Name:
Science Class:
Teacher:
Hand in day:

Y8 Science
Term 1 Homework Booklet
Biology

	Hand in Date	Parents Signature
Digestion		
Homework 1		
Homework 2		
Homework 3		
Homework 4		
Circulation		
Homework 1		
Homework 2		
Homework 3		
Homework 4		

Digestion: Homework 1

Nutrients

Learn the different food groups and try to remember what each group is used for in the human body:

Carbohydrates: Two types: starch and sugar. They provide energy – an excess cause's weight increase.

Protein: Important for growth and repair of cells and tissues.

Lipids (fats and oils): Stored as a reserve energy supply. A layer under the skin provides insulation against cold. An excess cause's weight gain and can lead to other health issues.

Minerals: Tiny amounts are needed – e.g. iron for red blood cells and calcium for teeth and bones.

Vitamins: small amounts are needed – e.g. vitamin C for repair of the skin and vitamin D for taking up calcium.

Dietary fibre: needed to keep the large intestine working well.

Water: Needed to stop a person becoming dehydrated.

Questions

1. What are the two types of carbohydrate?

2. What does the body use carbohydrates for?

3. Why is protein important?

4. Give some examples of foods that contain protein.

5. What role do lipids play in the body?

6. Give an example of a mineral needed as part of a healthy diet.

7. Give an example of a vitamin needed as part of a healthy diet.

8. What can a lack of dietary fibre cause?

Digestion: Homework 2

Testing for Nutrients

Exam Question:

Describe how a student could test cow's milk to show whether it contains **protein** and different types of carbohydrate (**sugar** and **starch**).

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(6)

Digestion: Homework 3

The Digestive System

1. Learn the spelling and function of each part of the digestive system:

Mouth: Teeth break down food into smaller pieces.

Salivary gland: Produces saliva which moistens food and contains enzymes to help digest food.

Oesophagus: Has muscular walls that move food from the mouth to the stomach by an action called peristalsis.

Stomach: Has strong muscular walls that allow food to be mixed, also produces hydrochloric acid and enzymes. The acid kills harmful microbes and provides the optimum pH for stomach enzymes to work. The enzymes help to digest food.

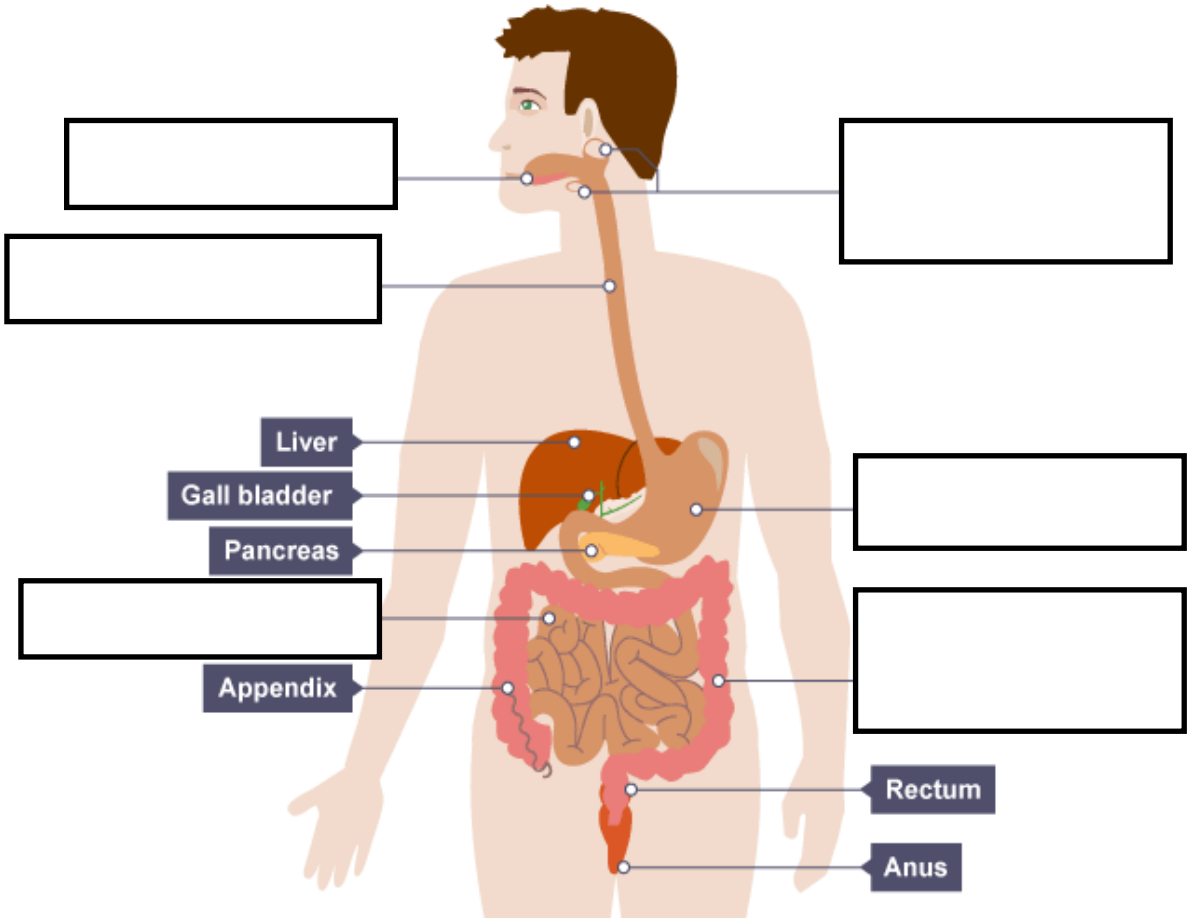
Small intestine: Food is absorbed into the blood in the small intestine. It has a very large surface area.

