

Examiners' report

GCSE

GATEWAY SCIENCE BIOLOGY A

**OCR Level 1/Level 2 GCSE (9-1) in Biology A
(Gateway Science)**

J247

For first teaching in 2016

J247/03 Summer 2025 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 responses 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 [Teach Cambridge](#).

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Paper 3 series overview

J247/03 is the first Higher tier paper in the J247 Gateway Biology suite. J247/03 assesses content from specification topics B1–B3 and B7. Therefore, to perform well on this paper, candidates need to have a sound knowledge of the theory covered in topics B1–B3 and be able to apply the skills and understanding that they have developed in the practical activities covered in topic B7. There are also questions involving the assessment of key mathematical requirements from Appendix 5e of the specification. This paper is not synoptic and so does not contain any material covered by topics B4–B6.

Compared with previous series, there was an improvement in the responses to questions involving practically based skills. This was particularly seen in the planning aspect of the Level of Response question (Question 20 (a)). A similar improvement was also seen in questions testing mathematical skills, such as standard form, significant figures and interconversion of SI units.

One common area that involved common misconceptions was in differentiating between the ideas of accuracy, validity and reliability.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
- could identify specific features in the kidney, including gross structure (Question 21 (a)) and fine structure (Question 2) - were able to differentiate between accuracy, reproducibility and validity (Questions 17 (e) and 20 (a)) - displayed a thorough knowledge of the processes involved in protein synthesis (Question 18 (b)) - could apply their knowledge of enzyme action to explain the principle of specificity (Question 20 (c)) - were able to apply their knowledge of ADH action to a particular situation (Question 21 (c)) - displayed a clear understanding of the action of neurotransmitters at a synapse (Question 23 (b)).	- could not give a clear description of how to set up a light microscope to see garlic root cells (Question 17 (b)) - completed only half of the calculation in Question 16 (b) (ii), calculating the number of years, rather than how many more years - confused the processes of transcription and translation in protein synthesis (Question 18 (b)) - used terms such as amount rather than volume or concentration to describe variables that need controlling (Question 20 (a)) - confused the functions of the cerebrum and cerebellum (Question 23 (a)).

Section A overview

Section A contains 15 multiple choice questions targeting Assessment Objectives 1 and 2 (AO1 and AO2). Candidates performed particularly well on this section of this paper with a significant number scoring 12, 13 or 14 correct out of a possible 15 marks.

- Questions 2, 4, 5, 6, 9, 10 and 12 were answered correctly by most of the candidates.
- Question 11 and 15 proved to be the most challenging questions, with Question 15 being correctly answered by approximately half of the candidates and Question 11 by just over a third of candidates.
- Examiners are still reporting difficulties in interpreting some of the candidates' responses, especially when the candidates try to change one letter to another. It is better for candidates to cross out the incorrect letter and re-write the correct letter clearly outside the box, rather than trying to write over the original letter.

Question 1

1 Which mechanism is used to control **water balance** in the human body?

- A Adjusting the glucose concentration of the urine
- B Altering the volume of urine produced
- C Changing the rate of urea production
- D Varying the rate of sweat production

Your answer

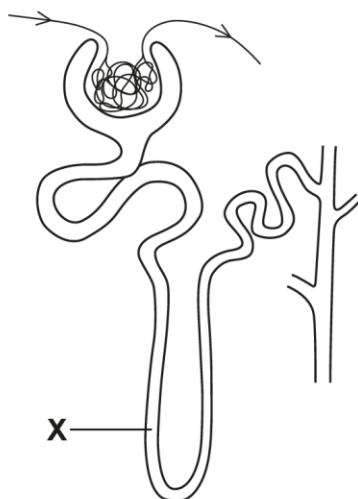
[1]

This question was an overlap question with Foundation tier. On this paper about three quarters of candidates correctly answered B.

Question 2

2 The diagram shows a kidney tubule.

What is the structure labelled **X**?



- A Bowman's capsule
- B Collecting duct
- C Glomerulus
- D Loop of Henle

Your answer

[1]

Question 3

3 The concentration of mineral ions in soil varies.

What describes how mineral ions move from soil into the root hair cells of a plant?

- A By active transport and diffusion
- B By active transport and osmosis
- C By diffusion only
- D By osmosis only

Your answer

☐

[1]

Although the majority of candidates answered correctly, there were a significant number who answered incorrectly with B. There was therefore a general appreciation that active transport is involved in uptake but some confusion between osmosis and diffusion.

Question 4 and 5

4 Which component of the nervous system **detects** stimuli?

- A Effector
- B Motor neurone
- C Receptor
- D Sensory neurone

Your answer

☐

[1]

5 Which of these biological molecules are **polymers**?

- A Amino acid and protein
- B DNA and glucose
- C DNA and protein
- D Glucose and protein

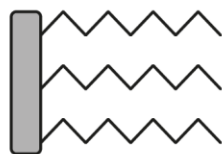
Your answer

☐

[1]

