

Examiners' Report

June 2018

GCSE Science 1SC0 2BH

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Introduction

Paper 1SC0/2BH is taken by candidates doing GCSE Combined sciences as part of a linear assessment model at the end of the course. This was the first paper for the new specification. The paper consists of 60 marks assessed by a variety of questions including multiple choice, short answer and an extended answer question worth 6 marks. Candidates should answer all questions in a time period of 1 hour and 10 minutes. In the extended answer question marks are also awarded for the ability to structure a response logically; this question is marked with an asterisk (*). In addition, the new specification assesses practical knowledge and maths skills in the papers. These requirements are given in the specification and there are 6 core practicals for each science which candidates must complete prior to the exams. Aspects of working scientifically were also assessed in questions throughout the paper.

The paper contained questions assessing the content from topics 1 and topic 6 - 9. These included cells and tissues, osmosis and leaf structures, transpiration and translocation, the nitrogen cycle, photosynthesis, the hormones of the menstrual cycle and the action of adrenalin. Questions on practical work included writing a plan for an investigation, safety precautions, microscopy knowledge, controls and the method and analysis of results for the practical testing of the elasticity of an artery. The maths skills assessed included magnification calculations and heart rate calculations.

The assessment of practical in examinations has replaced the controlled assessment component of the previous specification. Candidates of all abilities were able to answer questions using their practical skills knowledge, including questions on safety precautions and the identification of controlled variables. However, candidates need to ensure they use terms including volume and mass accurately. There was some confusion between what 'a control' is as opposed to controlling variables and it is essential that candidates can distinguish between these two very separate practical skills.

Candidates of all abilities were able to access the more straightforward maths questions including microscopy calculations including the ability to write answers in standard form and calculating heart rate. Candidates of all abilities were able to analyse data to give a conclusion but often confused the describing and explaining of data thus losing marks unnecessarily.

Question 1 (a) (ii)

This calculation question required candidates to calculate an image length using the actual length and the magnification. The majority of candidates were able to access this and correctly apply the magnification calculation. As this is an overlap question with the foundation paper there was not a conversion between units required; however at a different stage in the paper this may also have been asked for. Common errors were dividing the actual size of the cell by the magnification rather than multiplying it or converting the answer into mm without stating the correct unit.

(ii) The actual length of the red blood cell from a turtle is $20.5\text{ }\mu\text{m}$.

Calculate the length of the magnified image of the red blood cell of the turtle when magnified $400\times$.

(2)



$$\begin{aligned} 20.5 \times 400 \\ = 8200 \div 1000 \\ = 8.2 \end{aligned}$$

Not (milli to micro)

..... 8.2 μm



This was one mark for the correct working. They then converted the answer into mm but did not give the unit so cannot be awarded full marks.

(ii) The actual length of the red blood cell from a turtle is $20.5\text{ }\mu\text{m}$.

Calculate the length of the magnified image of the red blood cell of the turtle when magnified $400\times$.

(2)

~~20.5 x 100~~

$$20.5 \times 400 = 2050$$

..... $2050\text{ }\mu\text{m}$



ResultsPlus
Examiner Comments

This was given one mark for the correct working.



ResultsPlus
Examiner Tip

Always show the workings on the paper.

(ii) The actual length of the red blood cell from a turtle is $20.5\text{ }\mu\text{m}$.

Calculate the length of the magnified image of the red blood cell of the turtle when magnified $400\times$.

(2)

$$20.5 \times 400 = 8200\text{ }\mu\text{m}$$

..... $8200\text{ }\mu\text{m}$



ResultsPlus
Examiner Comments

This was two marks for giving the correct answer on the answer line.

Question 1 (a) (iii)

This magnification calculation required candidates to convert their answer into standard form. Candidates of all abilities were able to access the question. Several candidates calculated the correct response but missed the instruction to present their answer in standard form so therefore lost 1 mark.

(iii) The width of the human red blood cell, when magnified $400\times$, is 3.08 mm.

Calculate the actual width of the cell and show your answer in standard form.

(2)

$\frac{3.08}{400}$

$$\frac{3.08}{400} = 7.7 \times 10^{-3}$$

ma

$$7.7 \times 10^{-3} \text{ mm}$$



This is two marks for giving the correct answer in standard form.

(iii) The width of the human red blood cell, when magnified $400\times$, is 3.08 mm.

Calculate the actual width of the cell and show your answer in standard form.

(2)

$$400 = \frac{3.08}{\text{width}}$$

$$3.08 \div 400 = 0.0077$$

$$0.0077 \text{ mm}$$



This is one mark for the correct answer but it is not given in standard form.

