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Examiners' Report/ Principal Examiner Feedback

January 2016

Pearson Edexcel IAL
in Biology (WBI01) Paper 01
Transport, Genes and Health

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Introduction

This paper tested the knowledge and understanding of the two AS topics: 'Lifestyle, health and risk' and 'Genes and health', together with elements of How Science Works. The range of questions provided plenty of opportunity for students to demonstrate their grasp of these AS topics. Overall, students coped well with this paper, finding most of the questions straightforward to tackle; there were very few examples of questions not being attempted at all, with all questions achieving the full spread of marks.

It was good to see how well many students could recall several areas of the specification in a good level of detail, including the core practical for measuring vitamin C concentration. It was also very pleasing to see few students losing marks for poor quality of written communication (QWC) with answers often set out in a logical style with key biological terms spelt correctly.

Some students let themselves down by not reading the questions carefully enough, or by providing a response without the detail required at this level.

Many students have clearly made good use of past papers and mark schemes, but it is important for students to understand the scientific principles covered in the specification so they can apply them to new contexts and not write a rehearsed answer to a question that has been asked in the past.

Question 1(b)(i)

Many students answered this question well. Good answers describe the glucose molecule as being polar or correctly described hydrogen bonding between glucose and water molecules. Descriptions of water being a good solvent or water molecules being polar were ingored as was reference to glucose having hydrogen bonds.

The response below gained 1 mark for a good description of hydrogen bonding between glucose and water molecules.

Suggest why glucose is soluble in water.

(1)

Contains OH groups. OH groups allows the glucose molecules to form hydrogen bonds with water, therefore making them soluble in water

The response gained no marks as it is not clear that the student is describing hydrogen bonding.

Suggest why glucose is soluble in water.

(1)

Because all of the hydrogens, the oxygen from water would be atracted to them.

Question 1(b)(ii)

Many students found this question challenging and provided only very simple responses that did not gain any credit.

This response gained one mark MP1

(ii) Suggest how triglycerides are transported in the blood.

(2)

Triglycerides are made up of 1 glycerol ~~mat~~ molecule and 3 fatty acid molecule. The ~~liver may transport makes~~ hormone in liver makes triglycerides and transports it into the blood. Triglycerides are soluble in organic solvents but insoluble in water.

The response below gained both available marks for MP1 and 2.

(ii) Suggest how triglycerides are transported in the blood.

(2)

Triglycerides are not soluble in water and therefore not in blood. : bind to molecules that are hydrophilic (eg proteins) and can be transported in blood. (eg lipoproteins for transport of cholesterol).

Question 2(b)

This question was answered well by many students. However, some students did not clearly express important ideas. For example, alveoli ' **increase surface area**' was not accepted as being equivalent to '**provides a large surface area'**. Many students managed to express the idea that the walls of the aveloi and capillaries are thin (MP3) but few went on to explain why (MP4).

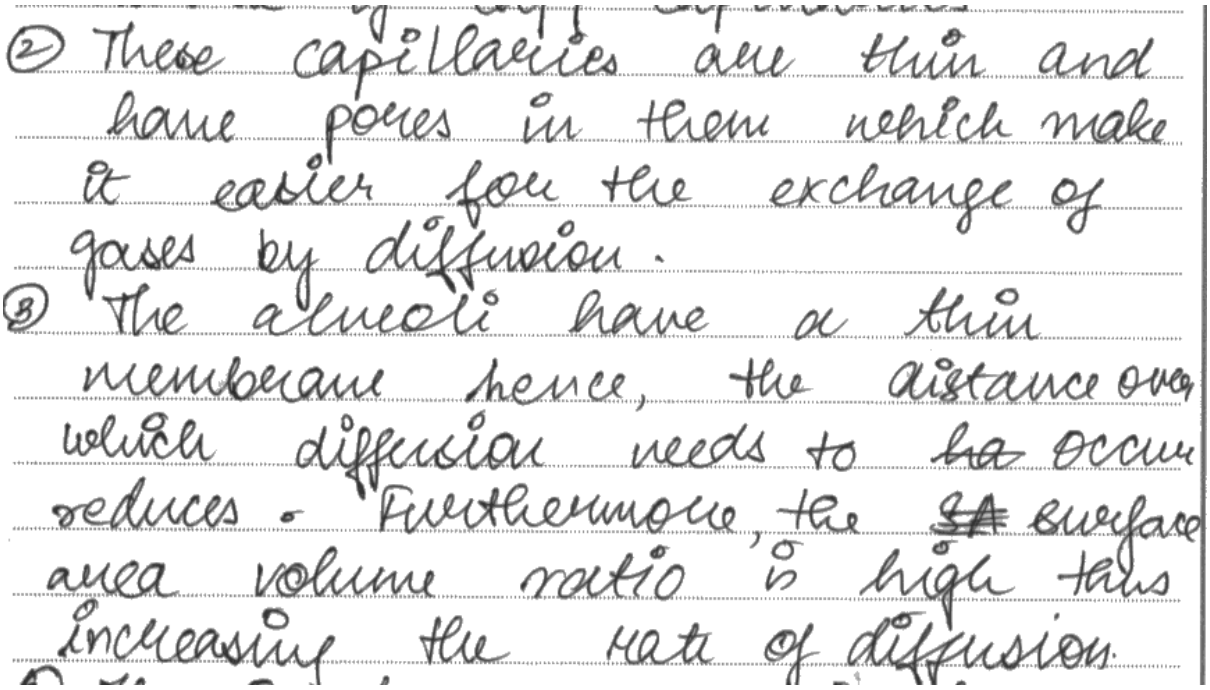
The response below gained 5 marks from MP 1, 2, 4, 5, 6 and 7.

