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Examiners' Report
June 2018

GCE Biology SNAB 9BN0 03

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Introduction

The 9BN0/03 Biology paper focused on the general and practical application of the Pearson Edexcel GCE Biology Specification A. Aspects of all topics area were considered and the paper included a series of question items linked to a pre-release scientific article.

The summer 2018 paper offered a wide diversity of question styles that gave candidates many opportunities to display their knowledge and understanding of material from across the whole specification. It allowed candidates to make connections from throughout the specification.

It was most pleasing to see candidates offering a host of encouraging responses that showed their good understanding of the material and much thanks should go to those who have taught them, as well as to the candidates themselves.

Whilst there were many clear and unambiguous responses, there were some candidates who could not be awarded marks due to the quality of their expression.

Question 1 (a) (i)

This question asked candidates to describe how a single PCR cycle would increase the amount of DNA present.

There were a pleasing number of encouraging answers with many candidates displaying a good grasp of how the PCR process worked including linking the three stages to their different temperature regimes. However, a sizeable portion failed to take note that the question specifically referred to one PCR cycle so when tackling the question in relation to the increase in DNA quantity they did not refer to it doubling.

To achieve full marks a good description of one PCR cycle was required. This answer gives a sound account of PCR relating the temperature to annealing, correctly referring to the elongation process as well as referring to DNA replication. DNA replication, by implication, is doubling of the DNA content.

1 A deer was found dead on National Trust land. Some people thought that the wounds that led to the deer's death could have been caused by a big cat such as a black panther.



(a) Samples of DNA from the wounds of this deer were collected.

Investigators used the polymerase chain reaction (PCR) to increase the quantity of DNA in the samples.

(i) Describe how one PCR cycle would increase the quantity of DNA present.

(3)

The sample of DNA is added into the PCR machine with DNA polymerase, DNA nucleotides and DNA primers. It then undergoes a series of temperature changes ~~several times~~. At 95° the DNA strands seperate and unwind. At 55°c the DNA primers attach to the strands. At 75°c the DNA nucleotides line up adjacent to the strands and DNA polymerase catalyses DNA replication (semi conservatively) and a ~~copies~~ copy (genetically identical) of the DNA is made.



Like many candidate responses, it started by giving the 'ingredients' before describing one PCR cycle. In this description, the candidate fails to gain the first marking point as there is no reference to hydrogen bonds being broken. However, the response covers the joining of the primers and the lining up of nucleotides along with the doubling of the DNA so it gained all three marks.



Always make sure that the question is read carefully. This one asked for a description of ONE PCR cycle.

This response illustrates the requirement for precision when answering questions. As this question asks for a description about one cycle, it would be expected that the temperatures required for DNA denaturing and annealing would be given.

1 A deer was found dead on National Trust land. Some people thought that the wounds that led to the deer's death could have been caused by a big cat such as a black panther.



(a) Samples of DNA from the wounds of this deer were collected.

Investigators used the polymerase chain reaction (PCR) to increase the quantity of DNA in the samples.

(i) Describe how one PCR cycle would increase the quantity of DNA present.

(3)

The PCR would amplify the amount of DNA present as it would be placed in a tube with nucleotides, fluorescent markers, and ~~&~~ DNA polymerase. The varying temperatures would cause double the DNA strand to separate, then enable DNA polymerase to attach to each strand, and allow complimentary nucleotides to ajoin, therefore making two new double stranded pieces of DNA. The amount of DNA would double in one cycle.

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Examiner Comments

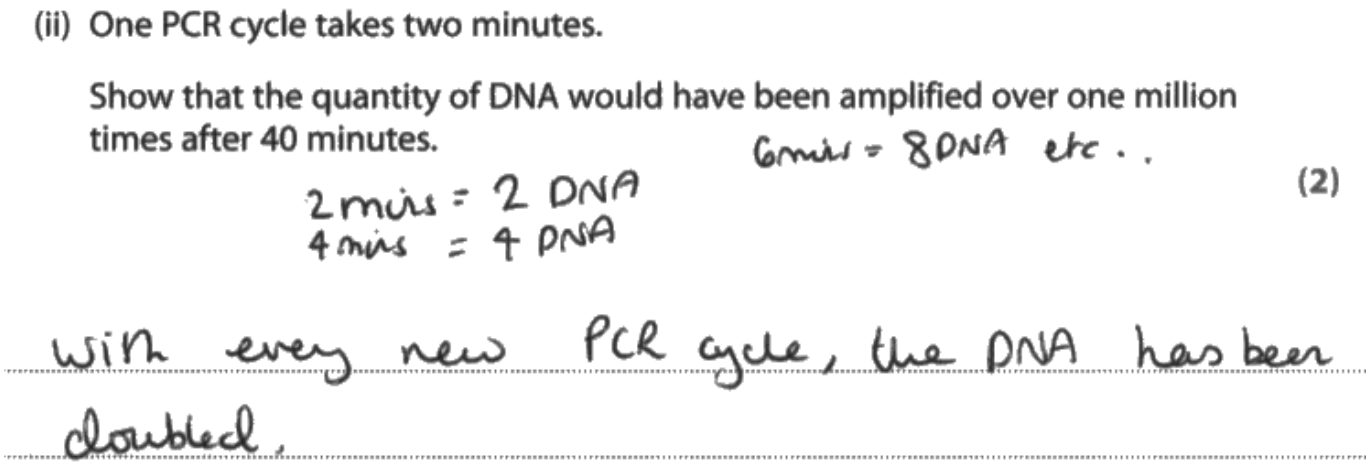
The candidate gives a general description of one PCR cycle but cannot gain either of the first two mark points. However, the third and fourth points can be awarded, so this answer gained 2/3.

Question 1 (a) (ii)

This maths item stated that one PCR cycle takes two minutes. It then requires that candidates use this information to prove that after 40 minutes, the quantity of DNA would have been amplified over one million times. Whilst it was nice to see responses that not only showed the answer but compared that to one million, this was not a requirement.

Whilst many candidates gained both marks, a sizeable portion found it challenging and perhaps the most common non-scoring response was an answer that stopped at '20 cycles'.

This response shows another commonly seen answer that could not be credited with the mark.


(ii) One PCR cycle takes two minutes.

Show that the quantity of DNA would have been amplified over one million times after 40 minutes.

6 mins = 8 DNA etc . .

(2)

2 mins = 2 DNA
4 mins = 4 DNA

with every new PCR cycle, the DNA has been doubled.

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Examiner Comments

The candidate has correctly appreciated that the DNA content would double with one PCR cycle but has not then used this information to calculate the quantity after 20 cycles.

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Examiner Tip

Make sure the answer fully targets the question being asked.

This response sets out the proof in a clear manner.

(ii) One PCR cycle takes two minutes.

Show that the quantity of DNA would have been amplified over one million times after 40 minutes. $\frac{40}{2} = 20$ 2^{20} (2)

$\frac{40}{2} = 20$. 20 PCR cycles. $2^{20} = 1,048,576$ which is greater than one million

ResultsPlus
Examiner Comments

A clear process is shown that leads to the correct answer, so both marks were awarded.

Question 1 (b)

This question item required candidates to relate the understanding of gel electrophoresis with the specific context of the question. This was identified in both the sentence before the question and within the question itself.

It was most pleasing to read a good number of clear and accurate responses that displayed a good understanding of this process and linked it to trying to identify whether a black panther was involved in the dead deer found on National Trust land. Common inaccuracies seen included referring to agar rather than agarose, or comparing results rather than bands and confusing the loading dye with a DNA stain.

This response gains three out of five but illustrates a number of points often seen in answers that did not gain full marks.

cycle 19 = 524288 (cycle 20 = 1048576) cycle 17 = 131072 cycle 18 = 262144

(b) The DNA produced by PCR was analysed to find out if a black panther was involved.

Explain how gel electrophoresis could be used to find out if this DNA came from a black panther.

(5)

DNA is extracted and mixed with an ~~this~~ enzyme^ (solution). This is then placed in a water bath.

The solution is then pipetted into wells in a box of agrose jelly. Electrodes are attached to either ends of the box and turned on. The DNA will separated along the gel leaving bands. When the process is finished compare the bands of this DNA with the DNA of the black panther. If the DNA is similar then the bands will be closer together / mean in position when the two are compared. The further away the bands are when compared the less similar the DNA is. ~~For~~ If the DNA is similar then there is a higher chance it came from a black panther.

(Total for Question 1 = 10 marks)

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Examiner Comments

The second paragraph starts with a reference to loading the wells which was considered suitable detail for the first marking point. However, the electrode statement was insufficiently accurate to gain the 'current/pd applied across the gel' mark. It then appropriately describes the comparing of bands (fifth mark point) with black panther DNA (fourth mark point). Then, like many, it discussed the outcome of the comparison in terms of 'similar' rather than a match, so did not gain the last mark point.

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Examiner Tip

Be aware that similar and same are not the equivalents.

Question 2 (a) (i)

This item required candidates to use the graphical data to support the conclusion that climate change is occurring in the Arctic.

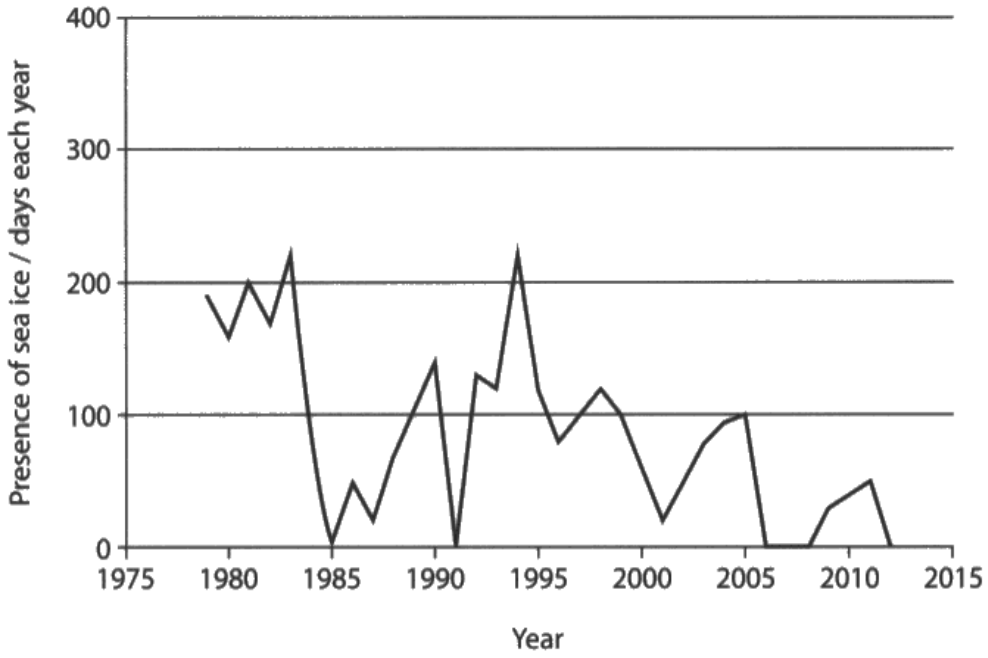
Many candidates were able to accurately interpret the data presented. However, a number of candidates did not differentiate between the number of days when sea ice was present per year and presence/absence of sea ice. In addition, it was quite common to see answers that tended to repeat the question rather than move it on. For example, candidates referred to climate change leading to absence of sea ice, when climate change is in the question stem.

The question states a conclusion and asks for an explanation for how the data supports this, but the focus of this response is on the fluctuations rather than the trend. As a consequence, the second part of the answer relating to climate change and melting sea ice was not considered.

2 Scientists are concerned that climate change may be affecting the Arctic environment and the polar bears that live there.

(a) In a study, scientists recorded the length of time ice was present each year in the sea around the west coast of Spitsbergen, an island in the Arctic.

The graph shows the number of days each year when sea ice was present.



(i) Explain how the data could support a conclusion that climate change is occurring in the Arctic.

(2)

This is because on the graph there are fluctuations of showing a difference in ice presence throughout the years. There are times where ice is present and is not, showing inconsistency in the climate and if ice is able to form at these times.

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Examiner Comments

No marks could be awarded for this answer.

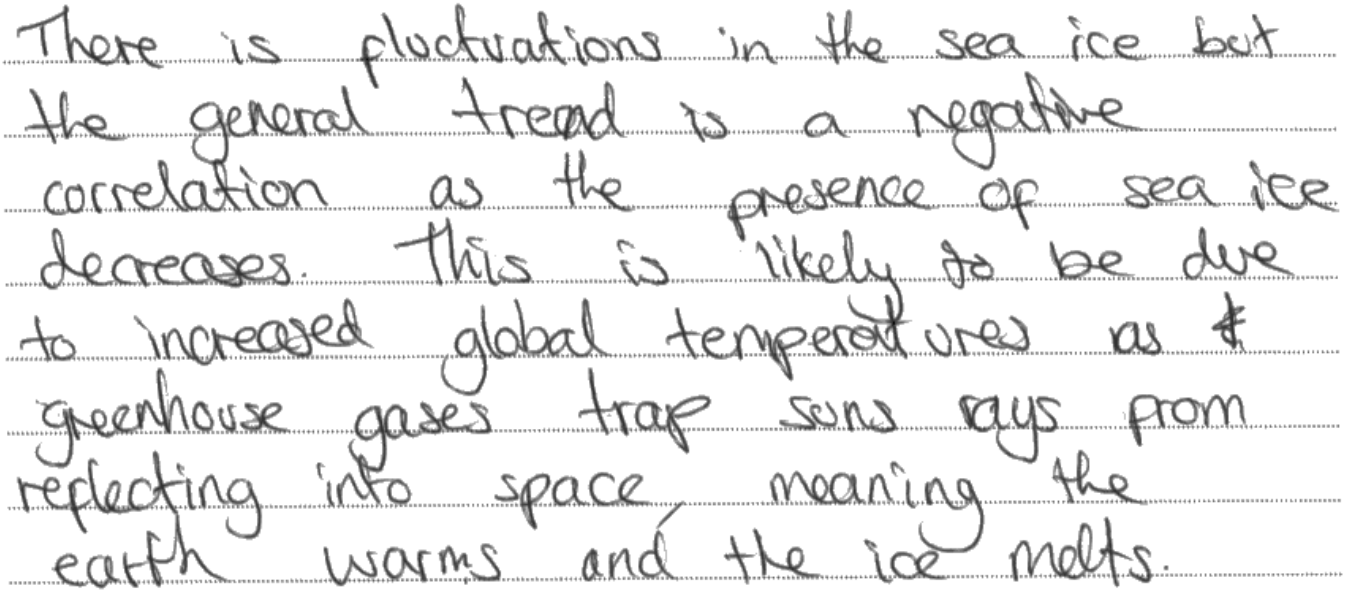
This is a clear and precise response that focuses on the question.

It Could Support it as the number of days that Sea ice is present has fallen every year 5 years on average (minus 1985 – 1990) which shows a Correlation (but not definitively a Causation) that the increased temperatures in the ~~artic~~ Arctic are Causing more Sea ice to melt or Seasonal temperatures to be higher, lowering the number of days the ice is present per year.

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Examiner Comments

Both marks awarded.

This candidate response illustrates an incomplete grasp of what the graph is representing. However, they have given a creditworthy explanation for the downward trend in the data.



ResultsPlus
Examiner Comments

This response was not awarded the first marking point, but did gain the second marking point.

ResultsPlus
Examiner Tip

Take the time to try and fully appreciate the descriptions given for each axis on a graph so that the data can be interpreted appropriately.

Question 2 (a) (ii)

This question asked candidates to use the graphical data to explain why it may not be useful in predicting climate change in the future.

There were a host of strong answers that used the data to give an explanation. However, there was a significant minority that did not consider the graph and therefore were not answering the question that had been posed.

This candidate has given the most frequently seen credit-worthy response by considering the fluctuations in the data. They then moved onto a general discussion that does not relate to the data provided.

(ii) Explain why the data may not be useful for predicting future climate change.

(4)

the number of days that the sea ice is present fluctuates a lot from year to year, and it doesn't decrease by a set amount or increase by a set amount so it would be hard to predict. Also, the presence of sea ice actually increases between 1992 and 1994, but decreases after that. It is also difficult to know how much greenhouse gas will be released into the atmosphere each year so, it is hard to predict the human effect on climate change as well.

ResultsPlus
Examiner Comments

This gained the fourth mark point, which relates to fluctuations in the data.

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Examiner Tip

If asked to use the data, make sure that the data is used.

Question 2 (b)

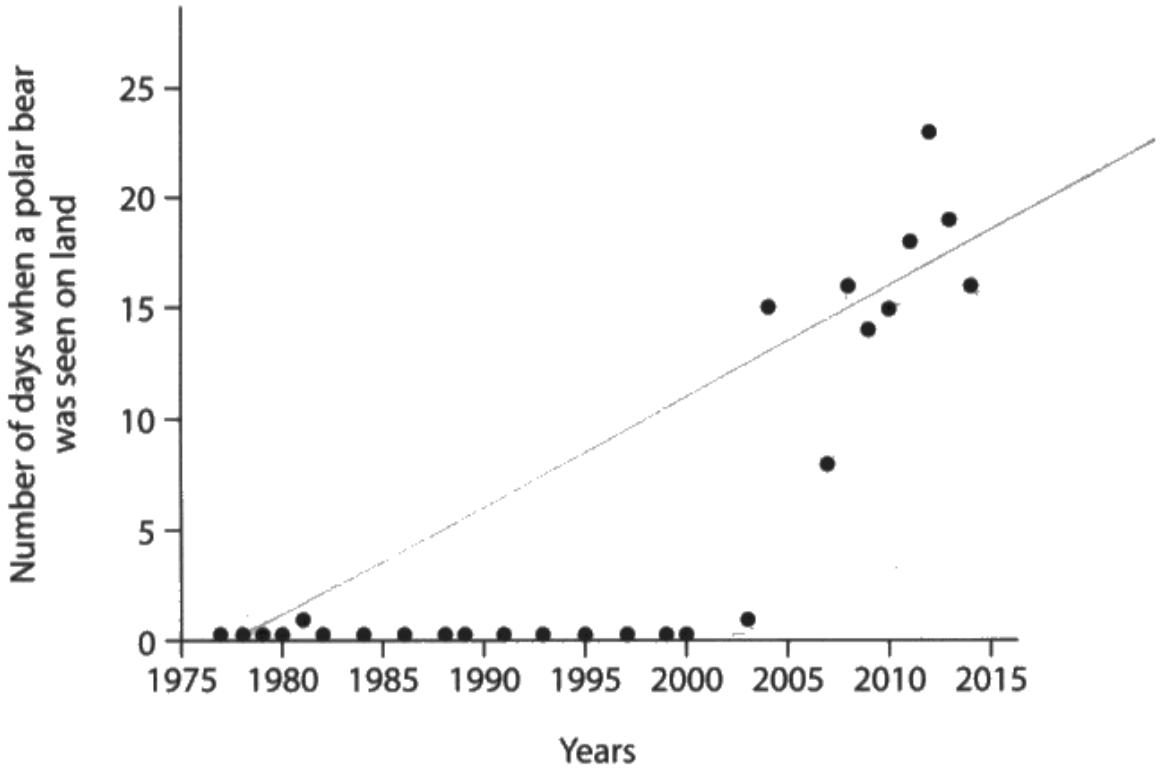
Candidates were presented with some graphical data and asked to sketch a trend line.

There was a diverse array of responses with some ignoring the data up to 2000 to others ignoring the data after 2000. Likewise, a number were inaccurate in their plot such as their curve dipping below the x axis or offering several lines. Having said that, there were many who were able to apply a suitable trend line to the data provided.

This response shows a line that does not really consider the number of polar bears seen on land between 1977 and 2000.

(b) The scientists also recorded data from west Spitsbergen on polar bear behaviour.

The graph shows the number of days polar bears were seen on land.



Sketch a trend line onto this graph.

(1)

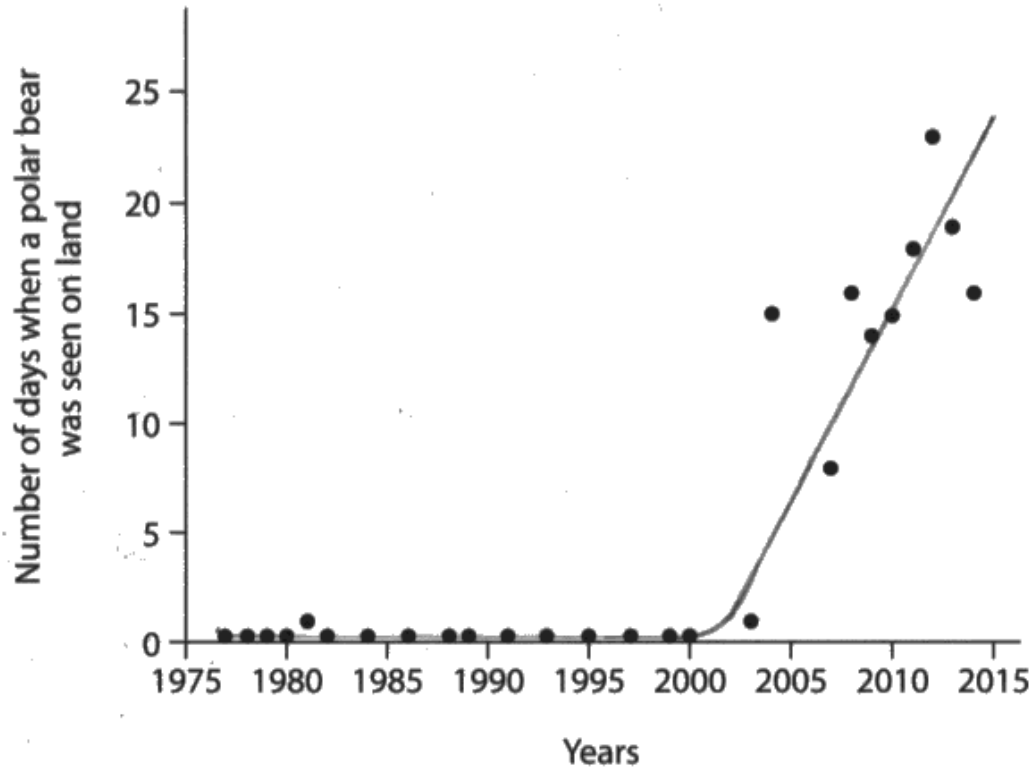
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Examiner Comments

No mark awarded.

This candidate has tried to take into account the differing data seen between 1997-2000 and 2000-2014.

(b) The scientists also recorded data from west Spitsbergen on polar bear behaviour.

The graph shows the number of days polar bears were seen on land.



Sketch a trend line onto this graph.

(1)

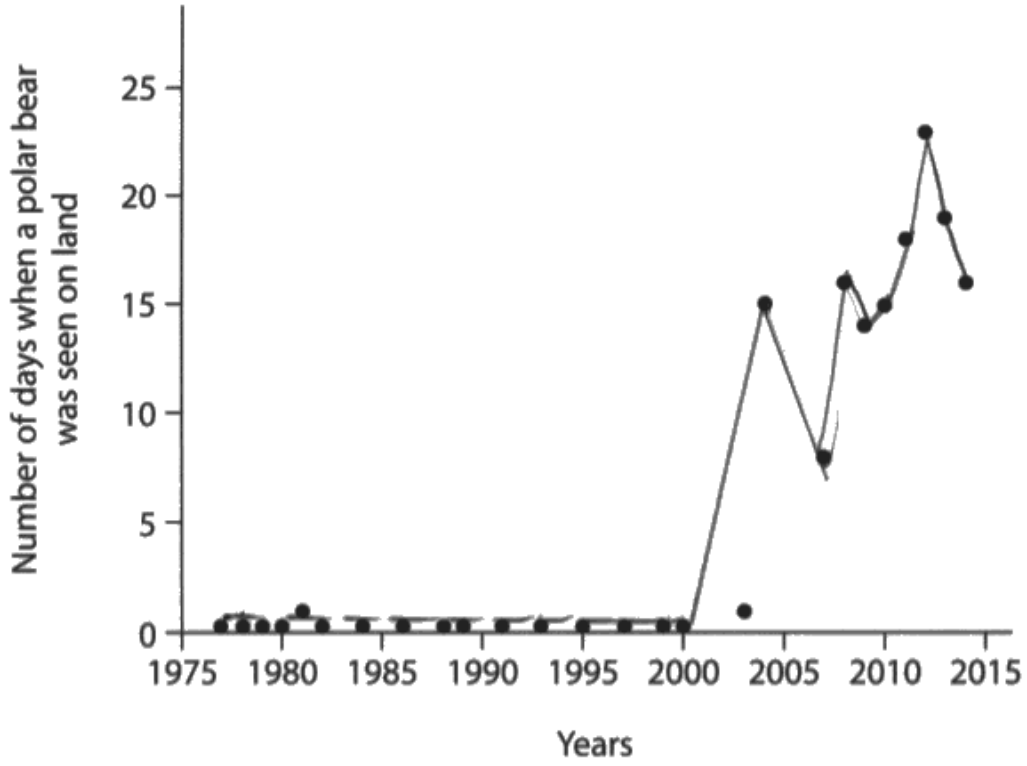
ResultsPlus
Examiner Comments

This trend line gained the mark.

This plot was not considered a trend line.

(b) The scientists also recorded data from west Spitsbergen on polar bear behaviour.

The graph shows the number of days polar bears were seen on land.



Sketch a trend line onto this graph.

(1)

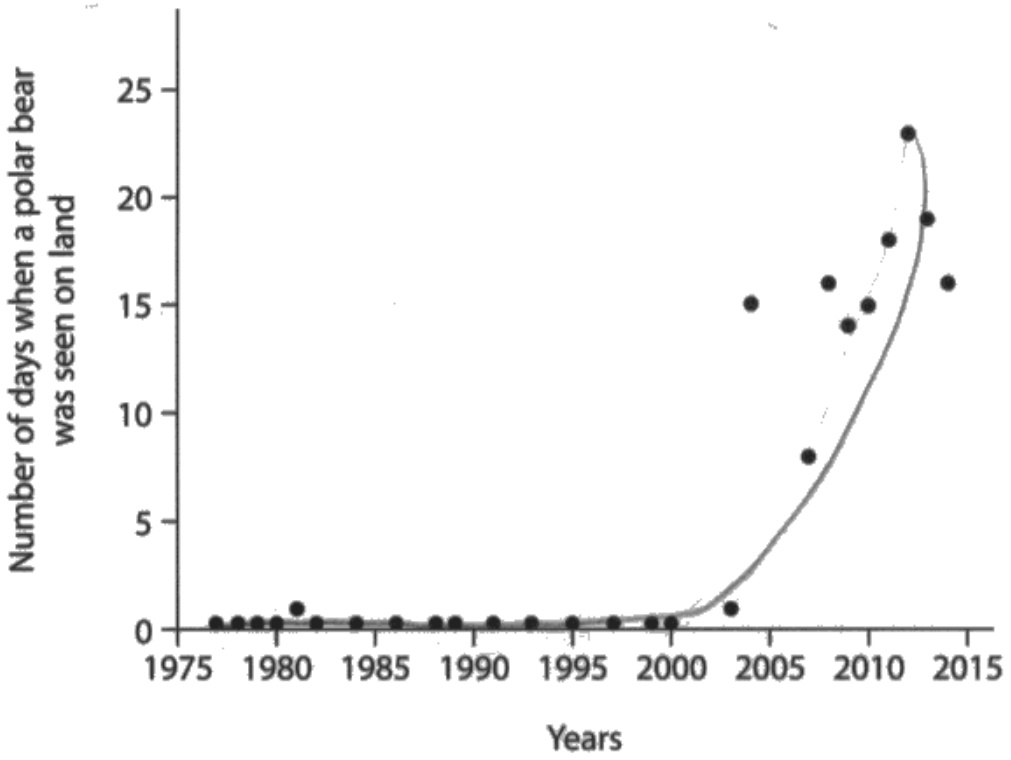
ResultsPlus
Examiner Comments

The mark was not awarded.

This trend line showed many of the qualities required such as including the 1997-2000 data, it started to rise at an appropriate time point and was a smooth curve through the later data. However, it curled back on itself at the top which was not appropriate.

(b) The scientists also recorded data from west Spitsbergen on polar bear behaviour.

The graph shows the number of days polar bears were seen on land.



Sketch a trend line onto this graph.

(1)

ResultsPlus
Examiner Comments

No mark awarded.

Question 2 (c)

This question required candidates to not only use the data provided in part (c) but also from the two previous graphs to assess the relationship between the number of barnacle goose eggs taken by polar bears and the presence of sea ice.

Many candidates were able to showcase their ability to synthesise this range of novel data into a considered and logical answer. However, others found it challenging and a sizeable number did not read the question carefully enough and referred to more polar bears on land rather than seen on land. Others felt that there were no seals present for the polar bears to eat.

This response correctly made the link between the length of time that sea ice was present and the number of polar bears seen on land. It also correctly referred to seals (second mark point) as: the polar bears struggling to hunt for seals due to the lack of sea ice.

(c) Birds, such as barnacle geese, use the land on Spitsbergen as nesting sites.

Polar bears usually hunt for seals from sea ice. They have also been seen feeding on eggs from barnacle geese nests.

Assess the relationship between the presence of sea ice and the number of eggs taken by polar bears since 2000.

(4)

There is clearly evidance within the graphs to show that as the number of days of sea-ice decreased, the number of polar bears seen on land increased. in both graphs 2000 and onwards have seen the most dramatic change. This indicates more polar bear going on land to search for more food, as they struggle to hunt for seals with no sea ice. This would have a negative correlation ~~between~~ because as the increase of polar bears seen on land increase the number of eggs taken by polar bears would decrease. However one critisism of this is the graph only shows number of polar bears seen which may not give an accurate representation of actual quantity of polar bears hunting for eggs.

(Total for Question 2 = 11 marks)

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Examiner Comments

The answer was awarded the third and then the second mark point.

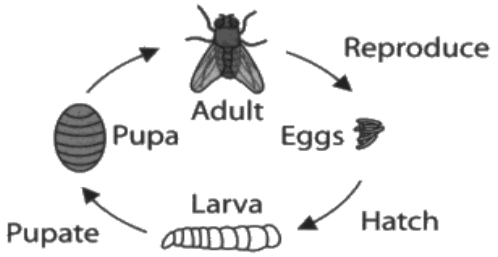
Question 3 (a) (i)

This question item required candidates to complete the Spearman's rank correlation coefficient table. The majority of candidates took this in their stride but the example below shows the most common error made.

This candidate did not appreciate that the final three differences in rank figures should be positive.

3 Blowflies are found in many parts of the world, including Africa.

The diagram shows the life cycle of one species of blowfly (species A) found in Africa.



An investigation was carried out to find the temperature at which 50% of the larvae of this species survive. This investigation was repeated for a further six species of African blowfly larvae, B to G. All other variables were kept constant.

In another investigation, the temperature of sand that the larvae selected when ready to pupate was recorded.

(a) A student used the data from these investigations to find out if there is a statistically significant correlation between the two sets of temperatures.

To do so, a Spearman's rank correlation coefficient can be calculated.

(i) Complete the table to rank all the data and to calculate d and d^2 for species E to G.

(3)

Blowfly species	Mean temperature at which 50% of larvae survive / °C	Rank for mean temperature for 50% larvae survival	Mean temperature of sand selected / °C	Rank for mean temperature of sand selected	Difference in rank (d)	Difference in rank squared (d^2)
A	49.0	5	26.1	7	−2	4
B	47.5	2	23.2	3	−1	1
C	48.5	3	24.7	6	−3	9
D	42.9	1	16.6	1	0	0
E	48.8	4	23.6	4	0	0
F	50.1	7	24.2	5	−2	4
G	49.2	6	23.1	2	−4	16



The response gained two marks. The first and third marking points were awarded, but not the second.



Always check the information in a table carefully, particularly if it includes processed data.

Question 3 (a) (ii) - (iii)

This question expected candidates to apply the given equation for the Spearman's rank correlation coefficient to the data supplied [3(a)(ii)]. They were then expected to consider the relevance of their calculated value using the critical value table provided [3(a)(iii)].

Whilst the majority were able to achieve the correct value for the coefficient, a significant minority failed to subtract their calculated value from one. This incorrect value was, however, still less than the critical value so would not have impacted negatively on their interpretation. Equally, if a candidate offered an incorrect calculation in part (ii), this error was carried through to part (iii), so long as they made the correct deduction from their erroneous coefficient value in relation to whether significant or not judged by comparing their calculated value to the critical value of 0.786 or at p=0.05 (or 5%).

The response here illustrates a commonly seen answer that was not awarded full marks for part 3(a)(iii) as the candidate did not make full use of the table provided.

(ii) Calculate the Spearman's rank correlation coefficient (r_s) using the equation:

(3)

$$r_s = 1 - \frac{6\Sigma d^2}{n(n^2 - 1)}$$

where $\Sigma d^2 = 34$ and n is the number of blowfly species.

$$r_s = 1 - \frac{6 \times 34}{7(49-1)}$$

$$= 0.39285714$$

$$= 0.39$$

Answer 0.39

(iii) The table shows critical values for r_s.

	Probability		
n	**0.10**	**0.05**	**0.01**
5	0.900	1.000	1.000
6	0.829	0.886	1.000
7	0.714	0.786	0.929
8	0.643	0.738	0.881
9	0.600	0.683	0.833

Deduce whether the data showed a statistically significant correlation.

(2)

The r_s value is smaller than the critical value. So we accept the null hypothesis that there is no correlation between the temprature at which 50% of the larvea survive and the temprature of the sand they select when ready to pupata.

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Examiner Comments

This candidate gave a correct answer to the calculation, to a suitable number of significant figures, hence gaining 3 marks for part 3(a)(ii). However, in part 3(a)(iii), the candidate did correctly deduce that their value was less than the critical value so there was no significant correlation but did not refer to the actual critical value or the correct level of probability.

Like many candidates, they referred to accepting the null hypothesis.

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Examiner Tip

When a table showing various critical values is provided, look to make full use of it. In this case, either the correct level of probability needed to be stated (@ p=0.05 or 5%) or the actual value (@ 0.786).

This candidate has carried out most of the Spearman's rank correlation coefficient calculation correctly but has failed to subtract their value from one in part 3(a)(ii). However, their interpretation of the value relative to the critical value is correct so gained full marks for 3(a)(iii).

(ii) Calculate the Spearman's rank correlation coefficient (r_s) using the equation:

(3)

$$r_s = 1 - \frac{6\Sigma d^2}{n(n^2 - 1)}$$

where $\Sigma d^2 = 34$ and n is the number of blowfly species.

$r_s = 1 - \frac{6(34)}{7(48)} = 0.6071$

Answer 0.607

(iii) The table shows critical values for r_s.

	Probability		
n	0.10	0.05	0.01
5	0.900	1.000	1.000
6	0.829	0.886	1.000
7	0.714	0.786	0.929
8	0.643	0.738	0.881
9	0.600	0.683	0.833

Deduce whether the data showed a statistically significant correlation.

(2)

Our value is 0.607 which for n=7 and 95% certainty or probability at 0.05 critical value is 0.786

- 0.607 < 0.786 so does not exceed critical value ∴ not a statistically significant correlation

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Examiner Comments

As the candidate had provided the working for their calculation in 3(a)(ii), a mark could be given for the numerator and a mark for the denominator, so it gained 2/3.

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Examiner Tip

It is always advisable to show working when doing a calculation.

This example gained all marks for the calculation but the answer to part 3(a)(iii) did not identify the correct probability, just the row based on the number of degrees of freedom.

(ii) Calculate the Spearman's rank correlation coefficient (r_s) using the equation:

(3)

$$r_s = 1 - \frac{6\Sigma d^2}{n(n^2 - 1)}$$

where $\Sigma d^2 = 34$ and n is the number of blowfly species.

$$r_s = 1 - \frac{6 \times 34}{7(7^2 - 1)}$$

$$= 0.3928...$$

$$= 0.39$$

Answer 0.39 (2dp)

(iii) The table shows critical values for r_s.

	Probability		
n	0.10	0.05	0.01
5	0.900	1.000	1.000
6	0.829	0.886	1.000
7	0.714	0.786	0.929
8	0.643	0.738	0.881
9	0.600	0.683	0.833

Deduce whether the data showed a statistically significant correlation.

(2)

The spearman's rank is below all of the critical values (0.714, 0.786, 0.929), which shows that there is no significant correlation between the temperature and the species.

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Examiner Comments

This answer gained 3/3 for 3(a)(ii) and 1/2 for 3(a)(iii). In the latter case, the candidate had identified that their value was less than the critical value and described what this means in terms of the correlation.

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Examiner Tip

When considering statistical tests, the calculated value should always be compared to the critical value at a probability of p=0.05 or at the 5% significance level.

Question 3 (b) (i)

In this question item, candidates were expected to determine how the mean temperature of 49°C could be calculated for the larvae of blowfly species F in the dead rhinoceros.

Only a minority of candidates gained both marks. Whilst many described how a mean was calculated, suggesting that they appreciated the relevance of the 'determine' command word, few correctly referred to either multiple temperature readings or a random position of the thermometer within the mass of larvae.

This response nicely illustrates a suitable description of how to calculate the mean, but the focus was on the rhino rather than the larvae, hence only 1/2 marks.

(b) A number of observations were made about a dead rhinoceros:

- adults of all seven species of blowfly (A to G) were observed near the rhinoceros
- large numbers of living larvae of species F were present inside the rhinoceros
- mean temperature in this group of larvae was 49 ± 1.1 °C
- mean temperature of the air surrounding the rhinoceros was 33 ± 3.0 °C.

(i) Determine how the mean temperature of 49 °C was found.

(2)

The core temperature of the rhinoceros taken using a thermometer probe in organs of rhinoceros. The mean calculated by adding up all the values and dividing by the number of samples. Error interval calculated by degree of precision in equipment (thermometer) used to record.

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Examiner Comments

This answer gained the second marking point.

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Examiner Tip

It is vital that all the information provided should be considered carefully to answer the question.

This question asked how the mean temperature of 49°C was found. To gain both marks, the second and third bullet points needed to be considered: the group of larvae (of species F) had a mean temperature of 49°C and that this group was within the rhino.

Question 3 (b) (ii)

The thrust of this question was to allow candidates the opportunity to explain why a raised temperature in the rhinoceros was an advantage to larvae of blowfly species F.

Many candidates were able to display a most encouraging understanding, gaining all of the marking points that were available. However, the mode score was one.

The candidate response given here was the most widely seen marking point awarded. In this case, the candidate has given a suitable description of increased enzyme activity.

(ii) It was observed that all the living larvae in the rhinoceros belonged to species F.

The metabolic activity of the larvae of species F increases the temperature within the dead rhinoceros.

Explain the advantages for this species of blowfly of increasing the temperature within the dead rhinoceros.

(3)

Increasing the temperature increases the kinetic energy of enzymes in the blowfly. This increases the frequency of collisions between enzyme and substrate molecules, so more enzyme - substrate complexes form. Therefore enzyme - catalysed reactions in the blowfly occur at a faster rate, so development and growth occur at a faster rate.

ResultsPlus
Examiner Comments

This answer gained 1/3 marks.

ResultsPlus
Examiner Tip

Always look at the mark allocation as it gives guidance on the amount of content required.

Question 4 (a) (i)

In this question item, candidates were expected to use the data table to describe the effect of storage time on germination success for wheat varieties P and Q.

A pleasing majority of candidates were able to recognise the reduction in successful germination of both varieties as storage time increased. However, many then simply repeated the data that was presented rather than manipulating it or giving subtrends as described by the third and fourth marking points.

The candidate has given an appropriate overall description of the trend. As the question referred to both varieties of wheat, the trend must apply to both for the award of this mark. However, the candidate does not then either manipulate the data or describe any subtrends.

(i) Describe the effect of storage time on the germination of seeds for these two varieties of wheat.

(3)

As the storage time increases ~~ase~~ the mean percentage germination for both varieties of wheat decrease. There is a negative correlation between the storage time and percentage germination.

ResultsPlus
Examiner Comments

Only the first marking point can be awarded so 1/3.

ResultsPlus
Examiner Tip

If data is going to be used in an answer, consider whether it should be manipulated in some way.

In this case, as both varieties are involved, one manipulation per variety was required for the second marking point.

Question 4 (a) (ii)

In this item, candidates were required to explain how the results of the control were useful in the context of the investigation described in question 4.

Whilst all marking points were seen, the first marking point was the most commonly encountered one, with the final marking point being the second most common. It should be noted that many candidates gave generic responses that did not relate to the context provided. This is illustrated in the two examples provided.

In this response, the candidate has only shown that they recognise that the control can be used as a comparison but has not really stated what the comparison is between.

(ii) Explain how the results for the control were useful in this investigation.

(2)

- We were able to use it as a comparison
- and to look at how far the seeds changed from 'normal'.

ResultsPlus
Examiner Comments

No marks were achieved.

This candidate has shown that the control will have a comparison function but has not linked this to both varieties of wheat, nor to being stored.

(ii) Explain how the results for the control were useful in this investigation.

(2)

to use as a COMPARISON to show if there was a significant change in germination.

ResultsPlus
Examiner Comments

No marks were awarded.

Question 4 (b) (i)

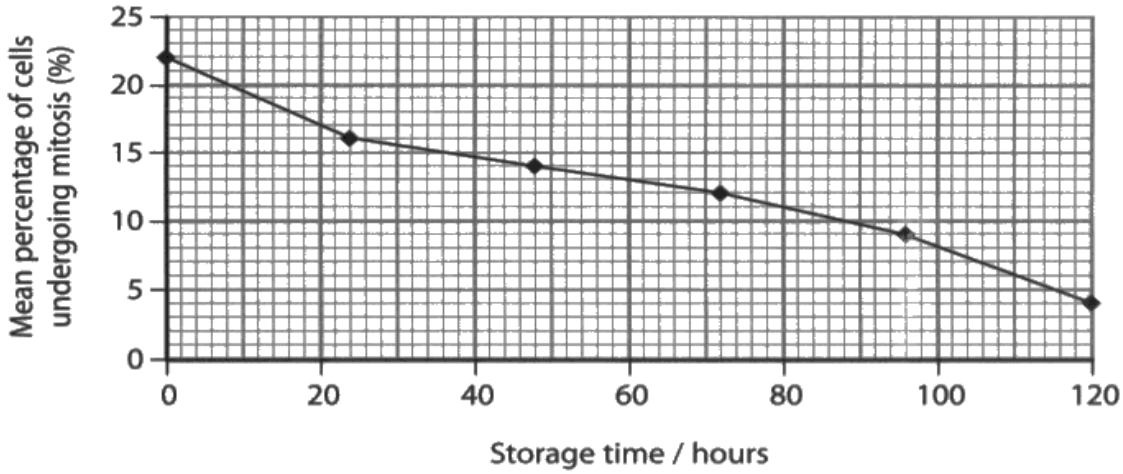
In this question, candidates were to describe the appearance of the chromosomes within a cell during metaphase.

There were a pleasing number of strong responses but a significant number referred to centrioles rather than centromeres or homologous pairs of chromosomes rather than pairs of chromatids.

This response is sufficiently clear to be awarded all three marks.

(b) Root tips were removed from the seedlings of variety Q. The percentage of cells from these root tips undergoing mitosis was recorded.

The results are shown in the graph.



(i) Describe the appearance of the chromosomes in the cells undergoing the metaphase stage of mitosis.

(3)

During metaphase the chromosomes line up in the centre of the cell by their ~~chromatids~~ centromeres. They are condensed and two chromatids are joined by a centromere. The centromere is in the middle with one chromatid facing one pole of the cell and the other chromatid facing the other pole.

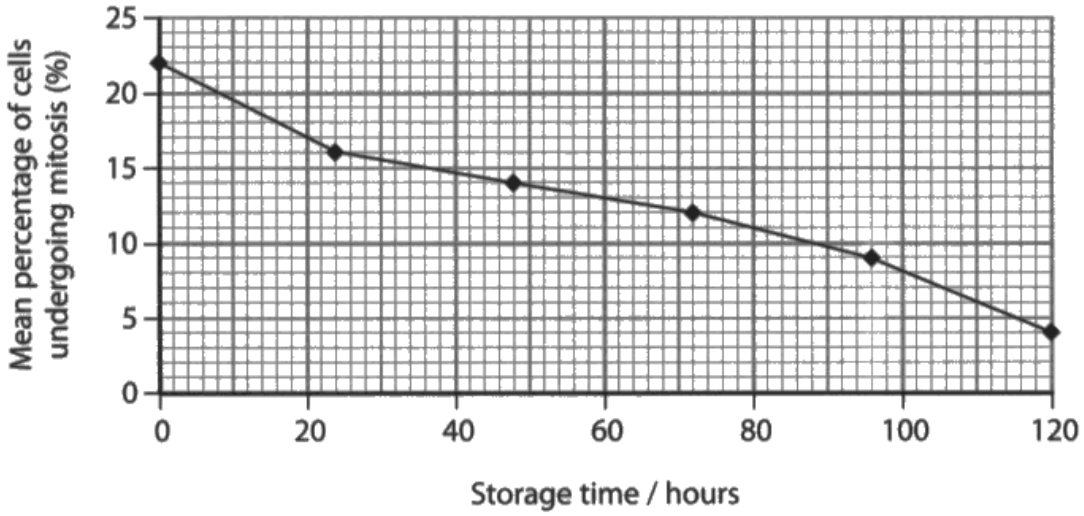
ResultsPlus
Examiner Comments

Marks awarded were initially the fourth marking point, as middle or centre of the cell was allowed as a suitable alternative to equator of the cell. Then the first marking point, quickly followed by the second marking point.

This response also gained three marks. The reference to centrioles was ignored as it was obvious that the candidate had not confused them with centromeres.

(b) Root tips were removed from the seedlings of variety Q. The percentage of cells from these root tips undergoing mitosis was recorded.

The results are shown in the graph.

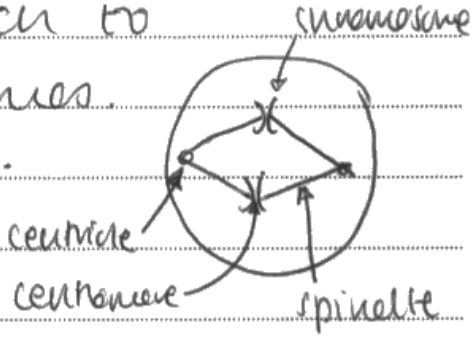


IMPACT

(i) Describe the appearance of the chromosomes in the cells undergoing the metaphase stage of mitosis.

(3)

Chromosomes are already shortened and condensed and begin to line up in the middle of the cell on the metaphase plate. ~~#~~ Spindles from the centrioles at opposite sides of the cell attach to centromeres of the chromosomes. No nuclear envelope is present.



ResultsPlus
Examiner Comments

This answer gained the first, then the fourth and finally the third marking point to achieve 3/3. As the diagram was suitably labelled it would have provided evidence for marking point 3 had it not been written above the diagram.

ResultsPlus
Examiner Tip

Well annotated diagrams can help but be careful not to just repeat what is written elsewhere in an answer.

Question 4 (b) (ii)

This question required candidates to consider the graphical data provided to explain how storage time affected growth in wheat seedlings of variety Q.

A good number of candidates were able to not only recognise the trend shown in the graph but relate this data about mitosis to growth in seedlings. However, it was not uncommon to read answers that either only referred to the change in mitosis due to length of storage time or the change in growth. A few candidates did not appreciate that seedlings were being considered, not seeds.

This candidate has correctly linked increased storage time with reduced growth in terms of growth rate. The second mark point could also be awarded as the reference to a lower level of mitosis is within the same sentence that started with a comment about an increased storage time.

(ii) Analyse the data to explain how storage time affects the growth of the seedlings of variety Q.

(2)

A greater storage time causes a decrease in the growth rate of seedlings of variety Q as less there is a lower mean percentage of cells undergoing mitosis

ResultsPlus
Examiner Comments

The first marking point was awarded on the second line and the second point due to the description on the third and fourth lines.

This response was typical of a significant minority in that it only focused on one aspect, in this case the graph, and did not therefore fully tackle the question.

(ii) Analyse the data to explain how storage time affects the growth of the seedlings of variety Q.

(2)

As storage time increases the mean percentage of cells undergoing mitosis decreases by 18% over 120 hours.

ResultsPlus
Examiner Comments

This answer gained the second marking point only.

ResultsPlus
Examiner Tip

As this question not only refers to data in the graph (relating to mitosis) but also to the effect of storage time on growth, then two aspects are needed for gain both marks.

Question 4 (c)

In this item, candidates needed to devise an investigation to test the stated hypothesis that the percentage of cells carrying out mitosis varied during the day compared to the night.

The hypothesis cued the candidates in by referring to mitosis in root tips; however, there were a number of answers that did not offer any root tip squash details.

It was most encouraging to read a host of responses that were clearly well thought through and were therefore practical. There were though, a number that were either impractical or not expressed sufficiently clearly. For example, it was not uncommon to mark responses that stated that root tips were removed and then the root tip squash was performed in the dark (or at night) and in the presence of light (or during the day).

Whilst there were six marking points available, to gain full marks the first marking point was a requirement.

This response started, like many, with a description of the variables but lacked the detail to gain full marks.

(c) It is claimed that the percentage of cells in a root tip undergoing mitosis during the day is different from the percentage during the night.

Devise an investigation to test this hypothesis.

(5)

- 3 plants (variety Q) prepared, all genetically identical
- 1 plant placed in a room with a light emitting ~~Pr~~ light/ or natural sunlight.
- 1 plant placed in a dark room with no light
- 1 plant used as control left outside ~~in natural light~~ for natural light during normal hours.
- Independent variable → light given to plant (light/dark)
- Dependent variable → Length of stem at the end of experiment.
- Control variables → Temperature, humidity, (biotic factors) genetic variability, water
- Leave for 120 hours before measuring to obtain valid results
- Repeat investigation to obtain reliable results - Calculate the Mean.
- Produce a table to present data and a graph to compare data between the 2 experiments.

(Total for Question 4 = 15 marks)

ResultsPlus
Examiner Comments

Three marks were awarded. The second marking point was given for the first bullet point. The first marking point, as a description of the plant in the day and night, over the next three bullet points. The third marking point was given in the sixth bullet point. It was felt that the description preceding this meant that the reference to controlled variables applied to the plant.

The reference to comparing the data was not sufficient for the final marking point.

This is a strong answer but illustrates that to gain full marks the first marking point had to be pieced together. The candidate early in their answer refers to cutting off root tips after the plant has been in the light and then near the end of the answer refers to repeating the cutting with the plant in dark conditions.

(c) It is claimed that the percentage of cells in a root tip undergoing mitosis during the day is different from the percentage during the night.

Devise an investigation to test this hypothesis.

(5)

Root tips from the same species of plant should be collected. 5 root tips will be used for the 'day' group, and 5 should be used for the 'night' group to enable this test to be valid and reliable. The ~~root tips~~ plants should be placed in normal conditions in the day (soil, water, humidity). After they have been in daytime conditions for a certain period of time, the root tips should be cut from each plant. The tip should be placed in HCL in order to breakdown the cell structure. It should then be placed in cold water*. the root tips should be ~~dyed~~ stained with a dye such as toludine blue, placed on a microscope slide with a slip on top and placed under the microscope. The number of cells undergoing mitosis should be counted as the chromosomes should be visible and a mitotic index can be calculated. The same should be done with the plants kept in the dark (at night), and the mitotic index of each can be compared.

(Total for Question 4 = 15 marks)

The whole experiment can be repeated for validity.

* and broken down with a small pin.

ResultsPlus
Examiner Comments

This response gained all five marks including the first, second, four, fifth and finally the sixth marking points.

ResultsPlus
Examiner Tip

When describing a method, write the process in the sequence that it would have been carried out. This decreases the chance of missing out stages.

Question 5 (a)

This question required candidates to describe the role of calcium ions in muscle contraction.

Many candidates had a robust grasp of this though there was some confusion seen with regard to the myosin binding sites on actin.

This is a clear answer which gives the full story and, like many, gives the description in a clear order.

5 Calcium ions are required for muscle contraction.

(a) Describe the role of calcium ions in the contraction of muscle fibres.

(3)

Calcium ions are released from the sarcoplasmic reticulum and diffuse through the sarcoplasm to initiate muscle contraction. At rest, the protein tropomyosin blocks the myosin binding sites on the actin myofilament, so myosin cannot bind. Calcium ions bind to calcium ion binding sites on troponin, which causes the troponin + tropomyosin on the actin to move, exposing the myosin binding sites. Without Ca^{2+}, myosin could not bind to actin, as the myosin binding site would be blocked, so the muscle could not contract.

ResultsPlus
Examiner Comments

All three marks awarded, in sequence.

This was a rather general and confused response that only gained one mark.

5 Calcium ions are required for muscle contraction.

(a) Describe the role of calcium ions in the contraction of muscle fibres.

(3)

Cacium ions determine whether or not the ~~tropomyosin~~ myosin actin binding site is free. If calcium ions are present they bind the, freeing up the binding site so the myosin heads can bind to the actin, allowing the rowing action to occur and the myosin to slide across actin causing muscle contraction.

ResultsPlus
Examiner Comments

The third marking point was given for the reference to the myosin heads binding to actin.

This response describes the process but misses out the reference to tropomyosin so only gained 2/3.

5 Calcium ions are required for muscle contraction.

(a) Describe the role of calcium ions in the contraction of muscle fibres.

(3)

Ca^{2+} ions bind to the troponin molecule, changing it's shape. It then exposes it's myosin binding site which binds to actin to form a cross bridge. This causes the sarcomere to condense (reading ~~to~~ and actin and myosin to stay the same. This leads to a contraction.

ResultsPlus
Examiner Comments

The first and third mark points were awarded.

Question 5 (b) (i)

For this question, candidates were asked to give one advantage and one disadvantage of using one muscle to supply the muscle fibres to investigate the effect of calcium ion concentration on muscle fibres.

There were a number of clear and considered answers supplied by candidates but also a number did not seem to appreciate that the question related to muscle fibres.

This short response gained the first marking point as it made reference to raising the validity, not just that it was valid.

(b) An investigation was carried out to study the effect of calcium ion concentration on muscle fibres.

Individual fibres, from one sample of muscle, were provided with different calcium ion concentrations. The force produced by each fibre was recorded and a mean force was calculated for each calcium ion concentration.

All other variables were kept constant.

(i) Give one advantage and one disadvantage of using muscle fibres from the same sample of muscle.

(2)

Advantage: Increases the validity of the results

Disadvantage:

ResultsPlus
Examiner Comments

One mark awarded.

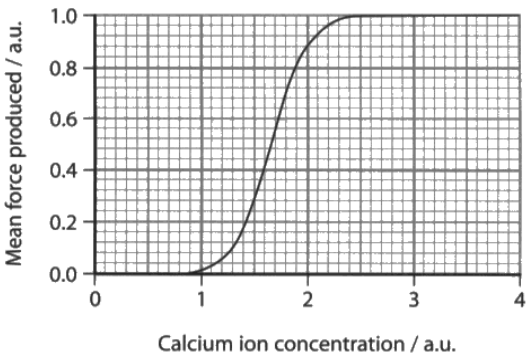
Question 5 (b) (ii)

A graph relating calcium ion concentration to the mean force produced by muscle fibres was presented and candidates were expected to explain the plot.

Many were able to give the general trend and a significant number also referred to no change in mean force produced between certain calcium ion concentration ranges. However, only a minority then went on to correctly explain each of these elements.

This candidate has described the change in mean force produced in the correct calcium ion concentration range for the second marking point. They have then offered an explanation but this is incorrect. They then deliver the third marking point.

(ii) The results are shown in the graph.



Explain the effect of increasing calcium ion concentration on the mean force produced by muscle fibres.

(4)

- Between 1 a.u. and 2.5 a.u. of calcium, the force produced ~~greatly~~ increases rapidly from 0.0 to 1.0. This is because calcium ions allow muscles to contract by causing troponin to bind to tropomyosin, so when it is higher more contraction can occur. *
- ~~However~~ At 2.5 a.u. to 4 a.u. the ~~relationship~~ mean force stays constant at 1.0 a.u, this shows the increase in calcium is only effective to a certain point. The concentration of 2.5 produces the greatest mean force, but any higher concentration would not make any more change. * this means a greater force can be produced

ResultsPlus
Examiner Comments

Two marks awarded.

Question 6 (a) (i)

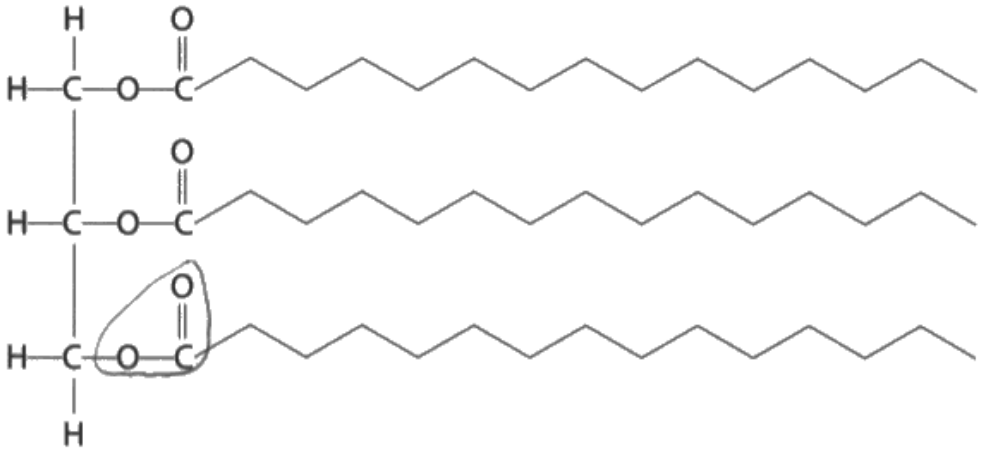
Candidates were asked, in this question, to draw a circle around an ester bond on the diagram of a triglyceride.

Whilst many candidates were able to correctly identify the bond, a range of incorrect options was also offered by candidates from carbon to carbon bonds in the glycerol component to within the hydrocarbon chain.

This response shows how candidates can correctly identify the ester bond in the triglyceride diagram provided.

6 Lipids and carbohydrates are found in both plants and animals.

(a) The diagram shows a triglyceride.



(i) On the diagram, draw a circle around an ester bond.

(1)

ResultsPlus
Examiner Comments

One mark (out of one) awarded.

Question 6 (a) (ii)

As the question asked candidates to describe how the diagram would be different when one of the fatty acids was unsaturated, answers that referred to the 'zigzag' or appropriate drawings were acceptable.

This answer correctly describes the bonding in the fatty acid chain and how the shape of the chain is altered.

(ii) The fatty acids shown on the diagram are saturated.

Describe how the diagram would be different if one of the fatty acids was unsaturated.

(2)

If one of the fatty acid anane chains were unsaturated there would be a double bond in the chain causing it to form a kink / bend so the chain wouldn't be completely straight.

ResultsPlus
Examiner Comments

Both marks awarded.

This response correctly describes the change in bonding due to one fatty acid chain being unsaturated. It then goes onto show the double bond in the 'zigzag' of the chain.

(ii) The fatty acids shown on the diagram are saturated.

Describe how the diagram would be different if one of the fatty acids was unsaturated.

(2)

Unsaturated fatty acids have at least one double C=C bonds, so the chains would be represented by two lines, e.g , on one of the fatty acid tails. This fatty acid therefore does not contain the maximum amount of hydrogen atoms. If there is one C=C, it is monounsaturated.

ResultsPlus
Examiner Comments

As there is no reference to a change in the shape of the 'tail', only the first marking point was awarded.

This answer does refer to kinks but not in relation to the actual fatty acid chain, so would not gain the second marking point; also the reference to branching is incorrect.

(ii) The fatty acids shown on the diagram are saturated.

Describe how the diagram would be different if one of the fatty acids was unsaturated.

(2)

The fatty acid would have less hydrogen. Would have double bonds that cause kinks/ branching.

ResultsPlus
Examiner Comments

No marks achieved for this response.

Question 6 (b)

This question is the nine mark extended response item. The candidates were asked to assess the relative importance of carbohydrates to plants and animals.

Whilst there were a number of very good answers offered by candidates, the majority were limited by one or more of the following:

- Only considering one or two roles of carbohydrates in plants and animals such as answers limited to energy storage or respiration and cellulose
- Significantly confusing responses such as considering carbohydrates as polysaccharides only, or that animals require glucose for respiration but plants require it for photosynthesis
- Either no comment on the relative importance or a very simplistic one.

It was noted that a number of candidates used additional lined paper when there was space available in the question paper. This was particularly evident in question 6b where much of the second page was not used.

There was limited focus on carbohydrates in this answer so it was deemed to sit in level 1. It also showed a rather simple assessment of the relative importance.

*(b) The carbohydrate content of vegetables ranges from 3 to 35%. However, meat contains little to no carbohydrate. Milk is the only food source from animals that contains a significant amount of carbohydrate.

Although plant material contains a higher proportion of carbohydrate than animal tissues, it has been claimed that carbohydrates are more important to animals than they are to plants.

Assess the relative importance of carbohydrates to plants and animals.

(9)

· Carbohydrates are important in some manner to both plants and animals.

· The majority of animals consume either vegetables, meat and milk in some regard. Either they consume one of the stated foods or multiples.

· However

· Animals only consume large amounts of milk when they are babies as the get it from their mothers. This suggests that younger animals need more carbohydrate. As milk has lots of the carbohydrates.

· Animals such as predators live off mostly meat, which suggests they need less carbohydrates than herbivores that only eat plants with higher carbohydrate levels than meat.

· This suggests that carbohydrates are a good food source that allows babies to develop. As carbohydrates are harder to break down in animals

· Plants have lots of carbohydrates inside them. Suggesting it is a important food source and that it plays an important role in the plants

· Plants use carbohydrates to store glucose so they can keep the energy needed for vital process stored within them.

. This suggests that plants need carbohydrates more than animals as it is there only source of stored energy.

ResultsPlus
Examiner Comments

The lack of much content places this response at the lower end of the level so was awarded 1 mark.

ResultsPlus
Examiner Tip

When tackling this type of question, take particular note of the command word so that the answer fully reflects the question. In this case, an assessment of relative importance of carbohydrates to plants and animals was required.

This response demonstrates isolated elements of biology in the context of the question, most notably respiration in both plants and animals, cellulose in plants and a reference to amylose and amylopectin as forms of starch.

The candidate has also made an assessment of the relative importance by stating that carbohydrates are more important to animals than plants but the evidence is limited.

Primary consumers (animals) eat plants, for example vegetables, which contain carbohydrates. Animals hydrolyse these polysaccharide chains to use glucose for respiration, which provides energy for all of their body's processes. Some animals (mammals) produce milk; this is used to feed young offspring, and so contains a significant amount of carbohydrate, to provide glucose for cellular respiration to produce ATP and allow growth of offspring. Animals can't make their own glucose, so rely on plants.

Plants make glucose via photosynthesis, which is then used in respiration, and in making organic molecules (biomass). Plants make cellulose (a polysaccharide / carbohydrate) which gives them structure and strong fibres (high tensile strength). Plants also store glucose as starch (amylose + amylopectin). Although plants need carbohydrates, they are autotrophs, so can make them on their own, however animals are heterotrophs, so rely on

plants to make carbohydrates for them; structurally carbohydrates (e.g. cellulose) are more important to plants, however animals expend more energy, (heat, movement, faeces) so carbohydrates provide more importance for energy.

(Total for Question 6 = 12 marks)





ResultsPlus
Examiner Comments

Whilst this response was also considered to be at level 1, it is of a higher order than the previous one and was awarded 3 marks.

Question 7 (a)

This item required candidates to describe how a hormone is released from a fat cell.

A pleasing number of candidates appreciated that this was asking them to describe the exocytosis of hormone via a vesicle fusing with the cell surface membrane. It was important that any description of exocytosis had to be sufficiently clear that it was the hormone, and not the vesicle, being released.

This response was typical of those that did not gain any marks.

7 The scientific article you have studied is adapted from several sources.

Use the information from the scientific article and your own knowledge to answer the following questions.

(a) 'The hunger system is mediated by hormones from the gut and from fat cells' (paragraph 6).

Describe how these fat cells could release hormones.

(2)

fat cells send information to the brain when we are hungry so the brain will then release certain hormones that will encourage us to eat.

ResultsPlus
Examiner Comments

This response did not tackle the actual question being asked.

ResultsPlus
Examiner Tip

Always read the question carefully to ascertain the focus of the item.

The candidate has made a correct reference to exocytosis so achieved the second marking point.

7 The scientific article you have studied is adapted from several sources.

Use the information from the scientific article and your own knowledge to answer the following questions.

(a) 'The hunger system is mediated by hormones from the gut and from fat cells' (paragraph 6).

Describe how these fat cells could release hormones.

(2)

releasing hormones via exocytosis or via channel proteins which will regulate the amount of hormone in the cell.

ResultsPlus
Examiner Comments

One mark awarded.

Question 7 (b)

This item used the context of the reward system to consider the role of dopamine as a neurotransmitter.

There were many fine answers offered by candidates who displayed a good knowledge of this material. Many of those that did not gain full marks missed out a stage or were not precise enough. In the latter case, an example would be referring to sodium channels opening or an unqualified reference to sodium ions moving.

This is a high scoring response that shows a number of important points.

Like many, this candidate set the scene by describing the role of calcium ions.

With regard to the first marking point, this candidate was awarded the point for their description of dopamine being released from the presynaptic membrane. The reference to it crossing the synaptic cleft would not have gained the mark as there was no description of it diffusing across.

The candidate has also given two alternative ways of gaining the third marking point. They have then correctly referred to the direction of sodium ion flow as well as the appropriate membrane channels opening.

(b) The reward system in humans involves the neurotransmitter dopamine pathway (paragraph 7).

Describe how dopamine acts as a neurotransmitter.

(4)

When an action potential arrives at the synapse it causes Ca^{2+} channels to open allowing Ca^{2+} to ~~through~~ the presynaptic membrane. This causes vesicles containing dopamine to bind to presynaptic membrane and exocytosis the neurotransmitter. The dopamine then crosses the synaptic cleft and binds to dopamine receptors on the post synaptic membrane. This results in Na^+ ion channels to open allowing Na^+ ions into the cell resulting in depolarisation and an action potential is generated and the impulse travels down the neuron. Dopamine is then either reuptaken by the presynaptic membrane or diffuses away to be broken down.

ResultsPlus
Examiner Comments

This answer gains all four marks with the marking order being the same as in the mark scheme.

ResultsPlus
Examiner Tip

With questions that ask for a process, consider whether there is a sequence to it. In this case, the dopamine cannot bind to the post-synaptic membrane before it has been released, and a depolarisation of the post-synaptic membrane cannot occur before sodium ion movement.

Further, always look to be precise in answers such as specifically describing the direction of flow e.g. for sodium ions.

Question 7 (c)

The article refers to a hormone, called ghrelin, and its epigenetic effects on a named gene leading to an increase in weight.

The candidates were asked to describe how ghrelin caused these epigenetic changes. A good percentage recognised two epigenetic changes - DNA methylation and histone modification - and potential transcription outcome.

This response correctly states two epigenetic examples over the first three lines.

(c) The hormone ghrelin may cause epigenetic changes to the *FTO* gene leading to weight gain (paragraph 9).

Describe how ghrelin could cause epigenetic changes.

(2)

higher levels of ghrelin could cause DNA methylation or histone modification to the DNA in the FTO gene, meaning when it is transcribed it carries these changes.

ResultsPlus
Examiner Comments

Both marks awarded.

Question 7 (d)

This item required candidates to consider three adjacent paragraphs from the pre-release article. In particular, they had to explain how probiotics may regulate food cravings.

A sizeable proportion of the candidature recognised that using probiotics was likely to change the composition of the microbiome. Rather fewer of the candidates were then able to fully follow this through to consider the implications of the change.

This example shows a typical way a candidate expresses the first three marking points.

(d) Probiotics include live bacteria that are ingested for health benefits.

Explain how probiotics may regulate food cravings (paragraphs 18, 19 and 20).

(3)

probiotics may change the types of gut flora a person has. Because of this, taste receptor may be affected, meaning a person might crave completely different foods. If more of one type of gut flora exists, then more of one food will be craved (this regulates cravings.)

ResultsPlus
Examiner Comments

The first three mark points were awarded in the sequence shown in the mark scheme.

Question 7 (e)

This question asked candidates to recall the role of enzymes involved in genetic modification.

Whilst there were a host of very impressive responses, the majority lacked a sufficient level of detail to achieve more than one mark.

This candidate has given a clear and detailed description of one of the enzymes involved for two marks out of four.

(e) Tabor used enzymes to genetically modify a 'harmless species of *Escherichia coli*' (paragraph 26).

Describe the functions of the enzymes used to genetically modify bacteria.

(4)

The enzymes act as restriction enzymes that are used to cut the bacterial plasmid and are used to cut out and isolate a specific gene. Using the same restriction enzymes to cut the plasmid and gene creates identical sticky ends that allow the gene and plasmid to 'stick' together.

ResultsPlus
Examiner Comments

This answer was awarded the first two marking points. The second of these points was that their answer referred to the formation of sticky ends by the restriction enzyme.

Question 7 (f)

This item required candidates to give two reasons why doctors want to prevent people being overweight.

Whilst the majority of candidates gave two reasons, a significant minority either only offered one or delivered a long list of reasons.

Whilst most candidates opted for two medical conditions, this response gave one such condition and a negative effect on the NHS.

(f) Give two reasons why doctors want to prevent people gaining excess weight (paragraph 28).

(1)

Increases the risk of cardiovascular diseases

Increased burden on the NHS service

ResultsPlus
Examiner Comments

The mark was awarded for this clearly set out answer.

ResultsPlus
Examiner Tip

When asked for a set number of reasons, there is no need to offer a list of many reasons.

A short answer that targets the question.

(f) Give two reasons why doctors want to prevent people gaining excess weight (paragraph 28).

(1)

Excess weight increases the risk of heart attacks and strokes.

ResultsPlus
Examiner Comments

Mark achieved.

Question 7 (g)

This question essentially required candidates to explain how biological molecules that enter the bloodstream elicit an immune response.

Some candidates displayed a clear and thorough understanding of the immune response. However, the majority did not take note that it was referring to biological molecules and not bacteria, hence they could not achieve the first marking point. Further, there were a sizeable number of answers that had correct elements but lacked the precision to gain marks such as that plasma produces antibodies. In addition, there were a number who did not attempt to tackle the question.

This is a sound answer with sufficient detail to gain three marks out of four.

(g) 'Bacterial molecules pass into the bloodstream where they do not belong, triggering an immune response' (paragraph 32).

Explain how the bacterial molecules could trigger a specific immune response.

(4)

The bacteria can becomere be engulfed by a macrophage which becomes an antigen presenting cell. T helper cells with complementary CD4 receptors bind to the APC and become activated. Here they divide into more T helper cells and T memory cells. The T helper cells then release cytokines which activate B cells stimulating them to divide into B memory cells and plasma cells. The plasma cells produce antibodies which bind to the APC and destroy it.

ResultsPlus
Examiner Comments

Like very many responses, it started with an inaccurate statement about bacteria being engulfed. However, there is a correct reference to an APC for the second marking point.

The third marking point is given as all elements have been supplied including the reference to complementary (in relation to the T helper cell receptors), the lack of which was the most frequent reason for not gaining this mark. The fourth marking point was not achieved as whilst B memory cells will be formed, this fact is not directly relevant to the question. The fifth marking point was seen on the penultimate line.

Question 7 (h)

This item required candidates to consider a quote from paragraph 34 from the pre-release article.

The majority of answers could be credited with the first marking point but only a few progressed to offering the second point.

This candidate response offers an acceptable description of the first marking point.

(h) Explain why genetically modified bacteria delivering drugs 'to the exact tissue in the body where they're needed and nowhere else' would decrease side effects (paragraph 34).

(2)

Only the tissues that need the ~~M~~ ~~APC~~ drugs are altered and affected by the drugs, and other healthy tissues aren't affected by the drug. This is because the drugs only come into contact with the tissue needing them.

ResultsPlus
Examiner Comments

One mark out of two awarded.

Question 7 (i)

This question item asked candidates to offer a description of the role of microbes found on the skin surface.

Many candidates had a good appreciation of the skin flora roles and all three marking points were seen.

This answer offers the second most commonly seen correct answer: the third marking point.

(i) There are 'trillions of microbes' found in the gut, 'as well as others living elsewhere in and on the body'.

Describe the role of the microbes that are normally found on the skin surface of humans (paragraph 40).

(2)

Microbes found on the skin out compete with any other foreign microbes that may land on the skin. This reduces the risk of becoming infected by diseases.

ResultsPlus
Examiner Comments

One out of two marks achieved.

This answer illustrates perhaps the most common general answer that was not considered creditworthy.

(i) There are 'trillions of microbes' found in the gut, 'as well as others living elsewhere in and on the body'.

Describe the role of the microbes that are normally found on the skin surface of humans (paragraph 40).

(2)

Provide a barrier for other microbes — cannot enter skin

ResultsPlus Examiner Comments

No marks given.

Question 7 (j)

This question required candidates to state the properties of an organ. The majority were able to achieve both marks but some did not gain the first marking point due to a lack of precision.

This short answer delivers both marking points clearly.

(j) The bacteria present in and on the body of a vertebrate 'can weigh as much as six pounds, and they make up a sort of organ' (paragraph 40). bodies.

State two properties of an organ.

(2)

made of differen tissues to carry out a specifiz funtion in the body

ResultsPlus Examiner Comments

Both marks awarded.

Question 7 (k)

This part of question 7 required candidates to compare and contrast the structure of a bacterium with HIV.

Candidates were mostly very good at offering a range of differences between the two but few were able to supply a similarity. Many candidates did not gain marks due to not considering the question closely enough. It asked them to specifically consider HIV and not any virus so referring to viruses having RNA or DNA as their genetic material but bacteria only having DNA was not creditworthy. Further, a number of candidates seemed to confuse capsid with capsule.

Like many answers, this one only offered two mark-worthy differences between HIV and a bacterium.

(k) Compare and contrast the structure of a bacterium, such as the one that causes neurological syphilis, with the Human Immunodeficiency Virus (HIV) (paragraph 49).

(3)

Bacteria has a flagellum which allows movement. HIV is a virus so doesn't. Bacteria also has pili which allows it to grip to surfaces and a thick mucus extracellular allowing cell to cell attachments to occur. Moreover HIV doesn't have these things. It has an antigen coat coat (glycoprotein) on a cell surface membrane.

ResultsPlus
Examiner Comments

This answer gained the third and then the fourth marking point.

ResultsPlus
Examiner Tip

Take note that a compare and contrast question requires both similarities and differences to be given to achieve full marks.

Question 7 (l)

This final question item asked candidates to name the validating process for scientific papers in the context of Pettersson's paper.

Whilst the majority gained this mark, some did not because:

1. they confused peer assessment with peer review

2. they referred to a scientific conference

Paper Summary

Based on candidate performance on this paper, candidates are the offered the following advice:

- Make sure you fully understand the command words being used so that you tailor your answers to the questions being asked
- Read the whole question so you appreciate the context of the question
- When provided with data in a question, make sure you consider it carefully
- Use the mark allocation as a guide to the detail you need to offer in your response
- Make sure you show clear working in calculation questions in case you make a mistake in your final answer
- As the question relating to the article is worth about 30% of the marks on this paper, give the article due consideration
- Consider carefully the 9-mark question
- Time permitting, read through your answers to make sure they are unambiguous
- Make sure your writing is legible at all times.

Grade Boundaries

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