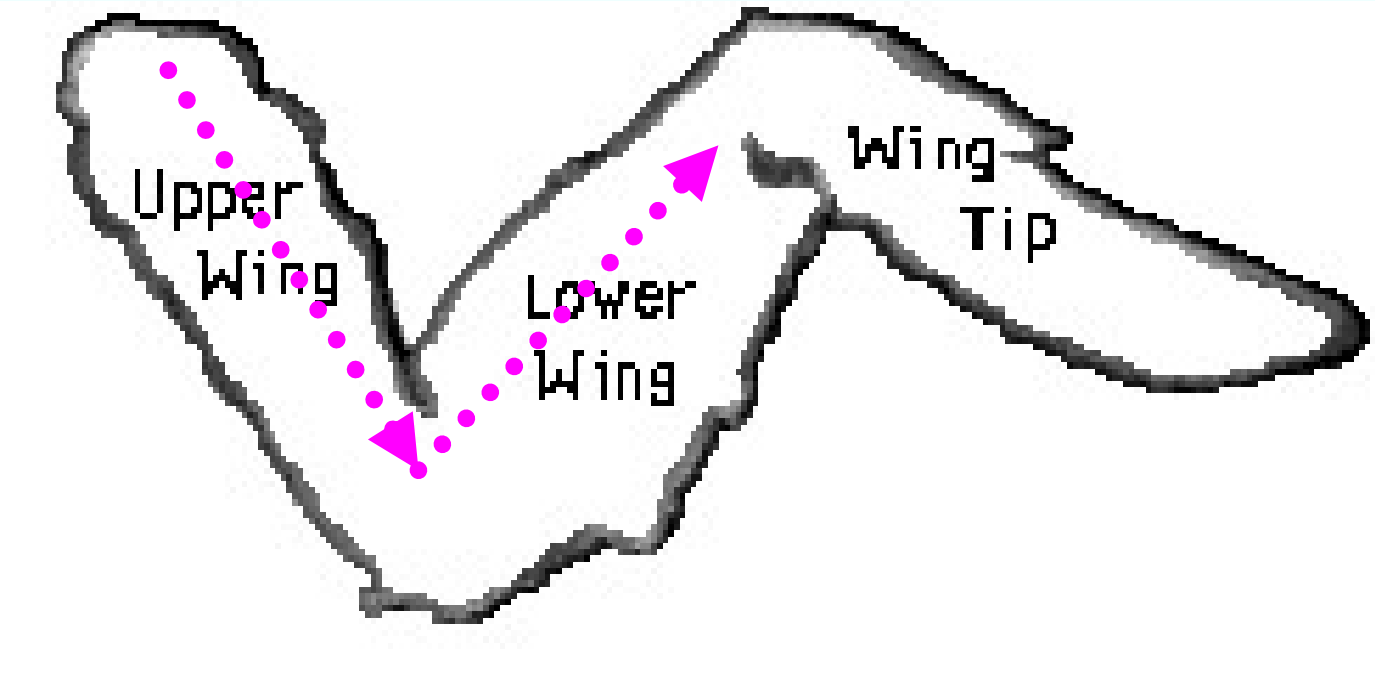
Chicken Wing – Initial Observations

- Study the chicken wing.

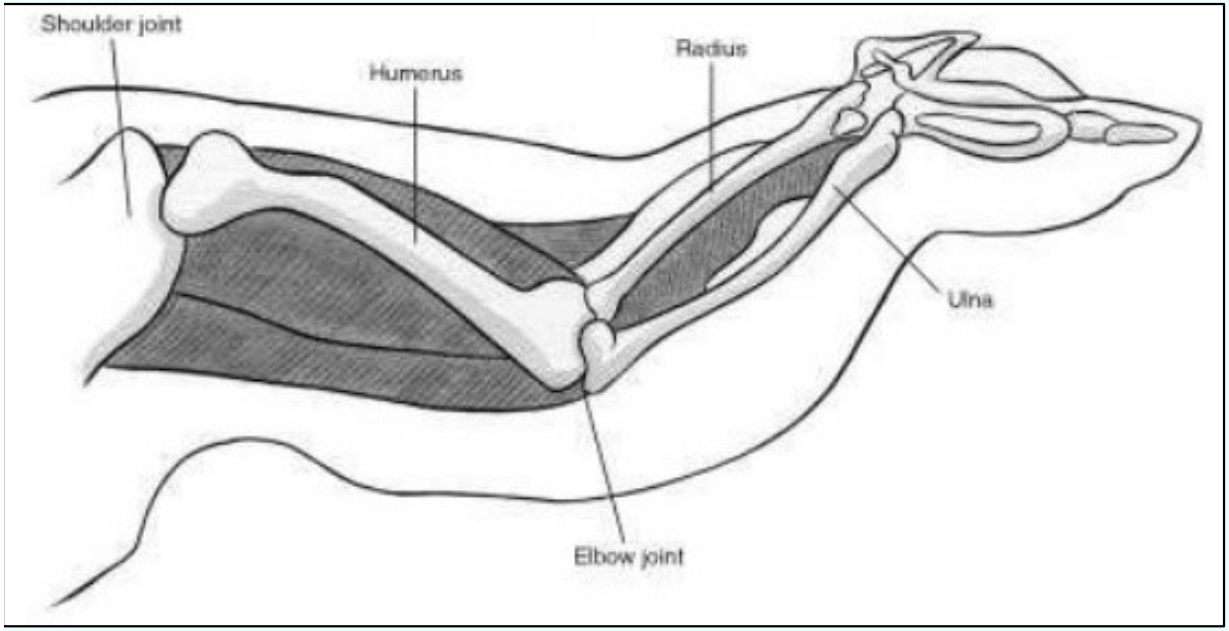
- One person should note:
  - The appearance of the skin.
  - How the skin feels.
  - Point where wing has been removed, can you see cartilage? Has the bone been cut? Can you see spongy bone or bone marrow?

