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## **Week 2 Revision**

# **Science (Biology)**

**Year 10**

**Name:** \_\_\_\_\_

**Tutor:** \_\_\_\_\_

# **Key Science Vocabulary**

## Accuracy

A measurement result is considered accurate if it is judged to be close to the true value.

## Calibration

Marking a scale on a measuring instrument. This involves establishing the relationship between indications of a measuring instrument and standard or reference quantity values, which must be applied. For example, placing a thermometer in melting ice to see whether it reads zero, in order to check if it has been calibrated correctly.

## Data

Information, either qualitative or quantitative, that has been collected.

## Error

See also uncertainty.

## Measurement error

The difference between a measured value and the true value.

## Anomalies

These are values in a set of results which are judged not to be part of the variation caused by random uncertainty.

## Random error

These cause readings to be spread about the true value, due to results varying in an unpredictable way from one measurement to the next. Random errors are present when any measurement is made, and cannot be corrected. The effect of random errors can be reduced by making more measurements and calculating a new mean.

## Systematic error

These cause readings to differ from the true value by a consistent amount each time a measurement is made. Sources of systematic error can include the environment, methods of observation or instruments used. Systematic errors cannot be dealt with by simple repeats. If a systematic error is suspected, the data collection should be repeated using a different technique or a different set of equipment, and the results compared.

## Zero error

Any indication that a measuring system gives a false reading when the true value of a measured quantity is zero, eg the needle on an ammeter failing to return to zero when no current flows. A zero error may result in a systematic uncertainty.

## Evidence

Data which has been shown to be valid.

## Fair test

A fair test is one in which only the independent variable has been allowed to affect the dependent variable.

## Hypothesis

A proposal intended to explain certain facts or observations.

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## Interval

The quantity between readings, eg a set of 11 readings equally spaced over a distance of 1 metre would give an interval of 10 centimetres.

## Precision

Precise measurements are ones in which there is very little spread about the mean value. Precision depends only on the extent of random errors – it gives no indication of how close results are to the true value.

## Prediction

A prediction is a statement suggesting what will happen in the future, based on observation, experience or a hypothesis.

## Range

The maximum and minimum values of the independent or dependent variables; important in ensuring that any pattern is detected. For example a range of distances may be quoted as either: 'From 10 cm to 50 cm' or 'From 50 cm to 10 cm'.

## Repeatable

A measurement is repeatable if the original experimenter repeats the investigation using same method and equipment and obtains the same results. Previously known as reliable.

## Reproducible

A measurement is reproducible if the investigation is repeated by another person, or by using different equipment or techniques, and the same results are obtained. Previously known as reliable.

## Resolution

This is the smallest change in the quantity being measured (input) of a measuring instrument that gives a perceptible change in the reading.

## Sketch graph

A line graph, not necessarily on a grid, that shows the general shape of the relationship between two variables. It will not have any points plotted and although the axes should be labelled they may not be scaled.

## True value

This is the value that would be obtained in an ideal measurement.

## Uncertainty

The interval within which the true value can be expected to lie. Whenever a measurement is made, there will always be some uncertainty or doubt about the result obtained. Uncertainty can be expressed in terms of spread of values obtained. For example, a length of 56 cm  $\pm$  2 cm would mean the true value could be anywhere between 54 cm and 58 cm.

## Validity

Suitability of the investigative procedure to answer the question being asked. For example, an investigation to find out if the rate of a chemical reaction depended upon the concentration of one of the reactants would not be a valid procedure if the temperature of the reactants was not controlled.

## Valid conclusion

A conclusion supported by valid data, obtained from an appropriate experimental design and based on sound reasoning.

## Variables

These are physical, chemical or biological quantities or characteristics.

### Categoric

Categoric variables have values that are labels, eg names of plants or types of material.

### Continuous

Continuous variables can have values (called a quantity) that can be given a magnitude either by counting (as in the case of the number of shrimp) or by measurement (eg light intensity, flow rate etc). Previously known as discrete variable.

