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OCR
Oxford Cambridge and RSA

GCSE (9–1)

Examiners' report

GATEWAY SCIENCE BIOLOGY A

J247

For first teaching in 2016

J247/01 Summer 2024 series

Version 1

ocr.org.uk/science

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 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 OCR.

Paper 1 series overview

J247/01 is the first paper candidates take for the foundation tier Gateway GCSE Biology suite. It assesses content from specification topics B1-3 and B7 practical skills. Therefore, for candidates to perform well on this paper they will need to have sound knowledge of the theory covered in B1- B3 and be able to apply this to novel situations. The J247/01 component includes a multiple choice section and a short response section that also includes a Level of Response question. The Level of Response question assesses the quality of communication as well as knowledge and understanding.

Candidates need to apply the skills and understanding that they have developed through practical activities covered in B7. There are also questions that involve the assessment of key mathematical requirements from Appendix 5f of the specification.

It is important that candidates understand the command words and what is expected when a particular command word is used. In some cases responses were given when explanations were needed and so not all marks were accessed. In other case responses were given that did not response the question in terms of the context in which the question was set.

Exam practice is essential so that candidates understand the requirements of a paper. In some cases, it was clear candidates were not reading the question carefully and lost marks due to not using the information provided.

It is good that candidates are attempting more of the paper and gaining more marks due to maths calculations. Showing workings out is essential in this process.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:

• demonstrated knowledge and understanding in;
  ○ - describing how to carry out a scientific drawing (Q16 (b) (ii))
  ○ - reactants and products of aerobic respiration (Q17 (a))
  ○ - knowing the food reagent and or positive test for protein (Q18 (a))
  ○ - knowing different contraception methods (Q20 (b))
  ○ knowing the role of valves (Q (21))
• applied knowledge and understanding in;
  ○ the effect of exercise on urine (Q17 (e))
  ○ the gas requirement for respiration (Q18 (b))
  ○ the stages in a reflex action (Q19 (a))
  ○ the similarities between the CNS of an octopus and a human and advantage of eyes close to the brain (Q19 (c) (i), Q19 (c) (ii))
	• found it difficult to name the advantages of the electron microscope (Q16 (c))
	• confused the response of insulin to eating a meal (Q17 (d) (ii))
	• could not identify the steps in a reflex action (19 (a))
	• found it difficult to identify how different contraceptive methods work
	• lacked understanding on the osmosis procedure in plants (Q22 (a))
	• found it difficult to extract information from a graph to draw conclusions in the Level of Response question (Q20 (a)).

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
○ peer review (Q21 (d)) ○ identifying control variables (Q22 (b)) ○ understanding the difference between obtaining reproducible and repeatable data (Q22 (c)) ○ calculating percentages (Q23 (c)) • analysed information and ideas to interpret and evaluate when they had to evaluate information from a graph and provided to make conclusions in Level of Response question (Q20 (a)) • analysed information and ideas to make judgements and draw conclusions in Q23 (b) (i) • analysed information and ideas to improve experimental procedures in Q23 (b) (ii).	

Section A overview

Candidates responded well to Section A and made sure they selected a multiple choice response for Q1-15. Most candidates have responded to feedback and most candidates are selecting upper case responses to make sure the desired letter is easily distinguishable.

Question 1

1 Which structures are found in plant cells but **not** in animal cells?

A Chloroplasts

B Mitochondria

C Nuclei

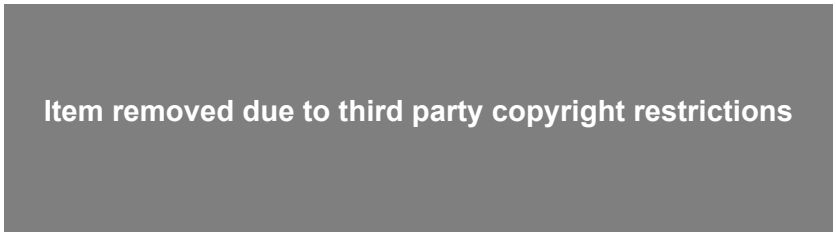
D Ribosomes

Your answer ☐ **[1]**

The majority of candidates could identify that chloroplasts are found in plants and not in animal cells. The most common incorrect answer was ribosomes.

