Student Name: Teacher:

Island School Science

Year 9

Staying Alive

Student Booklet 2023

GLOSSARY

Nutrition

Word	Meaning
diet	The food that you eat.
fibre	Substance found in food which cannot be used by the body. It helps to keep our intestines clean.
nutritional information	Information label found on a food packet to tell you what is in the food.
nutrients	Substances needed in the diet to provide raw materials.
raw materials	Substances used to make other substances out of.
starch	Type of insoluble carbohydrate found in plants.
water	A compound made of hydrogen and oxygen which the body uses as a solvent.
balanced diet	Eating a wide variety of foods to give us all the things that we need.
carbohydrate	Substance found in food that is used for energy.
chemical energy	Energy stored in chemicals like food.
fat	Substance found in food that is stored to be used for energy in the future. It also helps to keep heat in our bodies.
heart disease	Disease caused by narrowing of the arteries carrying the blood to the muscles of the heart, so the heart muscles do not receive enough oxygen.
kilojoule (kJ)	Unit of energy used on food packets. There are 1000 J in 1 kJ.
mineral	Properly called a ‘mineral salt’ and found in food. Needed in small quantities for health (e.g. calcium).
protein	Substance found in food that is used for growth and repair.
starch	Type of insoluble carbohydrate found in plants.
sugar	Type of soluble carbohydrate. Glucose is an example of a sugar.
vitamin	Substance found in food that is needed in small quantities for health (e.g. vitamin C).

The Digestive System

Word	Meaning
absorbed	When soluble substances go through the wall of the small intestine into the blood.
anus	The opening at the end of the gut.
appendix	Small tube branching off the large intestine. It has no function in humans.
contract	Something gets smaller.
digestion	Process that breaks food into soluble substances in our bodies.
digestive juices	A liquid containing enzymes that break down food.
digestive system	A group of organs that carry out digestion.
egestion	When faeces are pushed out of the anus.
enzyme	A chemical that can break up large molecules.
faeces	Waste food material produced by the intestines.
feeding	Putting food into your mouth. Also called ingestion.
fibre	Substance found in food which cannot be used by the body. It helps to keep our intestines clean.
gullet	Tube that goes from the mouth to the stomach. Sometimes called the ‘food pipe’ but properly called the oesophagus.
gut	All the organs of the digestive system apart from the mouth.
ingestion	Putting food into your mouth.
insoluble	Something that does not dissolve is said to be insoluble.
large intestine	Organ that takes water out of waste food.
molar	Grinding tooth at the back of the mouth.
rectum	Organ that stores faeces before they are egested.
saliva	A digestive juice. It contains an enzyme that breaks down starch into sugar.

Respiration and the Breathing System

aerobic respiration	Process that uses up oxygen to release energy from food. Carbon dioxide is produced as a waste gas.
air sacs	Groups of alveoli in the lungs where oxygen comes out of the air and goes into the blood. Carbon dioxide is also transferred from the blood to the air in these.
alveolus	Small, round pocket that is grouped with other alveoli to form air sacs in the lungs. Plural = alveoli.
anaerobic respiration	Process that releases energy from food in the absence of oxygen.
breathing	Moving muscles in order to make air flow into and out of the lungs.
breathing system	Set of organs (lungs, windpipe, diaphragm) that allow air to be taken into and out of the body.
bronchus	Tube in the lungs that branch out from the trachea. The trachea splits into the left and right bronchi. Plural = bronchi.
bronchiole	Each bronchus splits into many smaller tubes, called bronchioles, which take air into the air sacs.
cilia	Small hairs on the surface of some cells.
cilated epithelial cell	Cells with cilia that are found in the lungs.
diffusion	The natural movement of particles from a place where there are a lot of them to a place where there are fewer of them.
exhale	To breathe out.
gas exchange	Taking oxygen into the blood and getting rid of carbon dioxide into the lungs. Happens in the air sacs in the lungs.
inhale	To breathe in.
lactic acid	A waste product produced by anaerobic respiration in humans.
mucus	Slimy substance which traps dirt and microbes and is moved out of the lungs by cilia.
product	New chemical formed in a chemical reaction.
reactant	Chemical that is used up in a chemical reaction.
red blood cells	Cells in the blood that carry oxygen.
respiratory system	System containing the lungs, bronchi and trachea.
trachea	Windpipe.
ventilation	Air moving into and out of the lungs.
word equation	A way of writing out what happens in a chemical reaction.

Circulatory System

absorb	To take in, e.g. when soluble substances pass through the wall of the small intestine and into the blood.
artery	Blood vessel that carries blood away from the heart.
capillaries	The smallest blood vessels. Substances enter and leave the blood through the thin walls of capillaries.
chamber	The heart contains four compartments called chambers.
circulatory system	System containing the heart and blood vessels.
heart	Organ that pumps blood around the body.
plasma	Part of the blood. A liquid that surrounds the blood cells.
pulse	The feel of your blood being pumped.
pulse rate	The number of times you can feel your blood being pumped in one minute.
red blood cells	Cells in the blood that carry oxygen.
tissue fluid	The liquid formed when plasma leaks out of capillaries, carrying oxygen and food to cells.
vein	Blood vessel that carries blood to the heart.

9SA 1a Nutrient Table

Write down the different food groups (nutrients), what the body needs them for and what kind of food they are found in.

Food Group	What is this food group used for in the body?	Foods that contain it
Carbohydrate (includes all sugar)	Needed for respiration for energy!	Pasta, rice, bread, anything sweet!

9SA 1b Food for Thought

1. Use the words in the box to complete the sentences.

diet	energy	fats	fibre	minerals
nutrients	raw	repair	water	

What we eat is known as our _____. Our food provides a source of _____ materials to make new substances.

These new substances are used for:

- _____ (to help us to move, etc.)
- growth and _____
- health.

Carbohydrates, proteins, _____, vitamins and _____ are all nutrients.

We also need to eat _____ and drink _____.

BLOGGS CRUNCHY BAR

NUTRITION INFORMATION							
		Per 100 g	Per 25 g bar			Per 100 g	Per 25 g bar
Energy	kJ	436	109	Vitamin B1	mg	1.4	0.35
Protein	g	7.6	1.9	Vitamin B2	mg	1.6	0.40
Carbohydrate	g	60.4	15.1	Vitamin B3	mg	18	4.50
Fat	g	18.4	4.6	Calcium	mg	800	200
Fibre	g	4.5	1.13				

2 Use the nutrition information label above to answer these questions.

a How much protein is there in 100 g of the food? _____

b How much fat would you get if you ate two of these bars? _____

c Name one vitamin shown on the label. _____

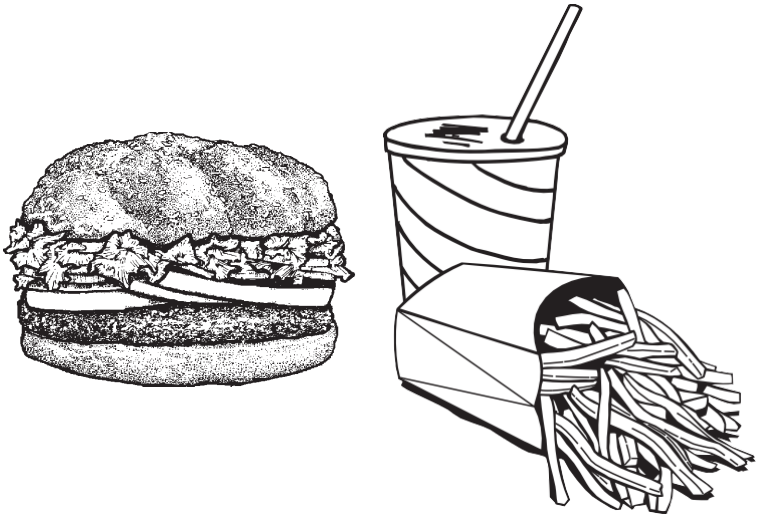
d Name one mineral shown on the label._____

e Which of the food substances listed helps the rest of your food to pass through your intestines as it is being digested? _____

9SA 1c 'A Big Burger Meal'

Answer the questions about this meal. You can use the words listed below to help you.

carbohydrate
energy
fat
growth and repair health
minerals
protein
sugar
vitamins
water



1. Name one type of food substance / nutrient found in each part of the big burger meal, and why the body needs it.

   a Bread roll Food substance / nutrient: _____

   Why the body needs it: _____

   b Beef Food substance / nutrient: _____

   Why the body needs it: _____

   c. Tomato Food substance / nutrient: _____

   Why the body needs it: _____

2a The fries are cooked in oil. What food substance does oil contain? _____

b What does the body use this for? _____

3a What substance does the cola drink mainly contain? _____

b What other substance does it contain? _____

c Suggest why this substance might be bad for you if you had too much.

_____

4 a If you only ate this meal, do you think you would get enough vitamins?

_____

b Explain your answer. _____

9SA 1d Nutrient Labels

Nutrient	Chocolate	Candy Bar
Calories	546kcal	522kcal
Protein	4.88g	15.5g
Fats	31.28g	33.7g
Carbs	61.17g	47.4g
Sugar	47.9g	42.22g
Fibre	7g	4.1g
Calcium	56mg	78mg
Iron	8.02mg	0.97mg
Magnesium	146mg	110mg
Potassium	559mg	407mg
Sodium	24mg	156mg
Zinc	2.01mg	3.94mg
Vitamin E	0.54mg	4.1mg

Which snack is healthier? Explain how you made your decision.

. . . . . .

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Why might we need to know what nutrients are in foods?

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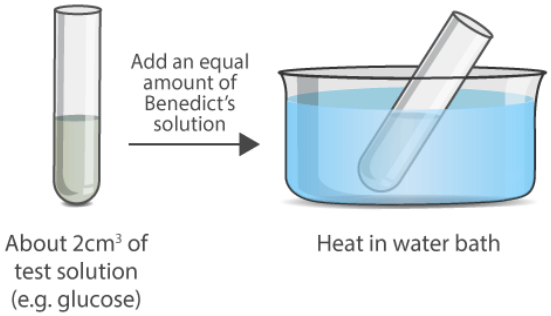
9SA 2a Food tests

Introduction

The nutrients in food can be tested using different biochemical reagents. Observe what happens.

Testing for sugars with Benedict's reagent - Teacher demonstration



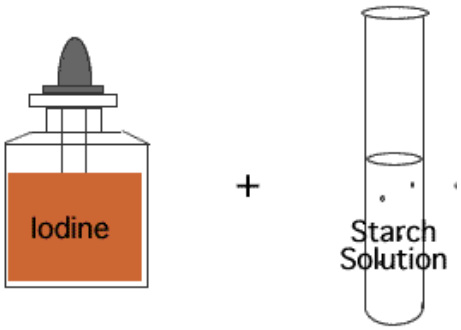
Safety:
What does the label on the Benedict's reagent bottle mean?

What safety precautions should you take?

Results:
What colour is Benedict's solution?

Sugar solution concentration	Colour after heating with Benedict's reagent
Very dilute	
Dilute	
Concentrated	

Testing for starch with iodine solution



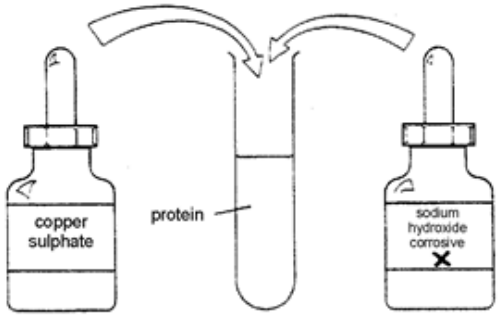
Safety:
What does the label on the iodine solution reagent bottle mean?

What safety precautions should you take?

Method:
Add a few drops of iodine solution.

Results:
What colour is the iodine solution?
Describe what happens when iodine solution is added to the starch solution.

Testing for protein using Biuret's reagents



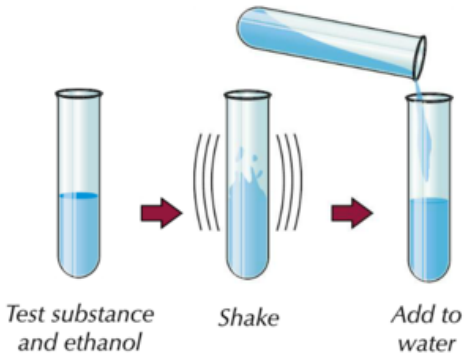
Safety:
What do the labels on the bottles mean?
$CuSO_4$:
NaOH:

What safety precautions should you take?

Method:
Add a few drops of copper sulphate solution to the protein solution.
Add an equal volume of sodium hydroxide solution.

Results:
Describe what happens to the protein solution when the Biuret's reagents are added.

The emulsion test for lipids (fats)



Safety:
What does the label on the ethanol bottle mean?

What safety precautions should you take?

Method:
Add 2 cm3 of ethanol to the food sample in the test tube. Seal with a bung and shake
Pour the food and ethanol mixture into a test tube of water

Results:
Describe what you see.

Summary table of positive nutrient test results:

Fill in the table below:

Nutrient	Biochemical reagent	Evidence for positive test result
Sugar		
Starch		
Protein		
Lipid		

What nutrients are found in milk and Oreo cookies?

You will now investigate what nutrients are found in milk and an Oreo cookie using each of these biochemical tests. Make sure you follow all safety precautions.
(Extra note: Crush the Oreo cookie with a little water first using a mortar and pestle)

Results table:

Add a tick if the food was positive for the nutrient.

Food	Sugar	Starch	Protein	Lipids
Milk				
Oreo cookie				

Conclusions:

1. Which food is healthier? Give reasons for your answer.

2. Could you survive on a diet consisting of only milk and Oreo cookies? Give reasons to support your answer.

Evaluation:

Which nutrients necessary for a healthy diet have not been tested for?
Suggest ways that this experiment can be improved.

9SA 3a Deficiency disease

Define a balanced diet.

……..……

……..……

Define deficiency.

……..……

……..……

Research Task
Pick one deficiency disease.
Find out its cause, symptoms and cure/prevention.
Write your findings in the table below.

Deficiency Disease Name	Cause and Symptoms	Cure/Prevention
1. Scurvy		
2. Rickets		
3. Kwashiorkor		

Deficiency Disease Name	Cause and Symptoms	Cure/Prevention
4. Anaemia		
5. Vitamin A deficiency		

Cite your sources

9SA 3b Which nutrient is deficient?

Read the following case study samples and deduce which nutrient is lacking in the diet.

Case study 1: Mansoor is five years old but is smaller than other children of his age. His hair is thin and he has brittle nails. He also has a swollen abdomen.

Which nutrient is lacking from his diet?
Give reasons for your answer.

Case study 2: Jisoo is sixteen years old and oftens feels dizzy and finds it hard to concentrate. She also gets tired very easily.

Which nutrient is lacking from her diet?
Give reasons for your answer.

Case study 3: Manuela is twenty-five years old and has dry inflamed skin and suffers from joint pain. She often takes time off work because she finds it difficult to fight off infections and her wounds heal slowly.

Which nutrient is lacking from her diet?
Give reasons for your answer.

Case study 4: Azizi is fifty years old. He is a picky eater and unfortunately, has just been diagnosed with colon cancer. He has suffered from regular bouts of diarrhoea and constipation for many years.

Which nutrient is lacking from his diet?
Give reasons for your answer.

