

GCSE (9-1)

Examiners' report

**TWENTY FIRST
CENTURY SCIENCE
COMBINED
SCIENCE B**

J260

For first teaching in 2016

J260/01 Summer 2023 series

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Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. A selection of candidate answers is also provided. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

A full copy of the question paper and the mark scheme can be downloaded from OCR.

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Paper 1 series overview

J260/01 is the Biology Foundation paper for the GCSE (9-1) Combined Science B (Twenty First Century Science). The examination covered topics B1 to B6 plus Ideas about Science and practical skills. To do well on this paper, candidates need to be comfortable applying their knowledge and understanding of scientific principles. They must also be familiar with a range of practical equipment and techniques. Most candidates made a good attempt at answering all the questions and limited their responses to the available spaces. The paper was challenging in places and discriminated well between candidates at different grades. There was no evidence that candidates ran out of time on this paper.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
<ul style="list-style-type: none"> • answered Question 1 on defence against diseases and Question 2 on medicines well • could add a scale to a bar chart and draw bars accurately in Question 2 (b) (ii) • produced a clear and detailed response for the level of response Question 4 (a) by writing a response linked to stopping cutting down trees, gaining at least Level 2 • could calculate percentage change in Question 5 (b) • could recall which gases are required and which gases are used in photosynthesis in Question 6 (a) • could interpret the graph in Question 6 (c) (i) • could calculate volume in Question 8 (a) (i) • could recall the action of hormones in Question 11 (a). 	<ul style="list-style-type: none"> • could not add a suitable scale or draw bars accurately in Question 2 (b) (ii) • could not suggest how to get a better estimate in Question 2 (b) (iv) • produced a limited level of response answer at Level 1 in Question 4 (a) • seemed unfamiliar with the calculations required in Questions 5 (b), 6 (b), 8 (a) (i) and 8 (a) (ii).

Question 1 (a) (i)

1 Some bacteria are pathogens that cause diseases.

(a) Our blood contains white blood cells. They help protect us against pathogens.

(i) Write down the name of the organ that pumps the blood around our body.

..... [1]

Most candidates knew that the heart is the organ that pumps blood around the body for this AO1 recall question. Incorrect answers included arteries and veins.

Question 1 (b)

(b) The human body has different types of defences against pathogens.

Draw lines to connect each **type of defence** with the correct **example**.

Type of defence	Example
Chemical	Bacteria in the gut compete against pathogens
Microbial	Skin stops pathogens entering the body
Physical	Stomach acid destroys pathogens

[2]

All candidates answered this recall question connecting examples to the type of defence. The majority were given 2 marks. When only 1 mark was given, it was most commonly for connecting 'chemical' to 'stomach acid destroys pathogens.'

Question 1 (c)

(c) Beth has a cut on her finger.



Platelets in Beth's blood help to seal the cut so bacteria can't get into it.

Which **two** statements explain how her platelets do this?

Tick (✓) **two** boxes.

They carry oxygen.

They make antibodies.

They make her blood clot.

They stick to the edges of the cut.

[2]

This question assessed AO2 with the application of knowledge and understanding of platelets. Many candidates were given at least 1 mark. The most common correct box ticked was 'they make her blood clot'.

Question 2 (a)

2 Medicines can be used to treat diseases.

(a) Complete the sentences to explain the use of medicines in the treatment of disease.

Use words from the list.

All	No	Some
-----	----	------

..... medicines kill pathogens.

..... medicines treat the symptoms of disease.

[2]

This question does not state that the words in the list can only be used once, but many candidates did not realise this and chose two different words for the spaces. This was evident as they originally put the correct answers and then crossed one out to change it to an incorrect answer (a different word from the list). This led to only 1 mark being given in most cases. This question covered AO1.

Question 2 (b) (i)

- (b) Four groups of students recorded how many times they had to take medicine in a year. There were eight students in each group.

Table 2.1 shows the results for **Group 1**.

Table 2.1

Student	Number of times medicine had to be taken
1	4
2	4
3	4
4	7
5	7
6	12
7	18
8	24

- (i) What is the median number of times medicine had to be taken in **Group 1**?

Put a **ring** around the correct answer.

4 **7** **8** **10**

[1]

All candidates answered this question assessing mathematical skills in AO2, the understanding of the term median. Some candidates showed a calculation of working out the mean and incorrectly circled 10, rather than the middle value.

Question 2 (b) (ii)

Table 2.2 shows the mean for each group.

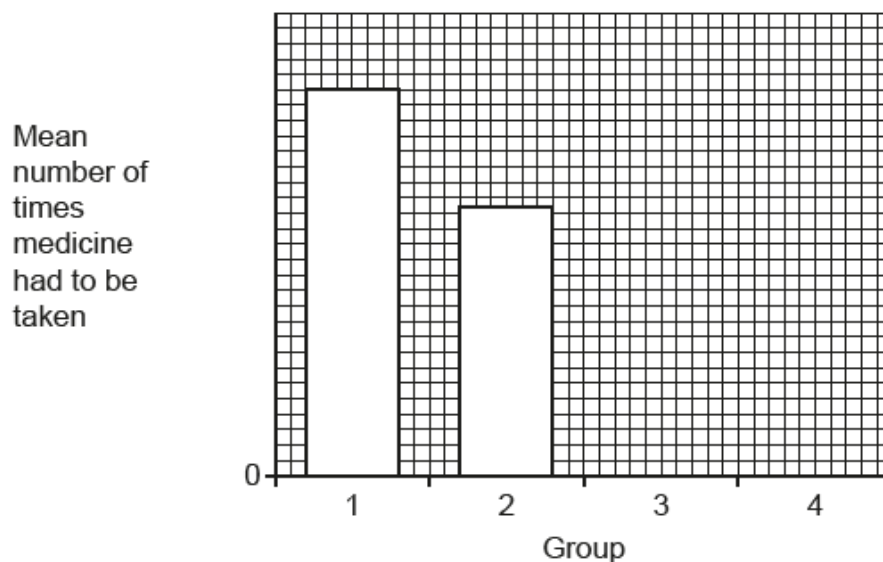
Table 2.2

Group	Mean number of times medicine had to be taken
1	10
2	7
3	4
4	5

(ii) Complete the bar chart of the data in Table 2.2.

