Pearson
Edexcel

Examiners' Report
June 2019

IGCSE Biology 4BI1 1B

ResultsPlus

Introduction

The new qualification was examined for the first time in this June series. The examiners were impressed with the standard of student responses. Centres have prepared students well for the new style of questions and the new areas of specification content. There was little evidence of students running out of time on the paper and most students attempted all questions.

Question 1 (a) (A)

Question Q01a required students to identify labelled structures from a three-dimensional diagram of a plant cell. In part A almost all students could identify the vacuole.

Question 1 (a) (B)

In part B almost all students could identify stucture B as the nucleus.

Question 1 (a) (C)

In part C almost all students could identify C as the cell wall.

Question 1 (a) (D)

In part D almost all students could identify part D as the cell membrane.

Question 1 (b) (i)

In Q01bi most students could give the letter of another stucture shown in the diagram but found in animal cells.

Question 1 (b) (ii)

Question Q01bii asked students to explain why some plant cells contain many chloroplasts, some plant cells contain few cholroplasts and some plant cells contain no chloroplasts. The best responses scored full credit for explaining that cells exposed to light such as pallisade mesophyll will have many chloroplasts for photosynthesis. Other plant cells such as root hair cells will have no chloroplasts. Some students wrote about different plants rather than different plant cells.

(ii) Explain why some plant cells contain many chloroplasts, some plant cells contain few chloroplasts and some plant cells contain no chloroplasts.

(3)

Plant cells in leaves contain many chloroplasts as they are needed to capture light energy for photosynthesis. These cells are likely to be at the top of leaves. Other cells e.g. those not so exposed to daylight (i.e. stems) would contain less. Plant cells in the roots would not contain any because they are in the dark under the soil and could not photosynthesise.

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Examiner Comments

This response scores 3 marks for writing that the chlorplasts are required to capture light (marking point 2) for photosynthesis (marking point 1). They also write that the cells in the roots do not contain any chloroplasts (marking point 5).

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Examiner Tip

Although this responses earns 3 marks it could be improved by reference to root hair cells or palisade cells.

(ii) Explain why some plant cells contain many chloroplasts, some plant cells contain few chloroplasts and some plant cells contain no chloroplasts.

(3)

As different cells have different functions not all are required to photosynthesise Photosynthesis requires chloroplasts containing chlorophyll. For plant cells such palisade cells in the cells leaves they're required to do much of the photosynthesis for the plants and the leaf. However plant cells in the roots don't require chloroplasts as they don't photosynthesise due to having limited light exposure.

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Examiner Comments

This response also scores 3 marks. The student explains that cells in the pallisade carry out photosynthesis (marking point 1). They also go on to write that the cells in the roots do not have exposure to light (marking point 2) and therefore do not require chloroplasts (marking point 5).

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Examiner Tip

Although the response gains full credit the candidate should have linked pallisade cells to having many chloroplasts to gain marking point 3.

Question 1 (c)

In Q01c most students could name the process that occurs at the ribosomes.

Question 2 (b)

Question Q02b gave students a table to complete giving the function of Vitamin D, Iron and fibre. Almost all reponses gained credit with most scoring all 3 marks. A number of responses failed to earn full credit as they described the function of fibre as helping digestion rather than gving its role in helping peristalsis.

Question 2 (c) (i)

Item Q02ci required students to calculte from the data given the number of 15-year-olds that could have their recommended daily allowance of protein supplied by the 18-month-old normal salmon. Most students gained full credit for the calculation.

Question 2 (c) (ii)

Q02cii asked students to disuss the conclusion that the results show that genetically modified (GM) salmon are useful in providing a balanced diet. Almost all students gained some credit. The very best responses mentioned some of the following points. The GM salmon is heavier and larger than the normal salmon and so provides more protein. However this may provide too much protein or more than the reccomended allowance and that other molecules such as carbohyrdate are required in a balanced diet. They may also have written that only one of each salmon type was used so the data may be unreliable. Some other resonses mentioned that no information on food supplied to salmon is given or that the protein needs for a balanced diet may vary depending for example on age or occupation.

(ii) **The student concludes that his results show that genetically modified (GM) salmon are useful in providing a balanced diet.**

Discuss the student's conclusion.

(6)

- They are useful as they have a higher mass, so more protein, which is good for a balanced diet.
- 1 GM salmon can feed more people than 1 normal salmon, so are good.
- GM salmon only provide protein, but humans need lots of different food groups, e.g. carbohydrates, as part of a balanced diet, so GM salmon are not very useful in providing a balanced diet.
- There may be some unknown dangers to humans of eating genetically modified animals.
- ~~Salmon do not~~ Only 1 GM salmon used, so not very reliable.
- Both GM salmon and normal salmon have more protein in them that one person needs, so makes no difference being genetically modified.
- GM salmon are bigger, but may not have more protein.

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Examiner Comments

This response scores 6 marks. They gain marking point 1 for noting that the GM fish as a higher mass so provides more protein (marking point 2). They also discuss the lack of other food groups such as carbohydrates (marking point 4). The answer notes that only one GM salmon was used (marking point 5) so not reliable (marking point 6) They also note that the GM salmon provides more protein than a person needs (marking point 3).

ResultsPlus
Examiner Tip

A good answer but the discussion could make a clearer reference to the data or conclusion not being reliable.

(ii) The student concludes that his results show that genetically modified (GM) salmon are useful in providing a balanced diet.

Discuss the student's conclusion.

(6)

it is unreliable as only one of each salmon was used ; ✗ it may be inaccurate as abiotic factors such as temperature and type of food are not mentioned to have been controlled. Genetically modified salmon are greater in mass (nearly double that of normal salmon) and length ✓ and may provide more protein for growth and muscle repair. However, the nutritional ~~ton~~ content of each salmon was not examined ✓ and the GM salmon may (and mass remain unchanged) contain too much fat and cause obesity and coronary heart disease. The normal salmon may contain more protein per gram. Also, salmon does not contain vitamins, minerals nor ~~fibre in the first place~~ generally when a balanced diet includes carbohydrates, fat, protein, water, fibre, vitamins and minerals

This response also scores 6 marks. It makes reference to being unreliable (marking point 6) as only one salmon is used (marking point 5). It notes that no information on food supply to salmon is offered. (marking point 7) It mentions greater length and mass (marking point 1). Providing more protein (marking point 2). It makes reference to other food components such as fat (marking point 4).

A very good response that earns full credit.