### Control

Control variable is one which may, in addition to the independent variable, affect the outcome of the investigation and therefore has to be kept constant or at least monitored.

### Dependent

Dependent variable is the variable of which the value is measured for each and every change in the independent variable.






### Independent

Independent variable is the variable for which values are changed or selected by the investigator.

## Organisation

**AQA GCSE Biology (Combined Science) Unit 2: Organisation**

**Principles of Organisation**

				
<b>cell</b>	<b>tissue</b>	<b>organ</b>	<b>organ system</b>	<b>organism</b>
Cells are the basic building blocks of all living things.	A group of cells with a similar structure and function is called a tissue.	An organ is a combination of tissues carrying out a specific function.	Organs work together within an organ system.	Organ systems work together to form whole living organisms.

**Food Tests (Required Practical)**

What are you testing for?	Which indicator do you use?	What does a positive result look like?
sugar	Benedict's reagent	Once heated, the solution will change from blue-green to yellow-red.
starch	iodine	Blue-black colour indicates starch is present.
protein	biuret	The solution will change from blue to pink-purple.
lipid	sudan III	The lipids will separate and the top layer will turn bright red.

**Effect of pH on the Rate of Reaction of Amylase (Required Practical)**

Iodine is used to test for the presence of starch. If starch is present, the colour will change to blue-black.

The **independent variable** in the investigation is the pH of the buffer solution.

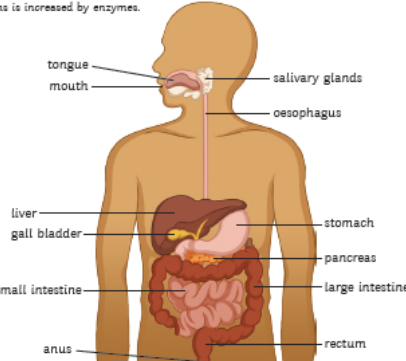
The **dependent variable** in the investigation is the time taken for the reaction to complete (how long it takes for all the starch to be digested by the amylase).

**Method:**

- Use the marker pen to label a test tube with the first value of pH buffer solution (pH 4) and stand it in the test tube rack.
- Into each well of the spotting tiles, place a drop of iodine.
- Using a measuring cylinder, measure 2cm<sup>3</sup> of amylase and pour into the test tube.
- Using a syringe, measure 1cm<sup>3</sup> of the buffer solution and pour into the test tube.
- Leave this to stand for five minutes and then use the thermometer to measure the temperature. Make a note of the temperature.

**The Digestive System**

The purpose of the digestive system is to break down large molecules into smaller, soluble molecules, which are then absorbed into the bloodstream. The rate of these reactions is increased by enzymes.



**AQA GCSE Biology (Combined Science) Unit 2: Organisation**

**Enzymes**

An enzyme is a biological catalyst; enzymes speed up chemical reactions without being changed or used up.

This happens because the enzyme lowers the **activation energy** required for the reaction to occur. Enzymes are made up of chains of amino acids folded into a globular shape.

Enzymes have an **active site** which the **substrate** (reactants) fits into. Enzymes are very specific and will only catalyse one specific reaction. If the reactants are not the complementary shape, the enzyme will not work for that reaction.

Enzymes also work optimally at specific conditions of pH and temperature. In extremes of pH or temperature, the enzyme will **denature**. This means that the bonds holding together the 3D shape of the active site will break and the active shape will deform. The substrate will not be able to fit into the active site anymore and the enzyme cannot function.

Enzyme	Reactant	Product
amylase	starch	sugars (glucose)
protease	protein	amino acids
lipase	lipid	glycerol and fatty acids




The products of digestion are used to build new carbohydrates and proteins and some of the glucose is used for respiration.

**Bile** is produced in the liver and stored in the gall bladder. It is an **alkaline** substance which **neutralises** the hydrochloric acid in the stomach. It also works to **emulsify** fats into small droplets. The fat droplets have a higher **surface area** and so the rate of their digestion by lipase is increased.