Make sure you:

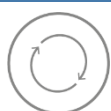
- complete the scale on the y-axis
- plot the two missing means.



[3]

This question was assessing the candidate's ability to construct a bar chart. The candidates were asked to complete the y-axis scale and plot the two missing bars. Most candidates could use the two bars already plotted to add a suitable scale. The bar for group 4 plotted at a mean of 5 caused the most difficulty as some candidates drew the bar incorrectly on the line at 4.8 or 5.2. Some also drew the bar free hand, and the top of the bar was at an angle. If the scale was incorrect, most candidates then did not plot correctly to their scale.

Assessment for learning



Candidates should be encouraged to practise choosing scales and drawing bars on a bar chart. The use of a ruler would make sure they are more accurate with the plotting of the bar, especially if it doesn't fall exactly onto the grid line.

Question 2 (b) (iii)

(iii) What is a correct conclusion from the data?

Tick (✓) **one** box.

Mean of group 1 < Mean of group 2

Mean of group 2 = Mean of group 3

Mean of group 3 > Mean of group 4

Mean of group 4 > Mean of group 3

[1]

This question was assessing the understanding the use of the symbols >, < and =. More than half of candidates could correctly conclude that the mean of group 4 was greater than the mean of group 3. The most common incorrect answer was the box above the correct answer, the mean of group 3 was greater than the mean of group 4.

Question 2 (b) (iv)

(iv) All the students in these groups are 16 years old. They are all girls. They are a small sample of all of the 16-year-olds in the UK.

Describe **two** ways you could get a better estimate of the mean value for 16-year-olds in the UK **without** asking all of them.

1

.....

2

.....

[2]

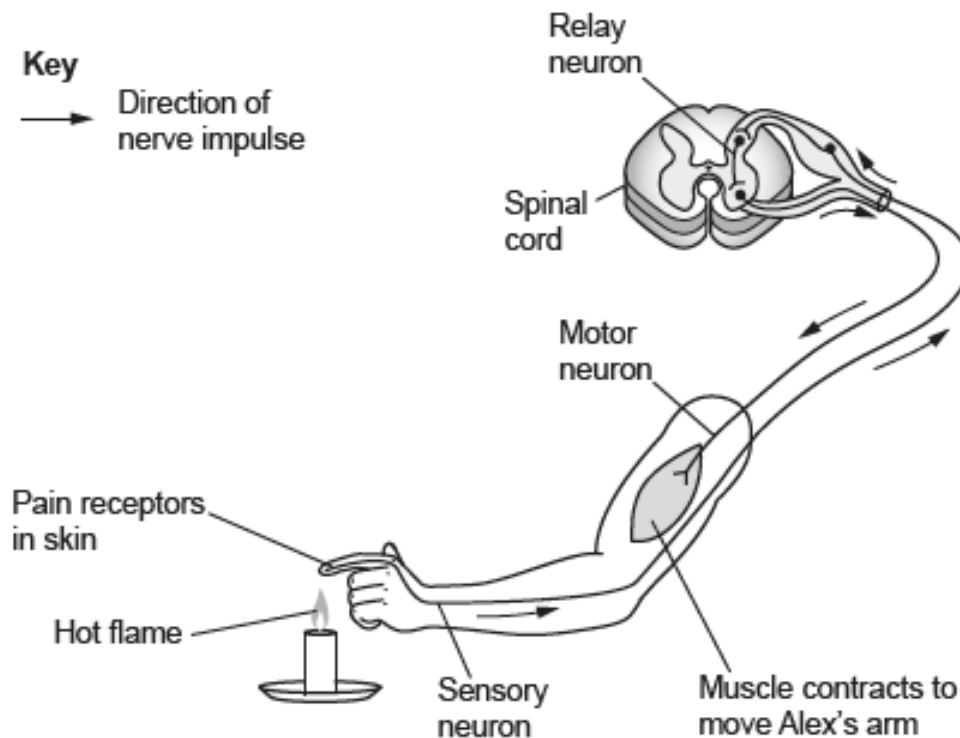
In this question assessing AO3, very few candidates were given 2 marks. The most common correct answer was about asking/including boys. The focus of many of the responses was on the words “without asking”. This led candidates to suggest online surveys, online questionnaires and looking at medical records, rather than answers about the principles of sampling such as a bigger sample size.

Question 3

3 Alex touches a hot flame.

Alex's arm moves quickly away from the hot flame. This is a reflex response.

The diagram shows the reflex arc.



Statements **A** to **E** explain how the structures of the reflex arc work to move Alex's arm.

The statements are **not** in the correct order.

- A** Heat detected by pain receptors in Alex's skin.
- B** Nerve impulse travels along motor neuron.
- C** Muscle contracts and moves Alex's arm away from the flame.
- D** Nerve impulse travels along relay neuron.
- E** Nerve impulse travels along sensory neuron.

Write the letters in the boxes to show the correct order.

One has been done for you.

A				
----------	--	--	--	--

[3]

This 6 mark level of response question assessed AO2. It required some knowledge and understanding of scientific ideas by Charlie and Ling about cutting down trees. The question is asking for the advantages and disadvantages of **stopping** people cutting down trees and this was often misinterpreted as the advantages and disadvantages of cutting down trees. This led to a mismatch of ideas and limited the candidate to a Level 1 answer. Candidates that had understood the question and only gave one advantage or disadvantage were given Level 1, which was the most common level given. Responses that explained both an advantage and disadvantage were given Level 2. There were few responses that could fully explain the advantages and disadvantages of stopping people cutting down trees. Common correct advantages seen were that the animals would not lose their habitats and the trees would remove carbon dioxide from the air and lead to less global warming, and the disadvantages were not having wood to heat homes and less jobs are available.