Question 3

3 The diagram shows the structure of a snake's heart.



Which sentence describes the structure of the snake's heart?

A It has one atrium and one ventricle.

B It has one atrium and two ventricles.

C It has two atria and one ventricle.

D It has two atria and two ventricles.

Your answer ☐ **[1]**

This question was challenging as most candidates could not identify the snake's heart having two atria and one ventricle. The most common incorrect answer was identifying the atria and ventricles incorrectly up by stating it has one atria and two ventricles.

Misconception

Candidates identifying the atria as the ventricle and vice versa.

Question 8

8 What is transported by red blood cells?

A Antibodies

B Glucose

C Hormones

D Oxygen

Your answer ☐ **[1]**

The majority of candidates could identify that oxygen is carried by red blood cells.

Question 9

9 Which blood vessel transports blood from the lungs to the heart?

A Aorta

B Pulmonary artery

C Pulmonary vein

D Vena cava

Your answer ☐ **[1]**

Less than half of candidates could correctly identify the pulmonary vein transports blood from the lungs to the heart.

Assessment for learning

Candidates could benefit revisiting blood vessels and the circulatory system more than once throughout the GCSE course to improve their recall of key knowledge.

Question 10

10 Which diagram shows a red blood cell?

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A **B** **C** **D**

Your answer ☐ **[1]**

This question was the most accessible in the multiple choice section A, with most candidates correctly identifying the red blood cell as B.

Question 14

14 Cellulose is a complex carbohydrate.

Which monomers is cellulose made from?

A Amino acids

B Fatty acids

C Glycerol

D Simple sugars

Your answer ☐ **[1]**

This question was the most challenging in the multiple choice Section A. Most candidates did not recognise that simple sugars (monomers) make up complex carbohydrates (polymer). Fatty acids (B) and amino acids (A) were the most incorrectly chosen answers.

Section B overview

This section assesses AO1, AO2 and AO3 and includes a selection of questions where candidates choose between options provided (by ringing a word or by ticking a box), plus short response responses and a Level of Response question. The overlap questions were Q22 and Q23 in this paper.

Most questions were attempted with a low number being omitted by candidates. The exceptions were the questions on aerobic respiration, rules of carrying out a scientific drawing and the overlap questions.

Knowledge gaps have been identified and the key misconceptions where centres could focus and revisit more often throughout the GCSE course were osmosis and improvements with exam technique. Where candidates did not score, it was due to a lack of use of scientific subject-specific terminology and vague responses. Teachers can improve this by using knowledge organisers in lessons for candidates to refer to.

Most candidates did not require the extra pages provided at the end of the exam booklet but it was utilised when necessary.

Question 16 (a)

16 A light microscope is used to view a specimen.

(a) Draw lines to connect each **part of the microscope** to its **role** in viewing the specimen.

Part of the microscope	Role
Stage	Moves the lenses up and down so the specimen can be seen clearly.
Objective lens	Makes the image bigger.
Focusing knob	Shines a light onto the specimen so that it can be seen.
Lamp	The part where the slide is placed.

[3]

This question in Section B was the most accessible for the candidates, with the vast majority obtaining maximum marks for correctly identifying the role of each of the part of the microscope.

Question 16 (b) (i)

(b) A student uses a light microscope to look at pollen grains.

(i) The total magnification of the microscope is ×400.

The magnification of the eyepiece lens is ×10.

Calculate the magnification of the objective lens used by the student.

Magnification = ... **[2]**

Many candidates obtained full marks here and applied their knowledge of calculating total magnification. Several candidates did not know how to calculate the magnification of the objective lens with the eyepiece magnification and total magnification provided in the stem.

Assessment for learning

Centres should make sure that knowledge gaps are revisited throughout the KS4 programme and maths is embedded with:

Total magnification = eye piece magnification x objective lens magnification.

Question 16 (b) (ii)

(ii) **Fig. 16.1** shows the image the student sees.