Large intestine: Absorbs water which solidifies waste.

Rectum: The final section of the large intestine. Where waste is stored before being released.

Anus: A strong muscle that opens to release waste from the rectum.

2. Label the diagram below:



Fill in the missing words…

Digestion is when l_____, insoluble molecules are broken down into small, s_____ molecules.

E_____ speed up the breaking down of these molecules.

In the mouth, s_____ is added which makes the food easier to swallow. Saliva also contains digestive juices.

In the stomach, food is churned up with a_____ and more digestive juices.

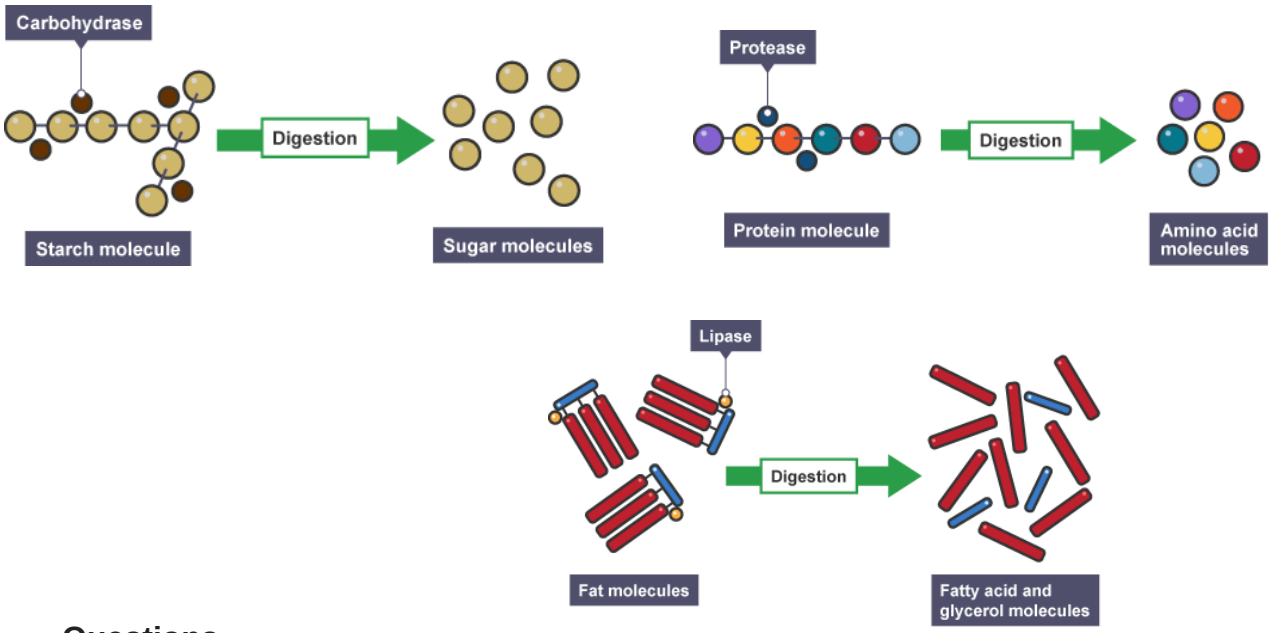
In the s_____ intestine, small digested molecules of food are absorbed into the b_____.

Food that cannot be digested goes into the large intestine, where w_____ is removed.

Digestion: Homework 4

Enzymes

Use the diagrams to help you answer the questions below…



Questions

1. What role do enzymes play in digestion?

2. What are starch molecules broken down into during digestion?

3. What is the name of the enzyme that helps with the digestion of starch?

4. What are protein molecules broken down into during digestion?

5. What is the name of the enzyme that helps with the digestion of proteins?

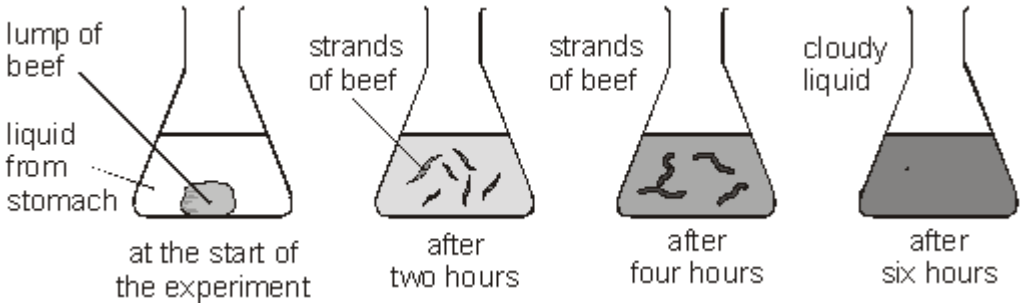
6. What are lipid molecules broken down into during digestion?

7. What is the name of the enzyme that helps with the digestion of lipids?

8. Once food is digested, how does it get into the blood?

Now answer the exam question…

A medical researcher used a tube to remove some of the liquid from a person's stomach. The researcher put the liquid into a flask which had a piece of boiled beef in it. The beef was digested in six hours. The diagrams show the flask at different stages of the experiment.



(a) (i) What type of substance in the liquid from the stomach caused the beef to be digested in six hours?

.....

1 mark

(ii) The researcher kept the flask at 37°C. Explain why.

.....

.....

1 mark

(b) In the human body, the digestion of protein in meat begins in the stomach and is completed in the small intestine.

(i) What is digested protein used for in the body?

.....

1 mark

(ii) Describe how the products of digestion get from inside the small intestine to the cells in the rest of the body.

