Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

January 2025

Pearson Edexcel International Advanced Subsidiary Level In Biology (WBI12)
Paper 01 Cells, Development, Biodiversity, and Conservation

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

January 2025
Publications Code WBI12_01_2501_ER

Introduction:

This paper tested the knowledge, understanding and application of material from the topics 'Cell structure, Reproduction and Development' and 'Plant Structure and Function, Biodiversity and Conservation.

The range of questions provided ample opportunity for students to demonstrate their grasp of these topics and apply their knowledge to novel contexts.

The questions on this paper yielded a wide range of responses and some very good answers were seen. The paper appears to have worked very well with all questions achieving the full spread of marks.

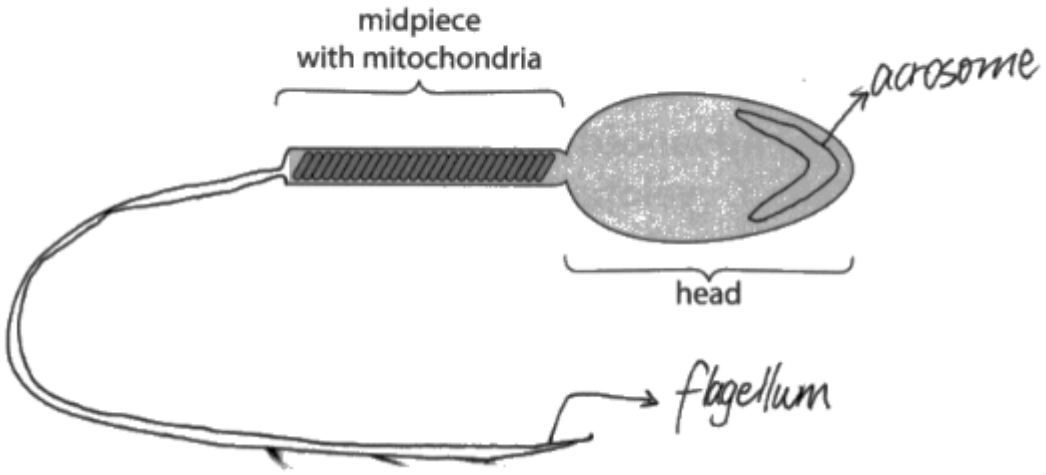
Question 1(a)(i)

This question provided students with an incomplete sperm cell. The mid piece and head of the sperm cell were provided.

Students were asked to draw and label a flagellum and an acrosome. Most students could do this correctly. However, care must be taken that label lines touch the intended structure(s).

A small minority of students did not label their drawings.

This is an example of a response which was awarded one mark:



Question 1(a)(ii)

This question asked students to give the function of the mitochondria in the midpiece of the sperm. Most students were able to give a creditworthy answer related to the sperm cell.

However, a small minority of students lost the mark because they referred to the production of energy.

Question 1(b)(i)

This question required students to analyse the provided data and give two conclusions that could be drawn from these data. Conclusions which were not drawn from these data were ignored.

Most candidates correctly identified the positive correlation between midpiece length and swimming speed, as well as the link between sperm swimming speed and males that mate with multiple females. Care must be taken when referring to the given variables. However, some candidates incorrectly stated that there was no correlation between midpiece length and swimming speed, despite clear evidence in the diagram.

Few candidates recognised that there was a greater spread of data for males who mate with more than one female.

Some students gave descriptions instead of conclusions, which were not creditworthy.

Question 1(b)(ii)

This question asked students to give the name of a statistical test that could be used to assess the strength of the relationship between length of midpiece and swimming speed of sperm cells. Most students could give one of the correct answers.

Some students gave more than one name, with the first answer being the one that was marked. Centres are reminded that if students are asked for a certain number of answers that some mark schemes may penalise additional incorrect answers.

Question 2(a)(i)

Most students knew that the value for 2pq was 0.48.

Question 2(a)(ii)

Most students knew that bb was represented by q^2. Care must be taken when writing the superscript.

Some students misread the question and gave p+q=1.

Question 2(b)

This question asked students to explain how the viral disease could result in a change in allele frequencies of the several genes.

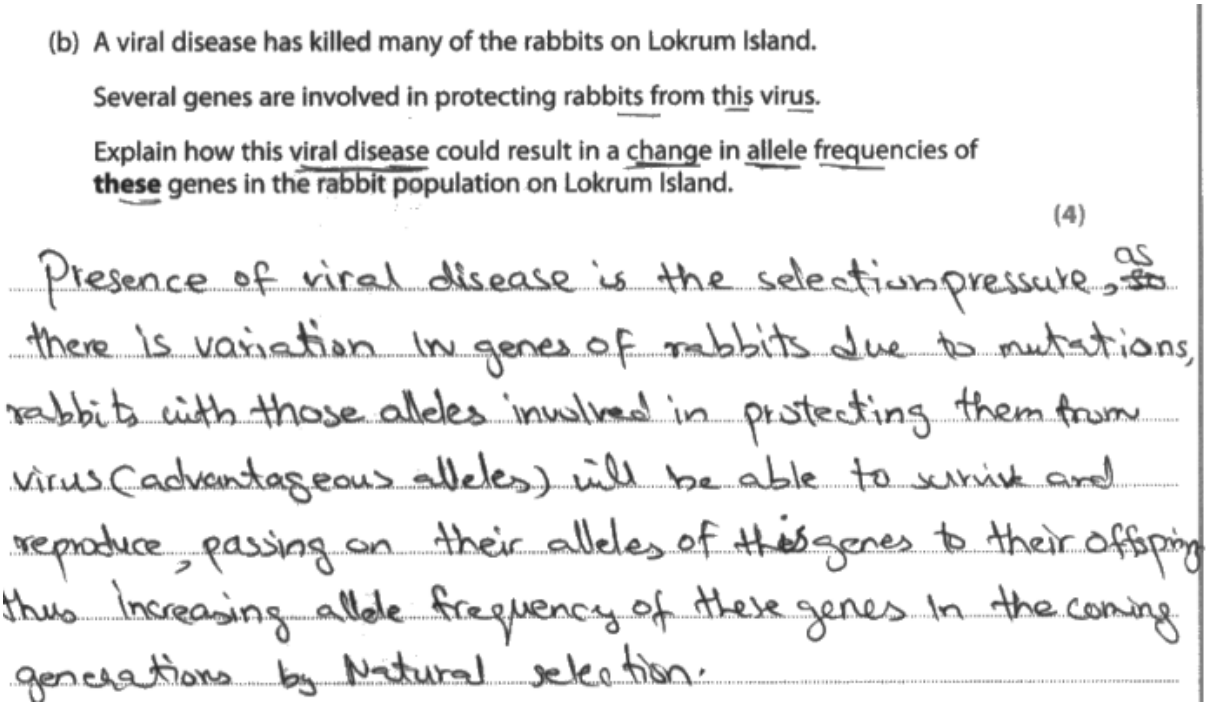
This question was a very good differentiator, and the full range of marking points were awarded.