Fig. 16.1

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The student was asked to produce a drawing of the pollen cells.

Describe to the student how a scientific drawing is produced.

.....

.....

.....

.....

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

This question challenged many students and they wrote about how to focus the microscope to see the pollen seeds. The most commonly given mark was for labelling the drawing. Several candidates did not gain any marks.

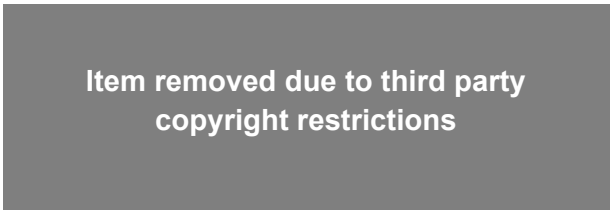
Assessment for learning

Centres should make sure that PAG's delivered allow for candidates to develop their skills in scientific drawings and give them the rules which should be applied.

Question 16 (c)

(c) **Fig. 16.2** shows an image of a pollen grain taken using an electron microscope.

Fig. 16.2



Give **two** reasons why the image shows more detail with the electron microscope than the image produced by the light microscope.

1 .....

.....

2 .....

.....

[2]

This question discriminated between students at different grades well and the full range of marks given was equally spread. The most common incorrect response was that electron microscopes can zoom in better. Candidates need to make sure they use the scientific terms of magnification and resolution.

Question 17 (a)

17 An athlete is running a 10 km race. They need to produce ATP in their cells during the race.

(a) Describe how cells make ATP.

In your answer include:

- the name of the process
- the substances that are used and made.

.....

.....

.....

.....

.....

..... **[4]**

Several candidates did not attempt this question on the paper. This was a knowledge and understanding AO1 question on aerobic respiration. Several candidates did not gain marks and the distribution amongst scoring marks was evenly spread. The most common scoring mark was the ability to link ATP production with the process of respiration.

Assessment for learning

Aerobic respiration has been identified as a knowledge gap in the candidates' understanding of key process in cell biology. Candidates would benefit from reinforcement and review of their understanding of respiration at different points in the GCSE course. E.g. decay, carbon cycle, enzymes, metabolism and thyroxine.

Misconception

Many students got aerobic and anaerobic respiration mixed up, and aerobic respiration produced lactic acid and aerobic respiration is the absence of oxygen. There were a lot of candidates mixing up reactants and products and negated marks accordingly.

A small number of candidates also confused ATP production with protein synthesis.

Question 17 (b)

(b) During the race, the athlete's body temperature increases.

Which of these responses will cool them down?

Tick (✓) **two** boxes.

Response	
Hairs stand up	
Increases sweat production	
Shivering	
Vasoconstriction of blood vessels	
Vasodilation of blood vessels	

[2]

Most candidates scored one or two marks on this question applying their knowledge and understanding of body temperature and homeostasis to exercise. The most common mark given was for increased sweat production. The most common incorrect response was vasoconstriction of the blood vessels instead of vasodilation.

Question 17 (c)

(c) During the race, the athlete produces a substance that causes pain in their leg muscles.

Which substance causes this pain?

Put a (ring) around the correct answer.

amino acid **fatty acid** **hydrochloric acid** **lactic acid**

[1]

The vast majority of candidates recognised that lactic acid caused pain in their leg muscles. The most common incorrect response was fatty acid.

Question 17 (d) (i)

(d) After the race, the athlete eats some food.

The graph shows the athlete's insulin production after the race.

(i) Estimate what time the athlete ate the food.

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

This question was well answered by candidates and they were able to identify the time the athlete ate corresponded to when insulin production rose. The most common response which did not gain this mark was stating 14:00, which was an hour too late.

Question 17 (d) (ii)

(ii) Explain why eating food affects the athlete's insulin levels.

.....

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

This question discriminated well between candidates at different grades. There was an even spread of marks given. The most common mark given was for correctly identifying that the glucose in food affected the athlete's insulin levels.

Misconception

Some students incorrectly thought that insulin breaks glucose down. There was confusion between the role of insulin and digestive enzymes.