**The Heart and Blood Vessels**

The **heart** is a large muscular organ which pumps blood carrying oxygen or waste products around the body. The **lungs** are the site of **gas exchange** where oxygen from the air is exchanged for waste carbon dioxide in the blood. Oxygen is used in the **respiration** reaction to release energy for the cells and carbon dioxide is made as a waste product during the reaction.

$$\text{glucose} + \text{oxygen} \rightarrow \text{carbon dioxide} + \text{water} + [\text{energy}]$$

	vein	artery	capillary
			

The three types of blood vessels, shown above, are each adapted to carry out their specific function.

**Capillaries** are narrow vessels which form networks to closely supply cells and organs between the veins and arteries. The walls of the capillaries are only **one cell thick**, which provides a short **diffusion pathway** to increase the rate at which substances are transferred.

The table below compares the structure and function of arteries and veins:

	Artery	Vein
direction of blood flow	away from the heart	towards the heart
oxygenated or deoxygenated blood?	oxygenated (except the pulmonary artery)	deoxygenated (except the pulmonary vein)
pressure	high	low (negative)
wall structure	thick, elastic, muscular, connective tissue for strength	thin, less muscular, less connective tissue
lumen (channel inside the vessel)	narrow	wide (with valves)

**The Heart as a Double Pump**

The heart works as a **double pump** for two circulatory systems; the **pulmonary** circulation and the **systemic** circulation.

The **pulmonary** circulation serves the lungs and brings deoxygenated blood to exchange waste carbon dioxide gas for oxygen at the alveoli.

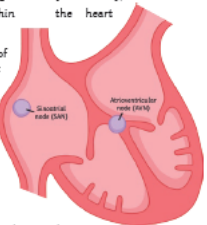
The **systemic** circulation serves the rest of the body and transports oxygen and nutrients from digestion to the cells of the body, whilst carrying carbon dioxide and other waste away from the cells.

The **systemic** circulation flows through the whole body. This means the blood is flowing at a much higher pressure than in the pulmonary circuit.

**The Heart as Pacemaker**

The rate of the heart beating is very carefully, and automatically, controlled within the heart itself.

Located in the muscular walls of the heart are small groups of cells which act as **pacemakers**. They produce electrical impulses which stimulate the surrounding muscle to contract, squeezing the chambers of the heart and pumping the blood.

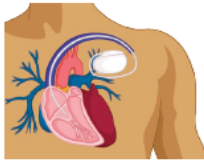


The **sino-atrial node (SAN)** is located near the right atrium and it stimulates the atria to contract. The **atrio-ventricular node (AVN)** is located in between the ventricles and stimulates them to contract.



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Artificial pacemakers can be surgically implanted into a person if their heart nodes are not functioning correctly.



### Coronary Heart Disease

**Coronary heart disease** is a condition resulting from blockages in the **coronary arteries**. These are the main arteries which supply blood to the heart itself and they can become blocked by build-up of **fatty deposits**.

In the UK and around the world, coronary heart disease is a major cause of many deaths.

The main symptoms can include **chest pain**, **heart attack** or **heart failure**. Yet, not all people suffer the same symptoms, if any at all.

**Lifestyle factors** can increase the risk of a person developing coronary heart disease.

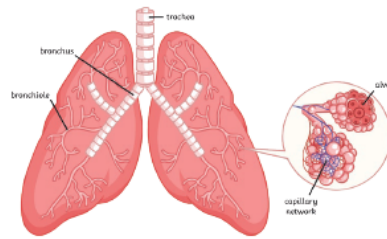
**Diet** – a high-fat diet (containing lots of saturated fat) can lead to higher cholesterol levels and this cholesterol forms the fatty deposits which damage and block the arteries.

**Smoking** – chemicals in cigarette smoke, including nicotine and carbon monoxide, increase the risk of heart disease. Carbon monoxide reduces the amount of oxygen which can be transported by the red blood cells and nicotine causes an increased heart rate. The lack of oxygen to the heart and increased pressure can lead to heart attacks.

