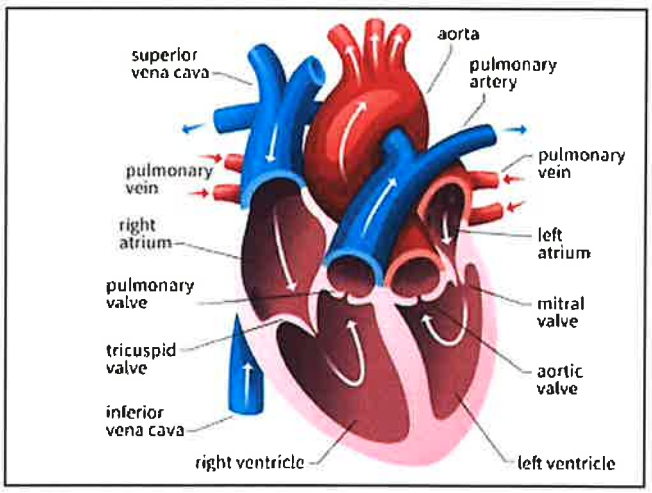
Name:	Form:

MYP 2
Year 8 IDU
Science and PHE

Heart and Lungs

Statement of Inquiry:	The **connections** between human body systems have **consequences** for **personal** physical wellbeing and **movement**.
Key Concept:	Connections
Related Concepts:	Consequences and Movement



8C MYP Command Terms

Term	Definition
Analyse	Break down in order to bring out the essential elements or structure. To identify parts and relationships, and to interpret information to reach conclusions.
Apply	Use knowledge and understanding in response to a given situation or real circumstances
Describe	Give a detailed account or picture of a situation, event, pattern or process
Design	Produce a plan, simulation or model
Discuss	Offer a considered and balanced review that includes a range of arguments, factors or hypotheses. Opinions or conclusions should be presented clearly and supported by appropriate evidence
Document	Credit sources of information used by referencing (or citing), following one recognized referencing system. References should be included in the text and also at the end of the piece of work in a reference list or bibliography
Evaluate	Make an appraisal by weighing up the strengths and limitations
Explain	Give a detailed account
Formulate	Express precisely and systematically the relevant concept(s) or argument(s)
Interpret	Use knowledge and understanding to recognize trends and draw conclusions from given information
Outline	Give a brief account
Present	Offer for display, observation, examination or consideration
Recall	Remember or recognize from prior learning experiences
Select	Choose from a list or group
Solve	Obtain the answer(s) using appropriate methods
State	Give a specific name, value or other brief answer without explanation or calculation
Suggest	Propose a solution, hypothesis or other possible answer
Summarize	Abstract a general theme or major point(s)

Glossary: Heart and Lungs

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).

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.

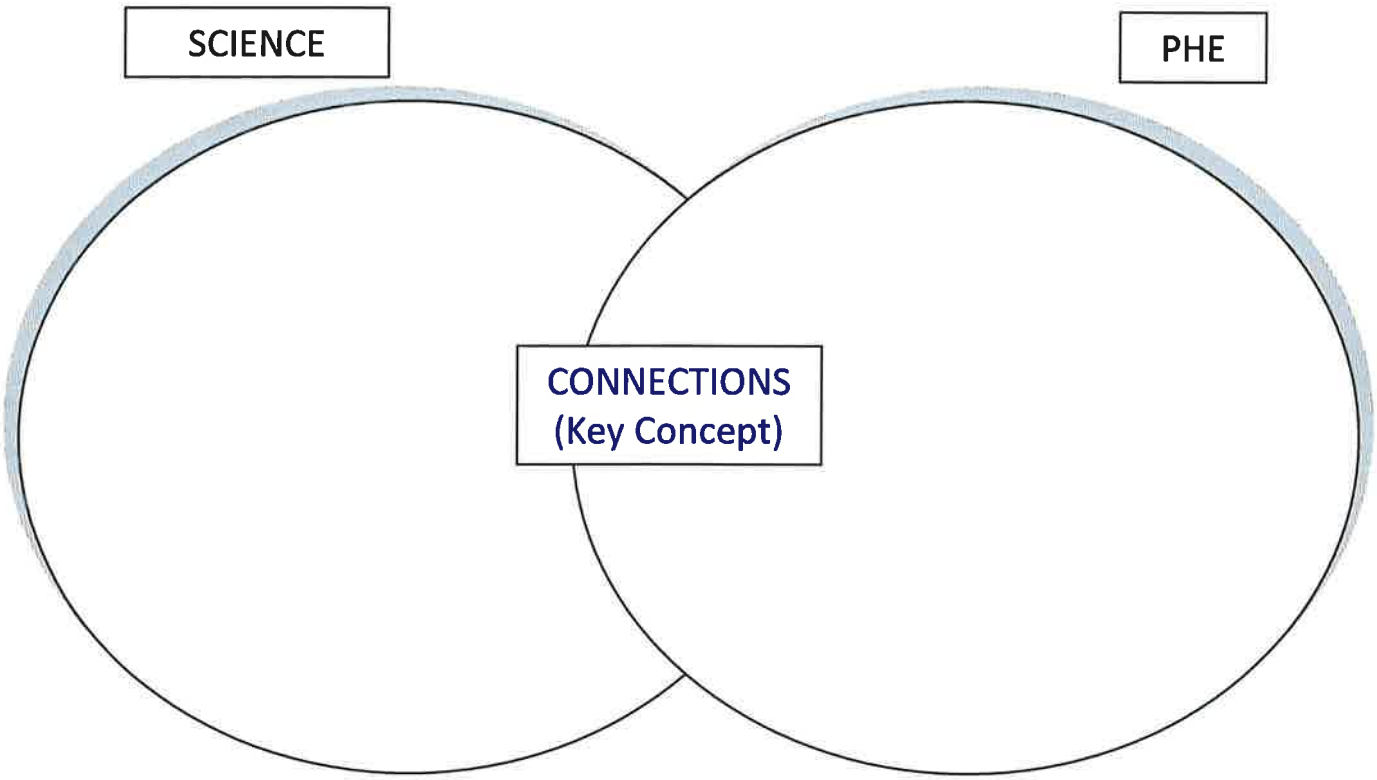
fibre	Substance found in food which cannot be used by the body. It helps to keep our intestines clean.
gullet	Tube that goes from the mouth to the stomach. Sometimes called the 'food pipe' but properly called the oesophagus.
gut	All the organs of the digestive system apart from the mouth.
ingestion	Putting 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.

absorbed	When soluble substances go through the wall of the small intestine into the blood.
amylase	An enzyme found in saliva that breaks starch down into sugar.
aerobic respiration	Process that releases energy from digested food. Needs oxygen from the air. Carbon dioxide is produced as a waste gas.
glucose	A type of sugar.
product	New chemical formed in a chemical reaction.
reactant	Chemical that is used up in a chemical reaction.
respiration	Process that uses up oxygen to release energy from food. Carbon dioxide is produced as a waste gas.
word equation	A way of writing out what happens in a chemical reaction.
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.
blood	Contains cells and a liquid called plasma. It flows around the body carrying various substances which are either made by the body or needed by the body.
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 connects the windpipe to the air sacs. Plural = bronchi.
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.

digestive system	The group of organs that carry out digestion.
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.
mucus	Slimy substance which traps dirt and microbes and is moved out of the lungs by cilia.
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.