Question 6

6 Which biological molecule does this diagram represent?



- A Glucose
- B Lipid
- C Protein
- D Starch

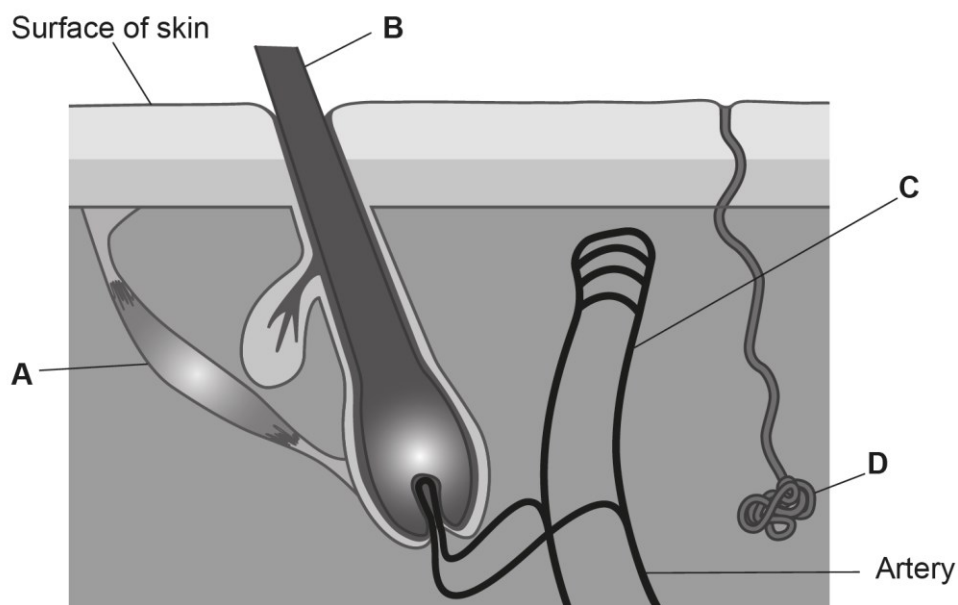
Your answer

[1]

More than two thirds of candidates could correctly link the diagrammatic representation of the molecule to the structure of lipids.

Question 8

8 The diagram shows the structure of the skin.



Which structure vasodilates and vasoconstricts to control body temperature?

Your answer

[1]

Erratum notice

Turn to **page 5** of the **question paper** and look at the **diagram** in **question 8**.

The label that currently reads 'Artery' should read 'Blood vessel'.

Cross out the word 'Artery' and replace it with the words 'Blood vessel'.

Most candidates correctly identified C as being the site of vasoconstriction and vasodilation. However, A was the most common incorrect answer with possibly some confusion stemming from the role of the movement of the hair in control of body temperature. An erratum was included to avoid any impression that structure C was an artery rather than a smaller blood vessel.

Question 9

- 9 A student observes stomata using a light microscope with a total magnification of $\times 400$. In the image the student sees, the stomata are 14 mm long.

What is the **actual length** of the stomata?

- A 3.5×10^{-2} mm
- B 3.5×10^{-2} cm
- C 3.86×10^2 cm
- D 5.6×10^3 mm

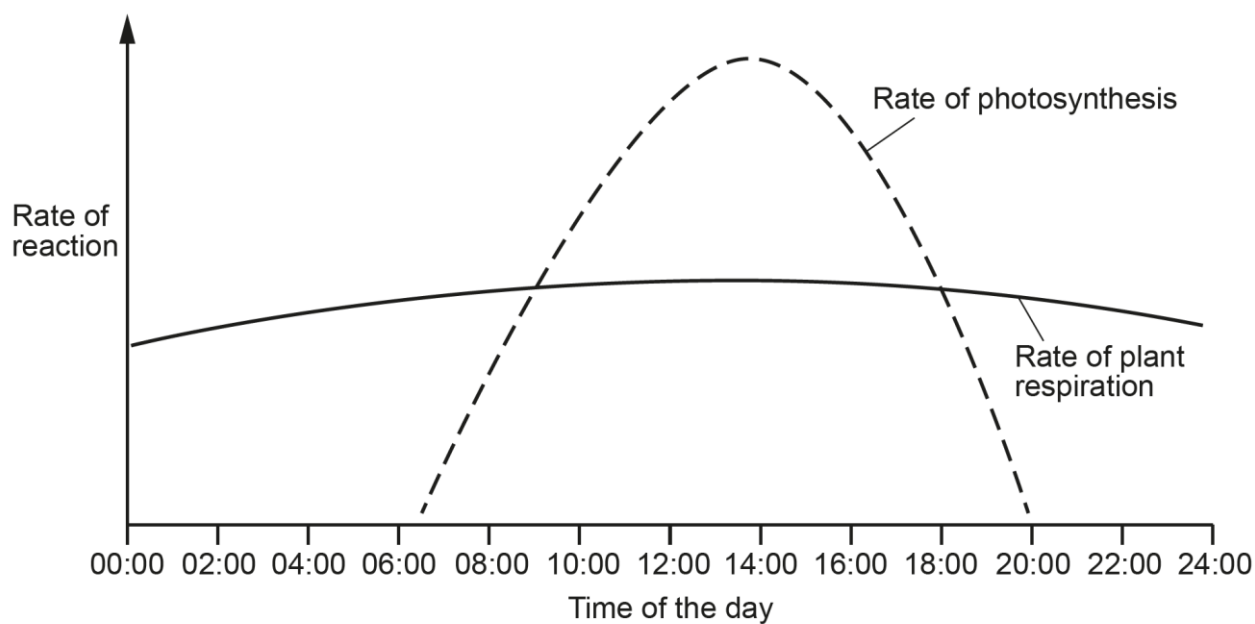
Your answer

[1]

The options for this question included possible interconversion of SI units and also the use of standard form. The majority of candidates answered correctly, showing an overall improvement in the use of these mathematical skills.