**Stress** – prolonged exposure to stress or stressful situations (such as high pressure jobs) can lead to high blood pressure and an increased risk of heart disease.

**Drugs** – illegal drugs (e.g. ecstasy and cannabis) can lead to increased heart rate and blood pressure, increasing the risk of heart disease.

**Alcohol** – regularly exceeding unit guidelines for alcohol can lead to increased blood pressure and risk of heart disease.



### Blood

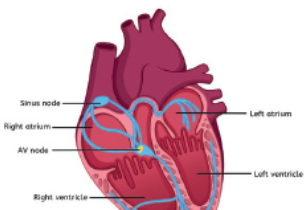
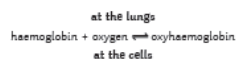
Blood is composed of **red blood cells** (erythrocytes), white blood cells and platelets, all suspended within a **plasma** (a tissue).

The **plasma** transports the different blood cells around the body as well as carbon dioxide, nutrients, urea and hormones. It also distributes the heat throughout the body.

**Red blood cells** transport oxygen attached to the

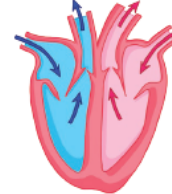
haem group in their structure. It has a biconcave shape to increase surface area and does not contain a nucleus so it can bind with more oxygen molecules.

**White blood cells** form part of the immune system and ingest pathogens and produce antibodies. **Platelets** are important blood clotting factors.



The **right atrium** receives deoxygenated blood via the **vena cava**. It is then pumped down through the valves into the **right ventricle**. From here, it is forced up through the **pulmonary artery** towards the **lungs** where it exchanges carbon dioxide for oxygen. The oxygenated blood then enters the **left atrium** via the **pulmonary vein** and down into the left ventricle. The muscular wall of the **left ventricle** is much thicker so it can pump the blood more forcefully out of the heart and around the entire body, via the **aorta**.

The blood only flows in **one direction**. This is because there are **valves** in the heart which close under pressure and prevent the backward flow of blood.



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### Rate Calculations for Blood Flow

The number of beats the heart performs each minute is called the **pulse** (or heart rate).

It is easily measured by counting the number of beats in a given time, e.g. 15s, and finding the total beats **per minute**.

Typically, a lower resting pulse rate indicates a greater level of physical **fitness**. During exercise, and for some time after, the pulse rate increases while the heart is working to provide more **oxygen** to the muscles.

**Cardiac output** is a measure of the volume of blood pumped by the heart each minute. **Stroke volume** is a measure of the volume of blood pumped from the heart each contraction (heart beat).

Cardiac output ( $\text{cm}^3/\text{min}$ ) = heart rate (bpm)  $\times$  stroke volume ( $\text{cm}^3/\text{beat}$ )

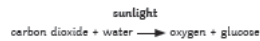
### Cancer

**Cancer** is the result of **uncontrolled** cell growth and division. The uncontrolled growth of cells is called a **tumour**.

Benign Tumour	Malignant Tumour
<ul style="list-style-type: none"> <li>Usually grows slowly.</li> <li>Usually grows within a membrane and can be easily removed.</li> <li>Does not normally grow back.</li> <li>Does not spread around the body.</li> <li>Can cause damage to organs and be life-threatening.</li> </ul>	<ul style="list-style-type: none"> <li>cancerous</li> <li>Usually grows rapidly.</li> <li>Can spread around the body, via the bloodstream.</li> <li>Cells can break away and cause secondary tumours to grow in other areas of the body (metastasis).</li> </ul>

### Plant Tissues, Organs and Systems

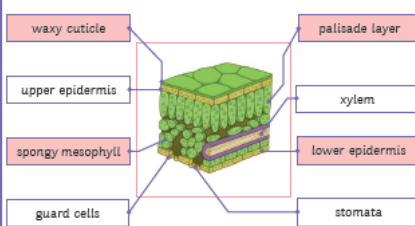
**Leaves** are plant organs and their main function is to absorb sunlight energy for use in **photosynthesis**. Within the cells are small organelles called **chloroplasts** which contain a green pigment called **chlorophyll**. This is the part of the plant which absorbs the sunlight and where photosynthesis occurs.