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.

8 IDU 1a Making Connections



Inquiry Questions:

Factual

What is the structure and function of the circulatory system?
What is the structure and function of the respiratory system?
What are the essential nutrients for a balanced diet?
What are the short and long term effects of exercise on the body systems?
How do organisms have energy for life functions?

Conceptual

How do body systems adapt to changing training methods?
How does a circuit plan address areas of cardio & muscular strength, and endurance?

Debatable

To what extent do global governments promote health and fitness?
To what extent does a health and nutrition address physical wellness?

8 IDU 1b Exercise and Nutrition Journal

Task Instructions:

Design a journal template to record your exercise and nutrition over a one-week period of time.

This journal is personal to you and will only be shared with your fellow students if you are comfortable doing so.

Be as honest as possible. We will revisit this exercise and nutrition journal periodically over the course of the IDU and see if your awareness of nutrition and its impact on your health and body systems has increased.

A simple design template that can be used and altered is shown below to assist you.

Journal Entry Date: _____

Day of the Week	Exercise Record	Nutrition Record

8 IDU 2a 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 _____

We also need to eat_____and drink_____.

BLOGGS CRUNCHY BAR

NUTRITION INFORMATION

		Per 100g	Per 25g bar			Per 100 g	Per 25g 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.

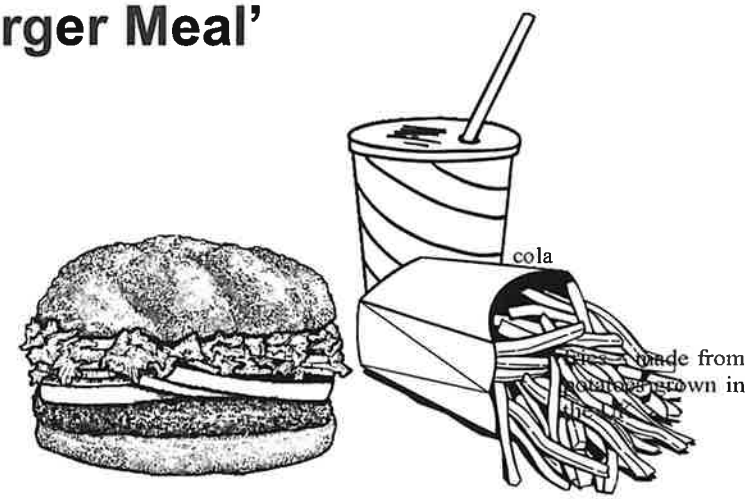
d Name one mineral shown on the label. _____

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

8 IDU 2b '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 that might be found in each part of the Big Burger meal and say why the body needs it.

a Bread roll Food substance: _____

Why the body needs it: _____

b Beef Food substance: _____

Why the body needs it: _____

c. Tomato Food substance: _____

Why the body needs it: _____

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

b What does the body use this for? _____

3 a 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. _____

_____

8 IDU 2c Testing for Starch and Fats

The test for starch (a carbohydrate)

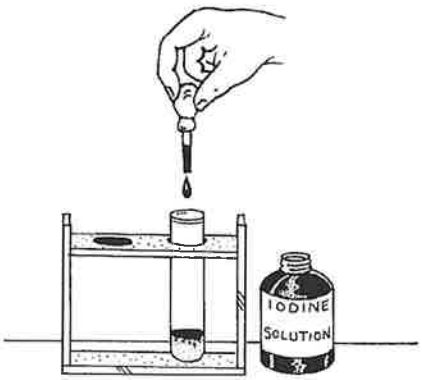
Apparatus

- **Food samples**
- **Pipette**
- **Water**
- **Iodine solution**
- **Spotting tile**
- **Test tubes and stoppers**

Iodine will stain your skin.

Method

1. Take a small sample of your food. If it is not a powder, go to step 4. If it is a powder, add it and an equal volume of water to a test tube.
2. Put the stopper in the test tube and shake for 10 seconds.
3. Put five drops in a well on a spotting tile.
4. Use a pipette to add two drops of iodine solution. If a **blue–black** colour appears, starch is present.



The test for fat

Apparatus

- **Food samples**
- **Piece of plain paper**

Method

1. Take a sample of your food and rub it into the paper for 20 seconds.
2. Carefully remove the food from the paper.
3. Hold the paper up to the light. If you can see a **permanent greasy mark**, fat is present.

Recording your results
Fill in this table to show your results.

Name of food	Did it contain starch?	Did it contain fat?

Considering your results/conclusions
How did you know if a food contained starch? _____

_____

_____

How did you know if a food contained fat? _____

_____

_____

Can you tell if some foods contain more starch than others?

_____

Which food contains a small amount of starch?

_____

Which of your foods contained the most starch? _____

Look up the amounts of starch (carbohydrate) in the foods that you tested. Does your answer above match the information that you have found?

_____

8 IDU 2d Testing for Sugars

Note: This can be done as a demo if required.

Testing for glucose

Apparatus

- **Bunsen burner**
- **Boiling tube**
- **Tripod**
- **Pipette**
- **Heatproof mat**
- **Benedict's solution**
- **Pestle and mortar**
- **Food sample(s)**
- **Gauze**
- **Eye protection**

Wear eye protection.

Method

1 Using a pestle and mortar, mash a small sample of food with an equal volume of water.

2 Pour the mashed food into a boiling tube.

3 Add 10 drops of Benedict's solution.

4 Place the boiling tube into a beaker of water. Heat the beaker until it boils.

5 Green, yellow and red colours indicate the presence of glucose.

Results for Glucose testing

Food	Observation	Conclusion
Bread		
Iceberg Lettuce		
Potato		
Apple juice		

*Testing for sucrose – **DO THIS AS A DEMO***

Apparatus

- **All the apparatus you needed for testing glucose (see above)**
- **Dilute hydrochloric acid**
- **Sodium hydrogen carbonate solution**
- **Eye protection**

Wear eye protection.

Method

1 Using a pestle and mortar, mash a small sample of food with an equal volume of water.

2 Pour the mashed food into a test tube and add about half a volume of dilute hydrochloric acid.

3 Place in a beaker of water and boil for 10 minutes.

4 Allow the tube to cool down for 5 minutes.

5 Add half a volume of sodium hydrogen carbonate solution. Then follow steps 3–5 from the Glucose testing experiment above. Record results in table below.

