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Examiners' Report
January 2013

GCE Biology 6BI01 01

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January 2013

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Introduction

On the whole it appears that candidates were well prepared with knowledge of a wide range of the specification content for this paper. The majority of candidates did very well with recall questions, often describing processes in the specification with a high degree of detail. A very wide range of marks was seen and a pleasing number of candidates managed to score over 70 of the 80 marks available.

Very few questions were left blank and there was no evidence in the majority of papers that candidates had insufficient time to complete the paper.

Questions that asked candidates to apply their knowledge and understanding to a specific context, were not as well answered by the majority of candidates. Unfortunately, there were also too many examples of candidates not reading the questions carefully. As a result many candidates lost marks by answering the question in their head rather than the question in front of them, often including a significant level of irrelevant detail. For example, writing extensively about genetic screening of human foetuses in a question about gene therapy in sheep. Other candidates ignored the context of the question and therefore lost marks by not being specific in their responses.

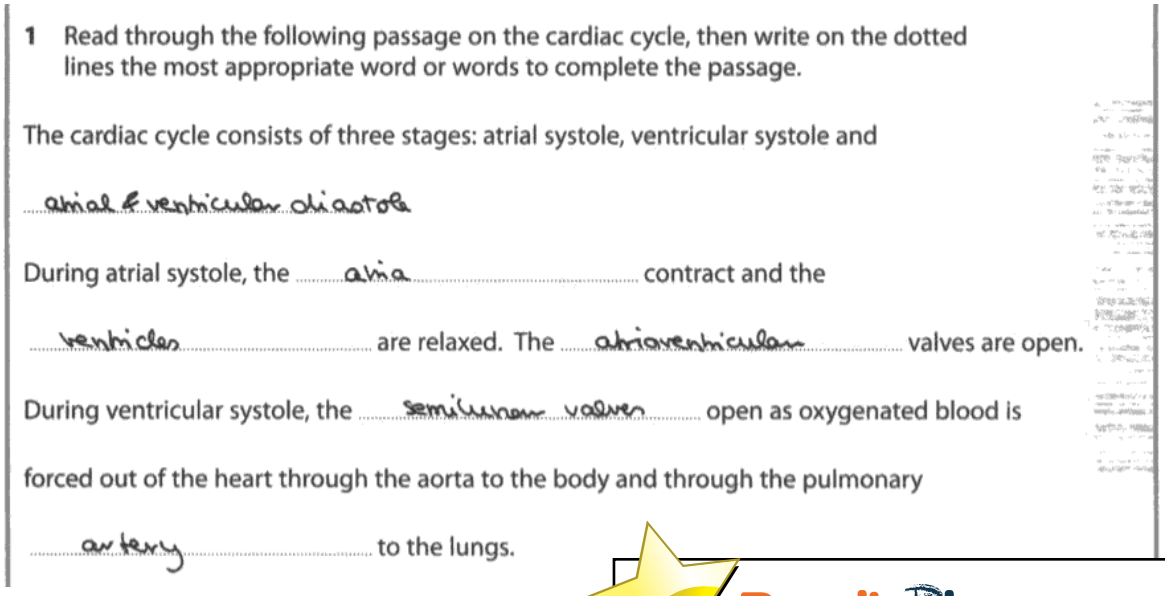
It was disappointing to see that some misconceptions still cause many candidates problems. For example, many candidates still think that the purpose of gene therapy is to remove and replace faulty genes.

It was very pleasing to see that candidates made fewer references to 'amount' than in previous papers and there were significantly fewer candidates who lost marks as a result of errors with their quality of written communication (QWC) in the questions that were assessed for QWC.

It was also pleasing to see large numbers of excellent responses; often being concise, clear and comprehensive, showing a good use of technical terms and biological names.

Question 1

This fill in the blanks with the most appropriate word question was very well answered by the majority of candidates with over 70% gaining all six marks available. The most common mistakes were mixing up the names of the two sets of valves or just referring to atrial diastole at the start when it was important for the ventricle to also be in diastole. A couple of candidates used the archaic term "auricles" instead of atria, although given credit the use of such terms should be avoided to help avoid confusion for candidates.



1 Read through the following passage on the cardiac cycle, then write on the dotted lines the most appropriate word or words to complete the passage.

The cardiac cycle consists of three stages: atrial systole, ventricular systole and

atrial & ventricular diastole

During atrial systole, the atria contract and the

ventricles are relaxed. The atrioventricular valves are open.

During ventricular systole, the semilunar valves open as oxygenated blood is

forced out of the heart through the aorta to the body and through the pulmonary

artery to the lungs.

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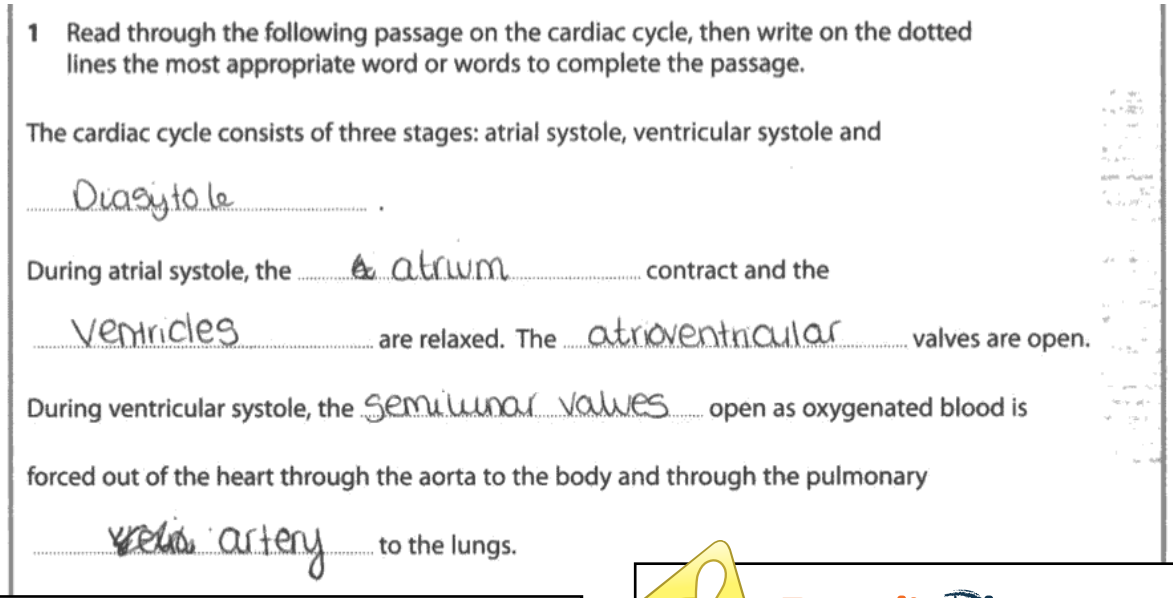
Examiner Comments

This response is typical of the vast majority of responses that gained all six marks available.



1 Read through the following passage on the cardiac cycle, then write on the dotted lines the most appropriate word or words to complete the passage.

The cardiac cycle consists of three stages: atrial systole, ventricular systole and

Diasytole .

During atrial systole, the & atrium contract and the

Ventricles are relaxed. The atroventricular valves are open.

During ventricular systole, the semilunar valves open as oxygenated blood is

forced out of the heart through the aorta to the body and through the pulmonary

Vena artery to the lungs.

ResultsPlus
Examiner Comments

This response gained five of the six marks available. It did not gain the first mark for "diasytole" as this spelling mistake has too much overlap with systole and is not a phonetic spelling of diastole.

ResultsPlus
Examiner Tip

Check spelling of technical terms carefully and if you can't remember how to spell them check them phonetically in your head to make sure the word can't be confused with something else.

1 Read through the following passage on the cardiac cycle, then write on the dotted lines the most appropriate word or words to complete the passage.

The cardiac cycle consists of three stages: atrial systole, ventricular systole and

atrial diastoyle .

During atrial systole, the atria contract and the

ventricles are relaxed. The atrioventricular valves are open.

During ventricular systole, the semi lunar valves open as oxygenated blood is

forced out of the heart through the aorta to the body and through the pulmonary

artery to the lungs.

ResultsPlus
Examiner Comments

This response gains five of the six marks available. Atrial diastole is not sufficient for the first blank because the atria start diastole while the ventricles are contracting.

1 Read through the following passage on the cardiac cycle, then write on the dotted lines the most appropriate word or words to complete the passage.

The cardiac cycle consists of three stages: atrial systole, ventricular systole and

Cardiac diastole .

During atrial systole, the atria contract and the

ventricles are relaxed. The Semi-lunar valves are open.

During ventricular systole, the ~~ventricles atrioventricular valves~~ Semi-lunar valve open as oxygenated blood is

atrioventricular valves

forced out of the heart through the aorta to the body and through the pulmonary

artery to the lungs.

ResultsPlus
Examiner Comments

This response scored four of the six marks available. Cardiac diastole was an acceptable alternative for diastole for the first blank, but this candidate has got the two pairs of valves the wrong way round.

Question 2 (a)

There were a good number of excellent responses from candidates describing the process in detail with correct reference to the specific enzymes and bonds involved. The majority of candidates recognised the need for the DNA double helix to be unwound and that complementary base pairing is involved in the formation of an mRNA molecule.

A significant number of candidates describe the mRNA molecule lining up by complementary base pairing as though it has already been made before transcription starts, or that nucleotides pair up with base pairs. Some candidates are confused about the enzymes involved and many referred to DNA polymerase. Other candidates named peptide bonds joining the nucleotides or strands together.

Only the better accounts clearly recognised that phosphodiester bonds are made via condensation reactions.

Few candidates recognised that mRNA needs to split from the DNA at the end of transcription, although many went onto describe the mRNA leaving the nucleus and the process of protein synthesis which was not relevant to the question asked.

This response gains all four marks available.

2 Messenger RNA (mRNA) and transfer RNA (tRNA) are important nucleic acids involved in the process of protein synthesis.

(a) Describe how a molecule of mRNA is made during transcription.

(4)

- DNA molecule "unzips" as hydrogen bonds between strands break.
- ~~complementary~~ Free nucleotides line up along one strand of DNA - the antisense strand.
- The nucleotides follow the complementary base pair pattern ~~A T C G~~
- RNA Polymerase, an enzyme, bonds the nucleotides together, forming phosphodiester bonds in a condensation reaction forming the mRNA strand.

ResultsPlus
Examiner Comments

This response gains credit for:
- the DNA strands separating;
- free nucleotides lining up against the antisense DNA strand;
- complementary base pairing;
- the reference to the named enzyme RNA polymerase;
- phosphodiester bonds forming;
- by condensation reactions.

2 Messenger RNA (mRNA) and transfer RNA (tRNA) are important nucleic acids involved in the process of protein synthesis.

(a) Describe how a molecule of mRNA is made during transcription.

(4)

Transcription takes place in the nucleus. A ~~g~~ strand of DNA from the gene is unwound from its double helix shape. The bases are exposed ~~and~~ as the strand becomes separated from it's other half. These bases are then free to join with any ~~oth~~ free floating bases in the nucleus.

ResultsPlus
Examiner Comments

This response just gains one of the four marks available for the DNA unwinding. The rest is not specific enough for credit.

ResultsPlus
Examiner Tip

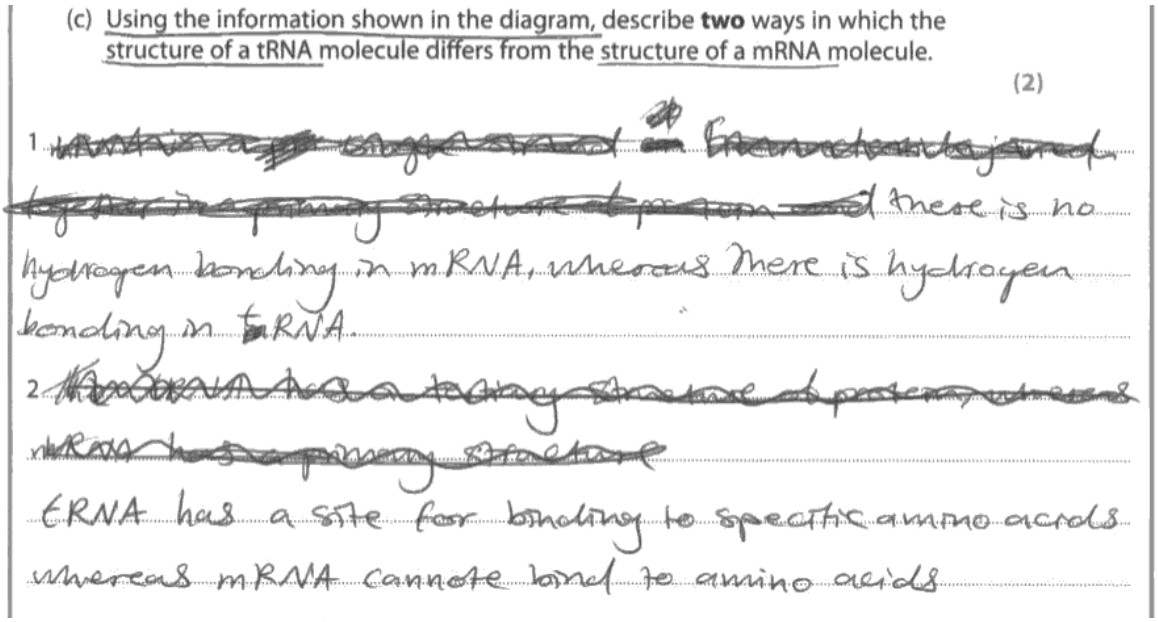
When asked to describe a process worth multiple marks aim to make at least as many clear separate points to the number of marks available.