Some students correctly identified that genetic variation exists within a population or that mutations contribute to this variation. Mutations which were not linked to variation were not creditworthy. However, a common misconception was that a selection pressure causes mutations, rather than acting on existing variation. While some students accurately recognised the viral disease as the selection pressure, others failed to do so and consequently did not gain this mark.

For the later mark points relating to the survival and reproduction of individuals with the advantageous allele, many students lost marks by referring to advantageous genes being passed on to offspring, rather than specifying the transmission of advantageous alleles.

Some students repeated the stem of the question and stated that there would be a change in allele frequency, without explaining what the change would be.

This is an example of a response which gained full marks:



(b) A viral disease has killed many of the rabbits on Lokrum Island.

Several genes are involved in protecting rabbits from this virus.

Explain how this viral disease could result in a change in allele frequencies of **these** genes in the rabbit population on Lokrum Island.

(4)

Presence of viral disease is the selection pressure, as there is variation in genes of rabbits due to mutations, rabbits with those alleles involved in protecting them from virus (advantageous alleles) will be able to survive and reproduce, passing on their alleles of these genes to their offspring thus increasing allele frequency of these genes in the coming generations by Natural selection.

Question 3(a)

Students were asked to describe how the structure and arrangement of cellulose microfibrils contribute to their functions in the cell walls of xylem vessels.
Most students were able to describe the arrangement of cellulose microfibrils in a mesh/at different angles and link this to providing strength/support. Some were able to describe the structure in detail, including repeated and alternately inverted glucose molecules, linked by glycosidic bonds.

Some students went on to discuss lignin which was not relevant to the question. Higher level answers also described hydrogen bonds linking microfibrils or the embedding in calcium pectate linked to increased strength.

Few students mentioned the movement of water or mineral ions through the cellulose walls due to gaps between microfibrils.

This is an example of a response which gained full marks:

Xylem vessels have cell walls containing cellulose microfibrils.

Describe how the structure and arrangement of cellulose **microfibrils** contribute to their functions in the cell walls of xylem vessels.

(3)

β-glucose connect by glycosidic bond to form microfibrils, and these microfibrils connect to each other by hydrogen bond. These microfibrils are arranged in different directions and many layers of microfibrils form cell walls of xylem vessels. They provide strength and support for xylem vessels.

Question 3(b)(i)

This question informed students that chemicals in the soil can affect the absorption of inorganic ions. They were provided with data showing the effect of two chemicals on the mean mass of calcium ions in the root of two types of maize.

Students were asked to give two conclusions for the effect of these treatments on the calcium ion content in the roots of these two types of maize.

Most students were able to draw valid conclusions from a bar graph showing the effect of two treatments on the calcium ion absorption by the roots of two types of maize. Many were able to conclude that both treatments reduced the mean mass/absorption of calcium ions. Some lost marks for describing calcium content in the various roots under different conditions rather than comparing each result with control data and making conclusions about the effect of each treatment.

A significant minority of students misinterpreted the data and believed that the treatments increased the absorption of calcium ions.

This is an example of a response which gained full marks:

(i) Give **two** conclusions for the effect of these treatments on the calcium ion content in the roots of these two types of maize.

(2)

1 Both treatments result in lower absorption of calcium ions.

2 EDTA has a much greater effect on maize type A than maize type B.

Question 3(b)(ii)

Students were asked to explain the effect EDTA would have on new cell walls in the roots of type A maize plants.

Most students were able to apply their knowledge of the structure of cell walls to explain the effect of EDTA treatment on maize root cell walls. Most students recognized that EDTA treatment would make maize cell walls weaker, with most correctly identifying the reason as reduced availability of calcium ions.

Some candidates were then able to give a more detailed explanation as to why reduced availability of calcium ions would result in a weaker cell wall by referring to reduced calcium pectate or middle lamella formation.

This is an example of an answer which was awarded full marks:

(ii) Explain the effect EDTA would have on new cell walls in the roots of type A maize plants.

(2)

- EDTA reduces the mean mass of calcium ions in the roots of maize type A
- therefore less calcium ions are transported inthrough the xylem vessel to the higher parts of the maize where new cells are made, as well as to the roots.
- the middle lamella between cells is made of calcium pectate, its constituents being calcium ions and pectin, which acts as a glue between cells due to its carboxyl groups ($COOH^-$) on the outside.

(Total for Question 3 = 7 marks)

- Since there are less calcium ions, calcium pectate production is reduced if not stopped entirely which affects the rate of cell growth or the strength between new cells.
- This then affects the newly formed roots or formation of roots which reduces overall mineral intake, and reduces stability in the soil due to weaker roots.

Question 4(a)(i)

The majority of students answered this question correctly by correctly identifying that the differences in the appearance of organelles were due to variations in the angle, side, or orientation from which they were viewed. However, some students incorrectly attributed these differences to factors such as different stages of organelle growth, the use of different types of microscopes (e.g., scanning vs transmission electron microscopes), or variations in magnification / resolution.

Question 4(a)(ii)

Students were given a photograph showing two centrioles and were asked to suggest why the two views of this organelle look different.

Most students could give a correct suggestion. However, a few students did not read the question correctly and gave answers referring to being two different organelles.

Question 4(b)(i)

This question provided students with a diagram of a cell in telophase.

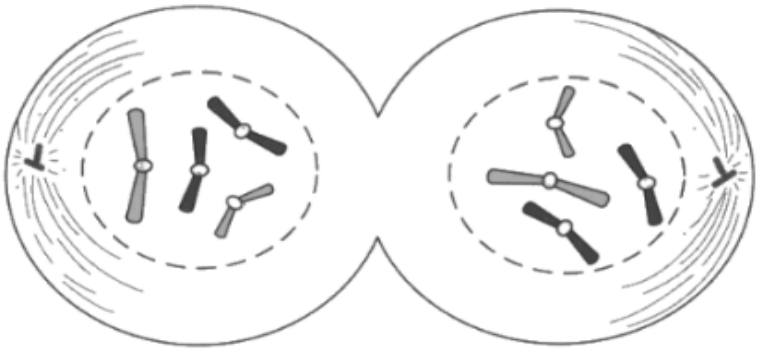
Students were required to apply their knowledge of events in mitosis to draw that cell in metaphase. Most students knew that the chromosomes lined up on the equator in metaphase, but some cells in anaphase were seen.

Most students carefully analysed the provided diagram to understand how many chromosomes they should draw and the position of the centrioles. Those which did so often scored full marks.

Some students did not carefully analyse the provided diagram and either drew an incorrect number of chromosomes, drew chromosomes which were not held together at the centromere or drew the centrioles in the wrong position. A small minority of students drew a nuclear membrane surrounding the chromosomes which negated mp3.

