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GCSE (9-1)

Examiners' report

TWENTY FIRST CENTURY SCIENCE BIOLOGY B

J257

For first teaching in 2016

J257/01 Summer 2024 series

Version 1

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Contents

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.

Paper 1 series overview

J257/01 is the first of two Foundation Tier papers assessing Biology B (Twenty First Century Science). The specification content of J257 Biology B is divided into eight chapters. The first six chapters describe the science content of the specification. Chapter seven describes 'Ideas about Science' and covers the requirements of 'Working Scientifically'. The final chapter describes the requirements for practical skills. The Breadth in Biology paper assesses content from across the whole specification. The paper includes short answer response questions such as structured questions, calculations and questions based on practical skills. There are no Level of Response questions on J257/01.

It would appear that candidates were entered for the correct tier. Almost all engaged fully with the paper and left few questions unanswered. Candidates did not appear to run out of time, and a wide spread of marks was obtained. It was evident that candidates understood the instructions for each question, and were mostly able to access them. One issue that was noted this year, particularly on Questions 7 (c) (ii) and 7 (d) was that not all candidates seemed to understand the command words how and why.

'How' means in what way, and 'why' means for what reason.

Candidates continue to follow instructions well, for example by drawing the correct number of lines or ticking the appropriate number of boxes. Some candidates showed clear evidence of highlighting or underlining key words in the stem of the question, which is good exam practice as there were a few instances this year of key information in the stem being apparently overlooked as candidates dived straight into an answer.

Candidates in this series demonstrated a greater confidence in mathematical skills, especially in the calculation of means and the use of decimal places and significant figures.

Questions common to the Foundation and Higher Tier papers were Questions 10 and 11.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
• read questions carefully, taking note of the command words, and engaged fully with the content, e.g. Questions 6 (e), 7 (c) (ii) • gave relevant and focused, rather than generic, responses • demonstrated a range of mathematical skills and always showed their working, e.g. Questions 9 (b) (i), 11 (c) and 11 (d) (iii) • used scientific terminology accurately, especially terminology associated with quantities, e.g. Question 10 (a) (ii), planning practical investigations, Question 10 (a) (i), and the immune system, Question 7 (d) • demonstrated that they had attempted to practise or revise practical skills, e.g. Questions 10 (a) (i) and 3 (c).	• did not attempt some questions • did not seem to understand or follow command words such as how or why • did not use scientific terminology, e.g. used the word amount rather than volume • demonstrated a lack of knowledge of basic ideas such as the structure and function of cells, organs and organ systems in Questions 1 (a)-(c), 4 (c), 6 (a)-(c).

Question 1 (a)

1

(a) Draw lines to connect each **organ system** to its **function**.

Organ system	Function
Digestive system	Produce and release hormones
Endocrine system	Gaseous exchange
Nervous system	Coordinate fast responses to stimuli
Respiratory system	Absorb dissolved food molecules

[3]

All candidates attempted this question and correctly followed the instruction to link the organ systems to their functions using lines. Most obtained 3 marks. Those given fewer than 3 marks generally knew the functions of the nervous and digestive systems, but were less secure in their knowledge of the respiratory and endocrine systems.

Question 1 (b)

(b) Which structure is the **smallest**?

Tick (✓) **one** box.

- Cell ☐
- Nucleus ☐
- Organ ☐
- Tissue ☐

[1]

Most candidates correctly selected nucleus on this question.

Question 1 (c)

(c) Which structure is the **smallest**?

Tick (✓) **one** box.

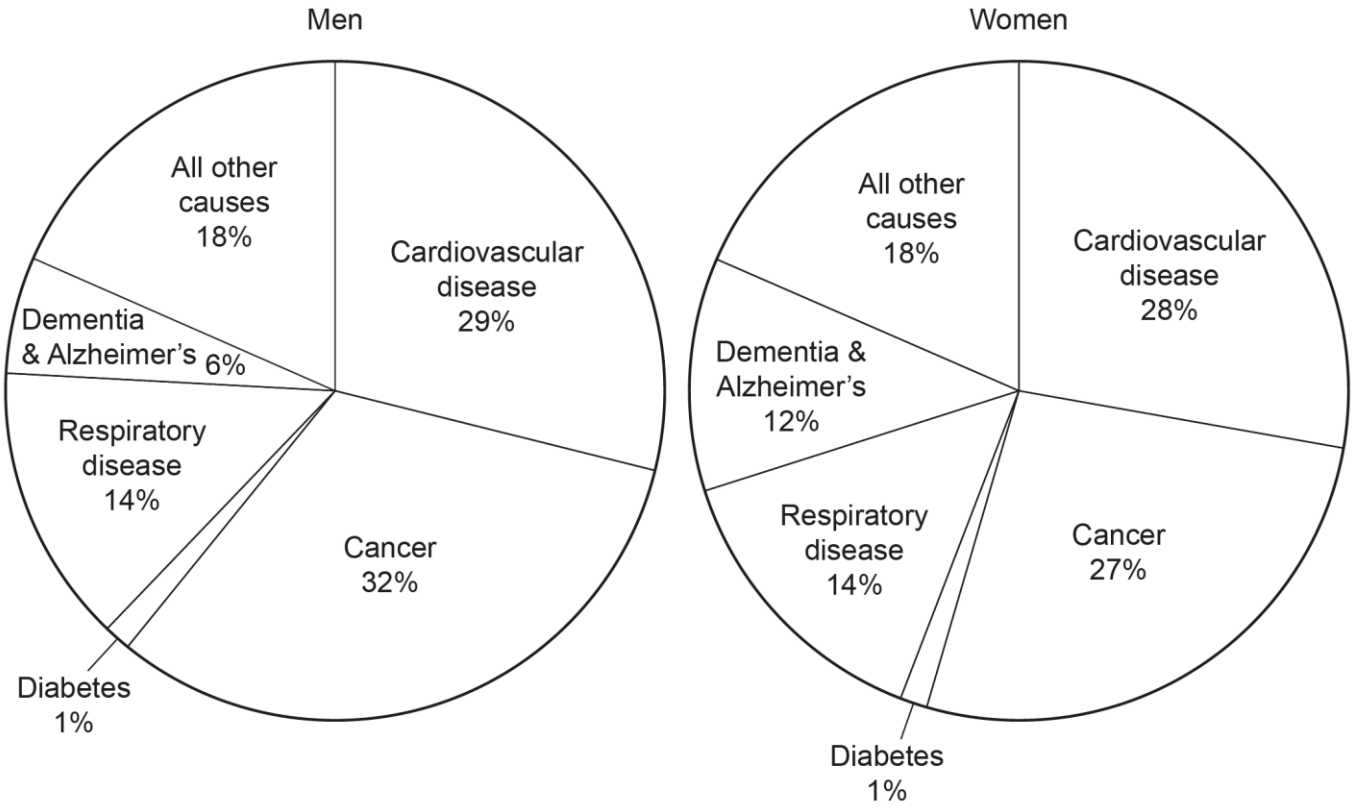
- Cell ☐
- Chromosome ☐
- Gene ☐
- Nucleus ☐