Exemplar 1

Advantages of Stopping people from cutting down trees could be, trees ^{give off} ~~produce~~ oxygen, they are habitats for animals, ~~and~~ ^{and} some trees ~~are~~ make food for humans and animals. ^{and wood can be used for heat.} ~~Disadvantages of stopping people from cutting down trees could be, cutting down trees.~~ Another advantage: cutting down trees can affect global climate. Disadvantages: animal habitats will be lost, less oxygen will be given off, more money is used to clear the trees and it is dangerous for animals and humans.

This candidate was given 2 marks, Level 1. It is clear that the candidate is explaining advantages of stopping cutting down trees. They explain that they are habitats for animals and that they provide food for humans and animals. The candidate then refers to the disadvantages of cutting down trees, so loss of habitats and using money to cut down trees. These are not disadvantages of stopping cutting down trees as asked by the question. This candidate only has valid advantages, so this limits the response to Level 1.

Exemplar 2

The advantages of ~~cutting down trees~~ + not cutting down trees is that there would be a ~~large~~^{more} Biodiversity which then stabilises the food chain. The trees also absorb lots of ~~oxy~~ Carbon dioxide and produce oxygen for humans to breath. Trees also provide shelter and homes for ~~& species~~ such as ~~birds~~ and bees nests. If Bees don't have a home then they have no reason to pollinate plants if they can't make honey. However, some disadvantages would be a lack of resources for ~~the~~ the large population to use and lack of space for more homes that need to be built. and The wood industry would also struggle as they wouldn't be able ^[6] to make furniture, paper etc.

This candidate was given 6 marks, Level 3. It is clear that the response is giving advantages and disadvantages of stopping cutting down trees. There is a good explanation of advantages which are: more biodiversity, stabilising the food chain, trees absorb carbon dioxide, and they provide shelter and homes and disadvantages which are: lack of space for homes and a lack of furniture and paper.

Question 4 (b)

- (b) There are differences between the individuals within a population of a species.

This variation can be caused by the environment.

State **one other** cause of variation between individuals.

.....
 [1]

This question was testing the recall that differences between individuals are caused by the environment and genetics. Many candidates incorrectly gave the names of process that could be used to cause variation such as selective breeding and evolution, or examples of environmental factors, rather than genetics.

Question 4 (c)

(c) Darwin and Wallace suggested that new species could evolve from earlier species.

Which **two** statements describe how **fossils** provide evidence for this idea?

Tick (✓) **two** boxes.

Fossils only form under certain conditions.

Fossils show that features of a species can change over time.

Some fossils have features of newer species and features of earlier species.

There are gaps in the fossil record.

Very few organisms end up as fossils.

[2]

Many candidates knew that 'fossils show that features of a species can change over time' and that 'some fossils have features of newer species and features of earlier species' are evidence for evolution. The most common incorrect response was 'there are gaps in the fossil record'.

Question 4 (e)

(e) Scientists can classify organisms into species based on similarities in their physical features.

Describe how DNA analysis can also be used to classify organisms into species.

.....

.....

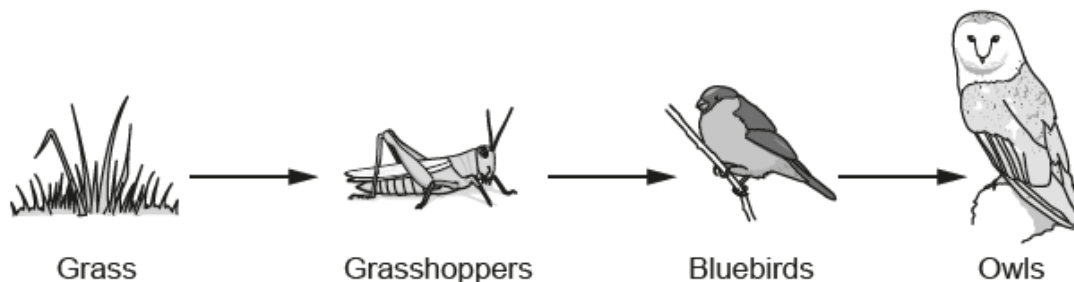
.....

..... [2]

Very few candidates were given marks on this recall AO1 question and some candidates did not answer it at all. Many candidates repeated the question. Some attempted to describe the idea of similarities or differences in features and linked this to being the same species or different species, without reference to DNA, which was insufficient to be awarded a mark.

Question 5 (a)

5 The diagram shows a complete food chain.



(a) Biomass is passed through this food chain when the organisms eat each other.

Where was all of this biomass originally produced?

..... [1]

This AO2 application question was generally well answered. Soil and sun were the most common incorrect answers.

Question 5 (b)

(b) The amount of biomass in the grass is 810 kg/m^3 .

The amount of this biomass passed on to the grasshoppers is 37 kg/m^3 .

Calculate the percentage of the grass's biomass passed on to the grasshoppers.

Give your answer to 3 significant figures.

Percentage = % [3]

This question was assessing mathematical skills, using decimals, percentages and significant figures. Candidates found this calculation challenging with very few answers being given the full 3 marks. The most common use of the figures was 810 divided by 37 giving an answer of 21.89. This could be correctly converted to 21.9 for the conversion to 3 significant figures mark to be given.

Assessment for learning



Exam technique should encourage candidates to show all the working out in a calculation question. Even if the answer is incorrect candidates can be given working marks and/or the correct conversion to 3 significant figures, but only if this can be seen by the examiner.

Question 6 (a)

6 Water and other substances are transported into and out of plants.

(a) Complete the table to describe how each substance is related to photosynthesis.

Tick (✓) the correct boxes.