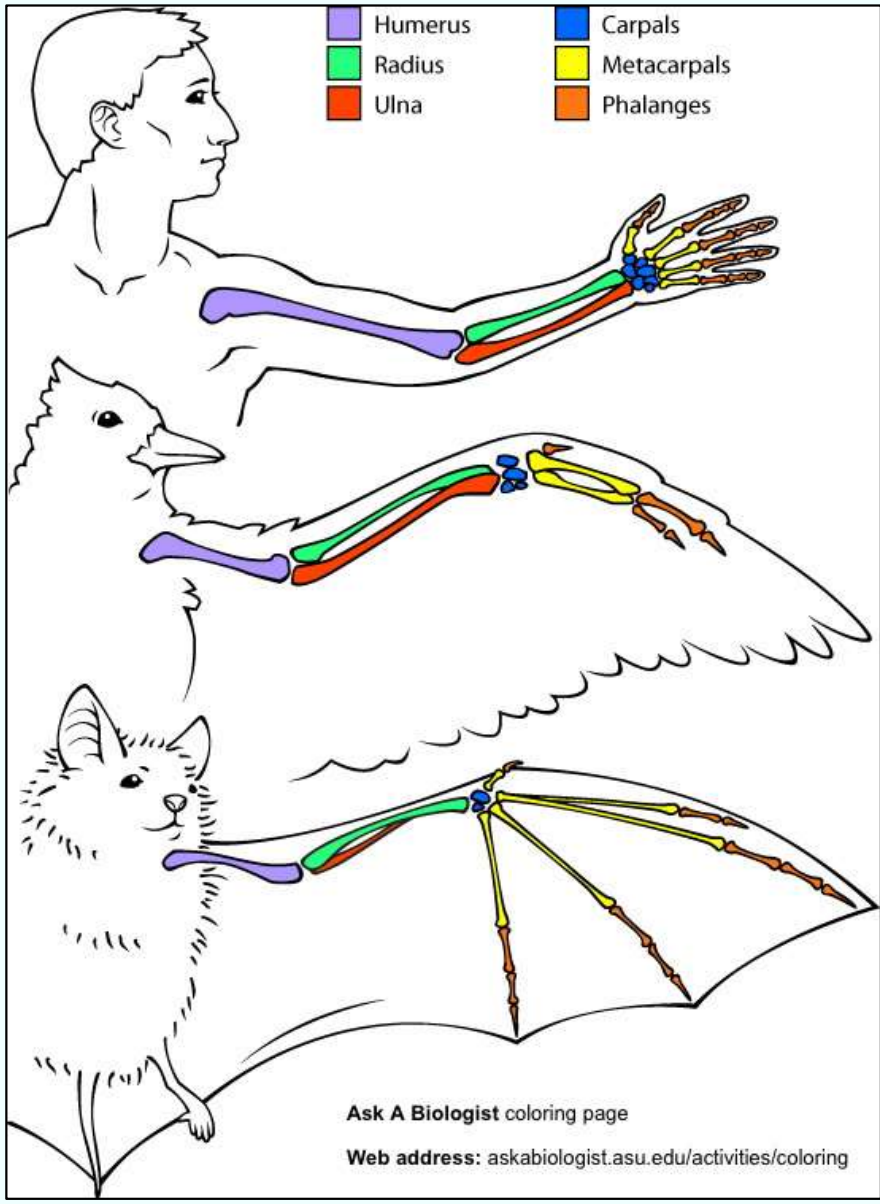
Skin removal

Using scissors carefully cut the upper skin in a V shape as shown



Turn over the wing and repeat for the lower skin.


Shoulder joint
Humerus
Radius
Ulna
Elbow joint


Humerus
Radius
Ulna
Carpals
Metacarpals
Phalanges
Ask A Biologist coloring page
Web address: askabiologist.asu.edu/activities/coloring

Identifying Structures

- **Muscle**
  - Bundles of pale pink tissue.
- **Tendons**
  - Shiny white tissues found at the ends of the muscle.
- **Cartilage**
  - Shiny, white found on the end of the bone.
- **Ligaments**
  - Shiny, white tissue found around joint, often difficult to find.

Dissection extension

- Teacher demo
- Bone is generally about 30 % protein (collagen) and 70 % calcium phosphate dry mass
- One bone will be left in 1M HCl overnight. One bone will be heated overnight at 60°C

Plenary

Write a tweet explaining to your followers how the muscles of the skeletal system work.

Character limit: 280

Useful for cover - as an extra

- BBC iPlayer - Operation Ouch! - Series 1: 1. Marvellous Muscles

Muscle Fatigue

Page 25

Starter:

1. What did you learn from the chicken wing dissection?
2. What do you think happens to your muscles when you exercise for a long period of time?

Muscle Fatigue

Page 25

Learning Intentions:

- To find out what happens to our muscles when we exercise for a long period of time.

Muscle Fatigue

Success Criteria

- ❑ I can undertake an experiment to test muscle fatigue
- ❑ I can explain why muscles become tired

Muscle Fatigue

- This is when a muscle loses its ability to contract as a result of over activity.
- It will happen when there is a lack of OXYGEN to the muscle
- There is a build up of Lactate

https://www.youtube.com/watch?v=PthdswsrM3Y

To avoid muscle fatigue

1. Rest Days
2. Warm Up Exercises
3. Stretch at the end of training
4. Alternate exercise in workouts
5. Use the right equipment

Stretches you can do while sitting

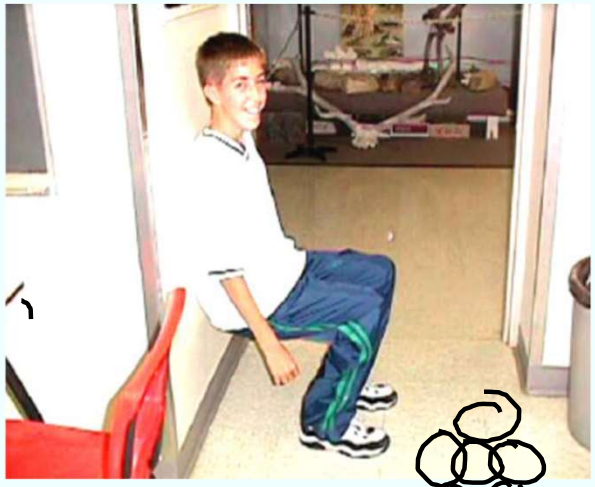
Muscle Fatigue Experiment

Aim:

To investigate how grip strength/strength can be affected by time.

Muscle Fatigue Experiment

- Method - In pairs go around the room trying each of the muscle fatigue exercises



Dynamometer

Muscle Fatigue Experiment

Do this:

Hold a book in each hand. Raise one arm straight out parallel to the ground and the other arm down at your side.

Muscle Fatigue ... Weight Lifting

How long did you hold the book before fatigue got the better of you?

_____ minutes _____ seconds

Which arm felt the fatigue the most? ◯ straight arm ◯ arm by your side

Which muscles experienced the most fatigue?

◯ biceps ◯ triceps ◯ deltoids ◯ pectoralis major

Muscle Fatigue Experiment

Do this:

Sit against the wall with your knees bent at a 90^0 angle. Hold this position for as long as it takes to feel muscle fatigue.

(If it's been more than 3 minutes you ain't doin' it right).

Muscle Fatigue ... Too Tired to Sit

How long did you sit before your legs started to burn like crazy?

_____ minutes _____ seconds

How did it feel to try to walk right after sitting against the wall?

The funny feeling in your legs is called *muscle fatigue*. Fatigue is caused by a buildup of _____ _____ in the muscle.

Muscle Fatigue Experiment

Do this:

Extend your arm out in front of you and using your hand, squeeze the tennis ball hard one time each second. This is how hard your heart works...and it doesn't complain!

Muscle Fatigue ... To Beat or Not to Beat

How is your heart (cardiac) muscle different from your arm (skeletal) muscle? (just compare how tired your arm got doing the work of the heart)

Does cardiac muscle experience fatigue? _____

Does skeletal muscle experience fatigue? _____

So, about how long did you "live", anyway??

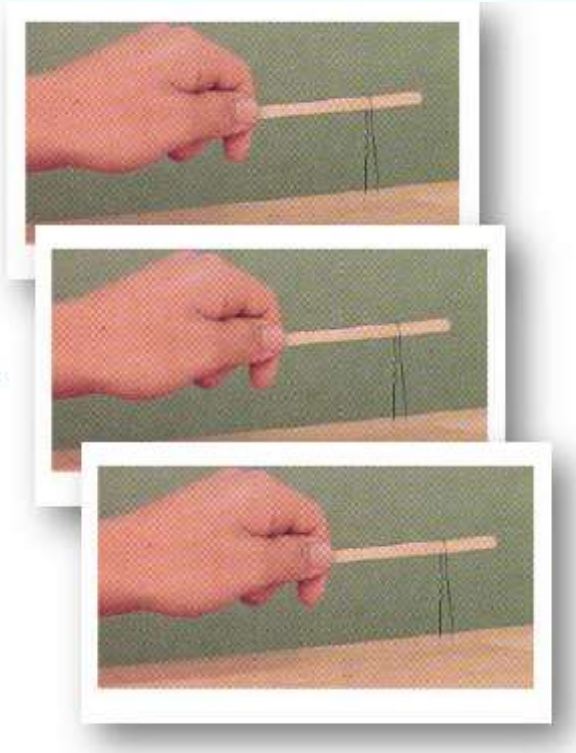
_____ minutes

You would not live long if your heart were made of skeletal muscle.