[1]

Around half of candidates selected the correct answer of gene, and almost all incorrect responses chose chromosome as the smallest structure, which would suggest that there is some confusion in the relative sizes of these structures.

Question 2 (a)

2 The pie charts show data about the cause of death for men and women in the UK in 2012.



(a) Which statements about the causes of death in men and women are **true** and which are **false**?

Tick (✓) **one** box in each row.

	True	False
A bigger proportion of men died of dementia and Alzheimer's than women.		
A bigger proportion of women died of cancer than men.		
The same proportion of men and women died of other causes.		
The same proportion of men and women died of respiratory disease.		

[2]

Almost all candidates were able to correctly interpret the pie charts.

Question 2 (b)

(b) State **two** lifestyle factors that increase a person's risk of developing cardiovascular disease.

1 .....

2 .....

[2]

Candidates understood the term lifestyle factors and the majority were able to name at least one lifestyle factor that increases the risk of developing cardiovascular disease. The most common issue was the use of imprecise language, for example 'drinking' rather than stating alcohol, and 'unhealthy diet' rather than stating what was unhealthy about the diet such as high fat or high salt.

Question 2 (c)

(c) Complete the sentences to describe the circulatory system.

Use words from the list.

alveoli	**blood**	**capillaries**
impulses	**nerves**	**valves**

The job of the human circulatory system is to transport ..... around the body. It is made up of the heart and blood vessels.

There are 3 types of blood vessels: arteries, veins and ..... .

The heart contains ..... to make sure the blood flows in the correct direction.

[3]

All candidates answered this question and most were given all 3 marks. Almost all candidates knew that the job of the circulatory system is to transport blood. Incorrect responses for the second sentence mostly included alveoli rather than capillaries, and for the third, nerves rather than valves.

Question 2 (d)

(d) Which **two** substances do the kidneys filter from the blood to form urine?

Tick (✓) **two** boxes.

- Carbohydrates ☐
- Fats ☐
- Protein ☐
- Urea ☐
- Water ☐

[2]

The majority of candidates obtained at least 1 mark on this question. The answer 'water' was regularly selected, 'urea' less so.

Question 3 (a)

3 A student is investigating the distribution of stomata on leaf surfaces.

The student removes 3 leaves from the same plant.

Leaf 1 – they cover the lower surface of the leaf in waterproof grease.

Leaf 2 – they cover the upper surface of the leaf in waterproof grease.

Leaf 3 – they cover both surfaces of the leaf in waterproof grease.

The results of the experiment are shown in the diagram.

Leaf 1	Leaf 2	Leaf 3
Slight wilting	Significant wilting	No sign of wilting
		

(a) Which conclusion can be made from the results of the investigation?

Tick (✓) **one** box.

There are no stomata on the lower surface of the leaf. ☐

There are less stomata on the lower surface of the leaf. ☐

There are the same number of stomata on the upper and lower surface of the leaf. ☐

There are more stomata on the lower surface of the leaf. ☐

[1]

The majority of candidates seemed to find the whole of Question 3 challenging. The main issue was that candidates were seemingly unfamiliar with the function of stomata. On this part-question, around a third of candidates selected the correct answer, and there was no other option particularly chosen.

Question 3 (b)

(b) Explain why **leaf 3** did **not** wilt.

.....

.....

.....

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

The majority of candidates found this question challenging.

Misconception

Several misconceptions were highlighted in this question. Incorrect responses that occurred regularly included the following :

Water enters the leaf through the stomata (this was very commonly written).