	Carbon dioxide	Oxygen	Water
Used for photosynthesis			
Made by photosynthesis			

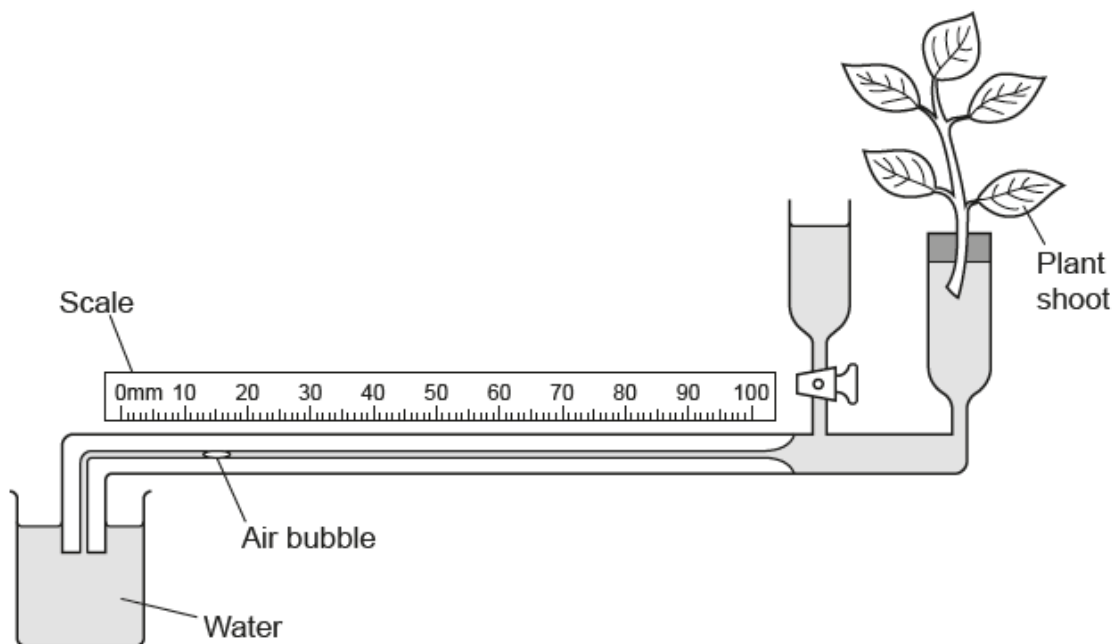
[2]

Most candidates were given at least 1 mark on this AO1 recall question, with nearly half being given 2 marks. Incorrectly, the 'used in photosynthesis' row often had a tick missing on water, or the gases were ticked the wrong way around. Some candidates also thought that water was made in photosynthesis.

Question 6 (b)

Jack investigates the effect of temperature on the amount of water taken up by a plant shoot.

He uses this apparatus to measure the amount of water taken up by the shoot.



Water is taken up into the shoot to replace water that evaporates from its leaves.

When water is taken up into the shoot, the air bubble moves along the scale.

(b) Jack does a practice attempt with the apparatus. His results are shown in the table.

Time since start of practice attempt (min)	Position of air bubble on scale (mm)
0	15
60	50

Calculate how many mm of water were taken up into the shoot in this practice attempt.

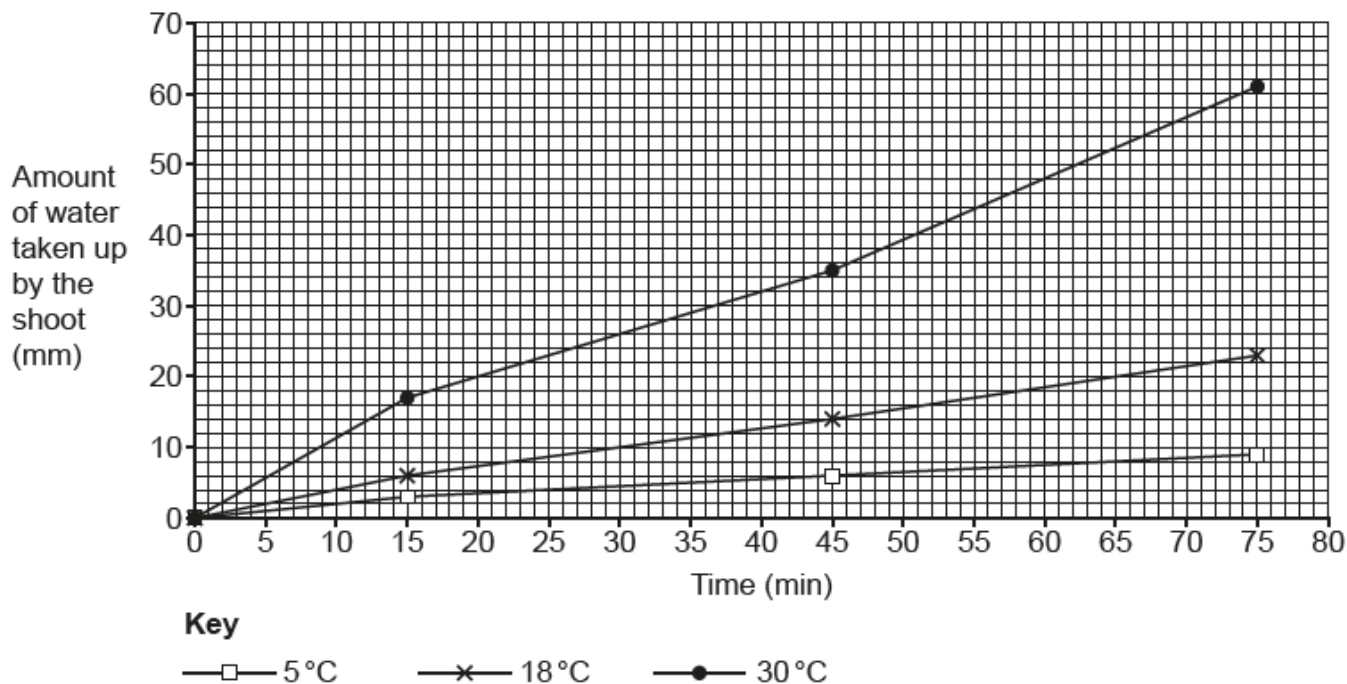
Water taken up = mm [1]

This question was assessing AO2, the application of knowledge and understanding of scientific procedures. Many candidates did not seem to understand that the bubble was moving along the scale and therefore they had to subtract 15 from 50 to calculate how much water had been taken up. Most incorrect answers were due to adding the two numbers together to get 60.

