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Examiners' Report
June 2023

International Advanced Level Biology WBI11 01

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Introduction

We saw a wide range of responses that overall covered all of our mark points with the exception of one in question 9. There appeared to be fewer blank responses than in previous series. The multiple-choice questions generated a range of responses and the calculations were given good attempts, although candidates still cannot do ratios and express their answers to an appropriate number of significant figures and decimal places. There were some really good attempts at the two levels-based questions, with few blank responses seen. From some responses seen it was clear that candidates are being taught how to approach this style of question and how to structure their answer. It was also evident that centres are using the mark schemes and examiner reports from previous series to prepare their candidates for their assessment.

Question 1 (a)(i)

This was invariably answered well by the vast majority of candidates. However, as expected, the commonest mistake was to use T instead of U.

Question 1 (a)(ii)

Most candidates could name this stage of protein synthesis as transcription. If the mark was not awarded it tended to be because the candidate had hedged their bets and written both transcription and translation.

Question 1 (a)(iii)

Most candidates correctly identified the enzyme as RNA polymerase. The most common errors were references to polymerase (unqualified) or to DNA polymerase or helicase.

Question 1 (b)

This was answered reasonably well with a good number of candidates able to score 2 or 3 marks and many scoring at least 1 mark. However, in the poorer responses, candidates did not give clear and categorical statements about similarities or differences. Few used a table.

Each of the five marking points were observed in the range of responses seen.

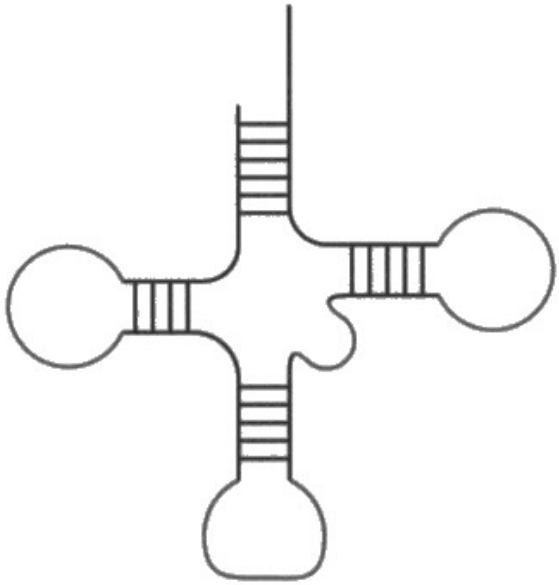
For similarities, candidates generally scored mark point 1 for nucleotides or ribose or the correct 4 bases, however, a number of candidates referred to both having U (uracil) without reference to the other 3 bases. Most candidates were aware of the single stranded nature of both molecules for mark point 2.

For differences, mark point 3 scored well in general, with less candidates scoring mark point 4 and even less scoring mark point 5.

A good number of responses scored mark point 4 by reference to the presence or lack of H-bonds with slightly less referencing linear versus folded (or clover leaf shaped). Few candidates referred to loops.

For mark point 5, many candidates had difficulty expressing their answer clearly in terms of the binding site.

(b) The diagram shows part of a tRNA molecule.



Compare and contrast the structure of an mRNA molecule with that of a tRNA molecule.

(3)

Both tRNA and mRNA contain 4 bases; Adenine, Uracil, Guanine, Cytosine.
The mRNA is a straight chain of bases whilst tRNA is folded into a "clover-leaf arrangement" held by Hydrogen bonds between bases
Also tRNA molecules have a binding site for amino acids, unlike mRNA molecules.

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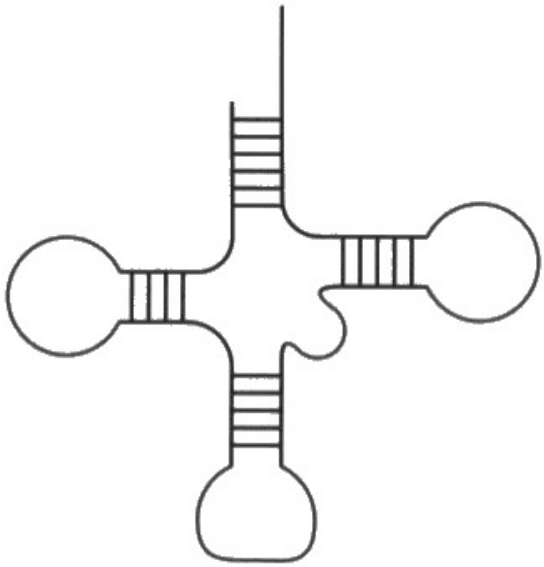
Examiner Comments

This is a good illustration of what we expected for mark point 1, 4 and 5.

(b) The diagram shows part of a tRNA molecule.



Compare and contrast the structure of an mRNA molecule with that of a tRNA molecule.

(3)

the tRNA & mRNA

both have single strand, both have ribose,

tRNA have specific size, mRNA size varies. tRNA can have anticodon but mRNA have codon

ResultsPlus
Examiner Comments

This response illustrates what we were after for mark points 2, 1 and 3.

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Examiner Tip

There are two important things to remember when answering compare and contrast questions:

- You must have at least one similarity and one difference to access full marks
- You must clearly state that 'both' have something and clearly state if something is a something – you will not get marks for writing two separate descriptions.

Question 2 (b)

Although most candidates were able to score a mark here with a value within the accepted range, a common error was to give too many decimal places.

Question 2 (c)

A good number of candidates were able to produce clear responses by homing in on explaining the changes in the blood volume, with reference to both graphs.

Those candidates who did that generally fared well, scoring all 3 marks or at least 2 marks. The mark that was awarded the least frequently was mark point 3.

However, there were many responses which failed to answer the question properly and just described the graph or volume changes, without reference to pressure. Some responses simply described the journey of blood through the heart.

(c) The volume of blood in the left ventricle changes during the cardiac cycle.