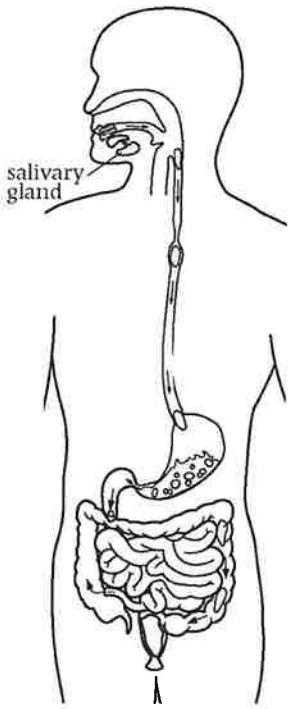
Results for Sucrose testing

Food	Observation	Conclusion
Bread		
Iceberg Lettuce		
Potato		
Apple juice		

8 IDU 3a The Digestive System

1 Label the parts of the digestive system on the diagram. Use a ruler to draw straight lines and these letters as your labels:

A - the large intestine (colon)
B - the small intestine
C – the rectum
D – the stomach
E - the gullet (esophagus)
F – the mouth
G - the anus



2 Match the function below to the structure named in question 1.

a Food is physically digested and mixed with saliva here _____

b This is where most of the digested food is absorbed _____

c Faeces is eliminated (egested) here. _____

d Muscle contractions move food along here to the stomach _____

e Water is absorbed here. _____

f This structure produces acid and digests proteins _____

g Undigested food is temporarily stored here _____

3 Enzymes are chemicals that break up large molecules into smaller ones. There are enzymes in the small intestine. Explain why these are needed here.

_____

_____

8 IDU 3b Process of Digestion

1 Complete the sentences using the words in the box.

absorbed	**anus**	**enzymes**	**intestine**
juices	**mouth**	**insoluble**	**soluble**

Digestion makes _____ substances into _____ ones.

This process starts in the _____ . During digestion, digestive

_____ are added to the food. These contain _____

which are special chemicals that can break the bonds in the larger food molecules.

When all the food that can be digested has been broken down, it is _____

by the small _____ . Food material like fibre that cannot be broken down

is passed out of the body through the _____.

2 For each of the structures below, say what it does to help with digestion:

The stomach: _____

_____

Teeth: _____

_____

3 Some food cannot be digested. This is called **fibre**. Write the names of the organs listed in the box in the order that a piece of fibre would go through them.

i _____ **ii** _____ **iii** _____

iv _____ **v** _____ **vi** _____

vii _____

anus	**gullet**	**large intestine**	**mouth**	**rectum**
		small intestine	**stomach**	

8 IDU 3c Modelling the Small Intestine

It is very difficult to do practical work with a real small intestine but we can make a model of how it works. Visking tubing can be used. This has microscopic holes in it that are too small to see.

Apparatus

- **Visking tubing**
- **Starch solution**
- **Warm and hot water baths**
- **Two syringes**
- **Benedict's solution**
- **Pipette**
- **Safety goggles**
- **Elastic band**
- **Digestive juice solution (amylase)**
- **Boiling tube**
- **Iodine solution**
- **Beaker**
- **Two test tubes**

Wear eye protection.

Method

1 Take some Visking tubing and tie a knot in one end. Using a syringe, carefully add 5 cm^3 of starch solution to the tubing.

2 Using the other syringe, add 1 cm^3 of the digestive juice solution.

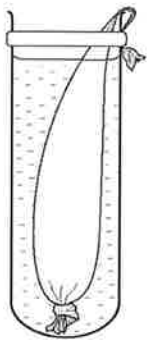
3 Holding the top of the tubing, wash the outside of it under a tap (to clean off any starch that may have been spilt).

4 Place the tubing inside a boiling tube of distilled water and leave the boiling tube in a warm water bath for 20 minutes.

5 Label the diagram below including the substances you have added.

6 Whilst you are waiting, add 1 cm^3 of the original starch solution into a test tube and test using iodine solution.

7 Take a second test tube, add another 1 cm^3 of starch solution and test using Benedict's solution.



8 After 20 minutes in the warm water bath, take out your boiling tube and test the water outside the tubing for starch and then for glucose.

Recording your results

1 What does iodine solution test for?

2 What happened to the starch solution when you added iodine solution?

3 What does Benedict's solution test for?

4 What happened to the starch solution when you added the Benedict's solution?

5 What did you find when you tested the water outside the visking tubing for starch and glucose?

Considering your results/conclusions

1 What do the following things represent in your model small intestine?

a the visking tubing:

b the mixture inside the visking tubing:

c the water outside the visking tubing:

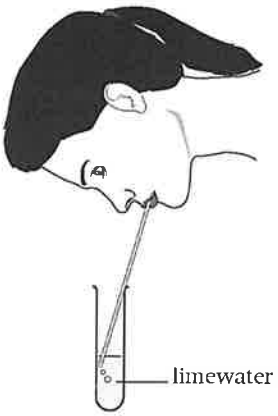
2 Name one way in which this model is not like a real small intestine.

3 Why do you think the boiling tube was put into a warm water bath?

4 Write a conclusion for this experiment.

8 IDU 4a Testing for Carbon Dioxide Gas

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



If I blow into limewater it will change from

_____ (clear/cloudy) to

_____ (clear/cloudy). This shows that

I breathe out the gas _____

(oxygen/carbon dioxide).

normal air – pink

exhaled air – yellow

air containing less carbon dioxide than normal air – purple

These tubes all contain hydrogen-carbonate indicator.

Hydrogen-carbonate indicator 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)

8 IDU 4b Signs of Life

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

Glucose + Oxygen → Carbon dioxide + water

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?