Question 1 (b) (i)

This is one of the new style of questions on planning an experiment. The experiment may be a required practical, a practical related to content or it could be, as in this case, one of the suggested practical tasks. This was answered well and many candidates got a mark for the idea that the artery needed to be measured and masses added. There were some responses which referred to stretching the artery with no reference to how, and others referred to stretching the artery until it broke which did not answer the question.

- (i) Describe a method you could use to see how much the ring of tissue from an artery could stretch before it no longer returned to its original size.

(3)

Add more masses slowly and then record the results until it can no longer be returned to it's original size.



ResultsPlus
Examiner Comments

This was awarded two marks for adding masses and for the idea that you repeatedly do this until it no longer returns to its original size.

- (i) Describe a method you could use to see how much the ring of tissue from an artery could stretch before it no longer returned to its original size.

(3)

Measure the ring of tissue ^{with a ruler} to find out its original size before setting up the apparatus. Then add 10 g of mass onto the mass carrier. Take off the ring of tissue and measure again. Repeat this, adding 10 g everytime, until it no longer returns to it's original size.



This was awarded full marks for measuring the original length, adding masses and removing them and repeating this until it no longer returns to its original size.

- (i) Describe a method you could use to see how much the ring of tissue from an artery could stretch before it no longer returned to its original size.

(3)

Keep adding 10g mass on the mass carrier to see how much the ring of tissue from an artery stretches. Measure this. Then repeat and keep measuring until the ~~the~~ ring of tissue breaks.



This was only awarded one mark for the idea that masses are added to the artery. It has no original measurement and shows the misconception that it should be done until the artery breaks.

Question 1 (b) (ii)

Safety precautions must be appropriate to the practical task being assessed, in this case dealing with animal tissue, so gloves, washing hands and sterilising equipment were the relevant precautions. General lab practice will not be awarded marks on this style of question as it has to be specific to the task. Most candidates gave the idea of gloves or washing hands and were awarded the mark.



(ii) Give **one** safety precaution you need to take when handling animal tissue such as blood vessels.

(1)

Wash your hands after handling animal tissue



ResultsPlus
Examiner Comments

This was worth the mark for washing hands

Question 2 (a) (i)

There are some misconceptions about the use of a coverslip with many candidates believing that it is used to allow light to shine onto the sample which is not the case. Acceptable responses were those which referred to keeping the sample still or keeping it flat. Also acceptable was the idea of protecting the sample from damage. Protecting the sample from bacteria was not acceptable as a marking point.

The layer of nail varnish shows an impression of the cells on the surface of the leaf.

(a) (i) State why a coverslip is placed on top of the leaf peel.

(1)

so the cells are more visible and increases surface area so can see more cells.



ResultsPlus
Examiner Comments

The idea of making it more visible is not accurate and was not awarded a mark.

The layer of nail varnish shows an impression of the cells on the surface of the leaf.

(a) (i) State why a coverslip is placed on top of the leaf peel.

(1)

In order to flatten out the leaf peel, making it ready for the microscope.



ResultsPlus
Examiner Comments

This was one mark for the idea of flattening out the nail varnish peel.

Question 2 (a) (ii)

The leaf peel was used because it was thinner, and light could pass through more easily. Common errors by candidates were the idea that the leaf was too big: this was not acceptable. The idea that the stomata could be seen was also acceptable for a mark.

(ii) Explain why the leaf peel rather than the whole leaf was viewed with a microscope. (2)

By taking a leaf peel, you can examine that part of the leaf in more detail than the whole leaf. Furthermore, stomata is found on the surfaces of the leaf, so it would be more practical to view the leaf peel taken from the surface, because that is where the stomata is found.



This was awarded one mark for the idea that the stomata can be seen more easily using a leaf peel.

(ii) Explain why the leaf peel rather than the whole leaf was viewed with a microscope. (2)

The leaf peel would be thinner, so if a light microscope was being used, the ~~the~~ light could shine straight through the specimen and ~~we~~ we can see directly through the specimen.



This was two marks for the leaf peel being thinner and light being able to travel through.

Question 2 (b) (i)

Candidates had to identify that there were three stomata present. Some candidates counted all the cells and others counted the number of guard cells.

Question 2 (b) (ii)

This question caused some issues for candidates with many not answering the question posed. The question asked them to describe HOW the stomata open but many of the responses were to do with why stomata open including gas exchange, water loss etc. The response should have been the idea that water moves into guard cells by osmosis causing them to become turgid or swell. A good number of candidates recognised the involvement of guard cells but did not get full marks as they didn't fully explain how stomata open.

(ii) The student observed that the stomata were open.

Describe how stomata open.

