

GCSE (9-1)

Examiners' report

TWENTY FIRST CENTURY SCIENCE BIOLOGY B

J257

For first teaching in 2016

J257/01 Summer 2019 series

Version 1

Contents

Introduction	4
Paper 1 series overview	5
Question 1 (a) and (b)	6
Question 1 (c)	6
Question 1 (d)	7
Question 2 (a)	7
Question 2 (b)	7
Question 2 (c)	8
Question 2 (d)	8
Question 3 (a)	9
Question 3 (b)	10
Question 3 (c)	10
Question 4 (a) (i)	11
Question 4 (a) (ii)	11
Question 4 (b)	12
Question 4 (c) (i)	13
Question 4 (c) (ii)	13
Question 4 (d)	14
Question 5 (a)	14
Question 5 (b) (i)	15
Question 5 (b) (ii)	15
Question 5 (b) (iii)	16
Question 6 (a)	16
Question 6 (b) (i) and (ii)	17
Question 6 (b) (iii)	17
Question 6 (c)	18
Question 7 (a)	19
Question 7 (b)	19
Question 7 (c)	20
Question 7 (d) (i)	20
Question 7 (d) (ii)	21
Question 8 (a)	22
Question 8 (b)	22
Question 8 (c) (i)	23
Question 8 (c) (ii)	23

Question 8 (d)	24
Question 8 (e) (i)	25
Question 8 (e) (ii)	26
Question 9 (a)	26
Question 9 (b)	26
Question 9 (c)	26
Question 9 (d)	27
Question 10 (a)	27
Question 10 (b)	28
Question 10 (c) (i)	28
Question 10 (c) (ii)	29
Question 10 (c) (iii)	29
Question 10 (d) (i)	29
Question 10 (d) (ii)	30
Question 11 (a)	30
Question 11 (b)	31
Question 11 (c)	31
Question 11 (d) (i)	32
Question 11 (d) (ii)	32
Question 11 (d) (iii)	32
Copyright information	32

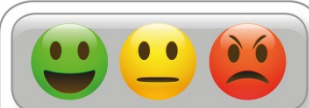


Would you prefer a Word version?

Did you know that you can save this pdf as a Word file using Acrobat Professional? Simply click on **File > Save As Other ...** and select **Microsoft Word**

(If you have opened this PDF in your browser you will need to save it first. Simply right click anywhere on the page and select **Save as ...** to save the PDF. Then open the PDF in Acrobat Professional.)

If you do not have access to Acrobat Professional there are a number of **free** applications available that will also convert Word to PDF (search for pdf to word converter).



We value your feedback

We'd like to know your view on the resources we produce. By clicking on the icon above you will help us to ensure that our resources work for you.

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. 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 can be downloaded from OCR.

Paper 1 series overview

J257/01 is one of two examination components for the revised GCSE examination for Biology B (Twenty First Century Science) assessed at Foundation Tier. This component uses many short answer questions to assess content from all eight chapters of the specification and links together different areas of Biology within different contexts. These contexts can be practical, familiar or unfamiliar requiring application of knowledge. Almost all candidates engaged fully with the paper and made a good attempt at answering the questions. A wide spread of marks was obtained, there was no evidence of shortage of time being a problem and there were very few instances of specific questions being left unanswered. Responses indicated that for the most part candidates understood the instructions for each question, were able to access them and that candidates were well prepared for the examination. However, there were instances where candidates were asked to tick two boxes or draw two lines, but only one action was completed – automatically losing the candidate a potential mark. There was evidence of some candidates highlighting command words and key information in the stem of the question on open response questions, which appeared to help them to effectively focus their response.

<i>Most successful specification areas</i>	<i>Least successful specification areas</i>
<ul style="list-style-type: none"> • B4.1.1 Anaerobic respiration in animal cells Q2(c) • M2b Calculating a mean Q4(c)(ii) • B3.3.5 Interpreting a food web Q5(a) • B3.3.10 Water cycle Q8(a) 	<ul style="list-style-type: none"> • B3.3.9 Decomposition Q5(b)(ii) • B3.1.2 Role of chloroplasts Q(6)(c) • B3.1.3 Enzyme function Q7(d)(i) and 7(d)(ii) • B1.3.2 Genetic engineering Q9(a) • B5.2.1 Structure of a reflex arc Q10(a)

Candidate Performance Overview

Candidates who did well on this paper generally did the following.

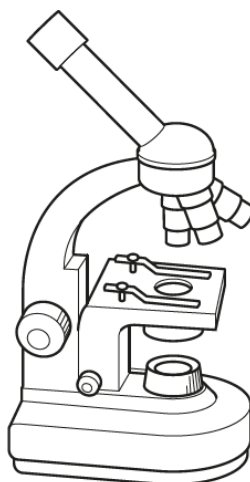
- used appropriate mathematical skills to confidently perform calculations such as calculating a mean Q4(c)(ii), range Q4(c)(i) and percentage Q8(e)(ii), and express values to a certain number of significant figures Q8(e)(ii), or in standard form Q10(d)(i)
- interpreted graphs and tables of data correctly e.g. Q4(b), Q6(b)(i) and Q6(b)(ii) and Q11(b)
- demonstrated mostly accurate and appropriate knowledge and understanding e.g. Q2(c), Q3(c), Q5(b)(ii), Q8(a), Q8(c)(ii), Q10(a) and Q10(b)
- applied their knowledge and understanding to familiar and unfamiliar contexts, using accurate scientific terminology e.g. Q5(a), Q6(c), Q7(d)(i), Q7(d)(ii), Q8(e)(ii), Q11(d)(i) and Q11(d)(ii)
- demonstrated sound knowledge and application of practical techniques e.g. Q1(a), Q1(b), Q1(c), Q4(a)(i), Q10(c)(ii) and Q10(c)(iii)

Candidates who did less well on this paper generally did the following.

- did not demonstrate secure scientific knowledge e.g. Q1(c), Q2(a), Q2(b), Q5(b)(i), Q5(b)(iii), Q10(a), Q11(d)(iii),
- produced responses that lacked accurate use of scientific terminology e.g. Q6(c), Q7(d)(i), Q9(a)
- did not express calculations in standard form or to an appropriate number of significant figures e.g. Q8(e)(i), Q10(d)(i)
- did not have a confident grasp of the knowledge and application of practical techniques e.g. Q1(b), Q4(a)(i), Q10(c)(ii)

Question 1 (a) and (b)

- 1 A student is setting up a light microscope to look at a slide of onion cells, as shown below.



light microscope

- (a) Draw an arrow **on the diagram** to show where the student should place the slide. [1]

- (b) When the student looks down the lens the image is blurry.

Describe what the student needs to do to focus the image.

..... [1]

Candidates performed particularly well on Q1(a) and identified where the slide should be placed. Some candidates lost the mark because their arrow did not touch the stage. Q1(b) proved more difficult for most candidates, with confusion over the correct naming of microscope components, and also incorrectly writing that the eyepiece or objective lenses would need to be changed to focus the image.

Question 1 (c)

- (c) The student knows the power of the eyepiece lens and the power of the objective lens.

How should the student work out the total magnification of the image?

.....
 [1]

Candidates who were not given the mark here suggested dividing the power of the eyepiece lens by that of the objective lens or attempted to use the image = actual size x magnification equation.

Question 1 (d)

- (d) The student draws one of the onion cells. The teacher asks the student to label the structure where the chromosomes are located.

Which structure should the student label?

Tick (✓) **one** box.

Cell wall

Chloroplast

Nucleus

☐☐☐

[1]

All candidates attempted this question, the majority successfully selecting nucleus.

Question 2 (a)

- 2 Cellular respiration takes place in all cells.

- (a) In which two parts of a cell does cellular respiration take place?

Tick (✓) **two** boxes.

Cell wall

Chloroplast

Cytoplasm

Mitochondria

Nucleus

☐☐☐☐☐

[2]

Most candidates selected mitochondria as the location for cellular respiration, but not all chose the other location of cytoplasm, even though the question asked them to tick two boxes.

Question 2 (b)

- (b) Cellular respiration is described as an exothermic process.

What is an exothermic process?

..... [1]

Candidates who knew exothermic related to energy generally described what an exothermic process is very well, often with a level of detail more akin to Chemistry. Others wrote that exothermic processes gave out oxygen, or just that the term meant cells gave out “something”.

Question 2 (c)

(c) Which of the following statements are true for **anaerobic** respiration in animal cells?

Tick (✓) **true** or **false** for each statement.

Statement about anaerobic respiration in animal cells	True	False
Produces ethanol		
Produces lactic acid		
Does not produce ATP		
Uses glucose		
Uses oxygen		

[3]

This question was answered very well, demonstrating a secure knowledge of anaerobic respiration. Most candidates selected three or more statements correctly.

Question 2 (d)

(d) Electron microscopes can be used to see small cell structures such as mitochondria.

Which statement explains why?

Tick (✓) **one** box.

They are easy to use.

☐

They are expensive.

☐

They have a higher resolution.

☐

They have a lower magnification.

☐





[1]

Candidates also scored well on this question, with almost all selecting the correct answer of higher resolution.

Question 3 (a)

3 Blackworms are animals that can reproduce sexually **and** asexually.

(a) Four students discuss blackworm reproduction.

	Amir There is much more genetic variation, which will be beneficial if their environment changes.	
	James They don't need to worry if they can't find a mate, they can reproduce without one.	

(i) Which student gives an **advantage** of the blackworm reproducing **asexually**?

Tick (✓) **one** box.

Amir

☐

Beth

☐

James

☐

Mia

☐

[1]

(ii) Which student gives a **disadvantage** of the blackworm reproducing **asexually**?

Tick (✓) **one** box.

Amir

☐

Beth

☐

James

☐

Mia

☐

[1]

(iii) Which student gives an **advantage** of the blackworm reproducing **sexually**?

Tick (✓) **one** box.

Amir

☐

Beth

☐

James

☐

Mia

☐

[1]

(iv) Which student gives a **disadvantage** of the blackworm reproducing **sexually**?

Tick (✓) **one** box.

Amir

☐

Beth

☐

James

☐

Mia

☐

[1]

All candidates attempted question 3(a) with varying success. Parts (i) and (iii) relating to the advantages of sexual and asexual reproduction were answered very well, parts (ii) and (iv) relating to the disadvantages, less so.

Question 3 (b)

(b) When blackworms reproduce asexually they split into two pieces. The pieces grow a new head and a new tail.

What type of cells must be present to allow the pieces to do this?

Tick (✓) **one** box.

Differentiated cells

☐

Gamete cells

☐

Meristem cells

☐

Unspecialised cells

☐

[1]

Most of the incorrect responses for this question identified differentiated cells.

Question 3 (c)

(c) Earthworms are a different type of worm. They are classified into a different group.

What sources of evidence do scientists use to classify species into different groups?

Tick (✓) **two** boxes.

DNA

☐

Physical similarities and differences

☐

Their age

☐

What they feed on

☐

Where they are found

☐

[2]

Many candidates demonstrated a secure knowledge of the evidence used to classify species into different groups, by selecting both DNA and physical similarities and differences. Those who did not obtain both marks often only ticked one box.

Question 4 (a) (i)

4 (a) Cows are used to produce milk and meat.

(i) Milk and meat contain protein.

Which reagent would you use to test for protein?

Tick (✓) **one** box.

Benedict's

☐

Biuret

☐

Ethanol

☐

Iodine

☐

[1]

Few candidates selected the correct answer of Biuret, including candidates who went on to score highly overall. The majority of the incorrect answers were given as Benedict's which would suggest that candidates are still not secure in their knowledge of testing for biological molecules.

Question 4 (a) (ii)

(ii) Cows produce different amounts of milk.

A farmer wants a calf that will produce a lot of milk in the future. The farmer carefully chooses which female cow to mate with a male bull.

What is the name of the process the farmer is using?

Put a ring around the correct answer.

Asexual reproduction

Evolution

Natural selection

Selective breeding

[1]

The majority of candidates selected the correct answer to this question.

Question 4 (b)

- (b) Adult female cows have an oestrus cycle. It is similar to the menstrual cycle in adult female humans.

A cow can become pregnant when it is in a phase called 'heat'. A cow is in the heat phase when oestrogen levels peak.

The graph shows how levels of progesterone and oestrogen change during the oestrous cycle in one individual cow.

Item removed due to third party copyright restrictions

On which day of the oestrus cycle is this cow most likely to become pregnant?

.....

[1]

On the 2018 J257/01 paper candidates found it very difficult to accurately extract information from a graph, but this year the majority of candidates demonstrated this skill successfully, often drawing ruled lines to carefully link the peak to the relevant day. Those who answered incorrectly identified on almost every occasion day 10, when the progesterone level plateaus.

Question 4 (c) (i)

- (c) The heat phase lasts for a different length of time in each cow.

The table shows the length of the heat phase in eight different cows.

Cow	Length of heat phase (hours)
A	2
B	4
C	5
D	30
E	8
F	2
G	10
H	3

- (i) Calculate the range for the length of the heat phase for all cows in this group.

Range = hours [1]

Most candidates were able to correctly calculate the range for the length of the heat phase. Those who did not obtain the mark generally calculated the mean.

Question 4 (c) (ii)

- (ii) Calculate the mean length of the heat phase for all cows in this group.

Mean = hours [2]

Most candidates calculated the mean correctly, but not all showed their working, which they are strongly advised to do. There were instances where candidates showed that they needed to divide 64 by 8, but then carried out this calculation incorrectly. If they had only written a final answer, they would have scored 0 marks.

Question 4 (d)

- (d) The cow oestrus cycle is controlled in the same way as the human menstrual cycle is controlled.

What controls the human menstrual cycle?

Tick (✓) **one** box.

Hormones

Nerves

The heart

The kidney

☐
☐
☐
☐

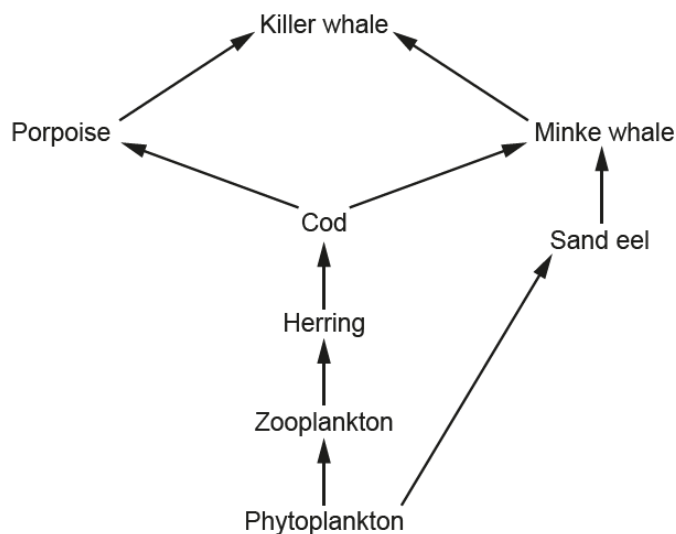
[1]

Every candidate attempted this question and almost all of them answered correctly.

Question 5 (a)

- 5 Killer whales can be found off the coast of Scotland.

The diagram shows part of their food web.



- (a) If the population of killer whales decreased, what effect would this have on the population of sand eels?

Explain your answer.

.....

.....

..... [2]

When candidates only obtained one mark, this was mainly for identifying that the sand eel population decreased. Lower ability candidates mis-interpreted the food web, and thought that the Minke whales ate the killer whales, so suggested the Minke whale population would decrease due to lack of food.

Question 5 (b) (i)

- (b) An adult killer whale was found dead off the coast of Scotland.

Scientists concluded that chemicals called PCBs caused the killer whale's death.

The PCBs had entered the killer whale's body from the food chain.

- (i) The PCBs increased in concentration in the bodies of organisms higher up the food chain.

Which word describes this process?

Put a ring around the correct answer.

Active transport

Bioaccumulation

Eutrophication

Translocation

[1]

Many candidates correctly identified the process as bioaccumulation.

Question 5 (b) (ii)

- (ii) The dead killer whale's body will be decomposed.

Describe how this will happen **and** explain why it is important.

.....

 [2]

Many candidates did not obtain any marks here. A common incorrect suggestion was that the dead whale would simply be a source of food to other animals, without addressing the issue of decomposition. Very few candidates were able to explain how the process happened, or why it was important. Others used information from the next question to write about decomposition happening because of temperature and enzymes. A significant number of candidates believed the whale posed a health risk.

Exemplar 1

...The body will decompose and be broken down by smaller.....
 ...microorganisms like bacteria, this is important as this.....
 ...continues the ~~water~~ carbon cycle.....

This candidate correctly and concisely describes how decomposition happens and why it is important, at an appropriate level of detail for a Foundation Tier paper. Although this candidate had already obtained 2 marks, their "carbon cycle" was equally creditworthy. It is advisable for candidates to be as specific as possible when referring to the recycling of substances essential to life and avoid using vague terms that do not appear in the specification such as nutrients.

Question 5 (b) (iii)

- (iii) Decomposition is affected by temperature.

Use words from the list to complete the sentences below.

You may use each word once, more than once or not at all.

amino acids

decreases

enzymes

fats

increases

water

As the temperature the rate of decomposition increases. This is
because the temperature will affect the involved in decomposition.
[2]

Almost all candidates obtained at least one mark here, for correctly identifying as the temperature increased the rate of decomposition would increase. Fewer candidates were able to demonstrate that they knew enzymes were involved in decomposition, often saying amino acids were involved instead.

Question 6 (a)

- 6 Plants photosynthesise and respire.

- (a) Carbon dioxide and water are needed by plant cells for photosynthesis.

These substances need to be transported into the cells.

Draw a line from each **substance** to the **process** that transports it into a cell.

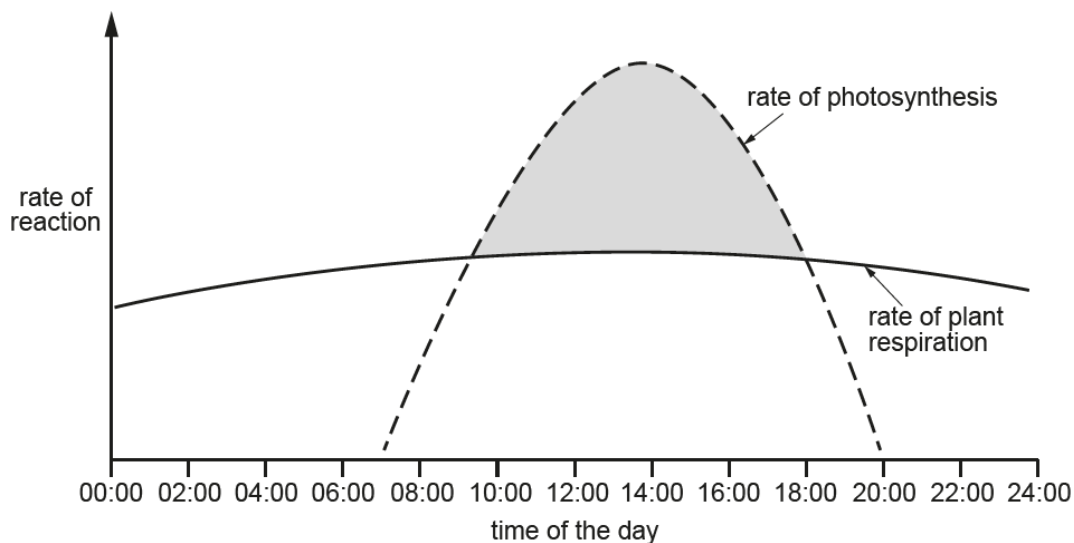
Substance	Process
Carbon dioxide	Active transport
Water	Diffusion
	Osmosis

[2]

Most candidates obtained at least one mark here for knowing that carbon dioxide was transported by diffusion. Some thought, however, that water was transported by active transport.

Question 6 (b) (i) and (ii)

(b) The graph shows the rate of photosynthesis and respiration in a plant during one day.



(i) Over which period of time did the plant photosynthesise?

From to [1]

(ii) During which period of time was the rate of photosynthesis greater than the rate of respiration?

From to [1]

A common error on this question was to misinterpret the scale, thus stating in Q6(b)(i) that the plant photosynthesised from 06.30 to 20.00, and in Q6(b)(ii) the rate of photosynthesis was greater than the rate of respiration between 08.30 and 18.00.

Question 6 (b) (iii)

(iii) A 'compensation point' is a point where the rate of photosynthesis is the same as the rate of respiration.

On the graph place an **X** to show a compensation point.

[1]

The majority of candidates gained the mark here, and the "X" made was almost always clean and unambiguous.

Question 6 (c)

- (c) Plants need magnesium to make chlorophyll.

One of Amy's plants is not getting enough magnesium from the soil. It is shorter than the other plants.

Explain why not getting enough magnesium has affected the plant's growth.

.....

.....

.....

.....

.....

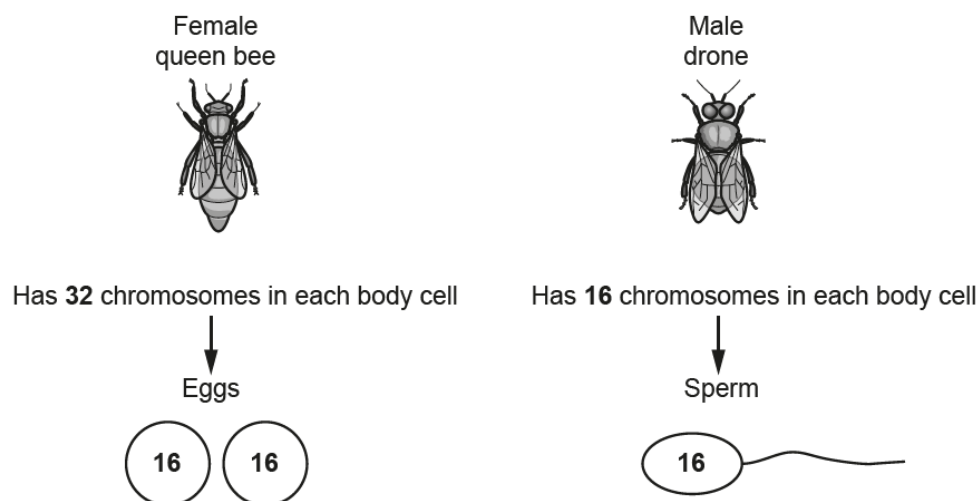
..... [3]

This question required candidates to apply their knowledge of photosynthesis and plant growth, and they found it challenging. Some candidates did score the “catch all” mark for giving the idea that chlorophyll is needed for photosynthesis, but many lost marks due to exam technique. If the question says that there is “not enough” magnesium, then candidates should avoid using absolutes such as “the plant will make no chlorophyll” or “there will be no photosynthesis” as this would not be the case. Very few candidates knew that less glucose would be produced or that the glucose would be used for growth. A significant number of candidates believed that magnesium was used to produce a growth hormone.

Question 7 (a)

- 7 Female and male bees have different numbers of chromosomes.

The diagram shows the number of chromosomes in female queen bees and male drones.



Use the information in the diagram to answer the following questions.

- (a) How is the number of chromosomes found in body cells in the queen bee different to those in the male drones?

..... [1]

Those candidates who didn't gain the mark here generally tried to explain why the queen had 32 chromosomes, rather than simply noting that the queen had more chromosomes.

Question 7 (b)

- (b) The female queen bee produces eggs.

Which type of cell division makes eggs?

..... [1]

Candidates who went on to obtain higher marks overall did well on this question, with responses which scored lower giving the answer mitosis or ovulation. Many candidates who answered correctly were able to spell meiosis correctly, which is to be encouraged.

Question 7 (c)

- (c) Fertilised and unfertilised eggs can both become offspring. The sex of the offspring is determined by whether or not the egg was fertilised.

Complete the table.

Egg	Number of chromosomes in offspring	Sex of offspring
Egg is fertilised		
Egg is not fertilised		

[4]

The question required candidates to interpret a diagram and apply their knowledge to a novel situation involving meiosis and fertilisation. Often candidates did not realise that the egg of the queen contained 16 chromosomes (believing it to have 32 chromosomes), so they thought a fertilised egg contained 48 chromosomes and an unfertilised egg 24. Many candidates completed the table for human cells (i.e. 46 and 23) or wrote XX and XY for the sex of the offspring.

Question 7 (d) (i)

- (d) Bees make honey from nectar.

Nectar is made of sucrose and water.

Bees have an enzyme called invertase. This enzyme converts the sucrose in nectar into two separate sugars.

- (i) Use the 'Lock and Key' model to describe how the enzyme converts the sucrose into two separate sugars.

.....

.....

.....

.....

.....

..... [3]

Many candidates appeared confused with respect to how enzymes work. The active site was often described as being the active transport, and very frequently the sucrose or substrate was said to contain the active site. Some candidates were able to demonstrate excellent knowledge of enzyme function and were awarded all 3 marks. However, very few candidates mentioned which was the lock and which the key. The concept of the sucrose fitting into the active site was not described well. Most marks were gained either for saying the enzyme has an active site or the enzyme is specific.

Exemplar 2

Ans active site has a specific space only an enzyme of the right shape can fit, so

It is clear that this candidate has some knowledge of enzyme structure and function but there is confusion to the location of the active site.

Question 7 (d) (ii)

- (ii) A student investigates the effect of temperature on the rate of the reaction catalysed by the enzyme invertase.

What effect will increasing the temperature have on the rate of reaction?

Explain your answer.

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

Candidates were able to obtain marks for this question in one of two ways, either by describing and explaining the effect of a moderate increase in temperature, or an excessive increase. Candidates who obtained high marks overall performed well on this question, most often for identifying that a high temperature would denature the enzyme and the rate of reaction would decrease. Some candidates obtained one mark, often because they explained the enzyme would denature, without describing the effect on the rate of reaction. Candidates who did not obtain any marks tended to simply say that the rate of reaction would increase, without mentioning up to an optimum, or explaining why.

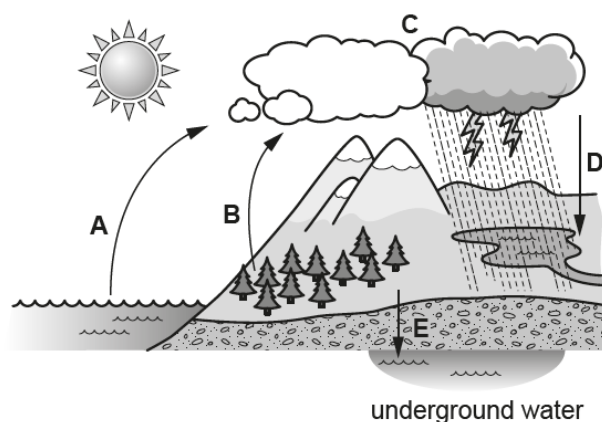
Exemplar 3

Increasing the temperature will increase the rate of reaction because the enzymes will be moving around faster and so the lock and key model will happen faster. [2]

This candidate narrowly missed obtaining 2 marks. They didn't state that the rate would only increase up to the optimum, and they needed to explain further than the enzymes wouldn't just be moving around faster but would be successfully colliding (with the substrate) more frequently. Simply saying the lock and key model would happen faster was too vague for the mark to be given.

Question 8 (a)

8 The diagram below shows the water cycle.



(a) Draw a line from A, B, C and D to the correct name for the process shown in the diagram.

A	Condensation
B	Evaporation
C	Precipitation
D	Transpiration

[4]

A minority of candidates obtained no marks on this question, but most were able to identify A as evaporation. The greatest confusion occurred with the meanings of B – transpiration and C – condensation.

Question 8 (b)

(b) Deforestation is happening to rainforests in Malaysia and Indonesia.

Deforestation can affect the water cycle.

Put a ring around the word that completes the sentence describing the effect of deforestation on processes B and E.

Deforestation will **decrease / increase / have no effect** on process B.

Deforestation will **decrease / increase / have no effect** on process E.

[2]

Most candidates obtained at least one mark on this question, and correctly answered the question relating to B more often than that relating to E.

Question 8 (c) (i)

- (c) The rainforests in Malaysia and Indonesia are being replaced with palm oil trees.

This will have an effect on the biodiversity of the area.

- (i) Choose **one** word from the list to complete the sentence.

animals

microorganisms

organisms

plants

Biodiversity can be defined as the amount of living in a particular area. [1]

For this question, the majority of candidates selected the correct answer of organisms.

Question 8 (c) (ii)

- (ii) Biodiversity is important for economic, ethical and environmental reasons.

For each statement in the table, decide if it is an example of an economic, ethical or environmental reason.

Tick (✓) **one** box for each statement.

Statement	Economic	Ethical	Environmental
All living things have a right to live.			
Species provide us with useful products.			
Removing one species can affect a whole ecosystem.			

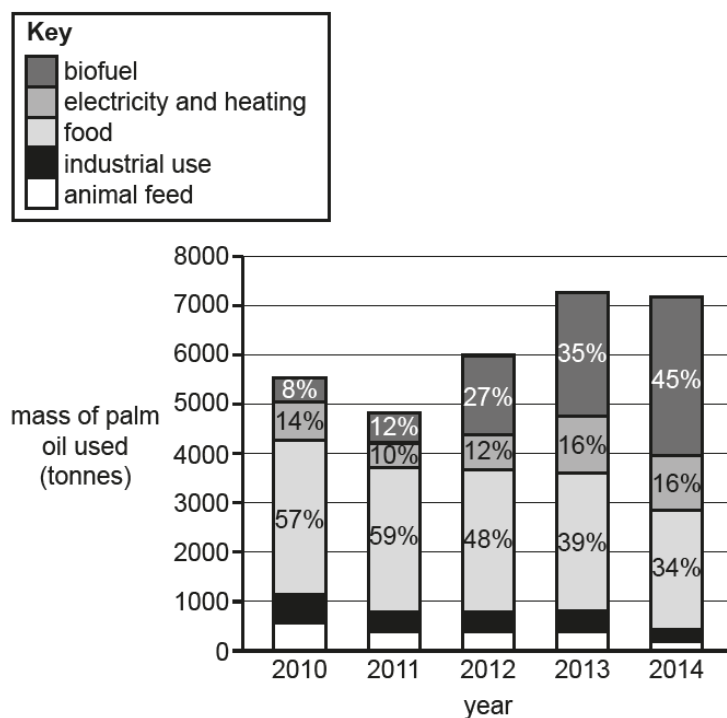
[1]

Many candidates answered this question correctly and there were very few instances of candidates not following the instruction to put one tick per box.

Question 8 (d)

- (d) The palm oil taken from the trees is used in different ways.

The bar chart shows changes in the uses of palm oil between 2010 and 2014.



Which use of palm oil increased the most from 2010 to 2014?

Use data from the graph to support your answer.

.....
 [2]

Most candidates obtained at least one mark on this question for selecting Biofuel, but fewer obtained both marks. Often, candidates did not achieve the second mark because they simply copied information from the graph e.g. stating Biofuel use was 8% in 2010 and 45% in 2014, rather than doing some processing of the displayed information to say the increase was 37%.

Question 8 (e) (i)

- (e) Orangutans live in the rainforests of Malaysia.



Orangutan

A century ago there were 230 000 orangutans.

The table shows the estimated number of three species of orangutans which remain today.

Species of orangutan	Number
Bornean	104 700
Sumatran	7500
Tapanuli	800

- (i) Calculate the percentage (%) of orangutans which remain today.

Give your answer to **2** significant figures.

Percentage = % [3]

Most candidates were awarded 1 or 2 marks, demonstrating the need for showing working within a calculation, but few obtained all 3 marks. The most common reason for this was for not giving the answer to two significant figures. Some candidates were able to obtain one mark for totalling the number of species.

Question 8 (e) (ii)

- (ii) The number of orangutans living in the rainforests of Malaysia is only an estimate.

Explain why.

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

The majority of candidates were able to give a creditworthy explanation, generally relating to the difficulty or impracticality in counting all orangutans

Question 9 (a)

- 9 Bacterial cells are used in a process called genetic engineering to make human insulin.

- (a) Define the term 'genetic engineering'.

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

Some candidates gained one mark for knowing that genetic engineering involved changing the genome, but very few were able to gain the second marking point for saying why the DNA of an organism might be altered.

Question 9 (b)

- (b) What condition could the insulin produced in this process be used to treat?

..... [2]

Many candidates were able to state that the condition was diabetes, and some knew specifically that insulin is used to treat type 1 diabetes.

Question 9 (c)

- (c) Bacteria were first used to produce human insulin in 1978. Before that, pig insulin was used to treat people who did not make their own insulin.

Suggest **two** reasons why it is better to use insulin produced by bacteria rather than pigs.

1
2 [2]

Many candidates did not obtain a mark on this question, because their answers said that pigs were dirty, simply that the pigs would have diseases or human insulin is not the same as pig insulin. Some candidates did recognise the process as being quicker or less likely to cause ethical or religious concerns and there were one or two answers about rejection but often the implication was that bacterial insulin was rejected.

Question 9 (d)

(d) Insulin is a protein.

What is a protein made from?

Tick (✓) **one** box.

Amino acids

Fatty acids

Glucose

Glycerol

☐
☐
☐
☐

[1]

The majority of candidates knew that proteins are made of amino acids, thus obtaining the mark.

Question 10 (a)

10 Reflexes help us to respond to stimuli. In a simple reflex, nerve impulses are passed along a pathway called a reflex arc.

The diagram in **Fig. 10.1** shows a reflex arc.

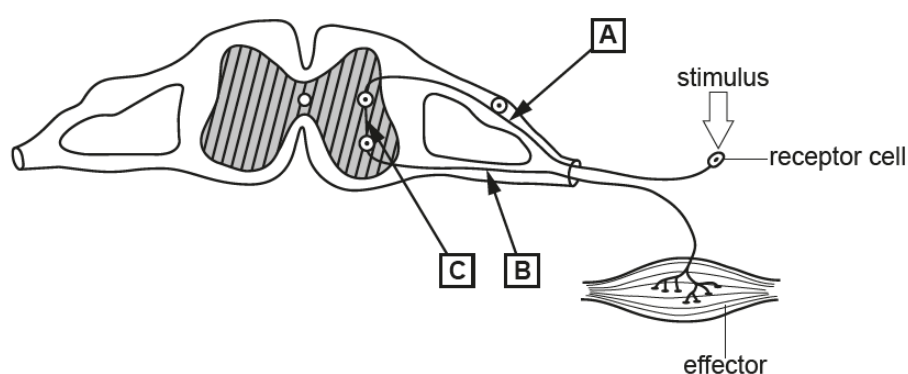


Fig. 10.1

(a) Name the structures labelled **A**, **B** and **C**.

	Name of structure
A	
B	
C	

[3]

It was evident that although candidates had learnt about the nervous system, they just didn't have the knowledge in this specific area.

Question 10 (b)

- (b) Write down **one** advantage of a reflex arc **not** involving the brain.

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

Candidates who obtained the mark here for mostly stated the response would be faster, although some candidates wrote that it would prevent injury.

Question 10 (c) (i)

- (c) Two students want to investigate reflex actions.

They set up an experiment as shown in **Fig. 10.2**.

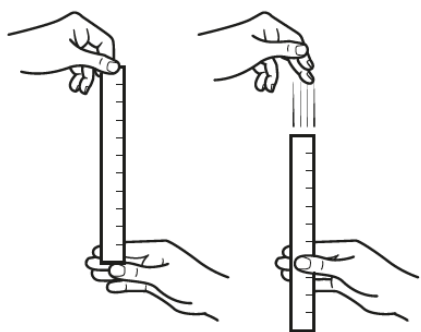


Fig. 10.2

Each student decides to use a different method.

- Using a stop clock, student **A** measures the time it takes for the participant to catch the ruler.
- Student **B** measures the distance the ruler falls through the participant's hand.

- (i) Write down **one** reason why student **B's** method is better than student **A's**.

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

A minority of candidates obtained the mark here, as most referred to either human error, just stated the results would be more accurate (without explaining why) or repeated the information given in the stem of the question.

Question 10 (c) (ii)

- (ii) Write down
- two**
- variables that both students would need to keep the same.

1

2 [2]

Most candidates obtained at least 1 mark here. Although many gave two variables, in some instances the variables were too similar e.g. same length ruler and same type of ruler. The most popular suggestions were dropping from the same height and using the same ruler.

Question 10 (c) (iii)

- (iii) Both students decide to repeat their experiment.

Explain why.

.....

..... [1]

Candidates should be encouraged to use the mathematical terminology given in the specification. For example, many candidates said that an average could be calculated, but the mode, median and mean are all types of average, and in this instance, repeating the experiment would be used to calculate the mean (or to identify outliers). Candidates appear to be using the terms accurate and precise interchangeably without any real understanding of their meaning.

**OCR support**

Centres may wish to make use of the Mathematical Skills Handbook (with questions for learners) and the Glossary of Terms for Practical Work that are available on the [OCR website](#).

Question 10 (d) (i)

- (d) Some nerve impulses can travel at a speed of 119m/s.

- (i) Which of the following shows 119 written in standard form?

Tick (✓) **one** box.

1.19×10^2

☐

1.19×10^{-2}

☐

11.9×10^1

☐

119×10

☐

[1]

Candidates performed well on this question and most selected the correct answer.

Question 10 (d) (ii)

(ii) Which part of a neuron speeds up transmission of a nerve impulse?

Tick (✓) **one** box.

Axon

☐

Fatty sheath

☐

Neurotransmitter

☐

Synapse

☐

[1]

A minority of candidates were correctly able to identify that the fatty sheath speeds up transmission of the impulse, with a wide variety of incorrect options chosen.