Muscle Fatigue Experiment

Do this:

1. Hold a popsicle stick in front of you , parallel to the table top.
2. Place a bent paper clip on the stick.
3. Raise the stick until the legs of the paper clip just touch he table.
4. The top of the paper clip should rest on the stick.
5. Hold the stick as steady as you can for about 30 seconds and observe.
6. Grip the stick tighter and repeat step 5.
7. Answer the questions on your answer sheet.



Muscle Fatigue ... Get a Grip

What happened to the paper clip even when you kept your hand steady?

What caused this? Hint: read the introduction

Muscle Fatigue Experiment

Do this:

1. Hold a clothespin between your thumb and index finger and see how many times you can squeeze it in one minute. Record
2. Now, without resting, squeeze it as fast as you can for a second minute. Record

Muscle Fatigue ... Clothespin Calisthenics

How many times did you squeeze the clothespin the first minute? _____

How many times did you squeeze the clothespin the second minute? _____

The soreness in your and arm is called *muscle fatigue*. Fatigue is caused by a buildup of _____ _____ in your muscles. Hint: read the introduction

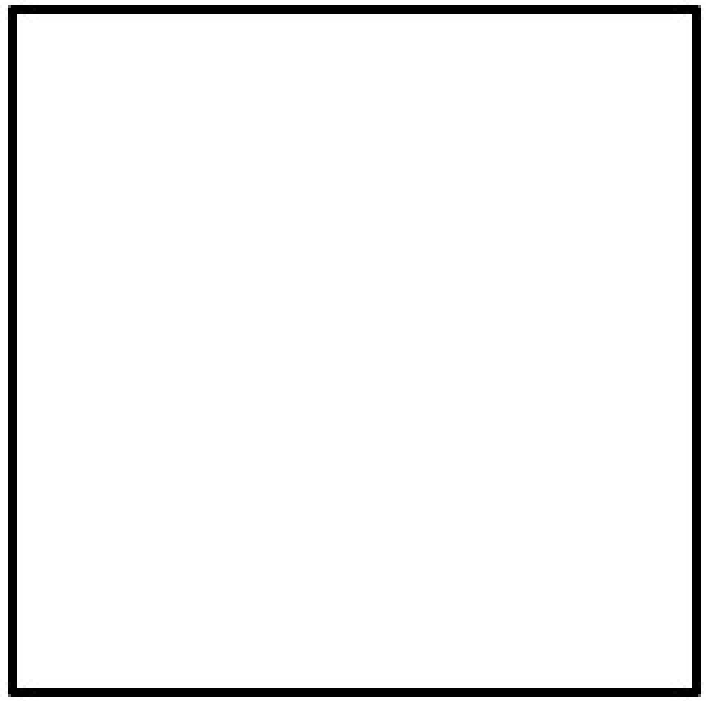
Why did you feel fatigue in your forearm rather than your fingers?

- **Conclusion**
- Grip strength reduces over time as muscles become fatigued
- Repeatedly gripping and un gripping an object leads to muscle fatigue.

Teeth

Starter

1. Draw your idea of the perfect tooth in the box.



2. What shape is it? Why is it this shape?

_____

3. How many teeth do you think you have?

_____

Teeth

Page 26

Learning Intentions:

- To name the 4 types of teeth
- To describe the job of each type of tooth
- To describe the purpose of teeth

Teeth

Success Criteria

- ❑ I can name 4 types of teeth
- ❑ I can describe the job of each type of tooth
- ❑ I can describe the purpose of teeth

Teeth

Types of teeth

A normal adult mouth has 32 teeth.

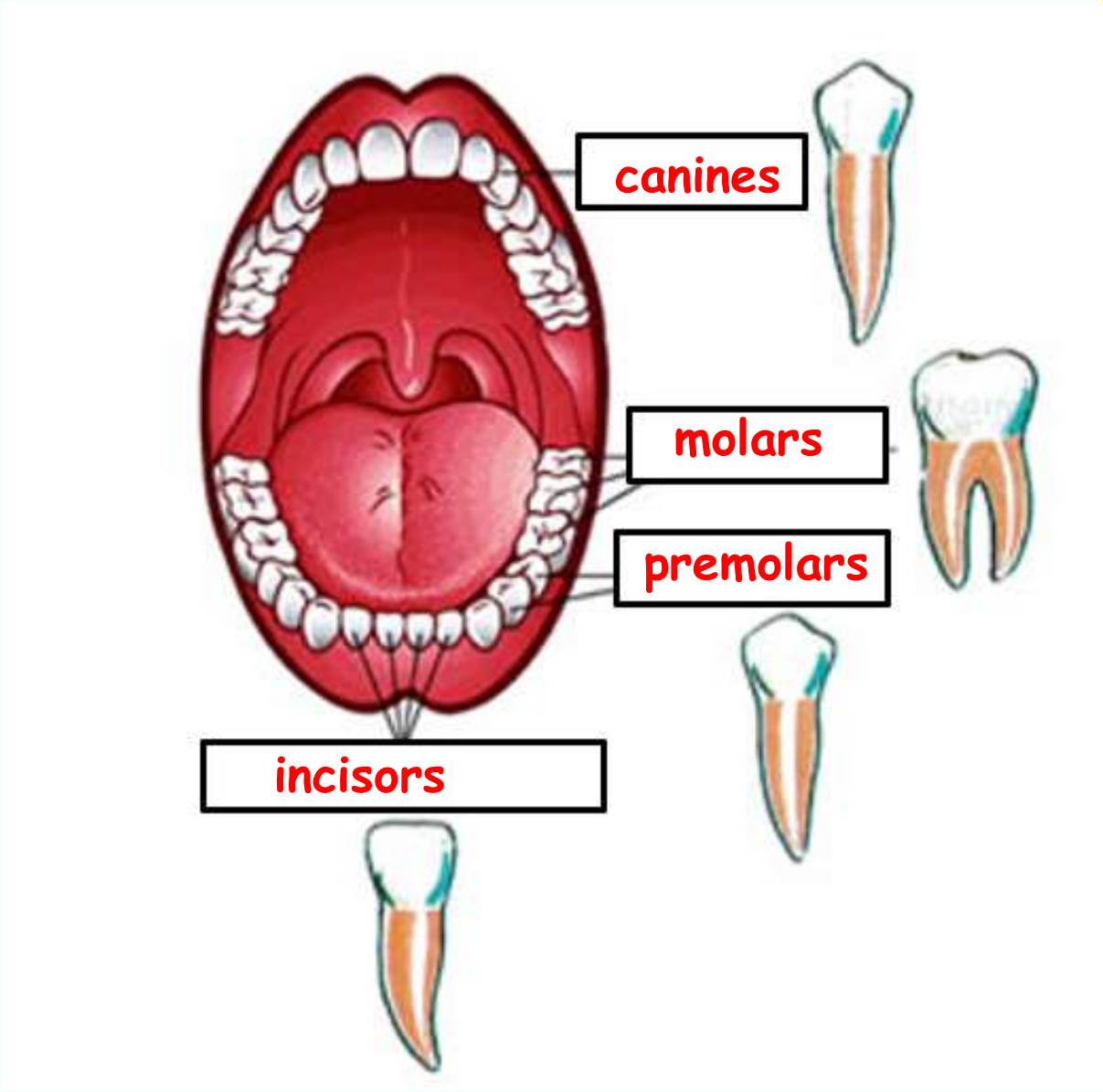
There are 4 different types of teeth which do different jobs.