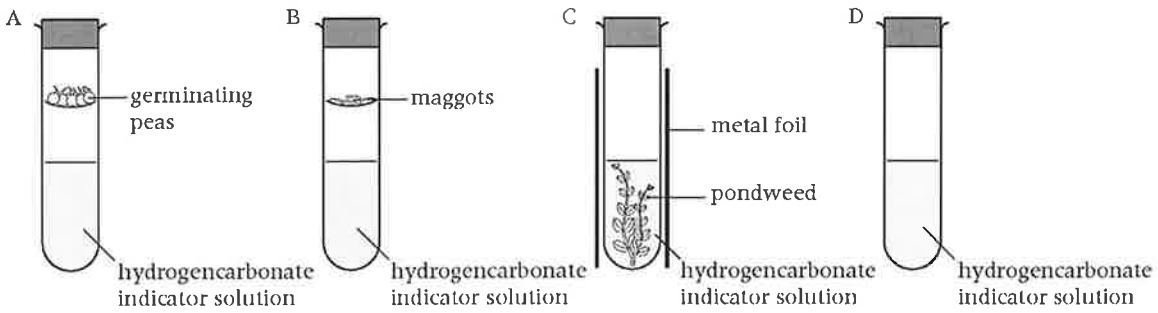
_____

_____

Hydrogen-carbonate indicator

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? _____

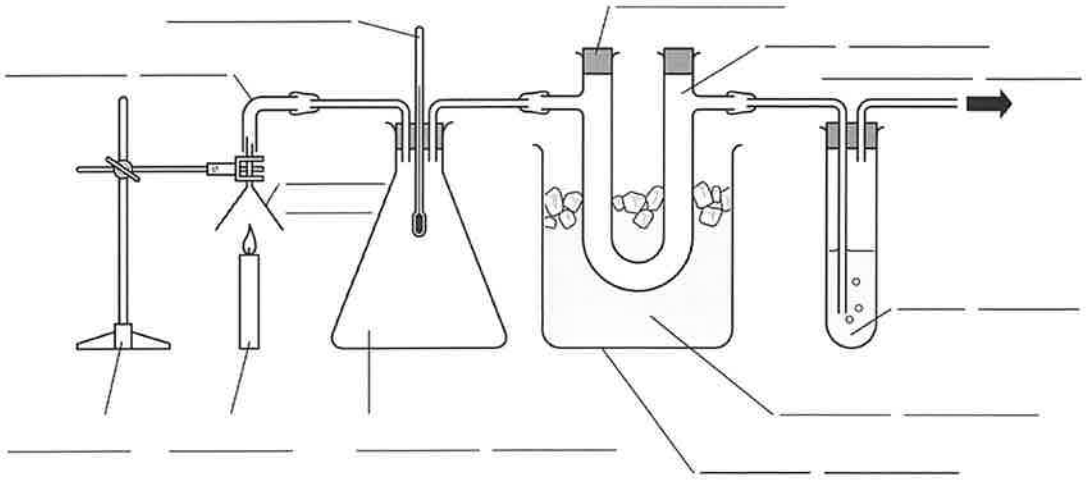
_____

8 IDU 4c Comparing Combustion and Respiration

What happens when a fuel burns? Is it similar to Respiration?

Your teacher will demonstrate the combustion of a fuel. Label the diagram using words from the list below.

delivery tube **bung** **funnel** **stand** **U-tube** **large beaker** **iced water** **boiling tube** **limewater** **thermometer** **candle** **conical flask**



Recording your results

Now write the results from the demonstration in the table below:

Observation	Before experiment	After experiment
Appearance of fuel		
Appearance of limewater		
Appearance of U-tube		
Temperature shown on thermometer (°C)		

How do you know that energy has been given off?

What gas was produced in this experiment, how do we know this?

Write the word equation for the reaction using Glucose as the fuel:

How does combustion compare to repiration?

8 IDU 4d Review – Breathing and Respiration

1 Use the words in the box to complete the sentences below. You may need to use some words more than once.

	blue	**carbon dioxide**	**cleaner**	**cloudy**	**cobalt chloride**	
energy	**glucose**	**thermal energy**	**limewater**	**lungs**	**oxygen**	**pink**
		respire	**warmer**	**water vapour**	**air**	

All organisms, animals and plants, _____ all the time.

Respiration releases _____ from food. In humans a lot of this energy is released as _____ to keep us warm.

The food substance used in respiration is called _____.

The other reactant in respiration is the gas _____.

The chemical products of respiration are _____ _____ and _____.

Breathing is the movement of air in and out of the _____.

You can show that you produce carbon dioxide by breathing out into _____.

It turns from clear to _____.

You can show that you breathe out water vapour using _____ _____ paper that turns from _____ to _____.

The air we breathe out contains more _____ _____ and less _____ than the air we breathe in.

It also contains _____ _____ and as well it is _____.

Explorers in the artic need a lot of energy because they lose a lot of energy warming the _____ that they have inhaled and exhaled.

8 IDU 5a Respiration Crossword

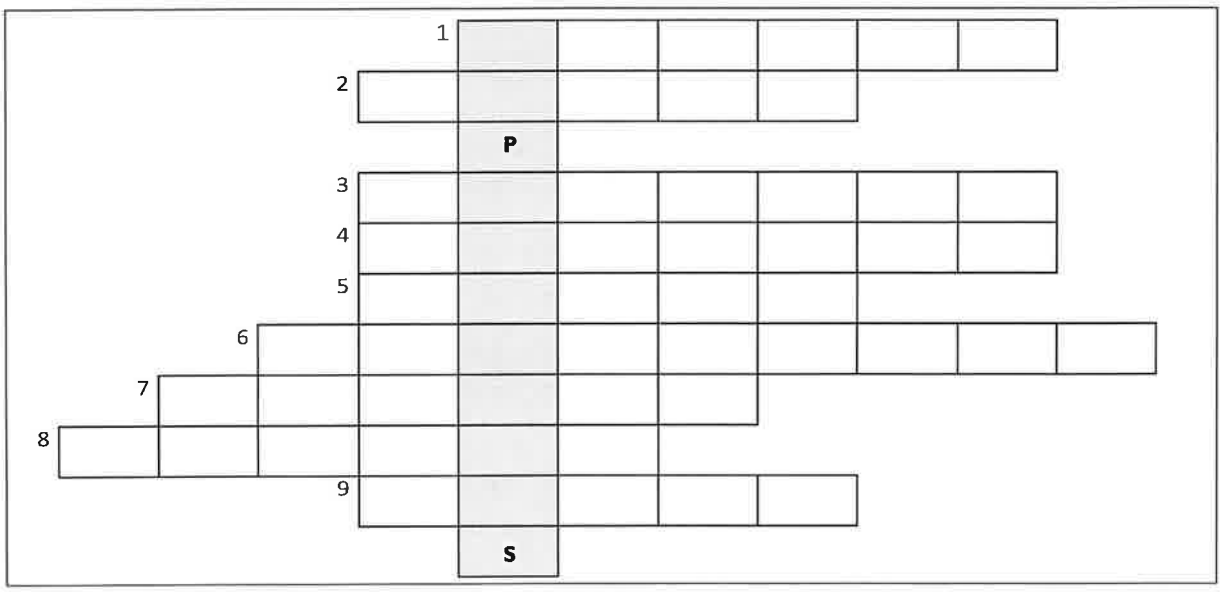
1 Fill in the missing words. Check you have the right answer by putting the words in the grid. The numbers in brackets show where the words go in the grid.

All the (9) ..... in your body need energy. Aerobic respiration is the process that combines glucose and oxygen to release energy. Food and oxygen are carried to the cells in the (5) .....

Aerobic respiration takes place when cells are getting plenty of oxygen. The word equation for aerobic respiration is:

(4) ..... + oxygen → (1) ..... (3) ..... + (2) ..... (+ (7 .....))

If there is not enough oxygen getting to the cells, (6) ..... respiration takes place. This produces (8) ..... acid as a waste product, which makes your muscles ache.



2 **a** Write down the word in the shaded squares .....

b Explain what these things are, and why they are important for respiration.

.....

.....

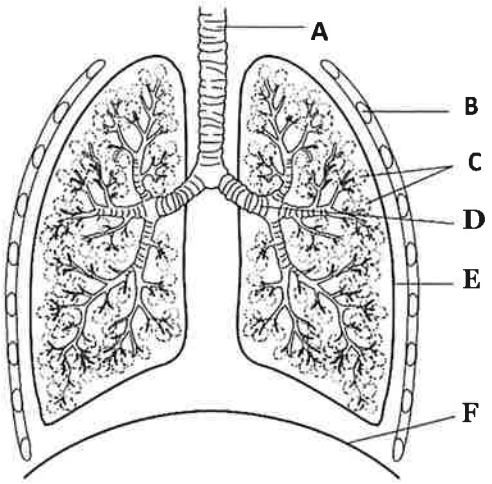
.....

.....

8 IDU 5b Breathing and Respiration

1 a Write down the letters **A–F**. Write the name of the part corresponding to each letter.