(3)

when light intensity increases, stomata open to allow CO_2 in for photosynthesis. Guard cells ~~be~~ also become turgid when water moves by osmosis into them, ~~a~~ widening the stomatal pore.



This scored full marks as it explains that water enters the guard cells causing them to become turgid.

(ii) The student observed that the stomata were open.

Describe how stomata open.

(3)

Stomata are used for gas exchange, so work with/for photosynthesis, which happens when there is sunlight. Stomata open when there is sunlight.



This demonstrates a typical response that did not score as it answers when stomata open and not how they open.



Read the question carefully

Question 2 (b) (iii)

The question asked candidates why the distribution of stomata was different on the top of the leaf to the bottom and they were told that no stomata were present on the top of the leaf. In general candidates lost marks due to the fact that they did not read that no stomata were present on the top of the leaf and referred to why stomata were on top thus did not score any marks. The responses that gained the marks referred to more stomata on the underside of the leaf to reduce water loss by evaporation or transpiration or stomata on the underside of the leaf to facilitate gas exchange for photosynthesis.

(iii) The leaf peel from the upper surface of this leaf showed no stomata.

Explain why it is an advantage to the plant to have this distribution of stomata in the upper and lower surfaces of the leaf.

(2)

On the lower surface of the leaf, it's good to have stomata so that transpiration doesn't occur as often, as if ~~it was~~ they were on the upper surface, the heat from the sun would evaporate the water more, leading it to wither.



ResultsPlus
Examiner Comments

This is a good response explaining why having stomata on the lower surface reduces water loss by evaporation during transpiration.

(iii) The leaf peel from the upper surface of this leaf showed no stomata.

Explain why it is an advantage to the plant to have this distribution of stomata in the upper and lower surfaces of the leaf.

(2)

Stomata are usually located on the lower surfaces of the leaf so gases can diffuse in and out easily. There are not many on the top of the leaf because the sunlight would absorb the moisture more quickly.



ResultsPlus
Examiner Comments

This is only one mark as it does not complete the explanation linking gas exchange to photosynthesis.

Question 3 (a)

This is a classic case of candidates misunderstanding the command word describe and actually giving a very creditable explanation of why blood flow increased to the muscle but this only scored 1 mark for the idea of increased blood flow to the muscles. The describe command word requires the candidates to describe the data so identify that the blood flow to the digestive system is reduced, the blood flow to the muscles is increased and the blood flow to the brain remains the same or is only reduced by a small amount.

- 3 Figure 5 shows the estimated blood flow through some parts of the body when a person is at rest and during exercise.

part of the body	estimated rate of blood flow in cm ³ per minute	
	at rest	during exercise
brain	750	748
heart muscle	350	1 150
digestive system	2 500	1 200
other muscles	1 200	14 500
all other organs (except lungs)	1 423	1 420

Figure 5

- (a) Compare the rate of blood flow through the body when this person is at rest and during exercise.

(3)

The blood flow on the heart muscle increases ~~because the~~ during exercise a lot compared at rest because the heart has to pump a lot of blood and so it puts the heart muscles at stress. other muscles also increase by a lot because the muscles need blood when exercising the muscles don't need that much blood when resting.

This response attempts to explain one observation of the data and is not a full description of the data so only scored one.

- 3 Figure 5 shows the estimated blood flow through some parts of the body when a person is at rest and during exercise.

part of the body	estimated rate of blood flow in cm ³ per minute	
	at rest	during exercise
brain	750	748
heart muscle	350	1150
digestive system	2500	1200
other muscles	1200	14500
all other organs (except lungs)	1423	1420

Figure 5

- (a) Compare the rate of blood flow through the body when this person is at rest and during exercise.

(3)

~~at~~ rest Both at rest and at exercise the blood flow in the brain and all other organs (table) stays fairly the same. The heart muscle and other muscle drastically increase blood flow during exercise compared to resting. The digestive system is the only part which uses less blood flow during exercise when compared to its blood flow at rest.



This scored maximum marks as it has described the three aspects of blood flow during rest and exercise.

Question 3 (b)

Candidates were asked for an explanation of why there was a change in blood flow to the muscles and a mark was awarded for there is less blood flow to the digestive system or there was increased blood flow to the muscles. The explanation required was that the blood was needed in the muscles for increased (aerobic) respiration. Most candidates accessed the first point and better answers linked the change to a reason for the explanation.

(b) Explain why there is a change in the rate of blood flow through the digestive system during exercise.

(2)

Ther body doesn't prioritise the digestive system during exercise as blood flow decreases by 1200cm^3 during exercise compared to rest. This is because muscles require oxygen to respire which is allocated by blood.