Question 10

10 The graph shows the rate of photosynthesis and respiration in a plant over 24 hours.



Between which times will the plant produce more oxygen than it will use?

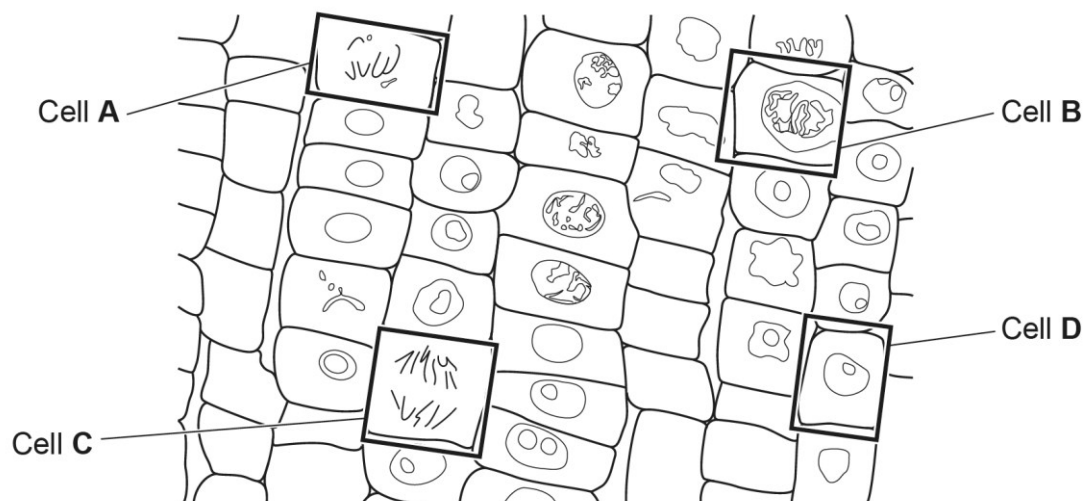
- A 00:00 and 09:00
- B 07:00 and 20:00
- C 09:00 and 18:00
- D 20:00 and 24:00

Your answer

[1]

Question 11

11 In which cell in the image will DNA replication be occurring?



Your answer

[1]

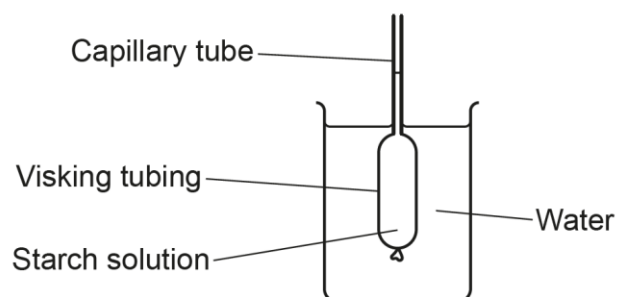
This question was found the most challenging by candidates in Section A. Candidates are expected to know that DNA replication occurs before the movement of chromosomes so were able to eliminate cells A and C. Candidates found it more challenging to differentiate between cells B and D, with B being the most common incorrect answer. Candidates who had experienced the practical suggestions listed in learning outcome B2.1b or images of the process of mitosis in cells may have been more able to make a correct decision between options B and D.

Question 12

12 Visking tubing is an artificial partially permeable membrane.

A student:

- puts starch solution into a visking tubing bag connected to capillary tubing
- puts the visking tubing bag in water (as shown in the diagram)
- measures the level of the solution in the capillary tubing at the start of the investigation and then one hour later.



What describes and explains what the students observes?

- A** The level of the liquid in the capillary tube falls as starch moves out of the visking tubing by diffusion.
- B** The level of the liquid in the capillary tube falls as water moves out of the visking tubing by diffusion.
- C** The level of the liquid in the capillary tube rises as water moves into the visking tubing by osmosis.
- D** There is no change in the position of the liquid in the capillary tube.

Your answer

[1]

Question 13

13 Which blood vessel transports blood **out** of the left ventricle?

- A Aorta
- B Pulmonary artery
- C Pulmonary vein
- D Vena cava

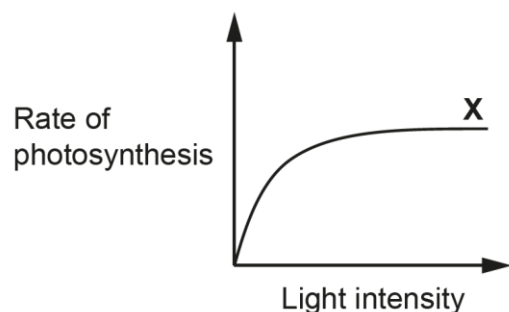
Your answer

[1]

Over three quarters of candidates answered correctly but the most common incorrect answer was B.

Question 14

14 Which factor or factors could limit the rate of photosynthesis at **X** on the graph?



- A Carbon dioxide and light intensity
- B Carbon dioxide and temperature
- C Light intensity and temperature
- D Light intensity only

Your answer

[1]

Although questions involving limiting factors are usually found to be challenging, over two thirds of candidates answered correctly.

Question 15

15 In multiple sclerosis, the speed of nervous transmission is reduced.

Damage to which part of the motor neurone will reduce the speed of nervous transmission?

- A** Cell body
- B** Dendrite
- C** Myelin sheath
- D** Synapse

Your answer

[1]

Section B overview

Section B of this paper contains a mixture of short answer questions, questions requiring longer responses and one 6–mark Level of Response question (Question 20 (a)). The questions between them cover all three Assessment Objectives AO1, AO2 and AO3.