Other students did not correctly identify that it is the glucose in food, but rather other food nutrients such as lipids and proteins, which affect insulin levels.

Assessment for learning

Glucose regulation and the role of insulin has been identified as a knowledge gap. Candidates would benefit from revisiting the role of insulin through the GCSE course to reduce the misconceptions raised.

Question 17 (e)

(e) Draw a line to connect the boxes that describe the urine produced by the athlete after the race.

Draw only **one** line.

High volume	Very concentrated urine
Low volume	Dilute urine

[1]

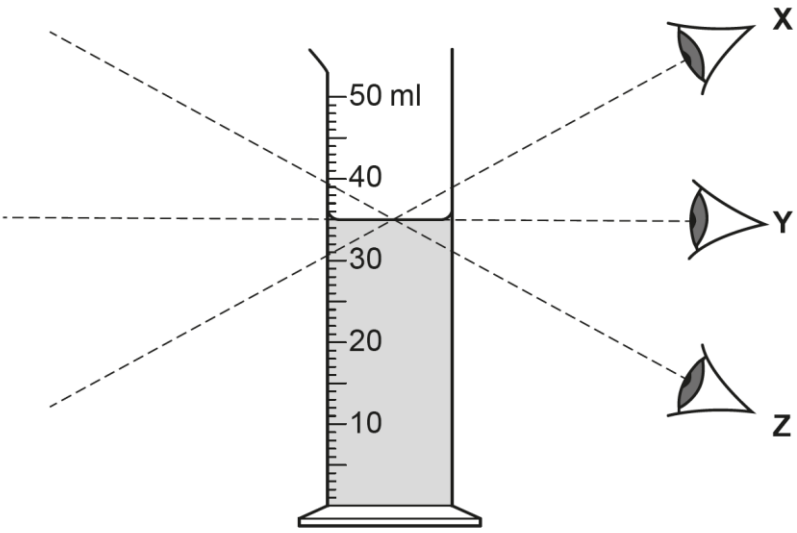
The vast majority of candidates did not seem to read the question correctly and drew two lines instead of one line which negated the mark. Candidates would benefit from reading the question carefully to make sure they do not disadvantage themselves.

Question 17 (f)

(f) A student records some data on the volume of urine produced by different athletes after the race.

Each athlete's urine is collected in a different measuring cylinder.

The diagram shows three eye positions where the student could view the level of the urine to measure the volume produced by a particular athlete.



Complete these sentences.

Put a (ring) around each correct option.

The student should always view the level of liquid from position **X** / **Y** / **Z**.

Viewing the liquid from different positions for the different athletes would introduce

sampling / **random** / **systematic** error into the measurement.

[2]

Most candidates gained a mark for correctly identifying position Y for reading off the measurement at the meniscus. However the majority of candidates did not seem to know the difference between random and systematic error.

Assessment for learning

Knowledge gap identified in candidates' understanding between systematic and random error.

The OCR specification clearly states that candidates will be assessed on working scientifically skills and WS1.3h states the ability to identify these two types of error. Centres should make sure that these skills are taught alongside the PAG practicals.

OCR support

The Language of Measurement in Context: Biology resource can be used to support students with understanding language of measurement terminology used, including systematic and random error.

Question 18 (a)

18 The diagram shows a hen's egg.

A chick can develop inside the egg.

(a) The developing chick gets most of its nutrition from the egg yolk.

A student tests the yolk for **protein**.

The tables show:

- reagents that could be used to test the yolk
- possible colours of reagents if there is a positive test.

Identify the reagent the student should use and the colour that this reagent will go if protein is present.

Tick (✓) **two** boxes.

Reagent	
Benedict's	
Biuret	
Iodine solution	

Colour	
Blue-black	
Purple	
Red	

[2]

This question required knowledge and understanding of food test reagents and positive results. This proved challenging for the candidates and several candidates did not score here.

Assessment for learning

Knowledge gap identified in candidates' understanding of food reagent tests and their qualitative colour results.