Question 6 (c) (i)

Jack does the experiment three times, each time at a different temperature.

His results are shown in the graph.



(c) In one of the experiments, the shoot had taken up 20 mm of water after 20 minutes.

(i) At which temperature was this experiment done?

Use the graph.

Temperature = °C [1]

Many candidates could translate the information on the graph and key. They recognised that a higher temperature would increase the amount of water taken up by the shoot, so correctly identified 30 using the graph and key.

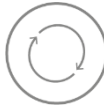
Question 6 (c) (ii)

- (ii) Calculate the average rate at which the 20 mm of water was taken up over the 20 minutes in this experiment.

Rate = mm/min [2]

Candidates found this calculation challenging. There was no requirement to use the graph as the figures to use were given in the question. Very few candidates showed their working out so it was difficult to assess what numbers were being used to calculate the rate. Most candidates were not given any marks.

Assessment for learning



Exam technique should encourage candidates to show all the working out in a calculation question. Even if the answer is incorrect candidates can be given working out marks.

Question 6 (d)

- (d) Explain why water was taken up more quickly by the shoot at higher temperatures.

.....

.....

.....

.....

.....

.....

..... [3]

Very few candidates were given any marks for this question. The candidates had to link the uptake of water to evaporation, transpiration, and photosynthesis. Many described water boiling, the leaf making more bubbles, or a reaction happening faster, without making these specific links.

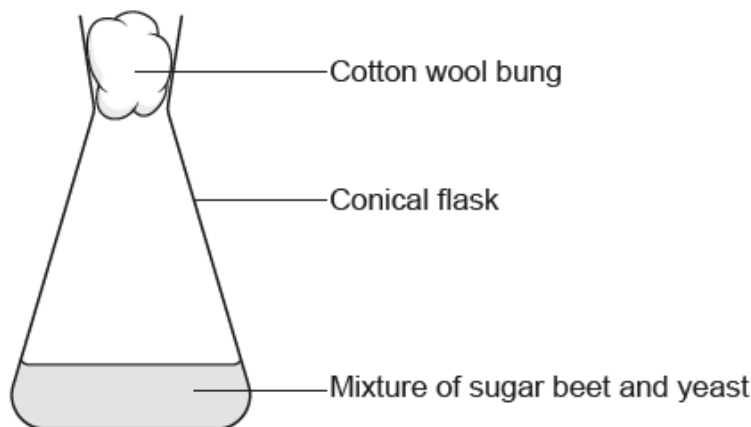
Question 7 (a) (i)

7 Bioethanol can be used as a fuel in cars.

This type of ethanol is made when anaerobic respiration happens in yeast.

(a) A teacher uses the equipment in the diagram to make this type of ethanol.

The yeast use glucose from a plant called 'sugar beet' for anaerobic respiration.



After 30 minutes the mixture is bubbling and feels warmer than it did at the start.

(i) Why does the mixture feel warmer?

Put a **ring** around the correct option.

The mixture feels warmer because the process of respiration is

endothermic / exothermic / photosynthetic.

[1]

A majority of candidates could recall that respiration is exothermic. The most common incorrect answer was endothermic.

Question 7 (a) (ii)

(ii) Why does the mixture bubble after 30 minutes?

..... [1]

Very few candidates were given a mark on this AO2 question. Many candidates mentioned a reaction, or that it was boiling. Some recognised that a gas was given off but didn't mention carbon dioxide.

Question 7 (b)

(b) Another type of respiration is aerobic respiration.

Complete the table to compare the processes of aerobic and anaerobic respiration.

Tick (✓) **one** box in each row.

Statement	Both types of respiration	Only aerobic respiration	Only anaerobic respiration
Happens without oxygen			
Produces the most ATP			
Requires glucose			

[2]

Most candidates gained at least 1 mark on this recall AO1 question about respiration. It was good to see the majority of candidates followed the guidance and only ticked one box in each row.

Question 7 (c)

(c) The teacher uses a light microscope to count the yeast cells in one drop of the mixture.

From this the teacher estimates there are 2 million yeast cells in the mixture in the flask.

Explain why this is only an **estimate** of the number of yeast cells in the flask.

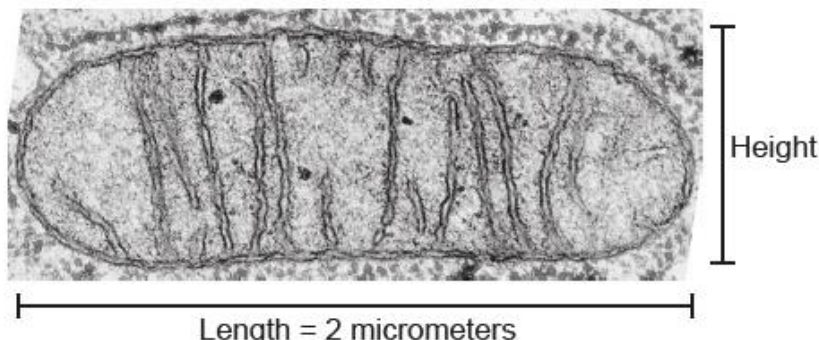
.....
 [1]

In this AO2 question, most candidates gave a reason why estimates are used such as the yeast cells are very small or that it would take too long to count them all, rather than why counting the yeast cells in a drop of mixture is an estimate.

Question 7 (d) (i)

(d) Aerobic respiration happens in the mitochondria in yeast cells.

An electron microscope was used to make this image of a mitochondrion.



(i) The length of the mitochondrion in the image is 2 micrometers.

Use this information to **estimate** the height of the mitochondrion.

Height of mitochondrion = micrometers [2]

In most cases many candidates put 1 as their answer, suggesting the height was half the length when it is smaller than a half. This suggests that the lines were not measured and were estimated. Without showing calculations or ratios candidates were either given zero or 2 marks.