Teeth break down food physically.

There are 4 types of teeth – incisors, canines, premolars and molars.

26/03/2025

4 Types of Teeth



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Type of Tooth	Function
Incisor	
Canine	
Premolar	
Molar	

For chewing and grinding

For tearing

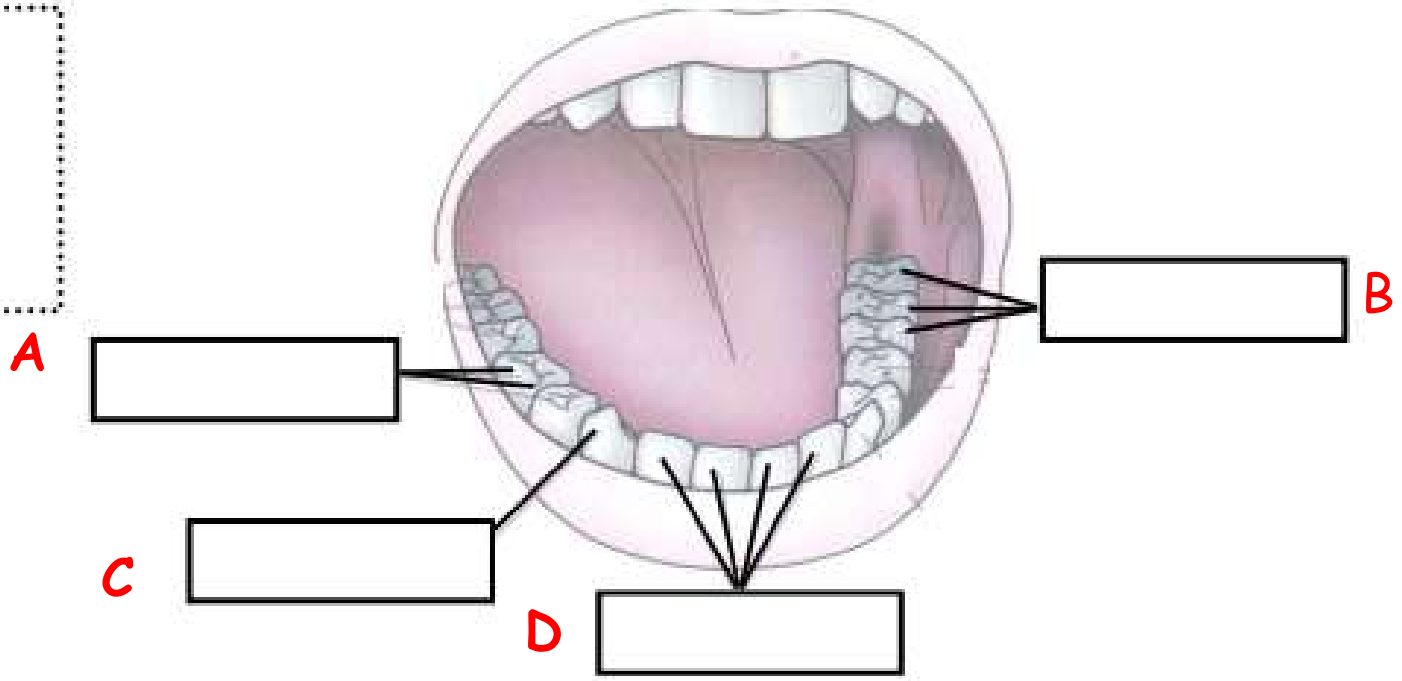
For biting

For chewing and grinding

Plenary

Match the tooth type to the correct letter in the diagram.

Canine
Premolar
Molar
Incisor



Success Criteria

To be successful you should be able to:

1. **Name the 4 types of teeth**
2. **Describe the job of each type of tooth.**
3. **Describe the purpose of teeth.**

Parts of the Tooth

Page 28

Starter

1. Name the four types of teeth

_____

2. Explain what each type of tooth does

_____

Parts of the Tooth

Page 28

Learning Intentions:

- To find out the different parts that make up our teeth
- To find out about problems that can affect our teeth

Parts of the Tooth

Page 28

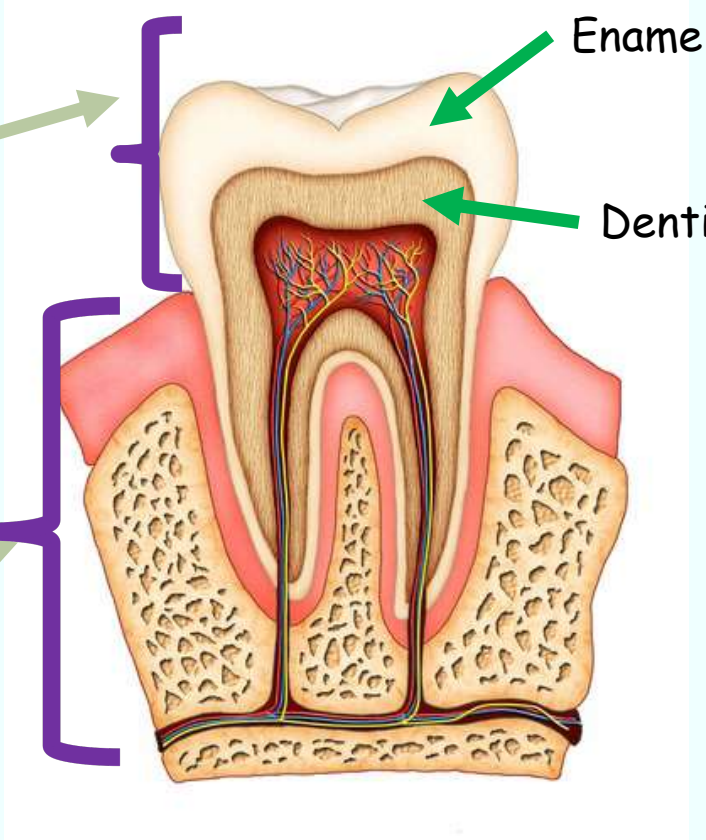
Success Criteria

- ❑ I can identify different parts of the tooth
- ❑ I can describe the problems that can affect our teeth

Anatomy of a Tooth

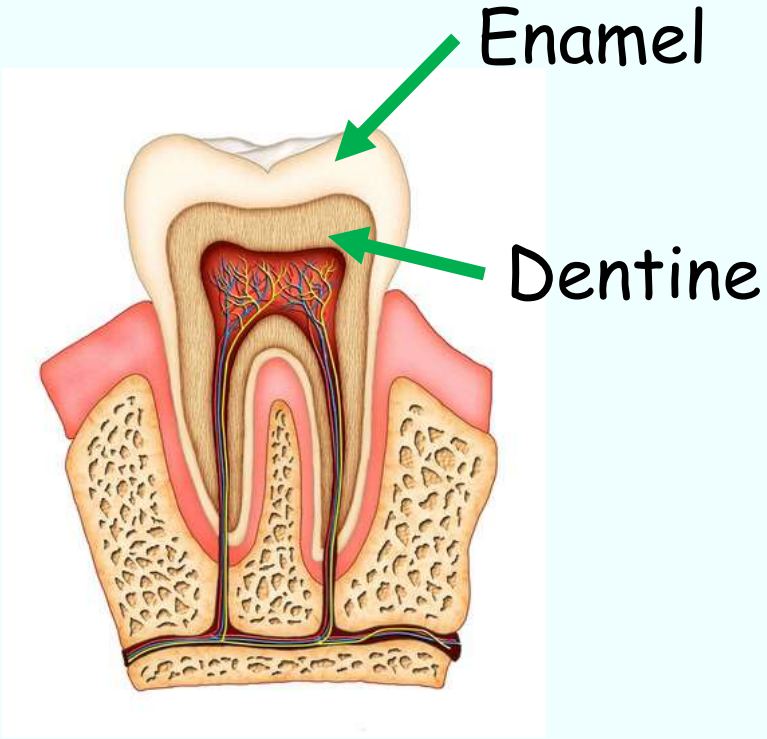
Crown – Above the gum

Root – Below the gum



Enamel is the hardest substance in the human body it covers the tooth.