Explain these changes.

(3)

As the blood is filling during diastole the volume of blood in the ventricals is high. After diastole then follows ~~ventricular~~ atrial systole which is the contraction of the walls of the ~~ventricals~~ artrium this forces blood into the ventricals ^ increasing the volume. Then after follows ~~at~~ ventricular systole where blood is forced out of the ventricals and the volume of blood ^ in the ventricals is reduced

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Examiner Comments

This response illustrates all three of our mark points. Ideally, we wanted the candidates to refer to an increase or decrease in volume but we did allow references to high and low provided it was clear.

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Examiner Tip

If a question requires you to write about changes, then you should be referring to increase, decrease or no change.

Question 3 (a)(i)

Many candidates drew the bond correctly. A wide range of drawings were seen by candidates who could not draw it correctly, with common errors including not putting the 'O' in, joining up the incorrect carbons and adding extra atoms to the diagram which were wrong.

3 Sucrose is a disaccharide made from glucose and fructose.

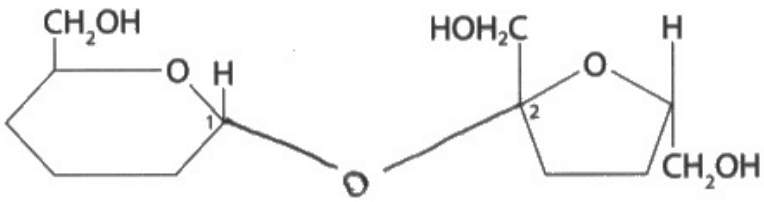
Glucose is joined to fructose by a 1–2 glycosidic bond.

(a) (i) The diagram shows a molecule of glucose and a molecule of fructose.

Carbon 1 on the glucose and carbon 2 on the fructose are numbered.

Complete the diagram to show a glycosidic bond between the glucose molecule and the fructose molecule.

(1)



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Examiner Comments

This is what we were ideally wanting for this question, although we did not mind if the bond was drawn horizontally.

Question 3 (a)(ii)

Surprisingly, the commonest error was to omit the H_2O, even if the formula for the sucrose had been given correctly.

(ii) Complete the formula equation for the reaction that makes sucrose from glucose and fructose.

(2)

$C_6H_{12}O_6 + C_6H_{12}O_6 \longrightarrow C_{12}H_{22}O_{11} + H_2O$

ResultsPlus
Examiner Comments

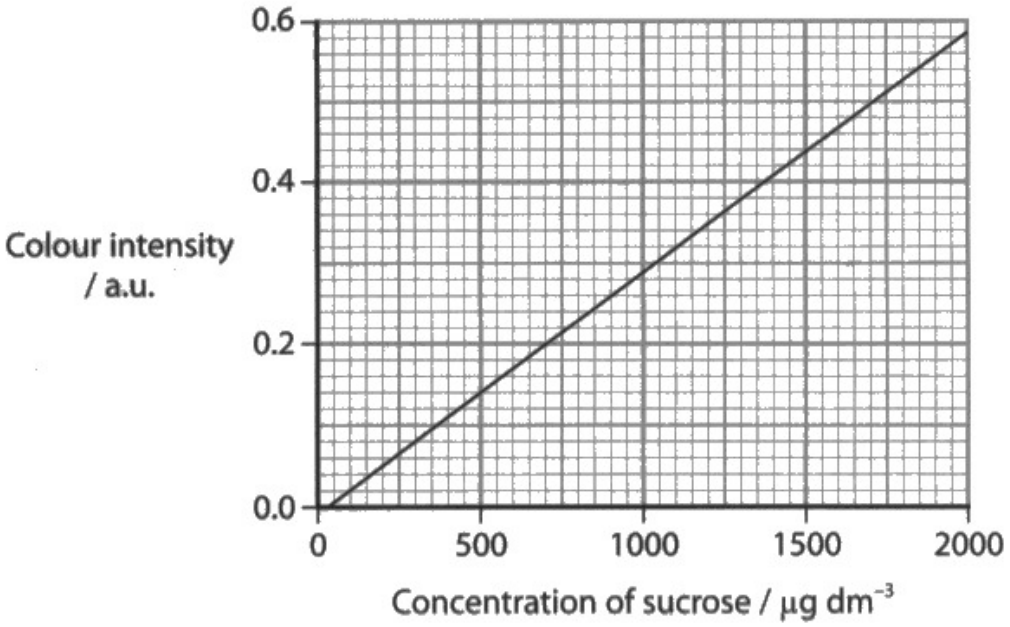
This is an example of what we were looking for. We did not mind in which order the two formulae were written but we did expect them to be written as a proper equation.

Question 3 (b)(i)

Candidates who had carefully read the information provided in the question realised that one sucrose molecule contained one fructose or that there would be the same number of fructose molecules as sucrose molecules. They were then able to describe the proportionality in terms of increasing concentrations of both molecules.

The colour intensity is directly proportional to the concentration of sucrose.

The graph shows this relationship.



(i) Give a reason why the colour intensity is directly proportional to the concentration of sucrose.

(1)

The greater the concentration of the sucrose the more the fructose molecules. ~~So the colou~~ fructose changes the colour intensity.

ResultsPlus
Examiner Comments

This was the commonest way that candidates answered this question, talking about the increase in concentration of both molecules.

Question 3 (b)(ii)

This question was targeted at the more able candidates and it was only them who realised that the question was referring to the sensitivity of the test. This meant that this was quite a low scoring question.

(ii) Suggest why the line does not start at the origin of the graph.

(1)

because colour can be seen clearly when the sucrose concentration is above 50 $Mgmd^{-3}$.

ResultsPlus
Examiner Comments

Some candidates looked at the graph and used it to answer correctly.

(ii) Suggest why the line does not start at the origin of the graph.

(1)

There is not enough fructose to ~~th~~ show change in colour when concentration of sucrose is too low.

ResultsPlus
Examiner Comments

Other candidates answered in terms of how much fructose was available, using the information in the question as a hint to what we were after.

Question 3 (b)(iii)

This question was generally well-answered by those candidates who realised that they were actually being tested on monosaccharides and disaccharides.

(iii) State why the concentration of maltose and lactose cannot be measured using this test.

(1)

Maltose and lactose does not contain fructose, So there will be no colour change when the chemical is added.

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Examiner Comments

This is an example of a correct answer.

ResultsPlus
Examiner Tip

If you are not sure what the question is asking, try and work out the theme of the question using any hints in earlier parts of the question, and then think what you have been taught about the topic.

Question 4 (a)(iii)

Candidates always seem to struggle expressing their answer as a ratio and this question was no exception. Many of the candidates still picked up one mark as they could calculate the volume correctly.

(iii) Another hydra has a surface area of $2.3\pi\,mm^2$, a body length of 1.8 mm and a diameter of 1.2 mm.

SA : V

Calculate the surface area to volume ratio of this hydra.

Use the formula:

volume = $\pi r^2 l$

$2\pi r l = 2.3\pi$

$2 \times 0.6 \times 1.8$

SA = 2.3π

BL = 1.8 mm

r = 0.6

(2)

2.3 : 0.648

$\pi r^2 l = \pi \times (0.6)^2 \times 1.8$

$= 0.648\pi$

Answer 2.3 : 0.648

ResultsPlus
Examiner Comments

This candidate could calculate the volume and realised that they could cancel out pi. However, the answer was not given as a correct ratio.

ResultsPlus
Examiner Tip

We require a ratio to be expressed either as 'something : 1' or '1 : something'.

(iii) Another hydra has a surface area of $2.3\pi\,mm^2$, a body length of 1.8 mm and a diameter of 1.2 mm.

Calculate the surface area to volume ratio of this hydra.

Use the formula:

volume = $\pi r^2 l$

$d = 1.2$ $r = 0.6$

$V = \pi \times 0.6^2 \times 1.8$

$V = 2.0358\ldots \frac{81}{125}\pi$

$SA = 2.3\pi$

(2)

SA : V

$2.3\pi : \frac{81}{125}\pi$

$\frac{81}{125}$ $\frac{81}{125}$

SA : V

3.5 : 1

4 : 1

Answer 4 : 1

ResultsPlus
Examiner Comments

This candidate knew how to express their answer in a correct ratio format and could select an appropriate number of figures to give their answer to.

(iii) Another hydra has a surface area of $2.3\pi\,mm^2$, a body length of 1.8 mm and a diameter of 1.2 mm.

Calculate the surface area to volume ratio of this hydra.

Use the formula:

volume = $\pi r^2 l$

(2)

$r = 0.6$

$l = 1.8$

volume = 2.0358

$\frac{2.3}{2.0358} = 1.1298$

Answer 1.1 mm

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Examiner Comments

Some candidates calculated the correct value but did not express their answer in an acceptable ratio format.

ResultsPlus
Examiner Tip

Ratios need to be expressed as '1 : something' or ' something to 1', not just the single value for the division.

Question 4 (b)

Marks were generally awarded for marking points 2 and 3: the importance of surface area or the thin layer of cells. However, in a number of cases, responses failed to qualify the large surface area with reference to **fast** diffusion (gas exchange), or to the thin layer of cells providing a **short** diffusion distance or **faster** gas exchange, thus losing either mark.

Surprisingly few candidates referred to oxygen being dissolved or present in the water or to tentacles (or the body) moving the water round to maintain the concentration gradient, thus not gaining access to mark point 1 or to mark point 4.

(b) A hydra has a hollow body that is made up of two layers of cells.

Explain how a hydra is adapted for gas exchange.

(3)

Hydra is small so large surface area to volume ratio so rate of diffusion / rate of gas exchange faster. O_2 from outside to inside & CO_2 from inside to outside. 2 layers of cell so thin wall, short diffusion ~~dis~~ distance so faster rate of diffusion. Cilia present on the surface of body which can beat back & forth to allow sufficient amount of O_2 available ~~sur~~ to diffuse from water into hydra It can move to place where higher concentration of O_2. Maintain steep concentration gradient with water to ensure diffusion is faster!
~~O2~~ Oxygen

(Total for Question 4 = 7 marks)

T
C
D
S

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Examiner Comments

This response illustrates all four of our mark points. As we had not labelled the tentacles on the diagram of the hydra, we allowed terms that clearly meant tentacles.

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Examiner Tip

This is another example of where you need to identify the theme of the question, think back to what you have been taught and then apply this knowledge to the context of the question.

In this question we clearly tell you that the question is about gas exchange but all the calculations have been trying to get you to look at the diagram and to think about factors that affect gas exchange.

(b) A hydra has a hollow body that is made up of two layers of cells.

Explain how a hydra is adapted for gas exchange.

Fick's Law given by: (surface area × conc. gradient) ÷ thickness of membrane (3)
cylindrical
Firstly, the body only being made up of two layers of cells shortens the distance of diffusion. Next, the hydra has a great surface area to volume ratio. ~~this means that~~ Having a cylindrical body with many tentacle like structures above its body, as well as a hollow body increases surface area. This allows rapid & and effective gas exchange by diffusion, increasing the rate of gas exchange by diffusion. The oxygen from water quickly diffuses into hydra body cells can carbon dioxide can be removed quickly. ~~they~~

ResultsPlus
Examiner Comments

This candidate has gone straight to the spec point about Fick's Law and developed their answer from what they have been taught.