This is an example of a response which gained all three marking points:

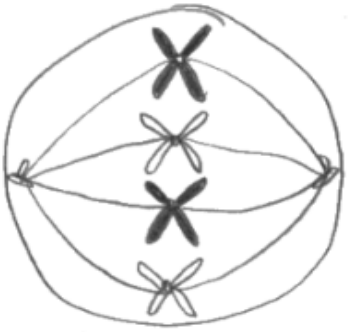
(b) The diagram shows a cell in telophase of mitosis.



(Source adapted from: https://www.shutterstock.com/image-vector/telophase-phase-cell-cycle-1678454008)

(i) Draw **this** cell to show it in **metaphase** of mitosis.

(3)

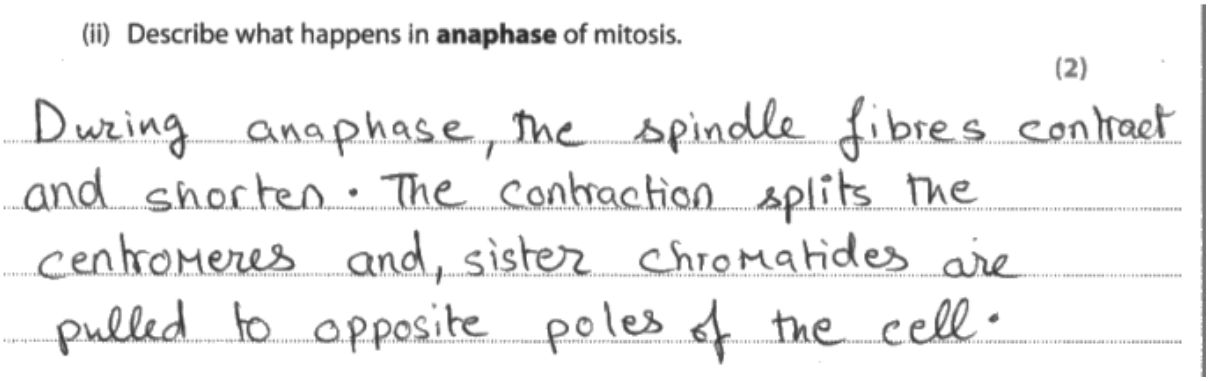


Question 4(b)(ii)

This question asked students to describe what happens in anaphase of mitosis.

Most students correctly identified that the chromosomes were being pulled apart to opposite sides of the cell. Some candidates also correctly mentioned that the spindle fibres contracted, facilitating the movement of chromosomes to opposite sides of the cell, which earned them mp2. Higher level answers included that the centromere may split or divide during this process.

This response gained all marking points, for 2 max:



(ii) Describe what happens in **anaphase** of mitosis.

(2)

During anaphase, the spindle fibres contract and shorten. The contraction splits the centromeres and, sister chromatides are pulled to opposite poles of the cell.

Question 4(c)

This question required students to analyse the diagram in order to calculate how long interphase would take.

Most students could do this calculation correctly, but some students did not read the question correctly and gave their answer in minutes not hours.

Question 4(d)

This question required students to state how the mitotic index of a tissue could be calculated.

Most students demonstrated a good understanding of the equation and described it correctly. However, some students mentioned counting the number of cells with visible chromosomes, which was not an adequate response, as chromosomes are not visible in all stages of mitosis.

Some students gave references to the time that cells were spending in stage of the cell cycle which was irrelevant.

Question 5(a)

Students were asked to complete the provided graph to show how the DNA content per cell would change when a cell with 2 a.u. of DNA undergoes meiosis to produce gametes.

Some students however misread the question and drew a graph for mitosis.

Most students recognized that during meiosis, cell DNA content would double, although a small minority did have the DNA content increasing to more than 4.

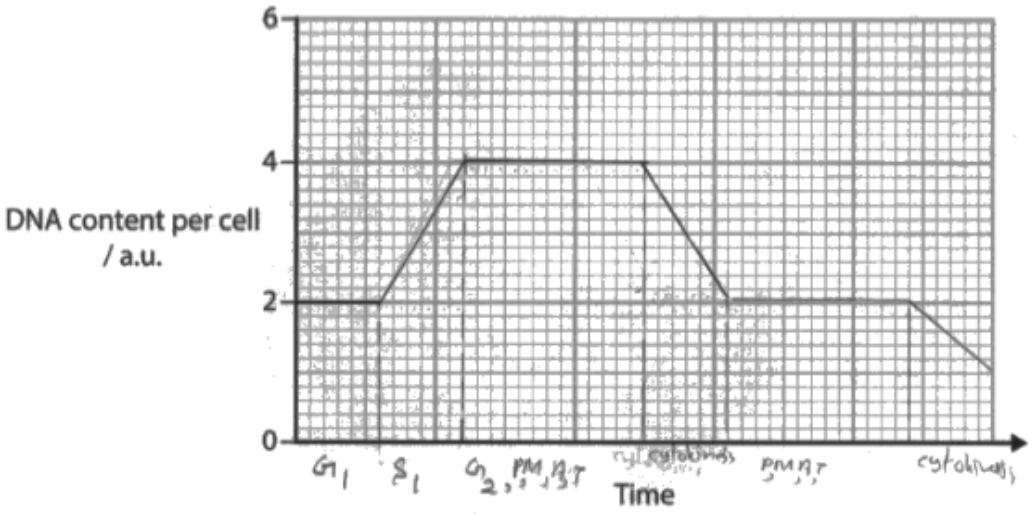
Most students also knew that the end DNA content would be 1 a.u. in a gamete. However, a significant number of responses drew a line directly from 4 to 1 a.u., as they did not take into account the time taken for meiosis II to occur.

This response was awarded 3 marks:

5 Some cells divide by meiosis to form gametes.

(a) Complete this graph to show how the DNA content per cell would change when a cell, with 2 a.u. of DNA, undergoes meiosis to produce gametes.