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2 marks

Maximum 5 marks

Knowledge Organiser: Y8 Digestion

Nutrients

The body needs a balance of nutrients to stay healthy. There are five groups of nutrients.

Macronutrients: macro simply means large or whole. Macronutrients need to be eaten in larger quantities than micronutrients.

	Purpose	Examples
Carbohydrates	Source of energy. Divided into: simple carbohydrates – sugars and complex carbohydrates – starches.	Bread, pasta, rice and potatoes.
Proteins	Provide materials to make new cells and to repair damaged tissues, such as muscles.	Animal products such as meat, fish, dairy. Plants such as lentils, nuts, seeds.
Fats (lipids)	Source of energy. Provide insulation (keep humans warm).	Oils, oily fish, nuts, dairy, fatty meats.

Micronutrients: micro simply means small. Micronutrients need to be eaten in smaller quantities than macronutrients but are absolutely essential to health.

	Purpose	Examples
Vitamins	Essential for many processes, e.g. bone growth/strength, nervous system, red blood cells, immune system. Need small amounts only.	Calcium – milk, canned fish, broccoli; iron – watercress, brown rice, meat; zinc – shellfish, cheese, wheatgerm; potassium – fruit, pulses, white meat.
Minerals	Essential for many processes, e.g. bone growth, metabolic rate, immune system, vision, nervous system. Need small amounts only.	A – dairy, oily fish, yellow fruit; B – vegetables, wholegrain cereals; C – citrus fruit, broccoli, sprouts; D – oily fish, eggs, fortified cereals.

Testing for Nutrients

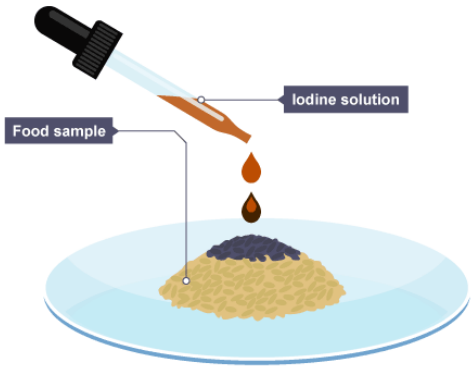
There are different tests which can be used to detect carbohydrates, proteins and lipids.

They involve adding a reagent to a food sample which changes colour depending on what biological molecules are present.

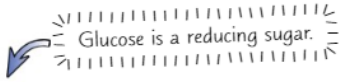
Sometimes it may be necessary to crush the food or add water to the food before adding the reagent.

Use Iodine Solution to Test for Starch

1) Make a food sample and transfer 5 cm^3 to a test tube.
2) Add a few drops of iodine solution.
   Gently shake the tube to mix the contents.
3) If the sample contains starch, the colour of the solution will change from browny-orange to black or blue-black.



Use the Benedict's Test to Test for Sugars

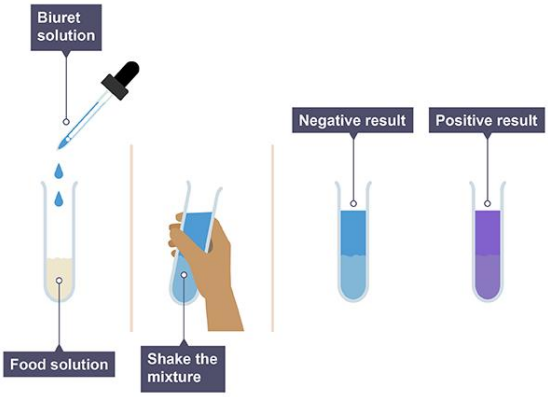


The Benedict's test is used to test for a type of sugar called a reducing sugar. Here's how you do it:

1) Prepare a food sample and transfer 5 cm^3 to a test tube.
2) Prepare a water bath so that it's set to 75 °C.
3) Add some Benedict's solution to the test tube (about 10 drops) using a pipette.
4) Place the test tube in the water bath using a test tube holder. Leave it in there for 5 minutes.
5) If the food sample contains a reducing sugar, the solution in the test tube will change from the normal blue colour to green, yellow or brick-red. The colour change depends on how much sugar is in the food.

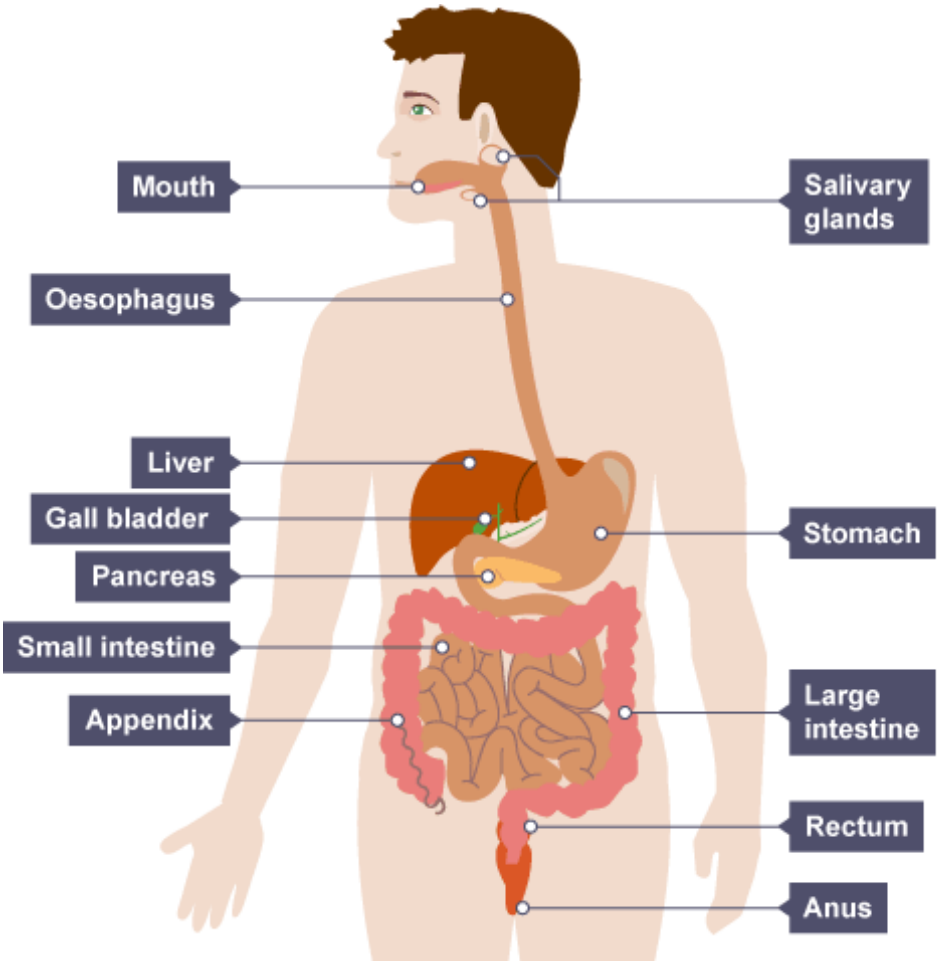
Use the Biuret Test to Test for Proteins