Question 2 (c)

Q2b) The majority of candidates recognised that it was hydrogen bonds holding the shape of the tRNA molecule together, although a significant number got the amino acid binding site and anticodon confused, together with transcription and translation.

Q2c) A number of candidates did not read the question properly and described differences in function rather than structure. Many said that tRNA carried amino acids or that there was an amino acid on the tRNA, without reference to the binding site. Some answers referred to tRNA being double stranded rather than having double stranded sections and a number of candidates referred to tRNA being branched. However, there were some really good, clear answers and the better candidates tended to score more points than needed for a maximum mark of 2. Few candidates recognised that tRNA has a fixed size compared to the variable size of mRNA.

A few candidates thought that a tRNA molecule has anticodon**s** and several candidates thought that tRNA only has three bases in its structure.



(c) Using the information shown in the diagram, describe **two** ways in which the structure of a tRNA molecule differs from the structure of a mRNA molecule.

(2)

1 ... there is no hydrogen bonding in mRNA, whereas there is hydrogen bonding in tRNA.

2 ... tRNA has a site for bonding to specific amino acids whereas mRNA cannot bond to amino acids

ResultsPlus
Examiner Comments

This is a typical example of a response that gained both marks available for identifying clear differences between tRNA and mRNA.

(c) Using the information shown in the diagram, describe **two** ways in which the structure of a tRNA molecule differs from the structure of a mRNA molecule.

(2)

1 tRNA consists of an amino acid as well as three bases, whereas mRNA is a small strand of bases, sugars and phosphates.

2 tRNA consists of only three bases, which is an anti-codon, and mRNA consists of multiple codons.

ResultsPlus
Examiner Comments

This is an example of a response that did not gain any marks. tRNA does not consist of an amino acid and only three bases. Candidates are asked to use the information on the diagram and tRNA may be a fixed size but it is certainly bigger than just 3 bases.

ResultsPlus
Examiner Tip

When asked to use the information shown in the diagram make sure you look at the diagram carefully and check that your answer makes sense by comparing it back to the diagram.

Question 3 (a)

This question scored very highly with over 70% of candidates gaining all three marks available. Virtually all of the candidates knew that the main part of the membrane was made up from phospholipids and due to their chemical properties there had to be a bi-layer –however, a significant number of candidates didn't explain about the molecules' orientations, expecting credit marks for stating that the phospholipid was hydrophilic at the head end and hydrophobic on the tails. Most candidates recognised the presence of protein with many providing further clarification e.g. with reference to carrier/channel/intrinsic protein or glycoprotein. A significant number of candidates also recognised the presence of cholesterol in the membrane structure.

Quite a few candidates aided the clarity of their answers through the use of clear annotated diagrams.

Unfortunately, a few candidates described function rather than structure and therefore did not score any/many marks.

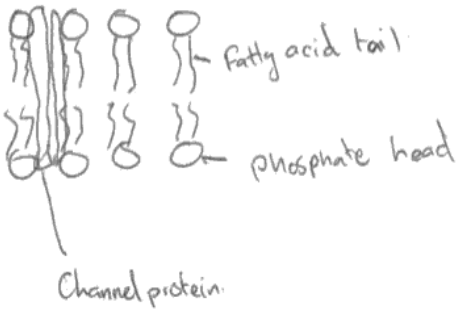
This response scores all three marks available.

3 Molecules are transported across the cell membrane in a number of different ways.

(a) Describe the structure of a cell membrane.

(3)

A Phospholipid bilayer. This consists of a phosphate head which is hydrophillic and two fatty acid tails which are hydrophobic. They align with the heads facing out and tails facing together. (as shown) ~~This creates~~ ~~them~~ With channel proteins and other types of proteins, to allow larger and or polar molecules through



ResultsPlus
Examiner Comments

This response gains credit for:

- phospholipids;
- the orientation of the phospholipids;
- channel proteins.

These points are also supported with a helpful labelled diagram that shows the orientation of the phospholipids and the position and nature of the channel protein and would have been able to gain the marks itself.

ResultsPlus
Examiner Tip

Annotated diagrams are often an effective way to clarify points and gain the marks available, particularly when describing structures.

3 Molecules are transported across the cell membrane in a number of different ways.

(a) Describe the structure of a cell membrane.

(3)

The structure of the cell membrane is thin and permeable to let certain substances in and out of a cell. They have channels which only allow certain substances in and out. ~~They are thin~~ Cell membranes ~~have~~ are made of phospholipids. They have hydrophilic heads and ~~non polar~~, hydrophobic tails.

ResultsPlus
Examiner Comments

This response gains just one mark for recognising that phospholipids are an important part of a membrane. The statements about the heads and tails is not enough for further credit as it has not been used to describe the orientation of the molecules in the membrane. Describing the function of the membrane is not relevant to the question asked.

ResultsPlus
Examiner Tip

Remember that cell membranes are not only made from phospholipids and if you are describing the structure of a membrane describe the orientation of the phospholipids in the bilayer.

3 Molecules are transported across the cell membrane in a number of different ways.

(a) Describe the structure of a cell membrane.

(3)

The cell membrane walls are thin so diffusion can take pace eficiently. They are partially permeable so osmosis can take place.

ResultsPlus
Examiner Comments

This is an example of a response that gained no marks because the candidate has not described the structure of the membrane as asked.

ResultsPlus
Examiner Tip

When asked to describe the structure of something focus on the components and arrangement of the molecules in the structure and do not be distracted by the function of the membrane.

Question 3 (b) (i)

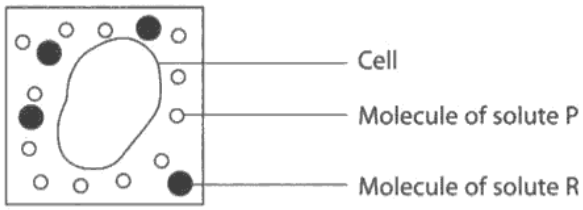
This question achieved the full range of marks. The majority of candidates recognised that solute P moved into the cell by diffusion down a concentration gradient for three marks, with many also recognising that it reaches equilibrium. However, a significant number of candidates confused osmosis and diffusion, either referring to solute P as water or stating that the particles diffused by osmosis. Others described the movement being "along a concentration gradient" that is not clear enough for credit. A number of candidates described the pattern of molecules every 10 minutes rather than stating the points clearly.

Rarely did candidates appreciate that the membrane was impermeable to solute R but often referred to the "cell not needing R" or "R was too big to fit through".

This response gains all five marks available.

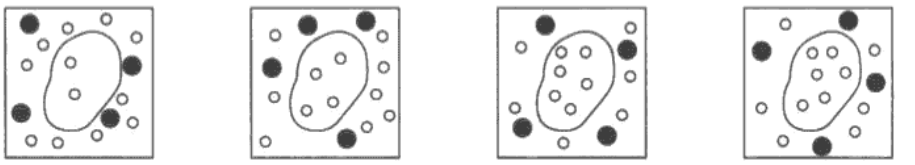
(b) Cells were placed in a solution containing two different solutes, solute P and solute R.

The diagram below represents the concentration of the two solutes outside one of the cells, when this cell was placed in the solution.



The cells were left in the solution for 50 minutes.

The diagrams below represent the concentrations of the two solutes, inside and outside the cell after 10, 20, 30 and 40 minutes in the solution.



After 10 minutes | After 20 minutes | After 30 minutes | After 40 minutes

(i) Using the information in the diagrams, describe the changes that have taken place in the concentrations of solute P and solute R, in the 40 minute period.

Suggest an explanation for these changes.

(5)

Solute P began with six molecules outside the cell and zero inside. After 10 minutes two molecules had entered. After 20 minutes this had doubled to 4 molecules entering. By 30 minutes half of the molecule P entred the cell, 6 molecules, this remained the same after 40 minutes although they had moved around.

This may have happened due to diffusion. Diffusion is the passive movement of particles from an area of high concentration to an area of low concentration. At the start Molecule P was concentrated outside the cell, with none inside so they diffused in. This continued until concentration was even, after 30minutes, then stopped. This was because net diffusion would remain unchanged. Solute R's molecules do not enter the cell. This may be because they are too large and endocytosis is not taking place.

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Examiner Comments

The direction and explanation for the movement of solute P is described for four marks and they correctly state that solute R does not enter the cell.

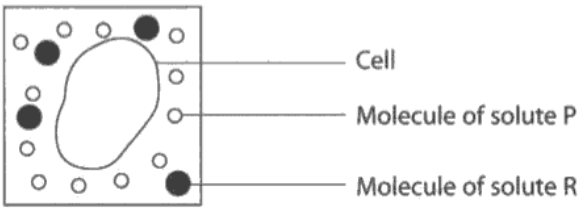
ResultsPlus
Examiner Tip

The first paragraph of this response is not very useful. Do not waste time by listing the numbers of molecules (data points) for every measurement. Most credit comes from identifying the correct trends, which in this case are successfully covered in the second and subsequent paragraphs.

This response scores four of the five marks available.

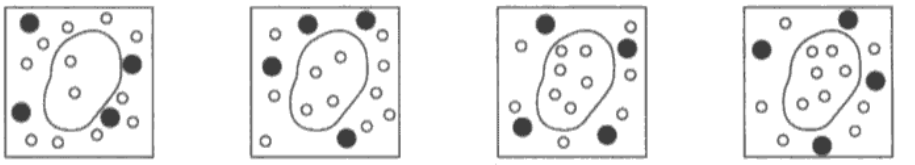
(b) Cells were placed in a solution containing two different solutes, solute P and solute R.

The diagram below represents the concentration of the two solutes outside one of the cells, when this cell was placed in the solution.



The cells were left in the solution for 50 minutes.

The diagrams below represent the concentrations of the two solutes, inside and outside the cell after 10, 20, 30 and 40 minutes in the solution.



After 10 minutes | After 20 minutes | After 30 minutes | After 40 minutes

(i) Using the information in the diagrams, describe the changes that have taken place in the concentrations of solute P and solute R, in the 40 minute period.

Suggest an explanation for these changes.

(5)

up to 20 mins
~~As the length of time increases~~ the concentration of solute p increase inside the cell and decreases outside the cell this is because diffusion is taking place ~~through the cell~~ and the solute goes from a high concentration (outside the cell) to a low concentration (inside the cell). At 30 mins and 40 mins the concentration stays the same inside and outside the cell because it has reached an

equilibrium so there is no concentration gradient for diffusion to happen. The concentration of solute R stays the same all the time because the particles are too large for diffusion to take place

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Examiner Comments

This response gives a good description and explanation of the changes that take place with solute P and therefore gains the maximum marks for that part of the question. However, they have not stated that R does not go into the cell or that the membrane is impermeable to R so fail to gain the full 5 marks.

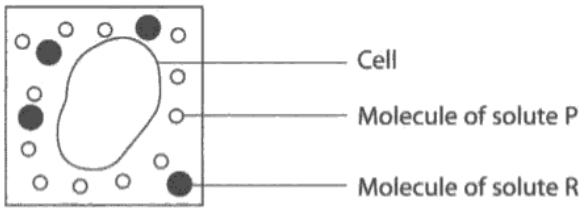
ResultsPlus
Examiner Tip

The concentration remains the same is not clear enough for an alternative to recognising that solute R does not enter the cell when comparing P and R. When answering questions aim to make positive clear statements.

This response gains two of the five marks available.

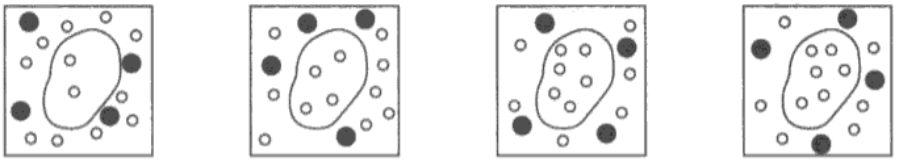
(b) Cells were placed in a solution containing two different solutes, solute P and solute R.

The diagram below represents the concentration of the two solutes outside one of the cells, when this cell was placed in the solution.



The cells were left in the solution for 50 minutes.

The diagrams below represent the concentrations of the two solutes, inside and outside the cell after 10, 20, 30 and 40 minutes in the solution.



After 10 minutes | After 20 minutes | After 30 minutes | After 40 minutes

(i) Using the information in the diagrams, describe the changes that have taken place in the concentrations of solute P and solute R, in the 40 minute period.

Suggest an explanation for these changes.

(5)

In the 40 minute period molecule of R is evenly spaced out on a outside the cell and as are the molecules P because there are 6 molecules P inside the cell and 6 molecules of P on the outside of the cell. A reason for this would be osmosis which is the net movement of water A solute from an area of high concentration to one area of low concentration through a partially permeable membrane. Osmosis passes

occurs until equilibrium has been reached by the solute molecules, which is why there is an equal ~~ass~~ amount of solute molecules both inside and out of cell.

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Examiner Comments

The reference to osmosis in this response is clearly incorrect, but it did not stop them gaining credit for recognising that the solute moved down a concentration gradient until equilibrium was reached.

ResultsPlus
Examiner Tip

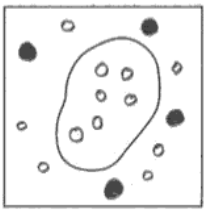
Don't forget that osmosis is the movement of water not solutes.

Question 3 (b) (ii)

The vast majority of candidates gained the mark for this question. There were a small number of careless answers missing a circle and also some with 2 larger black circles inside the cell and 2 outside. Any crossing out was generally clearly done, allowing access to the mark.

(ii) Complete the diagram below, to show the concentration of solute P and solute R inside and outside the cell, after 50 minutes.

(1)

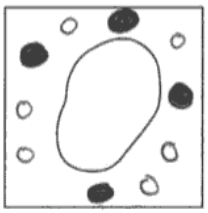


ResultsPlus
Examiner Comments

This is an example of the correct response that gained the mark.

(ii) Complete the diagram below, to show the concentration of solute P and solute R inside and outside the cell, after 50 minutes.

(1)



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Examiner Comments

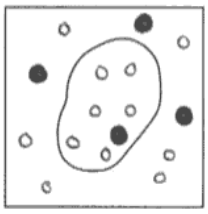
This response gains no marks because solute P has disappeared from inside the cell.

ResultsPlus
Examiner Tip

The question asks candidates to show the concentration both inside and outside the cell so do not just partially answer the question asked.

(ii) Complete the diagram below, to show the concentration of solute P and solute R inside and outside the cell, after 50 minutes.

(1)



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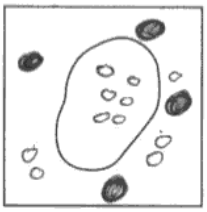
Examiner Comments

This response did not gain the mark because a molecule of R has slipped into the cell.

(ii) Complete the diagram below, to show the concentration of solute P and solute R inside and outside the cell, after 50 minutes.

(1)



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Examiner Comments

This response did not gain the mark because there are only five molecules of solute P drawn outside the cell.

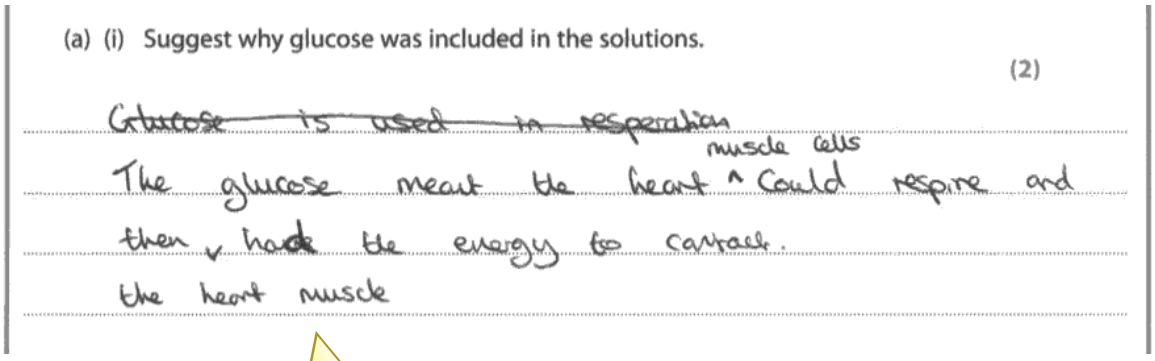
Question 4 (a) (i)

There were a lot of disappointing responses to this question suggesting that many candidates did not think about the question asked in the context of the investigation given.

Many candidates failed to appreciate that glucose was needed for respiration and that it released energy in the form of ATP. Many were also unable to make the link that this energy/ATP would be needed to make the heart contract. Some answers referred to glucose providing energy, but does not explain how. Some others noted that energy was produced, but failed to go on to say what this energy was for or provided vague description for its use eg., 'for the heart to work'. Some candidates stated that energy was produced for respiration.

A significant number of candidates ignored the context of the question and were therefore unaware that the heart was dissected out of the embryo and was monitored in a Petri dish surrounded by fluid to keep it functioning – these candidates often commented that the glucose was used to make the embryo grow. We even saw responses suggesting that glucose was there to remove the bitter taste of caffeine as they needed sugar to drink coffee because they found it too biter without sugar.

Very few candidates recognised that the glucose solution could affect the osmotic balance of the solution.


(a) (i) Suggest why glucose was included in the solutions.

(2)

~~Glucose is used in respiration~~ muscle cells

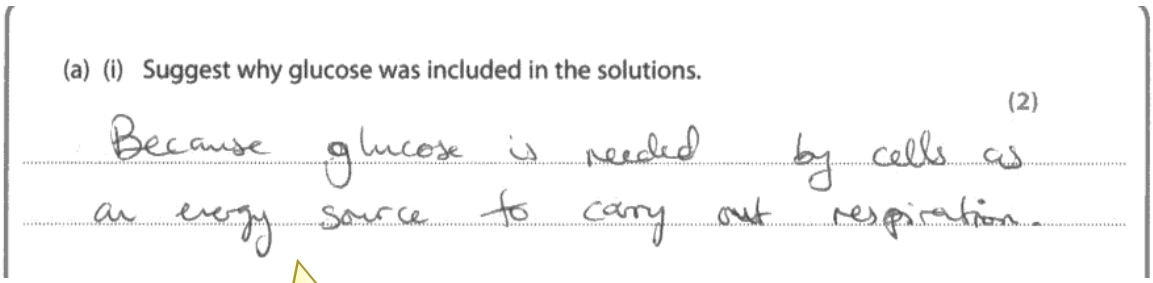
The glucose meant the heart ^ could respire and then ~~made~~ the energy to contract.

the heart muscle

ResultsPlus

Examiner Comments

This response gains both marks available. Glucose is needed for respiration and the energy is needed for the heart to contract.


(a) (i) Suggest why glucose was included in the solutions.

(2)

Because glucose is needed by cells as an energy source to carry out respiration.

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Examiner Comments

This response is typical of many that scored only one mark. It recognises that glucose is needed for respiration, but it does not state what the energy is needed for.

(a) (i) Suggest why glucose was included in the solutions.

(2)

TO Keep it as a control ~~was~~ when each experiment was carried in order to increase the reliability of the results.

ResultsPlus
Examiner Comments

This response gained no marks. It recognises the value of control (good for Q4 (a) (ii) validity not reliability) but does not explain why glucose is needed in the solution.

Question 4 (a) (ii)

This was a very poorly answered question on the whole with the vast majority of candidates not being able to appreciate validity in the context of the question asked (the preparation of the different caffeine solutions). Some candidates confused reliability and validity and as such some of the best responses seen were written as a response to Q4a(iii) rather than Q4a(ii).

A significant number of candidates referred to preparing a range of caffeine concentrations. A small number of candidates correctly referred to the need to control the glucose volume or concentration. Very few considered controlling the pH of the solutions. In a number of cases the mark was lost by candidates using the term 'amount' instead of something specifically measurable.

(ii) Suggest how the caffeine solutions were prepared to obtain valid results.

(1)

the same volume of glucose in each solution, using a pipette.

ResultsPlus
Examiner Comments

This is an example of a response that gained the mark.

(ii) Suggest how the caffeine solutions were prepared to obtain valid results.

(1)

They were prepared in the same environment, and concentration using the same amount of glucose solution to dilute the caffeine.

ResultsPlus
Examiner Comments

This response gains the mark. It would not gain the mark for using the same amount of glucose as it is not clear what is meant. However, they do gain credit for using the same concentration of glucose solution to gain valid results.

ResultsPlus
Examiner Tip

Always avoid using vague terms like amount and use measurable variables such as concentration, mass volume, etc instead.

(ii) Suggest how the caffeine solutions were prepared to obtain valid results.

(1)

Caffeine solution leave for 30s after adding to the chicken embryo

ResultsPlus
Examiner Comments

This is an example of a response that did not gain any credit. Acclimatisation of the embryo's heart in the solution will be important for validity, but the question asks how the caffeine solutions should have been prepared and not how they should have been used.

ResultsPlus
Examiner Tip

Read the question carefully.

(ii) Suggest how the caffeine solutions were prepared to obtain valid results.

(1)

They could have had set amounts of percentages of caffeine set up ready and then topped up with glucose to make the same amount of solution eventuine.
eg 10% glucose 90% caffeine, 20% gluc 80% caffiene etc.

ResultsPlus
Examiner Comments

This is an example of a response that did not gain the mark. What has been described by this candidate is something that is clearly invalid as they are changing the glucose concentration as well as the caffeine concentration in setting up these solutions.

ResultsPlus
Examiner Tip

To collect valid data in a simple investigation you need to aim to only have one independent variable changing so that any measurable change in the dependent variable can be attributed to that change in independent variable and not another variable (like glucose concentration).

Question 4 (a) (iii)

The majority of responses correctly referred to repeating the experiment or to use more hearts or more embryos. However, it was still disappointing to note that a number of students did not understand the concept of reliability. The most common errors were referring to the use of different concentrations of caffeine or to have the same volumes of solutions, either glucose or caffeine.

(iii) State how these results could be made more reliable.

(1)

Repeat ~~same~~ 3 times and collect concordant results.

ResultsPlus
Examiner Comments

This is an example of a good response where the candidate has a good grasp of reliability.

(iii) State how these results could be made more reliable.

(1)

Each caffine concentration could be repeated 3 times and then averaged.

ResultsPlus
Examiner Comments

This is an example of a response that gained the mark.

(iii) State how these results could be made more reliable.

(1)

~~Same~~ Same Concentration of glucose and same Volume of Solution

ResultsPlus
Examiner Comments

This is an example of a candidate who has confused reliability and validity and therefore does not gain any credit.

(iii) State how these results could be made more reliable.

(1)

They could be made reliable by using another solution instead of glucose.

ResultsPlus
Examiner Comments

This is an example of a response that did not gain the mark.

(iii) State how these results could be made more reliable.

(1)

use more concentrations of caffeine for the investigation.

ResultsPlus
Examiner Comments

This is an example of a response that did not gain the mark.

Question 4 (a) (iv)

With this question many candidates described overall changes to heart rate without specific reference to the actual concentrations of caffeine. While those candidates who did refer to the concentrations often described the changing heart rate at each point, rather than the general trends which was required. As a result figures were often quoted but rarely manipulated, or manipulated incorrectly.

Most candidates managed to understand that as the concentration of caffeine increased after 0.1 mg cm^{-3} the heart rate decreased. Some pointed out the peak in heart rate at 0.1 mg cm^{-3} or the fact that it was an increase of 20%. Few candidates recognised that concentrations up to 0.3 mg cm^{-3} caused an increase in the heart rate above the base rate.

This response gains all three marks available.

(iv) Using the information in the graph, describe the effect of caffeine on the heart rate of the chicken embryo.

(3)

caffeine concentrations up to at least 0.3% caused an increase in heart rate. A caffeine concentration of 0.1% made the the heart beat 20% faster (120%) ~~concentrations of caffeine above 0.3%~~ caused which was the ~~quickest the~~ highest the heart rate got to. Caffeine concentrations above about 0.32% had a negative effect and caused the ~~beat~~ heart rate to be lower than the base heart rate. A concentration of 1% caused the heart to stop beating all together.

ResultsPlus
Examiner Comments

This response gains credit for:

- recognising that concentrations up to 0.3 cause an increase in the heart rate (above base rate);
- that 0.1 was the fastest rate;
- that there was a 20% increase at 0.1 (correct manipulation of figures);
- and that concentrations above 0.32 caused a decrease in the heart rate.

This response gains two of the three marks available.

(iv) Using the information in the graph, describe the effect of caffeine on the heart rate of the chicken embryo.

(3)

The initial rate at 0·10 mg cm^{-3} a concentration of caffeine the heart rate increased by 20%. from there the base heart rate decreased rapidly to 60% 105% at at 0·20 mg cm^{-3}. At 0·5 mg cm^{-3} the ~~to~~ base heart rate dropped rapidly to 60% then more slowly decreased to 0% at 1·0mg cm^{-3}. from 0·1mg cm^{-3} to ~~1·0mg cm^{-3}~~ 0·5 mg cm^{-3} the base heart rate dropped ~~to~~ by 60%. 120% - 60%

ResultsPlus
Examiner Comments

This response gains the manipulation of figures mark for recognising the 20% increase at 0.1 (although they do not state that this is the fastest rate). They also gain credit for recognising that the rate decreases with an increase in caffeine concentration above 0.1. However, it is not helpful to describe the rate at every concentration point.

ResultsPlus
Examiner Tip

When describing data do not turn the graph into prose by stating every point shown on the graph. Describe significant points e.g. maximums and points of change and describe the trends shown.

This response scores no marks.

(iv) Using the information in the graph, describe the effect of caffeine on the heart rate of the chicken embryo.

(3)

At 0mg cm^{-3} the heart rate was 100%. At 0·1mg cm^{-3} the heart rate ~~was~~ increased to 120%. At 0·2 mg cm^{-3} the heart rate was 110% and decreased to 104% at 0·3 mg cm^{-3}. The biggest fall occured ~~data~~ between 0·3 and 0·5mg cm^{-3}. ~~and~~ At 1·0 mg cm^{-3} the heart rate was 0%.

ResultsPlus
Examiner Comments

This response states a lot of the data points without describing any trends or calculating any changes and therefore does not gain any credit.

ResultsPlus
Examiner Tip

When describing data do not just restate the data from the graph. Identify trends and calculate changes for credit.

Question 4 (b) (i)

There were plenty of very good answers to this question with candidates including accurate and relevant descriptions of appropriate techniques, revealing that many candidates had carried out this investigation and recalled it well. Candidates were particularly strong on identifying the independent variable, control variables and the value of repeats. The method of determining heart rate was described clearly by those who had obviously carried out the investigation. However, in many cases a time reference was left out. Some candidates were confused between microscopes, telescopes and stethoscopes. Encouragingly a lot of candidates realised the value of measuring the base heart rate for comparison, unfortunately, several did not refer to the experimental details provided and therefore stated that they would use distilled water.

This response gains all four marks available.

(b) (i) Describe how this investigation could be carried out using *Daphnia* instead of chicken embryos.

(4)

Taking a daphnia and placing it on a cavity slide with cotton wool to trap it. ~~place~~ placed under a microscope and add different concentrations of caffein. for every concentration, observe the daphnia through a microscope and using pen and paper dot everytime you see a heart beat, ~~one time~~ ~~repeat with different~~ time for 20 seconds and multiply the number of ~~beats~~ dots by 3 to determine beats per minute. repeat procedure 3 times ~~for~~ for each concentration.

ResultsPlus
Examiner Comments

This response gains credit for immobilising the *Daphnia*, using a range of different caffeine concentrations, describing how to measure the heart rate and repeats.

This response scored three of the four marks available.

(b) ~~(i)~~ Describe how this investigation could be carried out using *Daphnia* instead of chicken embryos.

(4)

*Daphnia are put onto a cavity slide. The pond water in the cavity slide is replaced with distilled water and the ~~Daphnia~~ are allowed to acclimatise ~~to~~ for 30s. After this time the slide is placed under a microscope and the heart rate is taken by adding a piece of paper. This is the base heart rate. Repeat this procedure and take an average. ~~Add a few drops of 0.1mgcm^3 caffeine~~ ~~Content~~ Repeat at least 3 times. Then repeat procedure with 5 different concentrations of caffeine solution, repeating them at least 3 times. Plot the averages on a ~~graph~~ line graph to compare

ResultsPlus
Examiner Comments

This response gained credit for recognising the value of acclimatisation for the *Daphnia*, repeats and using a range of caffeine concentrations. They did not gain the mark for measuring the heart rate of the *Daphnia* (despite remembering the method) because they did not include a time reference.

ResultsPlus
Examiner Tip

Remember to measure the rate of something you also need to measure time.

This response gained two of the four marks available.

(b) (i) Describe how this investigation could be carried out using *Daphnia* instead of chicken embryos.

(4)

Different Solution would be measured of Concentrates of Caffine. The Selected amount of these Solutions would each be put onto a piece of Cotton wool which would be held to the daphnia to inhale. This would be held to the daphnia for ~~a~~ the same amount of time with each concentration. The daphnias heart rate would then be recorded and the experiment repeated to ensure valid results.

ResultsPlus
Examiner Comments

Although this candidate clearly either hasn't conducted the core practical, or remembered how they did it, they managed to gain two marks for general good investigation points i.e. identify the independent variable (caffeine concentration) and repeat your measurements for reliability.

ResultsPlus
Examiner Tip

Make sure you carry out and revise the practical investigations highlighted in the specification.

This response scored no marks.

(b) (i) Describe how this investigation could be carried out using *Daphnia* instead of chicken embryos.

(4)

The experiment could be carried out with a Daphnia instead of chicken embryo's because the Daphnia are invertebrates and are also very easy to obtain. Daphnia's are also almost see through so when you carry out the experiment it would be easier to see the physical effect that ages with adding caffeine, along with the heart rate. Daphnia's also have a very simple blood circulation, making effects more common. Also there will be less of a moral issue using Daphnia's instead of chicken embryo's.

ResultsPlus
Examiner Comments

This response ignores the question asked and instead explains why it is better to use *Daphnia* instead of chicken embryos.

ResultsPlus
Examiner Tip

Read the question carefully to make sure you answer the question asked and not the one in your head.

Question 4 (b) (ii)

The majority of candidates gained this mark for recognising either that the experiment would kill the chick embryos or that the embryos were unable to give consent. There were plenty of good answers and it was obvious that the candidates had very strong views on this matter and about the right that living creatures had to life.

Some candidates had not read the question carefully and talked about *Daphnia* instead of the chicken embryos. As a result candidates often referred to caffeine killing the embryo without realising that removal of the heart did this. Consequently, many responses stated that the embryo may be killed or might die.

(ii) Suggest **one** ethical issue in the use of chicken embryos in this investigation.

(1)

~~Bec~~ people believe that its more ethical using ~~daphnia &~~ invertabrates such as daphnia as they have a less sophisticated nervous system - therefore may not feel as much pain or no pain as chicken embryos.

ResultsPlus
Examiner Comments

This candidate provides a good response that gained the mark by making an ethical comparison between the experiment described and the investigation they would have carried out. They clearly recognise that vertebrates have a more sophisticated nervous system and might feel pain (for example during the removal of the heart).

(ii) Suggest **one** ethical issue in the use of chicken embryos in this investigation.

(1)

~~Some~~ The chicken embryos cannot give consent to be tested on.

ResultsPlus
Examiner Comments

This is a typical response that gained the mark available for recognising that the chicken embryos can't give consent.

(ii) Suggest **one** ethical issue in the use of chicken embryos in this investigation.

(1)

Chicken embryos are potential chickens that could hatch - ~~[illegible]~~ it is unfair to kill a potential life, can be viewed as 'murder' and unfair

ResultsPlus
Examiner Comments

This is an example of a response that was also worthy of credit. They recognise that the experiment will kill the embryo and they make it clear that they do not consider this acceptable.

(ii) Suggest **one** ethical issue in the use of chicken embryos in this investigation.

(1)

The Chicken embryos, if placed in too high a Concentration, could die the to investigation as seen in the graph. The heartbeat eventually stopped which could be attributed to murder

(Total for Question 4 = 12 marks)

ResultsPlus
Examiner Comments

This is an example of a response that did not gain a mark. The candidate has not fully related the question to the investigation described and has confused it with the *Daphnia* practical. Saying the embryo could die implies that it is possible that it might not die. - Removing the heart from the embryo will cause the embryo to die - not the exposure to caffeine.

ResultsPlus
Examiner Tip

Make sure you read the whole of the question carefully, particularly the investigation details supplied.

(ii) Suggest **one** ethical issue in the use of chicken embryos in this investigation.

(1)

~~[illegible]~~

any use of an animal is wrong.

ResultsPlus
Examiner Comments

This response did not gain credit because it does not explain why using an animal is wrong.

ResultsPlus
Examiner Tip

Rather than making very general statements, particularly about ethical issues, you should specifically relate it to the context of the question asked.

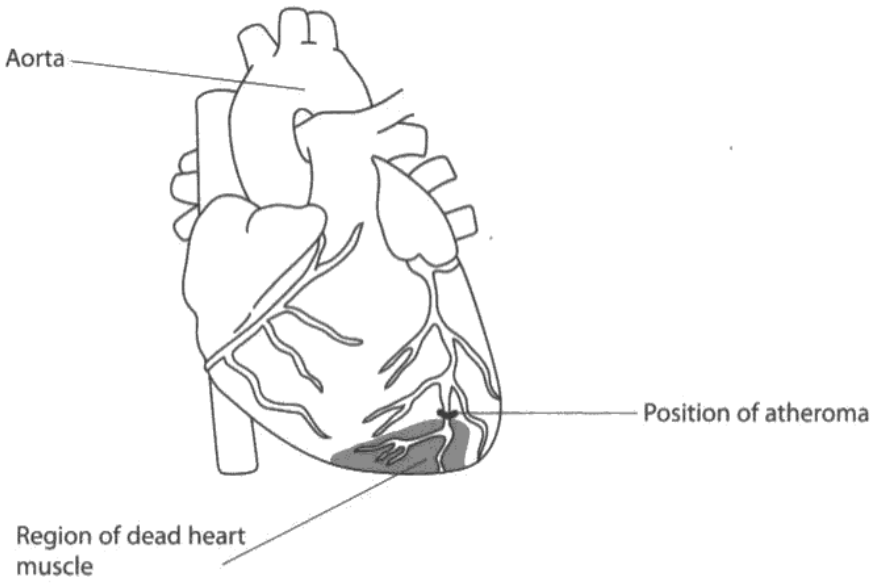
Question 5 (a) (i)

Most candidates scored highly for this question providing good descriptions of the parts of the wall of the aorta and relating the collagen, muscle and elastic tissue to their functions. There were some candidates who just stated that the aorta was large and described its function as pumping oxygenated blood around the body and therefore failed to score many marks.

This response scored all three marks available.

5 Atherosclerosis is responsible for many deaths that result from cardiovascular disease (CVD).

The diagram below shows an external view of a human heart.
The position of an atheroma (plaque) is shown and a region of dead heart muscle is shaded.



(a) (i) Explain how the structure of the aorta relates to its function.

(3)

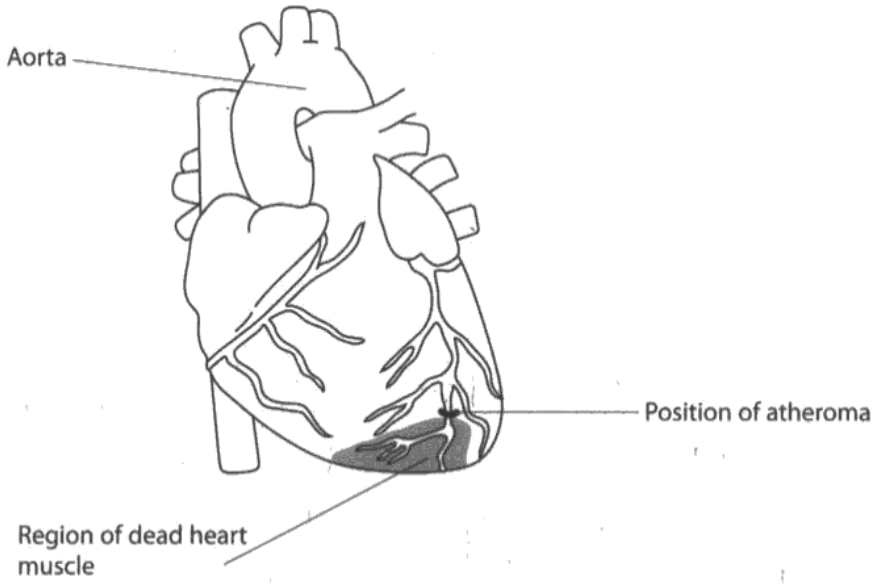
It is wide and has a thick muscular wall to withstand blood flowing out of the ventricles at high pressure. It has a semilunar valve at its base to prevent backflow into the ventricles. It has arteries linking off it so blood can flow to different parts of the body

ResultsPlus
Examiner Comments

This response gained credit for the following seven points:
- the thick wall - to withstand high pressure;
- muscular wall;
- semi lunar valve - to prevent back flow;
- branching - to supply blood to different parts of the body.

5 Atherosclerosis is responsible for many deaths that result from cardiovascular disease (CVD).

The diagram below shows an external view of a human heart.
The position of an atheroma (plaque) is shown and a region of dead heart muscle is shaded.



(a) (i) Explain how the structure of the aorta relates to its function.

(3)

The aorta has thick cell walls so that high pressures of blood do not cause it to tear/break. It is also ~~non elastic~~ slightly elastic so that it can expand when needed. The aorta has 3 entrance ways also too present high blood pressure.

ResultsPlus
Examiner Comments

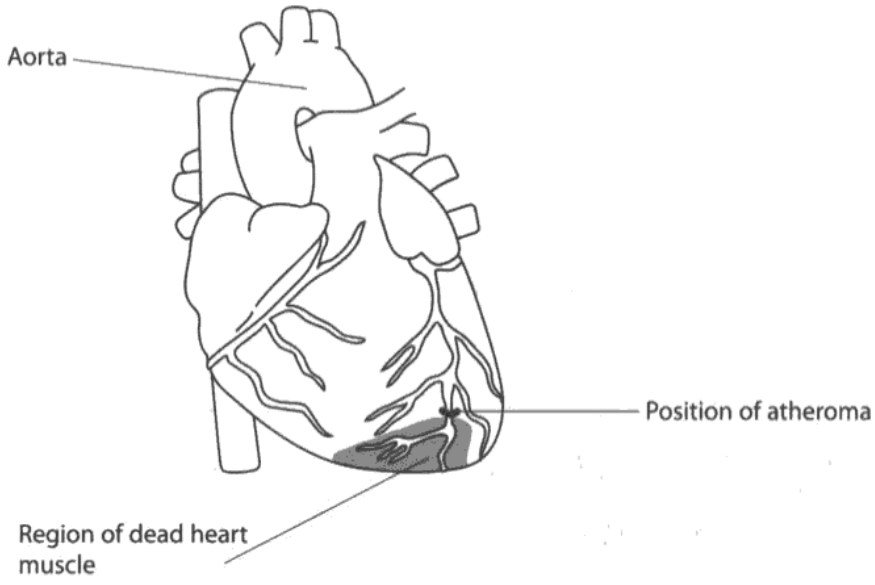
This response gained one of the three marks available. The aorta does not have a cell wall (it is not a plant of prokaryotic cell), but it did gain credit for recognising the function of a thick wall. Slightly elastic is too vague for credit and the aorta does not have three entrances so this was not credited as branching.

ResultsPlus
Examiner Tip

Be careful when you use the term 'cell wall' as it is a specific cellular structure, so if you are describing a wall as being thick or thin then refer to the number of cells e.g. the aorta has a thick wall with many cell layers.

5 Atherosclerosis is responsible for many deaths that result from cardiovascular disease (CVD).

The diagram below shows an external view of a human heart.
The position of an atheroma (plaque) is shown and a region of dead heart muscle is shaded.



(a) (i) Explain how the structure of the aorta relates to its function.

(3)

~~The aorta carries blood away from the heart so it needs to be wide.~~

The aorta carries most of the blood away from the heart so it needs to be wide and thick so its stronger.

ResultsPlus
Examiner Comments

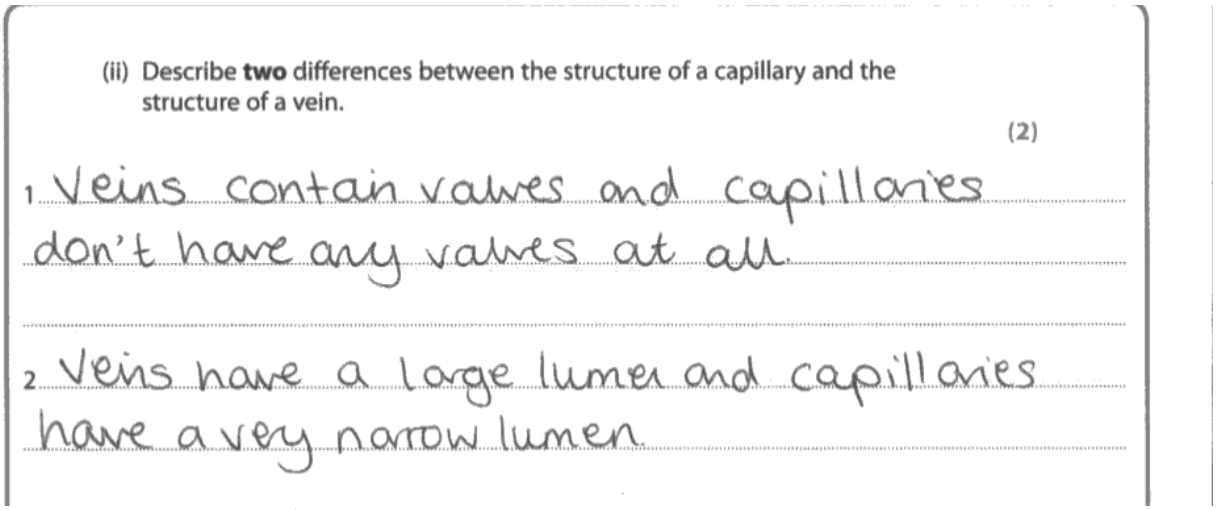
This response gained no marks. Wide is not clear enough to be credited as a large lumen. Thick does not specifically refer to the wall of the aorta, so again is not clear enough for credit.

ResultsPlus
Examiner Tip

Make sure your points are clear about what they refer to e.g. wall or lumen.

Question 5 (a) (ii)

Many candidates gained full marks here, most commonly for knowing that veins have valves and also have muscle/elastic tissue in their wall. A significant number of candidates lost a mark for just stating that capillaries are one cell thick, not making it clear whether they were referring to the wall of the lumen. Simply stating that capillaries were narrow or veins were wide is not enough for credit – at this level they should be referring to the lumen for credit.



(ii) Describe **two** differences between the structure of a capillary and the structure of a vein.

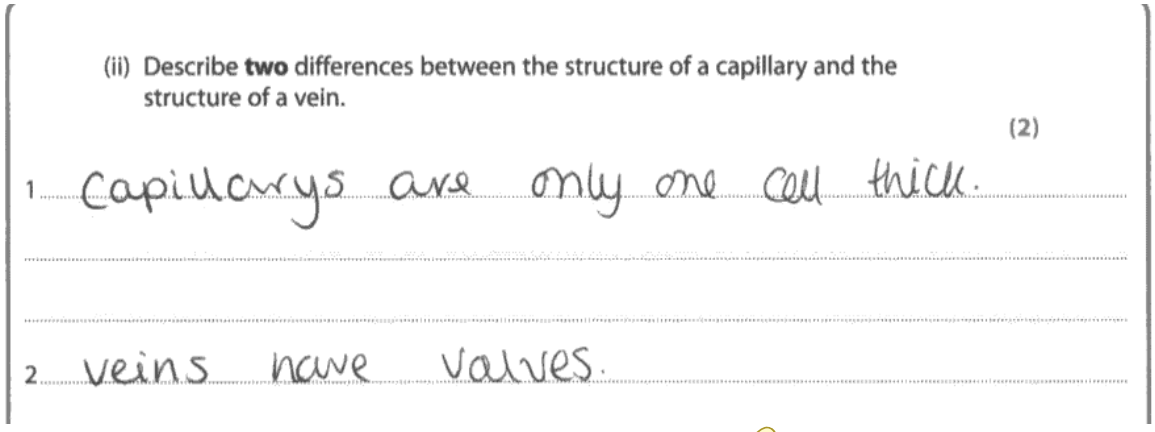
(2)

1 Veins contain valves and capillaries don't have any valves at all.

2 Veins have a large lumen and capillaries have a very narrow lumen.

ResultsPlus
Examiner Comments

This is an example of a good response that makes two clear comparative points and therefore gained both of the available marks.



(ii) Describe **two** differences between the structure of a capillary and the structure of a vein.

(2)

1 Capillarys are only one cell thick.

2 veins have valves.

ResultsPlus
Examiner Comments

This response gained one mark for 'veins have valves'. Capillaries are only one cell thick is not enough for credit because it could refer to the thickness of the wall or the lumen.

ResultsPlus
Examiner Tip

Be specific about what is only one cell thick.

Ideally comparative answers should clearly refer to both structures being compared.

(ii) Describe **two** differences between the structure of a capillary and the structure of a vein.

(2)

1 veins are alot bigger in size compared to the cappilaries.

2 cappillaries are described as oxygenated networks and supply blood to the limbs, veins supply deoxygenated blood to the heart to be oxygenated.

(b) (i) Suggest how the location of the atheroma results in the position and size of

ResultsPlus

Examiner Comments

This response failed to score any marks. Veins are bigger than capillaries is too vague as it is not clear what is bigger - the wall, lumen, length?

ResultsPlus

Examiner Tip

Be specific about what you are referring to when comparing sizes e.g. the thickness of the wall or width of the lumen.

When asked to describe structures avoid describing functions instead.

Question 5 (b) (i)

Many responses to this question were long winded and vaguely presented. Many mentioned the blockage without referring to the dead heart muscle later on. Most marks were gained for recognising that the arteries supply oxygen. There were also a significant number of good descriptions of the position and size effect or where the area of dead muscle would be. Only a few candidates referred to the lack of respiration causing cell or tissue death. A small number of candidates wasted time and space with descriptions of atheroma formation, again not reading the question carefully.

(b) (i) Suggest how the location of the atheroma results in the position and size of this region of dead heart muscle.

(3)

If the position of the atheroma was higher more of the area below would be dead. It is only the area below the atheroma that is dead because blood cannot reach that area, causing it to die because there is no oxygen. ~~Def~~ Depending on the position of the atheroma the dead heart muscle will be below and around it where no blood is getting to and at the ends of the arteries.

ResultsPlus
Examiner Comments

This response gained all three marks available for recognising:
- that if the atheroma was higher up more of the heart muscle would die;
- that they are affected downstream of the atheroma;
- the artery supplies the muscle with oxygen.

(b) (i) Suggest how the location of the atheroma results in the position and size of this region of dead heart muscle.

(3)

If the atheroma is near the bottom of a side artery (e.g. position A) there will only be a small amount of dead heart tissue but if it is in a main artery (such as position B) more of the heart tissue will be dead as the atheroma will affect all of the side branches of that artery.

ResultsPlus
Examiner Comments

This response gained just one mark for making a very clear point about the position of the atheroma affecting the size of the dead heart tissue.

ResultsPlus
Examiner Tip

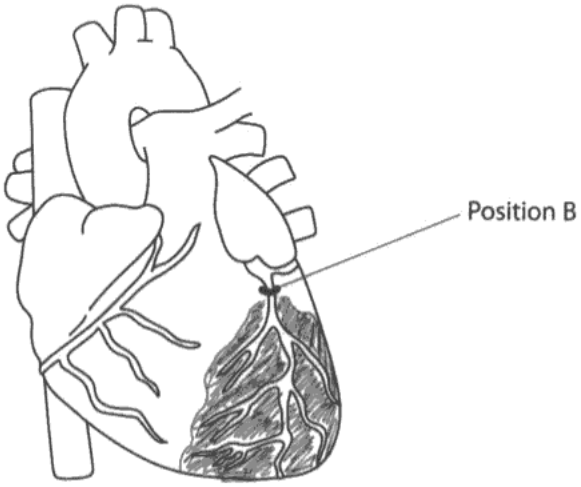
When you see the command word suggest you should explain your answer. For example, in this case you should explain why the heart muscle dies in the region affected by the atheroma.

Question 5 (b) (ii)

Over 85% of candidates managed to score both marks available for this question by managing to shade the area supplied by the affected arteries and avoiding shading above the position of the atheroma.

(ii) On the diagram below, shade an area to show the position and size of dead heart muscle, if the atheroma occurred at position B.

(2)

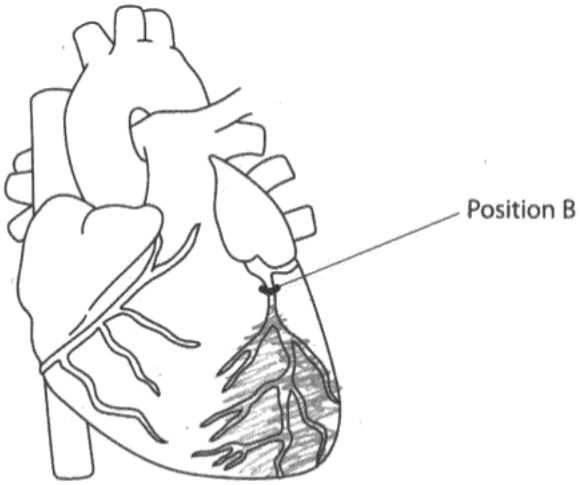


ResultsPlus
Examiner Comments

This response is typical of the majority of responses that gained both available marks.

(ii) On the diagram below, shade an area to show the position and size of dead heart muscle, if the atheroma occurred at position B.

(2)

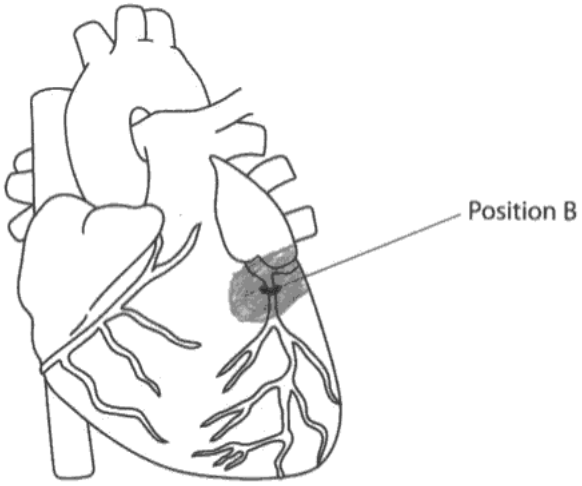


ResultsPlus
Examiner Comments

This response only gained one of the two available marks because the area shaded does not cover the ends of the blood vessels affected.

(ii) On the diagram below, shade an area to show the position and size of dead heart muscle, if the atheroma occurred at position B.

(2)



ResultsPlus
Examiner Comments

This response did not gain any marks because the area shaded does not cover all the total area of the heart supplied by the artery affected, it also extends above the atheroma suggesting that heart muscle dies upstream of the atheroma.

Question 6 (a)

This question was assessed for quality of written communication with examiners specifically checking the spelling of technical terms. Very few candidates were penalised for poor spelling. Where mistakes were made it was with the words glycosidic, amylopectin or accidentally writing amylase instead of amylose. Many candidates scored very highly with this question providing a high level of specific structural detail demonstrating that this area of the specification has been well covered and understood by most candidates. A few candidates did confuse the structure of starch and protein and surprisingly a lot of candidates did not mention that starch is made up of α-glucose.

This response scores all five marks available.

6 Enzymes act as biological catalysts.

Amylase is an enzyme present in saliva that catalyses the hydrolysis of starch into maltose.

*(a) Describe the structure of starch. - Amylose + amylopectin

(5)

Starch contains two polysaccharides of alpha glucose; amylose and amylopectin. Amylose is a long unbranched chain of alpha glucose that coils round to become compact for storage. It contains 1-4 glycosidic bonds between the ~~monosac~~ alpha glucoses. Amylopectin is a molecule of starch with a large ~~mass~~ number of branches, these branches are useful for quick and efficient glucose breakdown. It contains 1-4 and 1-6 glycosidic bonds. It is insoluble in water, so there is no ~~water~~ osmotic effect in the cell.

ResultsPlus
Examiner Comments

Credit was gained for recognising:

- starch is made from alpha glucose;
- amylose is coiled;
- amylose and amylopectin;
- glycosidic bonds;
- comparing the difference in bonding between amylose and amylopectin;
- amylopectin is branched.

This response gained three of the five available marks.

6 Enzymes act as biological catalysts.

Amylase is an enzyme present in saliva that catalyses the hydrolysis of starch into maltose.

*(a) Describe the structure of starch.

(5)

Starch is a polysaccharide mainly used as energy stores. It is made of amylose and amylopectin. Amylose is a straight chain molecule and Amylopectin is a branched chain molecule. Both of these have very compact structures which ~~aids~~ helps them be such good energy stores.

ResultsPlus
Examiner Comments

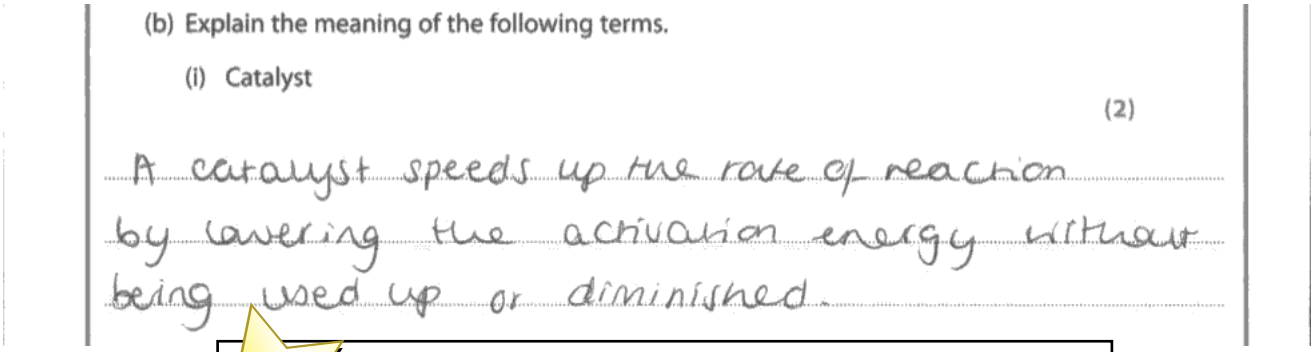
This response gained credit for:
- amylose and amylopectin;
- amylopectin is branched;
- both are compact molecules.

ResultsPlus
Examiner Tip

When describing the structure of polymers try to include the names of the monomers and bonds involved.

Question 6 (b) (i)

Few candidates struggled with explaining what is meant by a catalyst. The most common responses covered the idea that they speed up reactions by lowering the activation energy. There were some excellent responses that recognised that catalysts do not change the products or equilibrium of a reaction.



(b) Explain the meaning of the following terms.

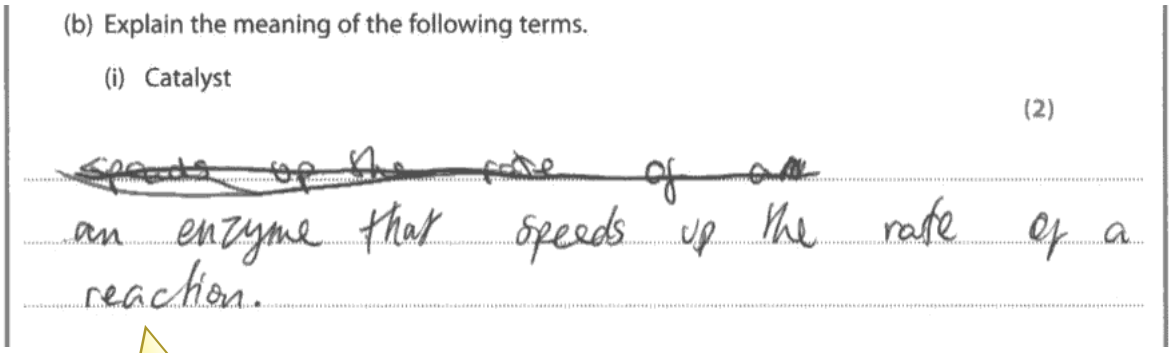
(i) Catalyst

(2)

A catalyst speeds up the rate of reaction by lowering the activation energy without being used up or diminished.

ResultsPlus
Examiner Comments

This response gains both available marks having made three clear points about catalysts.



(b) Explain the meaning of the following terms.

(i) Catalyst

(2)

~~speeds up the rate of a~~ an enzyme that speeds up the rate of a reaction.

ResultsPlus
Examiner Comments

This response gained one mark for speeding up the rate of reaction.

ResultsPlus
Examiner Tip

Remember enzymes are catalysts, but not all catalysts are enzymes. When a question carries two or more marks you should include two or more clear points.

Question 6 (b) (ii)

Most candidates had a good grasp of what a hydrolysis reaction involves. Some candidates referred to 'breaking large molecule into small molecules' rather than specifically mentioning bonds. Most candidates recognised that water is used, although a few did state that water was produced and a small minority hedged their bets and stated that water was used or produced and therefore did not gain the mark.

(ii) Hydrolysis

(2)

Hydrolisis is the opposite of condensation reaction. It's a reaction which water is added to break bonds apart and separate molecules. For example: maltose + water = glucose + glucose and the glycosidic bond breaks apart.

ResultsPlus
Examiner Comments

This response is typical of the many that gained both marks available.

ResultsPlus
Examiner Tip

Don't forget to avoid using = in a chemical equation.

(ii) Hydrolysis

(2)

Hydrolysis is the breakdown of molecules, formed in condensation reactions, by the addition of water

ResultsPlus
Examiner Comments

This response gains one mark for the use of water, but it does not mention bonds being broken.

(ii) Hydrolysis

(2)

Hydrolysis is a catabolic reaction, the opposite of condensation, when two subunits are broken down to produce two distinct molecules plus H_2O.

eg maltose → glucose + glucose + water

ResultsPlus
Examiner Comments

This response gained no marks. It does not mention bonds and has water being produced rather than used.

(ii) Hydrolysis

(2)

Hydrolysis is the name of the reaction in which the glycosidic bonds of joining two sugars are broken.

ResultsPlus
Examiner Comments

This response gained one mark for recognising that bonds are broken in hydrolysis reactions.

ResultsPlus
Examiner Tip

Don't forget that hydrolysis involves water.

Question 6 (c)

There were some excellent responses recognising that amylase in saliva breaks down starch into maltose that tastes sweeter than starch, but most candidates gained the mark available for recognising that a sugar is produced.

(c) Bread contains a high proportion of starch. If bread is chewed for a long period of time it begins to taste sweet.

Suggest why bread tastes sweet after chewing for a long period of time.

(1)

Because the amylase in our saliva (in the bread) catalyses the hydrolysed of starch into maltose, and maltose is a sweet tasting sugar.

ResultsPlus
Examiner Comments

This is a good example of a response that gained the available mark.

(c) Bread contains a high proportion of starch. If bread is chewed for a long period of time it begins to taste sweet.

Suggest why bread tastes sweet after chewing for a long period of time.

(1)

The starch breaks down into other molecules and becomes saturated. sylivia contains water which breaks glycosidic bonds

ResultsPlus
Examiner Comments

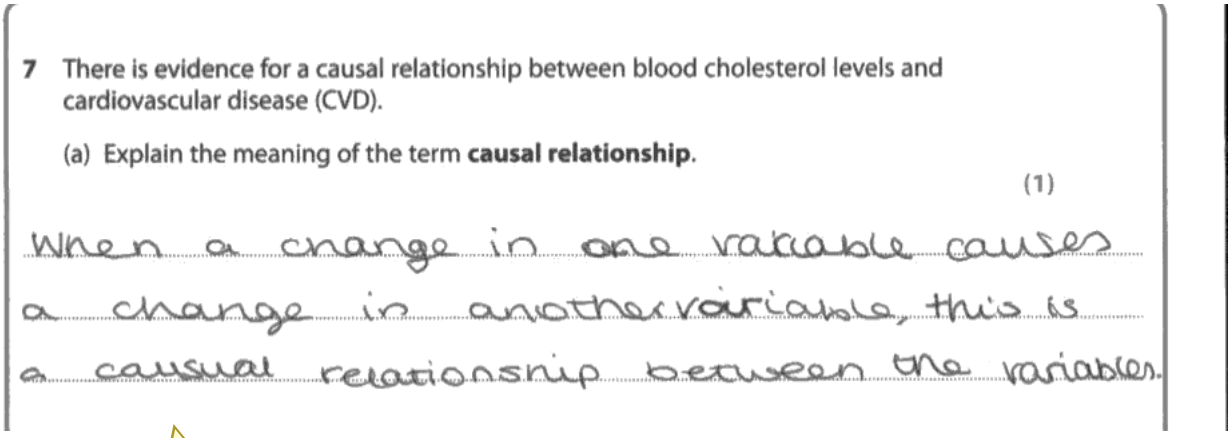
This is an example of a response that failed to gain the mark.

ResultsPlus
Examiner Tip

Although water is needed in hydrolysis reactions, thankfully water is not enough to break glycosidic bonds by itself.

Question 7 (a)

Many candidates gave a correct definition often stating that 'one variable causes a change in another variable'. Some candidates correctly used examples, but sadly, others did not use examples properly to bring out the idea of causation. A significant number of candidates read it as "casual relationship", another indication of candidates not reading questions carefully enough – a recurring theme. There were a significant number of candidates who did not gain the mark by simply mentioning trends, links, relationships, correlations etc.



7 There is evidence for a causal relationship between blood cholesterol levels and cardiovascular disease (CVD).

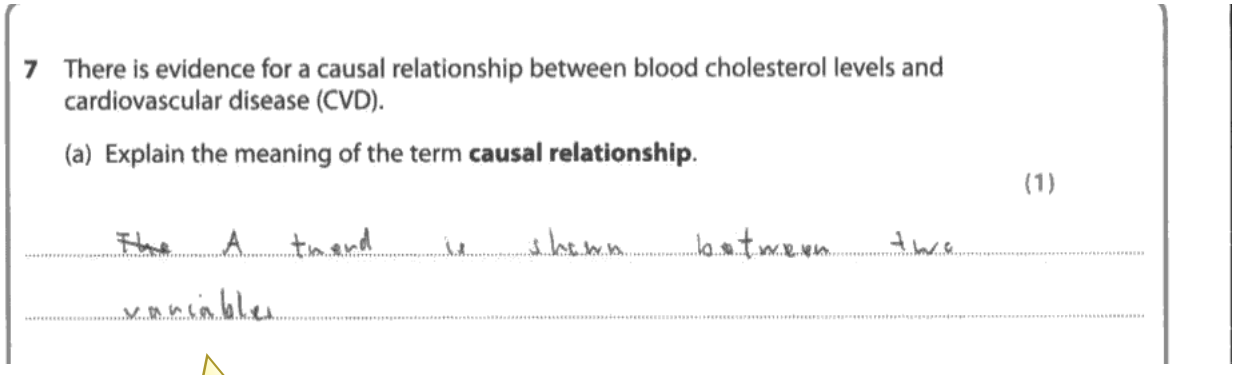
(a) Explain the meaning of the term **causal relationship**.

(1)

When a change in one variable causes a change in another variable, this is a causal relationship between the variables.

ResultsPlus
Examiner Comments

This is an example of a response that gained the mark.



7 There is evidence for a causal relationship between blood cholesterol levels and cardiovascular disease (CVD).

(a) Explain the meaning of the term **causal relationship**.

(1)

The A trend is shown between the variables

ResultsPlus
Examiner Comments

This is an example of a response that failed to gain the mark - a causal relationship is more than just a trend.

Question 7 (b) (i)

Most candidates demonstrated a good understanding of protein structure. Most gained marks for mentioning peptide bonds, providing details of the secondary structure and naming further bonds responsible for the folding of the protein. Few candidates provided specific details of where the peptide bonds form and many just mentioned primary structure without making it clear what the primary structure actually is.

This response gains all four marks available.

(b) Lipoproteins are composed of phospholipids, cholesterol and proteins.

(i) Proteins are made up of amino acids.

Describe how amino acids join together to form the three-dimensional structure of a protein.

(4)

amino acids are joined by peptide bonds between the amine group and the carboxyl group. They get there 3D structure from the order of amino acids which determines where hydrogen bonds form which product beta pleats and alpha helis. Ionic bonds also form aswell as disulphide bridges between R groups containing sulpher. All of these bonds help determine the 3D shape.

ResultsPlus
Examiner Comments

Mpt 1, 2, 5, 4 and 6 given

This response gains credit for:

- peptide bonds;
- where the peptide bond forms;
- describing the secondary structures;
- naming other bonds involved;
- recognising that bonds are formed between the R groups.

(b) Lipoproteins are composed of phospholipids, cholesterol and proteins.

(i) Proteins are made up of amino acids.

Describe how amino acids join together to form the three-dimensional structure of a protein.

(4)

Amino acids go through many stages to break down, ~~many~~ they then go into secondary structure where molecules form a chain - tertiary where they coil up tight and they then gain hydrogen bonds to hold the structure together.

ResultsPlus
Examiner Comments

This response gains just one of the available four marks for recognising that hydrogen bonds are involved.

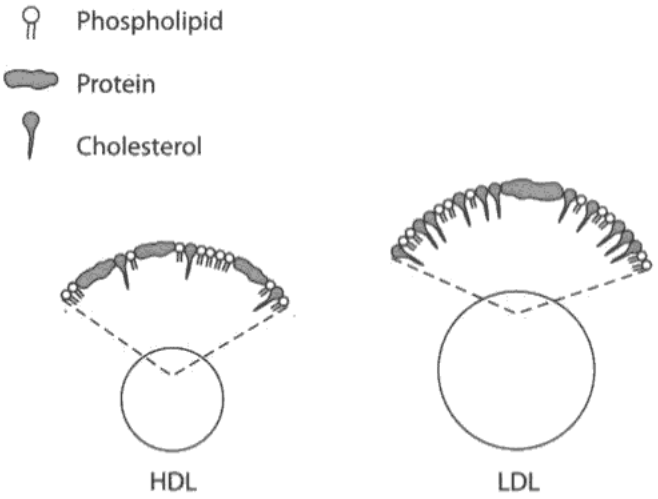
ResultsPlus
Examiner Tip

Just naming secondary and tertiary structure is not enough - make sure you describe what they are.