(3)

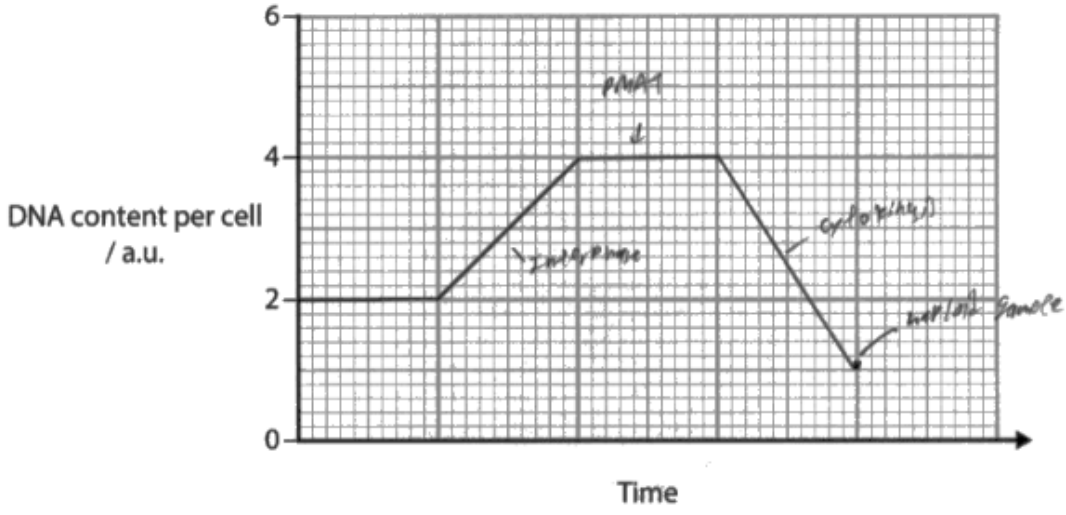


This is an example of a response which did not gain mp2:

5 Some cells divide by meiosis to form gametes.

(a) Complete this graph to show how the DNA content per cell would change when a cell, with 2 a.u. of DNA, undergoes meiosis to produce gametes.

(3)



Question 5(b)

Students were asked to measure the line XY on the photograph and calculate the magnification of the photograph.

A surprising number of students made an error in this process, with the most common errors being measuring length incorrectly, performing unit conversions incorrectly or not giving their answer to two significant figures.

Most were able to use the actual given length of the pollen grain as the denominator in their calculation.

Centres are reminded of the importance of students practicing key mathematical aspects listed in the specification.

Question 5(c)

This question gave a diagram of a peony flower and asked students to describe the growth of a pollen tube and the process of fertilisation.

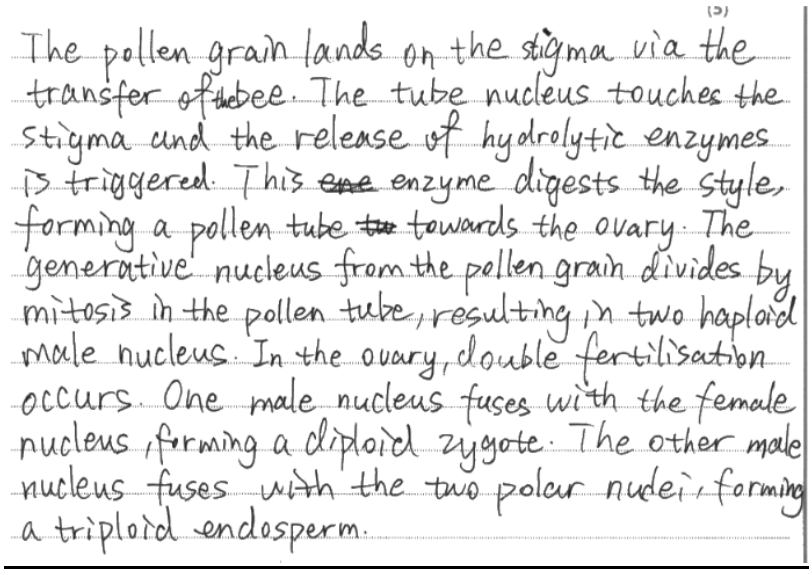
This question was a very good differentiator, with many excellent responses gaining all of the higher-level marking points.

It was generally understood by most students that digestive enzymes were involved in the growth of the pollen tube. Most could also correctly describe the pollen tube destination, although some students referred to the pollen grain moving down the pollen tube.

The most common reason why students did not gain marking point three was due to describing the division into 2 male sperm cells or 2 generative nuclei. More students correctly described the fusion of a male haploid nucleus with the polar nuclei than with the egg cell nucleus. Surprisingly few students gained mp4.

Students are advised to take care to use the terms 'nucleus' and 'nuclei' correctly.

This is an example of a response which scored full marks:



The pollen grain lands on the stigma via the transfer of the bee. The tube nucleus touches the stigma and the release of hydrolytic enzymes is triggered. This ~~one~~ enzyme digests the style, forming a pollen tube ~~the~~ towards the ovary. The generative nucleus from the pollen grain divides by mitosis in the pollen tube, resulting in two haploid male nucleus. In the ovary, double fertilisation occurs. One male nucleus fuses with the female nucleus, forming a diploid zygote. The other male nucleus fuses with the two polar nuclei, forming a triploid endosperm.

Question 6(a)(ii)

Students were asked to explain the advantages for the millipede of being able to make holes in xylem and phloem.

It was disappointing that many students did not read the question carefully or did not apply their knowledge to the question asked.

A significant number of responses just described the roles and functions of xylem and phloem in plants.

However, when students did apply their knowledge to the question, most identified that the millipede gained water or minerals, ions, from the xylem. However, some didn't mention the term ions, which was required for the marking point.

Some students identified that sucrose or organic solutes were taken from the phloem by the millipede. However, a lack of precision in some answers resulted in no mark being awarded. For example, referring to nutrients, glucose or sugar from the phloem.

Some candidates explained the advantages of this gained material, with most explanations centring around respiration / growth or metabolic reactions. However vague explanations, such as increasing the survival of the millipede, or providing places for the millipede to hide, were not credit worthy.

Centres are reminded that references to producing energy are incorrect.

This is an example of a response which scored full marks:

(iii) Explain the advantages for this millipede of being able to make holes in xylem and phloem.

(3)

Making holes for xylem will provide water and minerals for it for growth and water as a solvent making holes for phloem will provide sucrose and amino acid which will enhance protein production and get sucrose that will break down to glucose for respiration to release energy, for growth and harder ~~exos~~ exoskeleton.

Question 6(b)(i)

This question asked students to suggest why the millipede has an exoskeleton and 200 poison glands.

Most students were able to suggest why the millipede had a hard exoskeleton, with many different creditworthy suggestions seen. A small minority of students confused the terms predator and prey.

Most students could also correctly identify that the poison glands are used to kill predators or prey, or to serve as a deterrent against predators. However, some candidates mistakenly referred to the digestion of plants using toxins or poisons, which was incorrect.

Question 6(b)(ii)

This question asked students to explain how scientists could determine how closely related the two species of millipedes are to each other.

It was clear that most students had a good understanding of this aspect of the specification, however lack of precision in their answers sometimes prevented the awarding of marks. For example, analysis of DNA unqualified was not sufficient for mp1 and comparing unqualified was insufficient for mp2.

