Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

January 2024

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

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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)

This question required students to use the information on the diagram to estimate the height of the sunflower. The students were also asked to give their answer with appropriate units.

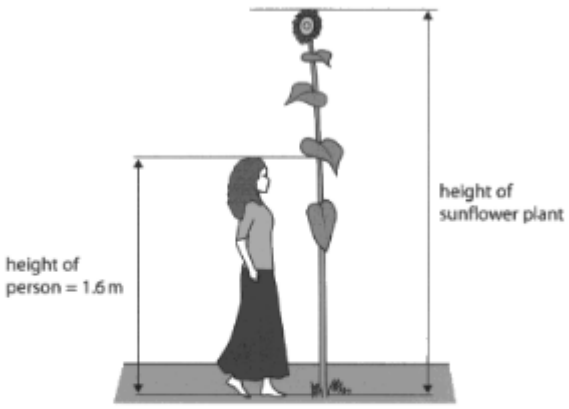
Some students chose to give their answer in metres to match the height of the person and some chose to give their answer in cm. Both were acceptable if the answer was within the expected range and had the correct units.

The most common mistakes made by students were to not give the unit, or to give an estimate that was clearly not correct based on the diagram.

This is an example of a response where the answer was not suitable based on the information in the diagram:

1 Plants contain tissues involved in the transport of substances.

The diagram shows a sunflower plant.



(a) Estimate the height of the sunflower, using the information in the diagram.

Give your answer with appropriate units.

(1)

Answer 4 m

Question 1(b)(i) and (ii)

This question expected the students to identify structure X as a sieve plate and that the tissue would therefore be phloem.

There were a significant number of students who thought that the tissue was xylem or sclerenchyma.

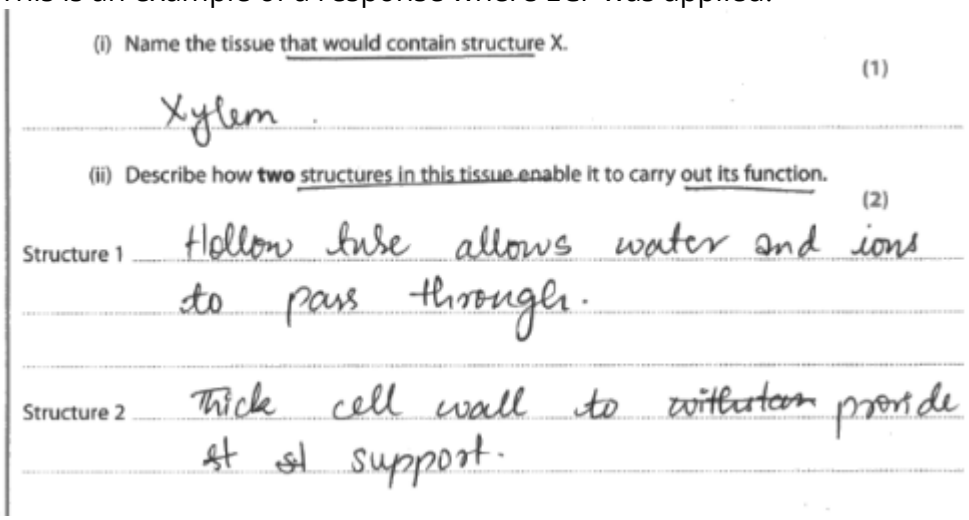
Students were then expected to identify two structures in this tissue and describe how they enable the tissue to carry out its function.

Although structure X was labelled on the diagram it was surprising how few students referred to sieve plates. Mp1 was usually awarded for the tube allowing translocation / movement of a correct substance. Frequent descriptions of the role of companion cells and plasmodesmata were also seen.

A number of responses described functions without relating to structures.

ECF was applied, so responses which correctly described how 2 structures in xylem enabled it to carry out its function could gain 2 marks. Lignin and pits were the most common aspects described for xylem.

This is an example of a response where ECF was applied:



(i) Name the tissue that would contain structure X. (1)

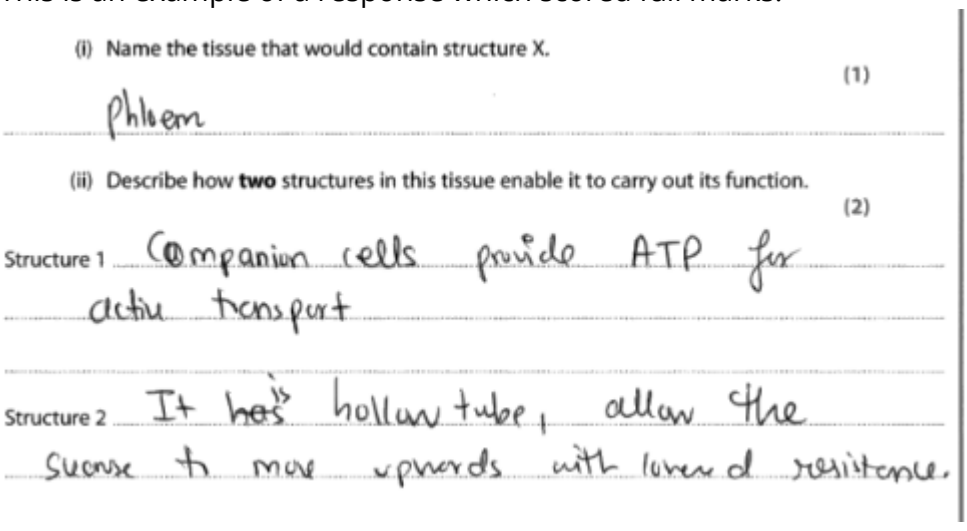
Xylem

(ii) Describe how **two** structures in this tissue enable it to carry out its function. (2)

Structure 1 Hollow tube allows water and ions to pass through.

Structure 2 Thick cell wall to ~~withstan~~ provide ~~st~~ support.