Stomata attempt to 'invade' the leaf, and are blocked from entering the leaf by the grease.

Wilting is due to a lack of sugar, or unwanted substances entering the leaf.

Wilting was prevented by the leaf absorbing the grease.

Question 3 (c)

(c) Describe a control experiment you could perform alongside this experiment.

Method .....

.....

Expected result .....

.....

[2]

Few candidates were able to demonstrate that they knew what a control experiment is and around a quarter of candidates did not attempt this question. Many suggested alternative experiments involving plants, such as investigating the effect of light intensity of photosynthesis in pondweed, starch testing and osmosis.

Question 3 (d)

(d) Which statements about stomata are **true** and which are **false**?

Tick (✓) **one** box in each row.

	True	False
Mineral ions move into the leaf via the stomata.		
Stomata allow water to enter the leaf.		
Stomata are needed for the exchange of gases.		
The size of the stomata is controlled by guard cells.		

[2]

All candidates attempted this question and around half were able to obtain at least 1 mark. A common incorrect response was ticking 'true' for 'Stomata allow water to enter the leaf'.

Question 3 (e)

(e) Which process in plants uses water as a reactant?

Tick (✓) **one** box.

Photosynthesis ☐

Reproduction ☐

Respiration ☐

[1]

The majority of candidates answered this question correctly.

Question 3 (f)

(f) Which structure transports water up the plant?

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

About a third of candidates were able to give the correct answer of xylem. The most common incorrect answer was 'stem' followed by 'root'.

Question 4 (a)

4

(a) Which scientists developed the theory of evolution by natural selection?

Tick (✓) **one** box.

Charles Darwin and Alfred Russel Wallace. ☐

Charles Darwin and Gregor Mendel. ☐

Gregor Mendel and Alfred Russel Wallace. ☐

[1]

Most candidates knew that Charles Darwin developed the theory of evolution by natural selection as almost all chose the first or second option. Around two thirds knew that Alfred Russel Wallace also was involved in the development of the theory.

Question 4 (b)

(b) Rats are considered a pest to many farmers as they eat their crops.

A chemical called warfarin can be used to kill rats.

Put statements **A** to **E** in the correct order to describe why many rats are no longer killed by warfarin.

A A mutation gave some rats resistance to warfarin.

B More rats became resistant to warfarin over time.

C Resistant rats were more likely to reproduce.

D Resistant rats were more likely to survive.

E The allele for resistance was passed to offspring.

Write **one** letter in each box.

[4]

Almost all candidates obtained 1 or more marks on this question, correctly identifying A as the first step in the process. Confusion arose with the placement of C and D, with some candidates believing that resistant rats reproduced before they survived.

Question 4 (c)

(c) Warfarin prevents blood clotting.

What is the role of red blood cells?

.....

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

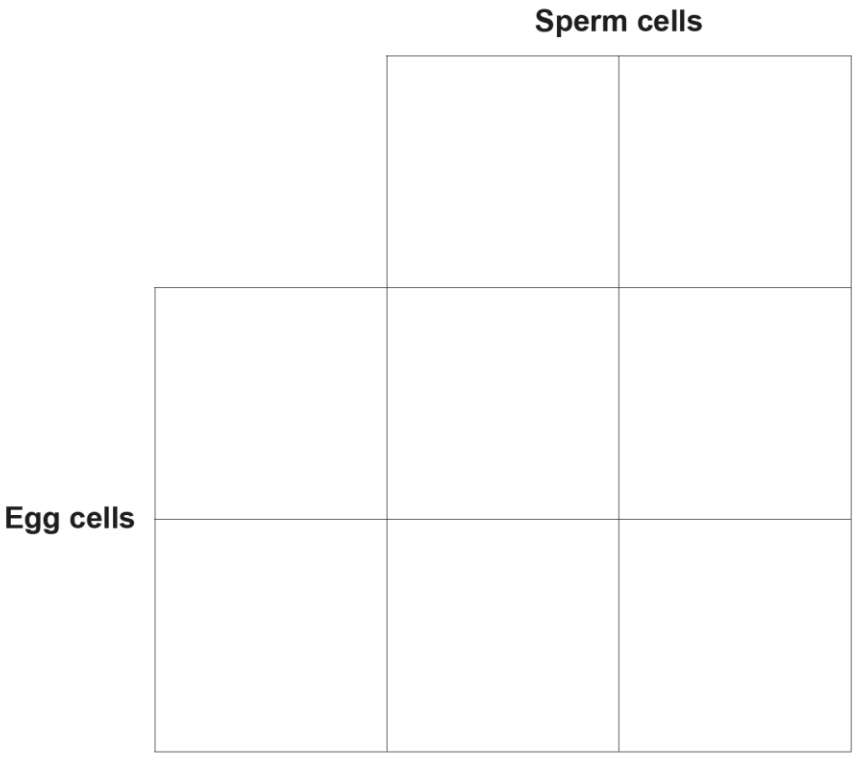
Around half of candidates gave the correct answer. Common incorrect responses included that red blood cells pump blood around the body, and clot blood.

Question 5 (a)

5 Sex determination in birds is controlled by two chromosomes:
- chromosome Z
- chromosome W.

Male birds have two Z chromosomes.
Female birds have one Z chromosome and one W chromosome.

(a) Complete the Punnett square to show that a bird breeder has a 0.5 probability of each offspring being male or female.