Question 7 (b) (ii)

The vast majority of candidates managed to gain both available marks for making clear comparisons between HDL and LDL. Where marks were lost it was for often just stating the number of molecules in the diagram or for comments about the surface area. Some candidates lost marks for using the words 'high' or 'low' rather than lower / higher / more / less etc. A number of candidates compared protein and cholesterol levels within either HDL or LDL rather than compare cholesterol or protein levels between HDL or LDL.

(ii) The diagrams below show part of the structure of the surface of high-density lipoprotein (HDL) and low-density lipoprotein (LDL).



Using the information in the diagram, describe the differences between the structure of HDL and the structure of LDL.

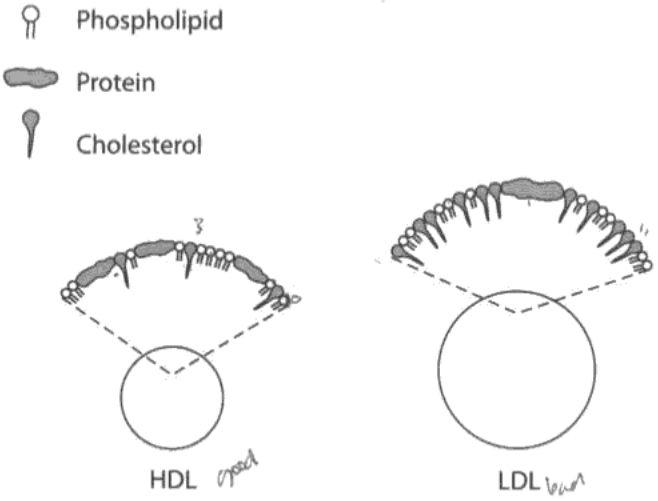
(2)

LDL's contain ~~more~~ many more cholesterol molecules compared to HDL. HDL also contain more protein compared to LDL. The LDL molecule is a lot bigger than the HDL molecule.

ResultsPlus
Examiner Comments

This response gained both marks having made three clear comparative comments.

(ii) The diagrams below show part of the structure of the surface of high-density lipoprotein (HDL) and low-density lipoprotein (LDL).



Using the information in the diagram, describe the differences between the structure of HDL and the structure of LDL.

(2)

LDL consists of one protein where as HDL consists of three. LDL contains 11 cholesterol molecules while HDL only has 3 cholesterol molecules.

ResultsPlus
Examiner Comments

Just counting the molecules in the small part of the molecule depicted is not sufficient for the comparison so this response gained no marks.

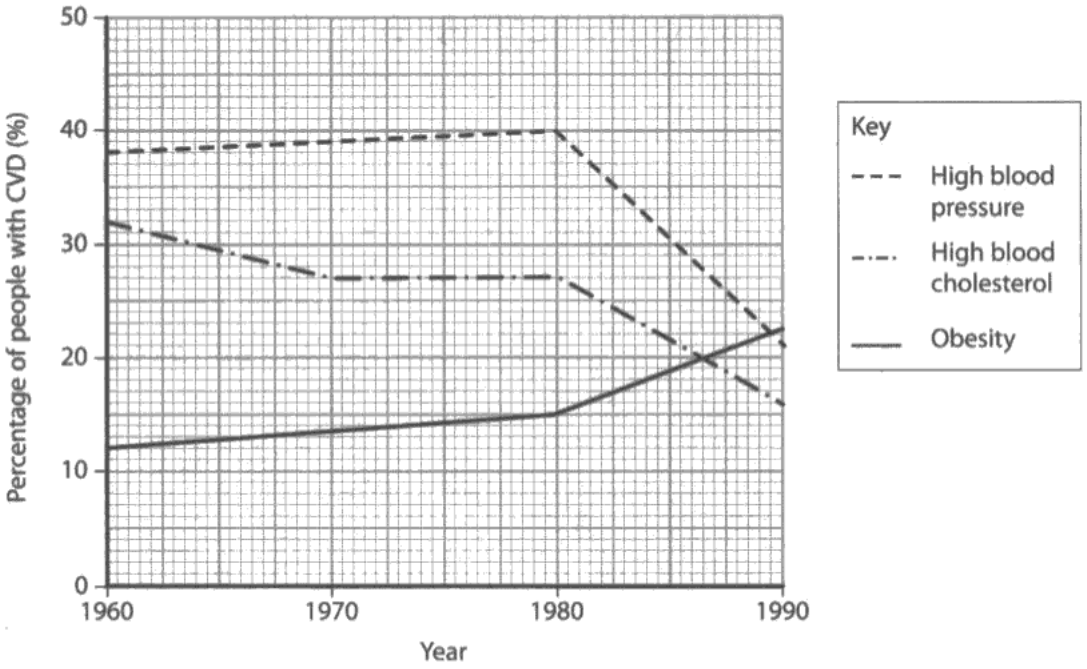
Question 7 (c) (i)

With this question too many candidates failed to follow the instruction to describe overall changes (1960 - 1990) and only described changes between 1980 and 1990 or described changes for each decade leaving the examiner to link all the parts of their answer together. As a result many candidates did manage to pick up a couple of marks e.g. for the trend for obesity but often lost the mark for blood pressure by failing to make the overall trend clear by just describing a "steady increase" and "rapid decrease".

This response gained all three marks available.

(c) Obesity and high blood pressure are also factors that increase the risk of CVD.

The graph below shows the percentage of people with CVD who have high blood pressure or have high blood cholesterol or are obese for the period 1960 to 1990.



(i) Using the information in the graph, describe the overall changes that have occurred in these risk factors during this period.

(3)

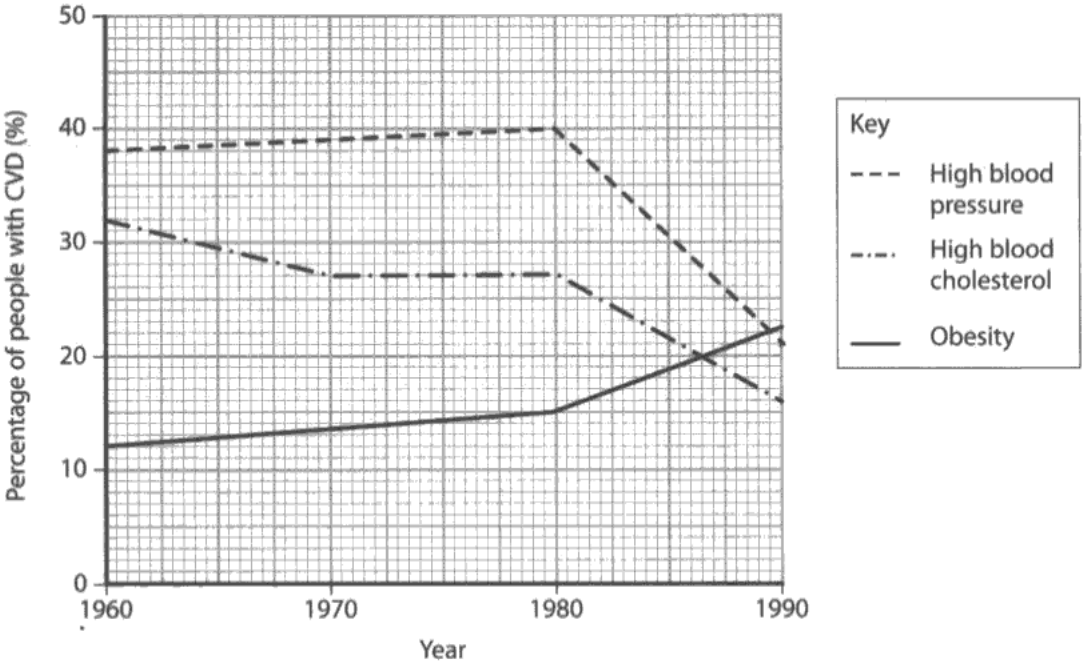
High blood pressure and cholesterol as a risk factor has decreased overall. High blood pressure decreasing by 17% and high blood cholesterol decreasing by 16%, half its original percentage in 1960.
Obesity as a risk factor has increased overall, rising by ~~10½%~~ 10.5%.

ResultsPlus
Examiner Comments

This response correctly identifies all three overall trends, also supports the trends with some correct calculations of the overall changes in the risk factors.

(c) Obesity and high blood pressure are also factors that increase the risk of CVD.

The graph below shows the percentage of people with CVD who have high blood pressure or have high blood cholesterol or are obese for the period 1960 to 1990.



(i) Using the information in the graph, describe the overall changes that have occurred in these risk factors during this period.

(3)

high blood pressure and high blood cholesterol both rapidly reduces since 1980. ~~as~~ Where ~~as~~ high blood pressure dropped from 40% to 21%. Where as Obesity increased since 1980 and increased from 15% to 22.5%.

ResultsPlus
Examiner Comments

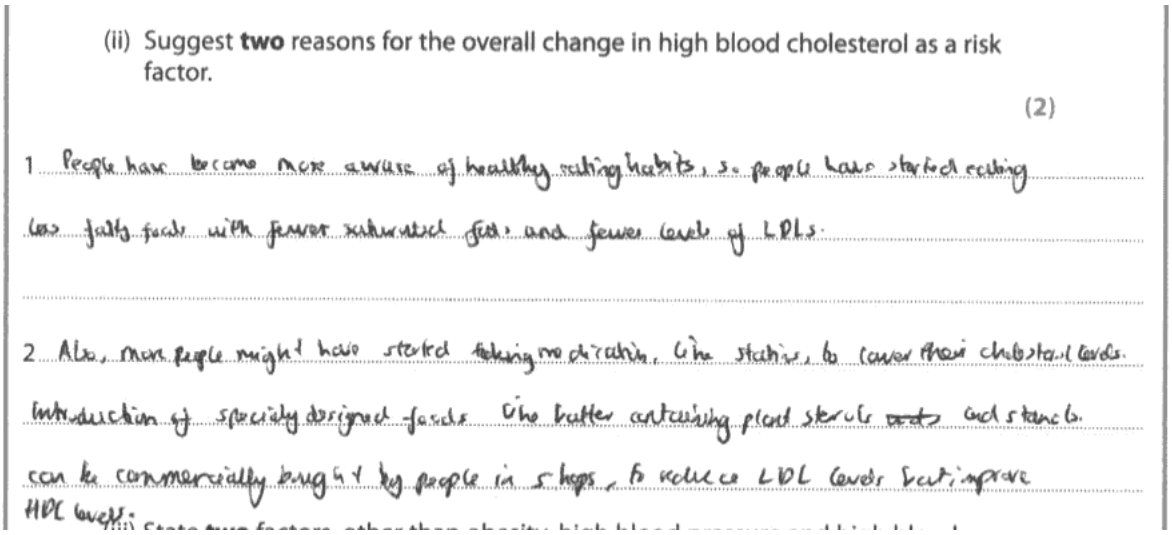
This response gained no marks because it only describes changes in the last ten years of the data rather than the total period of 1960-1990 as requested in the question.

ResultsPlus
Examiner Tip

Read the question carefully to make sure you cover the data required in your answer.

Question 7 (c) (ii)

The majority of candidates picked up one or two marks for this question. Where marks were lost, candidates vaguely referred to use of drugs to lower cholesterol, 'improving diet' or 'better medication'. A few candidates misread the question and described the effects of high cholesterol, or described ways to reduce blood pressure (such as using antihypertensives and eating less salt).



(ii) Suggest **two** reasons for the overall change in high blood cholesterol as a risk factor.

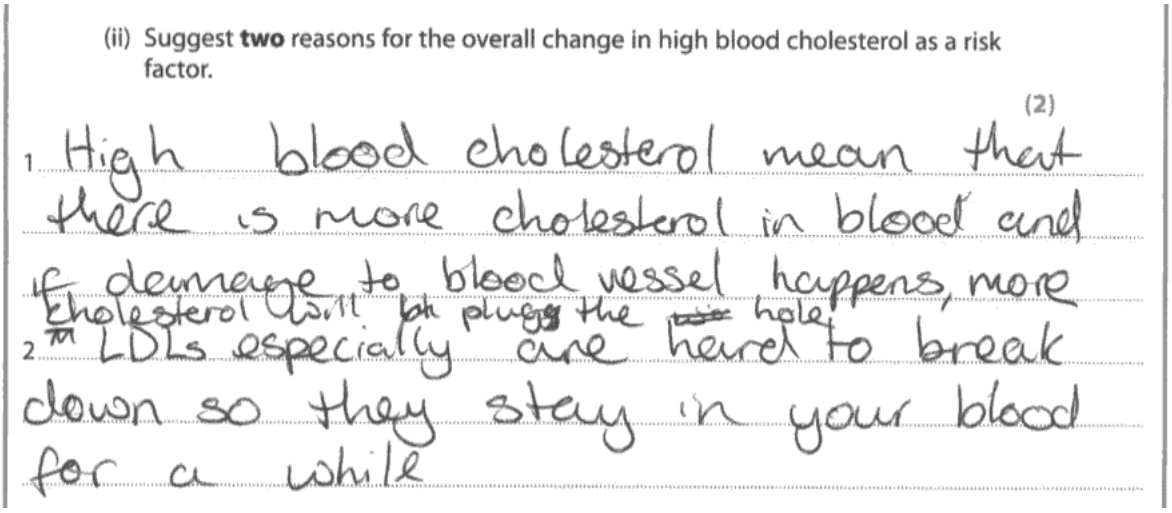
(2)

1 People have become more aware of healthy eating habits, i.e. people have started eating less fatty foods with fewer saturated fats and fewer levels of LDLs.