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



(i) Name the tissue that would contain structure X. (1)

Phloem

(ii) Describe how **two** structures in this tissue enable it to carry out its function. (2)

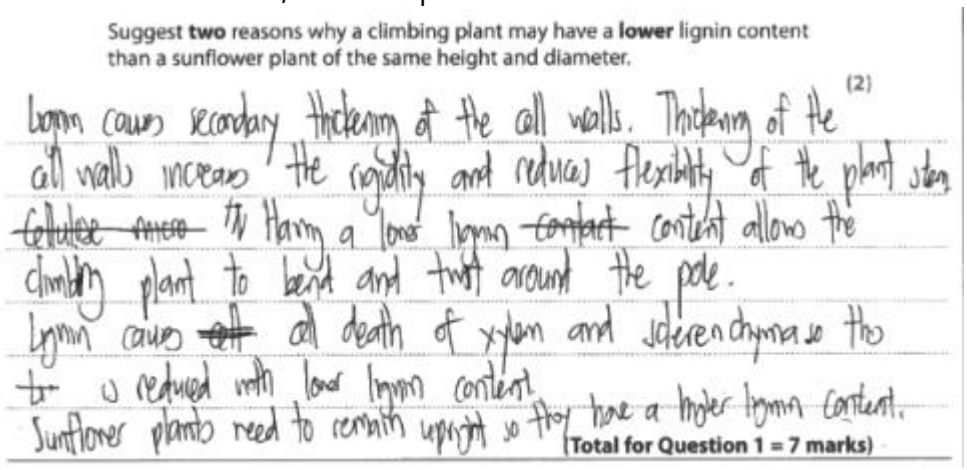
Structure 1 Companion cells provide ATP for active transport

Structure 2 It has hollow tube, allow the sucrose to move upwards with lower resistance.

Question 1(c)(ii)

This question asked students to suggest two reasons why a climbing plant may have a lower lignin content than a sunflower plant of the same height and diameter.

It was pleasing to see that nearly all students took careful note of the diagram to help them answer this question. Numerous high-quality answers were seen which were awarded both marks, for example:

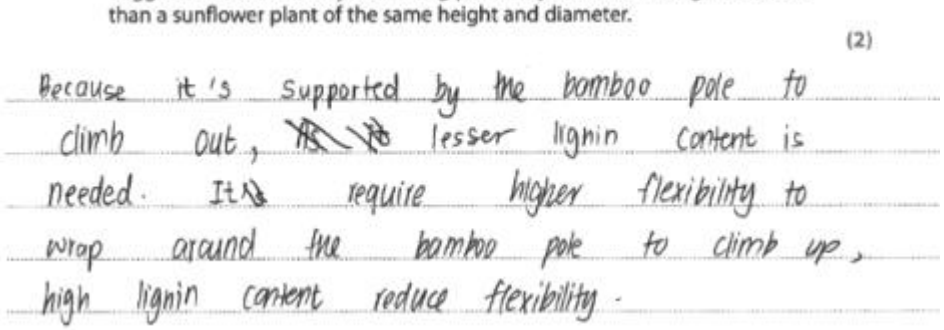


Suggest **two** reasons why a climbing plant may have a **lower** lignin content than a sunflower plant of the same height and diameter.

(2)

Lignin causes secondary thickening of the cell walls. Thickening of the cell walls increase the rigidity and reduces flexibility of the plant stem ~~cellulose fibres~~ // Having a lower lignin ~~content~~ content allows the climbing plant to bend and twist around the pole.
Lignin causes ~~cell~~ cell death of xylem and sclerenchyma so the ~~tr~~ is reduced with lower lignin content.
Sunflower plants need to remain upright so they have a higher lignin content.

(Total for Question 1 = 7 marks)



Suggest **two** reasons why a climbing plant may have a **lower** lignin content than a sunflower plant of the same height and diameter.

(2)

Because it's supported by the bamboo pole to climb out, ~~it's~~ ~~to~~ lesser lignin content is needed. It require higher flexibility to wrap around the bamboo pole to climb up, high lignin content reduce flexibility.

Where students scored no marks they usually discussed the function of lignin in transportation of water, as opposed to structural support.

Question 2(b)(i)

This question asked students to explain what is meant by the term sustainable.

Many excellent explanations were seen, with mp1 being the most commonly awarded.

Question 2(b)(ii)

This question expected students to analyse the information provided and then comment on the results of the investigation.

This question proved to be a very good differentiator and the full range of marks was seen.

Some students misinterpreted the given information and concluded that HDPE was the best packaging material to use as it did not reduce the numbers of bacteria.

Mp1 was the most commonly awarded.

The majority of students were able to conclude that pine was the most effective packaging or that plant-based packaging was more effective than oil-based at reducing the numbers of the bacteria.

Fewer students were able to apply their knowledge of anti-microbial properties of plants to this context, with mp2 being the least commonly awarded marking point.
A significant number of responses were able to make a correct comment regarding the given standard deviations or a relevant comment regarding the methodology of the experiment.
However, care must be taken in the terminology used as this was a common reason why marking point four was not awarded. For example 'accuracy' is not suitable when referring to overlapping standard deviation. Numerous irrelevant comments were seen regarding that calculating the SD made the investigation more reliable.
Numerous references were seen regarding not knowing if the type of fish in each group were the same.
This is an example of a response which did not take careful note of the table headings:

Comment on the results of this investigation.

(4)

The greatest number of S. aureus bacteria were found on pine wood. Both pine wood and poplar wood had the greater number of bacterial growth, compared to HDPE and Polystyrene which ~~her~~ relatively had fewer growth of bacteria. Wood packaging material s are obtained from plant based sources and hence are biodegrable whereas HDPE and polystyrene are oil based plastics and hence do not decompose as much as wood.

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

Comment on the results of this investigation.

(4)

poplarwood, pine wood and polystevene all 3 has antimicrobial properties Because the caused a mean decreare in the number of S. aurus Bacteria / colonies cm^{-2}. however HDPE has no antimicrobial properties as it had 0.00 colonies cm^{-2} decreare So HDPE has no effect on Bacteria So it has the lowest effect on Bacteria. Pine wood has the highest antimicrobial properties as it has the largest decrease in the number of S. aurus of 7.14 ± 0.28 colonies cm^{-2}. So pine wood is the Best packaging material and the Safest to use By humans. poplar wood has 0.79 decreare /colonies cm^{-2} So there is 6.35 colonies cm^{-2} difference with pine wood. ~~SD Bars~~ SD error Bars don't overlap so there is a significant difference betweens all the results and the size of SD Bars are small so results are more reliable and less variable

Question 3(a)(ii)

This question expected students to remember the equation for heterozygosity index and use it to calculate the number of heterozygotes in the cluster of Monarch butterflies.