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



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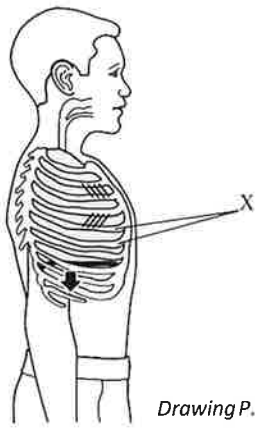
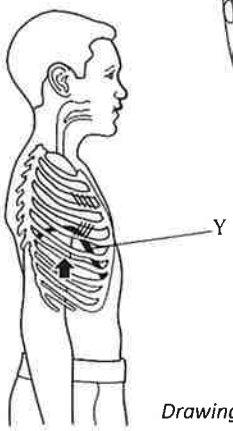


Drawing P.



Drawing Q.

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?

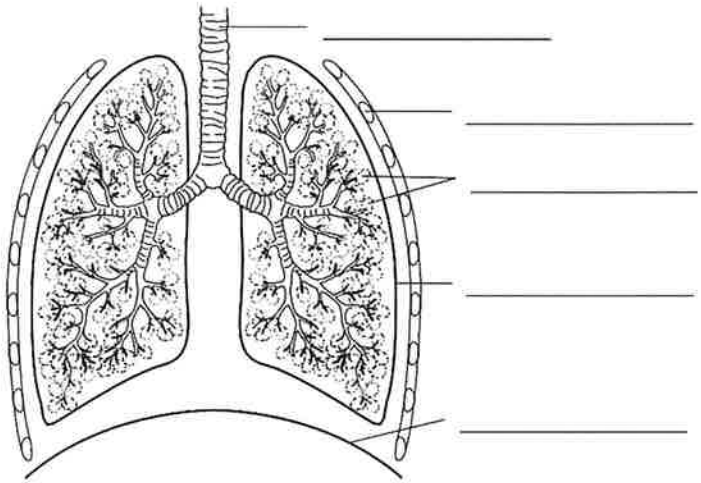
e Copy and complete the word equation for this process.

_____ + glucose ⟶ carbon dioxide + _____ (+ energy)

8 IDU 5c Breathing (Part 2)

1 Label the diagram with the following words.

air sacs
diaphragm
lung
rib
windpipe



This drawing shows the breathing system and some of the bones in the chest.

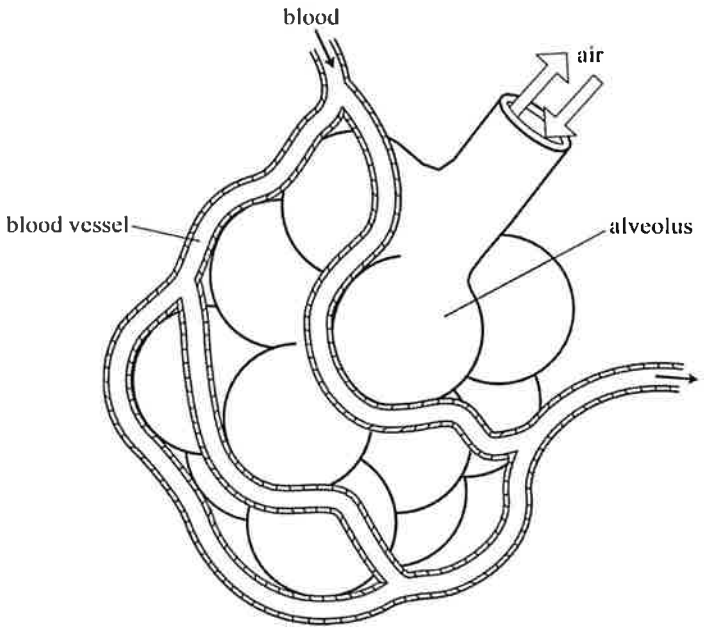
2 Fill in the missing words in these sentences, using the words in the box. You may need to use some words more than once.

	blood vessels	**carbon dioxide**		**exhaling**
heart	**inhaling**	**lungs**	**oxygen**	**respiration**

Breathing *in* is called_____. Air goes into the_____. A gas from the air called_____goes into the blood. A waste gas dissolved in the blood, called_____, goes into the lungs. Breathing *out* is called_____. When we do this, the waste gas goes into the air._____gas, from the air, is needed by the cells in the body for_____. The gas is carried by the blood. The _____ is an organ that pumps the blood. The blood travels around the body in tubes called_ _____.

8 IDU 5d Air Sacs in the Lungs

The diagram shows an air sac from a lung.



1 What sort of blood vessels are found surrounding air sacs? _____

2 **a** Draw some red blood cells on the diagram. Do not shade them in.

b Blood cells change colour slightly depending on how much oxygen they are carrying (they are bright red when carrying a lot of oxygen). Find two coloured pencils, one bright red and one dark red. In the correct areas, shade some of the red blood cells dark red and some of them bright red.

3 **a** On the diagram, draw a labelled arrow showing which direction oxygen particles are going.

b On the diagram, draw a labelled arrow showing which direction carbon dioxide particles are going.

c Your two arrows show a process that occurs in the lungs. What is the name of this process?

_____

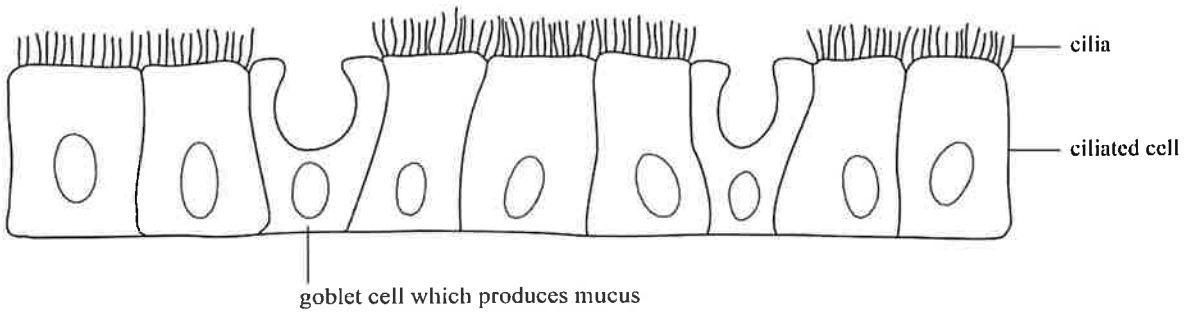
d In which part of the blood is carbon dioxide carried? _____

8 IDU 5e Lung Diseases

The breathing (or respiratory) system has various adaptations to prevent microbes, which might cause an infection, from entering the lungs.