This has two marks for giving the change in blood flow linked to the reason that the muscles require oxygen for respiration.

(b) Explain why there is a change in the rate of blood flow through the digestive system during exercise.

(2)

There is a change in the rate of blood flow through the digestive system because it isn't used during exercise and ~~therefore~~ meaning it's not a priority



This response does not score as it does not state what the change in the rate of blood flow through the digestive system is.

(b) Explain why there is a change in the rate of blood flow through the digestive system during exercise.

(2)

in the digestive system the rate of blood flow decreases from 2500 to 1200 ~~mls~~ during exercise. This is because more blood is needed in the muscles such as heart while the digestive system doesn't require as much.



This only scores one for giving the change in blood flow in two different ways, it does not explain why a change in blood flow is required.

Question 3 (d)

Candidates were required to apply the equation for cardiac output which is in the specification unit 8. Spec point 8.12. There was no mark attributed to the recall of the equation as both marks were maths calculation marks. The correct answer was 70 b.p.m. Candidates who failed to convert the units to all millilitres or all litres but showed their working were awarded one mark and this was the most frequent reason for only scoring one mark.

- (d) A person has a cardiac output of 4.9 litres per minute. The stroke volume of each heart beat is 70 ml.

Calculate the heart rate.

(2)

Cardiac output = stroke volume \times heart rate



$$\frac{\text{cardiac}}{\text{stroke}} = \frac{4.9}{70} = 0.07$$

0.07

beats per minute



ResultsPlus
Examiner Comments

This scored one for the correct equation showing the workings and an answer but the candidate has not converted the millilitres into litres for the stroke volume.

- (d) A person has a cardiac output of 4.9 litres per minute. The stroke volume of each heart beat is 70 ml.

Calculate the heart rate.

(2)

$$\text{Stroke volume} = \text{Cardiac output} \times \text{heart rate}$$

$$70 \text{ ml} = 4900 \text{ ml} \times \text{heart rate}$$

$$\text{heart rate} = \frac{4900}{70} = 70 \text{ bpm} \quad \text{70 beats per minute}$$



ResultsPlus
Examiner Comments

This scored both marks for the correct answer. The full workings are also shown.

Question 4 (a) (i)

Candidates seem to struggle with the new practical style questions across the paper. In this case they were asked to give a control for this experiment which is where the apparatus is set up in the same way as figure 13 but with (distilled) water or no nitrate pellets added. Many gave a control variable such as keeping the volume of solution the same but this is not the same thing.

- 4 (a) A student investigated the effect of nitrate ion concentration on plant growth. She placed barley seedlings in three test tubes containing different concentrations of nitrate fertiliser.

Test tube 1 contained distilled water with 1 pellet of nitrate fertiliser.

Test tube 2 contained distilled water with 2 pellets of nitrate fertiliser.

Test tube 3 contained distilled water with 3 pellets of nitrate fertiliser.

After 7 days, the lengths of the seedlings were measured.

Figure 6 shows an example of the apparatus used.

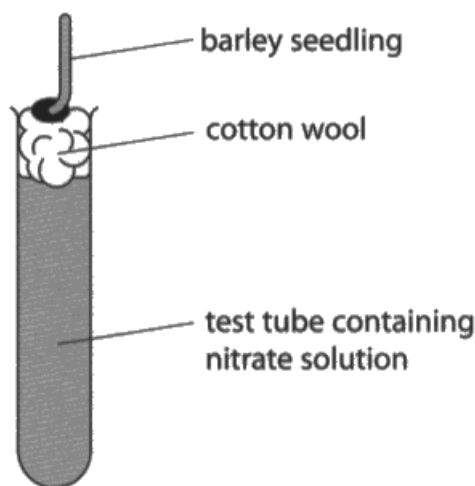


Figure 6

- (i) Describe a control for this investigation.

(2)

A control for this investigation would be a test tube with just distilled water in it, some cotton wool at the top with a barley seedling on the top of the cotton wool.



This scored two marks as it gives a control which is the same apparatus with just distilled water and no nitrate.

- 4 (a) A student investigated the effect of nitrate ion concentration on plant growth. She placed barley seedlings in three test tubes containing different concentrations of nitrate fertiliser.

Test tube 1 contained distilled water with 1 pellet of nitrate fertiliser.
Test tube 2 contained distilled water with 2 pellets of nitrate fertiliser.
Test tube 3 contained distilled water with 3 pellets of nitrate fertiliser.