[3]

The majority of candidates engaged very well with this question and obtained all 3 marks, even though sex determination in birds is not a familiar process. There were very few instances where candidates selected the wrong chromosomes for the egg and sperm cells or did not perform the cross correctly.

Question 5 (b)

(b) Complete the table to compare sex determination in birds and humans.

Tick (✓) **one** box in each row.

	Only birds	Only humans	Both birds and humans
Sex is determined by two different chromosomes.			
Males are produced when there are two copies of the same chromosome.			
In females, sex is determined by the presence of two different chromosomes.			

[2]

All candidates attempted this question and most were able to obtain 1 mark, most often for identifying that sex is determined by two different chromosomes in both birds and humans.

Question 5 (c)

(c) Describe how a human male baby develops male characteristics.

.....

.....

.....

.....

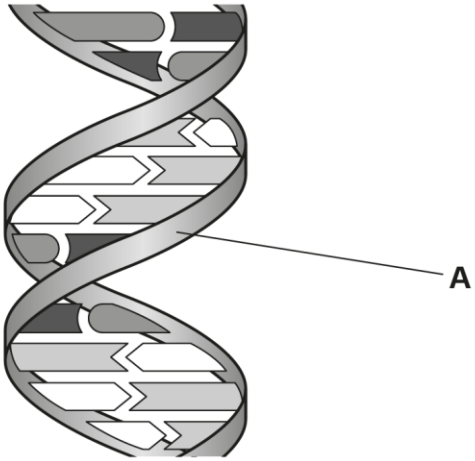
.....

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

A small number of candidates did not attempt this question and most found it challenging. A number of issues and misconceptions were evident in their responses. Candidates tended to list male primary and more often secondary sexual characteristics. The main misconception was that male characteristics are acquired through contact with other males, and from copying what is perceived by some candidates to be male behaviour. Many candidates stated that male characteristics develop due to the X chromosome or that male genes/alleles are dominant and female genes/alleles recessive. Some candidates correctly mentioned testes and testosterone in their responses, but very few demonstrated that they knew that there is a gene on the Y chromosome that causes the development of testes.

Question 5 (d)

(d) The diagram shows the structure of DNA.



What are the **two** components of the part labelled **A** on the diagram?

1 .....

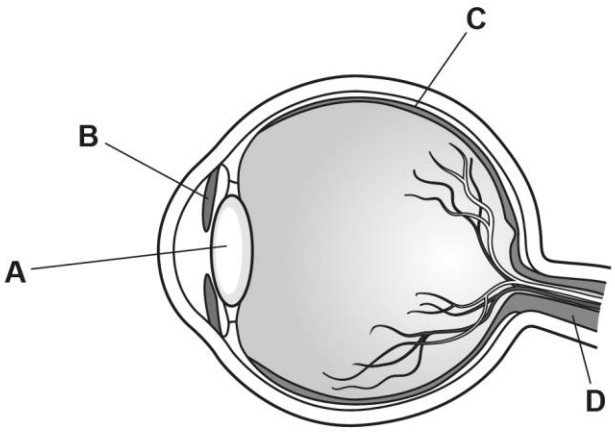
2 .....

[2]

A variety of incorrect responses were commonly given in response to this question such as base, ATCG, gene, chromosome or double helix. Most candidates were unable to obtain any marks here.

Question 6 (a)

6 The diagram shows the human eye.



(a) Which letter shows the retina? ..... **[1]**

Less than half of candidates gave the correct answer of C. Almost all incorrect responses selected D, the optic nerve.

Question 6 (b)

(b) Which letter shows the iris? ..... **[1]**

A similar number of candidates to part (a) selected the correct answer. The most common incorrect response was A, the lens.

Question 6 (c)

(c) What role does the optic nerve have in the functioning of the eye?

Tick (✓) **one** box.

- Bends light to focus it on the retina. ☐
- Controls the amount of light that enters the eye. ☐
- Controls the diameter of the pupil. ☐
- Transmits nerve impulses to the brain. ☐

[1]

Over half of candidates selected the correct answer, namely the optic nerve transmits nerve impulses to the brain. There was no particular incorrect option chosen.

Question 6 (d)

(d) Some babies are born with cataracts.

Cataracts affect the lens.

Explain how cataracts would affect a baby's vision.

.....

.....

.....

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

The majority of candidates obtained at least 1 mark on this question, answering most often that cataracts impair vision, although some went into greater detail, describing the vision as blurred. Candidates were less secure in their understanding of how cataracts affect the eye, despite being told in the stem that cataracts affect the lens. Many believed that cataracts damage the retina or cornea. Few were able to link a cloudy lens to reducing the amount of light entering the eye.

Question 6 (e)

(e) Surgical removal of cataracts in babies can be done, but there may be problems after surgery.

In a study, scientists removed the lens from 12 babies with cataracts but left behind the stem cells.

All the babies grew a new lens within 3 months.

Should more babies with cataracts be offered this treatment?
Explain your answer.

.....

.....

.....

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

There were some well-considered responses that referred to both the benefits and disadvantages of the procedure. There were few 'generic' responses and most candidates attempted to make their answer relevant to this particular question. Some candidates were confused by this question. For example, they believed that the stem cells were left behind by mistake and that growing a new lens was an undesirable outcome.