1) Prepare a sample of your food and transfer 2 cm^3 to a test tube.
2) Add 2 cm^3 of biuret solution to the sample. Mix the contents of the tube by gently shaking it.
3) If the food sample contains protein, the solution will change from blue to purple.



The Digestive System

Digestion turns large **insoluble** substances into small **soluble** ones. The organs of the **digestive system** help us digest food. Many of them produce **enzymes** (substances that are **catalysts** and help speed up the digestion of food).



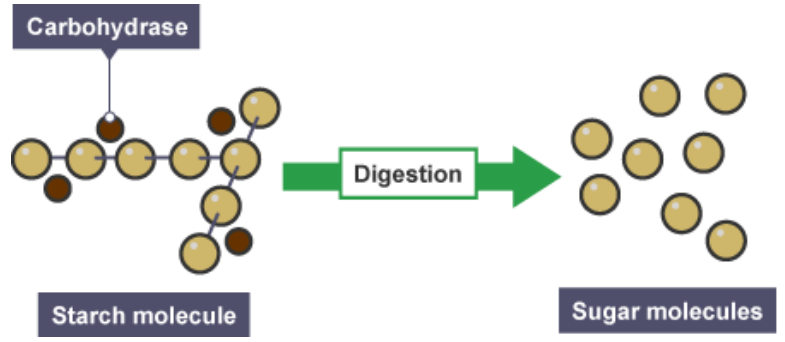
Organ	Role in Digestion
Mouth	Teeth break down food into smaller pieces.
Salivary Gland	Produces saliva which moistens food and contains enzymes to help digest food.
Oesophagus	Has muscular walls that move food from the mouth to the stomach by an action called peristalsis.
Stomach	Has strong muscular walls that allow food to be mixed, also produces hydrochloric acid and enzymes. The acid kills harmful microbes and provides the optimum pH for stomach enzymes to work. The enzymes help to digest food.
Small Intestine	Food is absorbed into the blood in the small intestine. It has a very large surface area.
Large Intestine	Absorbs water which solidifies waste.
Rectum	The final section of the large intestine. Where waste is stored before being released.
Anus	A strong muscle that opens to release waste from the rectum.

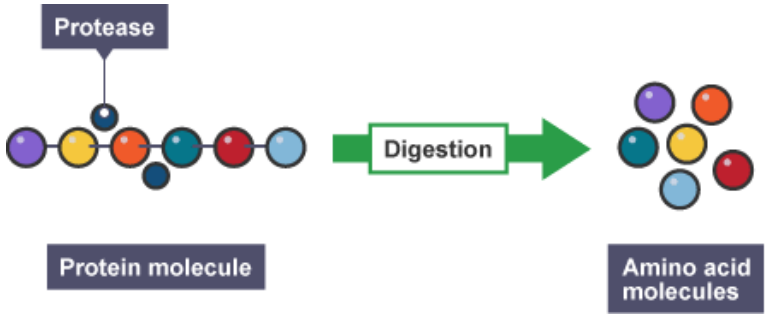
Enzymes

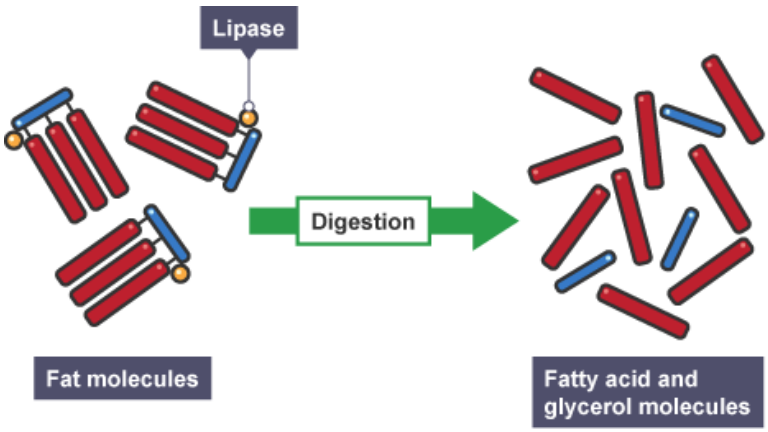
Food has to be broken down chemically into really small particles before it can be absorbed. Enzymes are the biological catalysts needed to make this happen quickly enough to be useful.