Dentine is a softer substance under the enamel.



Parts of the tooth

Page 28

Enamel is a very hard substance which covers the tooth.

Dentine is a soft substance under the enamel

Problems

What type of problems can we encounter with our teeth?

It is important to visit the dentist regularly (twice a year) to try and prevent the above problems from developing.

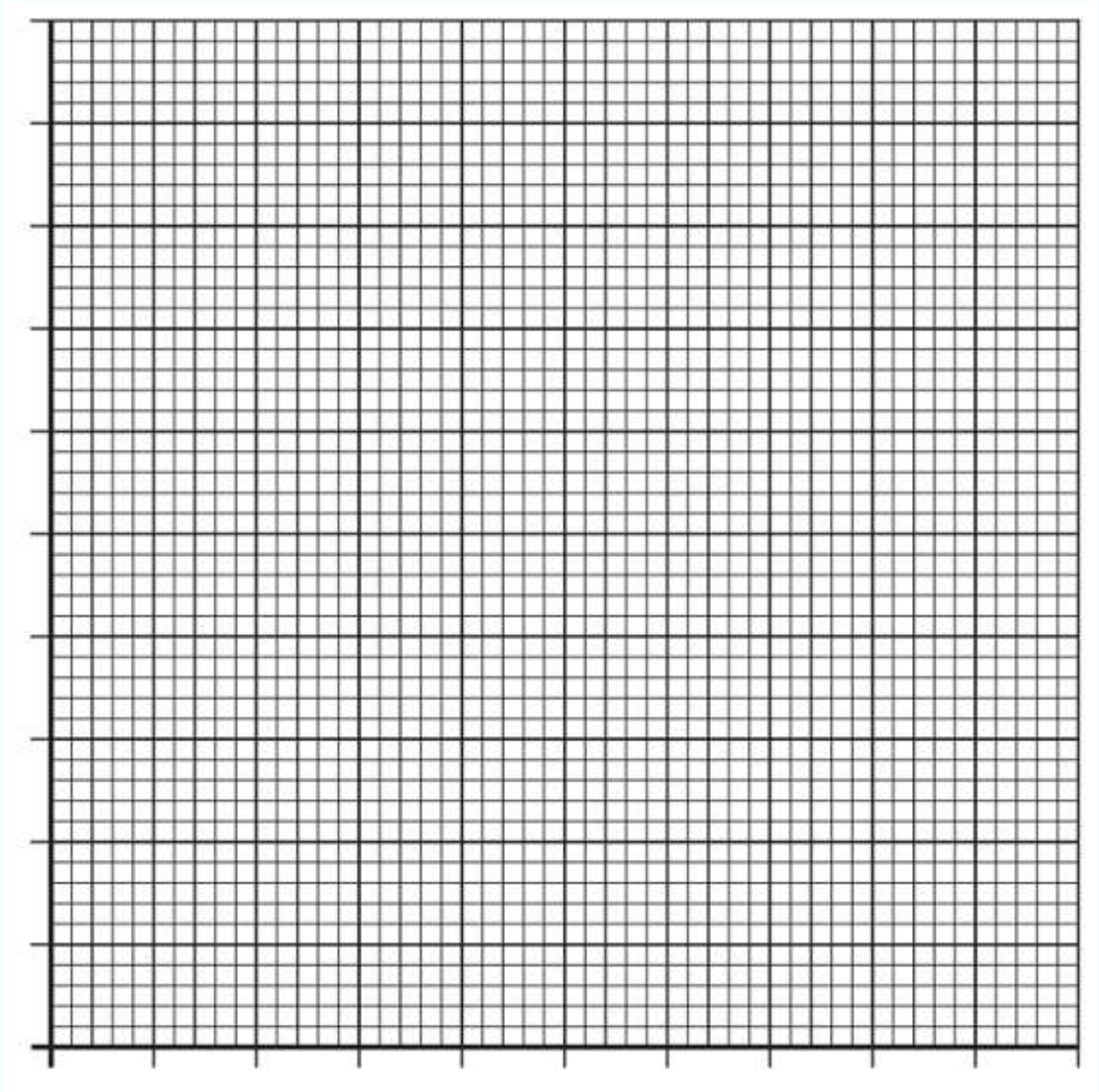
Task

Page 29

A survey was carried out to find out how long adults have gone without visiting the dentist. The results were as follows:

Length of time between dentist visit	Percentage of adults (%)
Less than 1 year	26
1-2 years	25
3-4 years	22
5-10 years	13
More than 10 years	12

Present the above information as a bar chart



Plenary

Use the link to the plenary wheel and answer the random question.

https://wordwall.net/resource/46577/science/plenary-wheel-2

Success Criteria

To be successful you should be able to:

- Identify the root and the crown of a tooth.
- Identify the two substances that teeth are made up of.

Toothpaste

Page 30

Starter

1. Why do we brush our teeth?

_____

2. What happens if we don't?

_____

Toothpaste

Page 30

Learning Intentions:

- To find out what plaque is
- To find out what it does to our teeth

Toothpaste

Page 30

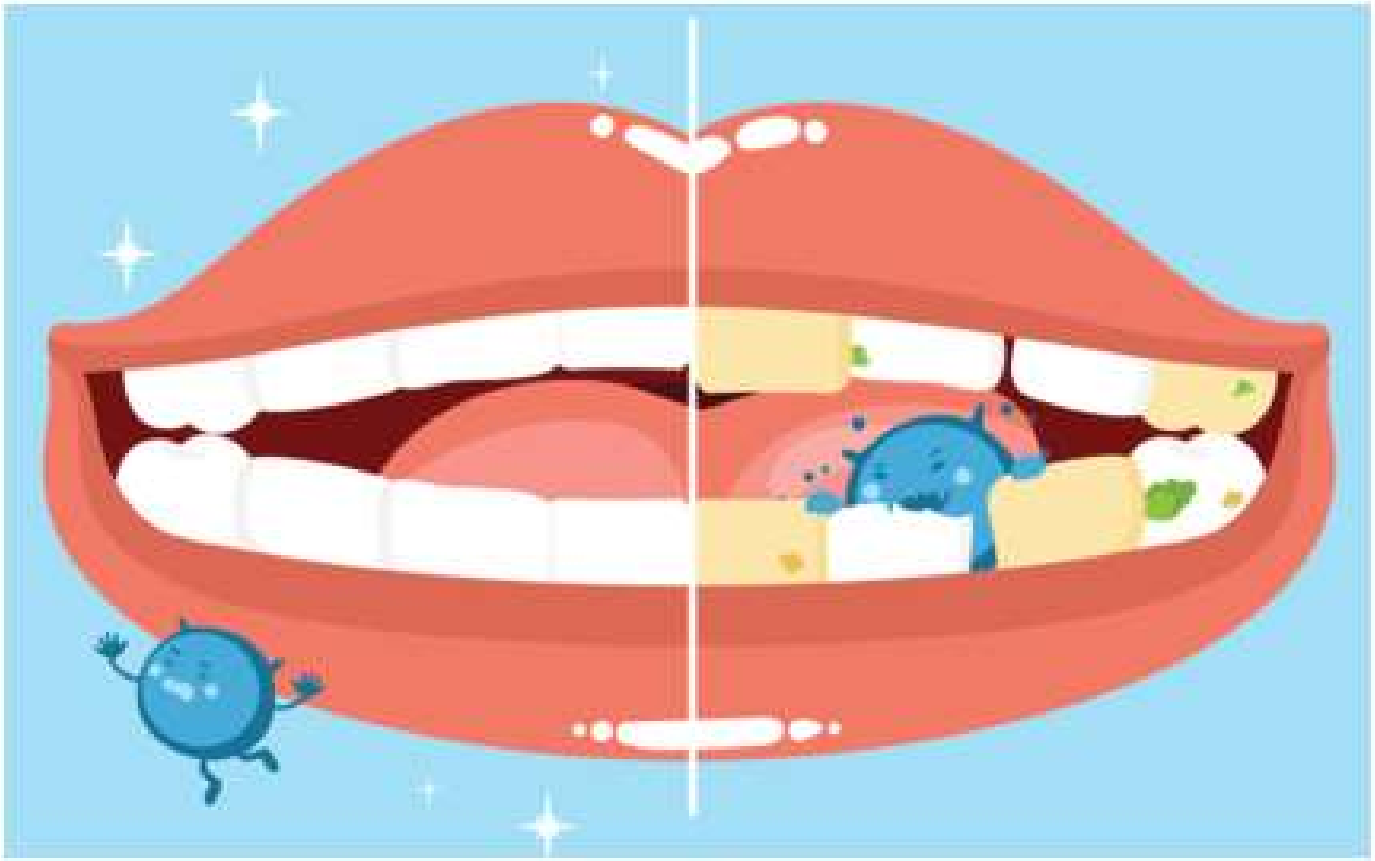
Success Criteria

- ❑ I can state what plaque is
- ❑ I can explain what plaque does to our teeth

How Does Toothpaste Work?

Bacteria in plaque produce ___acid___ which cause tooth decay.

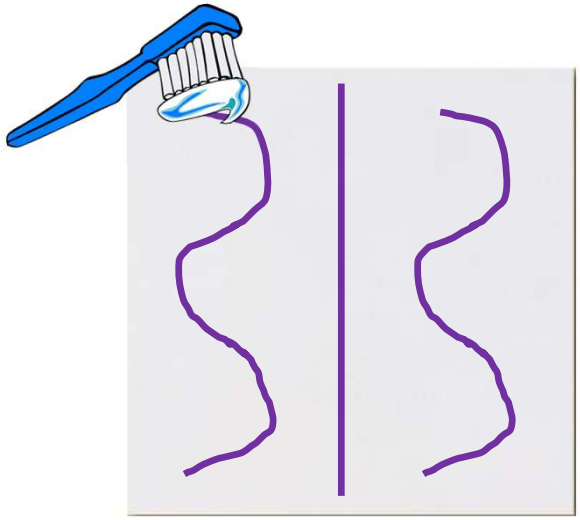
Toothpaste contains an ___alkali___ which ___neutralises___ the acids.



Toothpaste Experiment

Aim: To investigate the effectiveness of homemade toothpaste

Method:



Compare the two toothpastes

Toothpaste Experiment

What you need:

- 3 teaspoons baking soda
- 1 teaspoon cornflour
- ½ teaspoon salt
- 3 teaspoons glycerine
- Water
- Optional – food colouring/ peppermint essence

What to do:

1. Mix together the baking soda, cornflour and salt
2. Add food colouring/mint essence (if using)
3. Gradually add water to form a thick paste

Toothpaste Experiment

Results: (which toothpaste was better?)

_____

_____

Conclusion: *(remember your aim)*

What have I found out from my experiment?

_____

_____

Evaluation:

What could I have done to improve my experiment?

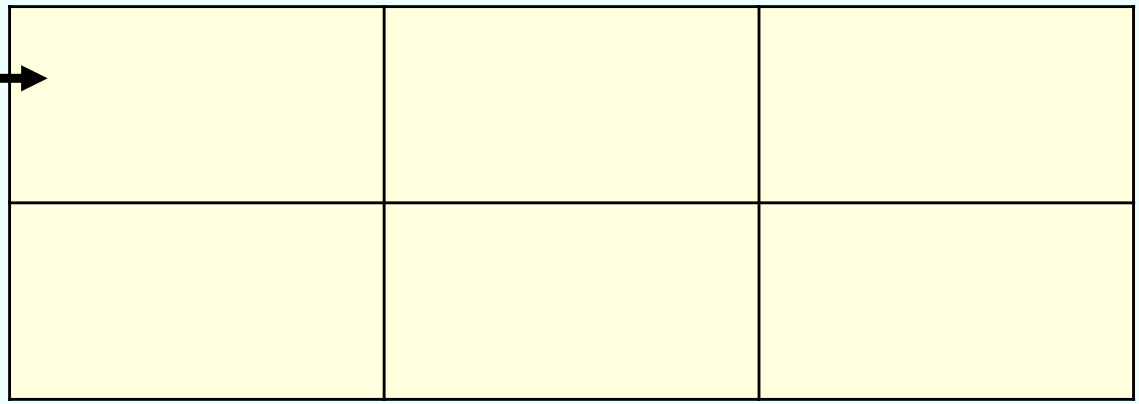
_____

_____

Plenary

Bingo!

Choose 6 of the key words from below and write them in a grid:



Incisor Plaque Canine Crown Alkali Enamel

Molar Root Acid Dentine Premolar Toothpaste

The teacher will read out a description. You must work out if it relates to your key word. If it does, score it off. The first to score all key words off is the winner.

Success Criteria

To be successful you should be able to:

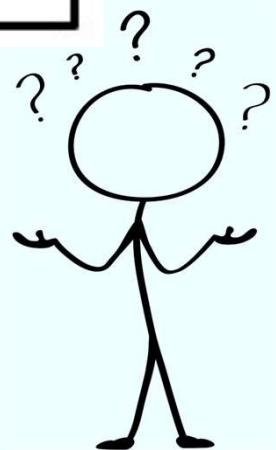
- Describe why plaque is a danger for our teeth.
- Explain how to prevent tooth decay.