Leaves are adapted to carry out their function. Leaves are typically flat and thin with a large **surface area**. This means they have a maximum area to absorb the sunlight and carbon dioxide. The thin shape reduces the distance for diffusion of water and gases.

Leaves contain vessels called **xylem** and **phloem**. The **xylem** transport water and dissolved minerals toward the leaves. The **phloem** transport glucose and other products from photosynthesis around the plant.

The **large air spaces** between the cells of the spongy **mesophyll** layer allow for the diffusion of gases. Carbon dioxide enters the leaves and **oxygen** exits the leaves.



The **guard cells** are specially adapted cells located on the underside of the leaf. They are positioned in pairs, surrounding the **stomata** (a small opening in the epidermis layer). The guard cells **change shape** to open and close the stomata, controlling the rate of **gas exchange** in the leaf.

### Root Hair Cells

Plants absorb water by **osmosis** through the root hair cells of the roots. Dissolved in the water are important minerals for the plant's growth and development, which are absorbed by **active transport**.

The **root hair cells** are adapted to their function with the following features:

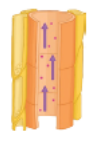
- Finger-like projection in the membrane increases the **surface area** available for water and minerals to be absorbed across.
- The narrow shape of the projection can squeeze into small spaces between soil particles, bringing it closer and **reducing** the distance of the diffusion pathway.
- The cell has many **mitochondria**, which release energy required for the active transport of some substances.



### Xylem and Phloem

**Xylem** vessels transport **water** through the plant, from roots to leaves. They are made up of **dead**, lignified cells, which are joined end to end with no walls between them, forming a long central tube down the middle. The movement of the water, and dissolved minerals, along the xylem is in a **transpiration stream**.

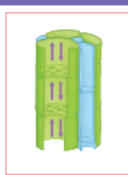
Xylem vessels also provide **support** and **strength** to the plant structure. They are found in the middle of roots so they aren't crushed within the soil. They are found in the middle of the stem to provide strength and prevent bending. In the leaves, they are found in **vascular bundles** alongside the phloem and can be seen as the veins which network across the leaf.



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**Phloem** vessels transport food such as dissolved sugars and glucose from photosynthesis. The food is transported around the plant to where growth is occurring (root and shoot tips), as well as to the organs which store the food. The transport occurs in **all directions** throughout the plant. The cells making up the phloem tube are **living**, with small holes in the walls where the cells are joined.



### Transpiration and Translocation

**Transpiration** is the loss of water, by **evaporation** and **diffusion**, from the leaves of the plant. Water is a cohesive molecule and as it evaporates, there is less water in the leaf, so water from further back moves up to take its place. This, in turn, draws more water with it. This is the **transpiration stream**.

Transpiration occurs naturally as there is a tendency for water to diffuse from the leaves (where the concentration is relatively high) to the air around the plants (where the concentration is relatively low), via the **stomata**.

**Environmental factors** can change the rate at which transpiration occurs:

- Increased **light intensity** will increase the rate of transpiration because light stimulates the stomata to open. The leaf will also be warmed by the sunlight.
- Increased **temperature** will cause the water to evaporate more quickly and so increase the rate of transpiration.
- Increased **humidity** (moisture in the air) will reduce the rate of transpiration. Whereas if the air becomes drier, the rate increases. A greater concentration gradient will increase the rate of diffusion.
- If the **wind speed** increases, then the rate of transpiration also increases. This is because as the water surrounding the leaves is moved away more quickly, the concentration gradient is increased.
- If the **water content** in the soil is decreased, then the rate of absorption in the roots decreases. This causes the stomata to become flaccid and close, reducing transpiration. If the loss of turgor affects the whole plant, then it will wilt.