Question 7 (a)

7 Foot and Mouth is a disease found in cattle, sheep and pigs.

It is caused by a virus.

(a) Name another type of organism that causes disease.

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

Around half of candidates obtained the mark on this question. Common incorrect responses referred to organisms (e.g. rats, bats and mosquitoes) rather than pathogens.

Question 7 (b)

(b) Foot and Mouth is spread between animals directly by contact and indirectly through transmission on equipment and people.

In 2001 there was an outbreak of Foot and Mouth in the UK.
The virus spread across the country very rapidly.
The government made the decision to destroy animals that had the disease.

Suggest why the government decided to take this approach.

.....

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

Two key pieces of information in the stem of the question (namely 'Foot and Mouth is a disease found in cattle, sheep and pigs' and 'Foot and Mouth is spread between animals') were overlooked by some candidates. They therefore incorrectly answered this question by stating that the destruction of farm animals was to stop the disease infecting people. Nevertheless, well over half of candidates gave a variety of correct responses, including referring to food security concerns and the economic impact of the disease.

Question 7 (c) (i)

(c)
(i) Other than destroying their animals, suggest how farmers can prevent the spread of the disease between two animals on their farms.

State **two** ways.

1 .....

.....

2 .....

.....
[2]

The majority of candidates were given at least 1 mark on this question, with around a third obtaining both marks. Candidates engaged very well with the question and there was a wide variety of sensible suggestions.

Question 7 (c) (ii)

(ii) Suggest how vets visiting many farms can prevent spreading the disease to animals on different farms.

.....

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

A number of candidates seemed to interpret this question as 'why would vets visit farms?' and therefore incorrectly suggested that vets would visit farms to educate farmers, treat animals or administer vaccines.

Question 7 (d)

(d) Animals can be vaccinated against Foot and Mouth.

Describe how a vaccination against Foot and Mouth would provide immunity.

.....

.....

.....

.....

.....

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

Compared to earlier series, candidates appear to be much more secure in their knowledge of the immune system and how the vaccination process works. Although there are still those who write that vaccines contain safe forms of the disease rather than the pathogen, or that vaccines contain antibodies, many more are using terms associated with the immune system with confidence and accuracy.

One point to note here is that some candidates appeared to be unaware of the difference between 'how' and 'why'. Therefore those candidates answered here in terms of why animals might be vaccinated.

Question 7 (e)

(e) Suggest why vaccinating animals when the outbreak happened was **not** a solution to the problem.

.....

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

Candidates found this relatively demanding question challenging. Many thought that there were simply too many farm animals in the UK to make vaccination a practical option. Others believed that it would take too long to develop a vaccine, or that a vaccine would be too expensive.

Question 8 (a)

8

(a) Cells can divide by meiosis or mitosis.

Tick (✓) **one** box in each row to show whether the statement describes **meiosis** or **mitosis**.

	Describes meiosis	**Describes mitosis**
Cells formed are gametes.		
Cells formed contain half the number of chromosomes.		
Cells formed contain identical genetic information.		
There are two cell divisions.		

[3]

Most candidates selected two or three boxes correctly and therefore obtained 2 marks on this question. There was no particular statement that caused difficulty, or pattern to the statements selected, although candidates most often knew that gametes are produced in meiosis.

Question 8 (b)

(b) Sperm cells are adapted to allow them to swim.

Suggest why sperm cells need a lot of mitochondria.

.....

.....

.....

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

The majority of candidates found this question very challenging and were unable to obtain any marks. There were a couple of issues here. The first was that few candidates made the link between the presence of mitochondria and the energy requirement of sperm, instead they just described the function of sperm. The other issue was that language associated with mitochondria was often vague. For example, mitochondria were described as power houses or energy factories. ATP was almost never mentioned. The term 'cellular respiration' is used in the specification and candidates should be encouraged to use this, rather than just writing 'respiration'. In addition, rather than associating mitochondria with energy release, they should be more specifically described as the sites where molecules of ATP are made.

Question 8 (c)

(c) Different species of squirrels can be found on either side of Arizona's Grand Canyon.
A canyon is a deep, narrow valley with steep sides.

When the Grand Canyon formed, the squirrels that lived on either side of the canyon evolved to become two different species.

Explain how the formation of these two new species happened.

.....

.....

.....

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

This can be a difficult concept, and candidates should be commended for their engagement and good attempts at answering. Candidates were often so close to being awarded the mark, but a lack of precision in their use of language or their demonstration of misconceptions let them down. Many candidates recognised that the environment or habitat was different on either side of the canyon, with some giving examples of how the habitats might differ. The idea of mutation was often written about too. Geographical separation was rarely mentioned and often arrived at by chance rather than by intent.

Misconception

Candidates appeared to believe that characteristics are acquired during a lifetime and then passed onto offspring. They also gave the impression that their understanding was that individuals rather than populations adapt and that individuals evolve within their lifetime.

Question 8 (d)

(d) Squirrels that inhabit Canada are starting to emerge from hibernation early.

These squirrels are producing sperm that cannot swim.

What effect will this have on the squirrel population in Canada?

.....

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

Candidates answered this question well, using concise and appropriate language.

Question 9 (a)

9 The normal range for a dog's body temperature is between 38.3 °C and 39.2 °C.

Vets suggest that owners measure their dog's temperature so that they are aware of their dog's normal body temperature.

(a) Why would it be helpful to know what their dog's normal body temperature is?

.....

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

This question was about thermoregulation and required candidates to apply their scientific knowledge and understanding to the scenario of an unwell dog. Unfortunately, many candidates were sidetracked by the scenario and answered as pet owners rather than biologists, for example they said the owner would know when to take to the dog to see a vet, or so they would know if there was 'something wrong' with the dog.

Question 9 (b) (i)

(b)

(i) An owner measures their dog's temperature 3 times.

	Temperature (°C)
1	38.7
2	38.9
3	38.7

Calculate the mean body temperature.

Give your answer to **1** decimal place.

Mean body temperature = ... °C **[3]**

Most candidates were given 2 or 3 marks on this question, 2 marks being for not giving their answer to one decimal place. A small number of candidates still do not show their working and it is essential for them to do this, as working marks can often be awarded if the final answer is incorrect.

Question 9 (b) (ii)

(ii) Why is it sensible to measure the dog's temperature a few times and then calculate the mean?

.....

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

Candidates appear to not understand the reasons for calculating a mean. Common incorrect responses included the owner would be able to work out the dog's average temperature, the thermometer might be broken or that the owner might not use the thermometer correctly.

Question 9 (c)

(c) Dog owners are advised to take their dog to the vet if its temperature is consistently over 40 °C.

A different owner is worried about their dog.

They measure their dog's temperature every hour for 7 hours.

Hour	1	2	3	4	5	6	7
Temperature (°C)	39.0	39.2	39.4	40.1	40.0	39.4	39.0

Should the owner take the dog to the vet?
Explain your answer.

.....

.....

.....

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

Most candidates obtained at least 1 mark on this question and used appropriate data to support their decision. A small proportion of candidates were sidetracked again and answered from the point of view of the dog's owner (e.g. 'the owner should take the dog to the vet because it's better to be safe than sorry') rather than engaging with the data, but these candidates were in the minority. Other candidates did consider the data but not in the light of the readings being consistently over 40°C, referring only to the normal range given in Question 9 (a). Nevertheless, there were some very well observed responses that used the data to good effect including the correct calculation of the mean temperature over the seven hours.

Question 9 (d)

(d) In hot weather dogs find it difficult to cool down.

Explain why this could be harmful to the dog's health.

.....

.....

.....

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

A wide variety of incorrect responses were given here, such as the dog would faint, have a stroke, have a heart attack, develop cancer or die. Many candidates attempted to explain why dogs would find it hard to cool down, referring to thick coats and only being able to sweat through the paws. Very few candidates made the link between high body temperature and enzyme function.

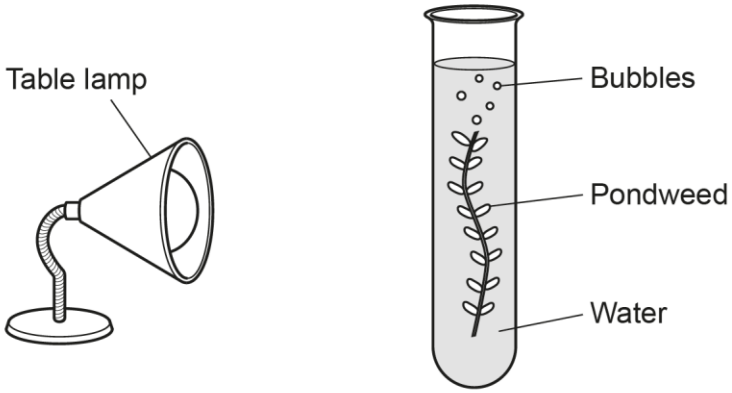
Question 10 (a) (i)

10 A student is investigating how light intensity affects the rate of photosynthesis.

(a)

(i) **Fig. 10.1** shows the equipment the student sets up.

Fig. 10.1



Describe the method the student will use with the equipment in **Fig. 10.1** to find how light intensity affects the rate of photosynthesis.

Include in your answer:
- what they will change
- what they will keep the same
- what data they will record.

.....

.....

.....

.....

.....

.....

.....

.....

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

Many candidates obtained 1 or 2 marks on this question, performing best on the section that asked them to state what they would keep the same. Fewer candidates were able to state what they would record and often just said they would count the number of bubbles, rather than the number in a set period of time.

Some candidates simply stated that would change the light intensity and didn't explain what they would need to do to change the light intensity, although many did explain that they would vary the distance of the pondweed from the lamp, or would use a lamp with a range of intensity settings.

It should be noted that candidates will not gain credit for writing about 'amounts' of substances – they need to be specific and, for example, refer to volume or mass.

Exemplar 1

Include in your answer:
- what they will change
- what they will keep the same
- what data they will record.

- They will change the distance of the lamp
- They will keep the same amount of water and same pondweed
- They will record the bubbles

The student is going to ~~count~~ measure the distance from the lamp to the glass, then ~~recount~~ measure the bubbles. Then you are going to keep on changing the distance of the lamp from the glass and measure the pondweed **[3]**

Sometimes candidates can get lost in an answer, so this question had scaffolding to help to direct them in their response. This candidate did exactly what they were asked, which helped them to obtain 2 out of the 3 available marks.