Question 6(c)

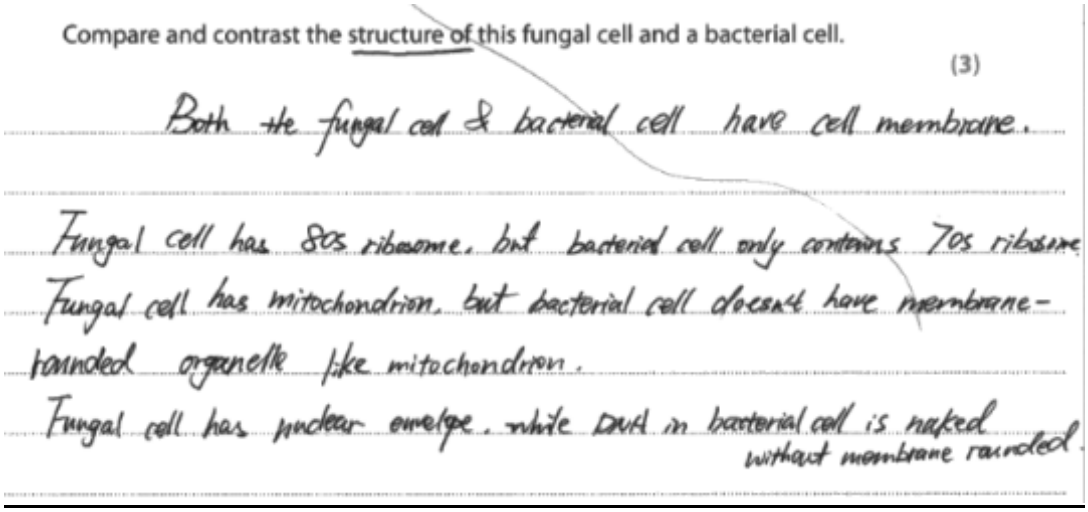
Students were given a labelled diagram of a fungal cell and asked to compare and contrast the structure of this to a bacterial cell. This required students to use their knowledge of prokaryotic cell structure and apply it to this situation.

Some students set out their work with clear side headings for similarities and differences. This is a good exam technique, ensuring that students do not lose marks by failing to give both similarities and differences.

Many students correctly identified numerous valid similarities and differences between fungal and bacterial cells, demonstrating their understanding of this aspect of the specification.

However a significant number of students mixed up incorrect similarities or differences with their correct answers, which resulted in lost marks.

This is an example of a response which scored full marks:


Compare and contrast the structure of this fungal cell and a bacterial cell.

(3)

Both the fungal cell & bacterial cell have cell membrane.

Fungal cell has 80S ribosome, but bacterial cell only contains 70S ribosome

Fungal cell has mitochondrion, but bacterial cell doesn't have membrane-bounded organelle like mitochondrion.

Fungal cell has nuclear envelope, while DNA in bacterial cell is naked without membrane bounded.

Question 7(a)

This question asked students to describe how post-transcriptional changes of pre-mRNA can produce active mRNA.

It is important that students read the question carefully and answer the question asked. Numerous students wasted time describing how pre-mRNA would be formed in transcription, or how the active mRNA would be translated, in addition to their points about splicing which were not credit worthy. Some students described epigenetic modification.

Students' descriptions of splicing showed their good understanding of the process. Nearly all responses correctly described the removal of introns by spliceosomes. Higher level responses referred to some exons being removed, or the rearrangement of exons to form a different sequence.

This response scored full marks:

7 Proteins can control cell processes and determine cell structure.

(a) Molecules of pre-mRNA are produced by transcription of active genes.

These molecules undergo post-transcriptional changes to form active mRNA.

Describe how post-transcriptional changes of pre-mRNA can produce active mRNA.

(3)

RNA splicing, spliceosome (in pre-mRNA) enzyme remove non coding introns and join coding exons, exons may be rearranged so code for different tertiary structure, or some (exon) removed producing shorter polypeptide, so active mRNA produced so can be translated unlike pre-mRNA.

Question 7(b)(ii)

This question asked students to give the function of a ribosome. It was important that students were be precise in answers and refer to the function of a ribosome and not the rough endoplasmic reticulum.

Question 7(c)(i)

This question introduced the enzyme methyltransferase (DNMT) and asked students to suggest the role of this enzyme in DNA methylation.

Most students correctly identified that methyltransferase binds the methyl group onto a cytosine base on the DNA to gain both marks.

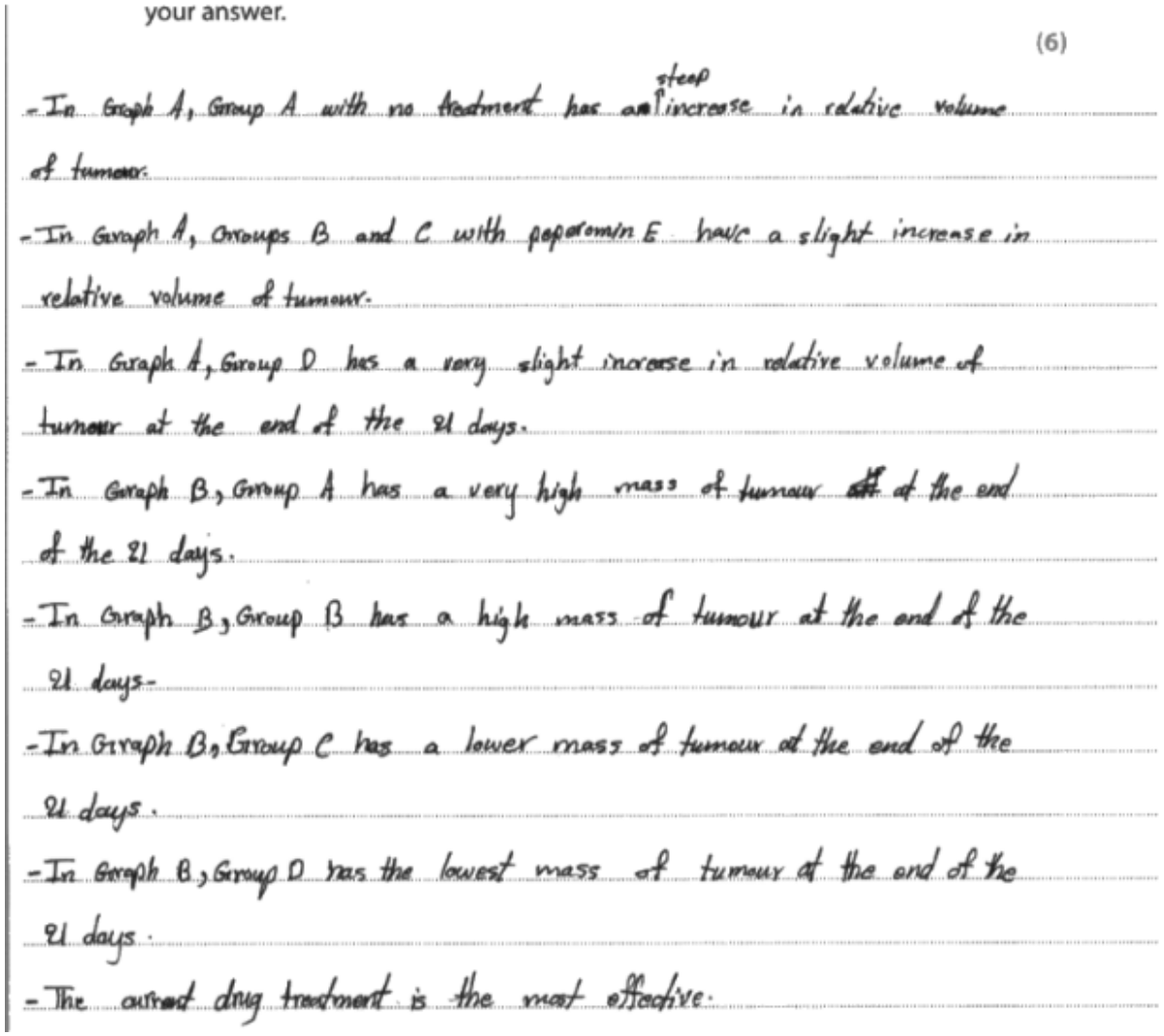
However, some students lost mp1 as they referred to the methyl group being added to histones, which was incorrect. Some students lost mp1 due to imprecision in their answer, references to transferring the methyl group were insufficient; the answer needed to specify that the methyl group binds or attaches to the DNA.