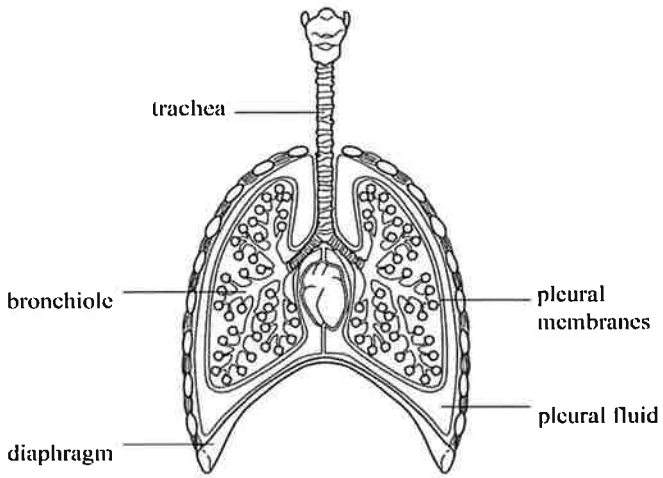
In the nose, hairs filter out dust, and microbes are trapped in a sticky fluid called **mucus**. We usually swallow the mucus or get rid of it by sneezing. The mucus also contains a chemical that kills microbes.

Once air enters the trachea and bronchi it passes over more mucus that is produced by special cells called **goblet cells**. This traps even more microbes. To prevent a build up of 'dirty' mucus in the air passages, which might cause an infection, there are tiny hairs called **cilia** lining the trachea and bronchi. These are constantly moving and they waft the mucus up and out of the lungs to the back of the throat where it is swallowed. If a large object is accidentally inhaled it is usually expelled quickly by coughing.



Despite these mechanisms we all suffer from infections of the respiratory system from time to time. Any part of the system can become infected. For example, **laryngitis** is when the **larynx**, or voice box, becomes swollen and inflamed. This is often associated with a loss of voice and sore throat. **Tracheitis** is inflammation of the trachea. **Bronchitis** is when the bronchial tubes become inflamed. This can make it difficult to breathe because these tubes are fairly narrow and any swelling will partially block them. All these infections are associated with an increased production of mucus that also blocks the airways. For this reason coughing is usually another symptom of a chest infection.

Surrounding each lung are two delicate membranes called the **pleural membranes**. One membrane lines the chest cavity and the other covers the lung. Between them is a fluid, which acts as a lubricant so that the lungs can move easily when you breathe in and out.



Adapted from Exploring Science for QCA

Pleurisy is an infection of the pleural membranes. They cannot slide over each other easily and this makes breathing very difficult and painful.

Many people today suffer from **asthma**. This is when the muscles in the walls of the tiny tubes, called bronchioles, contract making them become even narrower. This makes breathing difficult. Asthma sufferers must always carry an inhaler. This contains a drug that makes the muscles relax, so the tubes widen again.

Tuberculosis, or **TB**, is a very serious lung disease caused by a bacterium that destroys the lung tissue and causes fever and weight loss. TB used to kill many people. Nowadays it is rare because most people are **immunised** against it.

Lung cancer is a major killer disease today. It is when cells in part of the lung grow and divide uncontrollably. Eventually a large lump forms which blocks some of the airways. If it is left untreated it grows bigger and bigger making breathing more and more difficult. Some of the cancer cells may break off and get carried to other parts of the body where they can cause another cancer to form. This is called a secondary growth. People who smoke are at a much greater risk of developing lung cancer than non-smokers.

1 List the ways in which the body is adapted to prevent microbes from entering the lungs.

2 **a** What is the proper name for the voice box?

b What is an infection of the voice box called?

c What are the symptoms of this disease?

3 Why do you often cough when you have a chest infection?

4 Describe what pleurisy is.

5 **a** Why do asthma sufferers find it hard to breathe?

b How do inhalers help them to breathe?

6 **a** Why is it rare for someone to catch tuberculosis today?

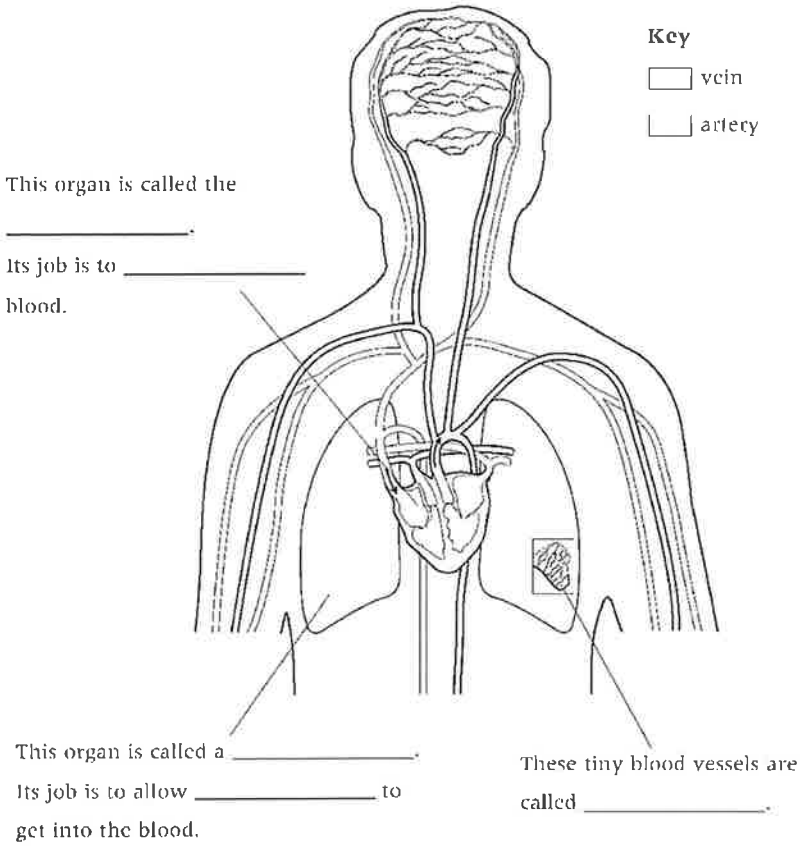
b Find out what tuberculosis used to be called.

7 Describe what happens when lung cancer develops.

8 IDU 6a 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?

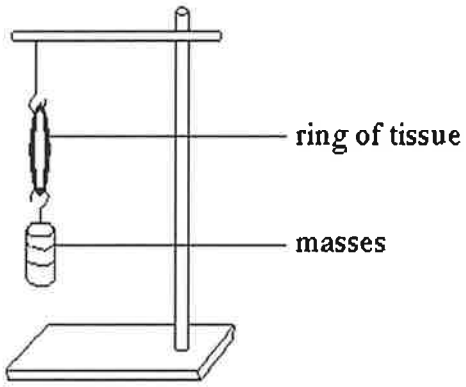
c Blood consists of cells and a liquid. What is the name of this liquid?

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

e Name one substance that a red blood cell carries.

8 IDU 6b Investigating Strength of Blood Vessels

Safety:
Always wear gloves when handling animal material.
Watch the experiment at all times as when the blood vessel ring breaks, the falling masses may cause injuries.



Introduction:

Blood is pumped around the body by the heart and flows though arteries, capillaries and veins. The **aorta** is the biggest artery in the body and carries blood directly from the heart.
In this investigation you will compare the **strength of the aorta with another blood vessel.**

Procedure:

1) Record the original length of the blood vessel ring before adding any masses.
2) Suspend the blood vessel ring from a hook on a clamp stand and attach it to a 10g mass hook. Record the extended length.
3) Remove the mass, record its recoiled length.
4) Load the ring with increasing masses until no further recoil takes place (the blood vessel does not return to its original length). At this point the blood vessel has reached its elastic limit.
5) Keep repeating until the blood vessel ring breaks.
6) Repeat whole experiment with a different blood vessel.