2 Also, more people might have started taking medication, like statins, to lower their cholesterol levels. Introduction of specially designed foods like butter containing plant sterols and stanols can be commercially bought by people in shops, to reduce LDL levels but improve HDL levels.

ResultsPlus
Examiner Comments

This is typical of a response that gained both marks available for identifying two clear reasons for the drop in high blood cholesterol as a risk factor.



(ii) Suggest **two** reasons for the overall change in high blood cholesterol as a risk factor.

(2)

1 High blood cholesterol mean that there is more cholesterol in blood and if demerage to blood vessel happens, more cholesterol will plugg the hole

2 LDLs especially are hared to break down so they stay in your blood for a while

ResultsPlus
Examiner Comments

This response gained no marks because instead of suggesting why high blood cholesterol is reducing as a risk factor, it attempts to explain why blood cholesterol is a risk factor.

ResultsPlus
Examiner Tip

Read the question carefully and answer the question asked.

Question 7 (c) (iii)

Most candidates could identify two risk factors for CVD. Failure to qualify an answer was the most common reason for not gaining the mark. For example just stating age instead of increase in age or just stating gender instead of indicating which gender (i.e. male).

(iii) State **two** factors, other than obesity, high blood pressure and high blood cholesterol, that increase the risk of CVD.

(1)

1 Gender - male

2 Age - older.

ResultsPlus
Examiner Comments

This response gained the mark because it provided suitable qualification of who is most at risk with both age and gender.

(iii) State **two** factors, other than obesity, high blood pressure and high blood cholesterol, that increase the risk of CVD.

(1)

1 smoking

2 genetic hereditary. poor diet

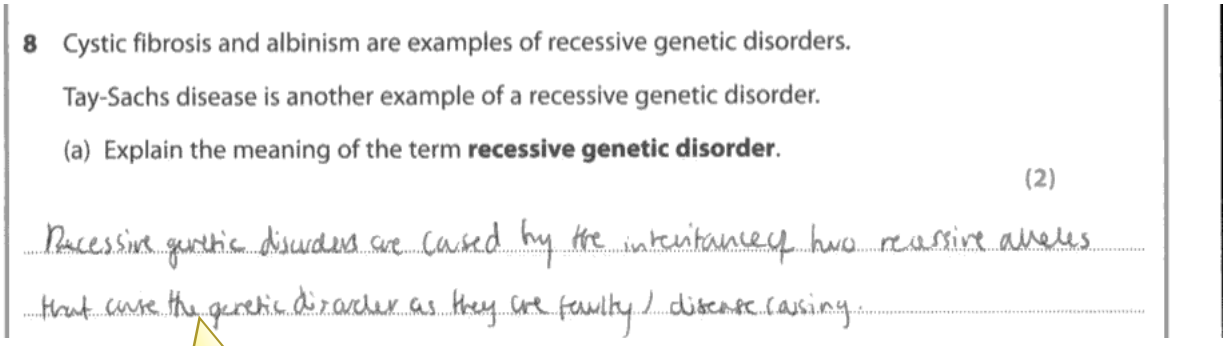
ResultsPlus
Examiner Comments

Smoking is a relevant factor, but poor diet is not specific enough so this response did not gain the mark available.

Question 8 (a)

Q8 (a) Most candidates gained one mark for this recognising that two recessive alleles were needed to show the disorder in the phenotype. However, surprisingly few candidates referred to the disorder being due to a faulty gene or allele, ignoring the full name in bold or recognising that the question was worth two marks.

Q8 (b)(i) - (b)(iv) These multiple choice questions were discriminatory and were well answered by the majority of candidates. (b) (iv) caused the most problems, this may be due to parts (i)-(iii) requiring the name of a person to be identified but part (iv) required the choice 'none of them' to be made. Candidates may have been reluctant to choose a negative statement.



8 Cystic fibrosis and albinism are examples of recessive genetic disorders.

Tay-Sachs disease is another example of a recessive genetic disorder.

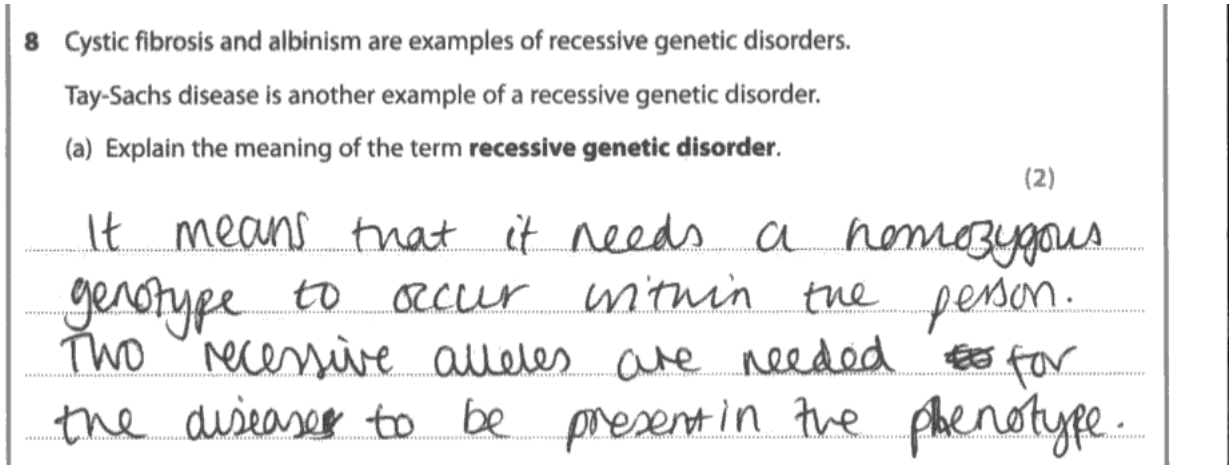
(a) Explain the meaning of the term **recessive genetic disorder**.

(2)

Recessive genetic disorders are caused by the inheritance of two recessive alleles that cause the genetic disorder as they are faulty / disease causing.

ResultsPlus
Examiner Comments

This is an example of a response that gained both marks available as they have recognised that a recessive genetic disorder is caused by two recessive, faulty alleles.



8 Cystic fibrosis and albinism are examples of recessive genetic disorders.

Tay-Sachs disease is another example of a recessive genetic disorder.

(a) Explain the meaning of the term **recessive genetic disorder**.

(2)

It means that it needs a homozygous genotype to occur within the person. Two recessive alleles are needed ~~to~~ for the disease to be present in the phenotype.

ResultsPlus
Examiner Comments

This is typical of the most common response where one mark has been awarded for recognising that two recessive alleles are needed for the disorder to be present. However, they have not explained what a genetic disorder is for the second mark.

ResultsPlus
Examiner Tip

Don't forget that genetic disorders are caused by faulty/mutant alleles.

8 Cystic fibrosis and albinism are examples of recessive genetic disorders.

Tay-Sachs disease is another example of a recessive genetic disorder.

(a) Explain the meaning of the term **recessive genetic disorder**.

(2)

Somebody has to be a carrier or has the disease and two carriers are needed for the genetic disorder to continue down the family line

ResultsPlus
Examiner Comments

This is an example of a response that failed to gain any marks as rather than defining the term they have concentrated on how it could be inherited.

8 Cystic fibrosis and albinism are examples of recessive genetic disorders.

Tay-Sachs disease is another example of a recessive genetic disorder.

(a) Explain the meaning of the term **recessive genetic disorder**.

(2)

This is when your ~~have two different genotype~~ genotype alleles are ~~is~~ different e.g Ff

Recessive alleles are not shown in the phenotype

ResultsPlus
Examiner Comments

This is an example of a response that failed to gain any marks because they have described heterozygous rather than recessive genetic disorder.

Question 8 (c)

This was a very discriminating question achieving the full range of marks, although less than 6 % of candidates managed to structure a full answer that gained them the full five marks available. Interestingly candidates often either wrote a reasonably detailed description of the gene therapy process or described how the investigation could be carried out by selecting a suitable control group and monitoring the life spans of treated and non-treated sheep. Few candidates combined both approaches. The most common mark was gained for identifying a suitable vector (e.g. a virus).

There were a significant number of answers referring to screening techniques rather than therapy. Some responses were also in the context of cystic fibrosis rather than adjusting to the context of Tay-Sachs disease (for example the use of a nebuliser to insert the vector into the lungs), suggesting that they had learnt a particular area of the syllabus and could not apply it to a different context/ Some candidates even went into detail about the CFTR protein. Others wrote in general terms about the application of gene therapy in humans, and completely ignored the experimental design component.

Unfortunately, many students still think that the purpose of gene therapy is to replace faulty alleles rather than provide a copy of a functioning gene.

This response scored all five marks available.

*(c) Tay-Sachs disease is caused by a gene mutation that results in the build up of lipid in the brain. It is hoped that gene therapy will be able to treat this disease in the future.

Sheep can also suffer from Tay-Sachs disease. Investigations have found that gene therapy increases the life span of these animals.

Suggest how these gene therapy investigations could have been carried out.

(5)

Firstly you would need to get a healthy ~~ver~~ ~~allele for~~ correct allele for the gene. Then you would attach it to a vector for example a virus. Then you would inject the virus into the right part of the ~~brain~~ body of the sheep. The virus would ~~the~~ now go into the body and replace the faulty gene. However you would have to keep on repeating this procedure because cells ~~always~~ always are renewing themselves.

Therefore you would have the independent variable as (Total for Question 8 = 11 marks)

TOTAL FOR PAPER = 80 MARKS

the virus and the dependent variable as life span of sheep. Use lots of sheep and inject them with vectors and compare their life span with healthy sheep to see if gene therapy actualy increase life span. But you would have to control the type of sheep used.

ResultsPlus
Examiner Comments

This response gained credit for:

- inserting the healthy allele into a vector;
- naming a suitable vector;
- recognising that the treatment needs repeating;
- measuring the life spans of the sheep;
- using a large sample of sheep for reliability;
- comparison to a suitable control group.

ResultsPlus
Examiner Tip

Although this is a good response, this candidate has made a mistake in thinking that gene therapy replaces faulty genes.

This response scores two of the five marks available.

*(c) Tay-Sachs disease is caused by a gene mutation that results in the build up of lipid in the brain. It is hoped that gene therapy will be able to treat this disease in the future.

Sheep can also suffer from Tay-Sachs disease. Investigations have found that gene therapy increases the life span of these animals.

Suggest how these gene therapy investigations could have been carried out.

(5)

They could have looked at a normal sheep without the Tay-Sachs disease and measured its lifespan. They then could have looked at the same type of sheep with Tay-Sachs disease and see how long its lifespan is. Finally they could treat another sheep with Tay-Sachs disease using gene therapy to see how long its lifespan is before determining if the lifespan increases or decreases with gene therapy.

ResultsPlus
Examiner Comments

This response is typical of those candidates who did not describe how gene therapy could be carried out, but did gain some credit for looking at the overall experimental design in the correct context i.e. measuring lifespan and comparing to control groups.

This response gained no marks.

*(c) Tay-Sachs disease is caused by a gene mutation that results in the build up of lipid in the brain. It is hoped that gene therapy will be able to treat this disease in the future.

Sheep can also suffer from Tay-Sachs disease. Investigations have found that gene therapy increases the life span of these animals.

Suggest how these gene therapy investigations could have been carried out.

(5)

Amniocentesis is one way of discovering if a offspring is effected or not. It consists of a portion of embryo/amniotic fluid being taken from around the uterus. With this it can be determined whether or not an infant has the gene mutation. Another form of therapy (called preimplantation) involves IVF and can allow the infant to grow and at the same time we know if they're effected. If they are effected certain actions can be taken to prevent any suffering. Ultrasound investigation could also be beneficial. Sample of womb (uterus) tissue could be taken and analysed to determine if the baby is effected.

ResultsPlus
Examiner Comments

This response is typical of those candidates who have confused genetic screening with gene therapy and therefore not covered any relevant mark points.

ResultsPlus
Examiner Tip

Make sure you know the difference between therapy and screening and read the question carefully to make sure you write about the correct one.

Paper Summary

To help prepare for future examinations, candidates are offered the following advice:

- read the whole question carefully, including the introduction, to help relate your answer to the context asked. You should read the question through carefully at least once and then write down your knowledge and understanding in a way that answers the question;
- don't assume that the question asked is the same as that which has appeared on a previous paper;
- read your answers back carefully – do they answer the question, have you made at least as many clear points as marks are available, and have you made any silly mistakes;
- when asked to distinguish between two things make sure your answer is comparative and mentions both things being compared;
- include a calculation whenever you are asked to describe or compare numerical data (particularly data presented in graphs);
- don't just quote lots of data from a graph – identify clear trends and avoid using vague terms such as 'steady increase' and 'rapid decrease' if the comparison or trend you are describing is not clear as a result;
- aim to avoid confusing terms such as reliable and valid, describe and explain;
- don't be afraid to include a diagram if it will help add clarity to your answer;
- when describing the measurement or control of variables, be specific about what is to be measured e.g. volume or mass, and avoid vague terms such as amount;
- pay particular attention to spelling, the use of technical names and terms, and organisation of your answer in QWC labelled extended writing questions;
- explore and assess examples of candidate responses from this report to help you understand what makes a good response to different types of question, and exemplify the level of knowledge and understanding expected at AS level.

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