### Disease Interactions

Having one type of illness can often make a person more susceptible to another type of illness:

- immune disorders → increased risk of infectious disease
- viral infection of cells → increased risk of cancer
- immune reactions → can trigger allergies
- very poor physical health → increased risk of depression or other mental illness

### Health and Disease

**Health** is the state of being free from illness or disease. It refers to **physical and mental wellbeing**.

Disease and lifestyle factors, such as diet, stress, smoking, alcohol consumption and the use of illegal drugs, can all impact the health of a person.

Some conditions are associated with certain lifestyle choices:

- Liver conditions are associated with poor diet and prolonged excessive alcohol consumption.
- Lung cancer is associated with smoking.
- Memory loss, poor physical health and hygiene are associated with the use of illegal or recreational drugs.
- Obesity and diabetes are associated with poor diet.
- Anxiety and depression are associated with stress and prolonged excessive alcohol consumption.

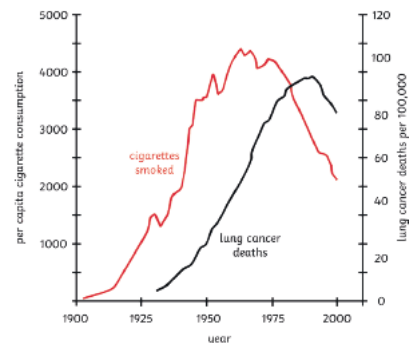
There can often be correlations between some factors and types of illness or specific diseases.

For example, in the graph shown to the right, there is a positive correlation between the number of cigarettes smoked and the number of lung cancer deaths.

However, there are other factors which can contribute to the development of lung cancer e.g. working with asbestos, genetic predisposition.

This means that although the evidence in the graph gives a strong indication that smoking is a cause of lung cancer, it cannot be stated that 'smoking will cause lung cancer'. Not every person who smokes will develop lung cancer and not every person who develops lung cancer will be a smoker.

Therefore, it can be stated that smoking increases the risk of lung cancer.



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### Heart Disease (Treatments)

There are a range of medical treatments for heart disease.

Treatment	Description	Advantages	Disadvantages
statins	Drugs used to lower cholesterol levels in the blood, by reducing the amount produced in the liver.	<ul style="list-style-type: none"> <li>• Can be used to prevent heart disease developing.</li> <li>• Improved quality of life.</li> </ul>	<ul style="list-style-type: none"> <li>• Long-term treatment.</li> <li>• Possible negative side-effects.</li> </ul>
stents	Mechanical device which is used to stretch narrow or blocked arteries, restoring blood flow.	<ul style="list-style-type: none"> <li>• Used for patients where drugs are less effective.</li> <li>• Offers long-term benefits.</li> <li>• Made from metal alloys so will not be rejected by the patient's body.</li> <li>• Improved quality of life.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires surgery under general anaesthetic, which carries risk of infection.</li> </ul>
heart transplant	The entire organ is replaced with one from an organ donor (a person who has died and previously expressed a wish for their organs to be used in this way).	<ul style="list-style-type: none"> <li>• Can treat complete heart failure in a person.</li> <li>• extended life</li> <li>• Improved quality of life.</li> <li>• Artificial plastic hearts can be used temporarily until a donor is found.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires major surgery under general anaesthetic, which carries risks.</li> <li>• Lack of donors available.</li> <li>• Risk of infection or transplant rejection.</li> <li>• Long recovery times.</li> </ul>

## **Organisation**

1) Summarise as much information from the knowledge organiser in the box below. Focus on key words and definitions rather than copying the text word for word.

2) Complete 5 self-quizz questions using the information you have summarised above in the box below.

Question	Answer



[Type here]

### 3) Complete both exam questions below and self-mark using the mark scheme

Foundation:

#### Q1.

Being overweight can affect the health and life expectancy of a person.

- (a) What is **one** lifestyle change a person could make to help them lose body mass?

Tick (✓) **one** box.

Drink more alcohol

☐

Eat less fatty food

☐

Stop smoking

☐

(1)

- (b) Exercise has many health benefits.

Give **two** health benefits of regular exercise.

Do **not** refer to losing body mass in your answer.