Results:

Blood Vessel	Mass at which elastic limit was reached (g)	Mass at which blood vessel snapped (g)

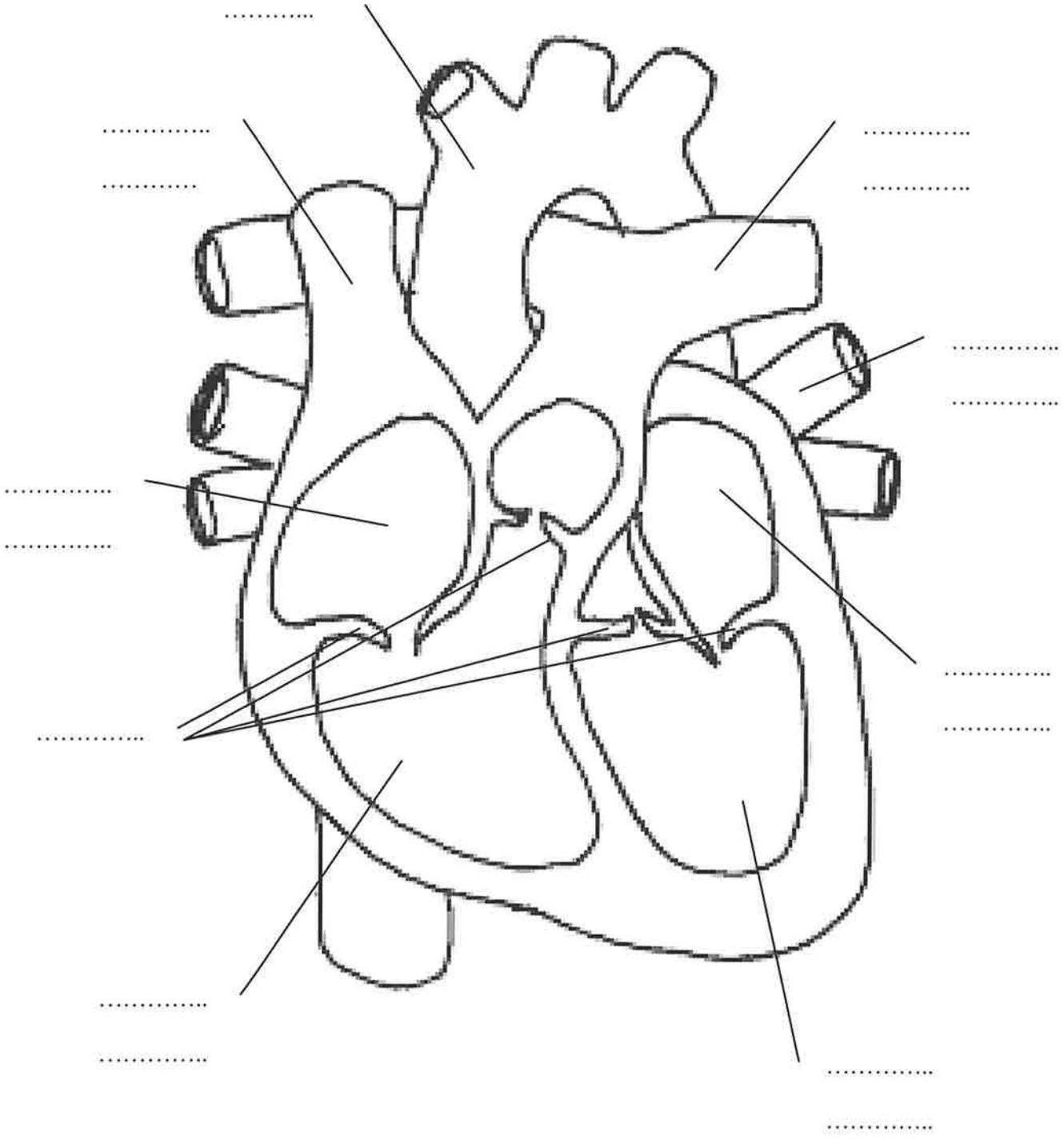
Conclusions:

Which blood vessel was stronger?

Explain your answer using your knowledge about the structure and function of blood vessels. Use diagrams if needed.

8 IDU 7a Heart Dissection

1 Colour the blood rich in carbon dioxide in dark red and the blood rich in oxygen in bright 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)

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 – Connections

RELATED CONCEPTS – Consequences and Movement

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.

8 IDU Respiration, Digestion and the Circulatory Systems – Review Notes

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**.

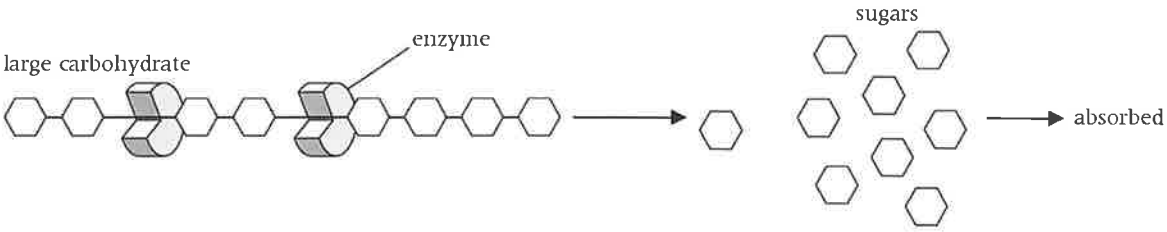
Substance needed	Examples	Why it's needed	Good sources
carbohydrate	starch, sugars	for respiration to release energy	pasta, bread, potatoes
protein		for growth and repair	meat, beans, fish
Fats and oils	Olive oil Animal fat	For our immune system and healthy skin and hair	Nuts, meat, seeds, diary products
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	