The majority of students were able to give a correct answer.

(ii) The heterozygosity index for a cluster of 8000 Monarch butterflies was calculated as 0.166.

Calculate the number of heterozygotes in this cluster.

(1)

$0.166 = \frac{x}{8000}$

$x = 1328$

Answer 1328

Question 3(b)

This question gave students information regarding herbicide chemicals being used to kill milkweed plants and a graph showing the percentage of fields in the USA containing milkweed plants from 1999 to 2010.

The students were also provided with the information that the female Monarch butterflies lay their fertilised eggs on the leaves of milkweed plants.

Students were expected to use all this information to help them give a detailed explanation of the effect on populations of Monarch butterflies.

Most students recognised that the population size of the Monarch butterfly would decrease. Many students also correctly referred to a decrease in genetic diversity.

Some students referred to there being no place for the butterflies to lay eggs. This was ignored as there was no evidence that all of the milkweed plants had been destroyed.

There were a significant number of responses however which did not address the genetic diversity aspect of the question. Care must be taken to check answers to ensure they answer all aspects of the question.

The higher quality answers clearly explained why a decrease in milkweed plants would lead to a decrease in the population of Monarch butterflies, with the most frequent explanation relating to fewer places to lay eggs.

This is an example of a 3-mark response:

Explain what effect this human activity would have had on populations of Monarch butterflies, including their genetic diversity, after 2010.

Use the information in the graph to support your answer.

(3)

- with time, percentage of fields containing milkweed plants decreases
- less milkweed plants lead to less surface area for Monarch butterflies to lay their eggs so less succes in reproduction so number of Monarch butterflies decreases so there are less alleles in the gene pool so less genetic diversity

Explain what effect this human activity would have had on populations of Monarch butterflies, including their genetic diversity, after 2010.

Use the information in the graph to support your answer.

(3)

human activity (the use of herbicides) has caused and overall (exponential) decrease in the % of fields containing milkweed plants (100% in 1999 and 18% in 2010) because of this the population of monarch butterflies will have decreased as they have less places to lay their eggs therefore after 2010 the population of monarch butterflies would have continued to decrease as the number of milkweed plants continues to decrease, this may also lead to a decrease in genetic diversity as the gene pool gets smaller which could lead to inbreeding

Question 3(c)(i)

This question asked students to state what is meant by polygenic inheritance with reference to the given phenotype of egg laying.

It is important for students to read the question very carefully to make sure they are answering the question asked. A significant number of responses gave a generic answer which was not related to the given context.

This is an example of a correct answer:

The rate of egg laying by hens is an example of polygenic inheritance.

This phenotype shows continuous variation.

(i) State what is meant by **polygenic inheritance** with reference to this phenotype.

(1)

Many different genes, (more than one), determine the phenotype of how many eggs are laid.

Question 3(c)(ii)

The question asked students to sketch a labelled graph to show the expected egg laying rate for a population of hens.

It was pleasing to see that many students could link the idea of polygenic inheritance from part (i) to this question and recognise that polygenic inheritance required a graph showing normal distribution.

However, few students could label the graph axes appropriately as they did not recognise that 'population' was not a variable.

Question 4(a)(ii)

This question asked students to state how to calculate the actual length of one of the pollen tubes in the photograph.

Most of the students gave a correct answer.

The most common mistake was to provide an equation which did not have actual length as the subject of the equation.

Question 4(b)

This question required students to explain why an embryo cell and an endosperm contain different quantities of DNA.

The students were provided with a diagram which labelled the polar nuclei and female gamete.

Most students knew that the embryo cell was diploid. However fewer students knew that the endosperm cell would be triploid, with numerous answers referring to it being haploid despite correctly explaining how a male nucleus would fertilise the polar nuclei.

Fewer students gained marking point two as they did not refer to the nucleus of the female gamete.

This is an example of a response which was awarded full marks:

Explain why an embryo cell and an endosperm cell contain **different** quantities of DNA.

(4)

The haploid male generative nucleus divides into two haploid male nuclei by mitosis. One ~~of the~~ haploid male nucleus fuses with the haploid female gamete nucleus in fertilisation to form a diploid nucleus. The zygote is diploid and divides by mitosis to form embryo cells that are also diploid because each mitotic division produces two genetically identical diploid cells. The other haploid male nucleus fuses with the two ~~polar~~ diploid polar nuclei in the ovule resulting in a triploid endosperm nucleus which becomes the endosperm tissue. An endosperm cell is 3n (triploid) while an embryo cell is 2n (diploid). This process is known as double fertilisation.

Question 4(c)

This question told students that an extract made from the Madonna lily plant was used as a treatment for skin burns.

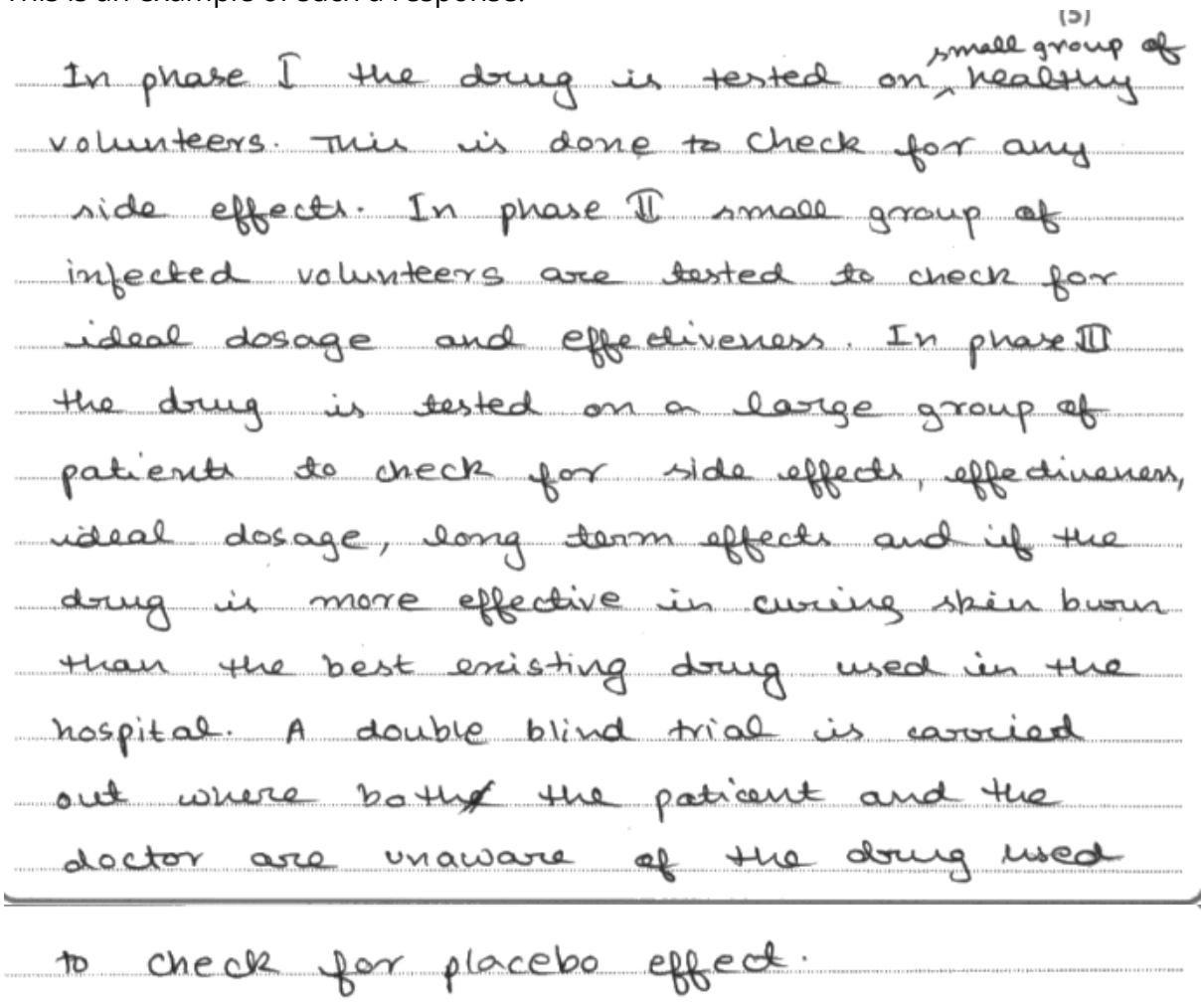
They were asked to describe a drug trial that could be used to determine two given aspects: safety and efficacy.

Nearly all students described testing on cells or animals and gained marking point one.

Frequent references to identification of side effects / safe dosage were seen linked to this stage, or the testing on healthy people.

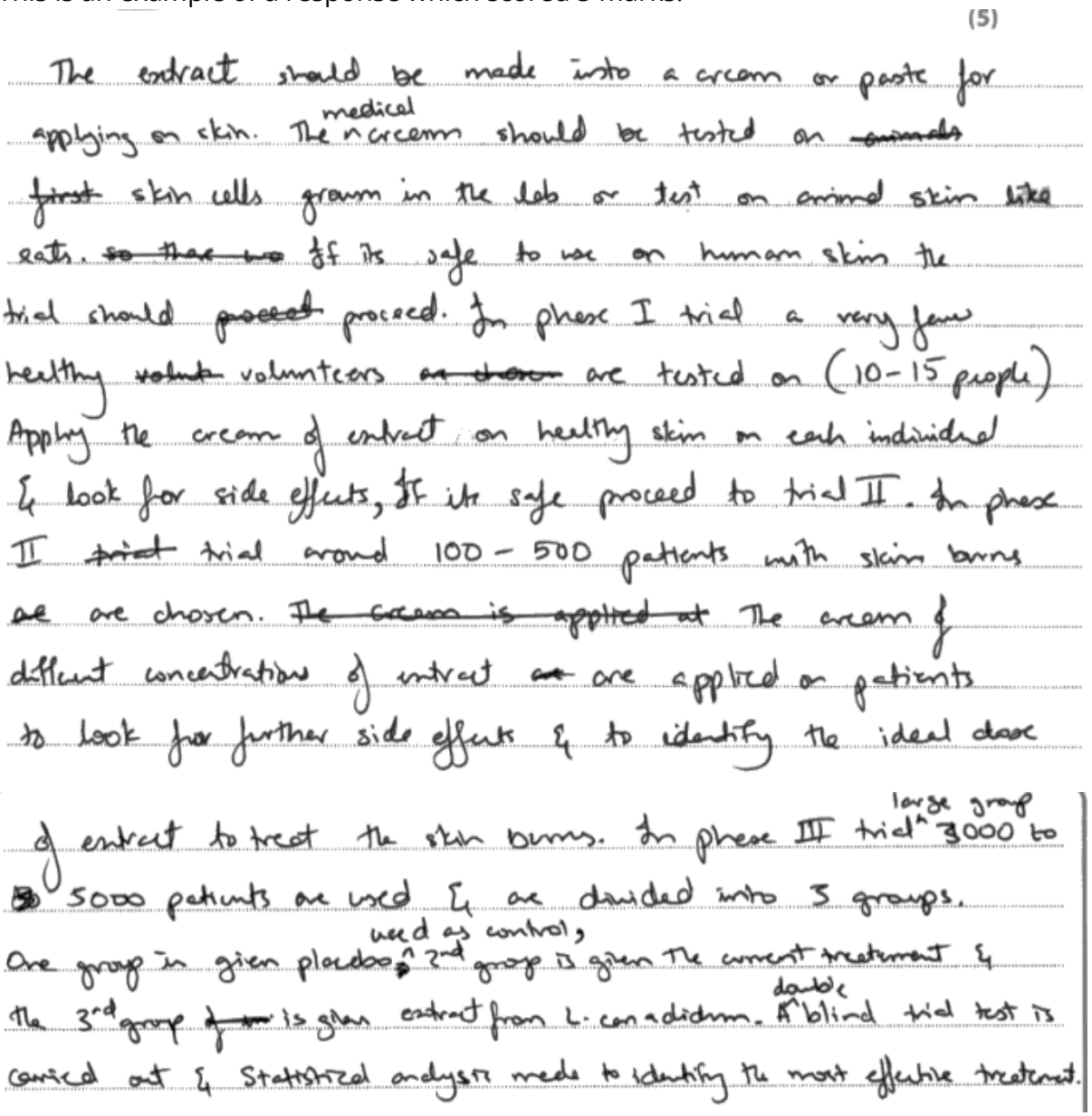
The most common reason why answers did not gain marking points 4 and 5 was because they gave a generic description and did not link their answer to the given context. Students were expected to recognise that the extract was a treatment for skin burns and therefore the patients selected should reflect this.

This is an example of such a response:



As the question asked them to describe how the drug trial could determine if the extract was more effective than the current skin treatment, students were expected to describe a double-blind trial involving patients with skin burns being given either the extract or the current skin treatment. References to using a placebo or using a control instead of the current skin treatment were not credit worthy.

This is an example of a response which scored 5 marks:



(5)

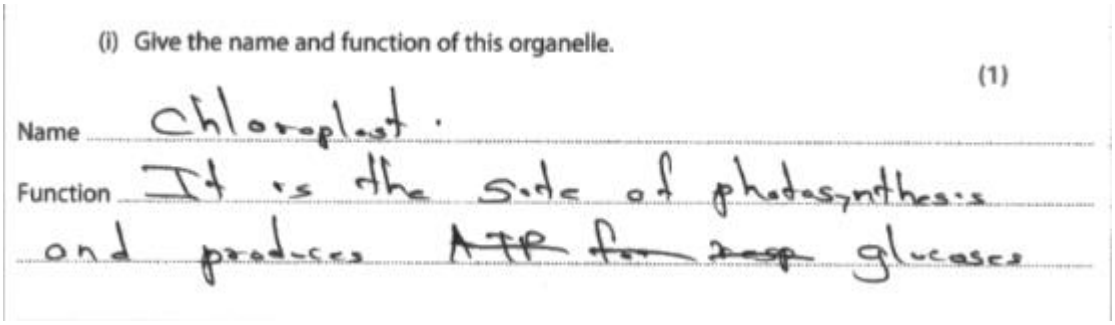
The extract should be made into a cream or paste for applying on skin. The medical cream should be tested on ~~animals~~ ~~first~~ skin cells grown in the lab or test on animal skin like rats. ~~so that we~~ If its safe to use on human skin the trial should ~~proceed~~ proceed. In phase I trial a very few healthy ~~volunte~~ volunteers ~~are chosen~~ are tested on (10-15 people) Apply the cream of extract on healthy skin on each individual & look for side effects, If its safe proceed to trial II. In phase II ~~trial~~ trial around 100 - 500 patients with skin burns ~~are~~ are chosen. ~~The cream is applied at~~ The cream of different concentrations of extract ~~are~~ are applied on patients to look for further side effects & to identify the ideal dose of extract to treat the skin burns. In phase III trial large group 3000 to 5000 patients are used & are divided into 3 groups. One group is given placebo used as control, 2nd group is given the current treatment & the 3rd group ~~is~~ is given extract from L. canadidum. A double blind trial test is carried out & Statistical analysis made to identify the most effective treatment.

Question 5(a)(i)

This question contained a photograph of a chloroplast. Students were expected to recognise the organelle from the photograph and give its function.

There were a significant number of students who didn't not recognise it was a chloroplast.

Where students did correctly identify the organelle, most could give a correct function and gain the mark, for example:



(i) Give the name and function of this organelle.

(1)

Name Chloroplast.

Function It is the side of photosynthesis and produces ATP for ~~resp~~ glucose

Question 5(a)(ii)

This question asked students to name the type of microscope used for the photograph and to give one reason for their answer.

Most students could identify that an electron microscope must have been used and could give a correct reason. The most common reasons related to high resolution or that the internal details of the chloroplast could be seen.

Unfortunately, some students, which had identified the organelle as a chloroplast in part (i), referred to named organelles which would not be found in a chloroplast, e.g. Golgi apparatus.

A number of responses thought it must have been a light microscope as the image was 2D. Another common incorrect answer related to the photograph being in black and white and not colour.

Question 5(b)(i)

This question asked students to state what is meant by species richness.

Most students could give a credit worthy answer.

The most common errors were giving the definition of species evenness or referring to a singular species.

Question 5(b)(ii)

This question asked students to calculate the index of diversity for an area of the lake with New Zealand Pygmy weed.

It was pleasing to see an improvement in performance in this type of calculation from previous series.

Calculate the index of diversity (D) for this area of the lake using the formula:

$$D = \frac{N(N-1)}{\sum n(n-1)}$$

Use the table to help you.

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

(3)

$\frac{153(153-1)}{6042} = 3.849056604$

Answer 3.85

Question 5(b)(iii)

This question required students to compare their calculated index of diversity value to the given value from a year later. ECF was applied from 5bii.

Nearly all students could gain the first marking point, for correctly giving an increase or decrease in the D value.

Some students did not extend their answer further than this, despite the question being worth two marks.

More able students could suggest what effect the New Zealand Pygmy weed had to cause this change in the index of diversity, with all possibilities from the marking point seen.

Question 6(a)

This question required students to complete the table with ticks and crosses to show which types of cells the structures are present in.

This question was a very good differentiator.

Nearly all students knew which type of cells contained the amyloplast and mitochondria. Fewer students gave a correct answer for nucleolus.

Few students recalled that some organelles in animal and plant cells contained circular DNA.