Enzymes are not living things. They are just special proteins that can break large molecules into small molecules. Different types of enzymes can break down different nutrients:

- amylase and other carbohydrase enzymes break down **starch** into **sugar**
- protease enzymes break down **proteins** into **amino acids**
- lipase enzymes break down **lipids** (fats and oils) into **fatty acids** and **glycerol**







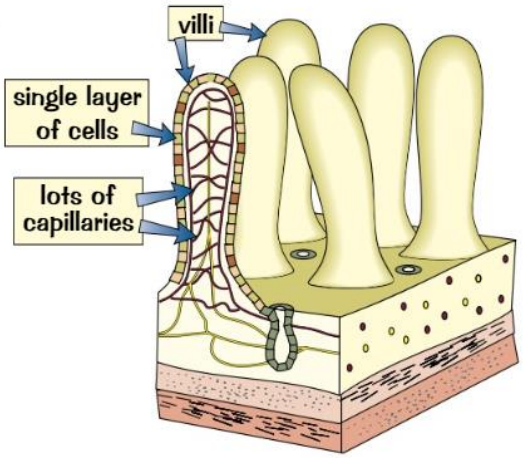
Absorption of Food

Digested food molecules are absorbed in the small intestine. This means that they pass through the wall of the small intestine and into our bloodstream. Once there, the digested food molecules are carried around the body to where they are needed.

Only small, soluble substances can pass across the wall of the small intestine. Large insoluble substances cannot pass through.

The Villi Provide a Really Big Surface Area

1) The inside of the small intestine is covered in millions of villi.
2) They increase the surface area so that digested food is absorbed more quickly into the blood.
3) They have:
   - a single layer of surface cells,
   - a very good blood supply.



Circulation: Homework 1

The Heart

1. Learn the spellings and definitions for the following keywords.

Artery: Blood vessel taking blood away from the heart

Vein: Blood vessel taking blood towards the heart

Capillary: Tiny blood vessel connecting arteries to veins

Atria/atrium: Upper chambers in the heart

Ventricle: Lower chambers in the heart

Deoxygenated: Blood which has no oxygen

Plasma: Straw coloured liquid that carries dissolved molecules and blood cells around the body

Platelets: Component of the blood responsible for clotting

Red blood cells: Specialised cells that carry oxygen

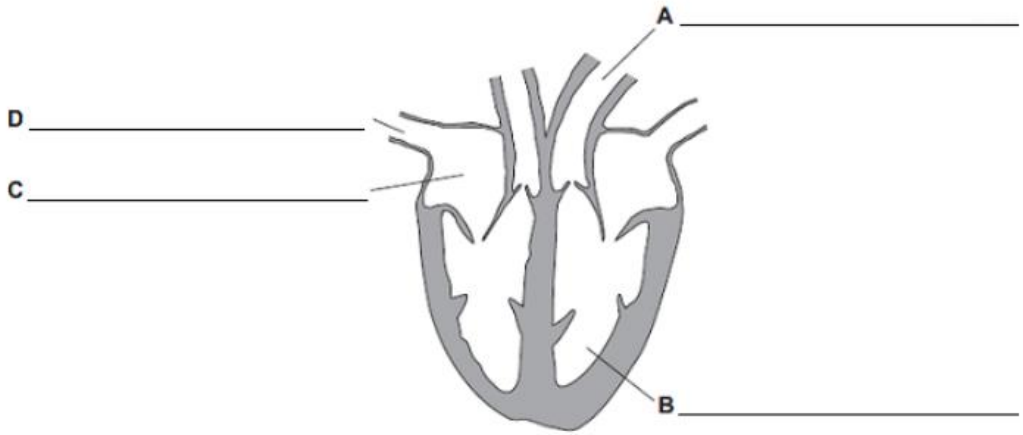
White blood cells: Specialised cells that help to protect the body against infection

Haemoglobin: Contained in red blood cells, binds to oxygen

2.

a) Label parts A, B, C and D.

b) Draw arrows to show the direction of the oxygenated and deoxygenated blood flow. Use different colours for oxygenated and deoxygenated.



Key words test:

1.

2.

3.

4.

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9.

10.

Circulation: Homework 2

Journey of a Red Blood Cell

Describe how the blood travels from the body to the heart and then back to the body. Use the following key words: aorta, vena cava, atrium, ventricle, lung, body, arteries, veins, oxygenated blood, and deoxygenated blood.

Circulation: Homework 3

Blood Vessels

1. Complete the following table:

	Arteries		Capillaries
Direction of Blood Flow		Carry blood away from the heart	
Blood Pressure	Blood under high pressure		Decreasing blood pressure
Valves			No valves
Walls	Thick Walls	Thinner Walls	
Type of blood			Blood starts oxygenated and slowly becomes deoxygenated

2. Answer the questions below:

a) How is the artery adapted for its function?

b) What is the role of the capillary?

c) What is the role of the valves in the heart and in the veins?

d) Why is the left ventricle thicker than the right ventricle?

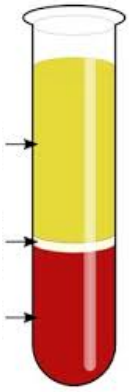
e) Why do we call the human circulatory system double circulation?