Question 7(c)(ii)

This question was the only level-based question on the paper.

Students were provided with a range of information to analyse, both qualitative and quantitative, and they were expected to use all this information to support their answer. Students who only used the graphs for example would have limited the mark they could achieve.

Most responses gained level one by discussing the data in the graphs and making a simple conclusion as to which drug was the most effective, for example:



your answer.

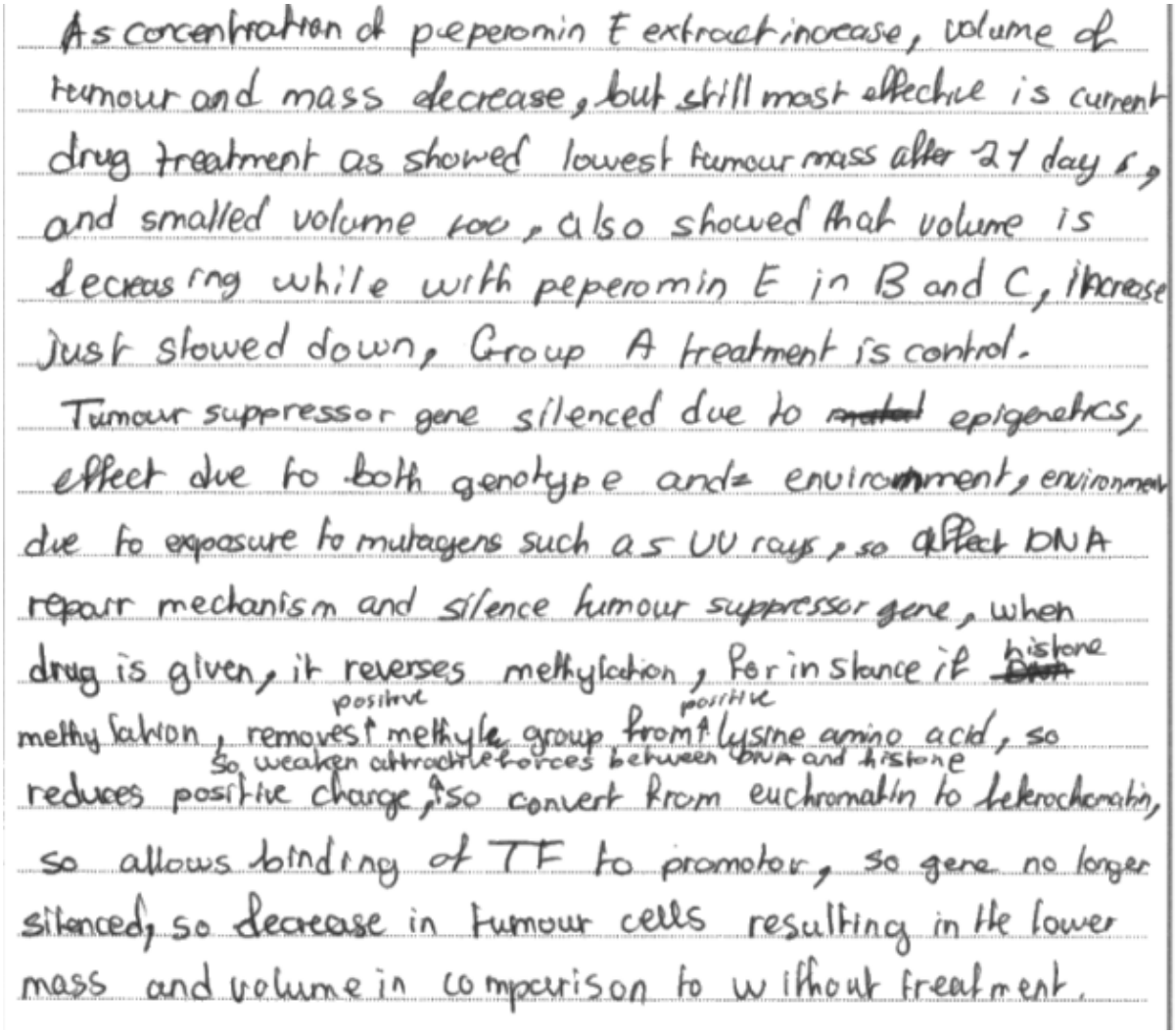
(6)

- In Graph A, Group A with no treatment has a steep increase in relative volume of tumour.
- In Graph A, Groups B and C with peperomin E have a slight increase in relative volume of tumour.
- In Graph A, Group D has a very slight increase in relative volume of tumour at the end of the 21 days.
- In Graph B, Group A has a very high mass of tumour at the end of the 21 days.
- In Graph B, Group B has a high mass of tumour at the end of the 21 days.
- In Graph B, Group C has a lower mass of tumour at the end of the 21 days.
- In Graph B, Group D has the lowest mass of tumour at the end of the 21 days.
- The current drug treatment is the most effective.

A level two response was usually achieved by students explaining how the drugs could result in the expression of *RASSF1*. For example, students discussed how the methyl groups could be removed, or the enzyme could be inhibited. They then often discussed how RNA

polymerase or a transcription factor could bind, and transcription of the genetic sequence could occur. Errors such as the gene preventing cell division instead of referring to the effect of the protein were common.