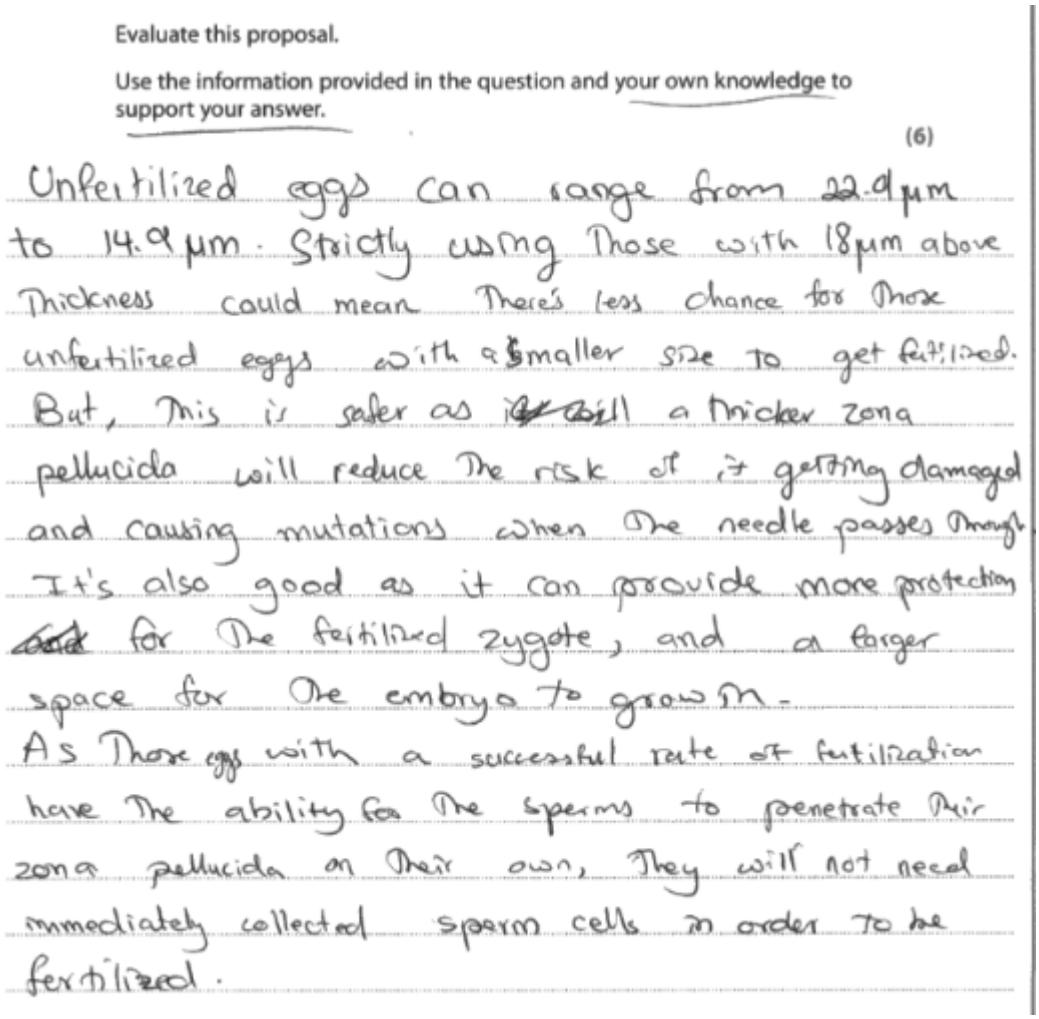
Question 6(c)(ii)

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

Students were given information regarding different suggested causes of infertility. They were also given information regarding a proposal to increase the number of successfully fertilised eggs.

Students needed to use this information, and their own knowledge, in order to answer the question.

Students usually achieved level 1 by giving correct conclusion(s) from the information in the table, for example:



Evaluate this proposal.

Use the information provided in the question and your own knowledge to support your answer.

(6)

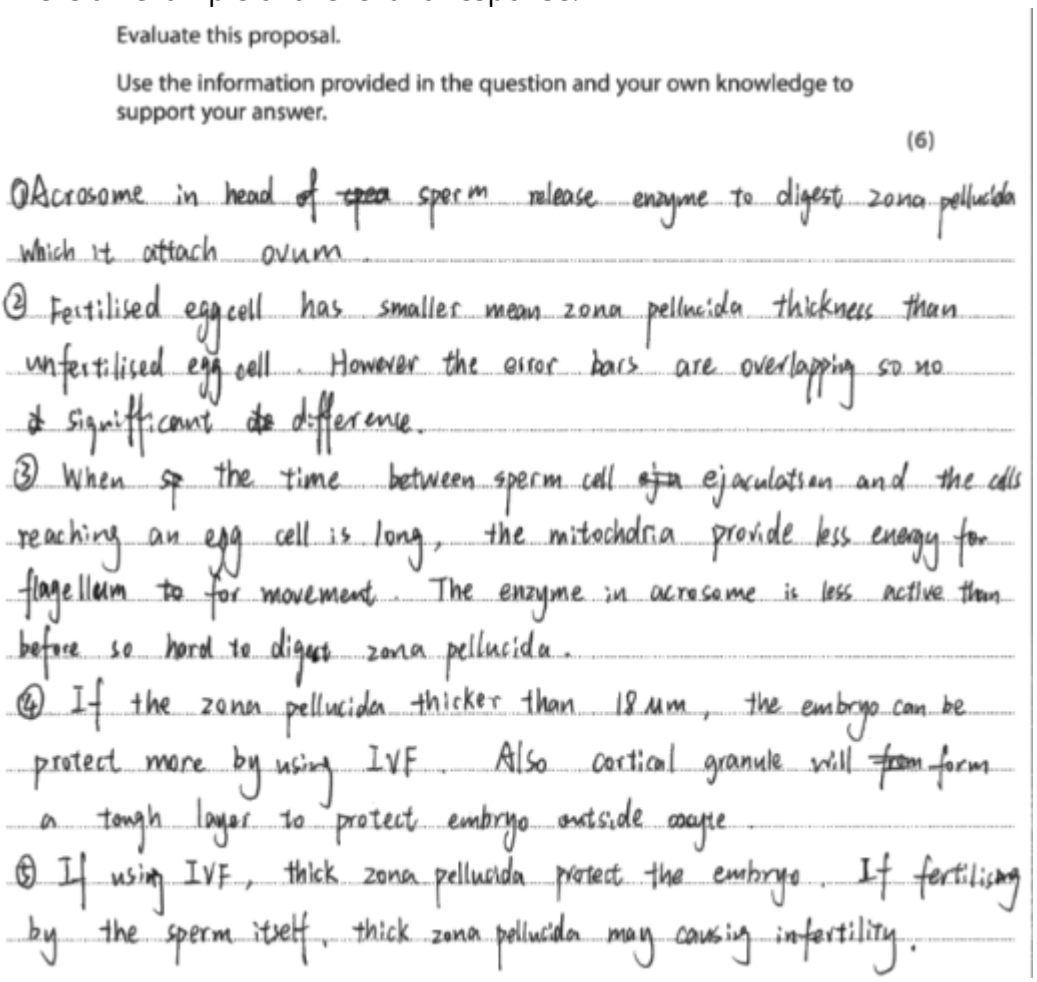
Unfertilized eggs can range from 22.9µm to 14.9µm. Strictly using those with 18µm above thickness could mean there's less chance for those unfertilized eggs with a smaller size to get fertilized. But, this is safer as it will a thicker zona pellucida will reduce the risk of it getting damaged and causing mutations when the needle passes through. It's also good as it can provide more protection for the fertilized zygote, and a larger space for the embryo to grow in.
As those eggs with a successful rate of fertilization have the ability for the sperms to penetrate their zona pellucida on their own, they will not need immediately collected sperm cells in order to be fertilized.