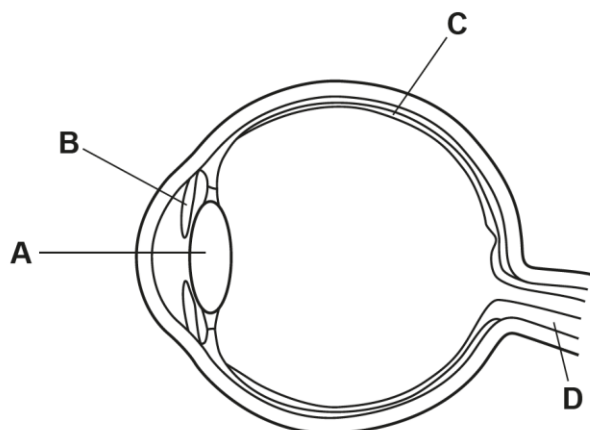
Candidates scored well on Questions 16 and 17 which were common with the Foundation tier paper. Question 16 concentrated on the eye and many candidates displayed a sound knowledge of the structure and the treatment of an eye defect. Question 17 involved the observation of root tip cells. Responses to how the light microscope should be used varied considerably and this may reflect the practical experience of the candidates.

A continued improvement in mathematical skills was seen in Question 16 (b) (ii), Question 17 (c), Question 21 (b) and Question 22 (d), with many candidates scoring full marks on each of these questions.

The difficulties involving the use of the terms accuracy, reproducibility and validity seen in Question 17 (e) and Question 20 (a) could have been eased if candidates had experience of the document 'Language of Measurement in Context' provided by OCR.

Question 16 (a)

16 The diagram shows the human eye.



(a) State which letter in the diagram performs each of the following functions:

Controls the size of the pupil

Focuses the light on the retina

Transmits electrical impulses to the brain

Detects light

[3]

Question 16 was overlap with the Foundation tier paper and part (a) proved to be a very accessible opening question. Errors were made by a small number of candidates, and some did not gain marks due to writing the name of the structures on the answer lines rather than the letters from the diagram.

Question 16 (b) (i)

- (b)** Short-sightedness is a condition that causes the light entering the eye to be focused before it reaches the retina.

Opticians measure the focusing power of the eye in dioptres (D).
It is written as a minus number and indicates how short-sighted you are.

	Focusing power in dioptres (D)
Low short-sightedness	less negative than -3.0
Mild short-sightedness	-3.0 to -4.0
Moderate short-sightedness	-4.1 to -6.0
High short-sightedness	more negative than -6.0

- (i)** A student has an eye test.
The optician tells the student that the focusing power of their eyes is -3.5 dioptres.

Explain to the student what this result means and how it is likely to be treated.

.....

.....

.....

..... [2]

Most candidates interpreted the table correctly and identified mild short-sightedness. Many also followed this up with a correct treatment, usually glasses with concave lenses. A small number of responses confused concave and convex lenses.

Question 16 (b) (ii)

(ii) Once short-sightedness has developed, it usually gets worse.

Another student has a focusing power of -1.0D which is changing by -0.5D per year.
Using a drug called atropine will reduce the change to -0.2D per year.

Calculate how many **more** years it will take for them to develop **mild short-sightedness** if they use the drug compared to not using the drug.

Number of years more = [2]

Most responses correctly calculated the number of years to develop short-sightedness with and without the drug and then subtracted one from the other. The most common error involved just calculating one of the times and giving the answer 4 or 10.

Question 17 (a)

17 A student is investigating mitosis in garlic roots.

The student grows some garlic for 10 days as shown in **Fig. 17.1** and removes a root.

The student takes a sample of tissue from four parts of the root, **A**, **B**, **C** and **D**, as shown in **Fig. 17.2**.

Fig. 17.1

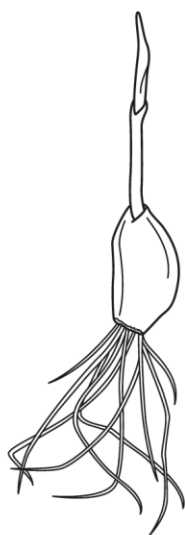
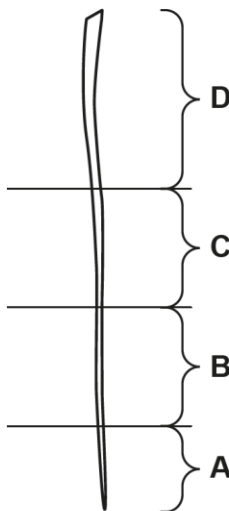


Fig. 17.2



- (a)** The student prepares a slide to look for mitosis in the different parts of the root. The student adds a stain when preparing the slide.

Explain why the student adds a stain to look for mitosis.

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

Question 17 was also an overlap question with Foundation tier. It proved to be a little more challenging than Question 16. In part (a) generalised responses such as 'to make the cells visible' were not credited as the question specifically asks about mitosis. Therefore, reference to making DNA, chromosomes or genetic material visible was the required answer, although nuclei or organelles were acceptable.

Question 17 (b)

(b) The student uses a light microscope to look at the garlic root cells on the prepared slide.

Describe how the student would set up the microscope so that the details of the garlic root cells are clearly visible.

.....

.....

.....

.....

.....

..... [4]

Despite specifically asking about how the microscope was set up, many candidates wasted time by initially giving long descriptions of how the slide should be prepared. If candidates did concentrate on the set up of the microscope, some answers were quite detailed. The need to focus was appreciated but some answers lacked a description of how this was achieved.

OCR support



The OCR Gateway Science Teach Cambridge website gives a pictorial guide to the use of the light microscope which may be useful for students. It can be found at [Purposeful Practicals - Microscopy \(onion cells\)](#)

Question 17 (c) and (d)

(c) The student takes two measurements when observing the cells under the microscope:

- the total number of cells in the field of view
- the number of cells in the field of view that are undergoing mitosis.

The results are in the table.

Part of the root	Total number of cells in field of view	Number of cells undergoing mitosis in field of view	Percentage of cells undergoing mitosis in field of view (%)
A	120		75
B	125	55	44
C	88	0	0
D	78	0	0

Calculate the number of cells undergoing mitosis in the field of view in part **A**.

Number of cells = [2]

(d) The student concludes that only cells found in certain parts of the root can divide by mitosis.

How does the data in the table support their conclusion?

.....
 [1]

Question 17 (e)

(e) The student wants to improve their experiment to:

- make a more accurate conclusion about where cells in the root can divide by mitosis
- check that their results are reproducible.

Draw **two** lines to connect each **improvement** with **how it can be achieved**.

Improvement	How it can be achieved
Make a more accurate conclusion.	Compare the results with other students' results.
Check that the results are reproducible.	Use a lower magnification so that more cells can be counted.
	Sample from more points in regions A and B .

[2]

Most candidates could identify how to check for reproducibility but there was more confusion over accuracy.

OCR support



The [Language of measurement in context](#) document on Teach Cambridge will be useful to share with candidates. It defines and exemplifies each term candidates should be familiar with within the context of a specific practical.

Question 17 (f)

(f) Cells located in region **D** differentiate to form a tissue responsible for translocation.

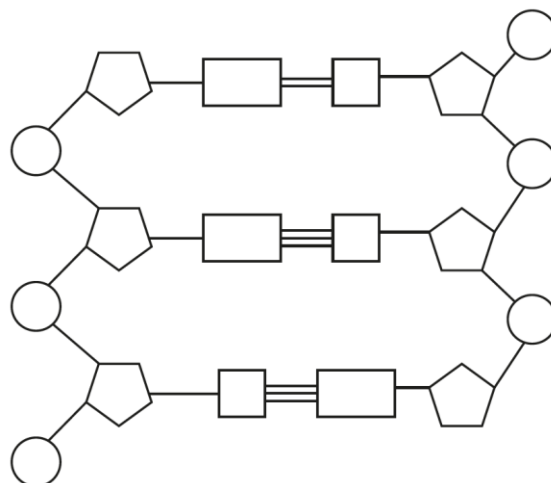
State the name of this tissue.

..... [1]

This question was well answered but if there was confusion it usually involved xylem and, to a lesser extent, meristems.

Question 18 (a)

18 The diagram shows part of a DNA molecule.



(a) Draw a circle around **one** nucleotide on the diagram.

[1]

Many candidates correctly ringed one complete nucleotide but some only included two or one of the three constituents.

Question 18 (b)

(b) Complete the sentences to describe how DNA codes for the production of a protein.

Use words from the list.

amino acids	chromosome	fatty acids	gene	mitochondrion
ribosome	transcribed	translated	transpired	

A small section of the DNA molecule containing the unzips.

The DNA is and mRNA is formed.

The mRNA molecule moves to a in the cytoplasm.

tRNA molecules carry which join to form a protein.

The nucleotide sequence has been

[5]

The cloze nature of this question yielded many correct responses with full marks. However, as is often the case, there was some confusion between transcription and translation and some responses included chromosome in the first gap rather than gene.

Question 18 (c)

(c) DNA molecules are found in both eukaryotic and prokaryotic cells.

Describe the differences in the location and shape of the molecule in these two types of cell.

Location

.....

Shape

.....

[2]

Misconception



A comparison of the genetic material in prokaryotic and eukaryotic organisms has been asked before on this paper. Candidates are starting to give good explanations of the location of the DNA but the shape of the molecule is still causing confusion. Many candidates think that only the DNA in eukaryotes forms a double helix and do not make the distinction between a closed loop versus strands. This misconception is shown in the following exemplar which scored the first but not the second mark.

Exemplar 1

(c) DNA molecules are found in both eukaryotic and prokaryotic cells.

Describe the differences in the location and shape of the molecule in these two types of cell.

Location ...eukaryotic cell: inside nucleus.....

...prokaryotic cell: inside cytoplasm.....

Shape ...eukaryotic cell: in a double helix shape.....

...prokaryotic cell: in a ring shape.....

[2]

Question 19 (a)

19

(a) Describe the process of photosynthesis.

.....

.....

.....

.....

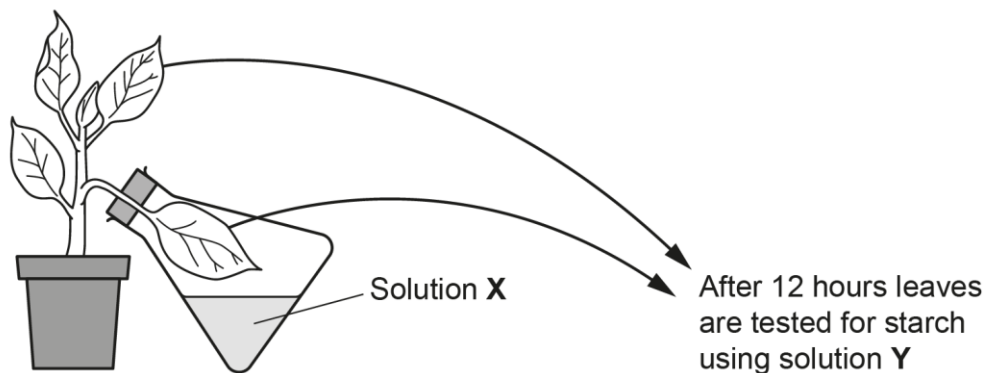
.....

..... [3]

Most candidates could identify the substrates and products of photosynthesis and so scored at least 1 mark. The location was also widely quoted. Fewer responses referred to the two-stage nature of the process. This is included in learning outcome B1.4b of the specification.

Question 19 (b)

(b) The diagram shows an experiment to show that carbon dioxide is needed in photosynthesis.



Give possible names for solution X and solution Y.

Solution X

Solution Y

[2]

Candidates are expected to be able to describe experiments investigating photosynthesis and so the reagents for this common reaction should be able to be identified. Most candidates could identify solution Y but there were few correct responses for solution X, the most common responses being water or lime water.

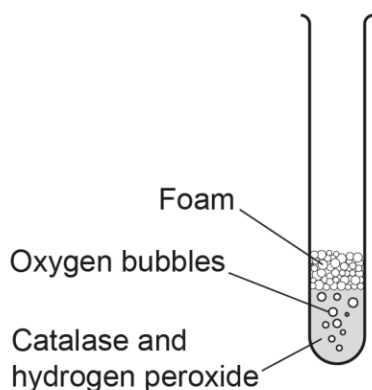
Question 20 (a)*

20 Catalase is an enzyme that breaks down hydrogen peroxide into oxygen and water.

When catalase is added to hydrogen peroxide in a test tube, the oxygen bubbles are visible as foam, as shown in **Fig. 20.1**.

The amount of foam present indicates how active the catalase enzyme is.

Fig. 20.1



(a)* Design an investigation to determine the effect of temperature on catalase activity.

Include in your answer:

- the measurements to be taken
- how to make sure the data obtained is valid.

.....

.....

.....

.....

.....

.....

..... [6]

This question was the 6 mark Level of Response question on this paper. Candidates were expected to focus on three main ideas in their answers:

- a brief method, including use of a water bath and a range of temperatures
- the measurements, i.e. the height of the foam or some measure of the volume of oxygen produced
- validity, including the variables that need to be controlled.

A common error included the use of the term amount rather than volume or concentration – an issue that has been flagged up before in previous reports. This is seen in this exemplar.

Exemplar 2

Begin by taking ~~a test tube~~ 5 test tubes ~~of~~ and filling them with the same amount of catalase and hydrogen peroxide before and then leaving the top stopper oxygen escaping with cotton to let oxygen through but not foam. Then put each test tube in a water bath ~~or~~ increasing in 10°C starting at 10°C and ending at 50°C every five minutes over the course of 30 minutes. Take a ruler and measure the height of the foam then plot it in a graph. ~~the~~ writing down the average height of foam for each test tube at each temperature to make sure the test is valid. ~~the~~ height each of the test tubes after the experiment to make sure they're the same before repeating the experiment a few times to make sure the results are accurate. ~~then~~ the student could also ask their friend from another school to repeat it ~~so~~ to ^{see} if it's reproducible. [6]

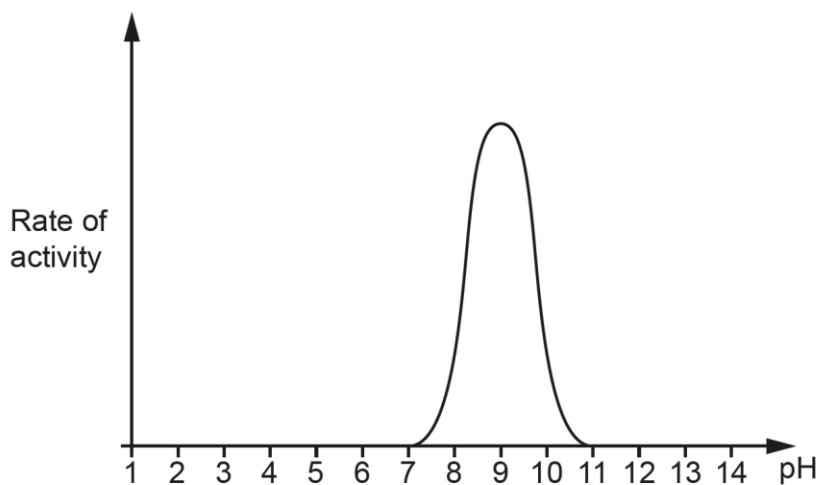
This candidate correctly states that the catalase and hydrogen peroxide should be mixed together and kept at a range of temperatures (although a water path rather than bath is stated). The height of the foam is measured with a ruler. However, the only variable to control is the time (30 minutes). The catalase and hydrogen peroxide are only qualified by the term 'the same amount'. Therefore, this response scored Level 2, 4 marks rather than a Level 3 mark.

Question 20 (b)

(b) Catalase is found in the human body.

Fig. 20.2 shows the effect of pH on the rate of activity of human catalase.

Fig. 20.2



What can you conclude about the effect of pH on the rate of activity of human catalase?

.....

.....

.....

.....

.....

..... [3]

Most candidates could identify the optimum pH as 9 and there were correct references to the range of activity being between pH7 and pH11. There was some confusion between this curve and the curve for temperature, with some candidates referring to the kinetic energy of the molecules.

Question 20 (c)

(c) Explain why catalase can only break down hydrogen peroxide.

.....

.....

.....

.....

..... [3]

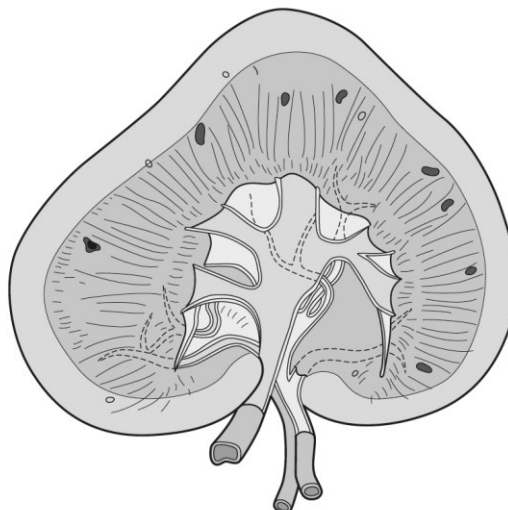
Examiners were looking for ideas covering the specific shape of the active site and the fact that only hydrogen peroxide molecules can fit the active site. Some candidates did not mention the active site and only referred to the shape of the enzyme. Others confused the lock and key process and thought that the enzyme entered the active site of the hydrogen peroxide molecule.

Question 21 (a)

21 A horse has two kidneys. The internal structure of each kidney is similar to a human kidney.

Fig. 21.1 is a diagram of the internal structure of a horse kidney.

Fig. 21.1



(a) Label the cortex region of the kidney on **Fig. 21.1**.

[1]

Learning outcome B3.3h states that candidates should be able to describe the gross structure of the kidney but fewer than half could identify the position of the cortex.

Question 21 (b)

(b) A horse produces approximately 650 ml of urine per hour.

Calculate the volume of urine a horse produces in one day.

Give your answer in litres.

Volume of urine = l [2]

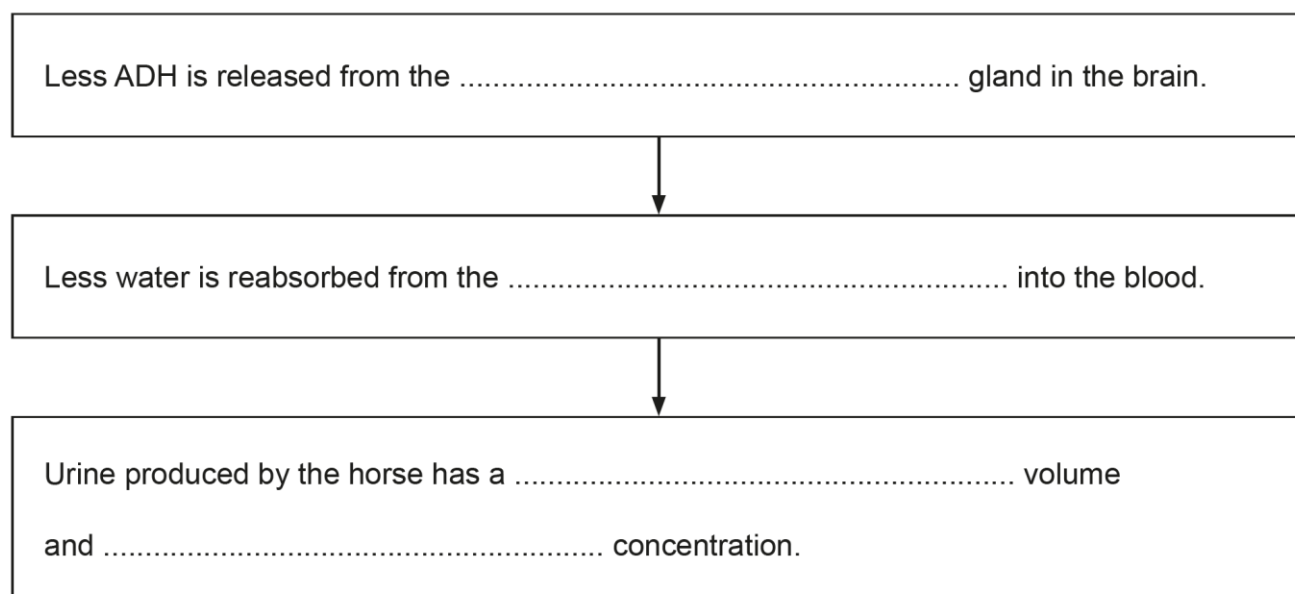
Most candidates scored 2 marks on this calculation, although there were a small number who incorrectly converted millilitres to litres.

Question 21 (c)

(c) Diabetes insipidus is a disease in horses that causes a reduction in the amount of ADH produced.

Complete **Fig. 21.2** to explain the effect of this disease on the urine produced by the horse.

Fig. 21.2



[4]

The pituitary gland was correctly identified by most candidates but the location of water reabsorption in the second box was sometimes incorrect or not specific enough. The mark scheme allowed kidney tubule or specific areas of the tubule, not just the kidney.