Extension:

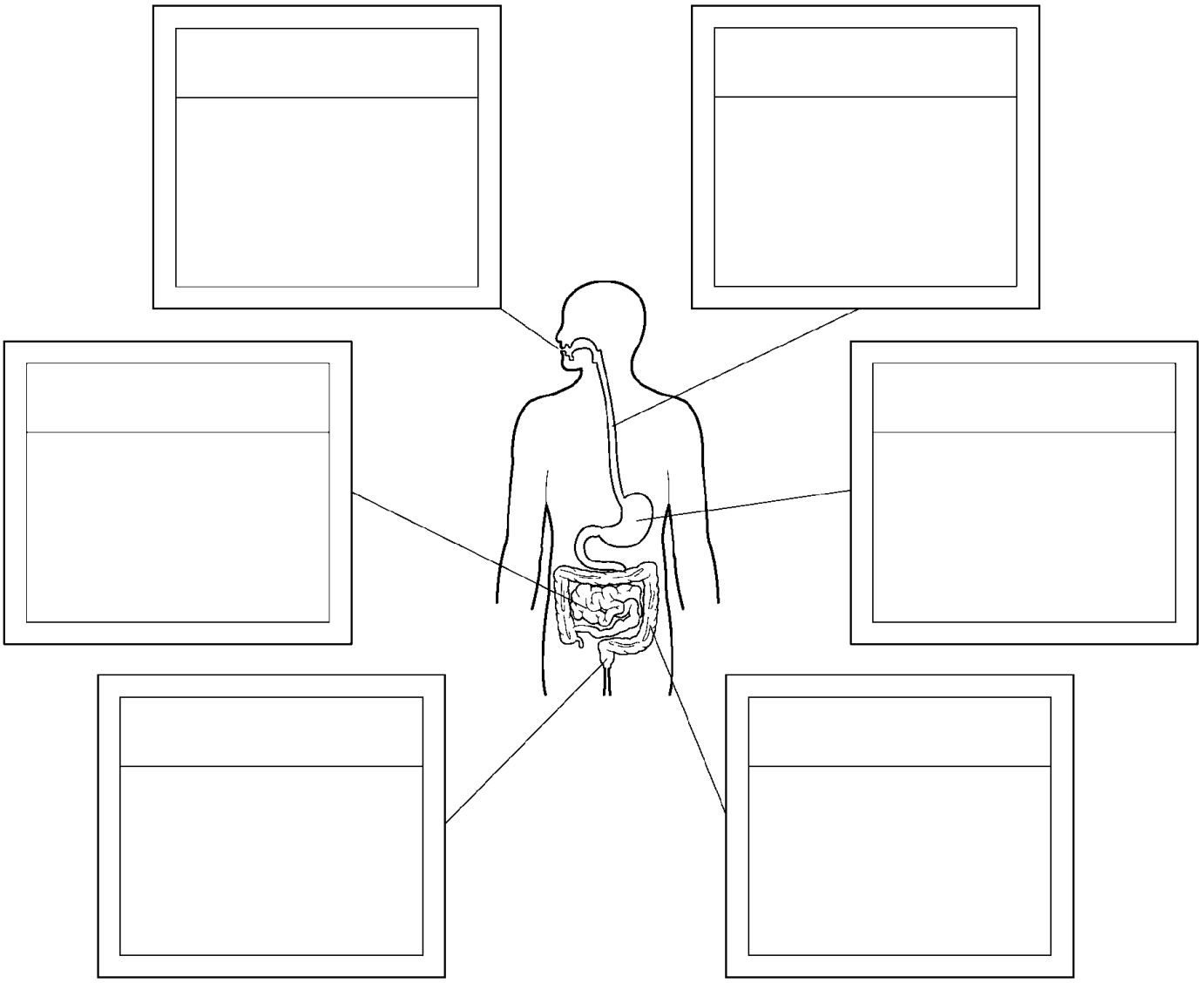
Case study 5: Shaheda is twelve years old. She is short for her age and finds it difficult to walk as her legs are bow-shaped. The enamel on her teeth is also very thin.
Which nutrient is lacking from her diet? Give reasons to support your answer.

Case study 6: Sam is sailing around the world but recently has noticed that his gums are sore and often bleed. He is bruising more easily and a recent cut on his hand is healing very slowly.
Which nutrient is lacking from his diet? Give reasons to support your answer.

9SA 4a The Digestive System

On the diagram below, write in the name of the organ that each line is pointing to. Use these words:

rectum	**small intestine**	**stomach**	**mouth**	**oesophagus**	**large intestine**



Write each sentence in the box with the correct organ to explain the function of each organ.

Water is absorbed here.	More enzymes are added here to chemically digest food. Soluble nutrients are absorbed into the blood..
Takes food to the stomach.	Food is ground up here and mixed with saliva which contains an enzyme to digest starch.
Faeces are stored here	The food is churned up with a strong acid here to kill bacteria and enzymes digest proteins.

9SA 4b Gizmo digestion simulation

Create an account on www.explorelearning.com using the class code provided by your teacher. Select “Gizmos”, search for the “Digestive System” and launch the Gizmo.

1. Line up the **large organs** of the digestive system using the Gizmo. List the order of the organs that food passes through using the words below.
   large intestine, small intestine, mouth, stomach, rectum, oesophagus, anus

2. Select a **food** from the options available. Click play and describe what happens to your chosen food as it passes each of the organs along the digestive system. (You can pause the simulation at each stage to make notes).

Digestive organ	Description of what happens to the food

9SA 5a Modelling digestion

You are going to model what happens in your digestive system when you eat a sandwich with a drink.

Materials and Equipment

Newspaper
Sandwich (slice of bread) and a glass of water (100ml/small beaker of water)
Scissors
Sealable freezer bag
250ml/large beaker
Bicarbonate of soda solution
Clear Vinegar
Green food colouring
Red food colouring
Tray/tub
Thin tights

Method

1) Spread newspaper over your table to work on. Cut up the sandwich using the scissors.

   What do the scissors represent?

   ……

2) Put the pieces into the freezer bag with the drink and add 2 tablespoons of the bicarbonate of soda solution, mix it around. What does the bicarbonate of soda represent?

   ……

3) Add a tablespoon of vinegar and a few drops of green food colouring. Mash everything up in the bag. WARNING – there may be some gas produced, don't let the bag pop! Let any gas produced out and don't squeeze the bag around so much that it bursts.

   What do you think the vinegar represents?

   ……

   What are you modelling when you squeeze and mash the bag?

   ……

4) Add some red food colouring to the bag and mix it in – this represents the waste products made by the body.

5) Take the mashed up mixture and squeeze it through a pair of tights over the tray (to catch the liquid). What do the tights represent?

……

In the human body, what would happen to the liquid that left the tights?

……

What substances would the liquid contain?

……

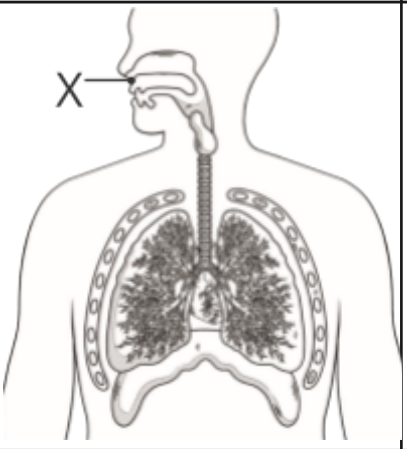
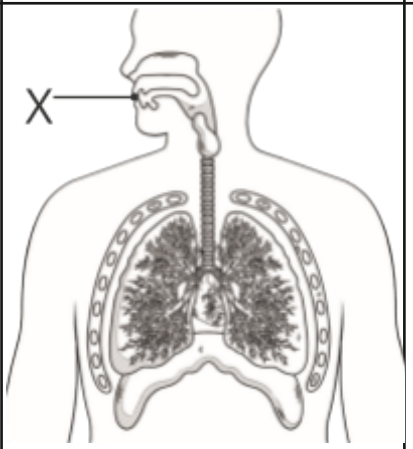
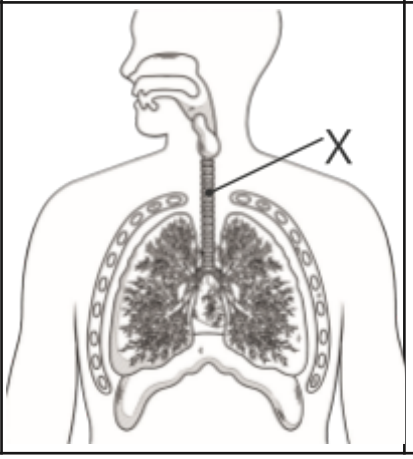
6) What are you left with? Cut a 2cm slit in the tights at the bottom and squeeze the contents into the large beaker. Describe it. What does it represent?

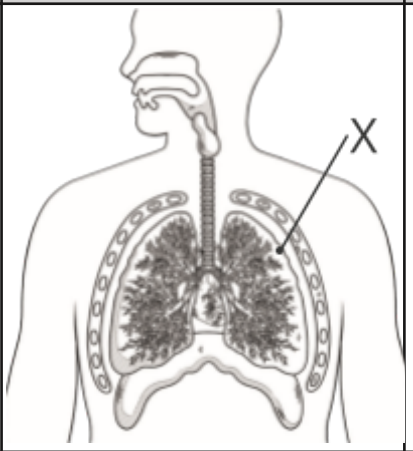
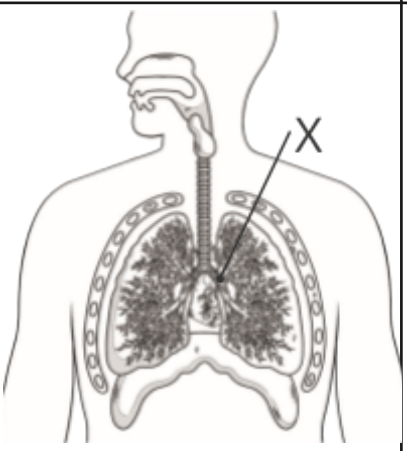
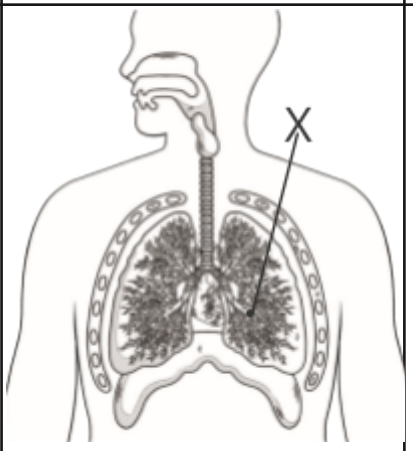
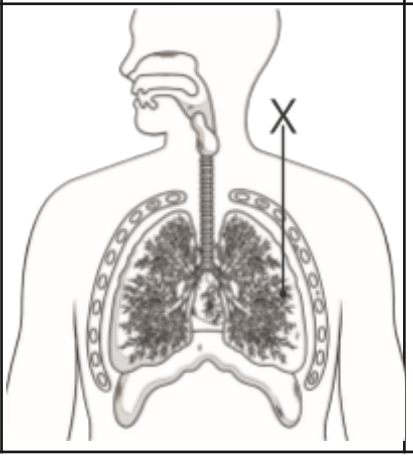
……

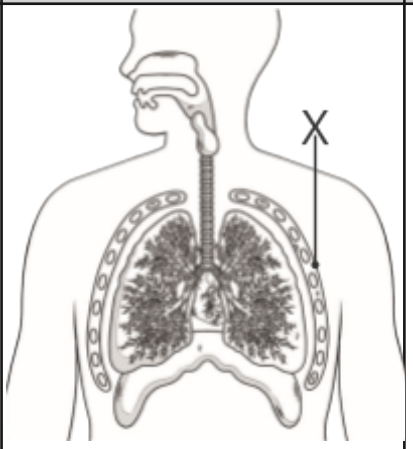
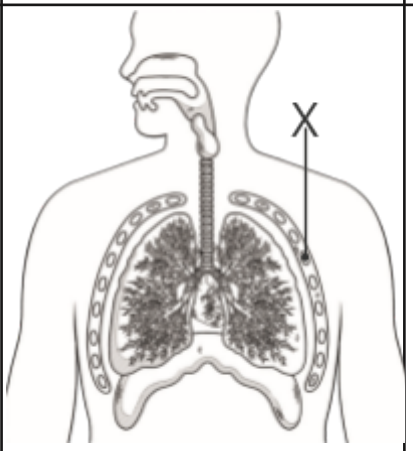
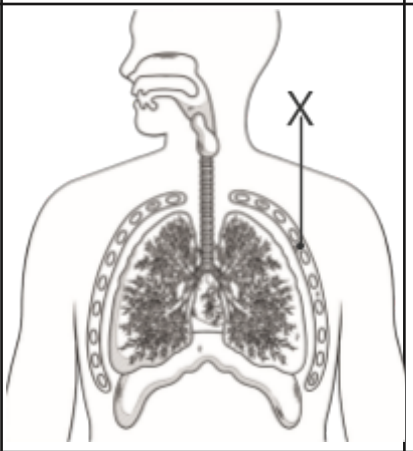
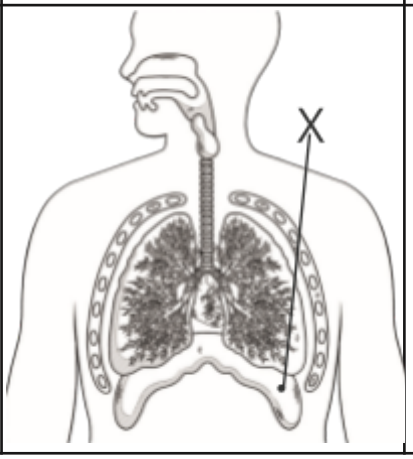
……

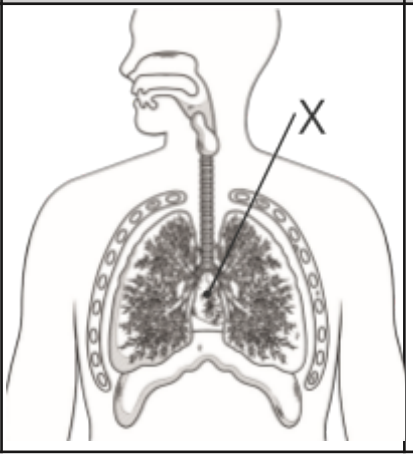
9SA 6a The Breathing System

Write the name of the part of the breathing system labelled 'X' in each diagram. Then, describe its role within the respiratory system in the final column.

Name of X	Diagram	Description of role
a		
b		
c		

Name of X	Diagram	Description of role
d		
e		
f		
g		

Name of X	Diagram	Description of role
h		
i		
j		
k		

Name of X	Diagram	Description of role
I		

Worksheet adapted from Twinkl.com.