Students usually achieved level 2 by either discussing reasons as to why sperm cell related issues could cause infertility issues or discussing why the proposal would increase the number of successfully fertilised cells. Relevant comments regarding other issues regarding the IVF process were frequently seen.

A lot of students are interpreting the results that the thicker ZP is as a result of the cortisol reaction.

Some students did not pay careful attention to the photograph showing the sperm cell being injected directly into the egg cell. Therefore they linked the newly ejaculated

sperm to the IVF technique and assumed that they would want to use newly ejaculated sperm so that they have more energy to digest the ZP.
This is an example of a level two response:



Evaluate this proposal.

Use the information provided in the question and your own knowledge to support your answer.

(6)

①Acrosome in head of ~~spea~~ sperm release enzyme to digest zona pellucida which it attach ovum.

② Fertilised egg cell has smaller mean zona pellucida thickness than unfertilised egg cell. However the error bars are overlapping so no ~~it~~ significant ~~the~~ difference.

③ When ~~sp~~ the time between sperm cell ~~ejac~~ ejaculation and the cells reaching an egg cell is long, the mitochdria provide less energy for flagellum ~~to~~ for movement. The enzyme in acrosome is less active than before so hard to digest zona pellucida.

④ If the zona pellucida thicker than 18 um, the embryo can be protect more by using IVF. Also cortical granule will ~~from~~ form a tough layer to protect embryo outside oocyte.

⑤ If using IVF, thick zona pellucida protect the embryo. If fertilising by the sperm itself, thick zona pellucida may causing infertility.

Level 3 was awarded when students gave a clear and detailed response which covered all 3 sections.

These are examples of level 3 responses:

Evaluate this proposal.

Use the information provided in the question and your own knowledge to support your answer.

(6)

This proposal is useful as the number of egg cells fertalized ~~out~~ of zona pellicuda ~~its~~ thickness is 16·6 ± 3·2 which is less than 18µm, the sperm may not be able to fertilize the egg cell of a thickness as it may run out of enzymes to break down follicle cells along with zona pellicuda as a result it can not reach the egg cell leaving it unfertilized therefore injecting sperm cell directly to egg cell helps the sperm nearer egg cell nucleus to fuse and continue fertilisation normally ensuring ~~we~~ the egg cell is fertalized resulting in diploid zygote formed to create embryo. Another reason why injecting sperm directly into egg cell can increase fertilization as sperm cells must take longer time to reach egg cell may die off during the time taken on their journey to egg cell, due to the acidity present, they may die off if they take a long time resulting in egg cell not being fertilized by injecting the sperm directly can shorten the amount of time taken by sperm enabling egg cell is fertalized resulting in more diploid zygotes formed. but although this is seen as an advantage, a disadvantage can be it may be expensive so not what ~~of~~ people can afford it and injetion used may cause harm to egg cell resulting in mutation or disease linking ~~to~~ egg cells to ~~a~~ infertility & will prevent

(Total for Question 6 = 12 marks)

Evaluate this proposal.

Use the information provided in the question and your own knowledge to support your answer.

(6)

- fertilised egg cell has smaller mean zona pellucida thickness than unfertilised egg cell
- But SD overlap suggesting that there is no significant difference between these two egg cells
- ~~egg~~ ~~unfertilised egg~~ are fertility may be due to sperm cell not only egg cell. Sperm cell may have lower acrosin activity so lower digestion & death before fertilisation. Sperm cell may have shorter flagellum so slower speed so death of sperm cell before fertilisation as it can't reach egg cell. Sperm cell may have less mitochondria so less energy supplied to flagella + so related have less chance of ~~finding~~ egg cell & fertilisation
- IVF helps in fertilisation by collecting both ~~sperm~~ gametes & fertilise them in petri dish but there is also chance of failure. In IVF female given hormones to stimulate it's ovary which is maybe considered unethical or risky as it may cause ovarian cancer
- recently obtained sperms so glucose is in high amounts ~~for~~ used in mitochondria & supply energy before death
- IVF is expensive so cause social discrimination
- IVF may involve destruction of embryos ~~as~~ & embryo has potential to live & have human rights so unethical

Question 7(a)(i)

This question required students to analyse the graph to deduce the effect of age and sex on the number of cases of the cancer.

Nearly all students correctly deduced the effect of age on the number of cases of the cancer. Most students could also make a correct deduction regarding the effect of sex on the number of cases. There were frequent mentions that males could be at a higher risk due to it being a sex-linked disease or due to a lifestyle reason. Some references to post-menopausal increases in women were also credited, but vague references to oestrogen were not.

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

(a) (i) Deduce the effect of age and sex on the number of cases of this cancer.

(3)

The greater the age the greater the number of cancer cases (positive correlation)
The cancer is mostly found in ~~males~~ males compared to females, this means that it's a sex linked disease.
This cancer only starts at the age of 40 for both genders, it increases until 79 in females then decreases, it increases for males with greater age

Question 7(a)(ii)

Students were given information regarding the population size of a city and the percentage of males over the age of 80.

Students were asked to calculate how many males over the age of 80 would have this cancer.

Nearly all students were able to correctly calculate 3% of 2 million and therefore marking point 1 was awarded. It was pleasing to see an improvement in the number of responses showing the working, which meant that mp1 could be awarded even if they made a mistake later on in the calculation.

The most common error was not inputting 2 million into the calculation correctly, for example inputting 200,000 instead.

Fewer students realised that they needed to use the graph value for the number of males over the age of 80.