Circulation: Homework 4

The Blood

1. Complete then table describing the structure and function of the different components of blood:

	Name	Function
		
		
		

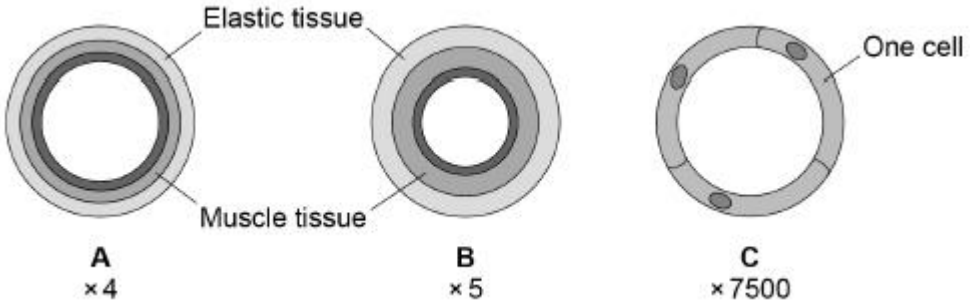
2. This question is about the circulatory system.

(a) Draw **one** line from each blood component to its function.

Blood Component	**Function**
	Destroys microorganisms
Platelet	Helps the blood to clot
Red blood cell	Transports glucose around the body
White blood cell	Transports oxygen around the body
	Transports urea

(3)

(b) The diagram below shows cross sections of the three main types of blood vessel found in the human body. Each blood vessel is drawn to the scale shown.



Which blood vessel has the smallest diameter?

Tick **one** box.

A		B		C	

(1)

(c) Which blood vessel in the figure above is an artery?

Give **one** reason for your answer.

Blood vessel: _____

Reason:

_____

_____

(2)

(d) (i) Name the red pigment found in red blood cells.

_____

(1)

(ii) Describe, in detail, the function of this red pigment.

_____

_____

_____

_____

(2)

(e) Describe **one** other way in which the structure of a red blood cell is different from the structure of a white blood cell.

_____

_____

(1)

(Total 10 marks)

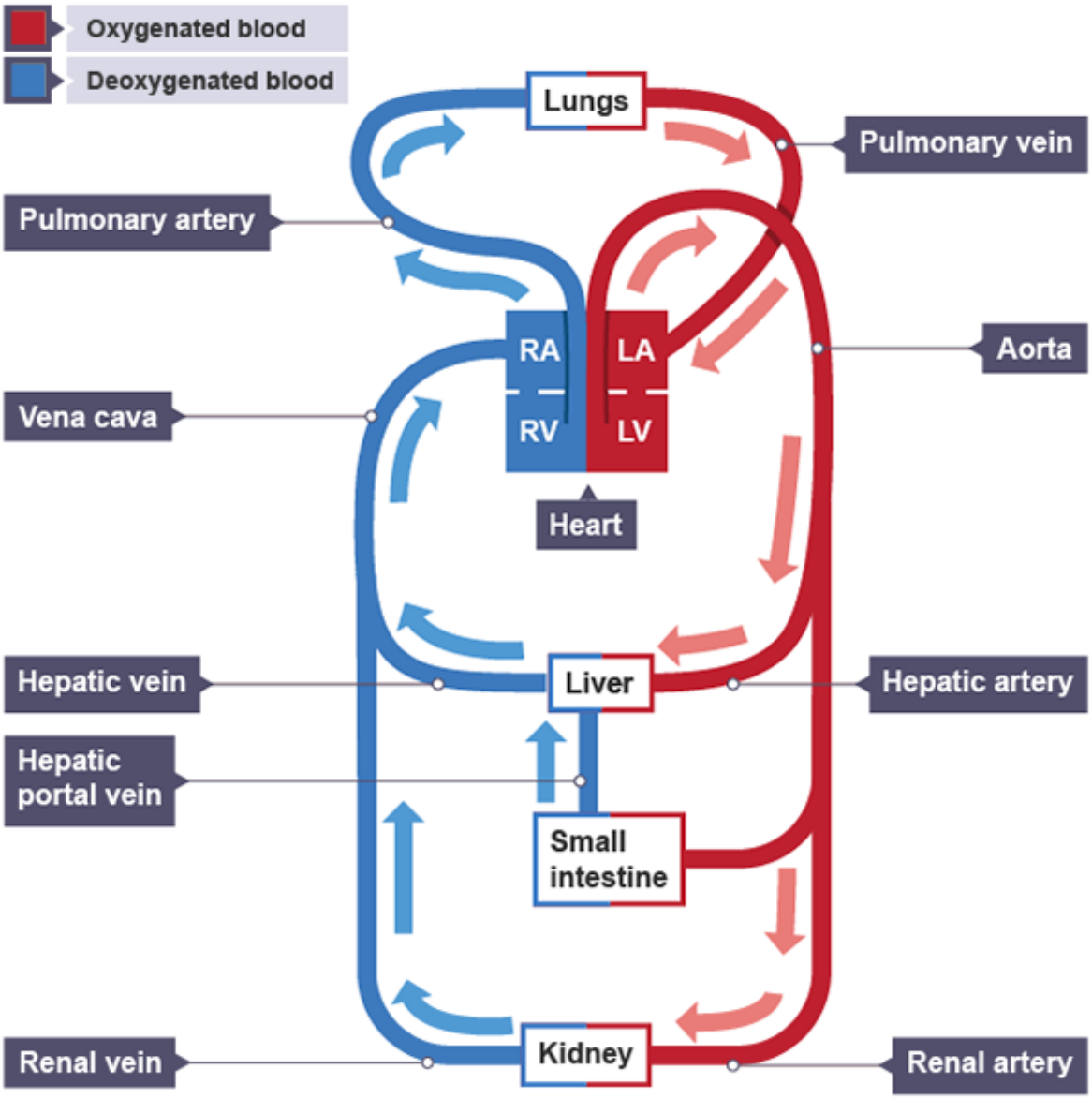
Knowledge Organiser: Circulation

The Circulatory System

Your circulatory system is made up of three parts: the heart, blood vessels and the blood itself.