Question 2 (d)

Item Q02d gave students a short passage and they needed to fill in a suitable word. Most reponses earned credit with the most frequently occuring mark being full credit. A number of students did not recognise the description of a gene as a length of DNA that controls the production of growth hormone.

Question 3 (a)

Item Q03a gave students a diagram of a food web. They then needed to examine the web and complete the table to show the number of producers, primary consumers and food chains. Almost all reponses scored some marks with most gaining 2. The most common error was a miscount on the number of food chains.

Question 3 (b)

Item Q03b asked students to explain why the energy in mudworms is not all transferred to the organisms that eat them. Almost all responses gained some credit. The best responses explained that energy is used in movement, energy is released in faeces, energy is released when the worm excretes, some energy is unavailable as not all of the worm is eaten and that some worms are decomposed.

(b) Explain why the energy in the mud worms is not all transferred to the organisms that eat them.

(4)

Some energy from the mud worms will be lost due to respiration, ~~and~~ movement, ~~and~~ excretion and other things. Therefore when the organisms eat them, only ~~10% of the~~ approximately 10% of the energy is transferred to the ~~next~~ organism.

This response scores 2 marks for reference to energy being released in respiration and excretion.

The response mentions respiration and movement but these are both the same marking point.

(b) Explain why the energy in the mud worms is not all transferred to the organisms that eat them.

(4)

Only 10% of energy is transferred to the organism that eats them. They lose much of their energy ~~on~~ through excretion & faeces & urine. Heat loss to the atmosphere also loses energy. Life processes such as movement also lose their energy. Some biomass such as bones cannot be eaten and the energy is not transferred.

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Examiner Comments

This response scores 4 marks. It refers to excretion and faeces. It also mentions heat loss and the fact that not all of the worm is eaten.

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Examiner Tip

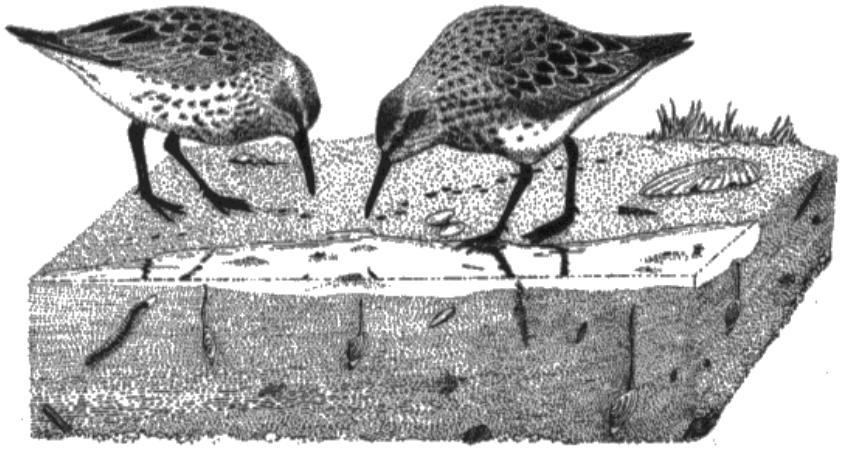
Some other responses failed to gain full credit as they confused faeces with excretion.

Question 3 (c)

Item Q03c gave students some information about sandpipers and then asked students to explain how sandpipers evolved to have long beaks. Almost all responses gained at least 1 mark with most scoring 3 or 4 marks. The best responses described how variation in beak length may be caused by a mutation and that this longer beak enables the birds to reach worms deeper in the mud. This means they would be more likely to survive and reproduce and pass on the allele for longer beaks on to their offspring.

(c) The diagram shows sandpipers feeding.

Sandpipers have long beaks so that they can dig for worms in the mud.



(Source: © Birchside www.fotosearch.com)

Explain how sandpipers evolved to have long beaks.

(4)

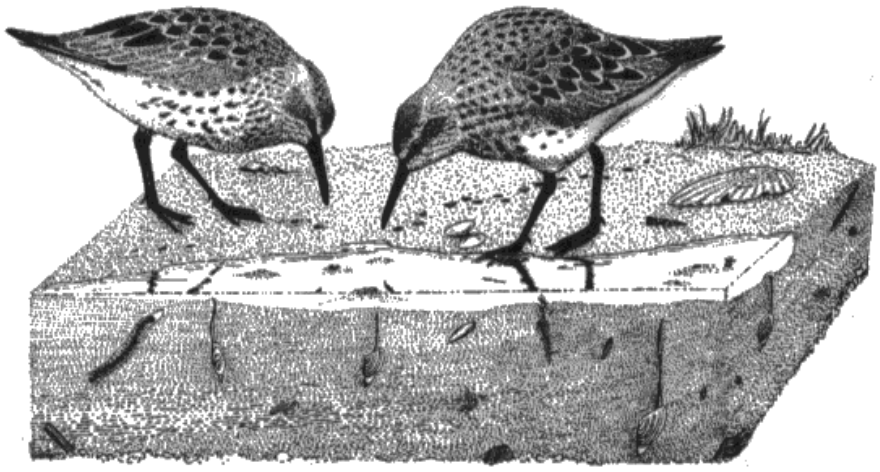
There is a genetic variation within the sandpipers specie. this is caused by mutation. the ones that are better adapted will be able to survive. they then will reproduce and pass on their alleles to their offsprings which will also share the same characteristic.

ResultsPlus
Examiner Comments

This response gains full marks. It mentions genetic variation caused by mutation. It then refers to (long beaks) surviving and reproducing and passing on alleles to their offspring.

(c) The diagram shows sandpipers feeding.

Sandpipers have long beaks so that they can dig for worms in the mud.



(Source: © Birchside www.fotosearch.com)

Explain how sandpipers evolved to have long beaks.

(4)

survival of the fittest and evolution

- they need to be able to get food from the ground which you can't do with short beaks. So any that had short beaks would of died the one that had longer beaks would of survived and reproduced.
- The offspring would of been born with a longer beak.
- The one that survive (long beaks) keep reproducing until after many generations short beaked sandpipers would of died out.

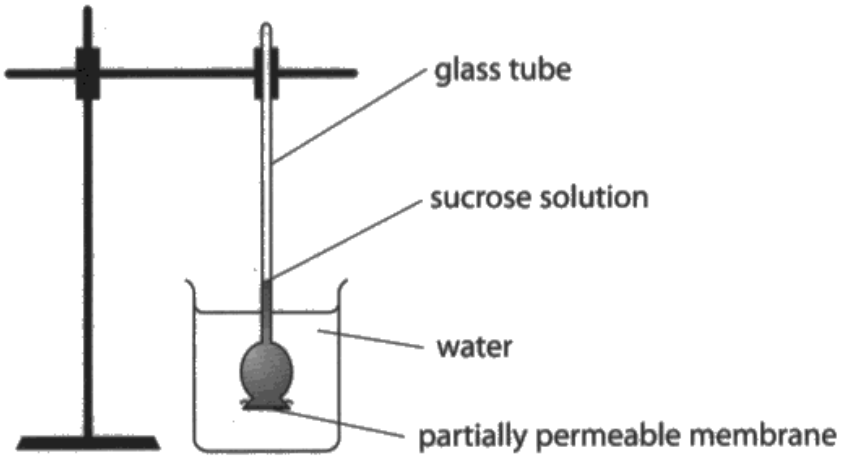
This response scores 2 marks. It refers to birds with short beaks being less able to get food and birds with longer beaks surviving and reproducing.

The response does not refer to variation, mutation or passing on alleles to offspring.

Question 4 (a)

Question 4 gave students a diagram of some apparatus used to show osmosis. In Q04a students had to explain what happens to the level of the sucrose solution in the glass tube. Many reponses gained full marks for explaining that the level would rise due to water entering the tube due to a water potential gradient from a more dilute solution to a more concentrated solution. Some students were confused about how to describe the gradient and notions of high water concentration.

4 This apparatus can be used to show osmosis.



(a) Explain what happens to the level of the sucrose solution in the glass tube.

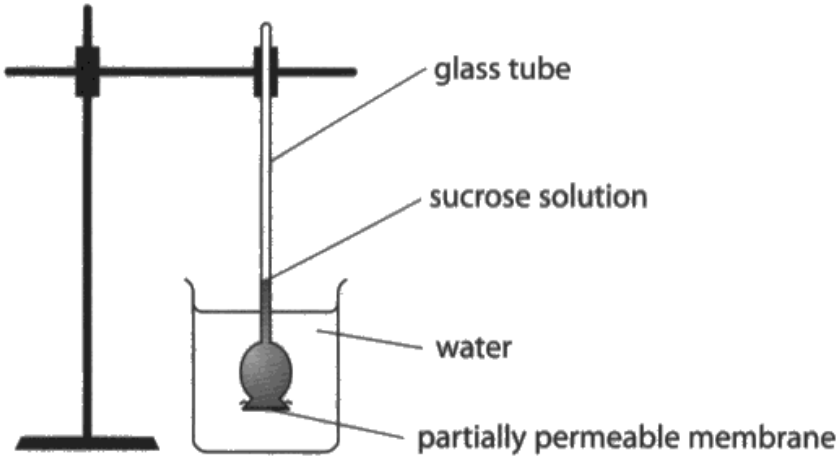
(3)

Osmosis is the net movement from an area of ~~high~~ low to ~~low~~ high concentration. Therefore the level of sucrose in the glass tube decreases as the starch solution diffuses into the water. Water concentration increases

This response describes movement of the solution. It gains no credit as the direction is wrong and the student thinks that solution is moving.

Osmosis is the movement of water from water or a dilute solution with a higher water potential to a more concentrated solution with a lower water potential.

4 This apparatus can be used to show osmosis.



(a) Explain what happens to the level of the sucrose solution in the glass tube.

(3)

the level of the sucrose solution increase as water moved from high water potential in the beaker to low water potential gradient in the glass tube through a partially permeable membrane.

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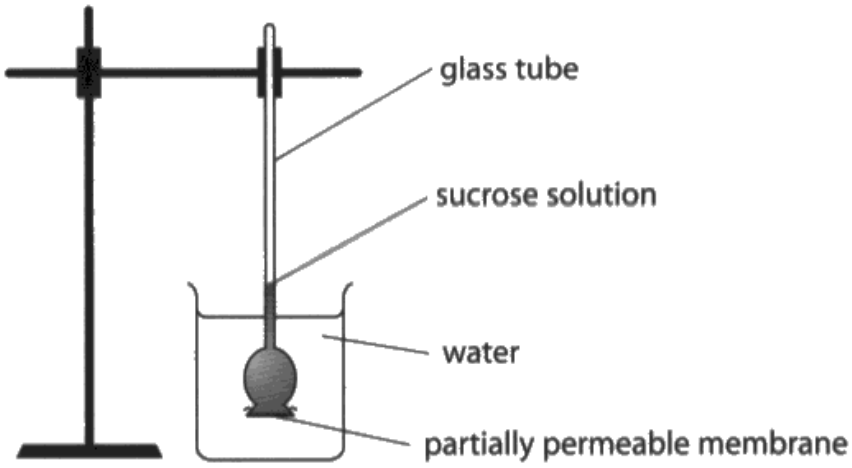
Examiner Comments

This response gains full credit. The level rises due to water moving from higher water potential in the beaker to lower water potential in the tube.

4 This apparatus can be used to show osmosis.



(a) Explain what happens to the level of the sucrose solution in the glass tube.

(3)

- It will increase
- because water is passes by osmosis through partially permeable membrane from high water potential to low water potential.
- It will be raised

ResultsPlus
Examiner Comments

This also scores full credit. Level increases, water passes through membrane from high water potential to low water potential.

Question 4 (b)

Q04b asked students to describe how the apparatus could be modified to measure the rate of osmsosis at different temperatures. Whilst most students gained credit only the best responses scored full marks. These described the apparatus not the method. Using a water bath, a ruler or scale and a stopwatch gained full credit.

(b) Describe how this apparatus could be modified to measure the rate of osmosis at different temperatures.

membrane

(3)

you could place the beaker of water in various temperatured water baths e.g. 10°C, 20°C, 30°C, 40°C and 50°C to measure the effect of temperature change on the rate of osmosis. Then use a stopclock and measure, with a ruler, how far up the sucrose solution has changed in volume every 5 mins, and record results in the table. You must keep the start volume of sucrose solution and water the same and also the size of the membrane as a larger surface area to volume ratio will increase the rate of diffusion.

(Total for Question 4 = 6 marks)

ResultsPlus
Examiner Comments

This response scores full marks for waterbaths, ruler and stopclock.

(b) Describe how this apparatus could be modified to measure the rate of osmosis at different temperatures.

(3)

place in water baths at different temperatures (15°C, 20°C, 25°C, 30°C) and measure the change in height of the solution (with a ruler) after a certain time period (stop watch/clock needed), after 5 minutes for an example,

ResultsPlus
Examiner Comments

This also scores full marks for waterbaths, ruler and stopwatch.

ResultsPlus
Examiner Tip

Some responses wrote about a method but made no reference to apparatus.

Question 5 (b) (i)

This question showed students a simple piece of apparatus that can be used to measure the oxygen consumption of germinating seeds. In Q05bi students had to suggest why the tap was opened after obtaining one set of results. Most students gained at least one mark with the best responses suggesting that the coloured liquid needs to be reset, to allow oxygen to enter the tube and to enable another set of readings to be taken.

(i) Suggest why the student opens the tap after obtaining one set of results.

(2)

to reset the experiment so the coloured liquid returns to the start by releasing the oxygen produced.

ResultsPlus
Examiner Comments

This response scores 1 mark for resetting the coloured liquid.

ResultsPlus
Examiner Tip

No credit for releasing oxygen produced as the seeds would absorb oxygen which would need to be replaced.

(i) Suggest why the student opens the tap after obtaining one set of results.

(2)

to let more oxygen in for the next result set of results, so that they start with the same volume of oxygen making it a fair test.

ResultsPlus
Examiner Comments

This response scores 2 marks for allowing oxygen in and for enabling a second set of results.

(i) Suggest why the student opens the tap after obtaining one set of results.

(2)

So that the coloured liquid moves back to the original position so that the experiment can be repeated using different variables.

ResultsPlus
Examiner Comments

This also scores 2 marks for resetting coloured liquid so that the experiment can be repeated.

Question 5 (b) (iii)

In item Q05biii students were asked to calculate the volume of oxygen in cm^3 absorbed when the coloured liquid moved 6mm. They were told the diameter of the tube and given the formula for volume.

(iii) The student measures the distance moved by the coloured liquid and converts this to volume of oxygen absorbed.

The volume of oxygen absorbed can be calculated using the formula

volume = $\pi \times \text{radius}^2 \times \text{distance}$

Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.

[diameter of tube = 1.0 mm]

(3)

~~$\pi \times 0.5^2 \times$~~

$\pi \times 0.05^2 \times 0.6 = 4.71 \times 10^{-3}$

volume = 4.71×10^{-3} cm^3

ResultsPlus
Examiner Comments

This scores all 3 marks.

(iii) The student measures the distance moved by the coloured liquid and converts this to volume of oxygen absorbed.

The volume of oxygen absorbed can be calculated using the formula

volume = $\pi \times \text{radius}^2 \times \text{distance}$

Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.

[diameter of tube = 1.0 mm]

(3)

$V = \pi r^2 \times d$

$V = \pi \times 0.5^2 \times 6.0$

$= 4.71 \text{ mm}$

$\div 10 = 0.471 \text{ cm}$

volume = 0.471 cm^3

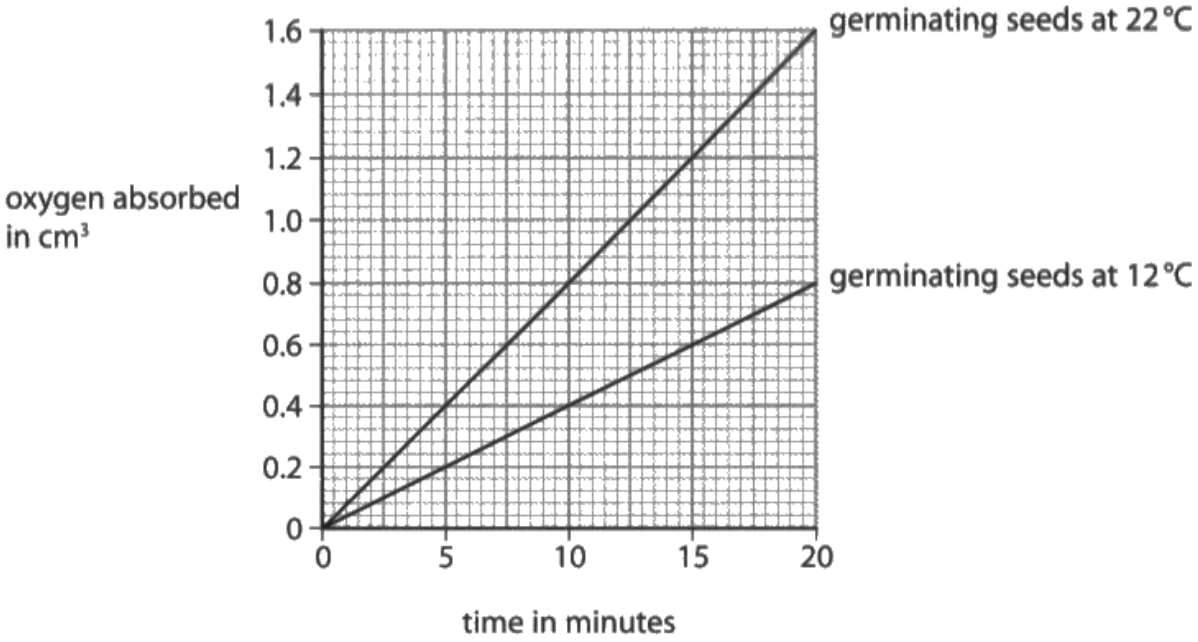
ResultsPlus
Examiner Comments

This scores 2 marks as although formula is correctly applied conversion to cm^3 is incorrect.

Question 5 (c) (i)

Item Q05ci required students to use information from a graph to calculate the percentage increase in the rate of oxygen absorption at 22°C compared to 12°C. Many responses scored full marks with some gaining 1 mark for correctly determining the rates but failing to calculate the percentage change.

(c) The graph shows the results of the student's investigation.



(i) Calculate the percentage increase in the rate of oxygen absorption at 22 °C compared to the rate of oxygen absorption at 12 °C.

Rate at 22°C = $\frac{1.6}{20}$ = 0.08 cm^3/min (2)

Rate at 12°C = $\frac{0.8}{20}$ = 0.04 cm^3/min

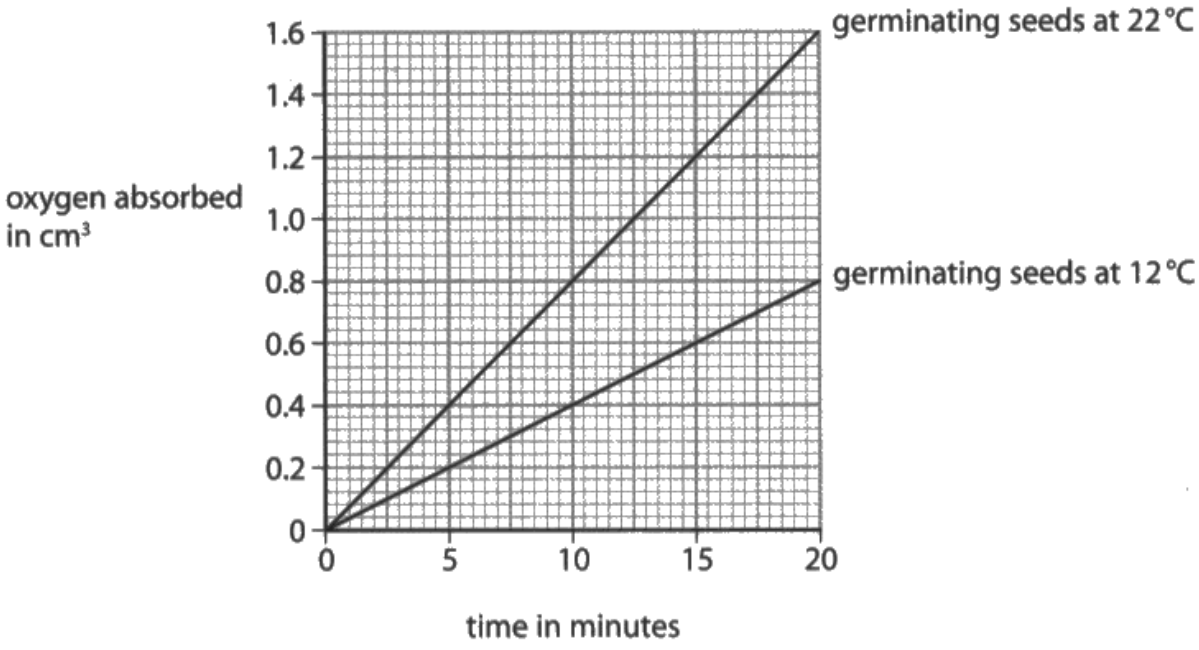
∴ % increase = $\frac{0.08 - 0.04}{0.04} \times 100$

percentage = 100%

This scores full marks.

The student could have saved themselves some work as each rate is over 20 minutes they did not need to divide each volume of oxygen by 20.

(c) The graph shows the results of the student's investigation.



(i) Calculate the percentage increase in the rate of oxygen absorption at 22 °C compared to the rate of oxygen absorption at 12 °C.

(2)

$\frac{1.6 - 0.8}{0.8} \times 100\%$

$= 100\%$

percentage = 100%

ResultsPlus
Examiner Comments

This response just compared the oxygen produced at 22°C with that at 12°C and also scores full marks.

Question 5 (c) (ii)

In Q05cii students were asked to explain why the rate of oxygen absorption was greater at 22°C than 12°C. Most scored at least 1 mark with many reponses scoring both marks for recognizing that respiration uses enzymes that work best at a higher temeparture due to increased kinetic energy.

(ii) Suggest why the rate of oxygen absorption is greater at 22 °C than at 12 °C.

(2)

This is because the temperature is higher (22°). The higher the temperature the faster the rate of oxygen absorption. This is because enzymes have more kinetic energy therefore more succesful collisions. Enzymes in the seed bind to the substrate more frequently increasing the rate of oxygen absorbed

ResultsPlus
Examiner Comments

This response scores both marks for writing that enzymes have more kinetic energy.

Question 6 (a) (i)

Most students could give the role of the sperm cell.

Question 6 (a) (ii)

In Q06aii most students could describe the structures in the head of the sperm as being the nucleus conatining chromosomes.

Question 6 (a) (iii)

In Q06aiii almost all responses correctly explained that the mid piece contains many mitochondria to release energy so that the sperm can use its tail to swim.

Question 6 (b) (i)

In Q06bi students had to calculate the number of damaged sperm cells in a sample. This required them calculating 24.8% of 5.8×10^7. Most were able to do this, although some had issues with standard form. We allowed 14 384 000.

Question 6 (b) (ii)

In Q06bii students were asked to discuss the scientist's claim that cigarette smoking could make male humans infertile. A whole range of scores were seen by the examiners. Most students scored at least 1 mark with only the very best responses gaining full marks. To gain full marks the responses needed to include arguments for the conclusion and against the conclusion. The arguments for are nicotine reduces normal cells and increases damaged cells. This leads to less chance of fertilisation. A comment that rats are similar to humans as both are mammals. The arguments against the conclusion might include that not all the sperm are damaged, the investigation was done on rats, not humans. The rats were not actually smoking or that there is no indication of the concentration of nicotine resulting from smoking. The experiment was not repeated or no indication of how many rats were used.

(ii) The scientist concludes that cigarette smoking could make male humans infertile.

Discuss this conclusion.

(5)

The table shows that ~~with lots~~ the largest ~~amount~~ concentration of nicotine '1.0 mg per kg' caused the greatest ~~number~~ percentage of damaged sperm cells, of 24.8% suggesting that if males were to smoke a large amount of cigarettes containing lots of nicotine, it will damage their sperm cells significantly, as opposed to having a small amount of nicotine. The damage to sperm cells will lead to infertility because they are not able to fuse with the egg cell to make a zygote, and if a large amount of sperm cells are damaged then this process of fertilisation will not happen, ~~called fertilisation~~.

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Examiner Comments

This student response scores 2 marks. One for nicotine damaged sperm and a sccond mark for the idea that this will prevent fusion of sperm with egg.

(ii) The scientist concludes that cigarette smoking could make male humans infertile.

Discuss this conclusion.

(5)

This conclusion may be valid because cigarettes smoke contain nicotine, and because rats and humans are both mammals their physiology and reproductive system is similar so we can assume that humans are affected the same way rats are. The more nicotine taken in, the higher the percentage of damaged sperm cells, showing that smoking can damage many sperm cells and thus the man would be infertile as the damaged sperms cannot fertilise the egg.

However, rats and humans are still different species and thus nicotine may have a different effect on the sperms. This conclusion is unreliable as it is not known how many rats were used and if he repeated the experiment. He did not control the conditions or check for damaged sperm cells before hand. The rat with 0 nicotone still had 6.4% of damaged sperm cells. It is unknown what percentage of damaged sperms mean that the male is infertile and the scientist only did 3 measurements and not more.

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Examiner Comments

This is an excellent reponse that scores full marks. The student mentions three arguments for the conclusion (marking point 3) that rats are similar to humans , (marking point 1) that nicotine damages sperm cells and (marking point 2) could lead to eggs not being fertilised. They also make three points gainst the conclusion. That rats and humans are different so nicotine may not affect them the same (marking point 5) , that we don't know how many rats were used (marking point 7) and that no some sperm are damaged without nicotine (marking point 4).

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Examiner Tip

This reponse is clear and easy to follow. It sets out the arguments for and against in different paragraphs.

Question 7 (a) (i)

In Q07ai students had to give two variables that the student controlled in their investigation into sugar content of fruit juices. Most responses could give two variables such as the volume of Benedict's solution used or the temperature of the water bath. Students may have lost marks for giving amount rather than volume.

Question 7 (a) (ii)

In Q07aii most students were able to put the fruit juices in the correct order of sugar concentration based on their knowldge of the Benedict's test.

Question 7 (a) (iii)

In Q07aiii students were asked to explain how they could use 1%, 5%, 10% and 20% sugar solutions to estimate the concentration of sugar in the fruit juices. The best responses described how 5cm^3 of each of the sugar concentration scould be added to 5cm ^{3} of the same Benedict's solution and placed in the water bath at 70 ^{o}C for three munutes. The resulting coloured solutions could then be used to compare with and match to the fruit juices. Some reponses gained two marks for writing to repeat the same method and compare colours.

(iii) The student is now given sugar solutions with concentrations of 1%, 5%, 10% and 20%.

Explain how the student could use these solutions to estimate the concentration of sugar in the four fruit juices.

(3)

Add 5cm^3 of each solution ~~of~~ to a seperate boiling tube. Add 5cm^3 of benedict's solution ~~to~~ to each concentration of sugar solution. place each boiling tube in a water bath at 70°c for three minutes. remove boiling tubes and record the colour for each concentration. compare the fruit juices colours with the sugar ~~solutions to estimate~~ solution colours to reach an estimate for concentration.

ResultsPlus
Examiner Comments

This response scores all three marks.

(iii) The student is now given sugar solutions with concentrations of 1%, 5%, 10% and 20%.

Explain how the student could use these solutions to estimate the concentration of sugar in the four fruit juices.

(3)

- Repeat the test ~~for~~ with these sugar solutions.
- The colour obtained from each of these sugar solutions can be used to compare with the results of the test with fruit juices.
- If ~~two~~ one of the sugar solution and one of the fruit juice have a similar colour change, this can be used to estimate the concentrations.

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Examiner Comments

This response scores two marks.

Question 7 (b) (i)

In Q07bi students were asked to suggest why fruit juices with high sugar content, that increase the number of bacteria in the mouth, may lead to increased tooth decay. Students did not need to know any of the details of tooth decay. They just needed to make link the link between sugar being a carbohyrdate and that carbohydrates provide a source of energy for respiration. Some students also suggested that bacterial anaerobic respiration produces lactic acid.

(b) Some fruit juices contain high concentrations of sugar.

These fruit juices increase the number of bacteria in the mouth.

This may lead to an increase in tooth decay.

(i) Suggest why high concentrations of sugar may increase tooth decay.

(2)

Increased concentration of glucose (sugar) leads to bacteria gaining more energy for mitosis from respiration as more glucose is available. This causes mitosis to occur at a greater rate thus increase the size of bacteria colonies in the mouth leading to a higher chance of tooth decay since increased number of bacteria feeding on tooth enamel.

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Examiner Comments

This response scores both marks for glucose being used and for energy released by respiration.

(b) Some fruit juices contain high concentrations of sugar.

These fruit juices increase the number of bacteria in the mouth.

This may lead to an increase in tooth decay.

(i) Suggest why high concentrations of sugar may increase tooth decay.

(2)

Sugas such as glucose/fructose are used for aerobic/anaerobic respiration of bacteria, as they oxidise the glucose to produce energy necessary for their survival. As there are a lot of glucose to sustain bacteria, they will divide and reproduce and produce more bacteria and can start digesting the teeth.

ResultsPlus
Examiner Comments

This also scores both marks.

(b) Some fruit juices contain high concentrations of sugar.

These fruit juices increase the number of bacteria in the mouth.

This may lead to an increase in tooth decay.

(i) Suggest why high concentrations of sugar may increase tooth decay.

(2)

bacteria accumulate to feed on sugary solutions to respire anaerobically producing lactic acid dissolving the enamel of the tooth causing infection to the tooth

ResultsPlus
Examiner Comments

This response also scores 2 marks for respiration of glucose to produce (lactic) acid.

Question 7 (b) (ii)

This item Q07bii asked students to explain another health risk to children who drink fruit juice with high sugar concentrations. Almost all responses gained credit with suitable examples being obesity caused by too high energy from high sugar drinks or heart disease due to excess sugars being converted to fat that may build up in arteries. Some students wrote about type 2 diabetes being caused by increased blood sugar levels.

Question 8 (a) (i)

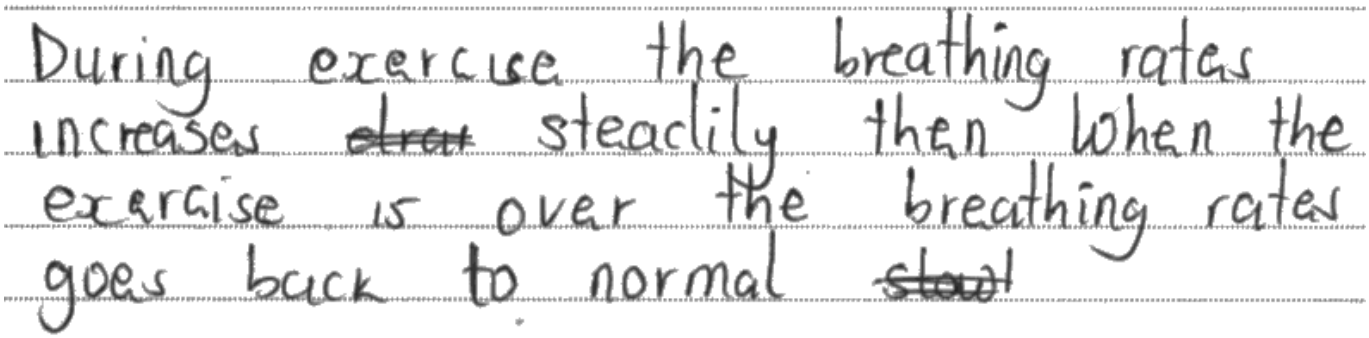
Question 8 gave students data from an experiment that measured the breathing rate of two people during and imediately after exercise. In Q08ai students had to plot a line graph of the reults for both persons. Almost all responses scored marks with most scoring the full 6 marks. The most common reason for errors was a poor choice of scale leading to plotting errors.

Question 8 (a) (ii)

In Q08aii students were asked to explain the change in breathing rate during exercise. Some responses described the changes whilst others explained the changes after excerise. Most responses scored either 1 mark for describing but not explaining the changes or 3 marks for a full explanation of the changes in rate during exercise. The best responses explained that the breathing rate increased during exercise to provide more oxygen to the muscles for respiration. Other creditworthy responses included more carbon dixide to be removed from the lungs.

(ii) Explain the change in breathing rate during exercise.

(3)



ResultsPlus
Examiner Comments

This response scores 1 mark for describing that the breathing rate increase during exercise. It offers no explanation.

(ii) Explain the change in breathing rate during exercise.

(3)

Breathing rate increases during exercise because the muscles are respiring quicker. This means that more O_2 is needed in the blood to diffuse into the muscle cells and there is more CO_2 to remove from muscle cells. Then, breathing rate drops after finishing exercise and returns to its original speed.

ResultsPlus
Examiner Comments

This response scores 3 marks for explaining an increase in breathing rate as muscles respire quicker and need more oxygen.

Question 8 (a) (iii)

Part Q08aiii asked students to explain why the breathing rate remains high for five minutes after exercise has finished. Many responses did not make the link to anaerobic respiration. Those who did scored both marks for an explanation linking anaerobic respiration to a build up of lactic acid. Some students wrote about oxygen debt or EPOC and this was also credited.

(iii) Explain why the breathing rates of persons P and Q remain high for five minutes after they have finished exercising.

(2)

Because during exercise sometimes anaerobic respiration occurs, due to less oxygen being present. This forms lactic acid and causes an oxygen debt. So the ~~person~~ person continues to breath heavily to repay this ~~oxy~~ oxygen debt.

ResultsPlus
Examiner Comments

This response scores both marks but makes all three points from the mark scheme.

(iii) Explain why the breathing rates of persons P and Q remain high for five minutes after they have finished exercising.

(2)

The body still needs to remove the lactic acid produced in anaerobic respiration So breathing rate stays the same to remove the waste ~~products~~ products

ResultsPlus
Examiner Comments

This response also gains two marks for reference to lactic acid formed by anaerobic reapiration.

Question 8 (b)

Item Q08b asked students to comment on the validity of the conclusion that person P is much fitter than person Q. Most responses gained some marks but only a minority gained all 4 marks. Those that did score full marks often wrote about why P could be described as fitter. Such as he has a lower resting breathing rate and that P recovers faster as their rate drops faster after exercise. The points that suggested that P may not be fitter included that both persons return to resting breathing rate by the same time and that P had a higher breathing rate during exercise. Other valid points were observations about the design of the investigation. These included no data on mass, age, sex or lung capacity of the persons. No information about their health such as smoking or asthma. No information about the nature or intensity of the exercise and that the test was only one measure of fitness and was not repeated. Some students wrote about changes in heart rate rather than breathing rate.

(b) The time taken to recover from exercise is often a good measure of fitness.

The scientist concluded that person P is much fitter than person Q.

Comment on the validity of this conclusion.

(4)

From the graph peson condition P does recover quicker quicker, however this is not necesarily ~~valid~~ valid. For example Peson Q's peak breathing rate is lower than Peson P's, and so their body may be more oxygen efficient, but also peson P may have exercising at a lower intensity than Person Q, and so had a smaller energy deficit and so the breathing rate did not need to remain as high for as long. In addition, Peson Q could have been much older then Person P, and so naturally had less muscle mass

(Total for Question 8 = 15 marks)

ResultsPlus
Examiner Comments

This response scores 4 marks. They note that Person P recovers faster (marking point 2) but Person Q's peak breathing rate is lower than P (marking point 4). They also make reference to intensity of exercise (marking point 7) and differences in age (marking point 5).

Question 9 (a)

Question 9 was about pollution. In Q09a students had to describe the effects of carbon monoxide poisoning on humans. Almost all responses scored some marks with very many gaining full credit. The best responses described how carbon monoxide binds with haemoglobin preventing transport of oxygen and thus stopping respiration and leading to death. A number of responses described carbon monoxide as a silent killer but did not describe any more effcts than that.

9 Pollution can occur in the atmosphere and in rivers.

(a) Carbon monoxide can pollute the atmosphere.

Describe the effects of carbon monoxide pollution on humans.

(3)

Carbon monoxide is poisonous as it can irreversibly bind to haemoglobin in the blood, preventing it from binding to oxygen. This reduces the oxygen carrying capacity of the blood and can lead to death.

ResultsPlus
Examiner Comments

This response scores three marks for describing how carbon monoxide binds to heamoglobin preventing oxygen carriage and thus leading to death.

9 Pollution can occur in the atmosphere and in rivers.

(a) Carbon monoxide can pollute the atmosphere.

Describe the effects of carbon monoxide pollution on humans.

(3)

- irreversibly binds with haemoglobin in red blood cells
- ∴ prevents sufficient oxygen being carried to cells in body
- ∴ prevents (aerobic) respiration, not enough ATP produced
- ∴ anaerobic respiration occurs
- ∴ build up of lactic acid

ResultsPlus
Examiner Comments

This response also scores all three marks for binding to haemoglobin, prevents oxygen transport and prevents respiration.

Question 9 (b)

Question Q09b asked students to explain the biological consequences of sewage pollution on a river ecosystem. Almost all responses scored marks with the most common score being full marks. This gave students the opportunity to write a prose answer to demonstrate their knowledge and understanding of the specification content. Some responses confused sewage with fertiliser. The best answers included most of the following points. Pathogenic bacteria can lead to disease. Nitrogenous waste or urea or nitrate content can lead to eutrophication. This causes light to be blocked preventing photosynthesis and leading to death of plants. Decomposers such as bacteria further reduce the oxygen content. This oxygen reduction prevents respiration in other aquatic organisms leading to their death and a reduction in biodiveristy.

(b) Water pollution can occur if sewage enters a river.

Explain the biological consequences of sewage pollution on a river ecosystem.

(6)

pollution
Sewage ^ causes eutrophication to occur in rivers. Sewage in the river becomes decomposed by bacteria; ~~bact~~ The more sewage there is in a river, the more bacteria ~~their~~ there will be. The bacteria uses oxygen to respirate and releases CO_2. The algae and plants convert CO_2 into oxygen by photosynthesis ^, the more ~~their~~ there are bacteria, the more plants and algae. If there is too much algae, it will cover surface of river and won't let sunlight to come throught ∴ the plants and algae inside the river won't be able to photosynthesise as much ∴ won't produce enough oxygen, most of ~~out~~ the oxygen produced will be ^ used up by bacteria ∴ the fish in the river won't have enought oxygen to respire and will die out, leaving more matter to ~~#~~ be decomposed by bacteria.

ResultsPlus
Examiner Comments

This response scores 6 marks. Marking point 4: eutrophication, marking point 3: decomposition, marking point 7: less oxygen , marking point 6: respiration , marking point 5: prevents photosynthesis and marking point 8: death of organisms.

(b) Water pollution can occur if sewage enters a river.

Explain the biological consequences of sewage pollution on a river ecosystem.

(6)

- Sewage pollution is high in growth minerals for plants like nitrates
- This causes an algal bloom, which in turn blocks out the light from the sun to the riverbed
- Because of this plants on the riverbed receive less sunlight therefore cannot carryout photosynthesis so stop producing oxygen
- Respiration The plants can only respire which produces carbon dioxide hence increasing carbon dioxide concentration in the water
- More carbon dioxide and less oxygen means fish living in river have less oxygen for respiration, as carbon dioxide concentrations increase causing fish to die due to lack of oxygen
- Dead fish attract microbes who respire increasing carbon dioxide levels in water even more until they die as well meaning the waterway becomes uninhabitable for most/all creatures

ResultsPlus
Examiner Comments

This response also scores 6 marks. For marking point 2: nitrates, marking point 4: algal bloom, marking point 5 no light prevents photosynthesis, marking point 7: less oxygen, marking point 6: for respiration and marking point 8: death of organisms.

Question 10 (b)

Question Q10b asked students to suggest why some biologists do not consider auxin to be a hormone. The best reponses suggested that auxin could not be a hormone as it is not produced in a glands and is not transported in the plasma. Other responses described auxin's different effects on roots and shoots.

(b) Plants produce plant growth substances such as auxin.

Suggest why some biologists do not consider auxin to be a hormone.

(2)

Because auxin is not secreated by gland ~~and wont~~ and it is not transmitted along the blood streum.

ResultsPlus
Examiner Comments

This scores 2 marks for not produced by a glands and not carried in blood stream.

(b) Plants produce plant growth substances such as auxin.

Suggest why some biologists do not consider auxin to be a hormone.

(2)

. Auxin is sometimes not treated as a hormone as it is not produced by endocrine glands or carried in the bloodstream like animal hormones - so it does not share all the typical features of a hormone.

ResultsPlus
Examiner Comments

This also scores 2 marks.

Question 10 (c)

The final question on the paper was the experiment design item which will be familiar to students and teachers from the legacy specification. As ever those students who had practiced such items had no difficulty gaining high marks on this item. Many reponses gined 5 or 6 marks and many used the CORMS prompt to help guide their answers.

C O R M M S

(c) Plant growth substances stimulate root growth from a cut stem.

Describe an investigation to find the best concentration of plant growth substance to stimulate root growth.

You should include experimental details in your answer and write in full sentences.

(6)

My independent variable will be the amount/volume of concentration of plant growth substance. My dependent variable will be the ~~length~~ length of roots, their root growth. I will have three plants and I will measure the lengths of roots after a week. Then I will ~~then~~ add 3 different level concentrations of plant growth substance to the 3 different plants. I will ~~then~~ add 25% concentration to Plant A. 50% concentration to plant B, and ~~75%~~ 75% concentration to plant C. Before this I will make sure the plants are the same species. After 1-2 weeks I will measure the length of the plant roots with a ruler and write them down in a table, working out the increase in length. I will do this every 2 weeks for 3 months, working on calculating an average in the table. I will also measure the amount of water being given to the plants using a measuring cylinder putting 50ml of water in each plant. My hypothesis is the plant with the largest amount of plant growth substance concentration will be have the longest length of roots. My (control variable) will be the amount/volume of water given to each plant. I will keep the ~~light~~ distance from the each plant and the light the same e.g 1 metre. I will also use the same type of soil. As well as the same light source.

ResultsPlus
Examiner Comments

This response gained all 6 marks. It scores C, O, M1, M2, S2, and S1. It does not score R as it uses the same three plants but measured them over many 2 week periods.

(c) Plant growth substances stimulate root growth from a cut stem.

Describe an investigation to find the best concentration of plant growth substance to stimulate root growth.

You should include experimental details in your answer and write in full sentences.

(6)

C✓ O✓ R M✓ M✓ S✓ S✓

Have five different pots filled with soil which each have a different concentration of growth substance. Concentrations should differ in regular intervals (eg. 0%, 5%, 10% etc.). The ~~solution~~ substance may be a mixture of mineral ions such as magnesium and phosphates. Plant five plants of the same age, size, mass and species into the different pots. After a few months, measure the height the plants have grown in cm using a ruler and record the results in a table. Repeat the ~~e~~ experiment several times ~~to~~ and obtain averages to make the results more reliable. Make sure the pH, volume and ~~minerals~~ of the soil is the same in each pot and keep the water volume, temperate and light intensity constant and the same for every plant.

ResultsPlus
Examiner Comments

This response scores 6 marks for C, O, M2, R, S2 and S1. It does not score M1 as it measures the height of the plant not the length of the roots but it still gains 6 marks.

Paper Summary

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

- ensure that you read the question carefully and include sufficient points to gain full credit
- in discuss items include points for and against and make sure that you include as many points as there are marks available
- in evaluate items include points for and against and make sure that you include as many points as there are marks available reach a conclusion that reflects the points you have made
- make sure you have practised calculations and understand and know how to apply any formulae
- write in detail and use correct and precise biological terminology
- make sure you have expressed your answer in the correct units and ensure you know the relationship between linear, squared and cubed units such as mm^3 and dm^3
- remember to use the knowledge and skills acquired during practical work to help in questions about unfamiliar or novel practical procedures
- questions require students to make links between different parts of the specification, so when considering an question remember to use all the knowledge and understanding you have gained throughout the specification
- in experimental design questions always be able to name the independent variable and give the range of values, the dependent variable , and how you are going to measure it and the control variables and explain how these will be controlled
- always read through your responses and ensure that what you have written makes sense and answers the question fully