This example shows a correct answer:

(ii) A city had a population of 2 million people. Three per cent (%) of this population were males over the age of 80.

Calculate how many of the males over the age of 80 would have this cancer.

(2)

100 000 = 660 cases

2 000 000 × 0.03 = 60 000

= 396

Answer 396

Question 7(b)(i)

This question asked students to state why cells in the sample were stained in order to calculate the mitosis index.

Many excellent answers were seen, demonstrating students understanding.

Question 7(b)(ii)

This question required students to describe how the mitosis index would be determined.

It was clear to see that the majority of students had an excellent understanding of this specification point, with many 2-mark responses seen.

One mistake made by some students was to get the parts of the equation the wrong way round.

Another was to give an incomplete equation part, for example dividing by 'total' unqualified.

Question 7(c)(ii)

This question expected students to apply their knowledge regarding condensation of chromosomes in mitosis to the given context.

It was pleasing to see that many students applied their knowledge and explained that if chromosomes were prevented from condensing, then the mitosis index would decrease.

This is an example of a response which scored 3 marks.

Explain how preventing the condensation of chromosomes would affect the survival of a patient with this type of cancer.

(3)

If the chromasomes can't condense, then mitosis can't occur. This would greatly reduce the mitotic index and speed of tumour growth. This would elongate the patient's lifespan.

Some students did not give an explanation. Instead, descriptions of the graph were seen. Students need to take careful note of the command word in order to access more marks.

Question 8(a)(ii)

Students were given a diagram showing six islands off the coast of California. They asked to explain how isolation caused the formation of six fox populations with different characteristics.

The most commonly awarded marking points were one, two and three. Students could explain that different islands might have different selection pressures. They could also give detailed answers regarding how an advantageous allele enable an individual's survival and be passed onto future offspring.

Fewer students were able link the idea of different genotypes to the different characteristics/eq to gain marking point four.

This response gained 4 marks:

(ii) Explain how isolation caused the formation of six fox populations with different characteristics.

Use the information in the question to support your answer.

(4)

geographical Isolation caused fragmentation So now there is six population that had different Selection pressure which causes mutation as a result of genetic variation. So different advantageous allel will enable them to live In different habitats increasing chances of survival of those with advantageous allel causing them to breed and become able ~~passing on advantageous allel to next~~ to pass advantageous allel to next generation increasing gene pool. So different population have different advantageous allel that increase there survival at there habitat

Question 8(a)(iii)

This question asked students to explain how molecular evidence could be used to determine which of the other five fox populations is the **most** closely related to the Santa Cruz population.

Fewer students gained marking point 2. The most common reason was for not explaining how they would determine the **most** closely related fox, and giving an explanation as to how they would determine if the populations were similar or more similar, for example:

(iii) Explain how molecular evidence could be used to determine which of the other five fox populations is the most closely related to the fox population on Santa Cruz.

(2)

Through molecular phylogeny the DNA of a fox can be analysed and compared to a fox of other island, this will show which ones are more closely related.

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

(iii) Explain how molecular evidence could be used to determine which of the other five fox populations is the most closely related to the fox population on Santa Cruz.

(2)

Molecular phylogeny to compare DNA base sequence by all the ~~species~~ populations of foxes whichever one has the most similar one to the Santa Cruz fox are most closely related.

Question 8(b)(i)

This question asked students to calculate the percentage decrease in the Santa Cruz population from 1994 to 2002.

As seen in previous exam series, there are a significant number of students who use an incorrect denominator in this type of calculation and therefore gained no mark or students who did not know how to perform the type of calculation at all.

Some students did not read the graph correctly and therefore gained no mark.

This is an example of the correct calculation:

(i) Calculate the percentage decrease in the Santa Cruz fox population from 1994 to 2002.

(1)

1500 − 80 = 1420

$\frac{1420}{1500} \times 100 = 94.7$

Answer 94.7 %

Question 8(b)(ii)

Students were asked to explain how the Hardy-Weinberg equation could be used to show the change in the frequency of a recessive allele.

It was clear that many students are less confident with this aspect of the specification, with a significant number of blank responses, whereas Q8(b)(iii) had very few blank responses.

It was pleasing to see that many students could recall the equation correctly, with a significant number of correct explanations seen as to how the frequency of the recessive allele could be calculated.

Fewer students went on to explain how it could be used to show a change in the frequency of the recessive allele.

This response scored two marks:

The equation : $p^2 + 2pq + q^2 = 1$

This should allow you to calculate the the frequency of the recessive allelle in 1994 and 2000 in which you can then subtract from eachother to find the change over that time.

Question 8(b)(iii)

This question gave students two aims of a conservation plan. Students needed to explain how conservation could achieve both of these goals.
It was important that student used information in previous parts of question 8.

Students which did not address both goals could not access all of the marking points. It was pleasing to see many excellent explanations which had followed the instruction to use the information in the question and their own knowledge. Frequent mentions of golden eagles, dogs and raccoons were seen in students responses.

The most frequently awarded marking points were one and four. All aspects of marking point four were seen, but captive breeding or reintroduction programmes were more common. References to breeding the different populations together were not credit worthy.

Many explanations included information as to how stud books could be used in a breeding programme to maintain the genetic diversity of the populations.
Fewer responses explained that treating diseased animals, or preventing diseased through vaccination could help to increase the survival chances of foxes and therefore result in an increase in the size of the populations.
This is an example of a response which gained 4 marks:

Use the information in the question and your own knowledge to support your answer.

(4)

. Protect Habitat by reducing number of golden eagles.
. Start Apply law to ban Hunting of Santa Cruz and Santa Catalina. develop captive breeding programme to selectively breed Fox populations to prevent inbreeding and increase genetic diversity, also increasing population to then reintroduce to their natural Habitat. develop zoos to take care of Foxes, to educate other on endangerment and to Protect from Predators (golden eagles) and to treat any disease, and prevent them.
Fox dogs or cats by regularly treating with Anti-microbials.

Paper summary

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

- 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. Answers which do not relate to the given context or command words 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.
- Some questions specifically state 'use information in the question to support your answer'. This refers to more than just quantitative data. You should re-read given information before attempting to answer the question.
- Study all of the mathematical skills in the specification which could be tested at this level and ensure you can perform them correctly.
- 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 in standard form.

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