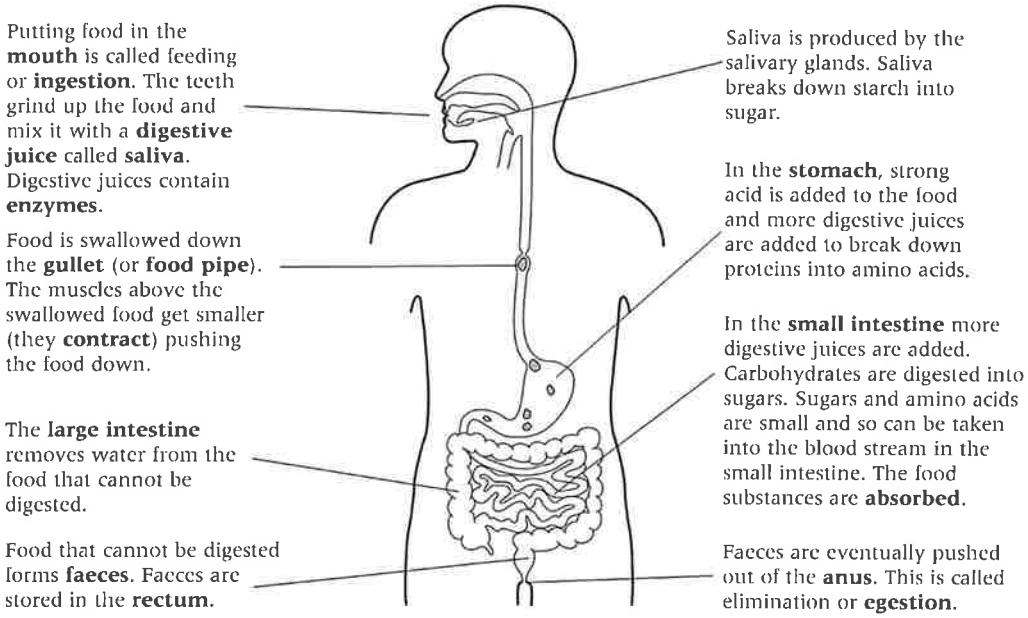
- We can do **tests** to find out which substances are in foods. For example, **starch** makes iodine solution go a blue–black colour. If a food contains **fats** it leaves a greasy mark when rubbed on paper. **Sugars** can be tested by adding Benedict's solution. If this goes green/yellow/red then glucose 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**.

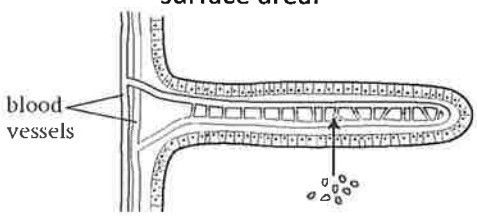
- To make use of the food, our bodies need to break it up into smaller sized molecules. This is called **digestion**. Digestion turns large **insoluble** substances into small **soluble** ones. The organs of the **digestive system** help us digest food.

- 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

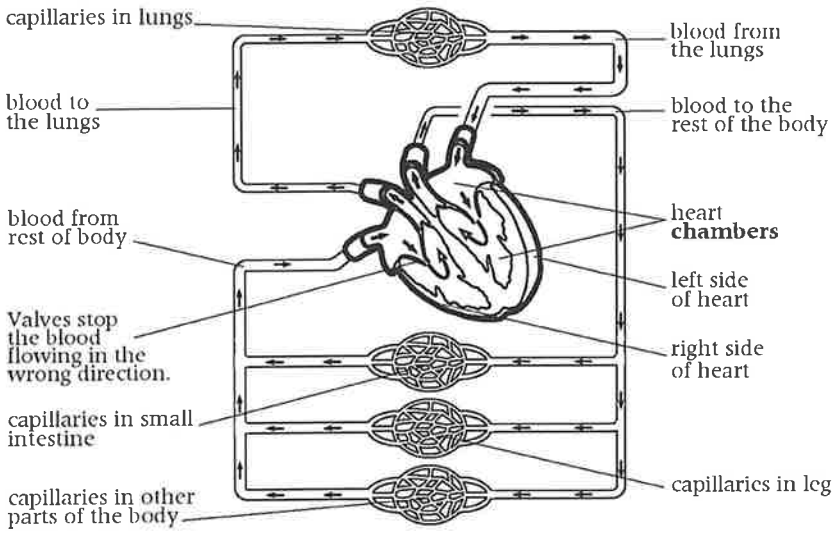
All living cells need to **respire** to release energy. Energy is needed by organisms to help them move, grow and make new substances to help them stay alive.

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**:

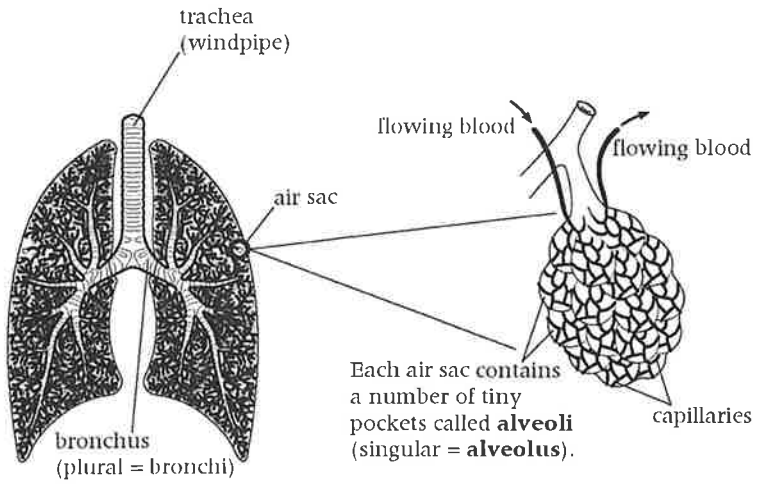
glucose + oxygen ⍰ carbon dioxide + water (+ energy)

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**.

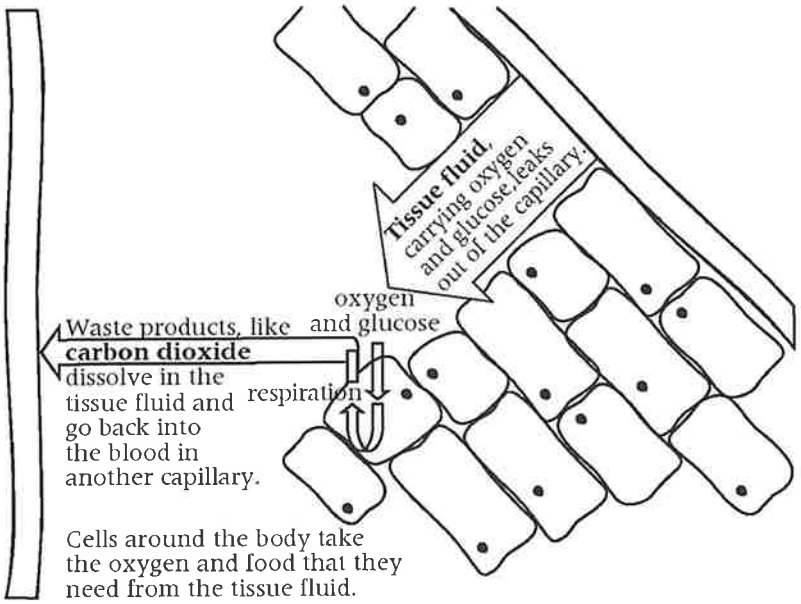


The oxygen is absorbed from the air by the **lungs**. The lungs are part of the **breathing system**.



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.

8 IDU Reflections on Inquiry and Interdisciplinary Science and PHE Link

Aim: Reflect on the Knowledge and Skills acquired in the Heart and Lungs through Inquiry

Questions asked	Answers found, and how we found them	Any further questions?
Factual What is the structure and function of the circulatory system? What is the structure and function of the respiratory system? What are the essential nutrients for a balanced diet? What are the short and long term effects of exercise on the body systems? How do organisms have energy for life functions?		
Conceptual How does a circuit plan address areas of cardio & muscular strength, and endurance? How to body systems adapt to changing training methods?		
Debatable To what extent do global governments promote health and fitness? To what extent does a health and nutrition address physical wellness?		