Question 7 (d) (ii)

(ii) Complete the sentences to explain how electron microscopes have increased our understanding of sub-cellular structures such as mitochondria.

Put a **ring** around each correct option.

An electron microscope has high magnification, which allows us to see structures that are very **dark / large / light / small**.

An electron microscope has high resolution, which allows us to tell the difference between structures that are very **close together / dark / far apart / light**.

[2]

This AO1 question was well answered, with many candidates understanding magnification and resolution.

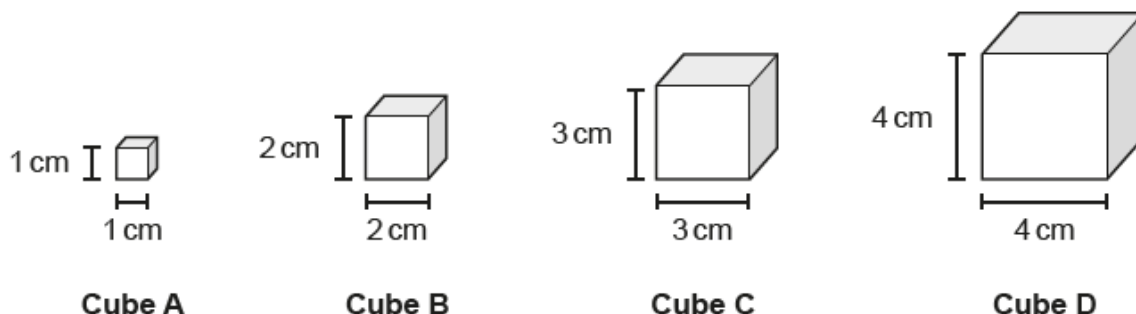
Question 8 (a) (i) and 8 (a) (ii)

8 Sam is learning about surface area : volume ratio.

- (a) Sam has four jelly cubes of different sizes, as shown in Fig. 8.1. Each cube has six square faces.

The cubes are a model of the surface area : volume ratio of animals of different sizes.

Fig. 8.1



The measurements of the cubes are recorded in the table.

Cube	Length of each side (cm)	Surface area of cube (cm ²)	Volume of cube (cm ³)	Surface area : volume ratio of cube
A	1	6	1	6 : 1
B	2	24		3 : 1
C	3	54	27	
D	4	96	64	1.5 : 1

- (i) Calculate the volume of cube B.

Volume = cm³ [2]

- (ii) Calculate the surface area : volume ratio of cube C.

Surface area : volume ratio = : [2]

The AO2.2 Questions 8 (a) (i) and 8 (a) (ii) were both assessing mathematical skills, calculating volume and then surface area to volume ratio respectively. On the whole candidates were either given zero due to incorrect numbers used and manipulated or given 2 marks for a fully correct answer. Candidates found the calculation of the volume slightly easier than the ratio.

Question 8 (a) (iii)

(iii) Describe the relationship between cube size and surface area : volume ratio.

.....
..... [1]

Most candidates found this AO3 question difficult and couldn't describe the relationship between surface area to volume ratio. Some candidates gave a partial relationship such as the larger the cube the larger the surface area or the larger the volume.

Question 8 (a) (iv)

(iv) Sam places jelly cubes **A**, **B**, **C** and **D** into a solution of coloured stain.
The stain diffuses into the jelly cubes.

Predict which cube will take the longest time for the stain to diffuse to the centre of the cube.

Explain your answer.

Prediction

Explanation

.....

.....

[2]

Most candidates were given the first marking point for predicting D as the cube that would take the longest time for the stain to diffuse into the centre. The second mark was rarely given as answers just repeated the idea it would take the longest time, or said it had the biggest surface area, which although correct from the table, does not explain why the diffusion of the stain would take longer.

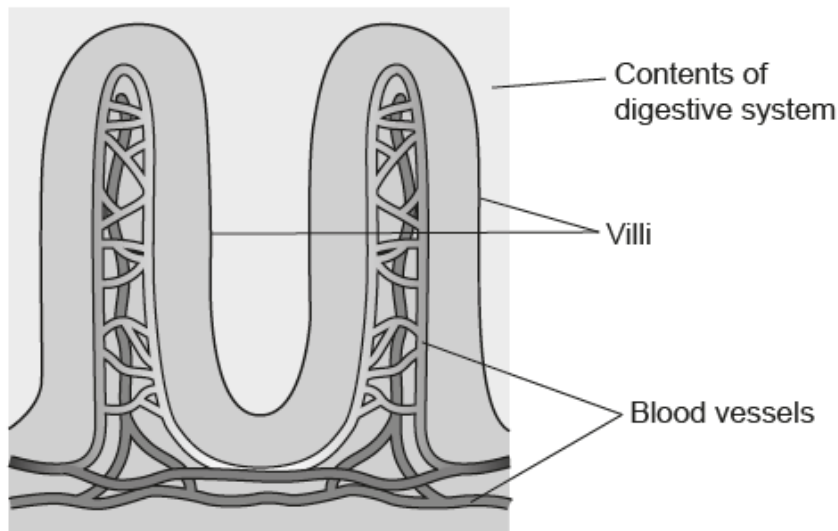
Question 8 (b) (i) and 8 (b) (ii)

(b) Humans are large animals. The human body is made of millions of cells.

To stay alive, every cell in the body needs a constant supply of water and other substances that are absorbed into the body by the digestive system.

Parts of the wall of the digestive system are covered with structures called villi, as shown in Fig. 8.2.

Fig. 8.2



(i) The surface area of the digestive system wall has villi rather than being flat.

Explain why this is an advantage.

.....
.....
.....
..... [2]

(ii) The villi contain blood vessels.

Explain why this is an advantage.

.....
.....
.....
..... [2]

Very few candidates were given any marks on Questions 8 (b) (i) and 8 (b) (ii). These questions were assessing the application of knowledge on the need for exchange surfaces and a transport system in multicellular organisms. Some candidates recognised the larger surface area. Many answers referred to the villi speeding up digestion and the blood protecting the villi against disease or carrying oxygen.