The candidates got confused, mixing up the wrong reagent with colour change. The candidates would benefit from revisiting this key knowledge throughout the GCSE course.

Question 18 (b)

(b) The hen's egg is covered in an eggshell that lets gases through.

Why is it important that the eggshell lets gases through?

.....

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

Many candidates gained this mark for correctly identifying the need for oxygen to reach the developing chick or removing carbon dioxide. Some candidates just repeated the stem of the question or spoke about the egg exploding from the build-up of gases.

Question 18 (c)

(c) As a chick develops, it makes new cells.

These are the stages of the cell cycle. They are **not** in the correct order.

A Movement of the chromosomes

B Cell division

C Cell growth

D DNA replication

E More cell growth

Write the letters in the boxes to show the correct order of the stages in one cell cycle.
Two have been done for you.

C		**E**		

[2]

This question discriminated well between the marks given. A third of candidates however thought the cell divided before DNA replication and the movement of chromosomes.

Assessment for learning

Knowledge gap identified in candidates' understanding of key stages in the cell cycle.

The candidates would benefit from revisiting this key knowledge throughout the GCSE course.

Question 18 (d)

(d) The size of a large hen's egg is approximately 40 mm.
The size of a bee's egg is 0.4 mm

How many orders of magnitude are there between the hen's egg and the bee's egg?

Orders of magnitude = ... **[1]**

This was the lowest scoring question on the paper. Candidates did not know how to calculate the order of magnitude. The most common mistake was dividing the size of the hen's egg by the size of the bee's egg and reaching a response of 100.

Assessment for learning

Knowledge gap identified in candidates' ability to calculate order of magnitude.

The candidates would benefit from revisiting this key knowledge throughout the GCSE course and make sure it is clearly embedded in schemes of work.

The OCR specification mathematical requirements M2h and Working Scientifically WS1.4d clearly states that candidates need to be able to make order of magnitude calculations.

OCR support

The Mathematical Skills Handbook can be used to support the teaching of skills such as Order of Magnitude calculations. It can also be shared with students to support their own learning and revision.

Question 19 (a)

19 The diagram shows the sequence of events that occurs during a reflex arc.

(a) Complete the reflex arc diagram.

Use the words from the list.

effector	**motor neurone**	**receptor**	**relay neurone**
sensory neurone	**stimulus**	**synapse**	

[5]

This question involved an understanding of a reflex action and a large majority of candidates did not seem to have the factual recall of it and the sequence was mixed up.

Assessment for learning

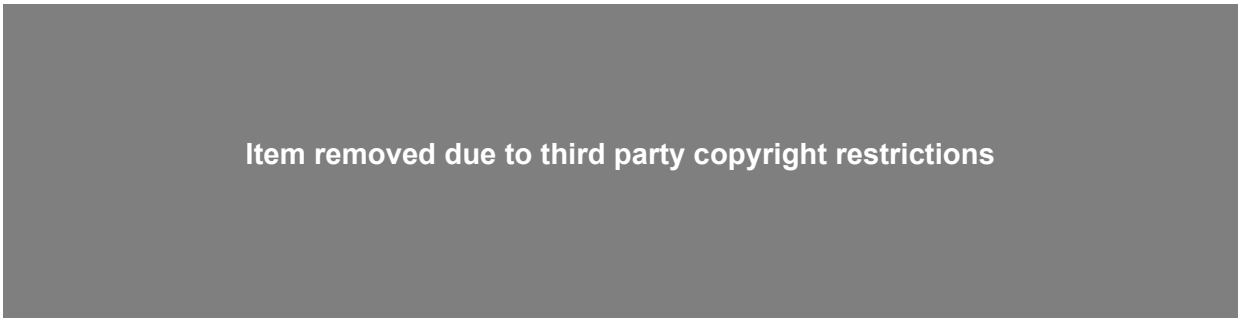
A knowledge gap has been identified in candidates' ability to recall a reflex action.

The candidates would benefit from revisiting this key knowledge throughout the GCSE course and make sure it is clearly embedded in schemes of work.

Question 19 (b)

(b) Neurones can be divided into two types depending on whether they have a myelin sheath.