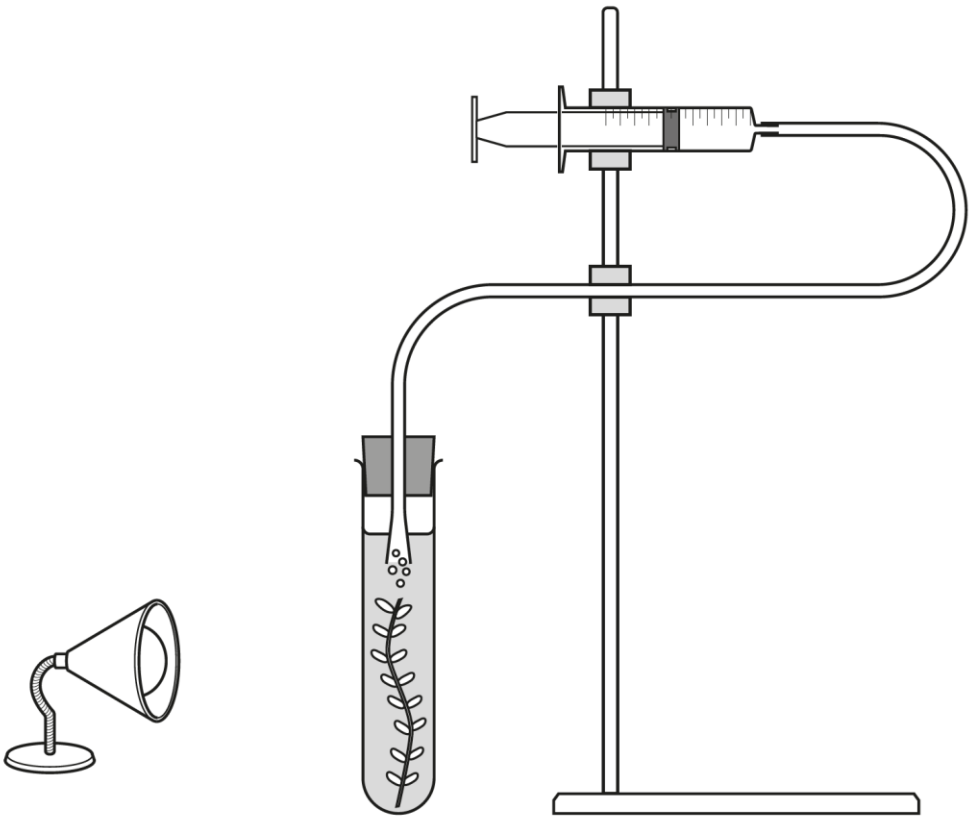
The 'amount of water' was not able to be given credit as the candidate should have used the term volume, but 'same pondweed' gained them the mark.

The marking point for stating the data to be recorded could not be given because the candidate did not mention that the bubbles needed to be recorded over a period of time. The term 'rate' was mentioned in the stem of the question and this should prompt candidates to consider that time is involved as the rate (of a reaction) can be thought of as a change in a measurement divided by the time.

Question 10 (a) (ii)

(ii) **Fig. 10.2** shows a different set of equipment that can be used.

Fig. 10.2



A second student suggests that the equipment shown in **Fig. 10.2** will improve the investigation.

Explain why.

.....

.....

.....

.....

.....

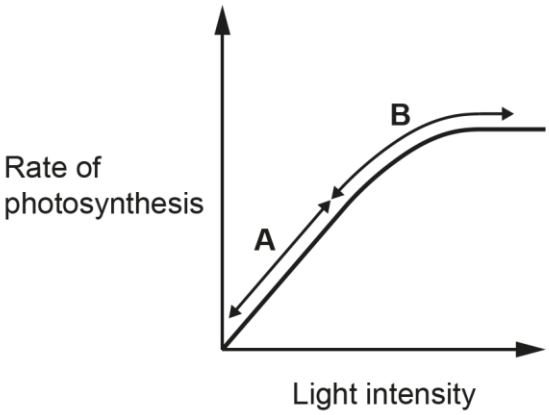
..... **[2]**

It would appear that many candidates are not familiar with gas syringes, as a common misunderstanding here was that the syringe would be used to inject air or liquid into the boiling tube. Those who did know how this piece of equipment works were able to gain credit, mainly for stating that the gas syringe collected the gas, and some candidates correctly explained that the syringe allows the volume of gas to be measured.

Question 10 (b)

(b) **Fig. 10.3** shows the effect of changing the light intensity on the rate of photosynthesis.

Fig. 10.3



Which section or sections of the graph in **Fig. 10.3** show the relationship $y = mx + c$?

Tick (✓) **one** box.