Question 21 (d)

- (d) A horse owner suspects their horse has diabetes insipidus.

Suggest **one** symptom, other than changes to urine, that the horse owner may observe.

..... [1]

Some candidates referred to increased thirst or increased drinking but these answers were in the minority.

Question 21 (e) (i)

- (e) Pregnant female horses have oestrogen in their urine.

Pharmaceutical companies collect the urine and use the oestrogen it contains to make a drug called Premarin.

Premarin is taken by some human females.

- (i) Give **one** function of oestrogen in the female menstrual cycle.

..... [1]

Most candidates correctly referred to the thickening or repair of the uterus lining but, in a few cases, oestrogen was confused with progesterone and maintenance of the lining was given as a response.

Question 21 (e) (ii)

- (ii) Large numbers of pregnant female horses are bred to collect enough oestrogen.
The horses are kept in stables and have a bag attached to them to collect the urine.

Suggest why some people do not agree with using horses to produce Premarin.

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

Information regarding confining the horses in stables with bags attached was included in the question to provide the candidates with some guidance. Some responses correctly expanded on this, but others were sidetracked on to other issues.

Question 22 (a)

- 22** When a person has diabetes, more blood sugar attaches to the haemoglobin in their red blood cells.

A blood test can determine what percentage of haemoglobin has sugar attached to it.

This haemoglobin is called HbA1c.

The normal range for HbA1c is between 4% and 5.6%.

People with symptoms of diabetes have a value that is 6.5% or higher.

- (a)** Explain why an individual with diabetes has a higher percentage of haemoglobin with sugar attached than an individual who does not have diabetes.

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.....

..... [3]

This question required knowledge of the effect of insulin on blood sugar levels. Many responses scored all 3 marks, although some candidates just gave a partial explanation by saying that blood sugar levels would be higher in people with diabetes.

Question 22 (b)

- (b)** Describe how an individual with type 2 diabetes could change their lifestyle to manage their diabetes.

.....

.....

..... [2]

This question was well answered with reference to changes in diet and levels of exercise.

Question 22 (c)

- (c) Doctors use the HbA1c blood test to inform them about how well their patients are managing their diabetes.

The doctor will give the patients an HbA1c blood test every three months.

The table shows the results of one patient's blood tests.

Test	HbA1c (%)
1 (at diagnosis)	13.2
2	11.5
3	8.7
4	7.4
5	6.9
6	7.2

What can the doctor conclude about how well this patient is managing their type 2 diabetes?

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.....

..... [2]

Many responses correctly stated that the patient is achieving some success at managing their diabetes because the test levels have dropped. However, far fewer also pointed out that the levels are still above the 6.5% level that is indicative of diabetes.

Question 22 (d)

(d) In 2015 there were an estimated 31 500 children in the UK with diabetes.

In 2019 this figure was estimated to be 36 000.

Calculate the percentage increase in the number of children diagnosed with type 2 diabetes, between 2015 and 2019.

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

Percentage increase = % **[3]**

There appeared to be a definite improvement in the ability to round answers to the correct number of significant figures in this summer's examination. There was also an improvement in percentage change calculations. As a result of these factors, many candidates scored full marks on this calculation.

Question 23 (a)

23

(a) Draw lines to link each **part of the brain** with its correct **function**.

Part of the brain

cerebellum

cerebrum

medulla

Function

coordinates conscious movement

controls heart rate and breathing rate

responsible for learning, language and memory

[2]

Most candidates scored a mark for identifying the function of the medulla, but a number of responses confused the functions of the cerebrum and cerebellum.

Question 23 (b)

(b) Dopamine is a neurotransmitter chemical that is released at synapses in the brain.

Describe the function of a neurotransmitter chemical at a synapse.

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..... [2]

There were some excellent responses to this question using correct terminology such as the diffusion of the neurotransmitter and the initiation of a nerve impulse in the next neurone. However, some responses did not gain marks due to using vague terms such as message or signal. This is seen in Exemplar 3, that scored a mark for the reference to diffusion but not a mark for the term signal.

Exemplar 3

.....

It converts the signal to a chemical which diffuses
across ~~the~~ the synapse to the next neuron to continue
the carrying the signal. [2]

Question 23 (c)

(c) Parkinson's disease results in a reduction in dopamine in neurones deep in the brain.

To try to identify the cause of the disease, scientists use two methods:

- animals have part of their brain deliberately damaged and are then observed
- the brains of people with the disease are studied.

Explain any difficulties scientists may encounter when using these two methods for studying Parkinson's disease.

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..... [4]

There were many good responses seen to this question scoring a selection of all five possible marking points. A small number of candidates just focused on the ethical concerns of animal experimentation and did not address any of the other issues.

Question 23 (d)

- (d) Scientists now think that a protein produced in the brain which helps brain cells survive is lost in Parkinson's patients.

A clinical trial of a possible treatment for Parkinson's disease was carried out by the scientists.

- Using robotic assisted surgery, tubes containing the protein were placed into the brain of Parkinson's patients.
- 41 patients took part in the study.
- After nine months, the scientists took a brain scan of each patient.
- The patients that had been given the protein showed an increase in the number of cells in the area of the brain where cells are lost in people with Parkinson's disease.

The scientists have said that more research is needed before this treatment will be offered to all Parkinson's patients.

Explain why.

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.....

..... [3]

Most candidates appreciated that 41 patients was a small study size and that nine months was a short time period for the study. However, all marking points were seen in a range of responses.

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