The graph shows the relationship between the speed of nerve impulses and the diameter of neurones, for both types of neurones.



Complete the sentences using the information from the graph.

Use numbers or words from the list.

1.0	**4.0**	**8.0**	**faster**	**identical**
negative	**positive**	**slower**		

For both types of neurones there is a ..... correlation between the diameter of the neurone and the speed of nerve impulses.

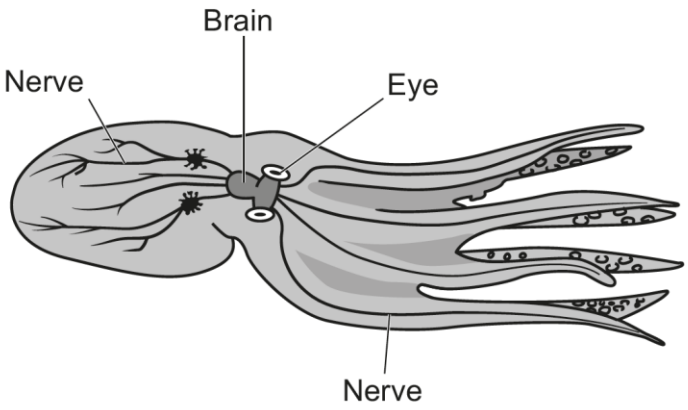
At a diameter of ..... micrometres, the speed of nerve impulses are the same in both types of neurone.

Above that diameter, the speed is ..... in the neurones with a myelin sheath. **[3]**

This was a high scoring question and candidates were able to extract information from the graph to draw conclusions.

Question 19 (c) (i)

(c) The diagram shows the nervous system of the octopus.



(i) Both the octopus and humans have a central nervous system (CNS).

Give **one** similarity and **one** difference between the octopus CNS and the human CNS.

Similarity .....

.....

Difference .....

.....

[2]

The majority of candidates scored on this question by being able to identify that the octopus and humans both have a brain. Candidates were challenged with the difference and couldn't identify that the spinal cord was missing from the octopus which makes up the CNS. The most common incorrect response from the candidates was generic, about both having nerves and not being specific about the CNS.

Question 19 (c) (ii)

(ii) In both the octopus and the human nervous systems, the eyes are close to the brain.

Suggest **one** advantage of this arrangement.

.....

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

Many candidates were able to identify the idea of a faster reaction time. The most common incorrect response candidates made was by not being comparative; that the response is faster or takes less time.

Question 20 (a)*

20

(a)* A female is trying to get pregnant.

To help improve her chances of pregnancy her doctor tells her:

- to monitor her level of a hormone that causes ovulation
- most sperm only survive 2 days in the female uterus, although some sperm can survive up to 5 days
- eggs only survive in the body for 24 hours after ovulation unless they are fertilised.

The graph shows the female's hormone level during a typical menstrual cycle.

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Explain when, during the female's menstrual cycle:

- having sex could **possibly** result in pregnancy
- having sex is **most likely** to result in pregnancy.

Use the information provided by the doctor, the graph and your scientific knowledge.

.....

.....

.....

.....

.....

..... **[6]**

The Level of Response extended writing question was based on the female menstrual cycle and ovulation relating to hormone levels. This question required candidates to use their own knowledge and understanding of the menstrual cycle, the stem of the question, and extract information from the graph. The question discriminated well with candidates achieving a good spread of marks within Level 1 and Level 2. To achieve Level 3 was challenging for the candidates as they had to correctly identify when the person was most likely to get pregnant and when pregnancy could occur. A lot of candidates did not state when pregnancy could occur and limited themselves to a maximum of Level 2. The most commonly given marks were for identifying that the person was most likely to get pregnant when the hormones peaked and correctly extracted information from the graph. The most common response that was given no marks was when candidates talked about having sex to get pregnant and not using any information provided or linked to ovulation or hormones.

Exemplar 1

At around day 10 of the mestrual cycle females could have a high likely of getting Pregnant. This is because on the graph we can see that the hormones between days 10 to 14 Increase rapidly.