Your heart keeps all the blood in your circulatory system flowing. The blood travels through a network of blood vessels to everywhere in your body. It carries useful materials like oxygen, water and nutrients and removes waste products like carbon dioxide.

Mammals have a **double circulatory system**. This means blood travels through the heart twice in one circulation of the body.



Ventricular walls are **thicker** than atrial walls because the ventricles have to pump blood further. The left ventricle wall is thicker than the right because it pumps blood around the body while the right pumps blood to the lungs, located close to the heart.

The oxygen and glucose carried in oxygenated blood is used for respiration in the body's cells.

The coronary arteries provide the heart muscle with the glucose and oxygen it needs for respiration. These are small blood vessels that branch off the aorta and can be seen on the external surface of the heart.

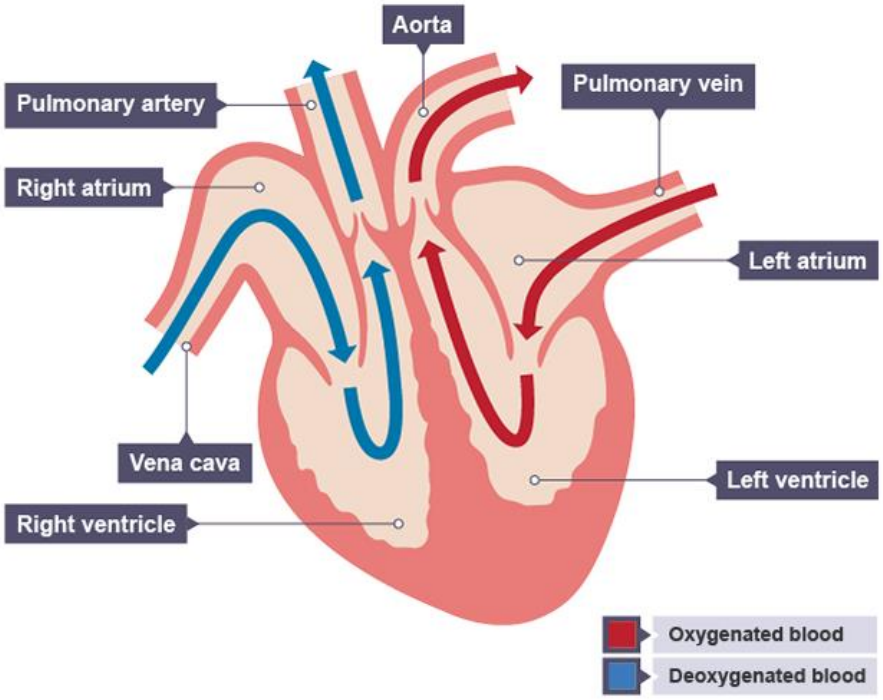
The following arteries and veins transport blood to and from some of the body's organs:

Blood vessel	Function
Vena cava	Carries deoxygenated blood from the body back to the heart.
Pulmonary artery	Carries deoxygenated blood from the heart to the lungs.
Pulmonary vein	Carries oxygenated blood from the lungs to the heart.
Aorta	Carries oxygenated blood from the heart around the body.
Hepatic artery	Carries oxygenated blood to the liver.
Hepatic vein	Carries deoxygenated blood back to the heart. Carries digested food (glucose and amino acids) from the liver around the body.
Hepatic portal vein	Carries digested food from the small intestine to the liver.
Renal artery	Carries oxygenated blood (also rich in urea) to the kidneys for excretion.
Renal vein	Carries deoxygenated blood (also low in urea as it has been purified in the kidney) back to the heart.

The Heart

The heart is a **muscular organ**. Its function is to pump blood. The right side pumps blood through the lungs, while the left side pumps blood through the body.

A **septum** separates the right and left sides. The left side has thicker walls because it needs to put the blood under higher pressure than the right side.



In general, blood flows into the heart from a vein, goes into an atrium, then a ventricle, and out through an artery. The heart contains valves to prevent the blood flowing backwards.

Blood follows the following path as it flows through the heart:

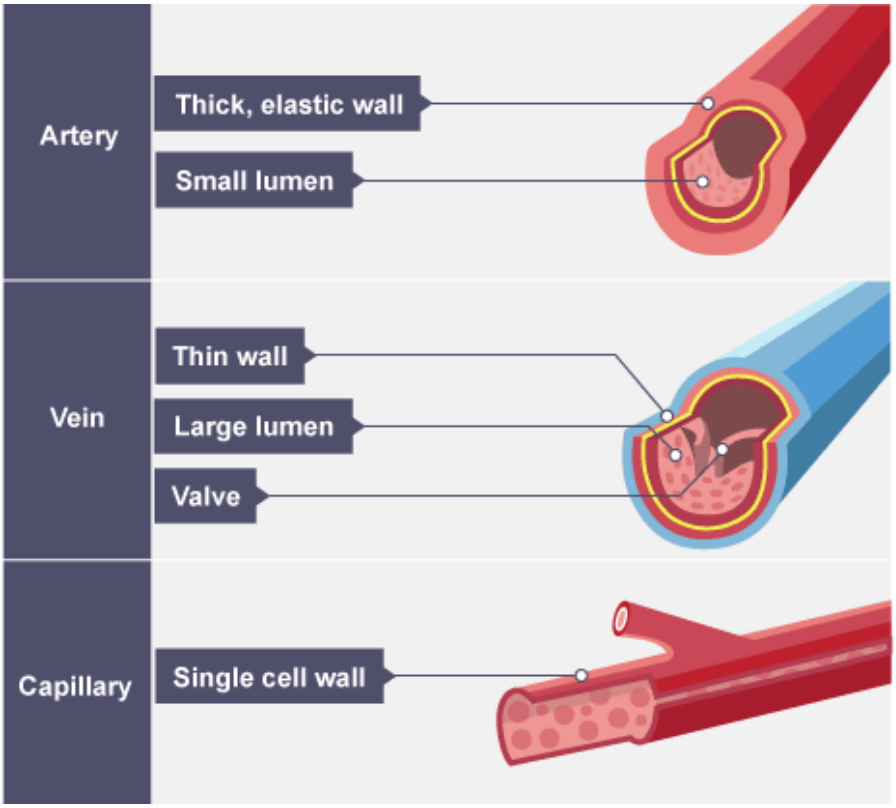
1. Deoxygenated blood enters the right atrium from the vena cava.
2. Blood moves into right ventricle.
3. Blood is pumped into the pulmonary artery.
4. The pulmonary artery carries deoxygenated blood to the lungs.
5. The blood becomes oxygenated in the lungs.
6. Oxygenated blood leaves the lung via the pulmonary vein.
7. Blood enters the left atrium.
8. Blood moves into the left ventricle.
9. Blood is pumped into the aorta, which carries oxygenated blood around the body.