This is an example of a level two response:


As concentration of peperomin E extract increase, volume of tumour and mass decrease, but still most effective is current drug treatment as showed lowest tumour mass after 24 days, and smalled volume too, also showed that volume is decreasing while with peperomin E in B and C, it decrease just slowed down, Group A treatment is control.
Tumour suppressor gene silenced due to ~~mutat~~ epigenetics, effect due to both genotype and environment, environment due to exposure to mutagens such as UV rays, so affect DNA repair mechanism and silence tumour suppressor gene, when drug is given, it reverses methylation, for instance if ~~DNA~~ histone methylation, removes positive methyle group from positive lysine amino acid, so reduces positive charge, so weaken attractive forces between DNA and histone so convert from euchromatin to heterochromatin, so allows binding of TF to promotor, so gene no longer silenced, so decrease in tumour cells resulting in the lower mass and volume in comparison to without treatment.

Higher level responses used all the given information and their own biological knowledge in their detailed explanation as to how a tumour could have developed, how these two drugs affect the activity of the *RASSF1* gene and the resulting changes in tumours. These answers included possible roles of the protein produced from the *RASSF1* gene. Higher level answers usually considered the methodology of the investigation and the validity of conclusions that could be drawn from the data.

This is an example of a response which achieved level 3:

Explain how treatment with these two drugs affects the activity of the *RASSF1* gene and the changes in tumours.

Use **all** of the information in part (c) and your own knowledge to support your answer.

(6)

The enzyme DNA methyltransferase ~~for~~ (DNMT) may methylate the RASSF1, leading to faster cell division and less cell death.

The methylated RASSF1 cell turns into a cancer cell as it grows abnormal fast and can't carry apoptosis.

As RASSF1 is methylated, it is ~~=~~ silenced, so the gene is not transcripted as it's DNA is more tightly bounded due to methylation of cytosine. The RASSF1 is not translated hence tumour supressing protein not produced leading to cancerous cell.

Group A with no treatment shows largest tumour at 4.9 relative volume at 21 days.

Group B and Group C shows decrease in tumour volume and mass with 2.8 and 2.5 at 21 days ~~and~~ respectively and masses of 285, 200 mg of tumour respectively.

This shows with higher concentrations of peperomin E, the effectiveness of reducing tumour volume and mass increases.

Group D with current drug treatments is most effective with 1.6 relative volume at 21 days and 170 tumour mass (mg). While Group A with no treatment is least effective.

The demethylation of RASSF1 is the removal of methyl group on the cytosin.

this causes DNA to bound together less tightly so ~~RNA can't~~ RNA polymerase can bind to DNA and transcript RASSF1. As only activated genes are translated and transcripted, the new demethylated and activated RASSF1 is transcripted, translated. So the tumour supressing protein is produced. This slows cell division and causes cell death of the cancerous cell.

This methylation and demethylation is a type of epigenetic modification, activating or silencing certain genes.

(Total for Question 7 = 14 marks)

Question 8(a)(i)

Students were given information regarding the St Helena plover and some invasive species.

Students were expected to use this information to suggest why the population of the plover decreased after the introduction of cats and rats to the island.

Most students gained a mark for describing cats/rats feeding on chicks or eggs. Their responses usually used terminology such as prey, predator, predation correctly.

Higher level responses linked less chicks hatching/surviving to idea of less reproduction in the future.

Some students also suggested that cats/rats could compete with plovers for food or that rats could carry disease which could kill the plovers. Lower-level responses referred to competition without recognizing that competition for food would have increased. Vague references to habitat loss were not sufficient for the context of this question.

Question 8(a)(ii)

Most students could calculate the mean rate of increase.

Question 8(b)(i)

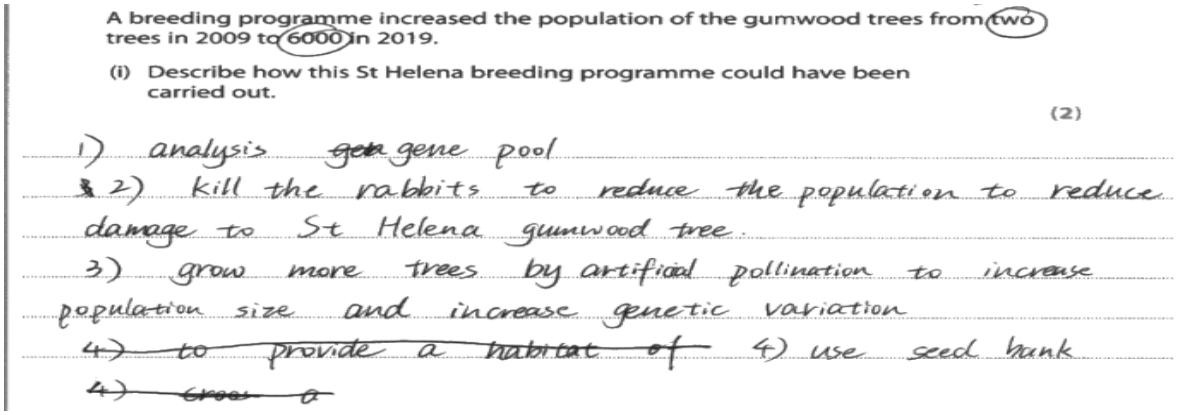
This question gave students information about a critically endangered gumwood tree native to the island of St Helena. Students were asked to describe how a breeding programme could have been carried out whilst resulted in a large increase in the population of these trees.

It was disappointing that a significant minority of students did not read the question carefully and either described breeding programmes in the St Helena plover or described other conservation methods for the gumwood tree.

It is important that centres remind students of the importance of reading all the given information above the question carefully and to also consider relevant terminology for plant-based scenarios versus animal-based scenarios.

Some students gave creditworthy suggestions around maintaining or increasing {genetic diversity/gene pool}. Some described planting seeds in a safe area without rabbits.

Some higher-level responses considered artificial pollination/fertilization, for example:



A breeding programme increased the population of the gumwood trees from two trees in 2009 to 6000 in 2019.

(i) Describe how this St Helena breeding programme could have been carried out.

(2)

1) analysis ~~gen~~ gene pool

2) kill the rabbits to reduce the population to reduce damage to St Helena gumwood tree.

3) grow more trees by artificial pollination to increase population size and increase genetic variation

~~4) to provide a habitat of~~ 4) use seed bank

~~4) grow a~~

Question 8(b)(ii)

This question asked students to explain one way that young trees could be protected from rabbits.

Most students could describe one correct way to separate rabbits from the trees, but fewer students recognised that the command word meant they needed to explain how this would protect the shoots.

Low level explanations, for example fences to prevent rabbits reaching the young trees were not explicit enough for mp2.

Question 8(b)(iii)

This question asked students to describe how a seed bank would successfully select, prepare and store seeds from these trees to aid the conservation of this endangered species.

This question was a very good differentiator, and the full range of marks were awarded.