In this candidate's response they state when the person is most likely to get pregnant when the hormones levels increase from day 10-14 by extracting the information from the graph. The candidate does not link this to ovulation, use any information provided by the doctor or mention when the person could get pregnant. Therefore Level 1 and two marks were given.

Question 20 (b)

(b) The table lists some of the different contraceptives available to males and females.

For each method of contraception, tick (✓) **all** the boxes that describe how that method works.

Method of contraception	Hormonal	Non-hormonal	Stops sperm entering the uterus	Stops ova (eggs) being released
Condom				
Diaphragm				
IUD				
Combined pill				

[4]

This question discriminated between students at different grades well and there was an even spread of marks given between zero to three. Only a small number of candidates were given maximum marks. The most common correct response was for the understanding of condoms stopping sperm entering the uterus and were non-hormonal. The most common incorrect response was for the IUD and how it works.

Question 21 (a)

21 Some people have a condition called varicose veins in their legs.

The veins swell up because the valves are not working properly.

(a) What is the role of the valves in veins?

.....

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

Many candidates did not know that valves stop the backflow of blood. The most common incorrect response stated that valves keep blood moving without qualifying it.

Assessment for learning

A knowledge gap has been identified in candidates' ability to define the role of valves.

The candidates would benefit from revisiting this key knowledge throughout the GCSE course and make sure it is clearly embedded in schemes of work.

Question 21 (b)

(b) Varicose veins are more common in pregnant females.

During pregnancy, the baby can push on the main veins bringing blood back from the mother's legs.

Give **one** reason why this could lead to varicose veins in the legs.

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

Many candidates found this question challenging to apply their knowledge. Most candidates rewrote the question or gave responses such as stops blood moving around the body.

Question 21 (c) (i)

(c) The data in **Table 21.1** shows the results from a study on varicose veins.

Table 21.1

Age group	Number of people with varicose veins	Percentage of people with varicose veins who are male (%)
< 25	1256	46.0
25–29	2403	32.5
30–34	4304	26.5
35–39	5387	27.7
40–44	5630	29.6
45–49	5713	34.5
50–54	5297	37.9
55–59	4625	41.6
60–64	3400	46.1
65–69	2271	40.6
70+	3438	33.3

(i) Calculate the number of **males** in the study with varicose veins who were younger than 25 years old.

Number of males = ... **[2]**

This question discriminated between students at different grades well and many candidates were able to identify that they needed to calculate 46% of 1256 people with varicose veins. Those who were given one mark incorrectly rounded down instead of up.

Question 21 (c) (ii)

(ii) Which conclusions based on the data in **Table 21.1** are **true** and which are **false**?

Tick (✓) **one** box in each row.

Conclusion	True	False
More females than males develop varicose veins.		
Varicose veins are more common in people under the age of 25.		
The age range 50–54 has the greatest number of cases of varicose veins.		
There are more than double the number of people with varicose veins in the age range 55–59 compared to 65–69.		

[2]

The vast majority of candidates were given at least one mark here in drawing conclusions from the data. More candidates gained full marks by correctly identifying if the four conclusions were true or false.

Question 21 (d)

(d) The results of the study were published in a peer review journal.

Give **one** reason why peer review is important.

.....

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

This question asks the candidates to understand the importance of peer review, which comes under the working scientifically WS1.1i part of the specification. Many candidates were able to achieve this mark. Centres should make sure that candidates are familiar with peer review when carrying out PAG activities and in schemes of work.

Question 22 (a)

22 A student investigates the effect of different concentrations of sugar solution on cubes of beetroot.

This is the method that they use:

Step 1 Cut four cubes of beetroot tissue.

Step 2 Place each beetroot cube in a test tube containing a different concentration of sugar solution.

Step 3 Leave the beetroot cubes in the sugar solutions for 3 hours.

Step 4 Remove the beetroot cubes from the sugar solutions.

(a) The student wants to calculate the percentage change in mass for each beetroot cube.

They want to use the method above to collect the data they need, but have missed some steps from the method.

Describe the **additional** steps needed in the method to find the data.

.....

.....

.....