9SA 7a The Breathing System Review

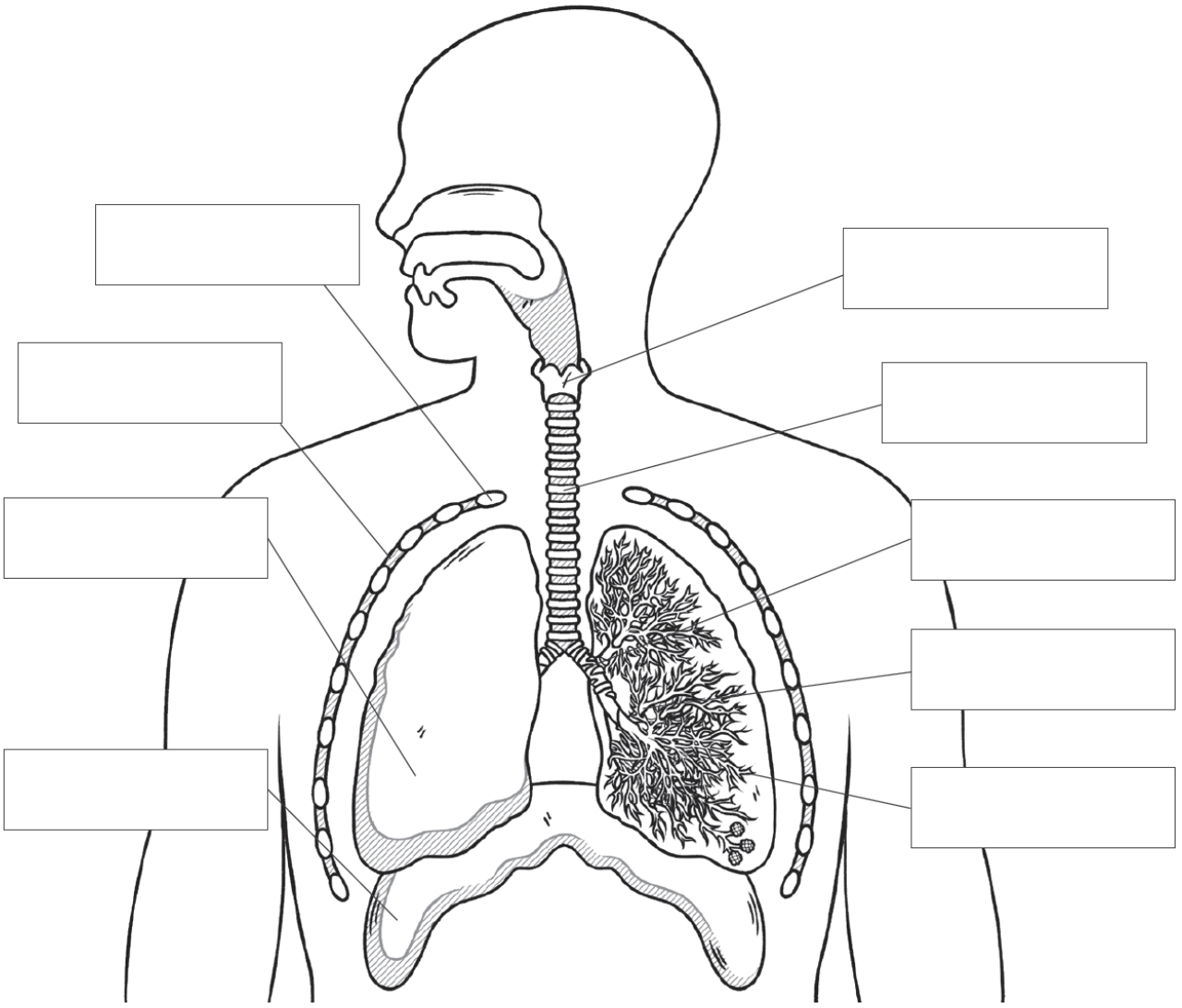
The respiratory system is a biological system in animals that is responsible for gas exchange.

In humans, the respiratory system consists mainly of the mouth and nose, trachea, lungs and diaphragm. This body system works in coordination with other body systems, for example the circulatory system, to ensure that each cell receives oxygen (O_2) for cellular respiration. Additionally, after each cell undergoes cellular respiration, carbon dioxide (CO_2) is produced as a waste product and it is the job of the circulatory and respiratory systems to remove CO_2 from the body.

Organs of the Respiratory System

Use the word bank to label the diagram of the lungs below.

alveoli	bronchioles	trachea
rib	intercostal muscles	bronchi
lung	diaphragm	larynx



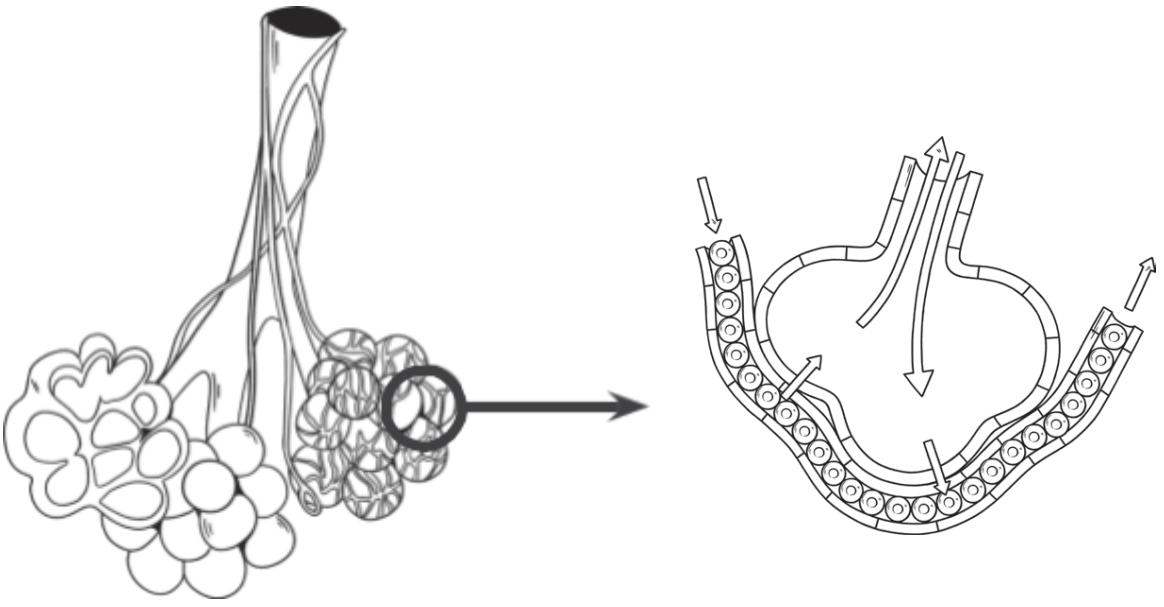
How does the breathing system work?

exhalation	intercostal muscles	bronchioles
alveoli	carbon dioxide	capillaries
rib cage	absorbed	inhalation
oxygen	bronchi	diaphragm

The lungs are protected by the _____. The _____ move the ribs when you breathe, however, the muscle responsible for moving air in and out of your lungs is the _____. The body takes in _____ and releases _____. The process of taking air in is called _____ and removing air is called _____. As you trace the path of airflow, the air moves down the trachea and into the _____ and then to the _____. The bronchioles then further branch out to structures that look like a bunch of grapes. These are the _____. Each alveolus (singular of alveoli) is surrounded by _____ which is a vessel so small that only red blood cells fit through.

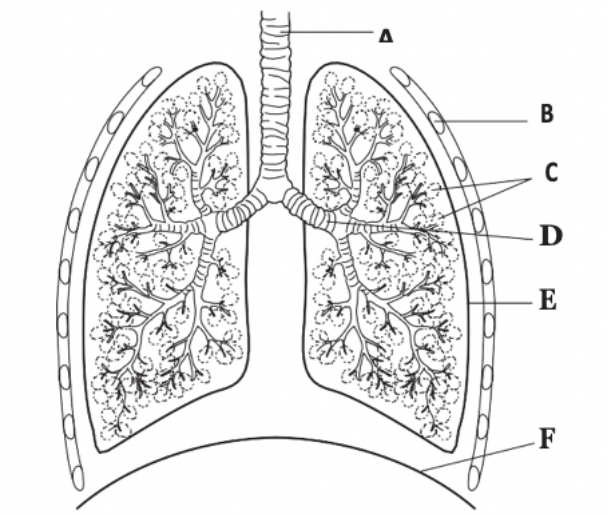
As the blood moves past the alveoli, oxygen is _____ and attaches to each red blood cell. Carbon dioxide is removed from the blood and back into the alveoli where it can travel back up through the lungs to be exhaled.

Label an alveolus and the capillaries in the diagrams below:



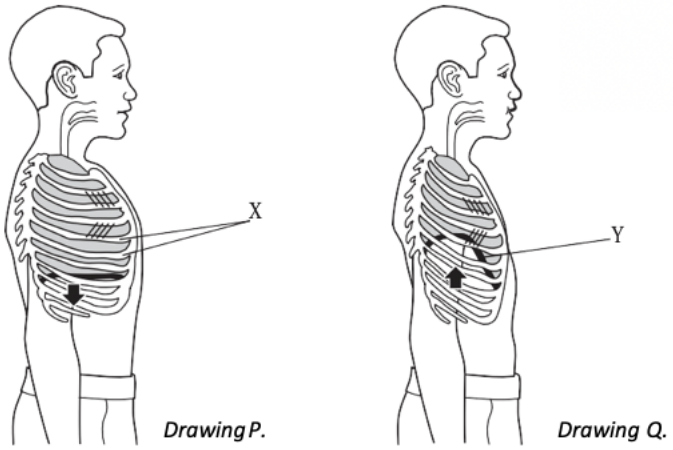
9SA 7b Breathing and Respiration

1a. Name the parts labelled A to F.



1b . How do the parts labelled **C** allow oxygen to get into the blood easily?

2.



a Which drawing shows someone with lungs full of air?

b What happens to the parts labelled **X** when someone inhales?

c What moves these parts?

d What happens to the part labelled **Y** when someone exhales?

3. Gas exchange happens in the lungs. Explain what ‘gas exchange’ is.

4. Oxygen and carbon dioxide are carried in the blood, through tubes.
    a. What is the general name for a tube that carries blood?

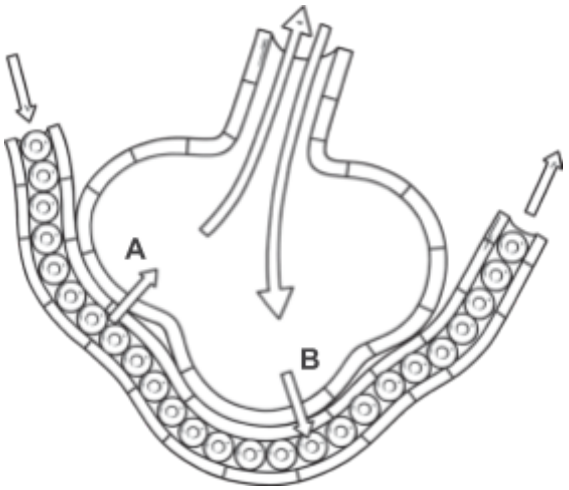
    b. How is oxygen carried in the blood?

    c. How is carbon dioxide carried in the blood?

    d. What is the name of the process that requires the oxygen?

9SA 7c Gas Exchange at the Alveoli

The diagram below demonstrates gas exchange occurring at the alveolus.



1. Label the gases identified as A and B.

   A: _____

   B: _____

2. Describe what is happening in the image above.

3. Explain two ways that alveoli are adapted for gas exchange.

9SA 8a Testing for Carbon Dioxide Gas

Carbon dioxide can be tested using limewater or sodium hydrogen carbonate indicator.

1. Limewater

Select the correct words from the brackets to complete the following sentences:

If I blow into limewater it will change from

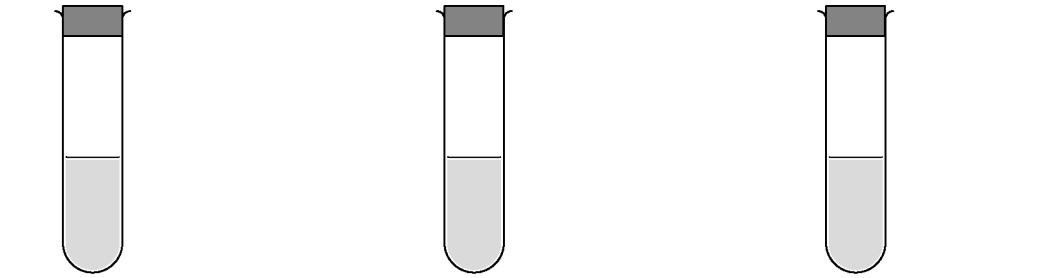
clear (clear/cloudy) to

cloud (clear/cloudy). This shows that

I breathe out the gas carbon dioxide

(oxygen/carbon dioxide).

2. Hydrogen-carbonate indicator



These tubes all contain hydrogen-carbonate indicator.

Hydrogen-carbonate indicators can detect the amount of carbon dioxide in the air.

In normal air it looks (pink/yellow/purple).

In exhaled air it looks (pink/yellow/purple) because there is (more/less) carbon dioxide gas in exhaled air than in normal air.

It looks **purple** in air containing (more/less) carbon dioxide than normal air.

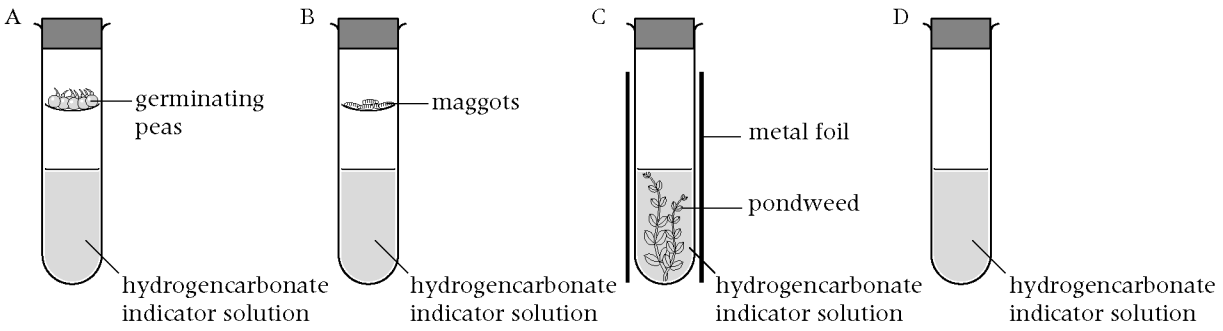
Body temperature can be measured using a (measuring cylinder/thermometer).

Normal body temperature in humans is (27°C / 37°C / 47°C)

2. Hydrogen-carbonate indicator (cont'd)

Hydrogen Carbonate indicator solution can be used to test for Carbon Dioxide.

- Yellow indicates high levels of CO_2
- Pink/Red indicates normal levels of CO_2
- Purple indicates low levels of CO_2



Tube	**Colour of indicator** (pink/yellow/purple)
A	
B	
C	
D	
E (pondweed in the light)	

What is the purpose of tube D? _____

_____

Why did tube C have metal foil around it? _____

_____

What does tube A and B show? _____

_____

What does tube E show? _____

_____

When do you think plants respire? _____

_____

9SA 8b Signs of Life

Respiration is the process that occurs in our …… and releases the …… for life.

Word equation for aerobic respiration:

…… + …… --> …… + ……..……+ (……..)

Body temperature

Person	Temperature (°C)
me	
my partner	

By what process is your body kept warm? _____

In mammals most of the energy from our food is used to keep us warm.

Peas

Type of Pea	Temperature (°C)
live peas	
dead peas	

What does this experiment show? _____

_____

_____

Why do doctors check our body temperatures?

_____

_____

Do you think that temperature alone is a good indication of life?

_____

_____

9SA 9a Aerobic and Anaerobic respiration

Use words below to fill in the gaps in the text. Some of the words need to be used more than once.

Aerobic Anaerobic carbon Energy enough glucose poisonous lactic acid little not all not enough oxygen oxygen debt pant water

Organisms respire in order to release energy.

…… respiration is respiration requiring …….. . In aerobic respiration the reactants are …… and …….. The products are water and …… dioxide. …… is also released.

Aerobic respiration: Glucose + oxygen ⟶ carbon dioxide + water + **ENERGY**

…… respiration is respiration without oxygen. Anaerobic respiration takes place when there is ……oxygen available but energy is required. This happens when an athlete runs very fast but the body cannot supply …… oxygen.

In anaerobic respiration the reactant is only …….. The product is …… ……..

A …… energy is released. This is because not all the energy is released from each glucose molecule.

Anaerobic respiration (in human): Glucose ⟶ lactic acid + **energy**

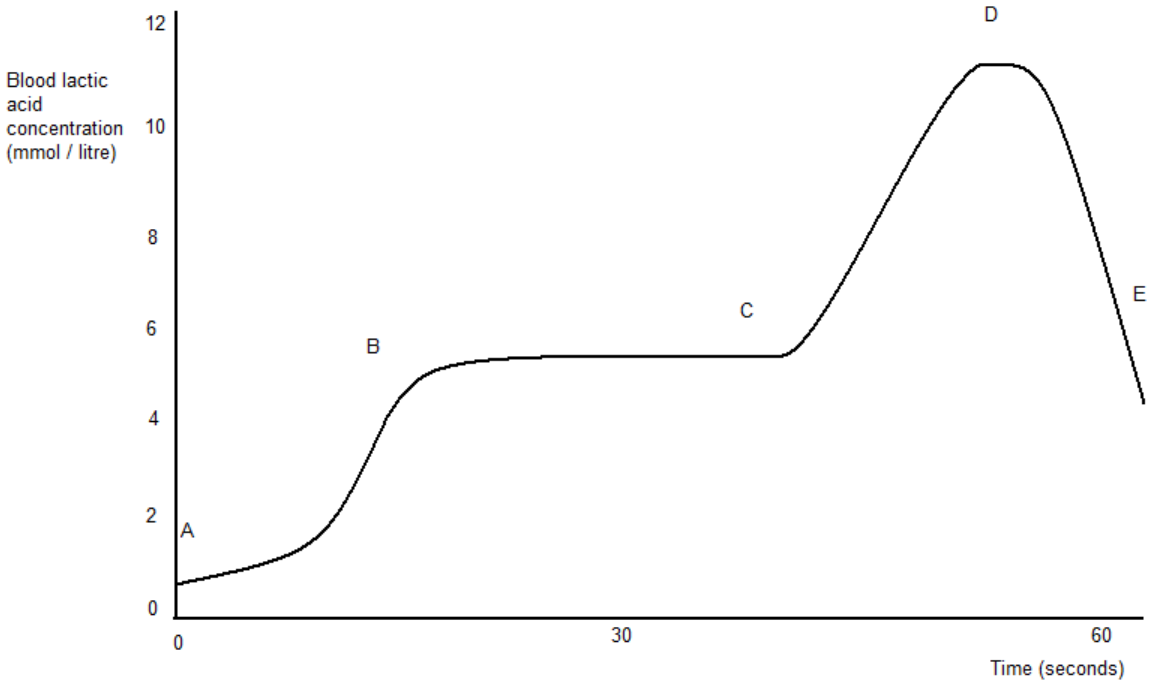
Lactic acid is ……..

To get rid of lactic acid the person will …… in order to get a good supply of oxygen. You have to keep breathing hard for a while after you stop to get oxygen into your muscles to convert the painful lactic acid which has built up to harmless …… dioxide and …… .

The amount of oxygen required to do this is called …… ……..

9SA 9b Respiration in athletics

The blood of an athlete was tested before, during and after a 400m race:



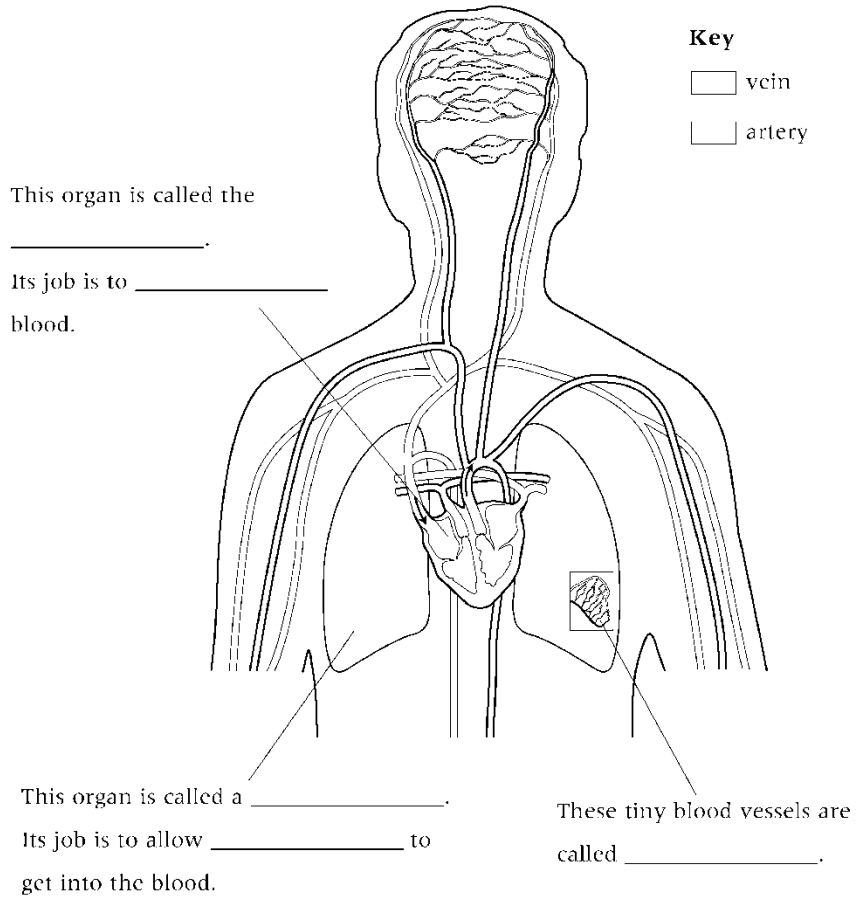
Complete the following table about each section of the race:

Section of race	Strategy	Anaerobic or aerobic respiration?	Explanation
A to B	Sprint start		
B to C	Stops accelerating and maintains pace		
C to D	Sprint finish		
D to E (after the race has finished)	Warm down, then rest		

9SA 10a Blood Vessels and Circulation

1 **Colour** all the veins in dark red and all the arteries in bright red and colour in the key.

2 Fill in the missing words in the sentences below.



2 Look at these pictures of blood vessels.

a Add the correct label to each picture: **vein, artery, capillary**

b What is the name of the liquid that leaks out of capillaries and surrounds the cells?

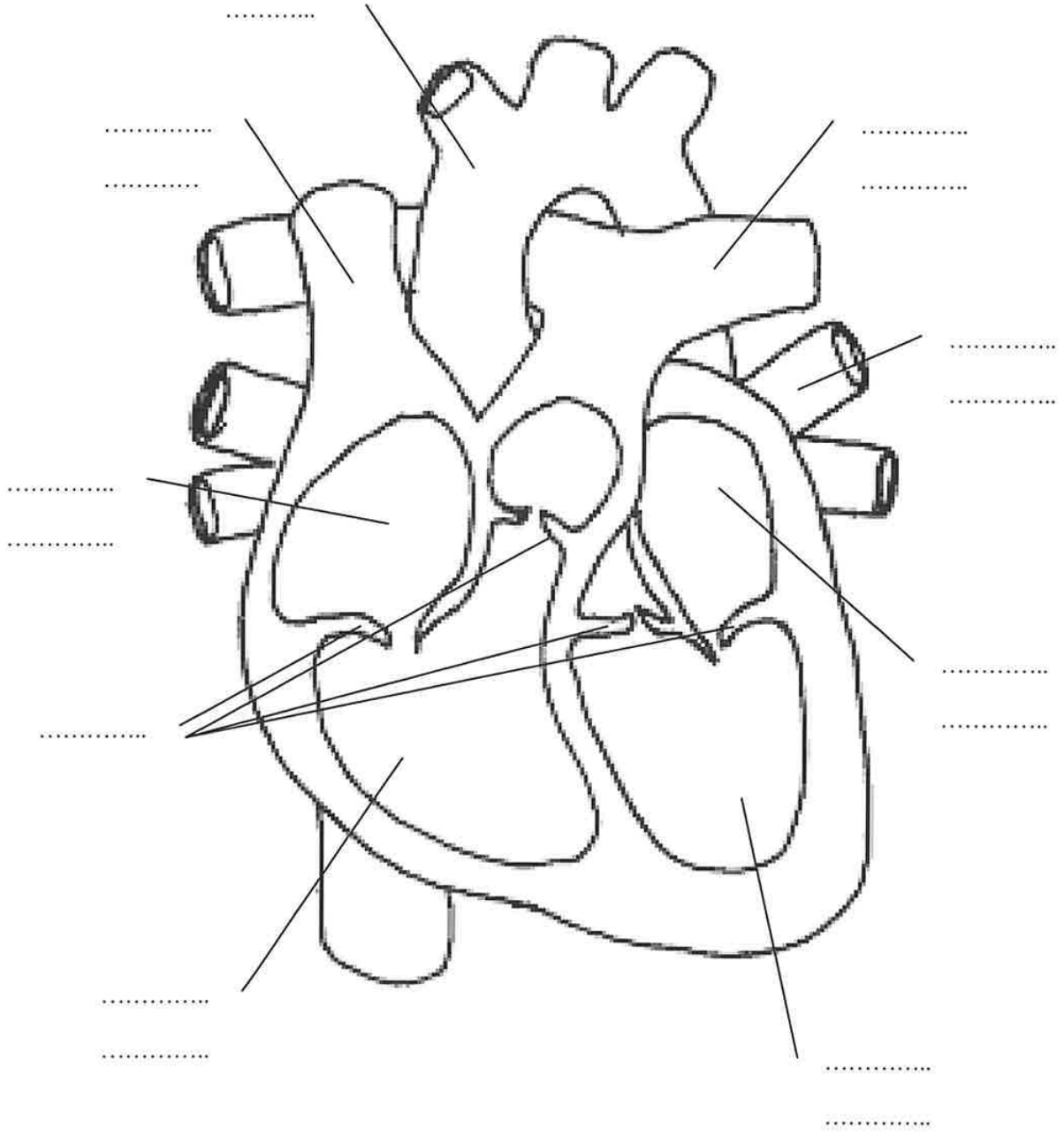
c Blood consists of cells and a liquid. What is the name of this liquid?

d Name one substance that the liquid in part **c** carries.

e Name one substance that a red blood cell carries.

9SA 11a Heart Dissection

1 Colour the blood rich in carbon dioxide in <u>blue</u> and the blood rich in oxygen in *red*.
2 Label the parts of the heart below.
3 **Add arrows to show the direction of the blood flow.**



Dissection notes and observations:

(you may draw diagrams or insert pictures here)

9SA 12-15 Investigation

MYP 3: Year 9 Science

Criterion B Assessment – Inquiring and Designing

Criterion C Assessment – Processing and Evaluating

UNIT:	**Staying Alive**
ASSESSMENT TITLE:	Investigating the relationship between a **named variable** and **heart rate** in year 9 students
Statement of Inquiry:	How can personal lifestyle choices influence the way body systems interact and have consequences for health and well being?
Key Concept:	Systems
Related Concepts:	Interactions and consequences (personal and cultural expression)
ATL Focus:	Communication skills Collaboration skills Organizational skills
Key Scientific Vocabulary:	

Data	Measurement of a parameter that can be quantitative (volume, temperature, pH, intensity of exercise and so on) or qualitative (colour, shape, texture, and so on).
Dependent variable	The variable in which values are measured in the experiment (heart rate is number of heart beats in 1 minute)
Prediction	Give an expected result of an upcoming action or event.
Hypothesis	A scientific explanation for an observation or expected outcome that requires experimental confirmation; can take the form of a question or a statement.
Independent variable	The variable that is selected and manipulated by the investigator in an experiment eg exercise intensity, type of exercise, length of exercise.
Qualitative data	Refers to non-numerical data or information that is difficult to measure in a numerical way eg red face, breathless, tired.
Quantitative data	Refers to numerical measurements.
Validity of the method	Refers to whether the method allows for the collection of sufficient valid data to answer the question. **Is it a fair test?**

Command Terms:	
	Design — Produce a plan, simulation or model. **Evaluate** — Weigh up the strengths, weaknesses and limitations. **Interpret** — Use knowledge and understanding to recognize trends and draw conclusions from given information **Analyze** — Break down in order to bring out the essential elements or structure. To identify parts and relationships, and to interpret information to reach conclusions.

Assignment Instructions (GRASPS)

Goal	You are required to determine the ***relationship between a variable of your choice and heart rate*** of a suitable sample year 9 students. This will be carried out in the school gym.
Role	You are a personal trainer who has been asked to find out how an aspect of exercise influences heart rate.
Audience	You will complete a ***scientific report*** on the findings of your investigation and submit it to the Head of Sport Science (your teacher!) for inspection.
Situation	You will work ***collaboratively*** in ***groups of twos***. You are required to ***design an organized practical investigation*** that will assist you in addressing the goal above. You must then ***perform the practical*** you have designed so that you can collect results (ideally 5 repeats) that will help you determine the relationship between your chosen factor (ideally 5 values) and heart rate (beats per minute). You will be given access to the gym, exercise machines and a stopwatch. Make sure that you wipe down all equipment with the sanitising spray after use.
Product	A ***scientific report*** should be completed to include a ***design, analysis and evaluation*** section. This report will be an electronic document that will be submitted via Google classroom for marking and will ***communicate*** the science of your investigation. You teacher will advise you of the due date for the report.

Success Criteria for Assessment	The ***final scientific report MUST include*** (see MYP Practical Report Checklist for Students in your booklet): - Title - Research Question - Background information - Hypothesis - Variables - Apparatus - Method - Safety considerations - Results table - Observations - Calculations - Graph - Conclusion - Strengths and Weaknesses - Improvements

Level Descriptors and Task Specific Clarifications for Criterion B:

Level	Level Descriptor	Task Specific Clarification
0	The student does not reach a standard described by any of the descriptors below.	- **None of the task specific clarifications** listed have been addressed in the scientific report, or no report has been submitted.
1-2	The student is able to: i. **state** a problem or question to be tested by a scientific investigation, with limited success ii. **select** a testable prediction iii. **state** a variable iv. design a **method with limited success**.	- A research question is stated that indicates the problem being investigated but the **question is not focused.** - One variable is stated correctly - A method is written but it **does not allow for necessary data to be collected**. - No safety consideration is given, or what is **written is inaccurate in parts**.
3-4	The student is able to: i. **state** a problem or question to be tested by a scientific investigation ii. outline a testable prediction iii. outline how to manipulate the variables, and **state** how **data** will be collected iv. design a **safe method** in which he or she **selects materials and equipment**.	- A research question is **simply stated** with a basic **prediction**, e.g. the heart rate will change during exercise. - In your method you have simply stated how you will collect **most data.** However, your apparatus does not completely match your method. - **Variables are stated**, but with no further details given.
5-6	The student is able to: i. **outline** a problem or question to be tested by a scientific investigation ii. **outline and explain** a testable hypothesis using **scientific reasoning** iii. **outline** how to manipulate the variables, and outline how sufficient **relevant data** will be collected iv. design a **complete and safe method** in which he or she **selects appropriate materials and equipment**.	- Your research question **identifies the independent and dependent** variable, and **outlines the method** you will use - You have outlined a possible hypothesis for this investigation with **regard to the effect of your variable on heart rate.** - You have **stated how you will measure** your control, independent and dependent variables - You have **selected a step by step method** which indicates what results you will record.
7-8	The student is able to: i. describe a problem or question to be tested by a scientific investigation ii. **outline and explain** a testable hypothesis using **correct scientific reasoning** iii. **describe** how to manipulate the variables, and **describe** how **sufficient, relevant data** will be collected	- Your research question **clearly identifies the independent and dependent variable**, references **the factor chosen** and **heart rate.** - Your background research references the **function of the circulation system and respiration.** This could be in the form of annotated diagrams/equations. - A hypothesis should be written and your prediction explained using scientific knowledge.

Level	Level Descriptor	Task Specific Clarification
	iv. Design a logical, **complete and safe method** in which he or she **selects appropriate materials and equipment**.	- All **variables are described in detail** – named, how they will be measured / controlled, and why control variables must be monitored. - Method gives a **detailed stepwise account** of how practical is conducted, with a **fully labeled diagram** and precautions related to **any safety issues** discussed.

Level Descriptors and Task Specific Clarifications for Criterion C:

Level	Level Descriptor	Task Specific Clarification
0	The student does not reach a standard described by any of the descriptors below.	- **None of the task specific clarifications** listed have been addressed in the scientific report, or no report has been submitted.
1-2	The student is able to: i. **collect and present** data in numerical and/or visual forms ii. **Accurately interpret** data iii. **state** the validity of a hypothesis **with limited reference** to a scientific investigation. iv. **state** the validity of the method **with limited reference** to a scientific investigation. v. **state limited** improvements or extensions to the method.	- **Some observations and data** have been recorded but can only lead to a partial conclusion that does not address the research question. - **No graph** of data is drawn. - Little or no reference made to the research question and hypothesis. - Statements are made regarding validity and reliability but contain **errors with regard to accuracy.**
3-4	The student is able to: i. **correctly collect and present** data in numerical and/or visual forms ii. **accurately interpret** data and **describe** results iii. **state** the validity of a hypothesis based on the outcome of a scientific investigation iv. **state** the validity of the method based on the outcome of a scientific investigation v. **state** improvements or extensions to the method that would benefit the scientific investigation.	- Although the recorded **results are presented accurately**, some errors are present. However the data will allow for a **conclusion to be drawn**. - Graph is drawn but with errors **and no interpretation** of the trend stated. - Conclusion stated, **but no discussion of science behind conclusion** statements. - **One - two weaknesses and improvements** are stated but with limited discussion.

Level	Level Descriptor	Task Specific Clarification
5-6	The student is able to: i. **correctly collect, organize and present** data in numerical and/or visual forms ii. **accurately interpret** data and **describe** results **using scientific reasoning** iii. **outline** the validity of a hypothesis based on the outcome of a scientific investigation iv. **outline** the validity of the method based on the outcome of a scientific investigation v. **outline** improvements or extensions to the method that would benefit the scientific investigation.	- Raw data is recorded accurately **in a mainly organized data table, with errors limited to just one.** - Averages are calculated accurately, and a graph is drawn with accurate but **limited interpretation** of the trend observed. - An **outline on the validity and reliability** of results is given - at least two reasons are provided.
7-8	The student is able to: i. **correctly collect, organize, transform and present** data in numerical and/ or visual forms ii. **accurately interpret data** and describe results **using correct scientific reasoning** iii. **discuss** the validity of a hypothesis based on the outcome of a scientific investigation iv. **discuss** the validity of the method based on the outcome of a scientific investigation v. **describe** improvements or extensions to the method that would benefit the scientific investigation.	- **All raw and processed data** is presented in a logical results table, with observations recorded in detail. - A **fully accurate graph of data** is drawn and detailed comments on **observed trends** are **outlined.** - Conclusion discusses the science of the investigation and links that to trends observed and the original hypothesis stated. The role of the circulatory system should be discussed. - **Detailed discussion on the reliability of results and validity of the experimental method** – these should be realistic scientific discussions only. - **Scientific improvements and extensions are described**.

Student Task Planning Notes:

MYP Science
Practical Report Template

Name:	Form:

UNIT:	Staying alive
Statement of Inquiry:	
Key Concept:	
Related Concepts:	
Investigation Title:	Experiment to investigate the effect of a variable on heart rate in year 9 students

Criterion B - Inquiring and Designing

Research Question

(What are you trying to find out?)

Background Scientific Information and Hypothesis

(Conduct additional research on the topic and write a scientific introduction)

(What do you think will happen and why? Give a scientific explanation)

Variables

Independent *(What will change and how will you change it?)*	
Dependent *(What will you measure to gather results?)*	
Control *(What variables will you keep the same to make it a fair test, and why? How will you keep the variables constant?)*	

Apparatus Set-up

(Draw a labelled diagram of the assembled apparatus that you will use. Write the name of any equipment not shown in the diagram)

Method

(Write a step by step account of how you conduct your experiment – the method must be DETAILED). Add as many steps as you need to.

1.

2.

3.

4.

5.

Safety

(How will you make sure your method is safe?)

Reliability

(What will you do to ensure your results are reliable?)

Criterion C - Processing and Evaluating

Results

Data

(Organise your results in a table with clear headings. Calculate averages.)

Observations

Graphing Results

You should draw a graph of your results and attach it to this report.

Analysis of Graph

(What did your results show? Are there any trends or patterns in your results? Can you give an example of a pattern or trend from your results? Are there any anomalies in your results?)

Conclusion and Evaluation

Scientific Conclusion and Explanation of Results

(Summarize what your results show. How well does this support your hypothesis ? Can you explain your results using scientific knowledge?)

Evaluation of Scientific Method and Results

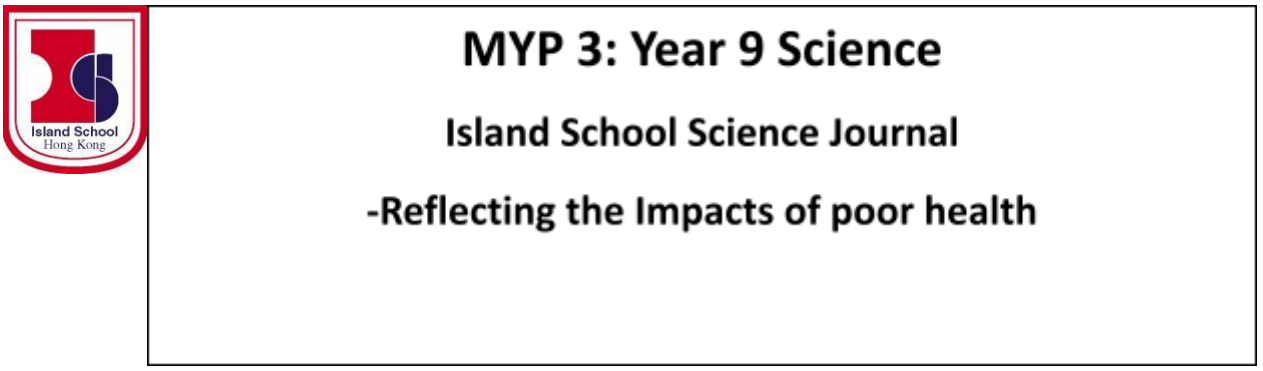
(How reliable were your results? How well did your investigation answer the research question? What went well with your method?

(Were there any problems or parts of your investigation that were not very accurate or could have been done better?)

Issue with justification	Suggested SCIENTIFIC Improvement

Bibliography:

9SA 16a Science Journal



General Guidelines

- Please do **not** plagiarise! Please do not directly copy and paste any passages or text from other websites and articles!
- Use simple language – we want the target audience to be for all year groups, so please don't get too technical in your writing!
- Watch your language – please do not use any offensive language in your articles. If you're discussing a controversial topic, please ensure you are being sensitive.
- Please keep your article 2-3 A4 pages long and include relevant pictures and diagrams. Ensure that you upload images in JPEG format and that you link in the URL. Make sure that images are "open source" and not copyright images. If you include the URL we can check that.
- Please write your article on the google doc on the google classroom

Submission Length & Format

- The length of your article must be no shorter than 2 A4 pages and no longer than 3 A4 pages
- Your submission should be in font Arial, size 11 with 1.5 spacing and default margins
- Please include at least 1-2 relevant diagrams, images or graphics to your article

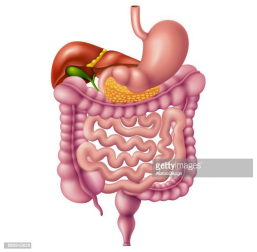
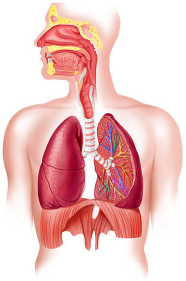
Citations & Bibliography – How to Avoid the Pitfalls of Plagiarism

- Please make sure you do not "copy and paste" any text from any sources
- Please reference any sources that you might be using in APA 7th edition format with 'Easybib', 'Cite This For Me' or any other citation website
- This Scribbr website may help you in citations: https://www.scribbr.com/apa-style/
- Please include references to books, websites or newspapers, as well as citations for any diagrams and images you may use

Here are some older publications for reference: https://island.edu.hk/student-publications/

Diseases related to digestive, breathing and circulation system

Look at the list of diseases that affect each organ system as stated. Your task is to choose one disease and compile information to share with 2 other people via a Canva presentation.

Digestive	**Breathing**	**Circulation**
		
Coeliac disease	**Popcorn lung**	**Deep vein thrombosis**
Lactose intolerance	**Lung cancer**	**Coronary heart disease**
Bowel cancer	**Asthma**	**Arrhythmia**

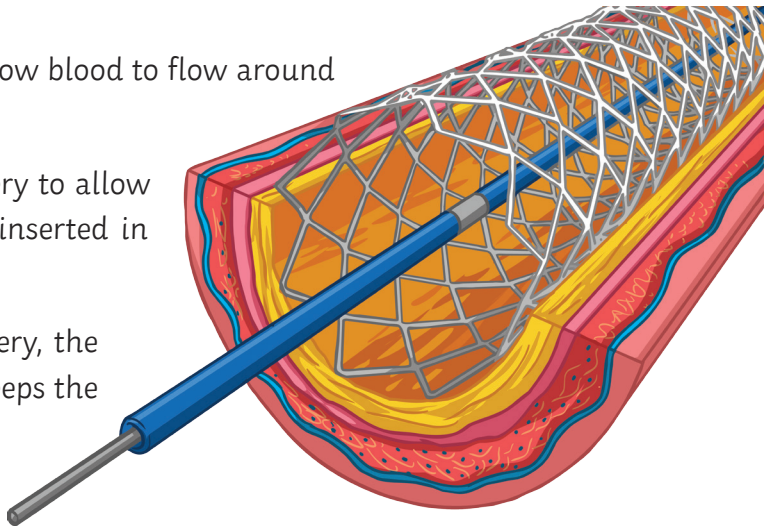
Individually complete research into **one** disease from **one** of the organ systems listed.

Produce an article for the **Island School Science Journal** using the guidelines provided.

Coronary Heart Disease **Information**

Stents

Stents are used to widen a narrowed artery to allow blood to flow around the body, preventing a heart attack.



A stent is a metal grid that is placed into an artery to allow the blood to flow. A catheter with a balloon is inserted in a blood vessel.

When it has found the narrow section of the artery, the balloon is inflated, then the stent expands and keeps the artery open.

Blood and oxygen can then flow freely around the body. They lower the risk of someone of a heart attack and will last for a long time. There is, however, a risk of infection and blood clots.

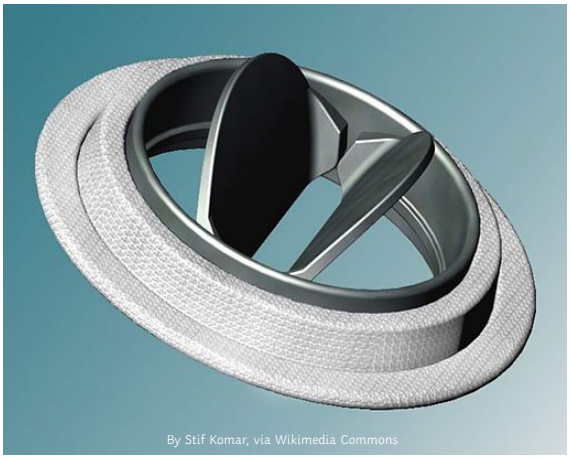
Statins

Statins are taken by people in order to lower the amount of cholesterol in the blood. They slow the production of cholesterol by the liver. Cholesterol can build up in the arteries going towards the heart, stopping the blood getting to the heart. It reduces the risk of people having a heart attack or a stroke.

Once they have been prescribed, statins have to be taken on a daily basis. There are some side effects of taking statins, which puts people off taking the drug. Some of the side effects include sickness and abdominal pain.

Some of the more severe side effects include liver failure and skeletal damage.

Mechanical Heart Valves


By Stif Komar, via Wikimedia Commons

The valves found in the heart can be damaged, which can cause the blood to flow in both directions. The blood cannot then circulate properly. If the valve is badly damaged, they can be replaced.

There are two types of replacement valves:

- biological valves, from humans or pigs;
- man-made valves, called mechanical valves.

A valve transplant is a lot easier than a whole heart transplant. For the valves to be fitted, it requires major surgery, with risks. There is also the risk of a blood clot.

An Artificial Heart

By JNakashima , via Wikimedia Commons

Artificial hearts are mechanical devices that pump blood around the body for someone who has heart failure. They are temporary until a donor heart can be found. They can also allow a person to rest their heart if it needs time to recover.

They are less likely to be rejected than a donor heart. This is because they are made of plastic and metal.

It does come with risks, though. Surgery can lead to bleeding out and infection. They also do not work as well as a natural, healthy heart. There is a risk of blood clots, potentially leading to strokes.

The patient also has to take drugs to thin the blood, which can cause problems if they cut themselves.

Heart Transplants

If the heart is severely damaged it may be necessary to have a heart transplant in order to save their life. It is essential to find a donor to match the patient in order to prevent rejection. A patient will also have to take immunosuppression drugs to help prevent rejection, this can cause a person to be more prone to infections.

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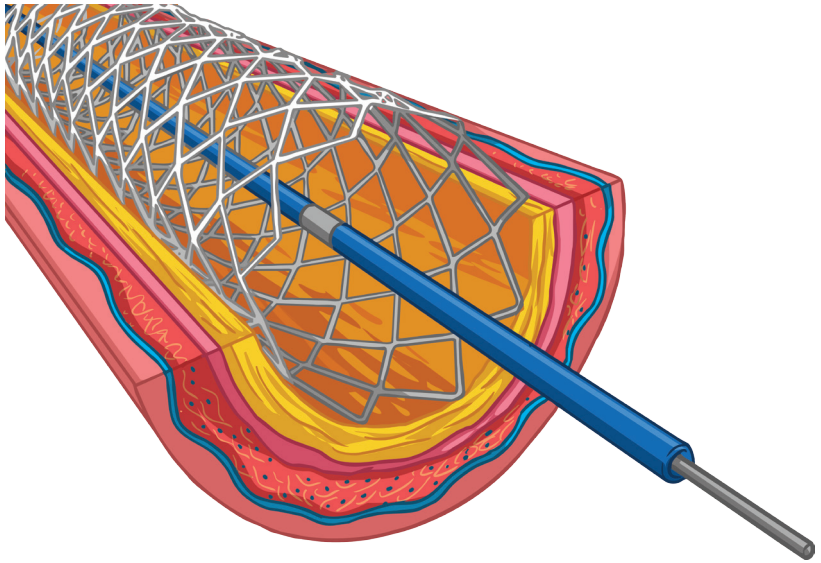

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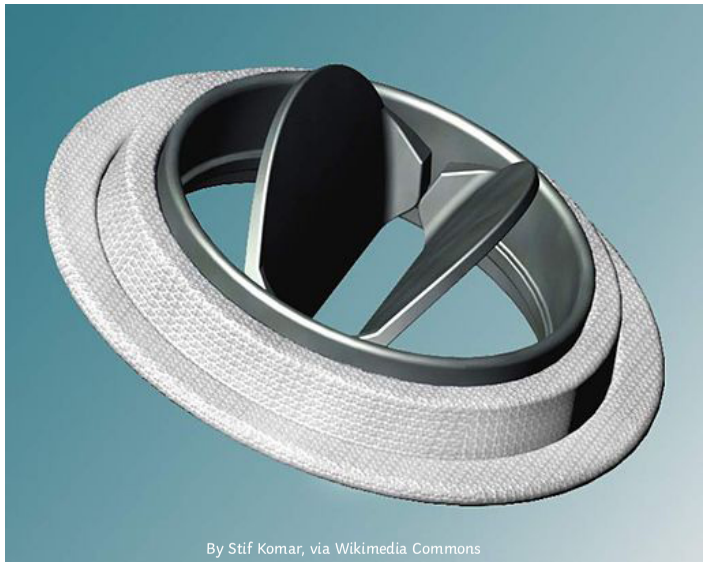

By Stif Komar, via Wikimedia Commons

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By JNakashima , via Wikimedia Commons

Heart Transplants

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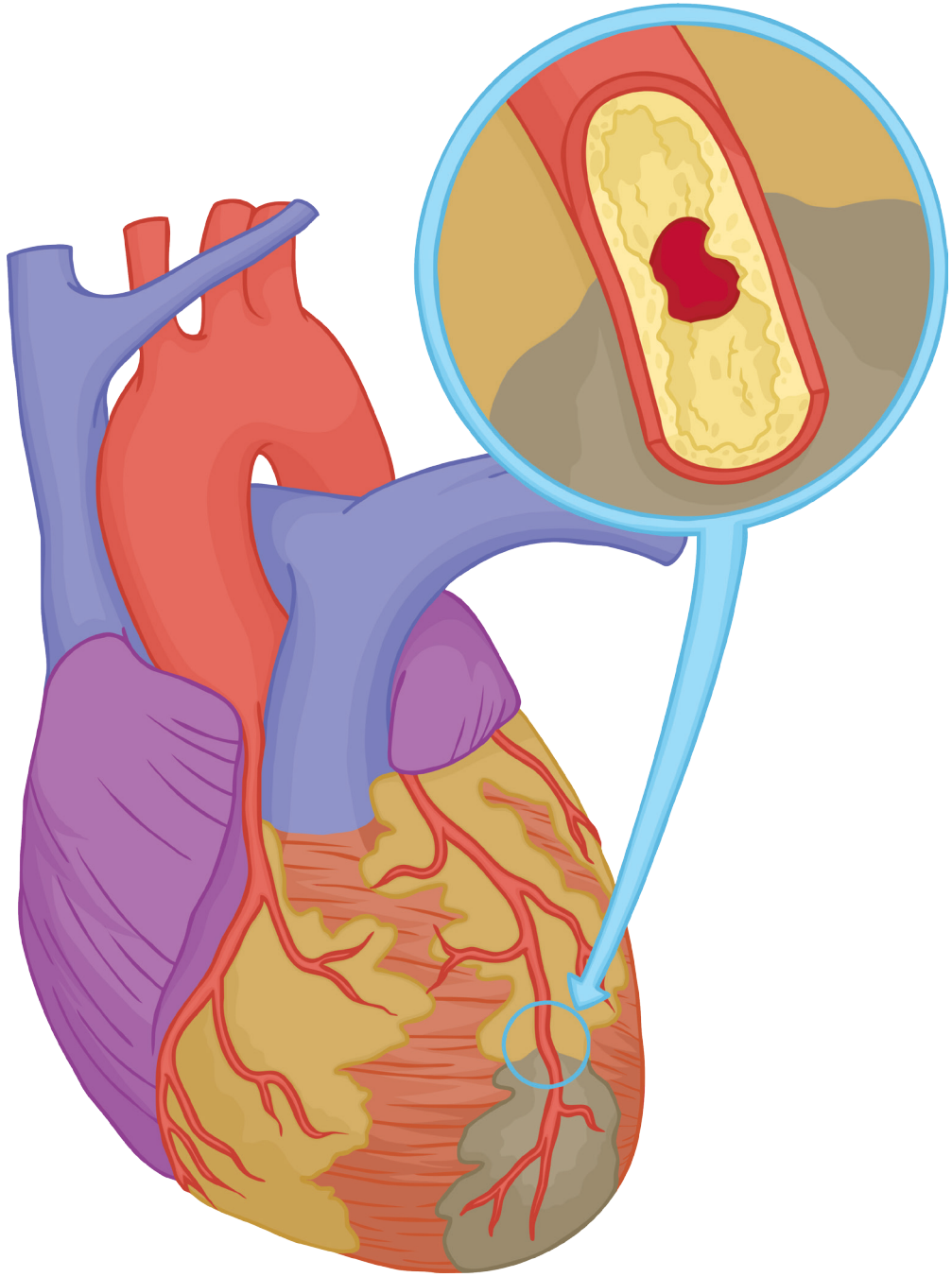
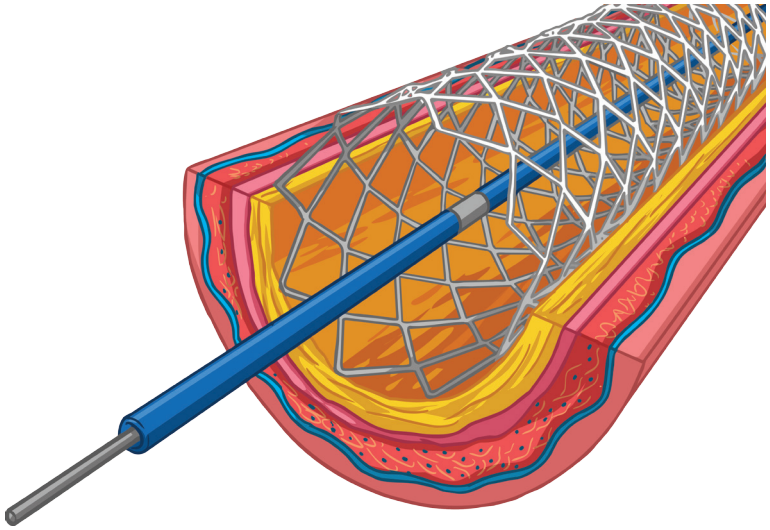
Coronary Heart Disease



Stents

Put the statements into the correct columns:

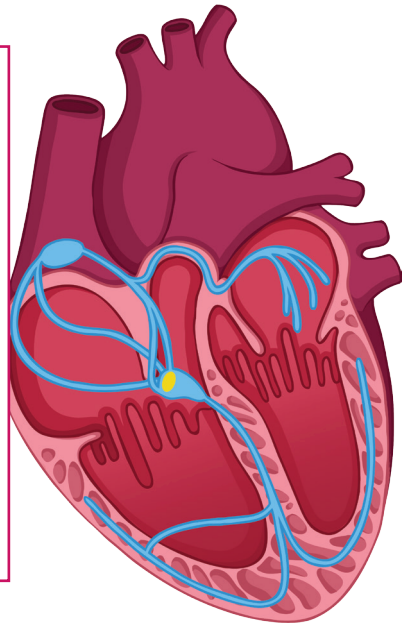
- Risk of a blood clot near the stent.
- Lowers the risk of a heart attack.
- Complications during surgery.
- Works for a long period of time.
- Recovery time is quite short.
- Risk of infection.



Positives	Negatives

Extension

Would you advise someone to have a stent fitted if they were at risk of having a heart attack? Explain your answer.



Treatment of Coronary Heart Disease

Heart Transplants

What are they?

Advantages

Disadvantages

Replacing Faulty Heart Valves

What are they?

Advantages

Disadvantages

Statins

What are they?

Advantages

Disadvantages

An Artificial Heart Transplant

What are they?

Advantages

Disadvantages

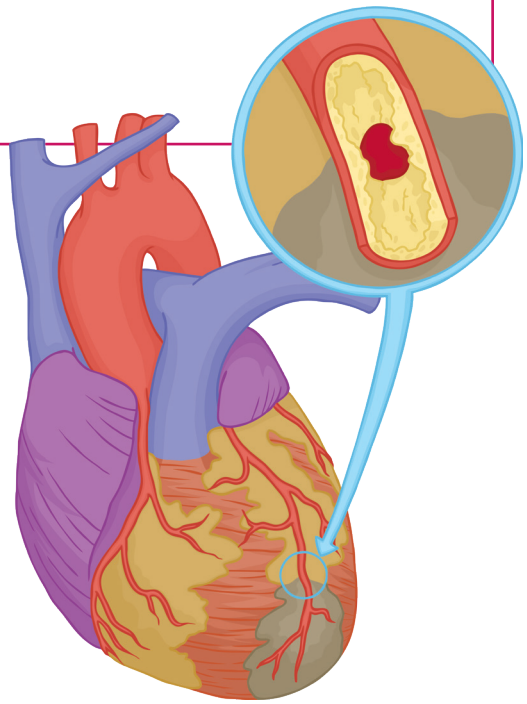
Treatment of Coronary Heart Disease **Extension**

Stents

What are they?

Advantages

Disadvantages



Exam Style Questions

1. What type of valve should a surgeon use for a leaky valve?

2. What are the disadvantages?

3. What can line the arteries to cause blood clots?

4. Why can a mechanical heart not be used for a long period of time?

9SA 18a Revision notes

Make notes for each lesson. Each statement should be addressed.

Lesson 1 Nutrients

- Name the different nutrients and their roles in the body.
- Describe the function of each of the nutrients.
- Identify the various sources of nutrients.
- Discuss why the energy requirements for different individuals may be different.

Lesson 2 Food Tests

- Use biochemical tests to identify the nutrients (starch, proteins, lipids, sugar) in food.

Lesson 3 Balanced diets and deficiency diseases

- Describe what a balanced diet is.
- Outline the cause of deficiency diseases including scurvy, rickets, Kwashiorkor, anaemia and vitamin A deficiency.

Lesson 4 The digestive system

- Name the organs in the digestive system and their function.
- Outline what each part of the digestive system does.

Lesson 5 Digestion and absorption

- Use physical model to explain the process of digestion.
- Outline the absorption of nutrients in the small intestine.

Lesson 6 Breathing system and lung dissection

- Name the different parts of the breathing system and their function.
- Identify different parts of the breathing system during lung dissection.

Lesson 7 Breathing and gas exchange

- Describe the role of muscle contraction and relaxation during inhalation and exhalation.
- Define diffusion.
- Describe the movement of oxygen and carbon dioxide between the alveoli and blood capillaries during gas exchange.
- Describe the adaptation of the alveoli for efficient gas exchange.

Lesson 8 Aerobic respiration

- State that respiration is one of the characteristics of living things.
- Outline that respiration is a chemical reaction which releases energy from food, and takes place in the cells.
- State the word equation for aerobic respiration.
- Outline how the presence of carbon dioxide can be tested using limewater and sodium hydrogen carbonate indicator.

Lesson 9 Anaerobic respiration and exercise

- State what anaerobic respiration in human is.
- Describe the difference between aerobic and anaerobic respiration.
- Explain the importance of anaerobic respiration during exercise.
- Explain muscle fatigue and oxygen debt.

Lesson 10 Circulatory system and blood vessels

- Outline the function of the circulatory system and the parts that make up the system.
- Outline the structure and function of arteries, veins and capillaries.
- Introduce the structure of the heart.

Lesson 11 Heart dissection

- Name the different parts of the heart.
- Describe how blood is pumped out of the heart.
- Identify the structure of the heart during dissection.

Lesson 12 Criteria B & C investigation – the effect of exercise on heart rate (planning)

- Plan an experiment to investigate the effect of exercise on heart rate with full consideration to safety, reliability and accuracy.

Lesson 13 Criteria B & C investigation – the effect of exercise on heart rate (data collection)

- Collect a meaningful number and range of data.

Lesson 14 Criteria B & C investigation – the effect of exercise on heart rate (data processing)

- Analyse data by calculating means and rates, plot graphs to identify patterns and trends that can be explained Biologically.

Lesson 15 Criteria B & C investigation – the effect of exercise on heart rate (conclusion and evaluation)

- Use Biological knowledge and understanding to explain results.
- Evaluate the flaws in collecting experimental data and suggest improvements to experimental techniques.

Lesson 16 – 17 Disorders of the digestive, respiratory and circulatory system (Science journal)

- Produce an article for the Island School Science Journal on diseases related to the digestive, respiratory and circulatory systems.

9SA 18b Respiration, Digestion and the Circulatory Systems – Summary Sheets

Digestion

We need to eat a wide variety of foods to provide our bodies with all the substances that are needed. When we do this, we are said to have a **balanced diet**.

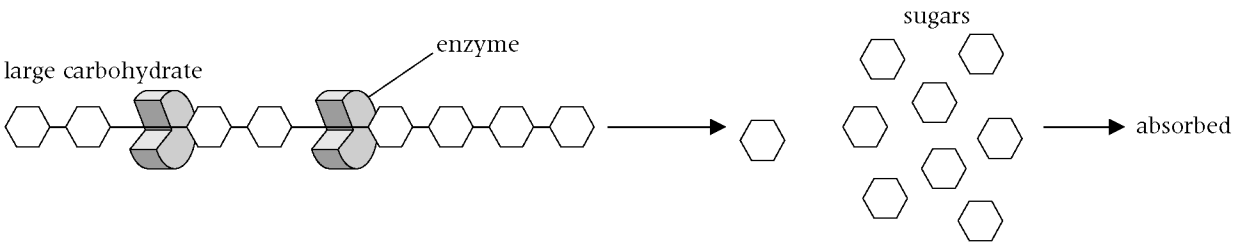
Substance needed	Examples	Why it's needed	Good sources
carbohydrate	starch, sugars	for respiration to release energy	pasta, bread, potatoes
protein		for growth and repair	meat, beans, fish
Fats and oils	Olive oil Animal fat	For our immune system and healthy skin and hair	Nuts, meat, seeds, diary products
vitamins	vitamin C	for health	fruits and vegetables – oranges contain a lot vitamin C
minerals	calcium	for health	fruits, vegetables and dairy products – milk contains a lot of calcium
fibre		for health; helps to keep our intestines clean stop them getting blocked up (**constipation**)	wholemeal bread
water		for health; water is important **solvent** in the body	

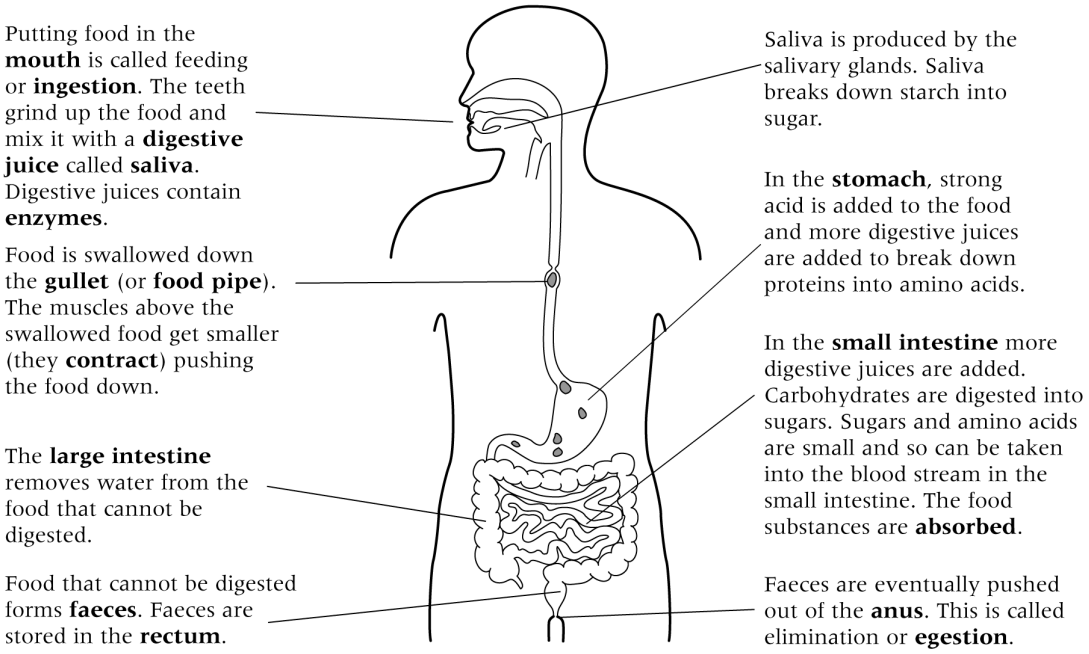
- We can do **tests** to find out which substances are in foods. For example, **starch** makes iodine solution go a blue–black colour. If a food contains **fats** it leaves a greasy mark when rubbed on paper. **Sugars** can be tested by adding Benedict's solution. If this goes green/yellow/red then glucose is present.
- **Nutrition information** labels on foods tell us what the food contains. The labels also tell us how much chemical energy is stored in the food. The amount of energy is measured in **kilojoules** (**kJ**).

- Eating too much of some foods can cause problems. Too much fat may cause **heart disease**.

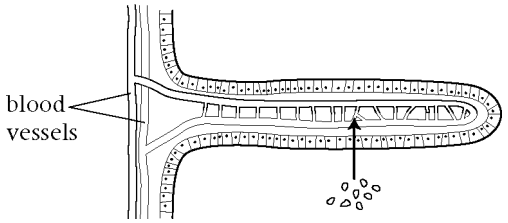
- To make use of the food, our bodies need to break it up into smaller sized molecules. This is called **digestion**. Digestion turns large **insoluble** substances into small **soluble** ones. The organs of the **digestive system** help us digest food.

- Many of them produce **enzymes** (chemicals that break up food).





To help absorb the digested food, the small intestine is covered with **villi**. These increase the surface area.



The digested food substances are carried around the body in the **blood**. The blood travels through **blood vessels**. **Arteries** carry blood away from the heart and **veins** carry blood towards the heart. The smallest blood vessels are **capillaries**. Substances enter and leave the blood through capillaries. Cells get the substances they need from the blood in capillaries.

Cells need food substances to:

- release energy
- make new substances.

Cells use a **chemical reaction** called **respiration** to release energy from a sugar called glucose.

Respiration

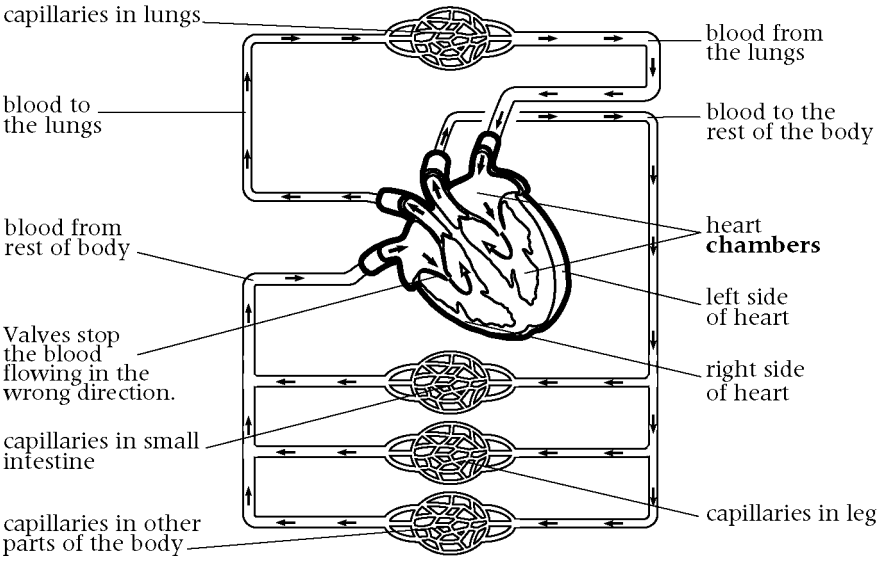
All living cells need to **respire** to release energy. Energy is needed by organisms to help them move, grow and make new substances to help them stay alive.

Respiration normally requires oxygen and so it is called **aerobic** (with air) **respiration**. It is a series of **chemical reactions** which can be summarised in a word **equation**:

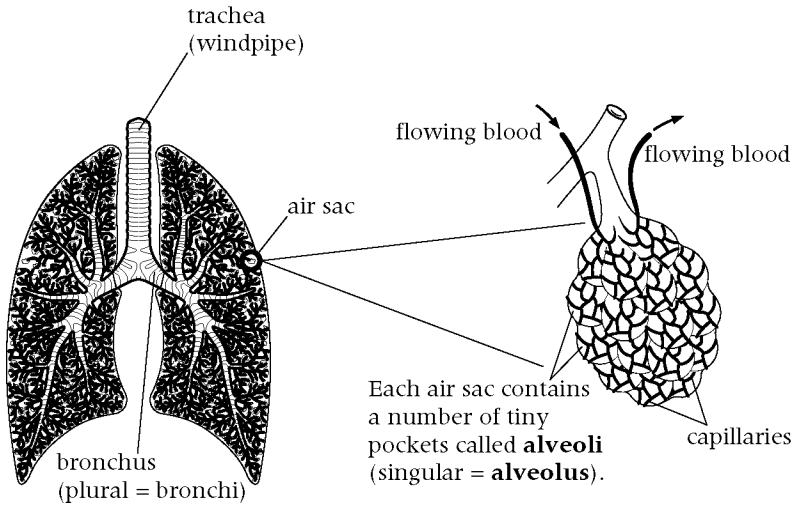
glucose + oxygen ⟶ carbon dioxide + water (+ energy)

Glucose and oxygen are the **reactants**. Carbon dioxide and water are the **products**. Energy is released but it is not a chemical substance so we can either miss it out of the equation or put it in brackets.

Glucose is supplied by the **digestion** of carbohydrates. It is carried around the body dissolved in the **plasma** of the blood. The blood travels through **blood vessels** and is pumped by the heart. The **heart** and the blood vessels form the **circulatory system**.

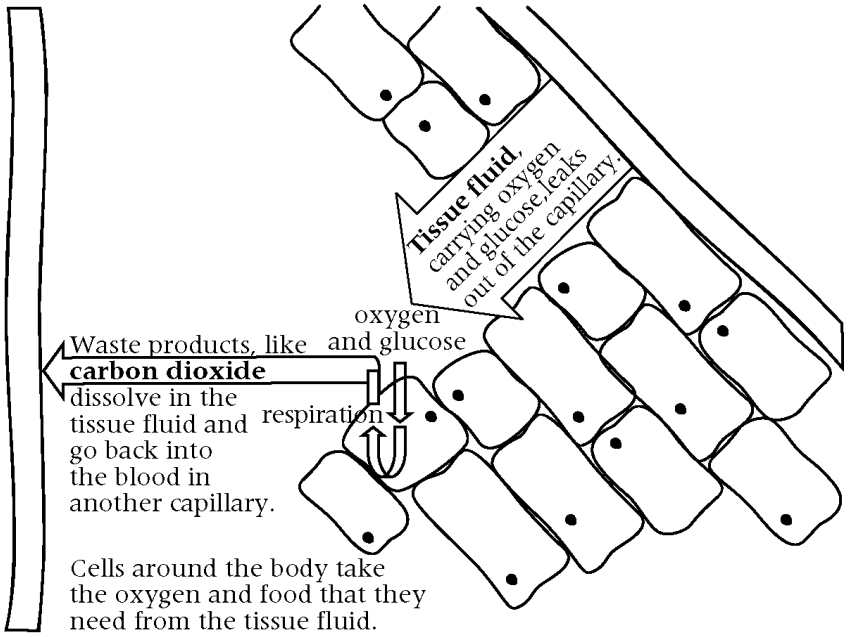


The oxygen is absorbed from the air by the **lungs**. The lungs are part of the **breathing system**.



The **alveoli** give the lungs a large surface area so that oxygen can quickly **diffuse** from the air inside the lungs into the blood contained in **capillaries**. The walls of the alveoli and the walls of the capillaries are only one cell thick which also makes it easy for oxygen to diffuse into the blood. The oxygen is carried by the **red blood cells**.

Tissue fluid comes out of other capillaries around the body and bathes the tissues in the body. Tissue fluid contains oxygen and glucose. The cells take the oxygen and glucose that they need from the tissue fluid and put the carbon dioxide that is produced back into the tissue fluid. The tissue fluid soaks back into other capillaries and the carbon dioxide dissolves in the blood plasma.



In the lungs the dissolved carbon dioxide diffuses out of the blood and into the air in the lungs. That is why we breathe out (**exhale**) more carbon dioxide than we breathe in (**inhale**). The carbon dioxide is **excreted** by the lungs. Carbon dioxide can be tested for by using limewater which turns from clear to cloudy. Oxygen diffusing into the blood and carbon dioxide diffusing out of the blood is called **gas exchange**.

Composition of inhaled and exhaled air.

	Inhaled air	**Exhaled air**
nitrogen gas	78%	78%
oxygen gas	21%	16%
carbon dioxide gas	0.03%	4%
water vapour	variable	more

When you exercise, your **breathing rate** (number of breaths in one minute) and your **pulse rate** (number of times your heart beats in one minute) increase. This is because your cells need more oxygen and glucose for respiration.

In some diseases or when there is little air (e.g. at the top of a mountain) the body cannot get enough oxygen. People in these situations often feel short of breath and tired. If too little oxygen gets to cells, the cells cannot release energy from food and so they die.

9SA 18c Respiration and Circulation Summary Cards

1 Label or cut out the statements and sort them into true and false sets.
2 Read the **true** statements and arrange them into a sensible order to produce two lists of summary statements. One list should be about **respiration** and the other about **circulation**.
3 Write out the statements onto **flash cards** or a **concept map**. This should help your **revision** notes.

Link the statements to the MYP concepts for this unit:

KEY CONCEPT – Systems

RELATED CONCEPTS – Interactions and Consequences

Capillaries are very small blood vessels.	Respiration produces glucose.
Respiration produces water.	Capillaries are very small electrical wires.
Blood flows backwards and forwards in the blood vessels.	Respiration uses carbon dioxide.
Substances are carried from the blood in capillaries to tissues in a liquid called tissue fluid.	Respiration takes place all the time.
Blood is pumped around the body by the heart.	Respiration releases energy.
Anaerobic respiration uses oxygen.	Respiration uses glucose.
Veins carry blood back to the heart from the body.	Cells die when someone gets frostbite. Frostbite is caused by too little oxygen reaching the cells.
Arteries carry blood back to the heart from the body.	Respiration uses water.
Carbon dioxide is carried around the body attached to white blood cells.	Respiration uses up energy.
Anaerobic respiration means respiring without oxygen.	Respiration produces carbon dioxide.
Glucose is transported around the body in paper bags.	Respiration uses oxygen.
Oxygen is transported around the body by red blood cells.	Respiration occurs in all living cells.
The left side of the heart pumps blood to the lungs.	Capillaries have very thick walls.
Glucose is transported around the body dissolved in the plasma.	Carbon dioxide is carried around the body dissolved in the blood plasma.
The left side of the heart is bigger than the right because it pumps blood around the body.	Respiration produces oxygen.
Cells die if they don't get enough oxygen.	Respiration occurs only in plant cells.

9SA 18: Practice Questions

Q1. Carbohydrate, fat and protein are three types of nutrient.

(a) Give the names of **two** other types of nutrient needed for a balanced diet.

1. .....
2. .....

2 marks

A balanced diet contains a variety of foods. Some food groups are shown in the table. They are labelled A to D.

			percentage of each substance in the dry mass	
food group	**example**	**carbohydrate %**	**fat %**	**protein %**
A meat and fish	liver	5	23	72
	beef	2	45	53
	cod	21	26	53
B dairy products	milk	42	33	25
	ice-cream	55	34	11
	yoghurt	68	11	21
C nuts	peanuts	9	58	33
	almonds	5	68	27
	coconut	8	83	9
D cereals and vegetables	wheat	84	2	14
	corn	86	3	11
	potatoes	90	1	9

(b) Which food group contains the highest percentage of the nutrient used by the body for growth and repair?

Tick the correct box.

A ☐ B ☐ C ☐ D ☐

1 mark

(c) Fibre is not digested but helps the digestion process.
Which food group contains the most fibre?

Tick the correct box.

A ☐ B ☐ C ☐ D ☐

1 mark

(d) Use the information in the table to suggest why milk is better for babies than ice-cream.

.....

..... 1 mark

(e) 100 g of dried coconut has more energy stored in it than an equal mass of dried potato.

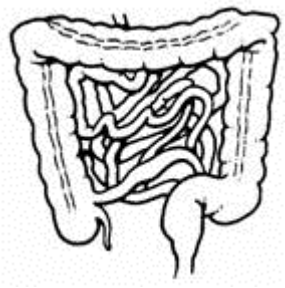
Give the reason for this.

.....

.....

1 mark
Maximum 6 marks

Q2. The drawing shows part of an organ system.



(a) Which organ system is it part of?

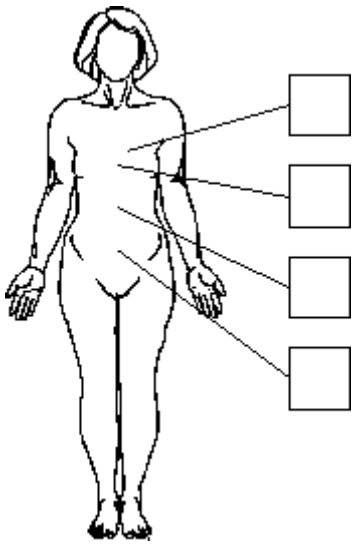
Tick the correct box.

circulatory system	☐	reproductive system	☐
digestive system	☐	respiratory system	☐

1 mark

(b) Where is this part of the organ system found in the body?

Tick **one** box.



1 mark
Maximum 2 marks

Q3. The information below was taken from the label of a can of baked beans in tomato sauce.

nutritional information		list of ingredients
100g provides:		
energy	406 kJ	haricot beans, tomato purée, water, sugar, modified starch, salt, paprika, onion powder, herb extracts, spices
protein	5.4 g	
total carbohydrate	17.6 g	
sugar	6.0 g	
fat	0.4 g	
fibre	3.7 g	

(a) A healthy diet contains a number of groups of substances. The nutritional information lists some of these.

Give **one** group of substances, needed for a healthy diet, which is missing from the nutritional information.

.....

1 mark

(b) (i) Which food, shown in the list of ingredients, provides the most protein in this can?

.....

1 mark

(ii) Give **one** reason why we need protein in our diet.

.....

1 mark

(c) (i) Name **one** food, shown in the list of ingredients, which provides fibre.

.....

1 mark

(ii) Why is fibre needed for a balanced diet?

.....

.....

1 mark
Maximum 5 marks

Q4. The following are important parts of a balanced diet.

carbohydrates
proteins
fats
vitamins
water

A pupil has a sweet, juicy orange to eat.

(a) Complete the following sentences using words from the list above.

(i) An orange is a good source of

..... and .....

2 marks

(ii) An orange is a poor source of

..... and .....

2 marks

(b) Give the names of **two** parts of a balanced diet which are **not** shown in the list above.

1. .....

2. .....

s

(c) In order to obtain the nutrients, food must be chewed Give **two** reasons why it is important to chew food.

1. .....

.....

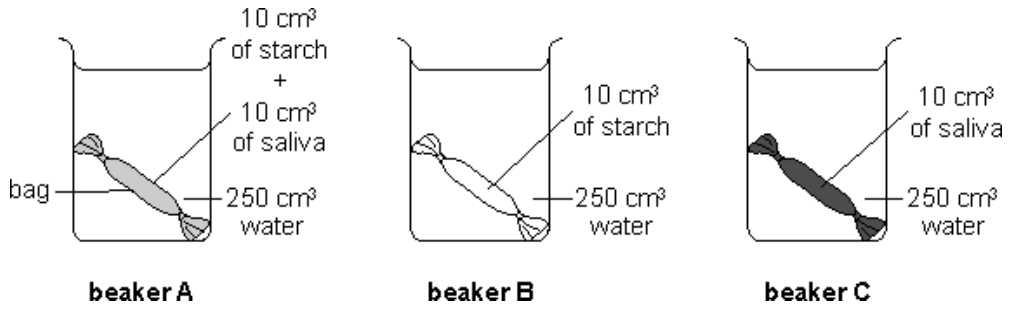
2. .....

.....

1 marks
Maximum 8 marks

Q5. Sally investigated how the human body digests and absorbs starch. She used saliva to digest the starch.

To model digestion she used special bags made from a semi-permeable membrane. These bags have lots of very small holes. Sally sets up the equipment as shown below. There is one special bag in each beaker.



She keeps the water in the beakers at 37ºC.
After 20 minutes, Sally tested the contents of each beaker and bag for starch and sugar.
The table below shows Sally's results.

	Was starch found in the bag?	Was sugar found in the bag?	Was starch found in the water?	Was sugar found in the water?
beaker A	✓	✓	✗	✓
beaker B	✓	✗	✗	✗
beaker C	✗	✗	✗	✗

(a) Suggest why Sally kept the water at 37ºC.

.....

1 mark

(b) (i) Explain why sugar was found in the bag in beaker A.

.....

1 mark

(ii) Starch was **not** found in the **water** outside the bag in any beaker. Suggest why.

.....

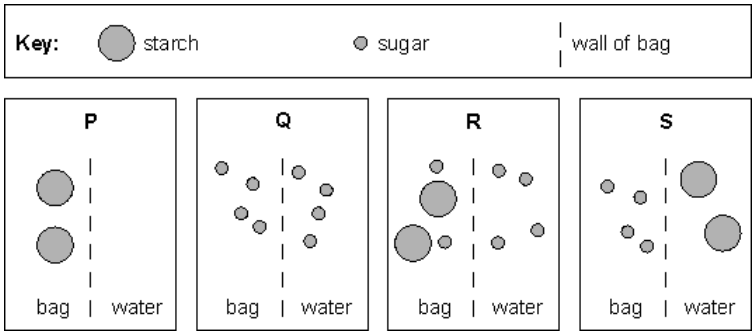
1 mark

(c) Why did Sally set up beaker C? Tick the correct box.

for a fair test	☐	for accuracy	☐
for reliability	☐	for a control	☐

1 mark

(d) Sally used diagrams to show what happened in her investigation.



Use the diagrams above to answer the following questions.

(i) Which diagram shows the **results** of beaker **B**? Write the letter.

.....

1 mark

(ii) Which diagram shows the **results** of beaker **A**? Write the letter.

.....

1 mark

(e) What does saliva contain that causes starch to change in beaker A?

.....

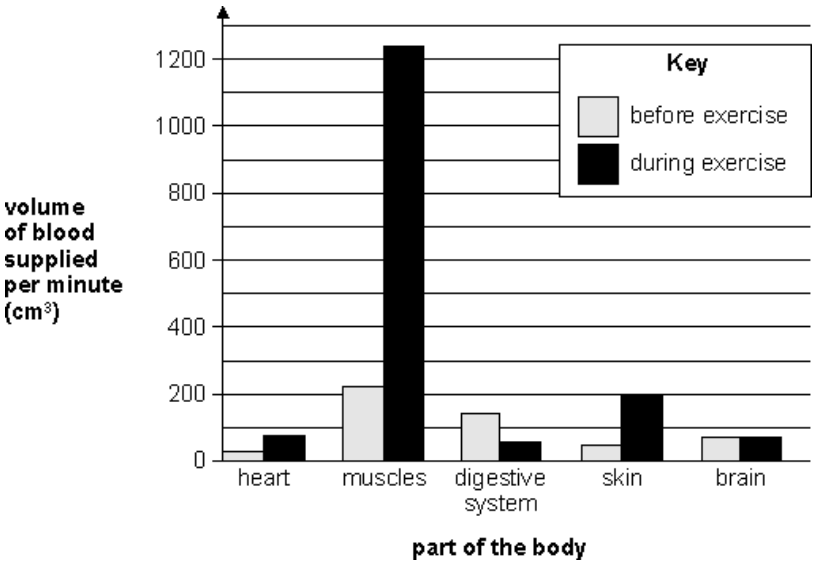
1 mark

(f) Sally chewed a piece of bread for 5 minutes without swallowing.
What would she notice about the taste of the bread after chewing for 5 minutes?
Use Sally's results to help you.

.....

1 mark
maximum 8 marks

Q6. When people exercise, the volume of blood per minute needed to supply different parts of the body changes. This is shown in the bar chart below.



(a) Explain why muscles need **more** blood during exercise. Give **three** reasons.

.....

.....

.....

.....

.....

3 marks

(b) Look at the bar chart.
Suggest why you should not go for a long run just after eating a meal.

.....

.....

1 mark

(c) Why is it important that the blood supply to the brain stays constant?

.....

.....

1 mark
maximum 5 marks

Q7. In 2007, a new law came in to stop people smoking in public buildings.

(a) Smoking can be very harmful.
Which three problems can be caused by smoking? Tick the **three** correct boxes.

being out of breath easily	☐	lung cancer	☐
being overweight	☐	food poisoning	☐
heart disease	☐		

2 marks

(b) Some scientists investigate 'passive smoking'. Passive smoking is when people breathe in smoke from other people's cigarettes.
They checked the health of three groups of people.

group A	group B	group C
non-smokers who spend **no** time in smoky places	**non-smokers** who spend time in smoky places	**smokers** who spend time in smoky places

(i) Which group of people breathe in the **least** cigarette smoke?
Tick the correct box.

group A ☐ group B ☐ group C ☐

1 mark

(ii) Which **two** groups will help scientists find out the effects of passive smoking?
Tick the **two** correct boxes.

group A ☐ group B ☐ group C ☐

1 mark

(c) People in **group B** are likely to have similar health problems to people in **group C.**
Explain why.

.....

.....

1 mark

(d) Four scientists investigated passive smoking. The table below shows the number of people each scientist studied from each group.

scientist	group A	group B	group C
David	289	3	18
Olga	8	6	11
Peter	402	399	403
Mary	15	210	511

Which scientist is likely to get the most reliable results?
Tick the correct box.

David ☐ Olga ☐

Peter ☐ Mary ☐

1 mark
maximum 6 marks

Q8. The word equation below represents a process taking place in the cells of the human body.

glucose + oxygen → carbon dioxide + water

(i) What process does this word equation represent?

.....

1 mark

(ii) As a result of this process, the proportions of oxygen and carbon dioxide in air breathed in and air breathed out change.

Which **one** of the statements below is true? Tick the correct box.

Air breathed out has less carbon dioxide and more oxygen than air breathed in. ☐

Air breathed out has less carbon dioxide and less oxygen than air breathed in. ☐

Air breathed out has more carbon dioxide and less oxygen than air breathed in. ☐

Air breathed out has more carbon dioxide and more oxygen than air breathed in. ☐

1 mark
maximum 2 marks

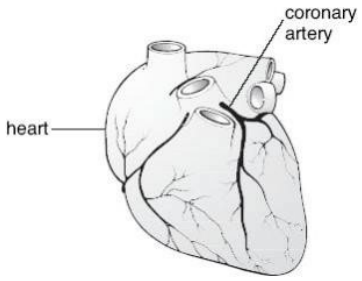
Q9. (a) Carbon monoxide, nicotine and tar get into the lungs when a person smokes.

Draw a line from each substance to the effect of the substance on the body.
Draw only **three** lines.

substance	effect of the substance
carbon monoxide	causes addiction to smoking
nicotine	causes influenza (flu)
tar	causes lung cancer
	causes red blood cells to carry less oxygen

3 marks

(b) The coronary arteries carry blood to the heart muscle.
The drawing below shows the heart and coronary arteries.



(i) Diagram 1 shows a section through a coronary artery.

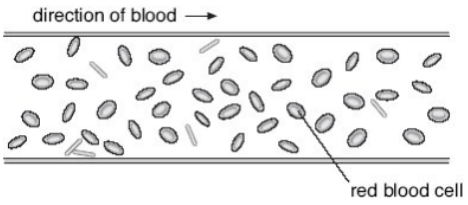


diagram 1

Smoking can cause damage to the coronary artery.
Diagram 2 shows a section through part of a damaged artery.

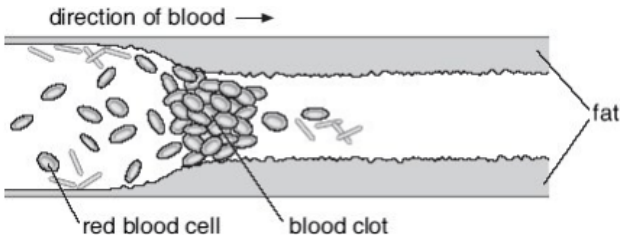


diagram 2

not to scale

Look at diagram 2. A blood clot has formed.

Give **one** other change in the coronary artery.

.....

.....

1 mark

(ii) Respiration takes place in the muscle cells of the heart.

Explain why a blood clot in the coronary artery prevents these cells respiring normally.

.....

.....

.....

.....

2 marks
maximum 6 marks

Q10. Read the magazine cutting about research into heart disease.

> **More heart disease in older women.**
> Heart disease amongst British women in the 60-79 age group is more common than previous research suggested. A recent study of 4,286 British women in that age group indicated that one in five showed signs of heart disease.

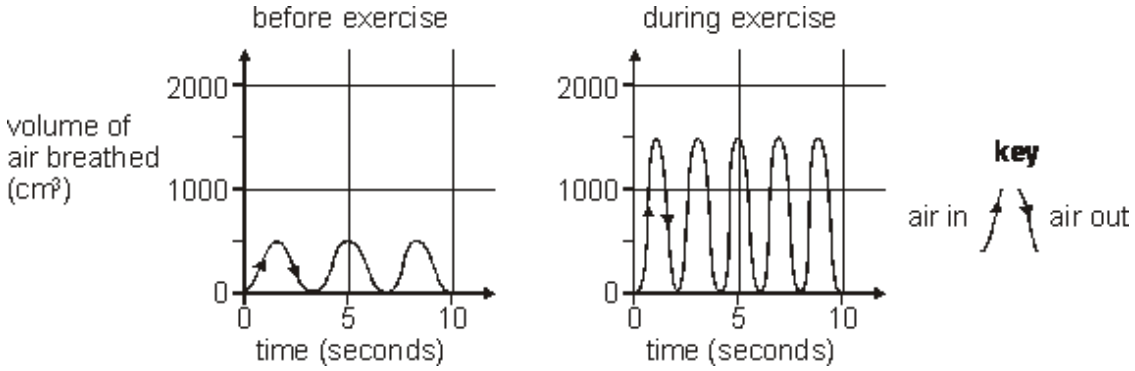
After reading the magazine cutting, pupils wrote the ideas below. Decide if each idea is supported by information in the cutting. Tick the correct box. Use the information in the cutting as evidence to justify your decision in the third column.

Idea	Is the idea supported by evidence? Tick the correct box.		Use the information in the magazine cutting as evidence to justify your decision
One in five of all British females show signs of heart disease.	Yes ☐	No ☐	
Earlier treatment for heart disease must have been more effective than modern medicines.	Yes ☐	No ☐	
Four out of five British women in the 60-79 age group showed no signs of heart disease.	Yes ☐	No ☐	

maximum 3 marks

Q11. Joanne measured the volume of air she breathed in and out of her lungs. She used the machine shown in the photograph below.

The graphs represent the volume of air Joanne breathed in and out with each breath **before** and **during** exercise.



(a) During exercise Joanne breathed more air in and out of her lungs than before exercising.

(i) How much **more** air did Joanne breathe in with each breath during exercise?

.....cm³

1 mark

(ii) Explain fully why Joanne needed to breathe in more air during exercise.

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3 marks

(b) (i) As Joanne exercised, the volume of air she breathed in and out increased.
Give **one** other way Joanne's breathing changed during exercise.

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1 mark

(ii) How does the graph show this other change?

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1 mark
maximum 6 marks