1.

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2.

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(2)

During exercise, breathing rate increases to provide more oxygen for aerobic respiration.

- (c) What is the equation for aerobic respiration?

Tick (✓) **one** box.

carbon dioxide + water  $\rightarrow$  glucose + oxygen

☐

glucose + oxygen  $\rightarrow$  carbon dioxide + water

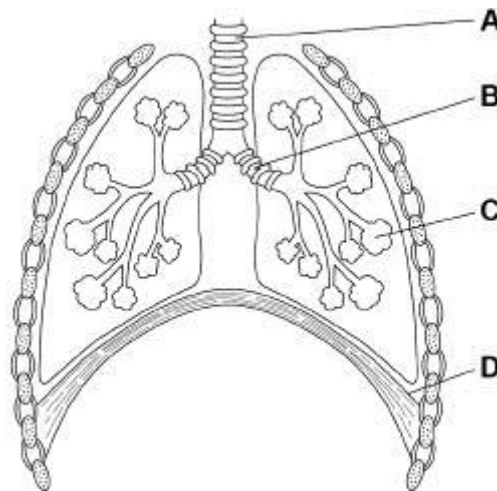
☐

oxygen + water  $\rightarrow$  glucose + carbon dioxide

☐

(1)

(d) The diagram below shows the human breathing system.



Where does gas exchange take place?

Tick (✓) **one** box.

A

☐

B

☐

C

☐

D

☐

(1)

A scientist investigated the effect of exercise on the breathing rate of four people.

This is the method used.

1. Measure the resting breathing rate.
2. Exercise for 10 minutes.
3. Measure the breathing rate as soon as exercise stops.
4. Record the time taken for the breathing rate to return to the resting rate.

The table below shows the results.

Person	Resting breathing rate in breaths per	Breathing rate after exercise in breaths per	Increase in breathing rate in breaths per	Time for breathing rate to return to resting

[Type here]

	minute	minute	minute	rate in minutes
<b>A</b>	12	45	33	5.5
<b>B</b>	10	28	18	4.0
<b>C</b>	11	35	24	6.5
<b>D</b>	13	52	39	10.0

- (e) The scientist concluded that person **B** was the fittest.

Give **two** reasons that support the scientist's conclusion.

Use the table above.

1.

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2.

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(2)

- (f) Suggest **two** reasons why the scientist's conclusion may **not** be valid.

1.

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2.

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(2)

- (g) Give **two** changes that happen in the body during aerobic exercise.

Do **not** refer to increased breathing rate in your answer.

1.

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2.

(2)

- (h) Muscles respire anaerobically during vigorous exercise.

Complete the sentences.

Choose answers from the box.

<b>amino acids</b>	<b>carbon dioxide</b>	<b>glucose</b>
	<b>lactic acid</b>	<b>oxygen</b>

Muscles respire anaerobically if they do not have enough \_\_\_\_\_.

Anaerobic respiration of glucose produces \_\_\_\_\_.

(2)

(Total 13 marks)

### Q1.

- (a) eat less fatty food

1

- (b) any **two** from:

- strengthens muscles  
*ignore references to losing weight / mass*  
*ignore references to immediate effects of exercise on body eg increases heart rate*  
*ignore makes you healthier*  
*allow makes you stronger*  
*allow improves stamina*
- strengthens heart (muscle)  
*allow keeps your heart healthy*
- reduces risk of (coronary) heart disease / CHD / cardiovascular disease

[Type here]

*allow reduces (blood) cholesterol*

*allow improves circulation*

- reduces blood pressure
- reduces risk of (Type 2) diabetes
- improves mental health / mood
- improves mobility
  - allow strengthens bones*
  - allow boosts immunity*
  - allow reduces risk of (some) cancers*
  - allow makes you fitter*
  - ignore improves a person's appearance*

2

(c) glucose + oxygen → carbon dioxide + water

1

(d) C

1

(e) any **two** from:

- lowest / lower resting breathing rate
  - statements must be comparative*
- lowest / lower breathing rate after exercise
- lowest / lower increase in breathing rate
- least amount of time for breathing rate to return to resting rate
  - allow less time for breathing rate to return to resting rate*
  - allow shortest recovery time*

2

(f) any **two** from:

- only based on one measurement
- person B may have done less intense exercise
  - allow person B may have done a different type of exercise*
- other factors (besides breathing rate) indicate fitness
  - eg stamina / strength / speed*
  - allow age / sex / body mass may not have been controlled*
  - ignore references to medical conditions*

2

(g) deeper breathing

*allow heavier breathing*

*ignore breathing rate increases*

1

increased heart rate

*allow blood flows faster*

*ignore more blood flows around body*

*allow increased (body) temperature*

*allow (increased) sweating*

*allow increased blood flow to skin*

*do **not** accept lactic acid is produced*

1

(h) oxygen

*word takes precedence*

*allow O<sub>2</sub>*

*ignore O / O<sup>2</sup>*

1

lactic acid

1

**[13]**



[Type here]

Higher tier:

**Q2.**

Lipids are an essential part of our diet.

- (a) Describe how a student could test a food for lipids and the positive result for the test.

Test for lipids

---

---

Positive result for lipids

---

---

(2)

A high concentration of cholesterol in the blood has been linked with coronary heart disease (CHD).

- (b) Name the type of drug used to reduce the concentration of cholesterol in the blood.

---

---

(1)

- (c) A new CHD drug has been trialled to reduce the concentration of cholesterol in the blood.

Patients were given the new CHD drug or a placebo.

One possible side effect of the new CHD drug is an increased risk of diabetes.

The table below shows some of the results.

	<b>Group 1: New CHD drug</b>	<b>Group 2: Placebo</b>
Number of patients	12 562	12 541
Number of patients developing diabetes during the trial	636	606

Calculate the difference between the percentage of patients developing diabetes in group 1 compared to group 2.

---

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---

---

---

---

(4)

- Explain how the drug could reduce the risk of CHD.

[illegible]

[Type here]

(4)

- (e) Give **three** factors doctors should consider when they plan to use a new drug with a patient.

Do **not** refer to cost in your answer.

1 \_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_

3 \_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_

(3)

(Total 14 marks)

## Q2.

- (a) (mix food with) ethanol **and** add (distilled) water  
**or**  
rub food on paper (and allow to dry)

1

milky / white (if lipid is present)

**or**

greasy mark (if lipid is present)

*result must correspond with test*

*allow apply Sudan Red / III / Black stain  
to food (1)*

*red / black (if lipid is present) (1)*

1

- (b) statin(s)

*allow named statin, e.g. simvastatin*

*allow aspirin / ezetimibe*

1

- (c)

*an answer of 0.231 scores 4 marks*

an answer of 0.23073753 scores **3**  
marks

$$\left( \frac{636}{12\,562} \times 100 = \right) 5.06288808$$

1

$$\left( \frac{606}{12\,541} \times 100 = \right) 4.83215055$$

1

(subtraction =) 0.23073753

1

(answer to 3 significant figures =) 0.231

1

- (d) (lower cholesterol leads to slower / less) build up of fatty material in (coronary) arteries

*(lower cholesterol leads to slower / less)  
build up of plaque(s) in (coronary)  
arteries*

1

(therefore less) narrowing of coronary arteries

*allow less (coronary arteries) blocked  
once for either mp2 or mp3*

1

(that prevents) reduced blood flow (through coronary arteries)

*allow less (coronary arteries) blocked  
once for either mp2 or mp3*

1

(that prevents) reduced oxygen supply to heart muscle

1

*if no reference to effect of drugs  
lowering cholesterol allow max **3** marks*

- (e) any **three** from:

- side effects  
*allow toxicity*
- efficacy  
*allow effectiveness*
- interactions with other drugs
- other treatments available  
*allow availability*
- patient's age / mass
- patient's health / allergies / (medical) history
- pregnancy
- patient choice
- dosage

3

[14]