Question 11 (a)

11 Read the newspaper article.

Scarlet fever cases increase

The number of scarlet fever cases is increasing. The number of confirmed cases in 2016 is reported to be > 19 000, the highest level in 50 years.

(a) The article states that > 19 000 cases were reported in 2016.

What does the '>' in this statement mean?

..... [1]

The majority of candidates knew that > means more than.

Question 11 (b)

- (b) Look at the data in the table showing the number of confirmed cases of scarlet fever.

Year	Number of confirmed cases of scarlet fever
2013	4700
2014	15637
2016	19206

Explain why doctors and scientists may be concerned by the data in the table.

.....

.....

.....

..... [2]

Candidates were often able to obtain 1 mark on this question for identifying an increase in cases over a particular time period, but few noticed that the increase between 2013-14 was greater than that between 2014 and 2016. Lower ability candidates did not refer to the data in their answer, and just said that the cases had increased.

Question 11 (c)

- (c) Calculate the percentage increase in the number of cases from 2013 to 2014.

Put a ring around the correct answer.

23% 30% 233% 333% [1]

The majority of candidates were not able to calculate a percentage change. However, there was evidence of working out, suggesting candidates hadn't just simply guessed a number. Most candidates incorrectly divided 15637 by 4700 and multiplied by 100, giving the answer 333%.

Question 11 (d) (i)

(d) Scarlet fever is common in children under 10 years old.

(i) Scarlet fever is a bacterial infection. It is transmitted easily by close contact.

How could the spread of this infection be reduced?

.....

.....

..... [2]

Most candidates were awarded at least 1 mark here and there were some excellent accounts of how to reduce the spread of infection. However, some candidates gave only one method – even though 2 marks were available, so lost out through what would appear to be exam technique. Although there is no vaccination available for Scarlet fever, this was an application of knowledge question, and therefore it would be entirely reasonable for a candidate to suggest vaccination.

Question 11 (d) (ii)

(ii) Doctors could prescribe some medication to treat this infection.

Write down **one** factor that doctors will consider before prescribing this treatment.

.....

..... [1]

Many candidates were able to correctly describe a relevant factor, with allergies, dose, age and side effects most often given.

Question 11 (d) (iii)

(iii) Which of the following diseases is also caused by bacteria?

Tick (✓) **one** box.

Athlete's foot

HIV

Malaria

Salmonella food poisoning

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

[1]

The majority of candidates correctly identified *Salmonella* as a disease caused by bacteria.

Copyright information

Question 4(b)

© DeLaval : <http://delaval-com-www.gtm.episerverhosting.com/Global/PDF/Efficient-dairy-herd-management.pdf> (The Oestrus Cycle, accessed 2018)

Supporting you

For further details of this qualification please visit the subject webpage.

Review of results

If any of your students' results are not as expected, you may wish to consider one of our review of results services. For full information about the options available visit the [OCR website](#). If university places are at stake you may wish to consider priority service 2 reviews of marking which have an earlier deadline to ensure your reviews are processed in time for university applications.



Review students' exam performance with our free online results analysis tool. Available for GCSE, A Level and Cambridge Nationals.

It allows you to:

- review and run analysis reports on exam performance
- analyse results at question and/or topic level*
- compare your centre with OCR national averages
- identify trends across the centre
- facilitate effective planning and delivery of courses
- identify areas of the curriculum where students excel or struggle
- help pinpoint strengths and weaknesses of students and teaching departments.

*To find out which reports are available for a specific subject, please visit ocr.org.uk/administration/support-and-tools/active-results/

Find out more at ocr.org.uk/activeresults

CPD Training

Attend one of our popular CPD courses to hear exam feedback directly from a senior assessor or drop in to an online Q&A session.

Please find details for all our courses on the relevant subject page on our website.

www.ocr.org.uk

OCR Resources: *the small print*

OCR's resources are provided to support the delivery of OCR qualifications, but in no way constitute an endorsed teaching method that is required by OCR. Whilst every effort is made to ensure the accuracy of the content, OCR cannot be held responsible for any errors or omissions within these resources. We update our resources on a regular basis, so please check the OCR website to ensure you have the most up to date version.

This resource may be freely copied and distributed, as long as the OCR logo and this small print remain intact and OCR is acknowledged as the originator of this work.

Our documents are updated over time. Whilst every effort is made to check all documents, there may be contradictions between published support and the specification, therefore please use the information on the latest specification at all times. Where changes are made to specifications these will be indicated within the document, there will be a new version number indicated, and a summary of the changes. If you do notice a discrepancy between the specification and a resource please contact us at: resources.feedback@ocr.org.uk.

Whether you already offer OCR qualifications, are new to OCR, or are considering switching from your current provider/awarding organisation, you can request more information by completing the Expression of Interest form which can be found here: www.ocr.org.uk/expression-of-interest

Please get in touch if you want to discuss the accessibility of resources we offer to support delivery of our qualifications: resources.feedback@ocr.org.uk

Looking for a resource?

There is now a quick and easy search tool to help find **free** resources for your qualification: www.ocr.org.uk/i-want-to/find-resources/

www.ocr.org.uk

OCR Customer Support Centre

General qualifications

Telephone 01223 553998

Facsimile 01223 552627

Email general.qualifications@ocr.org.uk

OCR is part of Cambridge Assessment, a department of the University of Cambridge. *For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored.*

© **OCR 2019** Oxford Cambridge and RSA Examinations is a Company Limited by Guarantee. Registered in England. Registered office The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA. Registered company number 3484466. OCR is an exempt charity.



**Cambridge
Assessment**