*(b) Describe how the human lung is adapted for rapid gas exchange.

(5)

A human lung contains millions of ~~alveolin~~ alveolis. This huge number of alveoli increases the overall surface area of the lungs. The alveolar surface is lined with mucus, that allows rapid diffusion of oxygen. The cell wall of a alveolus is flattened, one cell thick along with the cell of capillary. There are ~~thi~~ small distance between these two cell wall, that allows rapid, effecient exchange of gases via diffusion. The outer surface of the alveoli is coated by numerous capillaries, that carries ~~blood~~ oxygenated blood quickly from the lungs, maintaing a steep concentration gradient. The ventilation of lungs also maintains a steep gradient between gaseous air and the mucus in the lungs.

Some common mistakes are ilustrated in the response below. Neither 'capillaries are thin' or 'thin membrane' are acceptable. Another frequently seen response that was ingored, was a description of alveoli or cappilary walls being one cell thick. The reference must be to thin walls or an accurate description of thin walls e.g. single layer of flattened or thin cells. The reference to 'surface are to volume ratio' is also incorrect in this context and was ignored. It is the total surface are that is important.


② These capillaries are thin and have pores in them which make it easier for the exchange of gases by diffusion.
③ The alveoli have a thin membrane hence, the distance over which diffusion needs to ~~ha~~ occur reduces. Furthermore, the ~~SA~~ surface area volume ratio is high thus increasing the rate of diffusion.

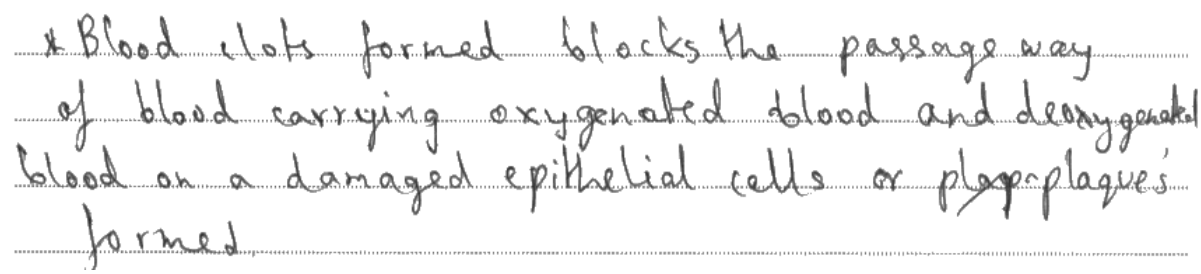
Question 2(c)

This question proved to be reasonably discriminating. The question required students to recognise that a clot would reduce blood flow through the lungs (MP1) and that the consequence would be a reduction in the rate of diffusion or the concentration gradient (MP2). Many students gained the first mark but few went on to achieve the second. Reducing the rate of gas exchange is provided in the stem and was not accepted for MP2.

The response below gained no marks. Unqualified 'blocks the path of blood' was not considered sufficient for MP1.

(c) Suggest why blood clots, formed in pulmonary thrombosis, reduce gas exchange in the lungs.

(2)


* Blood clots formed blocks the passage way of blood carrying oxygenated blood and deoxygenated blood on a damaged epithelial cells or ~~plop~~ plaques formed

This response gained one mark for the first sentence (MP1). The second sentence simply repeats the question and gains no credit.

(c) Suggest why blood clots, formed in pulmonary thrombosis, reduce gas exchange in the lungs.

(2)

The blood clot will narrow or block the artery which reduces blood flow. As a result rate of gas exchange reduces

This response gained both marks.

(c) Suggest why blood clots, formed in pulmonary thrombosis, reduce gas exchange in the lungs.

(2)

Reduce the amount of blood flowing to the lungs and so there is less oxygen/carbon dioxide availability, so rate of diffusion (gas exchange) is lower.

Question 3(a)(i)

Many students simply suggested different countries have different populations. This was not accepted as there are many ways in which a population might differ other than in size. To gain a mark students needed to suggest to that different coutries have different population sizes.

Frequently suggested incorrect answers included: 'the same sample size (100 000) was used', 'to improve relibaility' or 'to make the results valid'.

The response below did not gain a mark.

(i) Suggest why the data are presented as deaths per 100000.

(1)

it is easier to compare . Different countries have different populations.

The response below gained the mark for a correct explanation.

(i) Suggest why the data are presented as deaths per 100 000.

(1)

So an accurate comparison can be made, as each country ~~will~~ has a different number of males.

Question 3(a)(ii)

Many students gained both marks for 155. An answer rounded to 154.8 was accepted but correctly calculated answers with more than one decimal place only gained one mark. Many students rounded down from 154.8 to 154 and did not get the second mark.

The response written in the answer space is taken as a student's final answer. Some students lost the second mark because of errors in rewriting their calculated answer into the answer space.

A common mistake was to carry out a subtraction and attempt to calculate a percentage change as shown in the example below, which gained no marks.

(ii) In France, 48 000 men died from CVD in 2011. The male population of France was 31 000 000.

Calculate the death rate from CVD per 100 000 males in France.
Show your working.

(2)

$$\frac{31\,000\,000 - 48\,000}{31\,000\,000} \times 1000\,\cancel{000}$$

100 deaths per 100 000

This response shows the correct calculation with sensible rounding and gains both marks.

(ii) In France, 48 000 men died from CVD in 2011. The male population of France was 31 000 000.

Calculate the death rate from CVD per 100 000 males in France.
Show your working.

(2)

$\frac{48000}{31000000} \times 100000 = 154.8$

155 deaths per 100 000

Question 3(a)(iii)

This question was generally answered well with many students gaining at least two of the available marks. Only comparative statements were credited. So simply stating, diets, smoking etc. did not gain any credit. Incorrect comparisons that referred to a reduced risk in Romania or fewer deaths in Romania to were also ignored.

This response gained two marks.

(iii) Suggest reasons for the different death rates from CVD in Italy and Romania.

(3)

- Each country has different diets containing different amounts of saturated and unsaturated fatty acids.
- People in Italy maybe exercise regularly more than people in Romania.
- People in Italy are maybe more aware than population of Romania about the risk factors of CVD

The response below gained all three marks for MP2, MP4 and MP5. 'The reference to genetic factors would not have gained MP1 as the student did make a comparison between the countries .

(iii) Suggest reasons for the different death rates from CVD in Italy and Romania.

(3)

Differences in diet. Romanians may consume more saturated fat containing foods. Also, Romanians may have a higher alcohol consumption rate. These differences could also be a result of genetic factors. Italians may overall perform a greater amount of aerobic exercise than Romanians.

In the response below, the student has failed to make any comparisons and gains no marks.

(iii) Suggest reasons for the different death rates from CVD in Italy and Romania.

(3)

Ethnicity and lifestyle factors affect risk. ~~xxxxxxxx~~

Question 3(b)(i)

This question appeared to discriminate well with a good range of responses. A number of students did not refer to **blood** cholesterol simply stating a reduction in cholesterol and did not gain MP2.

This response was awarded one mark for MP1. The second marking point (MP2) was not awarded, as the student does not refer to blood cholesterol.

(b) Statins are prescribed to reduce the risk of CVD.

(i) Explain why statins reduce the risk of CVD.

(2)

Statins stop the action of enzymes in the cholesterol synthesis pathway so less accumulation of cholesterol leading to reduced risk of CVD.

The response below gained both available marks for MP 2 and 1.

(b) Statins are prescribed to reduce the risk of CVD.

(i) Explain why statins reduce the risk of CVD.

(2)

Statins reduce the risk of CVD as it lowers blood Cholesterol levels. It does that by blocking the liver enzyme that makes Cholesterol.

Question 3(b)(ii)

Students had many different options to choose from and the majority of students gained both marks.

Question 4(b)(i)

The majority of students correctly described the relationship between the phopholipid to cholesterol ratio and membrane fluidity.

The main reason for not gaining this mark was lack of clarity in the response.

Question 4(b)(ii)

Many students correctly calculated the percentage change.

A typical and clearly organised response that gained both marks is shown below.

(ii) Calculate the percentage change in membrane fluidity when the ratio of cholesterol to phospholipid increases from 0.4 to 0.8.

Show your working.

(2)

$1.3 - 1.1 = 0.2$

$\frac{0.2}{1.3} \times 100 = 15.38$

15.4

15.4 %

In the response below the student has correctly selected values form the graph gaining the first mark. The calculation was then carried out incorrectly so the second mark could not be awarded.

(ii) Calculate the percentage change in membrane fluidity when the ratio of cholesterol to phospholipid increases from 0.4 to 0.8.

Show your working.

(2)

$$\frac{1.3-1.1}{1.5} \times 100.$$

$$= 13.3\%.$$

13.3 %

Question 4(b)(iii)

This question proved to be a good discriminating question.

While some students struggled to gain any marks and appeared not to know the role of cholesterol in the cell membrane many were able to suggest that cholesterol reduced the movement of phospholipids or fatty acid tails (MP3) . A few students were also able to attribute this property to the interaction of cholesterol with the fatty acid tails (MP1 or 2). A significant number of students simply described the relationship shown in the graph and did not answer the question asked.

This example illustrates how the lack of detail prevented the award of marks. If the student had linked reduced movement to fatty acid tails or phospholipids, it would have been possible to award MP 3.

(iii) Suggest how cholesterol affects membrane fluidity.

(2)

The cholesterol in the cell membrane ~~it~~ causes it to become more stable, so decreasing its movement, ~~by~~ therefore decreasing its fluidity.

Again, in this response the student did not specify what cholesterol was linking. If they had suggested cholesterol form links between fatty acid chains, they would have gained MP2.

* (iii) Suggest how cholesterol affects membrane fluidity.

(2)

The Cholesterol forms links between the cell membrane molecules ~~The molecules have~~ This gives bigger spaces for the protein molecules within the membrane to move.

In the response below the student addresses all three available marking points to gain a maximum of two marks.

(iii) Suggest how cholesterol affects membrane fluidity.

Cholesterol attaches or holds the fatty acid tails together, ∴ the tails' movement is restricted and the fluidity is decreased. It is embedded in the bilayer to inhibit the movement of fatty acid tails.

Question 4(c)

Some students answered this question well, recognising that to maintain a high concentration of potassium ions inside the cells would require an active transport process that utilised ATP. However, many students tried to provide answers in terms of diffusion or facilitated diffusion and gained no marks.

This response gained no marks. Channel proteins were not accepted for MP3.

(c) The concentration of potassium ions in red blood cells is higher than the concentration in blood plasma.

Explain how this difference in potassium ion concentration is maintained.

(2)

When the concentration of glucose in the red blood cells ~~decrease~~ increase, potassium ions move into the red blood cells down the concentration gradient as there is less potassium ions in the red blood cells. Aslso there maybe less ~~membrane~~ channel proteins for potassium ions making it difficult for it tomove out of the cell.

The response below provided all three marking points (MP 1, 3 and 2) and gained a maximum score of two. Carrier proteins was accepted for MP3.

(c) The concentration of potassium ions in red blood cells is higher than the concentration in blood plasma.

Explain how this difference in potassium ion concentration is maintained.

(2)

Potassium ions are charged, and so cannot diffuse through phospholipid layer of membrane. Potassium ions are actively taken into the red blood cells (by ~~active transport~~) by carrier proteins ~~against~~ concentration gradient. Potassium binds to protein and proteins change shape using ATP. This only occurs in one direction maintaining the concentration.

Question 4(d)

Many students recognised that water was entering cells by osmosis (MP1 and 2). Descriptions of concentration gradients were often poorly expressed making it difficult to award MP3. Few students attempted to explain why the cells burst and marking point 4 was seen infrequently.

The response below gained all three available marks from MP3,2, 1 and 4.

(d) Red blood cells swell and burst if placed in water.

Explain why this happens.

(3)

There is a high water potential outside red blood cell and low water potential inside cell. The water moves by osomosis from high to low water potential into the cell. The volume of cell increases, the cell has no cell wall but only a cell membrane that cannot hold it's shape as it's too weak to withstand the pressure of water.

In the response below, the student gained one mark for reference to osmosis. It is not clear if the initial description of concentration differences refers to solute or water, and the second reference to water concentration is incorrect so MP 3 could not be awarded.

(d) Red blood cells swell and burst if placed in water.

Explain why this happens.

(3)

Water ~~##~~ molecules move from a higher concentration to a lower concentration down a concentration gradient by osmosis, the concentration of water in the cell is more than the concentration outside the cell. the cell swells and bursts. ~~also because it does not have~~

Question 5(a)(i)

The majority of students had an understanding of what a recessive allele was and gained this mark.

This was a reasonably typical correct response.

(a) Explain the meaning of each of the following terms.

(i) Recessive allele

(1)

A gene that can only be expressed on the phenotype in the absence of dominant allele. where it is homozygous recessive (rr)

Question 5(a)(ii)

Many students produced a response that referred to a change in the sequence of bases gaining one mark. A surprising number of students provided a response in terms of 'a change in the base sequence of amino acids'. These students may be trying to describe a change in the DNA base sequence coding for particular amino acids. However, responses like this reflect a lack of clarity of expression that prevents examiners awarding marks.

The response below gained both marks for a change in the base sequences of DNA.

(ii) Gene mutation

(2)

• A change to the sequence of bases of DNA that can cause a change to the amino acids coded for by the DNA and therefore affect the polypeptide chain (protein) formed by the DNA

This response only gained one mark for a change in the DNA.

(ii) Gene mutation

(2)

A change in the DNA sequence which would result in a different formation of amino acid.

Question 5(b)

This question was answered well by many students. Marking points 2 to 7 were frequently seen. Although a number of students expressed the idea of a change in DNA sequence, few described a change in the DNA triplet or DNA codon so did not gain MP1.

The response below gained a maximum of five marks.

A change occurs in the base sequence causing a change in the sequence of amino acids. A disfunctional protein is produced. This is due to the change of the shape of the active site. This change resulted from the change in bonding and folding of the protein. The change of the bonding and folding resulted from the change in the primary structure. The position and type of amino acids was changed hence the position and type of bonds.
When the specific shape of active site is changed as a result of this sequence of events, the glycogen substrate doesn't bind. So, there is no collisions between the enzyme and substrate. As a result, its not broken down but stored in the body.

The response below gained three marks (MP 2, 4 and 7)

*(b) Explain how a mutation in the GAA gene could result in a change in the activity of the enzyme acid alpha-glucosidase.

(5)

An alteration in the gene would alter the entire protein. A gene codes for a sequence of amino acids to form a protein; if a change occurs in this sequence then the coding for that protein would be different. As a result, the protein would have a very ~~differt~~ different primary structure. This causes the protein to fold differently as well changing its 3D shape. When its 3D structure is different, this affects the active site complex as ~~enzymes~~ substrates would not be able to bind to the active site as they would not fit into ~~the~~ it. Therefore, the ~~activ~~ enzyme activity is lowered as not many products are formed due to the inability of the active site to bind to the substrate. This is because an enzyme is specific and would only bind to specific substrates. As there are no 'specific' substrates for the enzyme, the enzyme activity is lowered.

Question 5(c)

This question proved challenging to many students. While many recognised that glycogen is used as an energy storage molecule, relatively few were able to explain why a lack of AAT would result in reduced energy for muscle cells. To gain marks students needed to link their answer to the release and use of glucose.

The response below did not mention glucose and did not gain any marks.

(c) The enzyme acid alpha-glucosidase breaks the glycosidic bonds in glycogen.

Suggest why a deficiency in acid alpha-glucosidase results in a lack of energy for muscle contraction.

(2)

Deficiency leads to lack of energy as the glycogen bond are not broken ~~to Glyc~~ Glycogen is ~~re~~ needed for respiration to give energy. Respiration decreases which leads to lack of energy.

This response gained both marks .

(c) The enzyme acid alpha-glucosidase breaks the glycosidic bonds in glycogen.

Suggest why a deficiency in acid alpha-glucosidase results in a lack of energy for muscle contraction.

(2)

Glycogen is a storage molecule. ~~It is~~ made of alpha glucose molecule. when there are not enough of engymes present, glycogen is not broken down to glucose molecule. Glucose is a respiratory substrate. Aerobic respiration cannot take place. ATP is not produced. Muscles respire aerobically.

Question 5(d)(i)

This question was well answered by the majority of students. On this occasion, limited misspelling of the terms was ignored, as long as it was clear what the student was attempting to say. Some students gave genetic testing or pre-implantation testing as an answer while others described the method of testing , these responses did not gain the mark.

Question 5(d)(ii)

A disappointing number of students appear not to have read the question carefully. Many of these students gave answers that related to the potential harm done to a fetus by the genetic testing, answering question 5(d)(iii).

In the response below the student expresses the idea that the recessive allele is rare (rare condition) so gains the mark.

(ii) Suggest why testing for glycogen storage disease type (II) is not offered to all pregnant women.

(1)

Some / Most pregnant women don't have the recessive allele for glycogen storage disease type (II) (so they are not offered testing).

In this response, the student suggests that testing is not offered because of the risks associated with testing. This did not gain the mark.

(ii) Suggest why testing for glycogen storage disease type (II) is not offered to all pregnant women.

(1)

If the test is positive, both parents may have to go through a lot of physical as well as mental stress and it may even lead to an abortion.

Question 5(d)(iii)

This question was answered well by the majority of students.

Both of these responses gained the mark.

(iii) Give **one** disadvantage of carrying out genetic tests on unborn children.

(1)

If false positive results are obtained may result in abortion and potential loss of a healthy baby.

(iii) Give **one** disadvantage of carrying out genetic tests on unborn children.

(1)

The procedure may lead to a miscarriage therefore leading to the loss of a potentially healthy baby.

Question 6(a)

Similar questrions to this have been seen before and many students were able to provide good answers.

The response below gained all four available marks. Thes e were awarded from MP 4, 3, 1, 6 and 5). The statement diffusion is not suitable would not have been accepted for MP 2.

6 Many animals have a heart and circulatory system.

(a) Explain why animals need a heart and circulatory system.

(4)

This system is a mass flow system. The heart acts as a pump to move the blood. A circulatory system is needed to cover long distances across the body at low time. As animals have a ~~large~~ small surface area to volume ratio diffusion is not suitable, as well as, that ~~the~~ the animals have a high metabolic rate therefore it requires a heart and circulatory system to transport nutrients and oxygen fast.

For this response the student gained two marks (MP3 and 5). It was considered that taken together, the last three lines were sufficient for MP 5.

6 Many animals have a heart and circulatory system.

(a) Explain why animals need a heart and circulatory system.

(4)

Animals need their heart to pump the blood all around the body. Circulatory systems is needed so that it pumps the blood to the lungs so it can be oxygenated and then pumped to the rest of the body so that the body cells take in the oxygen to complete their functions.

Question 6(b)

This question was approachable for the majority of students. However, lack of detail in responses resulted in some students failing to gain some of the mark points. For example to gain MP4 students needed to describe or refer to both stretch and recoil. Reference to recoil alone was not sufficient.

In this response the student gained all four available marks from MP2, 3, 4, 6 7. Muscular walls was not accepted as being equivalent to walls being thick or containing collegen (MP1).

(b) When the human heart contracts, blood from the left ventricle enters the aorta.

Describe how the structure of the aorta is related to its function.

(4)

It has a smooth endothelium to reduce friction and maintain high blood pressure.

It has muscular walls to withstand high pressure without damage.

It has elastic tissue in walls which allows aorta to stretch and recoil to withstand and maintain high blood pressure.

It has a valve to prevents backflow of blood.

The student gained one mark for the following response (MP2).

(b) When the human heart contracts, blood from the left ventricle enters the aorta.

Describe how the structure of the aorta is related to its function.

(4)

Aorta has a small lumen to maintain a high blood flow, and it has strong muscles and ~~smot~~ smooth muscles to protect it's walls from getting damaged due to the high blood pressure. It has a folded lumen walls so it can contract whenever it needs to.

Question 7(a)

This was a very straightforward question with almost half of students gaining the full 4 marks available. The majority of students knew that DCPIP is required and attempted to describe a titration. MP4 was often not awarded as it was difficult to determine from the description provided if the students were describing the correct colour change. Some students also lost marks because they described the measurment of vitamin C in solutions rather than vitamin C in broccoli juice.

The response below gained all four available marks from MP 1, 2, 3, 5 (in line 6 reference to time was ignored). The description of colour change was not considered sufficiently clear and would not have gained MP4.

(a) Describe how the vitamin C content of broccoli could be measured.

(4)

Brocolli juice can be added to a test tube. ~~[redacted]~~ DCPIP ~~[redacted]~~ (a solution that turns colorless when vitamin C is in the substance) would be added to the brocolli juice drop-by-drop as we shake the test tube until it turns colorless. The time taken and the drops added would be measured. The temperature would be kept the same. Repeat experiment for more reliable results.

The student gained one mark for this response (MP2). The student does not mention using jucie or broccoli extract so can't be awarded MP1. The description of the colour change is not in the context of the titration or use of juice, so does not gain MP4. The method suggested does not resemble a titration so the response can not be awarded MP3.

(a) Describe how the vitamin C content of broccoli could be measured.

(4)

Vitamin C turns DCPIP (vitamin C indicator) from blue to colourless. So, obtain the green part of broccoli and add the known concentration and volume of DCPIP, shake the mixture and calculate the amount of vitamin C present. Repeat the experiment using different broccoli and concentration of DCPIP. As a control, add water to broccoli. Controlled variables: temperature; volume of DCPIP and type of broccoli

Question 7(b)(i)

Students were required to describe the two main observations. When asked to describe data it is important that students look at the mark allocation and make a judgment about the sort of response they make. There are clearly two main observations from the data and students were required to describe each of these for a mark. Both cooking methods reduced vitamin C over time (MP1) and boiling caused a greater reduction (MP2). Many students described one of the observation in great detail. Even when they included additional mathematical analysis of one or more data points they only gained one mark.

The response below gained both marks.

(i) Using the information in the table, compare the effect of these two cooking methods on the vitamin C content of broccoli.

(2)

On both methods of cooking, the vitamin C content of broccoli decreases as the time of cooking increases. When boiling, the vitamin C content of broccoli is lower than when microwave cooking, even though the time of cooking is the same.

In this response the student only gained one mark (MP2).

(i) Using the information in the table, compare the effect of these two cooking methods on the vitamin C content of broccoli.

(2)

Boiling decreases vitamin C content more than microwave does. After 8 min of boil vitamin C content declined by 26.8% while after 8 min of being in a microwave vitamin C content declined by 22.3%.

Question 7(b)(ii)

Many students appeared to confuse the ideas of repeatability and validity.

Some students did not think about the investigation and suggested controlling the temperature or pH – neither being appropriate for this particular investigation. Suitable suggestions involved controlling some aspect of the broccoli such as its mass or type.

Repeating the experiment will not improve validity of the results. The response below did not gain a mark.

(ii) Describe **one** way in which the student could ensure that the results were valid.

(1)

Repeat the experiment several times and find out the mean values of the result.

Question 7(b)(iii)

Good explanations were offered, in terms of damage to the cell membranes and vitamin C diffusing out of the cells, by many students. However, a significant number of students appeared not to have read the stem of the question and suggested that boiling denatured or destroyed the vitamin C.

In this response, all three marking points were awarded.

(iii) Vitamin C is not destroyed by the cooking methods used in this investigation.

Suggest why the vitamin C content of broccoli changes when broccoli is boiled.

(3)

because the phospholipid of the cell membrane melt, which increases the permeability of the membrane, so vitamin C will be easier to diffuse out of the broccoli. So vitamin C is lost in down concentration gradient.

This response gained no marks. It is possible that the student di not read the question carefully.

(iii) Vitamin C is not destroyed by the cooking methods used in this investigation.

Suggest why the vitamin C content of broccoli changes when broccoli is boiled.

(3)

Vitamin C content in broccoli might be denatured by the high temperature. Vitamin C content may be broken down.

Question 8(a)

Many students were able to suggest that risk was a measure of probability or the chance that an event will happen (MP1). However, relatively few students seemed to have any concept of what relative risk was (MP2). This is disappointing given that much of the data around risk factors is given in terms of relative risk.

This was one of the better response seen in which the student has made a reasonable attempt to explain relative risk.

(a) Suggest what is meant by the term **relative risk**.

(2)

Increased probability of developing a disease due to compared a risk factor, compared to risk of developing the disease if the risk factor is ~~in~~ normal.

The response below is a more typical response. The student has attempted to explain risk but not the idea of a comparison. So only MP1 was gained.

(a) Suggest what is meant by the term **relative risk**.

(2)

the chance of developing type 2 diabetes. which increases if level of excercize is low for eg.

Question 8(b)

Many students approached this question in a logical way and described the trends for the three different BMI groups, gaining all three marks.

This response gained all three marks.

(b) Using the information in the graph, describe the effect of exercise on the relative risk of developing type 2 diabetes for the three BMI groups.

(3)

The relative risk of developing type 2 diabetes decreases as the amount of exercise increases for both the < 25·0 and ≥ 30.0 BMI groups. As for the 25.0 - 29.9 BMI group, there is decrease in relative risk of developing type 2 diabetes from 0·5 hours per week ~~of exercise~~ to 2·0 - 3.9 hours per week of exercise but there is an increase of the relative risk from 4·0 - 6·9 hours per week ~~on~~ onwards. The highest relative risk is 1·06 for the 25·0 - 29·9 BMI group at >7 ~~pe~~ hours per week of exercise.

In the response below the student did not relate the amount of exercise to the risk of diabetes and did not gain any marks.

(b) Using the information in the graph, describe the effect of exercise on the relative risk of developing type 2 diabetes for the three BMI groups.

(3)

~~For~~ 25.0 - 29.9 BMI group is the highest among the 3 groups
25.0 - 29.9 BMI group is the highest ~~at~~ → 7 for the amount of
exercise at ≥7 and <25.0 BMI group is the least
The 3 BMI groups are same for <0.5 amount of exercise
≥ 30.0 BMI group decreases as the amount of exercise increases
~~<25.0 BMI g~~

Question 8(c)

In this question, students were expected to use the information provided to devise advice for someone with a BMI greater than 30. Many students suggested increasing the amount of exercise (MP1). However, relatively few students went further and suggested reducing energy intake (MP2) or reducing BMI to below 25 (MP3). Many students suggested reducing particular food types e.g. fats or carbohydrates. The key point is to reduce energy intake not simply change food types so these responses were not accepted as an alternative to MP2.

The response shown below gained all three marks.

(c) Suggest the health advice that could be given to a person with a BMI greater than 30.0, to reduce the risk of type 2 diabetes.

(3)

Increased exercise would decrease the [redacted] risk of type 2 diabetes. Reduce the BMI to less than 25.0. Decrease the energy intake for energy balance. Decrease the carbohydrate intake.

This response gained one mark (MP1).

(c) Suggest the health advice that could be given to a person with a BMI greater than 30.0, to reduce the risk of type 2 diabetes.

(3)

They should exercise more than 7 hrs per week. They should eat less sugary diets as well as ~~kss~~ start starch diets. They should have more active life styles. This will reduce their weight. They should also eat less carbohydrates.

Question 8(d)

Most students found this question straightforward and gained two marks for sensible suggestions.

Question 8(e)

Many students found this question difficult. Answers were expected to be in the context of the study carried out. Three main limitations of the study that can be derived from the information provided are that, it only included women (MP1), it only considered one occupation (MP2) and all the data were collected by self-reporting (MP3). Many students made suggestions based on information not provided e.g. 'don't know age of the nurses'. If the information is not provided then it cannot be used as a justification for the study not being more widely applicable. Such responses were ignored.

Paper Summary

Based on their performance on this paper, students 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.

- Read your answers back carefully – do they answer the question, have you made at least as many clear points as marks are available.

- When asked to distinguish between two things make sure your answer is comparative and mentions both things being compared.

- When asked to describe data, either graphs or tables, look first for the main trends i.e. the overall changes and describe these. You need then to make a judgment about the usefulness of any mathematical manipulation of the data and this should only carried out if it adds value to your written description.

- Do not be afraid to include a sketch diagram or graph 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 student responses from this report to help you understand what makes a good response to different types of questions, and exemplify the level of knowledge and understanding expected at AS level.