Digestion

Page 32

Starter

Brainstorm what you already know about digestion



Digestion

Page 32

Learning Intentions:

- To find out the definition of digestion
- To learn what organs make up the digestive system

Digestion

Page 32

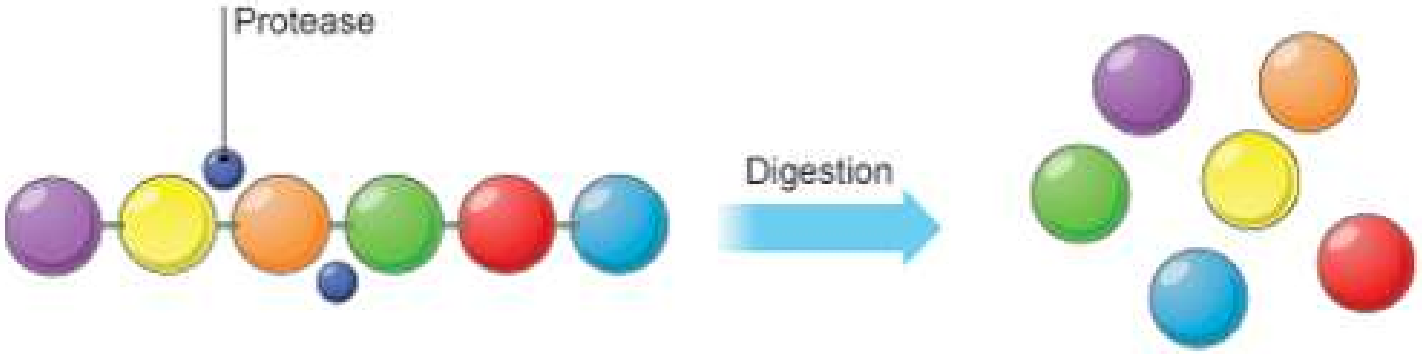
Success Criteria

- ❑ I can state the definition of digestion
- ❑ I can state which organs make up the digestive system

Digestion

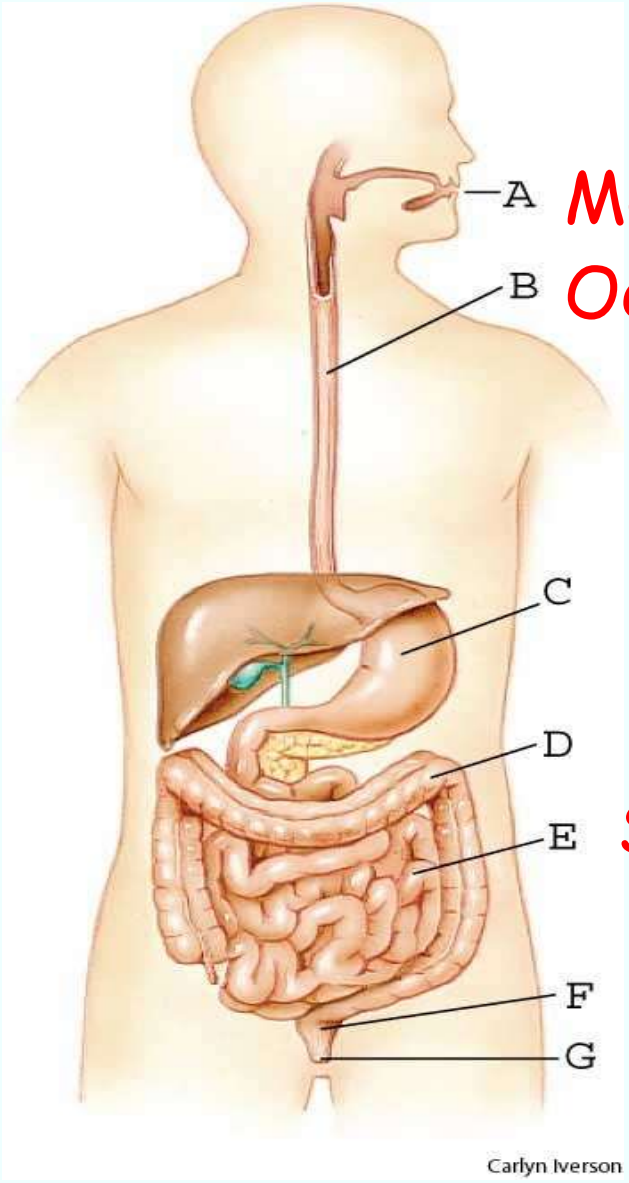
Page 32

Digestion is the physical and chemical breakdown of large insoluble food particles into small soluble food particles so that they can be absorbed into the blood.



Digestive System

Page 33



Mouth

Oesophagus

Stomach

Large intestine

Small intestine

Rectum

Anus

Which parts do you remember the names of?

Organ	How it helps break down food
Mouth	
	Carries food from mouth to stomach
Stomach	
	Breaks food down from large insoluble molecules to small soluble molecules, and absorbs them into the blood
Large intestine	
	Stores solid waste
Anus	

Organ	How it helps break down food
Mouth	Teeth mechanically break food down into small pieces. Enzymes break food down chemically.
Oesophagus	Carries food from mouth to stomach
Stomach	Contains acid to kill harmful microbes
Small intestine	Breaks food down from large insoluble molecules to small soluble molecules, and absorbs them into the blood
Large intestine	Absorbs water into the blood
Rectum	Stores solid waste
Anus	Allows waste to leave the body

Plenary

Based on what you have learnt today about the structure and function of the digestive system, write three quiz questions (and answers) that you could use to test the person next to you.

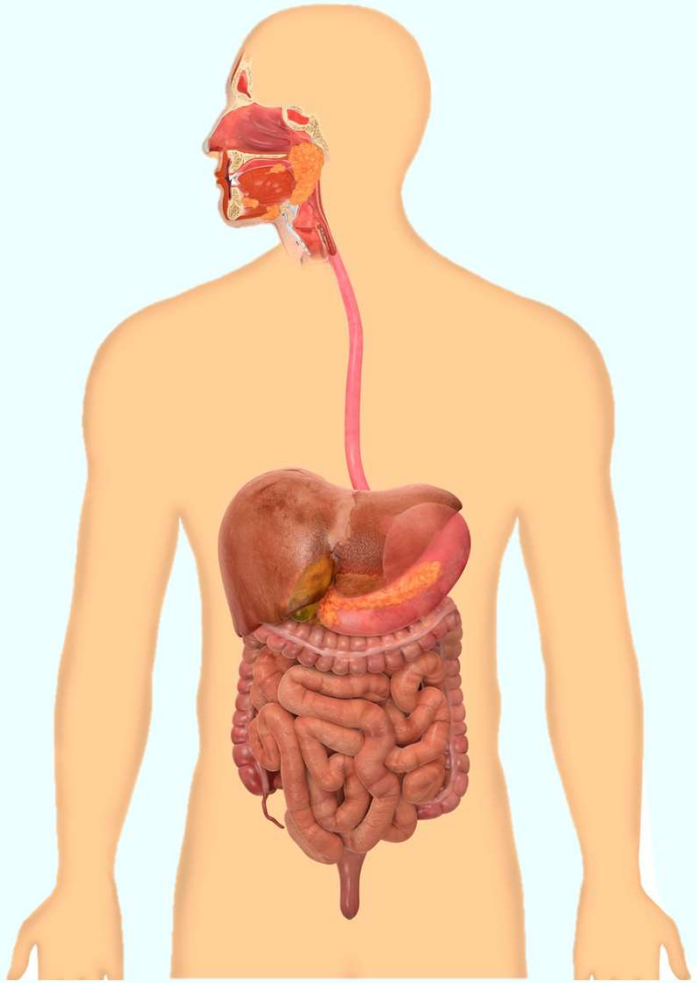
1.

2.

3.

Gums to Bum Demonstration

Your teacher will demonstrate the passage of food through the digestive system, from gums to bum!