Section **A** ☐

Section **B** ☐

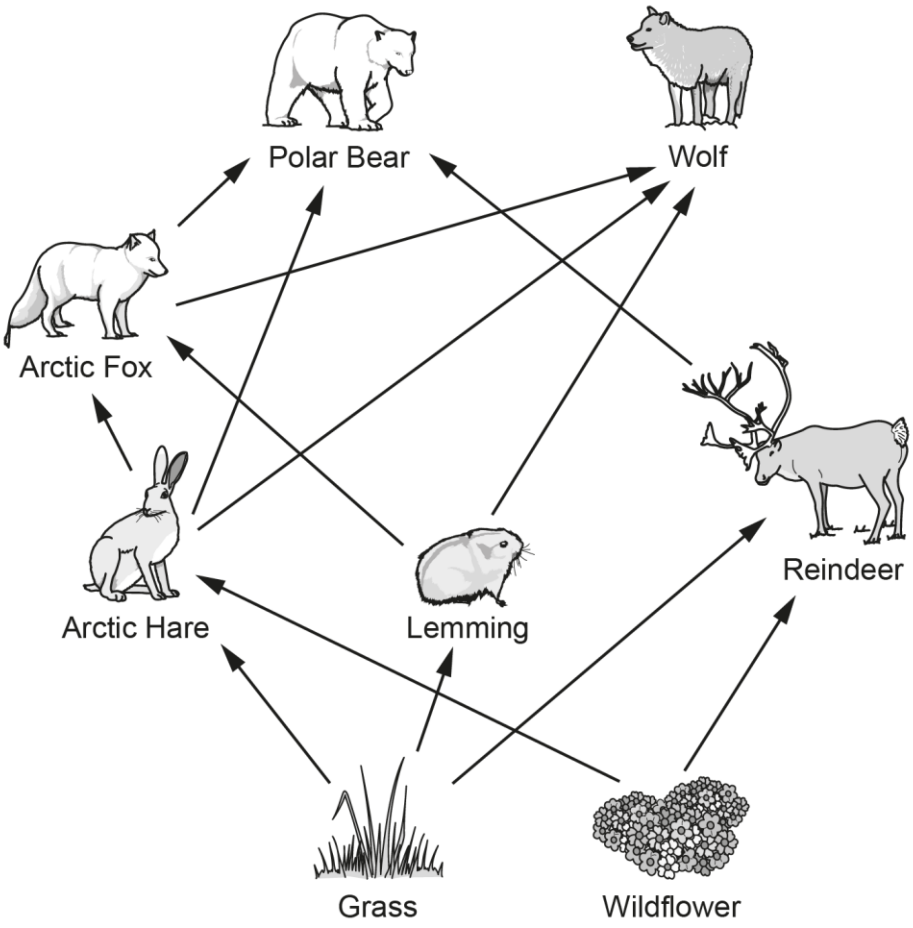
Sections **A** and **B** ☐

[1]

Candidates appeared to be either unfamiliar with the equation of a straight line, or unable to apply it to this context. Around a third of candidates gave the correct answer, with the distractors selected relatively equally.

Question 11 (a)

11 The diagram shows the feeding relationships of some of the organisms that live in an Arctic ecosystem.



(a) What does each picture in the food web represent?

Tick (✓) **one** box.

A community ☐

A population ☐

An individual ☐

[1]

This question tested whether candidates knew what is represented by the names of species in a food web and highlighted a misunderstanding, as many candidates incorrectly selected 'an individual'.

Question 11 (b)

(b) Complete each sentence by writing in the correct number.

There are ..... producers in the food web.

There are ..... herbivores in the food web.

The arctic fox is in trophic level ..... .

[3]

Candidates generally completed the first and second sentences correctly, although fewer were able to identify the trophic level of the fox, perhaps because they were unfamiliar with this term.

Question 11 (c)

(c) A lemming has a mass of 82 g.
An arctic fox eats the lemming, but only consumes 75 g of the lemming.

Calculate the percentage mass the arctic fox has consumed.

Give your answer to **3** significant figures.

Percentage mass consumed = ... % **[3]**

Some candidates misunderstood or misread the question and calculated percentage change, rather than the percentage consumed. Nevertheless, provided that they showed their working, including their answer before rounding, they could still obtain 2 marks. It appears that candidates are more confident in their use of significant figures compared to previous series.

OCR support

Our Mathematical skills handbook can be used alongside teaching maths skills such as calculating percentage and using significant figures, and can be shared with candidates for revision and use in lessons.

Question 11 (d) (i)

(d) When lemmings are in short supply, the arctic fox will eat eggs.

(i) Eggs contain protein.

Which reagent is used to test for protein?

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

The majority of candidates were not able to obtain a mark on this question. Of the many incorrect answers given, a large number were totally unrelated to the tests used to identify the presence of biological molecules (PAG2).

OCR support

Our Practical support guide can be shared with candidates for use in lessons as well as for revision. It provides a series of resources that relate to each PAG, and gives examples of the practicals in different contexts for candidates to experience.

Question 11 (d) (ii)

(ii) The yolk of the egg contains lipids.

Put a (ring) around the **two** components that make up a lipid.

amino acids **fatty acids** **glucose** **glycerol**

[2]

Most candidates obtained at least 1 mark on this question, selecting 'fatty acids'. Glycerol was less commonly chosen, with glucose often circled instead.

Question 11 (d) (iii)

(iii) A student calculates the surface area and volume of an egg.

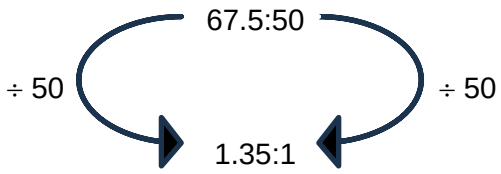
Surface area of the egg = 67.5 cm^2

Volume of the egg = 50 cm^3

Show that the surface area to volume ratio of the egg is 1.35 : 1.

[2]

Around half of candidates obtained one or two marks. Those who were given 1 mark generally stated the ratio of 67.5:50. Some candidates were clearly able to transfer their mathematical skills and apply the techniques learned in maths using the following procedure:



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