.....

.....

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

This question discriminated well with a good range of marks given across the candidates. This was a standard demand question which is challenging of the candidates taking the foundation tier paper. Many candidates had a good grasp of the osmosis PAG and could identify that the mass of the beetroot needed to be measured before and after. A few candidates stated that a balance was required to do this. The less successful responses candidates made were about measuring the size and length of the cubes.

Question 22 (b)

(b) State **two** variables that the student should control in this investigation.

1 .....

2 .....

[2]

Most candidates gained marks on this question. The most common mark given was for identifying time was a control variable.

Question 22 (c)

(c) Describe how the student could find out if their data is both repeatable and reproducible.

Repeatable .....

.....

.....

Reproducible .....

.....

.....

[3]

There was a good range of marks given for this question. There were a high number of candidates who did not attempt to respond to this question with a high omit rate. The most commonly awarded response was for repeating the experiment demonstrating their understanding of repeatable. The less successful responses stated that they would know another student/person should conduct the experiment for reproducible.

Question 22 (d)

(d) Two of the beetroot cubes increased in mass.

Explain why some of the beetroot cubes will increase in mass.

.....

.....

.....

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

This was the most challenging question for candidates to respond to correctly. Most candidates did not recognise this question was about osmosis and the movement of water. The most commonly given mark was for correctly identifying that water would move into the beetroot cubes.

Assessment for learning

A knowledge gap has been identified in candidates' ability to apply their knowledge of osmosis in this practical. Most candidates did not know that water moves from a dilute to a concentrated solution or water moved into the beetroot by osmosis. Frequent revisiting of key knowledge and progress tests can help fill knowledge gaps.

Misconception

Candidates concluded that sugar moved into the beetroot cubes not water. Revisiting key processes such as osmosis throughout the GCSE course will help to minimise this misunderstanding.

Question 23 (a) (i)

23 In 2013, scientists researched the use of stem cells to reverse hearing loss.
The scientists used 18 individual rodents for this research.

- They used a chemical to cause deafness in one ear of each rodent.
- They used stem cells to grow nerve cells in the lab.
- They transferred approximately 50 000 nerve cells into each rodent's ear.
- After 10 weeks they tested the rodents' hearing.

(a)
(i) What type of stem cell will the scientists have used?

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

Most candidates did not know that embryonic stem cells were used. A lot of candidates randomly named a specialised cell, e.g. root hair/nerve cell or stated, incorrectly, the use of adult stem cells. This question also had a high omit rate as candidates did not attempt to respond to it.

Question 23 (a) (ii)

(ii) Why will the scientists have used this type of stem cell?
Tick (✓) **one** box.

Can differentiate into any type of cell ☐

Can differentiate into some types of cells ☐

Easy to collect ☐

[1]

Many candidates gained this mark for correctly identifying that stem cells can differentiate into any type of cell.

Question 23 (b) (i)

(b) Results from the research showed that the 18 rodents regained an average of 46% of their hearing.

(i) One of the scientists claims 'this research shows that our method will cure people who have a similar hearing problem'.

State **three** reasons why this scientist's claim is **incorrect**.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

The majority of candidates gained one or two marks on this question as they were able to analyse information to draw conclusions. The most common correct response was correctly identifying that hearing was not fully restored at 46%. The response which candidates gave the least often was the experiment wasn't conducted over a long period, only ten weeks.

Question 23 (b) (ii)

(ii) Suggest **one** way the scientists could extend their research.

.....

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

A large majority of candidates gained this mark for correctly identifying how scientists could extend their research. The most commonly given mark was to test on humans. The least common correct response was testing the rodents for longer.

Question 23 (c)

(c) The scientists discover that a different technique could one day be used to successfully treat 15% of the 10 million people who have hearing loss.

Calculate how many of the 10 million people with hearing loss could benefit from this technique.

Number of people = ... million **[2]**

This was a good question for creating a distinction between candidates, as candidates had an equal spread of marks ranging from zero through to two. Most candidates attempted this calculation question. The most common mistake candidates made was to display 1 500 000 million instead of 1.5 million.

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