Blood Vessels

Blood is carried through three different types of blood vessels in the body:

1. arteries
2. capillaries
3. veins

All blood vessels are specifically structured to perform their function:

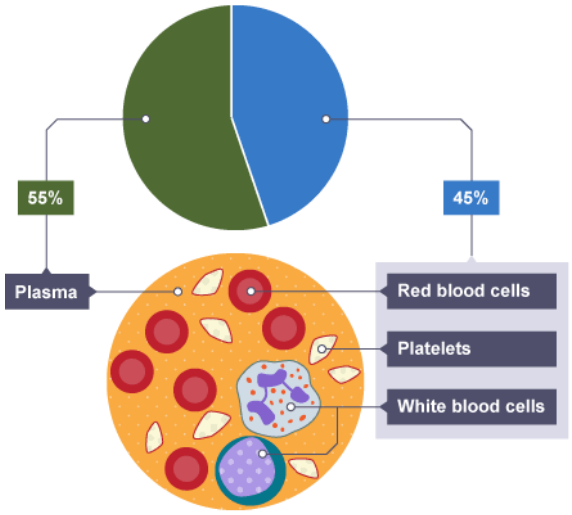


	Artery	Vein	Capillary
Function	Carry blood away from the heart (usually oxygenated blood, except for the pulmonary artery)	Carry blood towards the heart (usually deoxygenated blood, except for the pulmonary vein)	Allows diffusion of gases and nutrients from blood into the body cells
Wall	Thick, muscular	Thinner	Very thin, one cell thick
Lumen	Small	Large	Very small, only allows blood to pass through one cell at a time
Other features	Thick muscular walls to withstand blood flowing at high pressure as it leaves the heart; the largest artery is the aorta	Contain valves to prevent back flow of blood	Walls are made of semi-permeable membrane to allow transport of gases and nutrients into and out of the blood

Components of Blood

Blood transports materials and heat around the body, and helps to protect against disease. It contains:

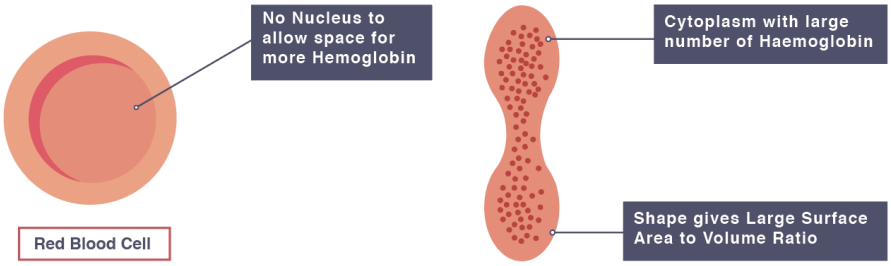
- plasma (straw-coloured liquid that makes up just over half the volume of blood).
- red blood cells
- white blood cells
- platelets



Component	Function(s)
Plasma	Transporting carbon dioxide, digested food, urea, hormones and heat
Red blood cells	Transporting oxygen
White blood cells	Ingesting pathogens and producing antibodies
Platelets	Involved in blood clotting

Red blood cells have adaptations that make them suitable for carrying oxygen:

- they contain haemoglobin - a red protein that combines with oxygen
- they have no nucleus so they can contain more haemoglobin
- they are small and flexible so that they can fit through narrow blood vessels
- they have a **biconcave** shape (flattened disc shape) to maximise their surface area for oxygen absorption



Heart Disease

Coronary heart disease

The heart is a muscular pump. Like all muscles, the heart needs oxygen to carry out aerobic respiration which provides the energy it needs to contract. The coronary arteries supply blood, and therefore oxygen, to the heart muscle.

Risk factors for cardiovascular disease

The risk of developing cardiovascular disease is increased by several factors, including:

- smoking
- high blood pressure
- high levels of salt in the diet
- high levels of saturated fat in the diet

High levels of salt in the diet can lead to increased blood pressure. This may damage the blood vessels, making it easier for fatty deposits to build up.

Heart attacks

A heart attack can happen after a sequence of events:

1. high levels of saturated fats in the diet are linked to an increase in levels of cholesterol in the blood
2. high levels of cholesterol cause fatty deposits to build up in the coronary arteries
3. a blood clot can form on a fatty deposit
4. the blood clot can block a coronary artery
5. some heart muscle cells do not get the oxygen and nutrients they need
6. the person develops chest pain
7. if left untreated then the cells start to die
8. this leads to a heart attack