Question 5 (a)

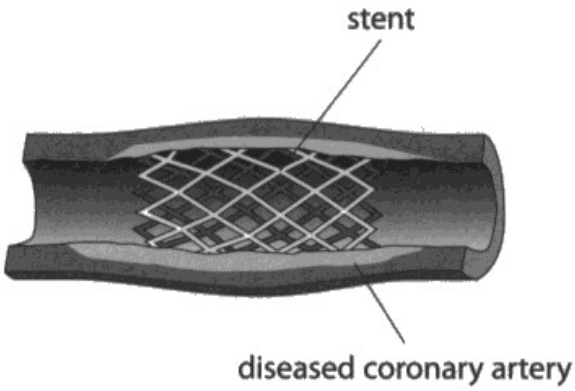
Candidates generally were familiar with the blood clotting process and the role of thromboplastin; there were some good responses and both marks were frequently awarded. However, in a number of cases candidates failed to state that the thromboplastin was released from, or contained in, platelets and so mark point 1 was not as frequently awarded.

There were quite a high number of candidates who wrote everything they knew about blood clotting, going way beyond the requirements of the question. Although this will not cost them marks, it can use up valuable time.

5 Stents are used in the treatment of atherosclerosis.

Stents widen the diseased coronary artery so that blood can flow through to the heart muscle.

The diagram shows a stent.



Stents can damage the endothelial cells lining the artery and trigger the formation of a blood clot.

Patients who have a stent fitted are given anticoagulants.

(a) Explain how damage to the endothelial cells results in the formation of thrombin.

(2)

The damaged area will release platelets which will then release the enzyme thromboplastin. (a soluble protein) Thromboplastin together with calcium ion catalyses the conversion of prothrombin into thrombin. (a soluble protein).

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Examiner Comments

This is an example of the type of response we were hoping for.

Question 5 (b)

This was well answered by the majority of candidates. The most common responses were excessive, heavy or uncontrolled bleeding. However, in a minority of cases side effects were mentioned rather than risks, which could not gain the mark.

(b) Give **one** risk of treating patients with anticoagulants.

(1)

It can lead to excessive bleeding or fatal fainting.

ResultsPlus
Examiner Comments

We did not really think that fainting was a risk, more a side effect. We could ignore this however as it is not wrong as such and so we awarded the reference to excessive bleeding.

Question 5 (c)(ii)

The story of blood clotting has been well rehearsed by many candidates and this question was generally well answered by candidates who were able to use the information provided to describe the idea that fibrinogen could not be converted to fibrin and thus a mesh could not be formed or platelets or blood cells would not be trapped, gaining both marks.

However, in some cases the positive story was told of fibrin being formed and a mesh being formed (or platelets or blood cells being trapped), which would only gain 1 mark as we needed the negative idea, which answers the question, for both marks.

A small minority of candidates gained only 1 mark for stating that there would be no conversion of fibrinogen into fibrin as they repeated the stem of the question and wrote that therefore a blood clot would not form.

(ii) Explain how variegin prevents blood clotting.

(2)

As variegin binds to the active site of thrombin, it prevents the conversion of fibrinogen into fibrin which creates a mesh of fibres which enables blood to clot.

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Examiner Comments

This candidate gained mark point 1 for saying what would not happen, so were able to award mark point 2 as well even though they did not say that the mesh would not be formed.

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Examiner Tip

Make sure that your answer actually answers the question and that you have not simply written everything you know about a topic. In addition, check that you have not simply repeated the stem of the question as you will not be awarded marks for what we have told you.

Question 5 (c)(iii)

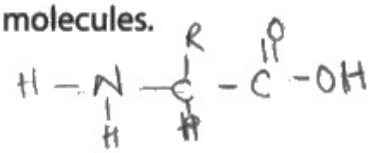
This was generally well answered and it was pleasing to see a number of responses gaining a maximum of 2 marks for all 3 marking points. Most candidates achieved 1 mark with many gaining 2.

Candidates who read the information carefully stated that variegin binds to the active site, thus gaining mark point 1, while others referred to the enzyme-substate complex or a lowering of the activation energy for the reaction. So, there were a variety of ways to gain this mark and this was seen more or less equally in the responses.

The second mark was mainly gained by reference to peptide bonds being broken while the least used option was a reference to hydrolysis. There was a small number of cases where references to incorrect bonds or to condensation were made.

(iii) Thrombin slowly splits variegin into two molecules.

Explain how thrombin splits variegin.



(2)

By hydrolysing the peptide bonds between the amino acids

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Examiner Comments

This response has been included to show how a succinct and accurate response can gain full marks.

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Examiner Tip

This is another example where you need to go back and look at the information given in the question to help you answer it.

Variegin is not named on your spec so therefore you are not expected to have been taught the answer. This means that you should go back and see what we have told you about the molecule. In this case we told you it was a protein. If you pick this up then you can work out that we are really asking you about how a protein is broken down.

Question 5 (c)(iv)

'Comment on' is not a command word that candidates find easy to answer and this was no exception.

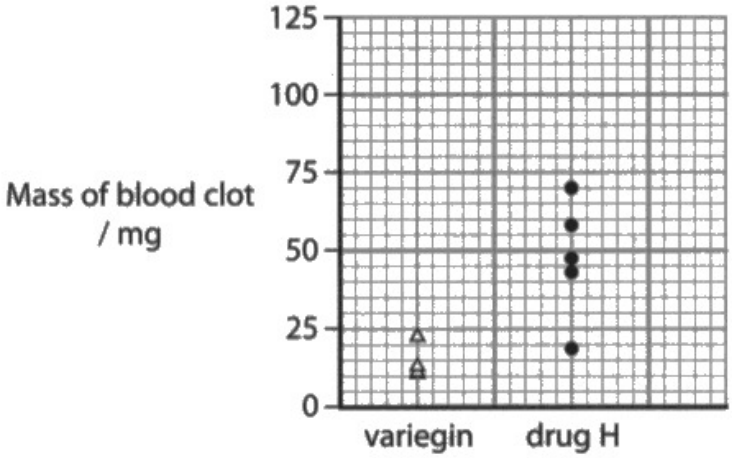
Most candidates spotted that there was less mass of blood clot with variegin (or the converse with drug H) for mark point 1. Some responses referred to the reduction in clotting with variegin, or variegin being more effective at clotting, which was also acceptable. The other mark points were rarely seen.

(iv) The effect of variegin on the mass of blood clots forming inside a stent was investigated.

The masses were compared with another anticoagulant, drug H.

The graph shows the results of this investigation.

Each plotted point represents the mass of blood clot in one stent.



Comment on the results of this investigation.

(2)

Drug H has higher mass of blood clot in mg than variegin. Variegin is a more effective anti-coagulant drug than drug H. This is because it forms smaller and less blood clots.

Drug H has a wider range of masses of blood clots in mg than variegin. This is clear from the more spread plotted points which reach 70 mg.

This is an example of one of the stronger responses that we saw.

A question starting 'comment on' requires you to look carefully at the data to identify any trends or patterns or differences. Sometimes there will be no trends, patterns or differences but this is just as important to point out.

You should also comment on any error bars, or lack of and link this with the validity or significance of the data. However, you will not gain credit for trying to link their presence / absence with reliability.

Question 6 (c)

The vast majority of candidates scored this mark and invariably it was for haemoglobin, the main and obvious option. Very few responses referred to myoglobin or to other possibilities which we had to include although did not expect such as catalase, peroxidase and cytochrome. There were a small number of blanks and also a few incorrect answers, including haem which we did not consider to be a molecule.

Question 6 (d)

Most candidates were aware of the action of antioxidants on free radicals to gain mark point 1. Many described it as reducing the free radicals but some went into detail of donating electrons to them.

A fair number of candidates were then able to carry the story forward and were able to go on to describe the effects of this in relation to reducing damage to blood vessel linings, with a few really good responses referring to oxidative stress. The best responses went further to state that plaque or atheroma formation was reduced. However only a few candidates went on to state that this reduced CVD or stroke of heart attacks etc.

Thus only a sizeable minority of the very best responses gained all 4 marks with a good number scoring 2 or 3 marks from a combination of mark point 1, mark point 2 or mark point 3.

(d) Explain why dietary antioxidants are important.

(4)

reduce number of ~~fr~~ free radical.
free radicals that damage endothelial lining, tissue damage, cell
damage will be reduced.
Hence thrombin will not ~~clot~~ form blood clots
hence ~~no~~ no atheroma or plaque formation.
reduced risk of cardiovascular disease.

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Examiner Comments

This example has been included as it is a very succinct response from a candidate who in all likelihood has used past paper mark schemes to prepare for this exam.

ResultsPlus
Examiner Tip

Using the mark schemes to past papers is a very good way of preparing for your exams; if we have asked a similar question in the past then the mark scheme is going to be very similar too.

Question 6 (e)(i)

This calculation was fairly straightforward but the marks were lost by candidates who did not know how to express their answers to two significant figures.

Question 6 (e)(ii)

Candidates vary in their ability to cope with percentage calculations and to then select an appropriate number of decimal places to express their answer in. As the question asked for percentage difference, we also accepted percentage increase and percentage decrease.

Question 6 (e)(iii)

Candidates varied in their ability to deal with this question which asked them to comment on the results displayed in a table and a graph; this was quite a lot of information to assimilate. The commonest mark points awarded were mark points 2 and 3. Numerous candidates wrote about the animals who ate the most and least antioxidants.

(iii) Comment on the results of this investigation.

Use the information in the table and the graph to support your answer.

(3)

Arachnids ~~has~~ have a lower mean antioxidant activity than insects. Organisms that eat animals have a lower mean antioxidant activity than those eat plants. The value of mean antioxidant activity of the organisms eating plants has a larger error bar than those eat animals. Grasshoppers have a highest mean antioxidant activity while black tarantulas have a lowest mean antioxidant activity.

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Examiner Comments

This is an example of one of the better responses that we saw. We could just ignore the last sentence as it is irrelevant and not contradictory to anything else written.

(iii) Comment on the results of this investigation.

Use the information in the table and the graph to support your answer.

(3)

The mean antioxidant activity of organisms that have a dietary habits is ~~lower~~ very low like in black beetles and goat weke bugs. Organisms that eat ~~plants~~ plants from silkworm to grasshoppers have high mean antioxidant activity per 100g. The mean antioxidant also gradually increase as the size of the organism increases. for example Grasshoppers has higher than crickets.

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Examiner Comments

This response is more typical of the less able candidates who have not been taught how to answer a question of this type and so simply describe the data given.

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Examiner Tip

One way for candidates to tackle this type of question would be to use the information in the table to bracket off and label the plant eaters and animal eaters in the graph as well as bracketing off the arachnids and insects in the graph. By doing this, not only is all the information gathered in one area and so can be easily seen, it also makes the candidate think about the information supplied more carefully, before beginning their response.

Question 7 (a)

Many candidates were able to score marks from the first 3 marking points but the fourth marking point often proved to be a stumbling block for many others.

A good number of the candidates gained mark point 1 by reference to the parents as being carriers or being heterozygous for the disorder. However , this point was more often gained from a genetic diagram, as was mark point 2 for the genotypes of the offspring.

Some candidates stated that there was a possibility of the unborn child being homozygous recessive or carrying both recessive alleles to be awarded mark point 3. To gain this mark from a genetic diagram, candidates had to clearly indicate which was the affected individual from the various offspring genotypes given from the diagram, which many candidates failed to do.

The fourth mark point was the one least frequently awarded. Many candidates just described the genetic cross and talked about the probability of having a child with PKU, thus not answering the question. Others lost marks for referring to a baby when they should have written embryo. Another common mistake was to state that the parents were being tested as this would help them decide if they wanted a child or not.

7 Prenatal testing is used to screen for genetic disorders in developing embryos.

(a) Phenylketonuria (PKU) is one genetic disorder that is screened for by prenatal testing.

This disorder is inherited in a similar way to cystic fibrosis.

Explain why a healthy couple might choose to have a prenatal test for PKU.

Draw a genetic diagram in your answer.

(4)

	P	p
P	PP no disease	Pp carrier
p	Pp carrier	pp PKU disease

Pp x Pp

PP : Pp : pp
1 : 2 : 1 ← disease

phenotype ratio
3 : 1

A healthy couple might be carriers to a ~~hetrezy~~ heterozygous genotype although they express the dominant phenotype and so there may be a 1/4 chance of the offspring inheriting homozygous recessive genotype and expressing PKU phenotype. So prenatal testing can let parents decide whether to continue pregnancy if the diseased child is a possibility.

ResultsPlus
Examiner Comments

This is an excellent example of how to lay out a genetic diagram to ensure that all available marks are awarded. In the written part of the answer, the first four and a half lines are describing the cross but in the last sentence, this candidate actually answers the question and is awarded mark point 4.

ResultsPlus
Examiner Tip

Always lay out your genetic diagram clearly so that we know what is what, particularly which genotype corresponds to which phenotype. If you are using a letter which has very similar lower and upper cases then accentuate the difference so that we are clear what is going on.

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This disorder is inherited in a similar way to cystic fibrosis.

Explain why a healthy couple might choose to have a prenatal test for PKU.

Draw a genetic diagram in your answer.

(4)

Alleles – P p

parental allele – PP Pp

	P	P
P	PP	PP
p	Pp	Pp

An healthy couple to have a prenatal testing to know whether there is a chance for their child to have a gereth'c disorder. By knowing this they would be able to decide whether to keep the baby or to abort it.

ResultsPlus
Examiner Comments

This is an example of a much weaker response, where the candidate has either got the genotypes of the parent wrong or else not made the size of the letters sufficiently discernible. They have also referred to aborting the baby.

The one mark awarded was a consequential error for the correct genotypes of the offspring, given the parental genotypes used.

Question 7 (b)

The importance of using all the information provided with the question is key with these levels-based questions. The candidate's best approach to this particular question would be to consider each of the questions that the women were asked in turn, considering the data for that and then discussing why each choice would be made by the women using the information in the table.

Some candidates were limited to a Level 1 mark as they made descriptions of data with barely any discussion. However, it was pleasing to see some more extended discussions of why the women made their choices using the information on the diseases from the table and candidates were therefore able to achieve a Level 2 mark. What was really pleasing was that a good number of candidates extended their discussions of the data further to achieve Level 3 and in some extremely high-level responses the discussion was extended to include a comparison of the choices that the women made on the basis of the severity of the diseases.

Discuss the responses to the three questions.

(6)

For question 1, under almost more than 90%. said yes to the first question across all genetic disorders. This may be due to the mother only having the blood test done on her, making the process less invasive for the baby. And they may want to be informed about whether their child is healthy or has a genetic disorder. A blood test is not ethically / morally wrong. Although it wasn't 100% as most mothers may be against the idea of being aware about their child inheriting one of these genetic disorders.

across all genetic disorders

For question 2, slightly more than 60% of women agreed to the question. As they are all aware of the risk of 1% miscarriage, some declined as they would prefer keeping the baby than be at risk of having a miscarriage. The 40%. of women saying yes is the same for all genetic disorder, as they are more worried about the risk of miscarriage and not wanting to have many genetic disorders instead. And the 60%. are worried about giving birth to a child with a genetic disorder. This 60%. may be the same women who said yes to Q1. For Q3, results varied as abortion is morally / ethically wrong for most religious people. For disorder A and D, the % of women who said yes is higher than the women who said yes to disorder B and C.

(Total for Question 7 = 10 marks)

This is because these A + D are untreatable diseases, and they do not want their child carrying this burden. Whereas less women said yes for B and C as they are both treatable. which makes less sense to abort the fetus if this genetic disorder would not burden the family nor the child.

ResultsPlus
Examiner Comments

This candidate has taken the approach that we would recommend; they have addressed each question in sequence and thought about either the advantages or the disadvantages of each method and used the information in the table.

Discuss the responses to the three questions.

(6)

Q1: blood test is free & pain and risk to pregnancy and baby, thus percentages for each disorder are very high, between 90-100%, for all disorders percentage is similar so severity & symptoms & condition does not effect decision

Q2: amniocentesis overall lower than blood test (around 60-72%) as risk of miscarriage and parents ~~so~~ worried it might influence their decision and lead to abortion if positive result, results all similar because although severity of disorders are all different it allows parents to prepare for child if decide to give birth, some parents do not want to abort child ~~so~~ as they consider it unethical or religiously wrong as it is a gift from God thus does not want to know if child has disease as it doesn't matter

Q3: termination overall lower than blood test and amniocentesis as some parents see abortion as religiously or ethically wrong as children are a gift from God and they deserve to have lives but some parents believe it is more ethical to end the life so they do not have to live a life of pain and suffering and some believe an embryo form it is not considered a life, disorder A has greatest percentage as symptoms are most severe of the 4 since it can cause significant pain and suffering for child, disorder B and C are similar in percentage as disorder is treatable and for B will not shorten life expectancy, disorder D is lower than A because can be treated with medical care and individuals lead healthy lives but higher than C and B as intellectual disability shunned by society

(Total for Question 7 = 10 marks)

ResultsPlus
Examiner Comments

This is another example of a high-level response.

ResultsPlus
Examiner Tip

Our levels-based questions need a logical approach. A way to structure the question needs to be decided on first, in this case deal with each question the women were asked in turn. Secondly all sources of information need to be used, in this case the graph and the table.

The trick is to write a little about a lot and not a lot about a little. Lengthy descriptions of data given will rarely get more than a Level 1 mark.

Question 8 (b)

This was the second of our two levels-based questions, but despite being set on a very familiar topic to this paper it did not perform as well as the previous one. Possibly what happened was that candidates saw 'CVD risk factors' and launched into writing everything they knew about what the risk factors were without explaining how they increased the risk.

Descriptions with limited explanations prevented candidates from achieving more than a Level 1 mark. A reasonable number of candidates tried to compare the two calculators but tended to do this by describing the data rather than using it to explain effectiveness. Surprisingly, a significant number of candidates failed to write about other factors which should have been considered, and those that did listed them without any explanation.

*(b) Explain the effectiveness of these two calculators in the assessment of risk and whether other factors should be considered.

(6)

In RAC-1, HDL cholesterol is not considered. HDL can help to bring saturated fat to the liver and excreted out from our body. In RAC-2, smoking is not considered. Smoking damage the epithelial cell of the artery. When people is older, there is higher chance of getting CVDs as the elastivity of the artery is decreased. Blood pressure is too high then it ~~there~~ will damage the artery as they are receiving more pressure. The no of cigarette should be known for more accurate result. LDL cholesterol (^they taken per days) and HDL cholesterol should be known separately instead of total amount of them. LDL is bad for our bodies while HDL is good for our bodies. Genetic background should be known also as they may may carry the gene. ^of their family The activity and mass of the body should be known also as inactivity has a higher chance of getting diabetes and CVDs. If the body mass is high, more pressure is needed for body to deliver the blood.

ResultsPlus
Examiner Comments

This is an example of a response that was awarded a Level 3 mark.

*(b) Explain the effectiveness of these two calculators in the assessment of risk and whether other factors should be considered.

(6)

RAC-1 is more effective than RAC-2, since it takes into account of age, blood pressure, smoking, total cholesterol and does not take into account for HDL cholesterol. HDL cholesterol is ~~thought to be that it~~ not considered to be a risk factor for CVD so it is not required to be taken into account but RAC-2 does, which isn't necessary. Smoking is an important factor since it contains different components that causes CVD, atherosclerosis, high blood pressure and narrowing of the lumen but RAC-2 doesn't ~~takes smok~~ count smoking. Sex/Gender could also be an important factor, since males are more likely to develop CVD than females. female hormone Oestrogen helps to reduce the risk of CVD for them. So sex could be ~~an~~ used as ~~inform~~ an important information by these calculators. With increasing age, the arteries lose elasticity, increased blood pressure has a higher chance for conducting CVD, high level of cholesterol also has high chances of conducting CVD, while HDL is not considered to be a risk factor. In conclusion, RAC-1 is more effective than RAC-2.

ResultsPlus
Examiner Comments

This is another example of a Level 3 response.

*(b) Explain the effectiveness of these two calculators in the assessment of risk and whether other factors should be considered.

(6)

RAC-1 is arguably the most effective. Both RAC-1 and RAC-2 include age, blood pressure and total cholesterol, all of which contribute to the likelyhood of developing CVD (eg. older individuals may have a higher risk of hypertension). RAC-2 does not include the factor of smoking which can greatly increase the risk of CVD (higher blood pressure and the caused plaques), making the calculator less effective. Both do not include HDL cholesterol which contributes to the buildup of plaque, lowering their effectiveness.

ResultsPlus
Examiner Comments

This response has been included as it illustrates how a Level 3 mark can be achieved without writing pages.

ResultsPlus
Examiner Tip

Again, your first decision is how to structure your response. From the wording of the question it would be sensible to consider the information needed by the calculators, then to assess the effectiveness of the calculators and then other factors. Next, the command word needs checking which in this case was 'explain' so you must use your knowledge to say 'why'.

Question 8 (c)(i)

Candidates who read the question carefully scored both marks here. A reasonable number of candidates picked out '10 year risk' and wrote about lifestyle changes; they missed the reference to 'information entered'.

The scoring responses generally included references to other risk factors not on the calculator (mark point 3) or to not knowing or guessing blood pressure or cholesterol levels (mark point 2) and some even suggested lying about this.

A smaller number of candidates referred to calculators not including the number of cigarettes or how long the person had smoked (mark point 1). In even fewer cases were there any references to LDL or the LDL : HDL ratio possibly being very high (mark point 4).

(c) The calculators work out the risk of a person developing CVD in the next 10 years.

(i) Explain why the information entered by a person may lead to an underestimate of their 10-year risk of developing CVD.

(2)

Firstly, there are other ~~fa~~ risk factors involved, which increase risk of CVDs such as high BMI, genetics etc. Also, the total cholesterol may be an underestimate as well, ~~and~~ as well as blood pressure. Person may not also be a smoker, but may be a passive smoker, and this would increase ~~h~~ the persons risk of getting CVDs

ResultsPlus
Examiner Comments

This response illustrates our third and first mark points.

Question 8 (c)(ii)

Again, this question needed reading properly for appropriate responses to be given.

Many candidates tended to state that people might not know their blood pressure or cholesterol levels, but less were able to give a second reason. Few candidates referred to the person having a high risk or named risk condition already and even fewer mentioned that people could not use the technology or could access the internet. Very few candidates gained both marks with the vast majority scoring 1 mark and a minority gaining 2 marks.

(ii) Suggest why these two risk calculators may not be suitable for everybody to use.

(2)

Some people may have specific diseases which will increase their risk of CVD anyway, so this calculator will give inaccurate ~~risks~~ risk of them getting CVD. Some People also do not know their HDL cholesterol, total Cholesterol or blood pressure so can give unlikely values and get false risks

ResultsPlus
Examiner Comments

This response illustrates our first two mark points.

ResultsPlus
Examiner Tip

With a question like this, if there are two marks assigned then you probably need to give two suggestions to gain full marks.

Question 8 (c)(iii)

This question was the one that many candidates thought they had been answering in Q08(c)(i) and Q08(c)(ii).

As a result, the majority of candidates were able to achieve this mark with responses varying. Most candidates referred to lifestyle (or a named lifestyle factor) changing or to CVD taking a while to develop. A few responses referred to age affecting the risk.

(iii) Suggest why these risk calculators estimate the **10-year** risk of developing CVD.

(1)

CVD is a long term illness and takes a while to develop due to blood clotting, age, diet. plaque ~~and~~ and, atheroma ~~and fatty~~ can build up over time and take years to develop.

ResultsPlus
Examiner Comments

This is an illustration of a good response.

ResultsPlus
Examiner Tip

If you find yourself writing the same answer for more than one question, it is possible that you have misinterpreted what was required by one of them. Go back and read the question again and then your response.

Question 9 (a)(ii)

Candidates did not appear to be off put by the unfamiliar context of this question. Our second and third mark points were the most frequently scored, with mark point 1 being missed by candidates who did not refer to osmosis. There were very few references to mark point 4; this did not surprise us but we felt that it should be included on our mark scheme as it is a perfectly reasonable explanation.

(ii) **Explain the advantages for osmoconformers of having cells with solute concentrations similar to that of the sea water they live in.**

(3)

> will have the same concentration gradient.
> therefore no osmotic effect
> water doesn't move in the cell causing it to burst as no water potential
> neither doesn't it move out causing cell to shrink.
> similar pressure.

ResultsPlus
Examiner Comments

This illustrates how 3 marks could be achieved; we accepted a reference to osmotic effect as being comparable to a reference to osmosis.

ResultsPlus
Examiner Tip

At this level, you should be using correct terminology in your answers; it is not unreasonable to expect an A level candidate to know that osmosis is the correct term for movement of water.

Question 9 (b)(i)

This was answered well by the majority of candidates who were able to suggest a whole number within the acceptable range.

Question 9 (b)(ii)

This was another question where we had to accept percentage increase and decrease as well as percentage difference. Most candidates picked up the first mark for calculating the percentage but lost the second mark for not expressing their answer correctly to two decimal places.

(ii) Calculate the percentage difference in the concentration of magnesium ions in the lobster compared with the sea urchin.

Give your answer to two decimal places.

(2)

54 - 9 = 45

$\frac{45}{9}$ x100 =

Answer 500 %

ResultsPlus
Examiner Comments

This candidate calculated the percentage correctly but did not express their answer to two decimal places.

(ii) Calculate the percentage difference in the concentration of magnesium ions in the lobster compared with the sea urchin.

Give your answer to two decimal places.

(2)

$\frac{54 - 9}{9} \times 100 = 500 \%$

$\frac{9 - 54}{54} = 83\%$

he decrease by

Answer 83.33 %

ResultsPlus
Examiner Comments

This response has been included to point out the correct way to express a recuring number to two decimal places.

ResultsPlus
Examiner Tip

Do not give your final answer as a recuring number even if we have not specified the number of significant figures or decimal places to use.

Question 9 (b)(iii)

A high number of candidates did not access the marks here as they expressed the idea that it was the concentration of the individual ions that were similar to their individual concentration in seawater. Very few candidates appreciated that it is the total concentration of all the ions that determines solute potential, so those who scored gained mark point 2.

(iii) These three animals are osmoconformers even though they have different concentrations of each ion in their cells.

Explain why these three animals can be described as osmoconformers.

(2)

The overall solute concentration are similar to the seawater. As all the ion can dissolve in water, the solute concentration of each ion would not matter. The sum of all the ion concentration is the solute concentration.

ResultsPlus
Examiner Comments

This was one of the very few responses that we saw that gained both marks.

Question 9 (b)(iv)

This proved to be quite a low-scoring question with only a relatively small proportion of candidates gaining the mark. Usually, the mark was given for stating that the osmo-conformers lived in different areas of the sea (or different areas of the sea had different ions concentrations) or that they had different diets or that they had different requirements for their bodies or cells.

(iv) Suggest why osmoconformers do not have the same concentration of each ion in their cells.

(1)

they have different ion concenhation depending on the ions needed for chemical reactions in their body.

ResultsPlus
Examiner Comments

This is an example of one answer that was acceptable.

(iv) Suggest why osmoconformers do not have the same concentration of each ion in their cells.

(1)

due to living in different parts of the sea, for example the sea urchin lives at the bottom of the sea

ResultsPlus
Examiner Comments

This was probably the most frequently seen correct suggestion.

Question 9 (b)(v)

The vast majority of candidates gained 1 mark for recognising that active transport was involved.

In some responses, the second mark was not accessed as there was no reference to the direction of movement.

(v) Energy is needed to maintain the concentration of ions inside the osmoconformers.

Explain what this energy is being used for.

(2)

ATP used to in active transport to take up ions against concentration gradient from ~~higher~~ lower to ion concentration to higher ion concentration.

ResultsPlus
Examiner Comments

This gained 2 marks as it was clear enough which direction the ions were moving.

Paper Summary

Based on their performance on this paper, candidates should:

- Avoid repeating information in the stem of the question in their answers as this will not gain marks.
- Take notice of the mark allocation for each item to help them decide if they have written enough points to be awarded that many marks.
- Consider the questions asked in the early question parts as they are quite often trying to give a clue as to what is expected in the latter question parts.
- Include A level detail and terminology in answers.
- Check the command word for each question before attempting their response. In particular, if the command word is ‘explain', then they need to make sure that some science has been used to say why something has happened. Their answer should include terms like because, therefore, as a result, so. Appendix 7 in the specification lists all the command words and their meanings.
- Remember that any information given in a question is there for a reason, albeit in a table, a graph, a diagram or in the text of the question, so it must be used in the response.
- Practice maths skills as outlined in the appendix. In particular candidates need to be able to convert one unit into another, write a ratio in the form '1 : x', express a value in correct standard form (only one digit to the left of the decimal point), round up values to a given number of decimal places or significant figures and work out percentages.
- Be aware when commenting on data that not all data shows a trend or a pattern and that this is just as important to point out.
- Refrain from talking about reliability of data and use terms such as significant or valid.

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