Alternatively watch the video:
https://www.youtube.com/watch?v=0gY-zXsUYgs

EXTENSION - Digestive Enzymes

Page 34

Starter

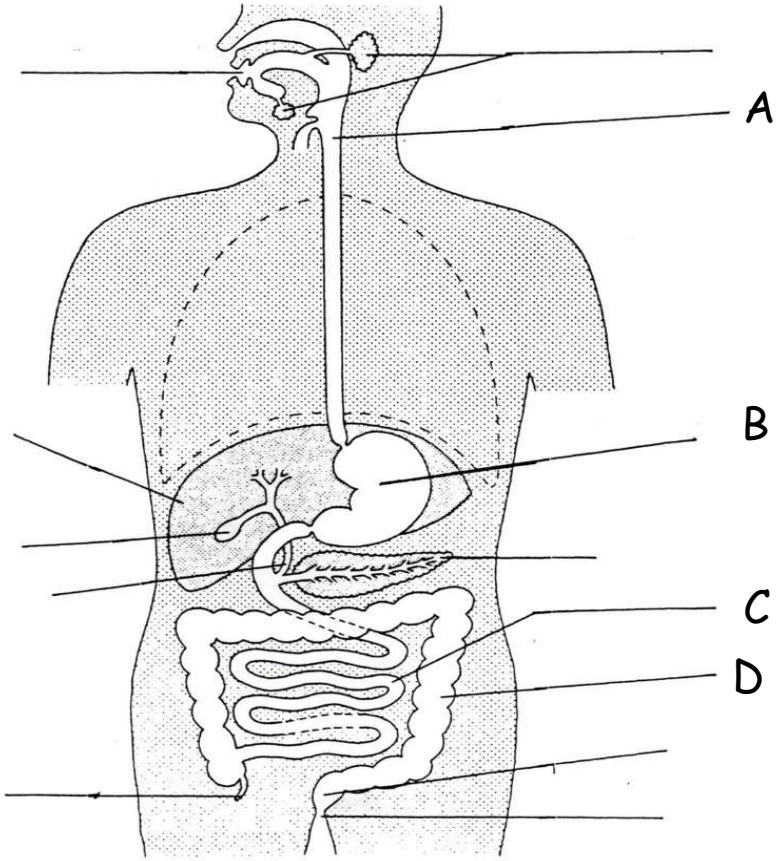
1. Name the parts labelled A to D.

A. _____

B. _____

C. _____

D. _____



Digestive Enzymes

Page 34

Learning Intentions:

- To find out about the role of enzymes in digestion
- To investigate digestive enzymes

Digestive Enzymes

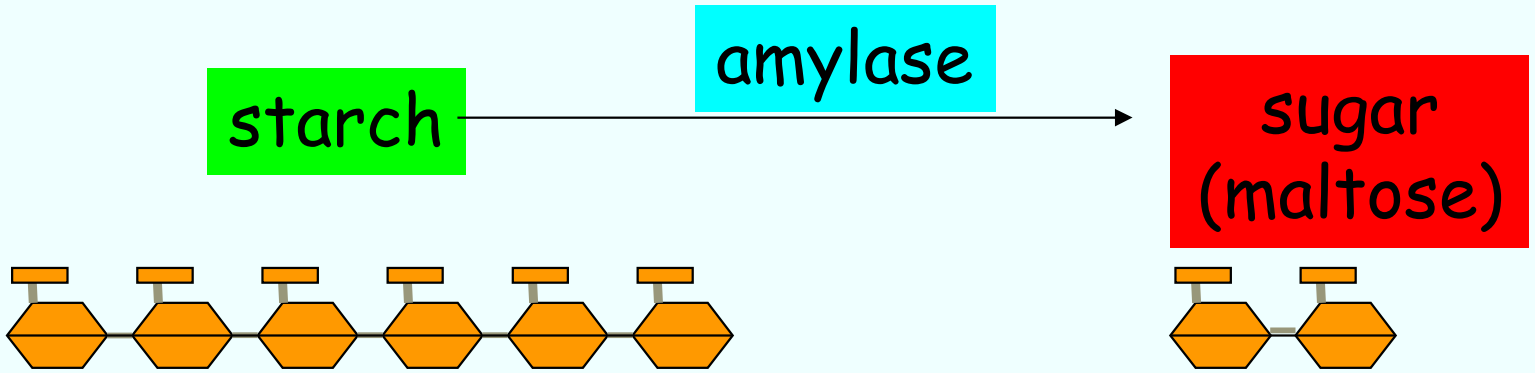
Success Criteria

- ❑ I can state the role of enzymes in digestion
- ❑ I can carry out an investigation on digestive enzymes

Enzymes

- Enzymes are molecules made in all cells that help speed up reactions – a biological catalyst.
- Enzymes are very important in digestion as they are needed to chemically break down food e.g. starch, proteins & fat.
- A different enzyme is needed to break down each type of food as one enzyme can only breakdown one type of molecule.

You are going to investigate the enzyme amylase – it is needed to break down starch into the sugar maltose.

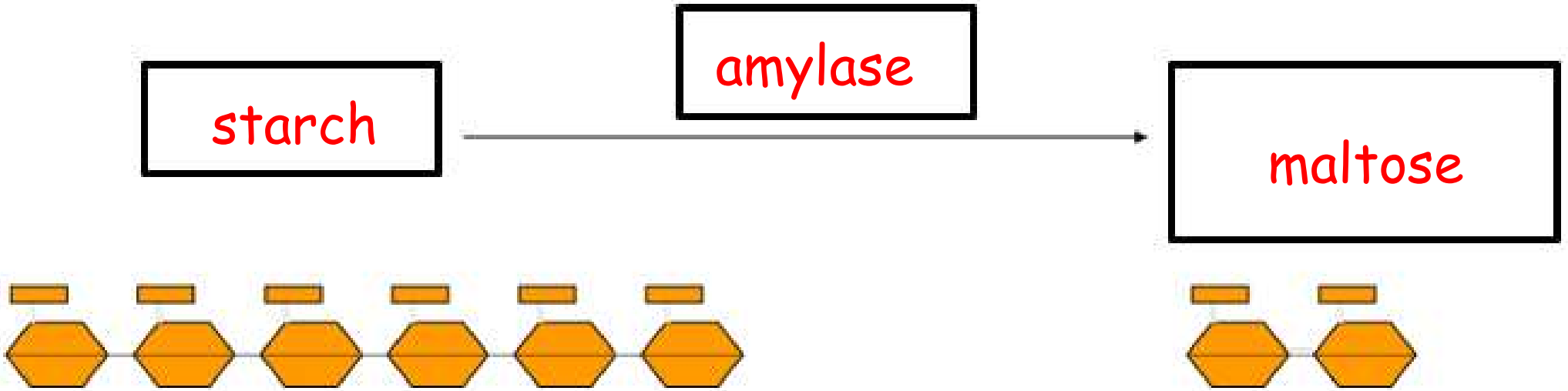


Enzymes

Page 34

Enzymes

- Enzymes are molecules made in all cells that help speed-up reactions.
- Enzymes are needed to chemically break down food.



Investigating digestive enzymes

Aim: To identify the contents of three unknown samples

Method:

Page 35

You are trying to find out which test tube has:

- **starch solution only**
- **water**
- **starch solution + amylase enzyme**

Starch test

1. Add 2 drops of solution to dimple tray.

2. Add 2 drops of iodine solution to same dimple.

Blue-black – starch
Orange/brown – no starch

Simple sugar test

1. Add 1ml solution to test tube.
2. Add same volume of Benedict's solution to test tube.
3. Heat to 90°C in a water bath for 5 min.

Brick-orange – sugar
Blue – no sugar

Investigating digestive enzymes

Page 35

Results:

Test tube	Starch test (✓ / x)	Sugar test (✓ / x)
1		
2		
3		

Investigating digestive enzymes

Page 35

Conclusion:

Test tube 1 contained _____ because ...

Test tube 2 contained _____ because ...

Test tube 3 contained _____ because ...

Plenary

Write a tweet explaining to your followers the effect that the enzyme amylase has on digestion.

Hint: what does it break down?

Character limit: 280

Success Criteria

To be successful you should be able to:

- Explain the role of enzymes in digestion
- Describe how to test for starch and sugar
- Explain how you can tell if starch and sugar are present