Misconception



Many candidates thought that the villi were used in the immune system for defence and to protect us from pathogens. This could be due to a mix up of cilia and villi.

Question 9 (a)

9 Our features are affected by our genome and our environment.

(a) Which statement is correct?

Tick (✓) **one** box.

Every feature is controlled by a single gene.

Every feature is controlled by multiple genes.

Most features are controlled by a single gene.

Most features are controlled by multiple genes.

[1]

Some candidates could recall that most features are controlled by multiple genes. The incorrect answers were spread throughout the other three choices.

Question 9 (b)

(b) Scientists have different terms for different parts of the genome.

Draw lines to connect each **term** with its correct **explanation**.

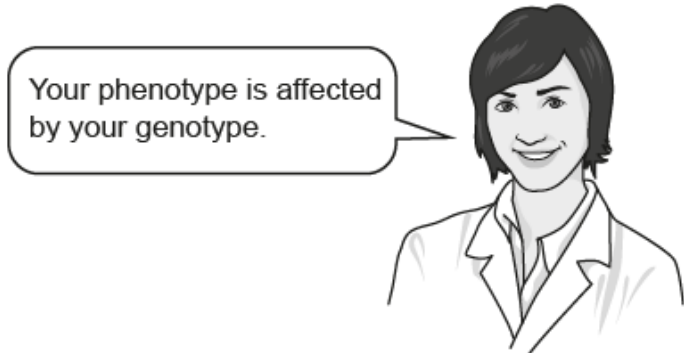
Term	Explanation
Allele	A dominant or recessive version of a gene.
Chromosome	A section of a chromosome.
Gene	A sex cell used for sexual reproduction.
Genome	A very long molecule of DNA. Humans have 23 pairs of these.
	All the genetic material of an organism.
	The part of a cell where the genome is stored.

[4]

This question was assessing the recall, AO1, of some of the key terms used in genetics. Most candidates were given at least 1 mark and often 2 marks. Few candidates knew all four terms. The most common correct line drawn was for 'chromosome', and 'genome' was the least.

Question 9 (c)

(c) A scientist says:



Explain the terms **phenotype** and **genotype**.

Phenotype

.....

Genotype

.....

[2]

Very few candidates could recall the definitions and explain phenotype and genotype. Of those candidates given marks, they were for stating that phenotype is how we look or our physical features. Most candidates just stated our genotype was our genes rather than using the key term alleles or genetic variants.

Question 9 (d)

(d) Describe how our genes affect our features.

.....

.....

.....

.....

[2]

Candidates found this AO1 question very challenging with very few candidates being given any marks. Most answered in terms of genes coming from both parents and that we get a combination of features from these genes. Some candidates mentioned dominant and recessive alleles, without reference to the genes carrying the code and making proteins.

Question 9 (e)

(e) Describe **one** example of how our features can be affected by our environment.

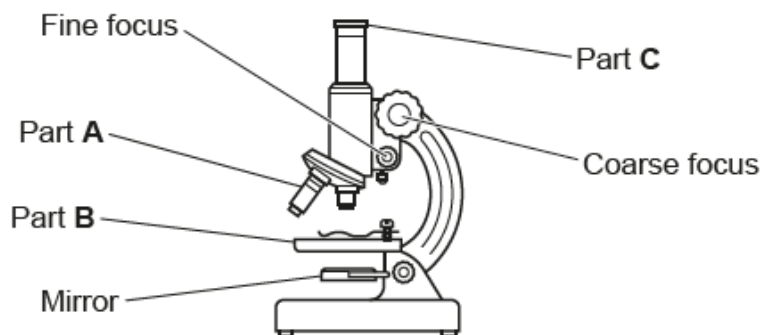
.....
 [1]

Candidates were asked to apply their knowledge of environmental features to give an example of how a feature could be affected. Common correct answers were about sun tans and skin colour changing in the sun, and hair colour and dye. Some candidates didn't quite give enough detail, for example said diet, but didn't say what feature it would affect.

Question 10 (a) (i) and 10 (a) (ii) and 10 (a) (iii)

10 A doctor uses a light microscope to look at the chromosomes in human body cells.

(a) The microscope is shown in the diagram.



(i) Draw lines to connect each **part** of the microscope with its correct **name**.

Part	Name
Part A	Eyepiece lens
Part B	Objective lens
Part C	Stage

[1]

(ii) The doctor uses steps **A** to **D** to look at the cells on a slide.

The steps are **not** in the correct order.

- A** Turn the coarse focus until the image is as clear as possible.
- B** Turn the fine focus until the image is as clear as possible.
- C** Adjust the mirror until the image is bright enough to see.
- D** Place the slide under the microscope.

Write the letters in the boxes to show the correct order of the steps.

One has been done for you.

D			
----------	--	--	--

[1]

(iii) The chromosomes in the cells are **not** clearly visible under the microscope.

Describe **one** thing the doctor can add to the slide to improve the visibility of the chromosomes.

..... [1]

Candidates were asked to demonstrate their knowledge and understanding of the parts and use of the microscope in Question 10 (a). Question 10 (a) (i) was well answered with most candidates identifying the correct parts from the diagram. More than half of the candidates could also put the steps in the correct order in Question 10 (a) (ii). Candidates found Question 10 (a) (iii) more difficult. Some correctly answered with stain or iodine, but many said to add water, to use more light or focus it.

Question 10 (b) (ii)

(ii) What is the expected ratio of XX to XY offspring?

Ratio = : [1]

This question was well answered with most candidates getting an equal ratio such as 1:1 or 2:2 from the Punnett square.

Question 10 (c)

(c) Describe how inheriting a Y chromosome causes the baby to be born with male characteristics.

.....
.....
.....
..... [2]

In this AO1 question, recall of how a human's sex is determined by the inheritance of genes located on sex chromosomes; specifically, genes on the Y chromosome that trigger the development of testes was being assessed. Most candidates could not recall any of this knowledge and the few marks that were given were for recognising that there are genes on the Y chromosome. Most answers just described the XX as female and XY as male or thought that the Y chromosome was dominant.