Most students could correctly describe the selection of genetically diverse seeds and some steps in the preparation of these seeds. Procedures such as drying and x-raying seeds were commonly seen.

Higher level responses described the use of antimicrobials or sterilization techniques. Weaker responses described washing seeds which was insufficient.

A number of students did not gain mp5 due to imprecision in their descriptions, for example describing storage in low temperatures instead of stating temperatures below 0C or freezing.

This is an example of a response which scored full marks:

(iii) Scientists have proposed storing seeds from St Helena gumwood trees in seed banks to aid the conservation of this endangered species.

Describe how a seed bank would successfully select, prepare **and** store seeds from these trees to aid the conservation of this endangered species.

(4)

select seeds with different combinations of alleles from different parents using a stud back to help in increasing the genetic diversity

~~prepare~~ prepare the seeds by drying them to prevent fungal growth and germination to occur, use an x-ray to check for the presence of an embryo.

store the seeds in a freezer to avoid them from dying.

breed different seeds together to produce a plant to help restore the old seeds

Question 8(c)(i) and (ii)

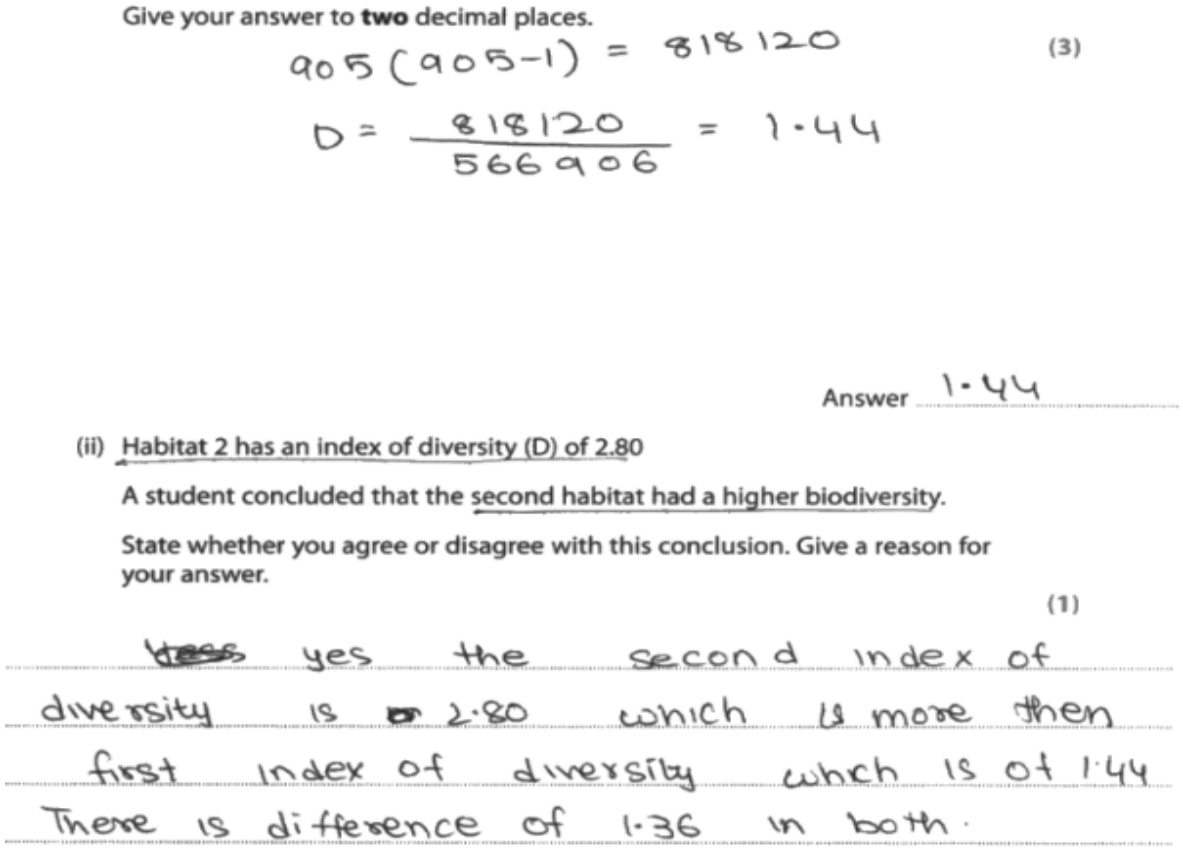
This question asked students to calculate the index of diversity for habitat 1. A table and formula were provided to give support to students.

Most students were able to correctly calculate the diversity index to be 1.44, earning the full three marks for (i). However, some candidates did not score all three marks because they failed to provide the answer to two decimal places, as specified in the question. Additionally, some candidates scored 1 or 2 marks for correctly calculating parts of the formula, such as N(N-1) or Σn(n-1), even if they did not arrive at the final correct value. Some students were awarded an ecf mark.

Most students provided a valid conclusion with an explanation. For example, they correctly concluded that habitat 1 had lower biodiversity than habitat 2, based on the diversity index being smaller for habitat 1. Some students also agreed with the conclusion because the D value for habitat 2 was larger, which indicated greater biodiversity or more species. Many students supported their reasoning by explaining that a larger D value correlates with higher biodiversity.

However, some students did not provide a conclusion and instead only gave an explanation, which was insufficient for the mark in (ii). Unfortunately, a small minority of students incorrectly interpreted the data and disagreed, giving answers such as "no, because the D value is smaller for Habitat 1," which was incorrect.

This in an example of a response that gained the full four marks available:



Give your answer to **two** decimal places.

$905(905-1) = 818120$ (3)

$D = \frac{818120}{566906} = 1.44$

Answer 1.44

(ii) Habitat 2 has an index of diversity (D) of 2.80

A student concluded that the second habitat had a higher biodiversity.

State whether you agree or disagree with this conclusion. Give a reason for your answer.

(1)

~~dress~~ yes the second index of diversity is 2.80 which is more then first index of diversity which is of 1.44 There is difference of 1.36 in both.

Summary

Based on their performance on this paper, students are offered the following advice:

- You should take into account the command words as well as the context given. Answers which do not match the command words or do not relate to the given context will not gain high marks.
- Information provided in the introduction to questions is provided for a specific reason. Read it carefully and analyse what information will be needed to provide a high-level response to the question being asked. If you have been provided with diagrams analyse them carefully too.
- Do not try and make a mark scheme you have learnt from a previous paper fit a different question with different context and command words.
- Study all of the mathematical skills in the specification which could be tested at this level. Do not give your answers as fractions unless you are asked to.
- Make sure you include your working with all calculations. Give relevant units where applicable. If rounding is necessary, make sure that this is done correctly.
- Take careful note of instructions regarding the presentation of your calculated answer, e.g. give your answer to the correct number of significant figures.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom