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GCSE Biology 1BI0 2H

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Introduction

The Pearson Edexcel GCSE (9-1) Paper 2 Biology (Higher tier) paper is the second of two papers taken as part of the GCSE (9-1) Biology qualification.This is the second assessment of the GCSE (9-1) Biology specification and the qualification follows a linear assessment model whereby candidates must complete the two papers in the same single year of certification.

Paper 2: Biology (Higher tier) is awarded a total of 100 marks and it is assessed by a variety of question types, including, multiple-choice questions, short answer questions, calculations and extended open-response questions. Candidates should answer all questions in a time period of 1 hour and 45 minutes. The extended open-response questions are identified by an asterisk (*) in the question paper to indicate that marks are also awarded for the ability to structure a response logically.

In addition, the GCSE (9-1) Biology qualification assesses practical knowledge and maths skills; the requirements of which are given in the specification. Furthermore, there are 8 mandatory core practical tasks which candidates must complete prior to the examination, as aspects of working scientifically are also assessed in questions throughout the paper.

The Paper 2: Biology (Higher tier) paper contains questions assessing the content from topics 1 and topics 6 to 9 as identified in the specification. In this examination series, candidates were required to respond to questions that tested their knowledge and understanding of the structure and function of leaves, food webs, transport of substances through plants, the urinary system, the hormones of the menstrual cycle, the structure and function of the heart, diffusion and Fick's law and the nitrogen and carbon cycles.

Questions designed to assess practical work included writing a plan to determine sampling techniques, the core practical task of respiration, applied knowledge of thermoregulation including an understanding of the need to control variables and how to set up a control. In addition to this, food testing was also assessed as an applied task when referring to testing for protein in urine. The maths skills assessment in this paper related to questions requiring mean calculations, unit conversions, percentages and rate calculations in addition to the use of significant figures and correct rounding of numbers.

Question 1 (a) (ii)

This item looked at the function of the spaces between the cells in the spongy mesophyll. The first marking point related to gas exchange or diffusion and the majority of candidates were able to access this. The second mark was awarded for the idea of carbon dioxide or water leaving the cells or oxygen entering the cells. There was some degree of misconception here in that the candidates often referred to gases being moved out of the leaf rather than out of the cell.

(ii) Explain the function of the spaces between the cells in layer B.

(2)

There are spaces to allow the transport and diffusion of gases in and out of the cell.

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Examiner Comments

The first mark here is for the idea of diffusion and there are no other marks available. The idea was needed that named gases moved in and out of cells for the mark.

The spaces store water and nutrients and the have a large surface area to absorb and store water.

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Examiner Comments

This was a common idea that the spaces inside the spongy mesophyll were there to store things like water or bacteria etc.

This response scored 0 marks.

Question 1 (a) (iii)

In order to answer this question candidates had to identify part C as the stoma (stomata was acceptable) and explain the function of stomata in allowing gas exchange or preventing water loss. Reference to guard cells was ignored as the arrow clearly indicates the hole between the guard cells.

(iii) Explain the function of part C in Figure 1.

(2)

Part C is the stomata and is surrounded by guard cells which open or close the stomata. Open stomata allow ~~gases~~ photosynthesis to occur where carbon dioxide and water enter the leaf. During respiration water can exit here and evaporate off, but normally stoma are closed to prevent this.

ResultsPlus
Examiner Comments

This candidate has correctly stated that part C is the stomata and given a description of the role of stomata. The main answers were to prevent water loss.

This response scored 2 marks.

ResultsPlus
Examiner Tip

When asked to explain something about a diagram where the name of the item is not stated on the diagram always state what the structure is as this will be credited.

Question 1 (b)

This question required candidates to compare the differences between a xerophyte and the standard leaf structure shown in figure 1. They were told that xerophytes live in very dry conditions to help with this. Generally this was answered well with the idea of reduced leaf surface area or fewer stomata. Some candidates were not awarded marks as they referred to other adaptations to do with the stem or the root structure which were correct but did not answer the question which was specifically about leaf structure.

(b) Xerophytes are plants adapted to live in very dry conditions.

State **two** differences between the leaf structure of a xerophyte and the leaf structure shown in Figure 1.

(2)

1 The xerophyte leaf will have a thicker waxy cuticle (to conserve water).

2 The stomata of the xerophyte leaf will be in pits on the under side.

ResultsPlus
Examiner Comments

This candidate has a clear understanding of the differences between a xerophyte leaf and the structure of the leaf shown in figure one. Both of these statements are worthy of the marks.

1 Figure one has cuticles, Xerophytes will not and will have smaller leaves that have a smaller surface area

2 Figure one has pores called stomata, to allow water in but xerophytes will not.

ResultsPlus
Examiner Comments

The second statement made by this candidate was a common mistake - the idea that xerophytes have no stomata rather than fewer stomata is not creditable. This response gained 1 mark.

Question 2 (a) (i)

This was the first maths based question on the paper and involved a straight multiplication of the biomass of a single organism with the number of organisms. A table was given where this calculation was completed for other organisms to help with answering this question. This was only 1 mark so candidates did not get any marks here for the working. The only answer allowed was the correct calculation giving an answer of 2108.

2 (a) A student was investigating the populations of organisms in a garden.

Figure 2 shows the estimates of the number and biomass of some of the organisms in the garden.

organisms	number	mean biomass of each organism in grams	biomass of population in grams
cabbages (plants)	80	70	5600
earthworms	620	3.4	?
slugs	30	4.1	123
hedgehogs	1	620	620
squirrels	2	600	1200

Figure 2

(i) Calculate the biomass of the population of earthworms in the garden.

(1)

620 x 3·4 = 2018

2018

ResultsPlus
Examiner Comments

Unfortunately this candidate has transposed the numbers in the answer and, although the working is correct as this question is only worth 1 mark, no mark can be given because of the error carried forward.

Always check mathematical calculations again after completing to avoid errors.

Question 2 (a) (ii)

This question looked at the effect of removing an organism from a food chain. This could be answered in two ways. The response seen most often was that as slugs were killed hedgehogs had to eat more earthworms so the number of earthworms decrease. Alternatively, candidates could have stated that there would be more food available for the earthworms thus the numbers would increase. In both these cases candidates were required to give both parts to justify the answer.

(ii) Hedgehogs eat slugs and earthworms.
Slug pellets were used to kill the slugs.

Explain how killing the slugs would affect the population of earthworms in this garden.

(2)

killing the slugs would temporarily decrease the hedgehog population, meaning there are less predators to eat the worms. So worm population would increase. This may attract more ~~ear~~ hedgehogs and decrease the earthworm population again.

ResultsPlus
Examiner Comments

Although this answer is muddled and the candidate has incorrectly mentioned predators, the fact that the candidate has mentioned that earthworm population has decreased means they have some understanding of the concept. We cannot penalise the fact that earthworms increase as they would be due to more cabbages being available.

This response scored 1 mark.

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Examiner Tip

Always try to answer a question - do not leave these early questions blank as you may hit a valid mark point if you read the question carefully.

Without any slugs, the hedgehogs food source has decreased. The hedgehog will now only eat earthworms, so the population of earthworms would decrease

ResultsPlus
Examiner Comments

This candidate has clearly understood what is required and gains both marks.

Question 2 (a) (iii)

With practical skills being assessed in exams with this specification the skill of planning an investigation is assessed on every paper and this method required a knowledge of sampling techniques to estimate the population of slugs in a garden. As slugs are slow moving organisms a quadrat would be an acceptable way of sampling these. The idea using the quadrat counting the numbers of slugs within the quadrat and an idea of scaling up from the quadrat to the area of the garden. Obviously other acceptable methods were credited including capture, mark and release methods if correctly explained. The majority of candidates scored 2/3 marks with the scaling up mark being the area where candidates lost a mark.

(iii) Describe a method that could be used to estimate the population of slugs in the garden.

(3)

You could count the number of slugs found in a belt transect, during wet weather where more can be seen. You can use a quadrat. Multiplying the number counted by $\frac{\text{quadrats}}{\text{area of garden}}$ can give you an estimation.

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Examiner Comments

In this case the idea of a belt transect was acceptable but several candidates referred to throwing a transect, mistaking it for a quadrat and this was not accepted. We can award the marks here for the idea of counting the slugs and also multiplying up to the size of the garden. We always try to mark positively to maximise the marks a candidate can be awarded.

This response scored 3 marks.

Use Use quadrats and randomly throw your quadrats in the garden. Then count the number of slugs in each quadrat and to find the mean number of slugs in the garden divide the total number of slugs by the number of quadrats used

ResultsPlus
Examiner Comments

This candidate was able to secure 2 of the available marks just missing out on the idea of scaling up the amount of slugs in one quadrat to the size of the whole garden.

Question 2 (b)

For this question candidates were asked to explain how cabbages, earthworms and squirrels contributed to the carbon cycle. As this is an explain question we were also looking for the science behind the movement of carbon/carbon dioxide through the carbon cycle. This was answered very well with the majority of candidates attaining 2/3 marks. Linking cabbages to removing carbon dioxide for photosynthesis and any of the organisms releasing carbon dioxide through respiration were the most common responses. Candidates could also gain marks for the idea of moving carbon when eating organisms or the role of decomposers in the carbon cycle.

(b) Explain how cabbages, earthworms and squirrels contribute to the carbon cycle.

(3)

Earthworms are underground and help eat the damaging bacteria etc from the soil. Cabbages decompose and squirrels ~~bury~~ dig holes and bury them inside and therefore all three contribute to the carbon cycle.

ResultsPlus
Examiner Comments

This candidate has failed to relate any of the processes to how carbon is moved through the system either in the form of carbon dioxide in the atmosphere or with carbon being passed from animal to animal or plant to animal when they are eaten. 0 marks awarded.

Question 3 (a) (i)

This question was based on one method of doing the respiration practical using hydrogencarbonate indicator. Candidates were asked how this method could be improved, this is another of the key practical tasks which need to be assessed on all biology papers. In order to improve on the experiment candidates needed to use correct terminology in their responses such as measuring the mass of organisms rather than the number of organisms. The idea of having the same volume of indicator solution. Please note that the amount of indicator solution is not creditable here, candidates must refer to volume for liquids or mass for organisms. Marks were also awarded for the idea of controlling temperature using a water bath. Candidates also lost marks here as they described changing the experiment using a gas syringe etc but this is not an improvement, it is a different experiment.

3 (a) A student investigated respiration in three different organisms.

Red hydrogencarbonate indicator was placed in each of three test tubes.

Gauze was placed in each test tube to hold the organisms.

In test tube 1 the student placed four germinating peas.

In test tube 2 the student placed four dried peas.

In test tube 3 the student placed four mealworms.

Bungs were added to each of the test tubes.

The three test tubes were left for one hour.

The equipment used is shown in Figure 3.

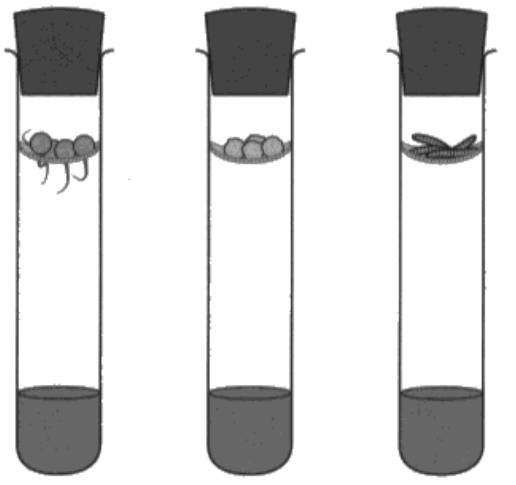

Figure 3

(i) State **two** ways this method could be improved to make the results for these three organisms more comparable.

(2)

1 measure the volume of carbondioxide produced using a gas syringe to know the exact amount.

2 more test tubes with the same organisms to get an average mean which can make the results more comparable.

ResultsPlus
Examiner Comments

The idea of repeating this is acceptable for the mark, here for 1 mark.

It is important that the answer is about controlling this experiment so changing things in the experimental set up is not accepted for this question.

ResultsPlus
Examiner Tip

When referring to solids in controlling variables always refer to the mass of solids. With liquids and gases the term volume is needed for the mark. Please never refer to amount of something in a biology paper as this will not be credited when talking about controlling a scientific variable.

(i) State **two** ways this method could be improved to make the results for these three organisms more comparable.

(2)

1 Use a 5cm Syringe to record results

2 Use a waterbath

ResultsPlus
Examiner Comments

This candidate like several others has changed the experiment rather than explained how to improve the experiment by controlling the variables. This was a common theme and it is important that candidates understand that in order to improve an experiment you cannot change the equipment used in the experiment, but must improve it by controlling the variables or repeating to get more reliable data.

This response scored 0 marks.

Question 3 (a) (ii)

This question asked for a control for the experiment and marks were lost by candidates as they referred to variables to control rather than 'a control'. What was required was the idea of the same test tube set up, ie with indicator but no organisms or an alternative to no organisms such as glass beads/plastic beads/stones. It is essential that candidates can tell the difference between a control for an experiment and a controlled variable.

(ii) Describe a suitable control for this investigation.

(2)

Have a tube with no organism inside with the red hydrocarbonate indicator and leave it for one minute.

ResultsPlus
Examiner Comments

The minimum that is acceptable here is the idea of the test tube with hydrogencarbonate indicator with no organisms. Therefore this candidate scores 2 marks for understanding the role of a control.

(ii) Describe a suitable control for this investigation.

(2)

~~temper~~ volume and PH of indicator in each tube as it affects rate of respiration.

ResultsPlus
Examiner Comments

This candidate has described controlling variables rather than a control and therefore cannot be awarded the marks.

Question 3 (b) (i)

Candidates could answer this question either from the idea of germinating peas respiring and producing carbon dioxide or the ideas that dead peas do not do this. Some candidates confused photosynthesis and respiration meaning that the outcome they reached was incorrect. Please note that the term respirate is not acceptable for respire as they have very different definitions.

(b) Hydrogencarbonate indicator changes from red to yellow when more carbon dioxide is present.

The results for this investigation are shown in Figure 4.

organisms	colour of hydrogencarbonate indicator
germinating peas	yellow
dried peas	red
mealworms	yellow

Figure 4

(i) Explain why the result for the germinating peas is different from the result for the dried peas.

(2)

The germinating peas respire due to its cells and bacteria. The dried peas do not respire because anything that does was killed off.

ResultsPlus
Examiner Comments

1 mark can be awarded here for either side of the argument but what is missing is the idea that during respiration carbon dioxide is released which changes the colour of the hydrogencarbonate indicator as seen in the table.

Question 3 (c)

This question required candidates to understand why cellular respiration is required in living organisms. What was required was the idea that energy is released or converted for metabolic processes such as protein synthesis, cell division, growth etc. A common error was candidates referring to producing or making energy which we cannot accept.

(c) Explain why cellular respiration is essential for living organisms.

(2)

Cellular respiration is exothermic so provides energy to the cells. Energy is needed in living organisms for things like movement, growth, breaking down and synthesising substances

ResultsPlus
Examiner Comments

This is an excellent answer linking the idea that energy is for the cell and a reason why this was required. Also allowed were references to metabolic processes. 2 marks awarded.

As it brings the essential gases ~~from~~ into the blood stream such as oxygen. & Cellular respiration produces energy which is required for organisms to survive and carry out activities which require energy.

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Examiner Comments

Unfortunately although this candidate has the right idea about what is going on during cellular respiration we cannot allow produces or creates energy as this is incorrect science. 0 marks awarded.

Question 4 (a)

This question was related to a simplistic experiment to understand why sweating causes a reduction in temperature. There were two conical flasks, one covered in wet tissue and one in dry tissue, then hot water is added to each and the temperature change measured every minute. This was a practical question again regarding the control of variables. Once again marks were lost by candidates as they referred to amount of water rather than volume. Simple temperature control was not awarded but the starting temperature of the water being the same was acceptable. As tissue paper is difficult to quantify we allowed the same number of layers/same type of tissue paper or the idea of covering the same area of the flask. Acceptable answers also included having the same volume/size conical flask. A few candidates lost marks by referring to beakers. It is essential that candidates use the information in the question to inform their answer particularly on practical based questions.

4 A student was investigating the effect of sweating.

The student set up two conical flasks each with a thermometer as shown in Figure 5.

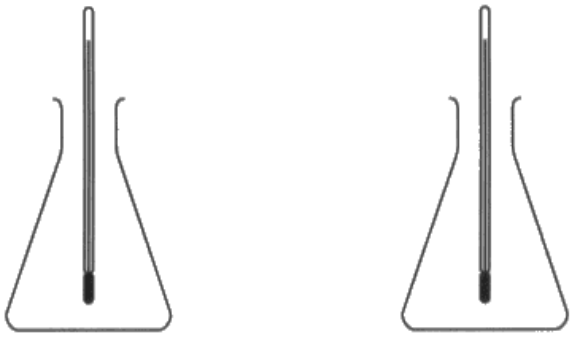

Figure 5

Flask 1 was covered in wet tissue paper.

Flask 2 was covered with dry tissue paper.

Hot water was added to each of the flasks.

The temperature of the water in each flask was recorded every minute for 10 minutes.

(a) State **two** variables that would need to be controlled in this investigation.

(2)

1 The Starting temperature of the water.

2 The Volume of water.

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Examiner Comments

Both of these are valid variables to control, so 2 marks have been awarded. Just the temperature of the water would have been incorrect as this is what is being measured but the starting temperature is a very effective control.

Question 4 (b) (i)

This question required a simple rate calculation and the time was given over 8 minutes so a subtraction 98 – 22 = 76 gave them 1 mark. This divided by 8 to attain 9.5 gained the second mark. Generally this was well answered.

(b) The results of this investigation are shown in Figure 6.

time in minutes	flask 1 (wet tissue paper) temperature in °C	flask 2 (dry tissue paper) temperature in °C
1	98	98
2	82	91
3	71	84
4	60	76
5	50	69
6	39	61
7	31	56
8	22	49
9	22	42
10	22	37

Figure 6

(i) Calculate the rate of temperature change in flask 1 from 1 to 8 minutes.

(2)

98 - 22 = 76.

..... °C per minute

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Examiner Comments

This illustrates that it is always worth showing working in a calculation as this candidate attained 1 mark even though the whole calculation was not completed.

(i) Calculate the rate of temperature change in flask 1 from 1 to 8 minutes.

(2)

9+8+21+1+6+0+50+34+7+1+7+22+.+453

$\frac{453}{8} = 56.6$

56.6 °C per minute

ResultsPlus
Examiner Comments

This candidate actually tried to calculate the mean for this. It is important that the question is read carefully to avoid this kind of error.

This response gained 1 mark.

Question 4 (b) (ii)

This question was well answered with most candidates able to give the trends shown in the data. Candidates stating that the temperature decreased faster in flask 1 than in flask 2 could be awarded 2 marks as this also implies that the temperature in both flasks decreased.

(ii) Compare the trends shown in the data for flask 1 and flask 2.

(2)

The temperature of the flask with dry tissue paper is higher than flask one, in one minute there is no temperature change

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Examiner Comments

Unfortunately this answer needed checking as the candidate has stated one correct statement and then one incorrect statement so cannot be awarded the mark. The first statement would also need qualifying as to what the difference was between flask one and flask two as this is a compare question so both sides of the argument need to be given.

(ii) Compare the trends shown in the data for flask 1 and flask 2.

(2)

Flask 1 had a faster temperature decrease however stopped at 22° (approx. room temp) and didn't go any lower. Flask 2 had a slower temperature decrease however didn't stop decreasing. Flask 1 reach room temperature at 8 minutes, even after 10 mins flask 2 didn't reach room temperature.

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Examiner Comments

In this case the candidate has gained 2 marks from the first statement as if it had a faster temperature decrease than flask two then they also must have both decreased in temperature which is the first marking point.

Question 4 (c)

Candidates did answer this question well with most able to state that sweat spreads onto the skin which then evaporates to remove thermal energy. A few candidates missed the first marking point as they just stated sweat being released rather than onto the surface of the skin.

(c) Explain how sweating helps to cool the body.

(2)

It opens the pores of the body in order to release heat and also. water - which cools down ~~the~~ your skin.

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Examiner Comments

This was just enough for the first marking point of releasing sweat/water onto the skin.

Sweating is absorbed which cools down the body, also the body releases an oil when we sweat to spread the sweat out evenly so that the body cools everywhere simultaneously

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Examiner Comments

The idea of sweat being absorbed is incorrect and the answer does not require any reference to sebaceous glands releasing oil so no mark can be awarded.

Question 4 (e)

It was pleasing to note how many candidates were able to recognise the importance of thermoregulation in enzyme action and many referred to denaturation of enzymes at high temperatures or enzymes working at their best at the optimum temperature for 2 marks.

(e) Explain why it is important to control the internal temperature of the human body.

(2)

It is important to control the internal body temperature, to maintain homeostasis and to allow enzymes ~~it~~ to live at their optimum temperature (37°C) as any higher and enzymes denature reducing rate of reaction and too low a body temperature decrease rate of reaction by a great amount.

(Total for Question 4 = 11 marks)

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Examiner Comments

This candidate has managed to recognise that it is important to control internal temperature as it is the optimum for enzyme action. This is worthy of 2 marks.

Question 5 (a) (ii)

This question requires an understanding of how water moves from the roots to the leaves of the plant. A few candidates lost marks as they referred to water entering the roots by osmosis. If they stated through the cells in the roots by osmosis/diffusion this was acceptable for a mark. The majority of candidates understood that water travel through the xylem and is then evaporated through the stomata. Some candidates mixed up the phloem and the xylem unfortunately.

(ii) Explain how water in the root is transported to the leaves of the plant.

(2)

Water is moved through the xylem from the roots to the leaves during transpiration. The xylem has no end walls so water can flow through easier.

ResultsPlus
Examiner Comments

This was the most common response to gain both marks. The idea of movement of water through the xylem by the process of transpiration.

Root hair cells in the roots of a plant absorb water molecules through osmosis. Osmosis is the net movement of water molecules from high concentration to a low concentration through a partially permeable membrane.

ResultsPlus
Examiner Comments

Although we accepted the idea of osmosis moving water from cell to cell in the root we did not allow the idea of osmosis moving water into the root as the question asks for the movement of water from the root thus it is already in the root. No marks awarded.

Question 5 (c) (i)

This question required candidates to recognise that the size of the stomata is controlled by guard cells.

Question 5 (c) (ii)

The description of trends in graphs is another skill tested throughout these papers and it is important that candidates do not make vague statements such as it increases but that they quote from the axes of the graph in their answer as well as quote from the data in their answer. In this case, as the time increased from 6am to 8am the size of the stomata increased to 0.9mm, after this the size of stomata steadily decreased. It is important that candidates understand the driver for this - in this case the time of day causes the change in stomata, not the other way around. It is always correct to quote the X axis first as this is the independent variable.

(ii) Describe the trend shown in Figure 7.

(2)

The size of the stomata is big during the day because there's sun light however in the evening its small (~~tree~~) and closed because there's no Sunlight.

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Examiner Comments

This candidate has not referred to time or size of stomata in their answer thus cannot be awarded the marks.

ResultsPlus
Examiner Tip

When answering questions on graph trends do try to use the information available, quote the information from the axes of the graph always starting with the x axis followed by the y axis. Then remember to quote important data from the graph such as where it peaks to maximise your marks.

Question 5 (c) (iii)

This question asked candidates to explain why temperature affected the size of stomata. There was some confusion regarding water entering through stomata rather than the idea that stomata close to reduce water loss as temperature increases.

(iii) The temperature increased from 8 am to 1 pm.

Explain why this affected the size of the stomata.

(2)

Because the guard cells become larger because there is more water inside it. However the amount of water decreases as it is needed to cope with the temperature in other parts of the plant and so ~~the~~ the stomata's size decreases

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Examiner Comments

This is worthy of 1 mark for the idea that the stomata decreased in size. The reason for this was needed which is to prevent water loss when the temperature is higher - this would have gained the second mark.

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Examiner Tip

In an explain question always try to give a reason why something has happened.

Question 6 (a) (i)

This question required candidates to recognise that glucose levels in the urine were higher than the acceptable range thus the doctor had concerns about diabetes. Some candidates lost marks as they referred to higher blood glucose concentration which we do not know from this data. It is important that candidates use the information given in the question in their answer.

6 (a) A person had symptoms including difficulty passing urine, aching in the lower abdomen, constant thirst and fainting.

A sample of their urine was tested.
The results are shown in Figure 8.

test	result	acceptable range
Glucose	200 mg per dl	0 to 130 mg per dl
Albumin (protein)	16 mg per dl	0 to 3 mg per dl
pH	3	5 to 7
Leukocytes (white blood cells)	40	2 to 5

Figure 8

(i) A doctor analysed the results and asked the person to have further tests for type 2 diabetes. → body doesnt respond to insulin.

Give a reason why the doctor came to this conclusion.

(1)

There was a much higher amount of glucose [redacted] than the acceptable range.

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Even though this candidate does not refer to the glucose being in the urine they have linked diabetes to higher glucose levels in the data so can be awarded the mark.

Because there is a high Glucose level within the blood.

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Examiner Comments

As we have not been given data on blood glucose concentration we cannot surmise this from the information given thus this cannot be awarded a mark.

ResultsPlus
Examiner Tip

Make sure when you quote information from tables or graphs that the information quoted is correct. In this case we have a urine sample not a blood sample.

Question 6 (a) (ii)

In order to answer this question candidates were expected to note that leucocytes or albumin levels were higher than the expected range indicating that bacteria or pathogens were present. Candidates lost marks by quoting all of the information in the table rather than picking out the relevant information.

(ii) Explain why the doctor also concluded that the person had a kidney infection.

(2)

As ~~there's not enough~~ the person has difficulty ~~passing~~ passing urine which is controlled by the kidneys kidneys. Pain in the lower abdomen also signifies issues with the kidneys.

ResultsPlus
Examiner Comments

No information was given as to the symptoms of the person tested so no credit was given to describing symptoms. It is important to answer based on the information given.

Question 6 (b)

This question required candidates to consider how to test for the presence of protein. The expected answer was to use biuret reagent (solution) which turns purple if protein is present. There was much confusion between biuret and Benedict's reagent; in addition to this, candidates also gave the iodine or emulsion test as an answer. This is a required practical and candidates should have completed these food tests as part of the course.

(b) Describe how a student could test a sample of urine for the presence of protein.

(2)

You could use the biuret test, it would change colour appropricite to the amount of protein present.

ResultsPlus
Examiner Comments

This is part of the answer to the question for 1 mark; the outcome of the test changing colour from blue to purple was needed for the second mark.

(b) Describe how a student could test a sample of urine for the presence of protein.

(2)

A student could ~~test~~ a sample of urine for the protein presence by using a universal indicator or pH probe ~~or~~ where a low pH indicates the ~~presence~~ presence of protein or if the indicator becomes orange/yellow or red (as well as some light green). ~~Also a test~~

ResultsPlus
Examiner Comments

This was a common theme for many of the answers with various different food tests or pH testing being applied. This was not creditable.

Question 6 (c)

This question asked for the route taken by urine from the kidney to outside the body. Many candidates described the route of the filtrate through the kidney. On this question there were many answers which were out of clip. Candidates should be told to ask for extra paper if they run out of lined space as below the answer lines the answer is not visible and if it is not obvious that the answer is continued the examiner may not know to ask for a further review of the question. The answer required was ureters to bladder to urethra.

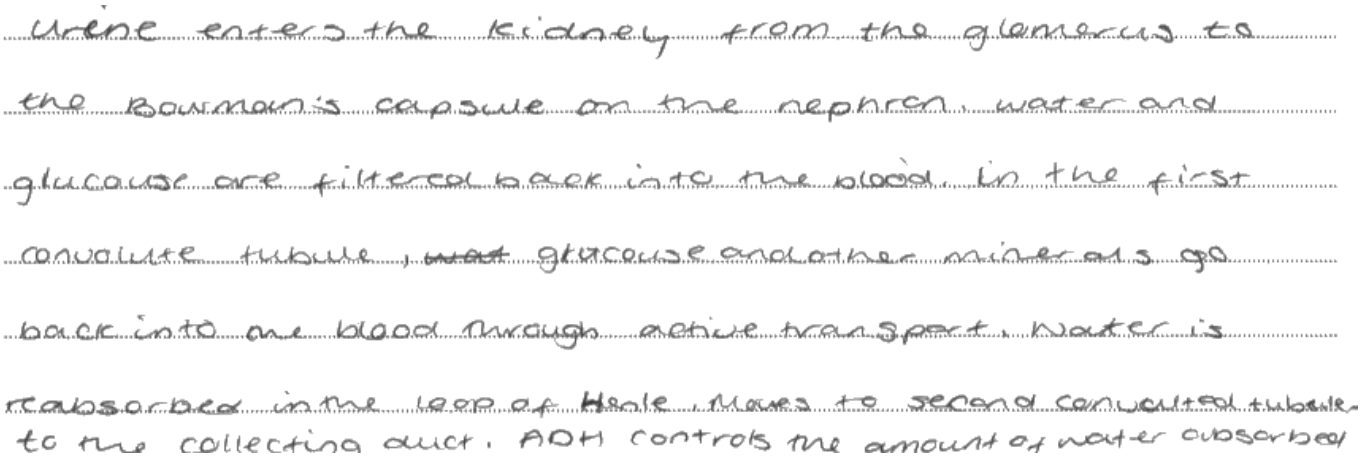
(c) Describe the route taken by urine from the kidney until it leaves the body.

(3)

Urine is taken to the blaclder through the ureta, it is then passed out of the body through the urethra, our blaclder contains a muscle that holds the urine in until we tell it to exit.

ResultsPlus
Examiner Comments

A clear path of the urine from the kidney to outside the body for 3 marks.



ResultsPlus
Examiner Comments

Whilst this is a good description of filtrate (not urine) flowing through the kidney that was not what the question asked for. The question states from the kidney which is when it leaves the kidney. There was a mark below the clip for urine passing into the bladder. This cannot be seen on the clip here which is the markers' view but it was sent to review where examiners can look at the full paper. In this case it is not obvious that the question continues and the mark may not have been awarded as there is no indication the answer continues.

ResultsPlus
Examiner Tip

It may be worth using a highlighter to pick out the key words in a question in order to answer the question that is being asked in order to avoid confusion.

Question 6 (d)

This question directly refers to a spec statement asking how urea is formed. The expected answer was deamination of amino acids in the liver. Candidates struggled a little with this with many answers referring to the pancreas or kidney and just general waste products.

(d) Urine contains urea.

State how urea is formed in the human body.

(2)

Urea is formed from the breakdown of amino acids, urea is a toxic substance when in excess. Amino acids form proteins.

ResultsPlus
Examiner Comments

This candidate is aware that urea is formed from the breakdown of amino acids for 1 mark. Deamination would also be credited.

It is formed from any ~~additional~~ additional waste within the body, also called toxic waste. It forms from the breakdown of food.

ResultsPlus
Examiner Comments

There were many answers vaguely referring to waste products which were not credited. The specification statement is clear that urea is formed from the breakdown of amino acids in the liver.

Question 7 (a) (i)

This was a straightforward question to identify the endocrine gland that produces FSH. The pituitary gland was required but several candidates referred to ovaries and even the thyroid gland.

7 (a) (i) Women with the condition known as polycystic ovary syndrome (PCOS) do not ovulate regularly.

Women with PCOS can be treated using clomifene therapy.

Clomifene therapy stimulates the production of FSH.

Name the endocrine gland that produces FSH.

(1)

Ovaries

ResultsPlus
Examiner Comments

This candidate incorrectly stated that FSH is produced by the ovaries. Oestrogen is produced by the ovaries. FSH is produced by the pituitary gland.

Question 7 (a) (ii)

This question asked for the changes that happens inside the ovaries due to clomifene medication. The idea that it contains FSH which causes ovaries to develop inside follicles was required or that oestrogen was produced was required. Many candidates gained 1 mark for stating the follicle matures.

(ii) During this therapy, a woman takes a clomifene tablet each day for the first five days of her menstrual cycle.

Describe the changes that would happen inside the ovaries during the first five days of this treatment.

(2)

The clomifene tablets would ~~increase~~ somulate production of FSH, this would stimulate the follicles. This stimulates of follicles would stimulate production of oestrogen which would the cause the lining of the oviduct to ~~thin~~ thicken.

ResultsPlus
Examiner Comments

Both marks can be awarded here, firstly for the stimulation of the follicles and secondly for stimulating the production of oestrogen for 2 marks.

Question 7 (a) (iv)

There were a lot of very informed answers in response to this question outlining that this was after ovulation and therefore progesterone was being released from the corpus luteum to maintain the lining of the uterus. Some candidates lost marks due to referring to the uterus thickening or the uterus wall thickening rather than the lining thickening.

(iv) During clomifene therapy, the woman has a blood test on day 20 of the menstrual cycle.

The blood test shows a high level of progesterone.

Explain the cause of this high level of progesterone on day 20 of the menstrual cycle.

(2)

The progesterone is used to maintain the lining of the uterus for the implantation of a fertilised egg for pregnancy. A high level late in the cycle could suggest a pregnancy as the uterus lining would have to be maintained

ResultsPlus
Examiner Comments

This candidate was able to give the explanation that progesterone maintains the lining of the uterus for 1 mark. In order to attain further marks they needed to state that the progesterone was released from the corpus luteum after the egg had ovulated.

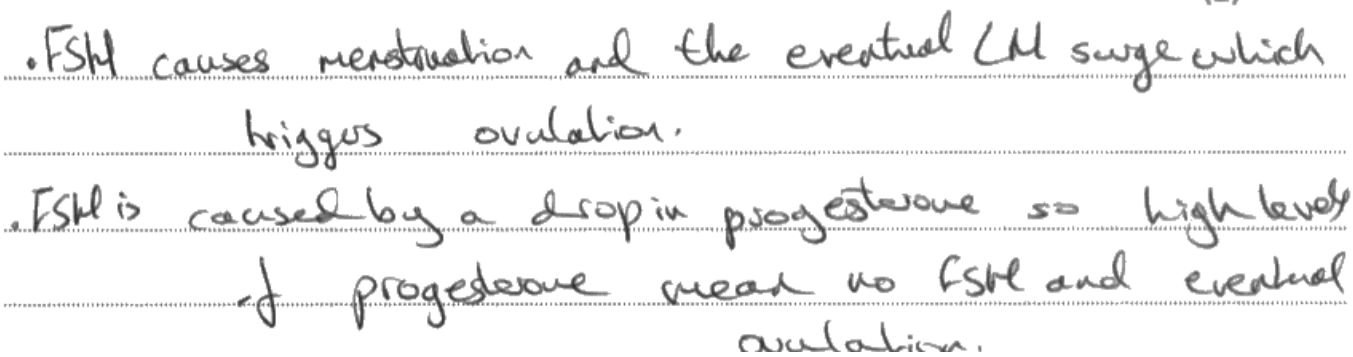
Question 7 (b)

An understanding of how oestrogen and progesterone can be used in the contraceptive pill was reasonably well understood. The majority of marks were gained from the idea of high levels of oestrogen and progesterone inhibiting the release of FSH or LH thus no eggs develop or ovulation is prevented. Several candidates understood that this causes a thickening of cervical mucus stopping the sperm from entering the uterus thus preventing pregnancy.

(b) Hormones are also used as a method of contraception.

Explain why taking high levels of oestrogen and progesterone in the combined contraceptive pill reduces the chance of pregnancy.

(2)



ResultsPlus
Examiner Comments

In this case the candidate has been awarded 2 marks as they have correctly linked the relationship between progesterone levels being high inhibiting LH and FSH production and also stated that LH causes ovulation therefore without it ovulation would not occur.

Question 7 (c)

This question asked for some higher order mathematical skills and candidates tackled it in a variety of ways. Calculators are allowed in biology examination as so candidates should use these when calculating percentages. The first mark was awarded for calculating 13.2% of 32.6 million. The second mark for understanding that 1.2% of the population taking the pill could get pregnant whilst on the pill, and the last for a correct rounding of the answer as the answer requires a number of people thus we cannot have 0.4 of a person. Some candidates lost this mark by rounding up instead of rounding down.

(c) The female population of Britain is 32.6 million.

The percentage of this population taking the combined contraceptive pill is 13.2%.

The combined pill is 98.8% effective.

Calculate the maximum number of females taking the combined contraceptive pill who could become pregnant.

(3)

13.2% × 32.6 million = 4,303,200

100% − 98.8% = 1.2%

4,303,200 × 1.2% = 51638.4

= 51,634 (maximum)

51,639

ResultsPlus
Examiner Comments

This calculation was fairly complex and the candidate managed to complete the calculation correctly however the rounding of the number from 51638.4 should have been downwards. This is one of the mathematical skills expected in the specification. Candidates should also be aware that we cannot have 0.4 of a person.

This response gained 2 marks.

13·2% of 32·6 = ~~3912000~~ 3912000

100 - 98.8 = 1·2%

~~1·2% of 3912000 = 4612000~~

1·2% of 3912000 = 46944

46944

ResultsPlus
Examiner Comments

It is always worth showing working, in this case correctly calculating that 1.2% of the population could become pregnant. Correct calculations will always be credited if the working is shown.

1 mark has been awarded.

Question 8 (a) (i)

8 (a) Figure 9 shows the stroke volume at different heart rates of a person who has trained for a marathon and of a person who has not trained for a marathon.

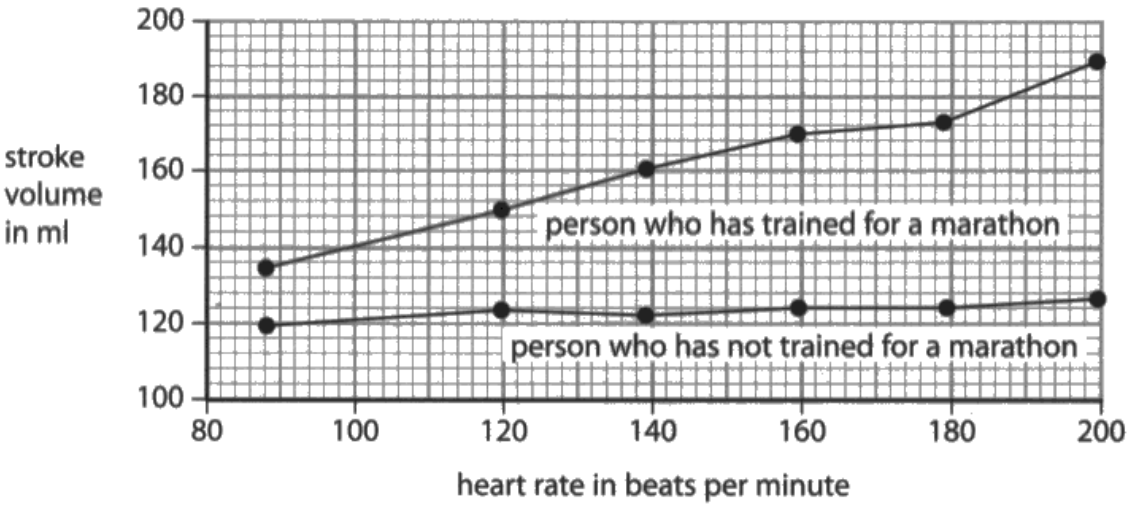


Figure 9

(i) Compare the effect of heart rate on stroke volume of the person who has trained for a marathon with the person who has not trained for a marathon.

(2)

For the person who has trained, increasing heart rate doesn't cause any major increase in stroke volume. Stroke volume is nearly constant for this person. For the person who hasn't trained, increasing heart rate has had ~~caused~~ a ~~big~~ larger effect on the stroke volume, increasing it fairly gradually.

ResultsPlus
Examiner Comments

This candidate has incorrectly read the graph and linked the increase in stroke volume with heart rate to that of the person who has not trained for the marathon rather than the one who has.

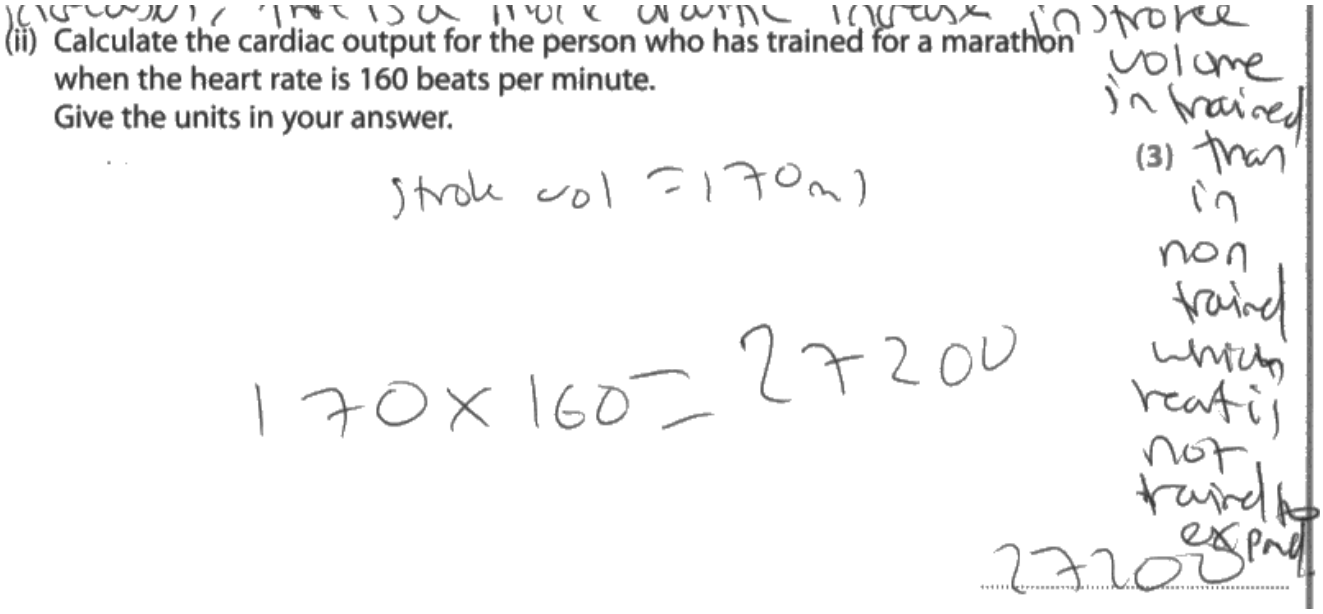
No marks have been awarded.

ResultsPlus
Examiner Tip

Always cross check your answer when describing or comparing graphs to ensure you have the correct readings from the graphs.

Question 8 (a) (ii)

For this question candidates had to recall the equation to calculate cardiac output, which is in the specification, then read from the graph and calculate the cardiac output. The question asks for the units to be given in the answer which many candidates missed so lost 1 mark. The units should be ml per minute or l per minute if converted. A common error was ml per beat per minute which is incorrect.



ResultsPlus
Examiner Comments

This candidate has correctly recalled the equation for cardiac output and correctly calculated the cardiac output. The question asks for the units to be included in the answer in this case ml per minute.

Note m is not acceptable for minute as it is the SI unit abbreviation for metres.

This response scored 2 marks.

ResultsPlus
Examiner Tip

In the enclosed clip it is clear that the candidate has written below the line above. Do not do this in examinations as the person marking will not see this on the previous question. If you need more space to write then ask for extra paper.

Question 8 (b)

This 6-mark question required a logical flow to the answer starting with the blood entering the heart through the vena through the right atrium through a valve to the right ventricle then exiting through the pulmonary artery to the lungs. The blood then returns to the heart through the pulmonary vein and enters the left atrium through a valve to the right ventricle then pumped to the body through the aorta. There were many excellent responses here with candidates correctly naming the valves although this was not required. Confusion between the right and left side of the heart made candidates lose some marks but if they had blood flow correctly through one side of the heart they could access level 2 for 3 or 4 marks dependent upon if they correctly linked this to the lungs or not. Level 1 could be attained by naming a correct chamber or blood vessel not mentioned in the question.

***(b) Blood from the body enters the heart through the vena cava.**

Describe how this blood flows through the heart and lungs to leave the heart through the aorta.

Include references to the chambers of the heart and the relevant valves in your answer.

(6)

The blood enters the body through the ~~left~~ left pulmonary vein into the left ventricle through a valve to stop the ~~back flow~~ back flow. It then goes into the ~~left~~ left atrium then out into an artery towards the capillaries at a higher pressure where gaseous exchange happens. The blood then flows ~~at a higher pressure~~ through the vena cava vein back towards the heart. It then enters the heart into the right atrium to the go through another valve to stop the back flow into the right ventricle the back out the right pulmonary vein.

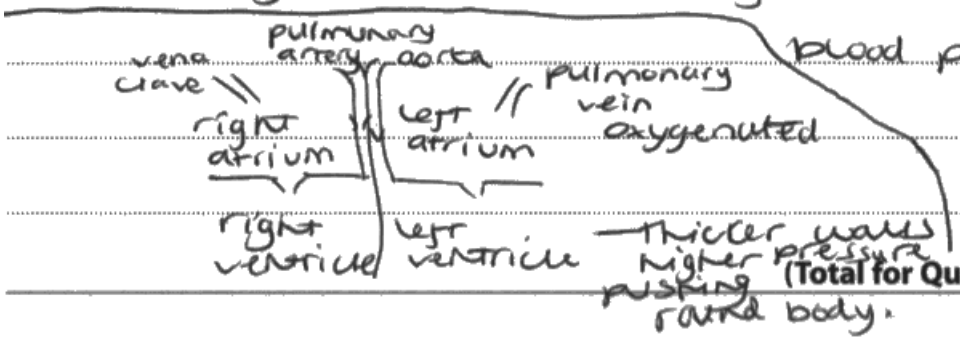
ResultsPlus
Examiner Comments

Although there is a little confusion in this response, the candidate has managed to link together correctly the atrium to ventricle and has also explained the role of valves, so can be awarded level 2 response; unfortunately the link to the lungs is incorrect so 3 marks are awarded.

ResultsPlus
Examiner Tip

Spend some time re-reading your answers carefully to see if you have written contradictory answers especially for the extended open responses.

Deoxygenated blood enters the vena cava to the right atrium where it is pumped through a valve to the right ventricle. From there it is pumper through another valve as it travels out of the heart through the pulmonary artery towards the lungs. At the lungs the blood becomes oxygenated again and travels back to the heart through the pulmonary vein into the left atrium. The blood is pushed through a valve to the left ventricle and then pushed through another valve to leave the heart through the aorta. The oxygenated blood then travels round the body through veins and arteries providing muscles with the oxygen, eventually returning to the heart through the vena clave with deoxygenated blood. Valves are important to stop backflow due to gravity, it allows blood to be pumped around the body in an upwards direction. The walls in the left ventricle are very thick because the blood pressure is higher.



(Total for Question 8 = 11 marks)

ResultsPlus
Examiner Comments

This candidate has given a correct pathway of blood from the vena cava to the aorta including the role of the pulmonary artery and pulmonary vein to and from the lungs. They have recognised that there is a valve on each side between the atrium and ventricle so can be awarded a level 3 response for 6 marks.

Question 9 (a) (i)

This question required candidates to interpret the diagram as showing many alveoli (air sacs) thus increasing the surface area for maximum diffusion. Candidates did sometimes miss the marks by referring to the capillary network or the pulmonary vein/artery. The question was implicit about why the alveoli have the internal structure. Candidates could also attain marks by talking about the alveoli having very thin membranes (walls).

9 (a) Figure 10 shows alveoli from a lung.

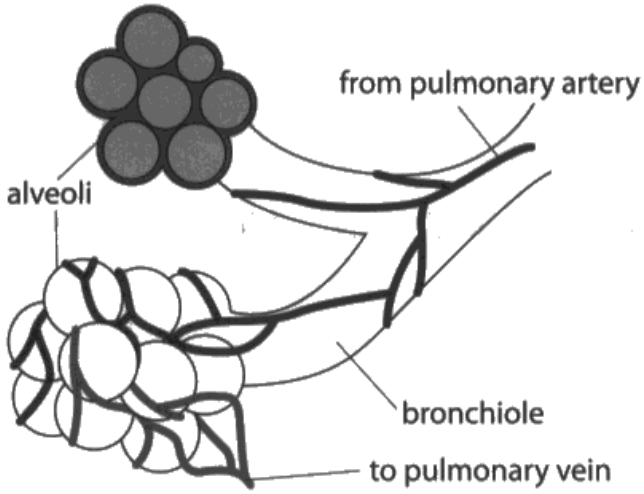


Figure 10

(i) Explain why these alveoli have the internal structure shown in Figure 10.

(3)

Alveoli have this internal structure as its function is ~~to~~ for carbon dioxide & diffuse out, by gas exchange. The pulmonary artery recieves the ~~de~~oxygenated blood, which contains ~~oxe~~ oxgyen ~~f~~ for gas exchange. The structure is also air ~~sacs~~ sacs that have thin walls, so that carbondioxide

ResultsPlus
Examiner Comments

This candidate scored 2 marks for the idea of maximising gas exchange or diffusion and for the idea that the alveoli had thin cell walls. The idea of having a large surface area or many alveoli was needed for the remaining mark.

Question 9 (b)

The image in this question shows movement of molecules across a membrane and candidates were asked to describe the movement of the molecules. They were expected to understand that molecules move from an area of high concentration to an area of low concentration until there were equal quantities of molecules on either side.

(b) Figure 11 shows the movement of molecules across a membrane.

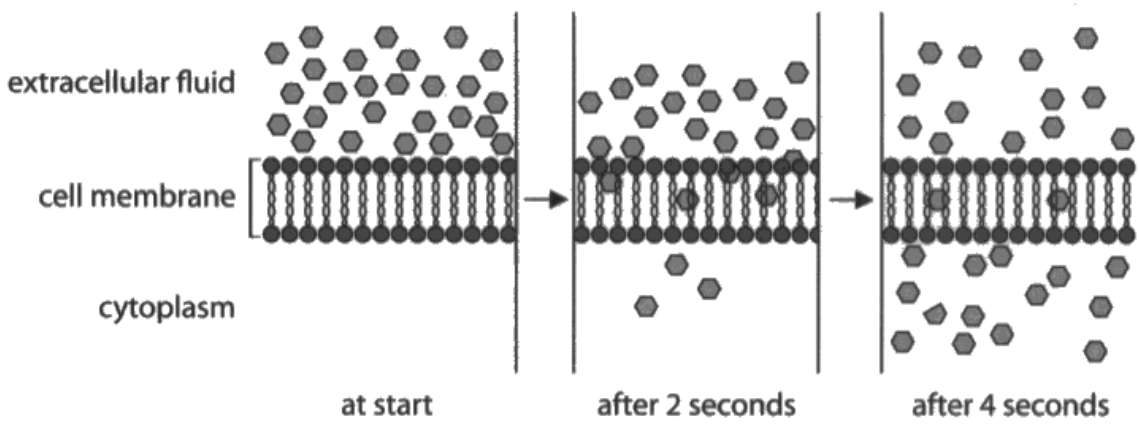


Figure 11

Describe how Figure 11 illustrates movement of molecules across a membrane.

(2)

Figure 11 shows molecules moving from an area of high concentration to an area of low concentration they across a partially permeable membrane, the cell membrane. If the molecules are water molecules, this is osmosis. The diagram demonstrates a fluid moving into a cell through its cell membrane into the lowly concentrated cytoplasm.

ResultsPlus
Examiner Comments

Several candidates were able to refer to diffusion of molecules down a concentration gradient or from there they were in high concentration to low concentration as this candidate did for 1 mark. What was needed for the second mark was the idea that there was no net movement of molecules once the concentration differences were equal.

Question 9 (c)

A specification point on Fick's law was addressed in this question and all marks could be awarded for the understanding of the proportional relationship between the rate of diffusion and the concentration differences and surface area and the inversely proportional relationship with the membrane thickness. Many candidates were able to understand this relationship or parts of it to access the different levels on this question. Marks were awarded across the mark range.

high → concentration x surface area / cell thickness ← low

*(c) Explain, using Fick's law, the factors that affect the diffusion rate of molecules into and out of cells.

(6)

Firstly, the concentration gradient will affect the rate of ~~reaction~~ diffusion. If the gradient is higher, the diffusion rate will increase as more gas particles will want to spread out of the alveoli (example). If the concentration difference is smaller, the rate of diffusion will be slower.

Secondly, the surface area will affect the rate of diffusion. If there is more surface area, more gas exchange can take place simultaneously. If surface area is low then the rate of diffusion will be slower.

Lastly, the thickness of the cell will affect the rate of diffusion. If the ~~cell~~ ~~is one cell~~ thing - it is diffusing through is ~~one~~ one cell thick, the rate of diffusion will increase as the gas particles will have to travel less. If the thickness is more than one cell, the rate of diffusion will decrease as ~~a~~ gas particles will travel further, thus taking longer.

(Total for Question 9 = 12 marks)

ResultsPlus
Examiner Comments

This candidate has a good understanding of the three factors that affect diffusion according to Fick's law and has explained the effect of these. They have not referred to the idea of proportionality in their answer so are awarded a level 3 for 5 marks rather than 6 marks.

Factors that affect diffusion are surface area, thickness of cell. Surface area affects diffusion because the larger the surface area the more quickly a substance can diffuse into the other however if a something has a smaller surface area then diffusion is less efficient. a Thickness of a cell wall can affect diffusion because the thicker the cell the more difficult it is Therefore for molecules to enter the cell meaning that less will be able to because the rate of diffusion would've decreased.

ResultsPlus
Examiner Comments

This candidate has correctly referred to the factors of surface area and membrane thickness and explained their effect on diffusion so can be awarded level 2 for 4 marks. It is important to attempt the 6-mark questions as most responses will contain some creditable content.

ficks law is that rate of diffusion ∝ surface area × concentration gradient / distance of membrane thickness

When surface area and the ~~conc~~ concentration gradient ~~times~~ multiplies by two, the rate of diffusion ~~time~~ multiplies by two. When the diffusion distance multiplies by two, the rate of diffusion divides by two.

A larger surface area increases the rate of diffusion as it increases the area for gas exchange and other substances to be able to pass through at a higher rate. Increasing the thickness of a membrane, increases the diffusion distance ~~making it longer~~ Therefore decreasing the rate of diffusion as it takes ~~is~~ longer for the diffusing substances to pass through. Having a higher concentration gradient ↑ increases the rate of diffusion as the particles / molecules will move readily ~~differs~~ diffuse to the lower concentration if there's a larger difference in concentration.

ResultsPlus
Examiner Comments

This candidate shows a clear understanding of all the factors effecting Fick's law including the proportionality so can be awarded full marks.

Diffusion rates of molecules is limited by the concentration of gas molecules. For example, during respiration, there would be a higher concentration of carbondioxide that leaves the organism if there is also a higher concentration of oxygen. This is because diffusion occurs when gas molecules move from a high concentration to a low concentration. Therefore, the concentration of gas is a limiting factor. The rate of diffusion also increases when pressure increases. This is because the movement of particles covers a smaller distance in a smaller amount of time. Therefore, the rate of diffusion increases. This is because concentration gradient the gas molecules move down is much smaller in compact areas of a cells. Therefore, pressure is also a limiting factor. Temperature may also affect ~~diffusion~~ diffusion rates as gas particles move faster in higher temperatures as they have more kinetic energy.

(Total for Question 9 = 12 marks)

ResultsPlus
Examiner Comments

Although this candidate has only referred to the effect of the concentration gradient on diffusion they have explained this well. We can ignore the other references to temperature etc as they are not relevant and we always try to mark positively. This candidate can be awarded 2 marks.

Question 10 (a)

This maths question required candidates to calculate the difference in the movement of carbon into and out of the atmosphere over a year. They firstly had to identify which was moving in and which was moving out which required considerable application of knowledge. The mathematical demand was not high but an understanding of movement was. Many candidates calculated a mean and therefore could not be awarded the marks. Some candidates did half of the calculation thus finding the movement into the atmosphere rather than finding both and subtracting them.

10 (a) Figure 12 shows the global movement of carbon into or out of the atmosphere.

process	movement of carbon into or out of the atmosphere in gigatonnes per year
photosynthesis	120.1
respiration	119.6
ocean uptake	92.8
ocean loss	90.0
combustion of fossil fuels	6.4

Figure 12

Calculate the net mass of carbon added to the atmosphere each year.

(2)

120·1 − 119·6 = 0·5

92·8 − 90 = 2·8

(0·5 + 2·8) − 6·4 = −3·1

−3·1 gigatonnes

ResultsPlus
Examiner Comments

This is the correct calculation as an alternative method of calculation of this from the mark scheme but is obviously still credited for the marks.

ResultsPlus
Examiner Tip

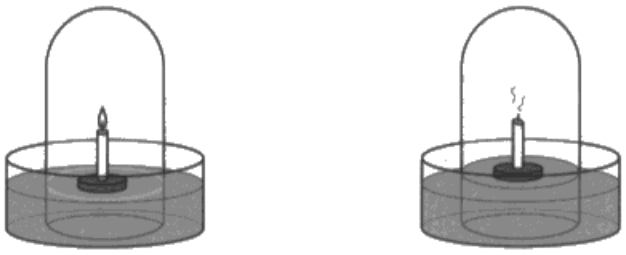
The net mass of carbon is what is left when you have removed carbon dioxide and added it. Many candidates just worked out the amount added to the atmosphere.

Question 10 (b) (i)

This was well understood with many candidates understanding that oxygen was required for the candle to burn. There were a couple of errors where candidates thought carbon dioxide was required.

(b) Joseph Priestley was a scientist who investigated how green plants and combustion affected the carbon cycle.

Figure 13 shows his first experiment.



candle sealed in a bell jar

candle after 3 minutes

Figure 13

(i) State why the candle was not burning after three minutes.

(1)

oxygen is needed to maintain the light of a fire. when sealed, the amount of oxygen used increases and the presence of oxygen depletes until it runs out.

ResultsPlus
Examiner Comments

Any reference to the idea that oxygen was required for burning was acceptable here for 1 mark.

Question 10 (b) (ii)

This question took the idea a little forward and candidates found this a little more tricky often confusing photosynthesis and respiration with the idea that the plant was removing oxygen through the process of photosynthesis.

(ii) Joseph Priestley continued the investigation but placed a plant inside the bell jar as shown in Figure 14.

Figure 14

He observed that the candle stayed alight for two minutes more than the candle in the bell jar in the first experiment.

Explain his observation.

(2)

The plant was respiring so oxygen was present from longer - this meant that the candle remains lighted for longer as oxygen is present for longer.

ResultsPlus
Examiner Comments

This response although incorrectly linked to respiration nevertheless gained 1 mark for stating that there was more oxygen present for 1 mark.

Question 10 (b) (iii)

Once again the variables that needed to be controlled were assessed here. The volume of air in the bell jar was needed but once again candidates lost marks by referring to the amount of air or concentration of air in the bell jar. References to the size/type of candle were awarded marks and the majority of candidates were able to access these marks.

(iii) State **two** variables that would need to be controlled to compare these two experiments.

(2)

1 Size of the candle

2 Amount / concentration of oxygen

ResultsPlus
Examiner Comments

The size of the candle is acceptable for the mark but we were looking for volume of air in the bell jar rather than concentration of oxygen as this would not have been controlled.

This response scored 1 mark.

1 The size of the candle bell jar.

2 The time in which the candle burns in.

ResultsPlus
Examiner Comments

The size of the bell jar was acceptable here for 1 mark. The time taken was the thing that was being measured so cannot be a variable to control.

ResultsPlus
Examiner Tip

If referring to the gases always refer to the volume of gases, not the amount when controlling variables.

Question 10 (c)

Higher ability candidates answered this question well but many candidates struggled with the role of the different bacteria in the nitrogen cycle. The majority of marks were awarded for the idea of decomposers being involved. The role of nitrifying and nitrogen fixing bacteria were sometimes confused. The nitrogen fixing bacteria convert atmospheric nitrogen into nitrates (ammonia or nitrates accepted here) and nitrifying bacteria converting ammonia into nitrates/nitrates. The least seen bacteria in this response was the role of denitrifying bacteria in the nitrogen cycle converting nitrates back into nitrogen.

(c) Nitrogen is cycled through the environment.

Describe the roles of bacteria in the nitrogen cycle.

(4)

Bacteria act as decomposers, they break down dead animals and plants. However, the nitrogen cycle also contains nitrogen fixing bacteria which is on the roots of the plant nodules that absorbs nitrates into the plant.

ResultsPlus
Examiner Comments

1 mark can be awarded here for the role of decomposers breaking down dead organisms. There is not quite enough for the nitrogen fixing bacteria as they only refer to nitrates, not from nitrogen to nitrates. This is the last question on the paper and is therefore aimed at those high scoring candidates.

Paper Summary

Most candidates were able to access both extended writing responses, demonstrating good knowledge of the blood flow through the heart and the factors effecting diffusion applied to Fick's law. Higher ability candidates were able to apply their knowledge of the hormones of the menstrual cycle and explain the roles of bacteria in the nitrogen cycle.

Many candidates were able to demonstrate a good level of knowledge in the early questions, including leaf structure and the role of stomata as well as thermoregulation related to sweating. The application of knowledge of core practical tasks remain a challenge and candidates need to use scientific terminology more frequently when answering questions related to practical tasks. Across the paper candidates showed they could extract data from graphs and calculate differences between two values.

The level of knowledge shown about food webs and the carbon cycle was very good for most candidates possibly reflecting the use of past papers as a revision strategy. However, when candidates are asked to compare two processes such as when answering the question related to cardiac output they must ensure they give details for both processes for each aspect they include in their answer. Candidates also showed a relatively good understanding of the urinary system and the transport of substances through plants.

Two short answer questions proved to be challenging for candidates of all abilities, these include the formation of urea by the process of deamination in the liver and the testing of urine for protein where they needed to apply their knowledge of food testing to urine testing. Many candidates lost marks on these questions because although they showed they did have some knowledge about the topic their responses were inaccurate and their choice of language meant the response was scientifically incorrect.

The responses to the questions assessing aspects of practical work have improved since last year. This is a new component for this specification and the improvement is expected as teachers increase their understanding of this aspect. Candidates of all abilities were able to answer questions using their practical skills knowledge, including the identification of controlled variables and improvements. However, candidates still need to ensure they use scientific terms, including volume and mass, accurately. Many candidates were able to write good methods for determining how to estimate the number of organisms in a garden using knowledge they were given in the question. Explaining why a variable needed to be controlled was more challenging, especially as this question was an alternative method for a core practical. Candidates remain confused as to the difference between controlling a variable and using a control.

Candidates of all abilities were able to access the straightforward maths questions of calculating a percentage, although candidates lost marks on this for incorrectly rounding the answer or giving an answer to a decimal place rather than a whole number. Many candidates could recall the equation for cardiac output but marks were lost by not including the correct units.

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

- Recognise that the word 'explain' means additional scientific information is needed that is linked to the answer given.
- Use all the information given in the question to help construct the answer but avoid repeating the information which has already been given, and giving a vague response which will not gain credit.
- Develop their practical skills knowledge to ensure they understand the difference between the factors being investigated, controlled variables and stating a control.
- If terms such as valid, reliable, accurate and precise are used candidates should ensure they know the scientific meaning of these terms.
- Ensure they know the core practical tasks and that they can apply the knowledge of these to new situations.
- Use genetic scientific terminology accurately in open responses.
- Ensure they consistently apply rules for rounding up numerical answers and understand recurring numbers.
- Read mathematical questions carefully to note whether an answer is required in standard for or to a specified number of significant figures or include the correct units.
- Always show the mathematical working when doing calculations as a mark can be awarded for errors carried forward.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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