Question 10 (d)

(d) Some females have a condition called Turner syndrome.

- They only have one X chromosome instead of two.
- There is no cure.
- They need to have their heart, kidneys and reproductive system checked regularly for problems throughout their lives.

A baby can be tested for Turner syndrome before they are born. Their chromosomes are tested using a sample of amniotic fluid from the womb.

Describe benefits **and** risks of doing this test before the baby is born.

.....
.....
.....
.....
..... [3]

In this AO3 question most candidates could draw conclusions from the information given and attempted to describe benefits and risks of doing the test before the baby is born. The most common answers were about preparing for the baby and causing harm or a miscarriage. Some candidates thought that a benefit was just knowing if they had Turners syndrome or not.

Question 11 (a)

11 Hormones help to control the human body.

(a) Complete the sentences to describe the action of hormones.

Use words from the list.

effectors	faster	glands	longer
receptors	shorter	slower	

Hormones are secreted by

Compared to nervous system responses, hormone responses are usually

..... and-lasting.

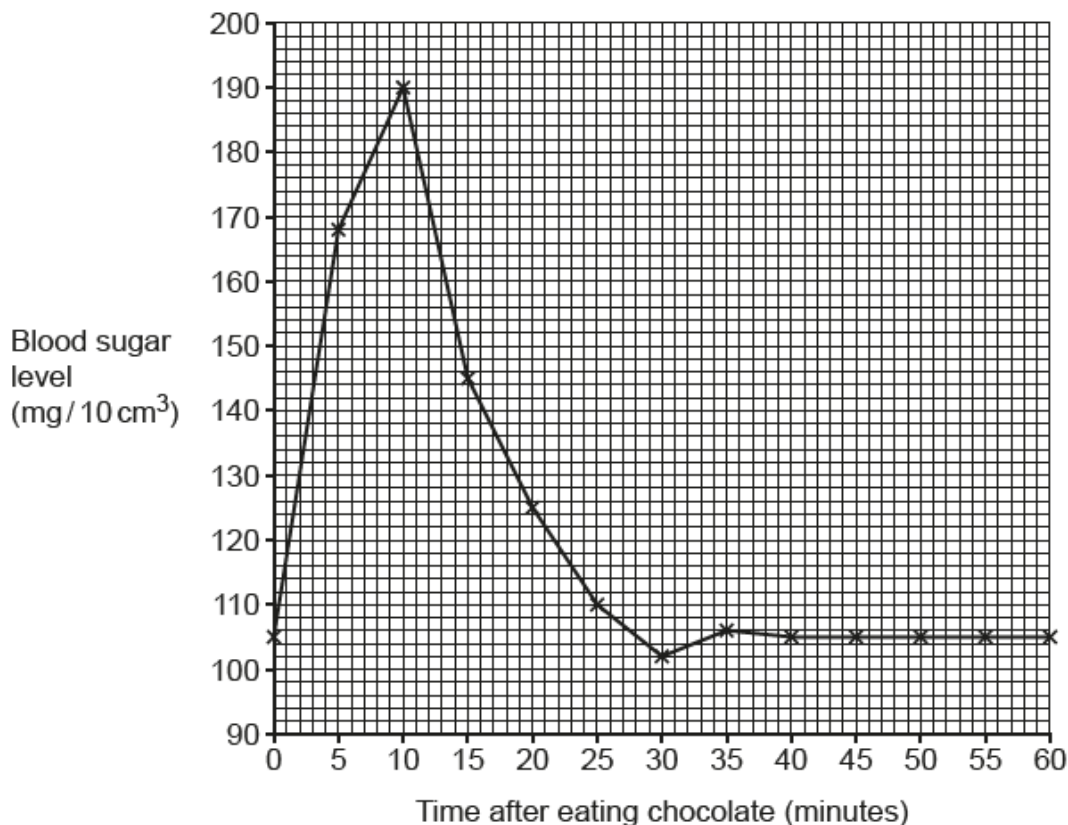
[2]

This question was assessing the recall of knowledge of the action of hormones. Many candidates were given at least 1 mark for glands.

Question 11 (b) (i)

(b) A student measured their blood sugar level every 5 minutes after eating chocolate.

The results are shown in the graph.



(i) Calculate the change in blood sugar level between 10 minutes and 25 minutes after eating the chocolate.

Change in blood sugar level = mg/10 cm³ [2]

Many candidates were given 2 marks on this question. They read 190 and 110 from the graph and correctly calculated 80 as the change in blood sugar level.

Question 11 (b) (ii)

(ii) Between which times does the hormone insulin **start** to affect the student's blood sugar level?

Tick (✓) **one** box.

Between 5 minutes and 10 minutes.

Between 15 minutes and 20 minutes.

Between 30 minutes and 35 minutes.

Between 40 minutes and 60 minutes.

[1]

Candidates were asked to analyse the graph and determine when the insulin started to affect the students blood sugar. Nearly half of the candidates recognised the change in gradient between 5 and 10 minutes.

Question 11 (b) (iii)

(iii) The student concludes that their normal blood sugar level is 105 mg/10 cm³.

Describe evidence from the graph that supports this conclusion.

.....

.....

.....

..... [2]

Many candidates could identify one piece of evidence from the graph that supported the conclusion and were given 1 mark. The most common correct answers were from the guidance, such as it started at 105 before the chocolate was eaten, or that the line stayed constant at 105 after 40 minutes.

Question 11 (c)

(c) Hormones can be used as a contraceptive.

Explain **one** benefit and **one** risk of taking a contraceptive pill containing hormones.

Benefit

.....

Risk

.....

[2]

This question was assessing AO1, the recall of benefits and risks of taking a contraceptive pill with hormones. Many candidates were given at least 1 mark and had a wide range of knowledge on this subject. The most common benefit was to not get pregnant. The most common risks were about forgetting to take it, it not being 100% effective and the risk of side effects, which many candidates gave valid examples of.

Misconception



Many candidates thought that the contraceptive pill can make a woman infertile.

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