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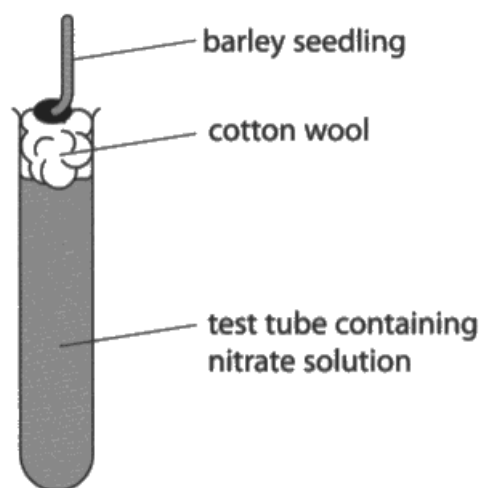


Figure 6

- (i) Describe a control for this investigation.

(2)

To use an equal amount of different components such as the distilled water and cotton wool so each answer is accurate and fair.



This gives the idea of controlling variables which is not the same as a control.

Question 4 (a) (iii)

As is often the case with practically based questions the answers must be specific to the question. In this case it was about measuring the growth of seedlings rather than length. Many candidates referred to ideas of measuring the nitrate solution absorbed or the rate of photosynthesis – not an easy thing to do. The expected answers were measure the change in mass or number of leaves present.

(iii) Give a method, other than measuring the change in length, that would show the growth of the seedlings.

(1)
the amount of time to
grow to a certain
length.



ResultsPlus
Examiner Comments

This was not awarded the mark as it is still the idea of measuring length and not another method.

(iii) Give a method, other than measuring the change in length, that would show the growth of the seedlings.

(1)
measuring the change in mass using
a balance.



ResultsPlus
Examiner Comments

This was awarded the mark as it is another method that can be used to show the growth of the seedlings.

Question 4 (b) (i)

This is an explain question so candidates who answered correctly that there was more growth with increased nitrate concentration gained the first mark. The second mark was based on why this happens because nitrates are needed to make proteins. Several candidates just repeated the question or commented that the seedlings have different lengths to start with, which the change in length negates as an issue.

(b) Figure 8 shows the results of this investigation.

seedling in test tube	length at the start in mm	length after 7 days in mm
1	4	11
2	6	17
3	5	26

Figure 8

(i) Explain why there are differences in the change in the lengths of the seedlings.

(2)

As the levels of nitrate fertiliser increase, the length of the seedling also increase. This is due to the levels of the nitrate ion concentration increases thus allowing more nitrogen to be stored allowing proteins to be made increasing growth.



ResultsPlus
Examiner Comments

This scored two marks for linking the increase in nitrate fertilisers to the increase in length and the requirements of proteins for growth.

(b) Figure 8 shows the results of this investigation.

seedling in test tube	length at the start in mm	length after 7 days in mm
1	4	11
2	6	17
3	5	26

Figure 8

(i) Explain why there are differences in the change in the lengths of the seedlings.

the different amount of fertiliser has caused a rapid increase in growth in these seedlings



ResultsPlus
Examiner Comments

This does not link the amount of fertiliser to the amount of growth for the seedlings so did not score a mark.

Question 4 (b) (ii)

(ii) Explain how nitrate ions were absorbed by the seedling in test tube 3.

(3)

The hair root cells of the seedling in test tube 3 absorbed the nitrate ions through osmosis and diffusion after the ions started going through the wool.



ResultsPlus
Examiner Comments

This received one mark for root cells. Osmosis is incorrect and rejected against diffusion.

(ii) Explain how nitrate ions were absorbed by the seedling in test tube 3. ^{active transport}

(3)

In seedling ~~the~~ in test tube 3 the nitrate ions would be absorbed by the root hair cells through active transport, going from a low concentration to a high concentration.



ResultsPlus
Examiner Comments

This scored three marks for using active transport as part of an explanation.

(ii) Explain how nitrate ions were absorbed by the seedling in test tube 3.

(3)

Water and mineral ions are absorbed through the roots of a ~~test~~ plant and pass through the body through the xylem, so the plant gains nitrate ions in this way. ~~Water~~ Nitrate ions will absorb from an area of high concentration (the solution) to an area of low concentration (the seedling) via diffusion, so the seedling gains nitrate ions.



ResultsPlus
Examiner Comments

This is an example of a response that used diffusion correctly as part of the explanation.

Question 4 (c)

This question asked candidates to explain why legumes are used in crop rotation. The simple response is to increase the amount of nitrates in the soil although this was missed by many candidates. The explanation as to why this happens is because nitrogen fixing bacteria living in plant nodules convert nitrogen gas into nitrates (or other nitrogen compounds). Candidates of high ability were able to explain crop rotation. Many candidates just restated information from the question about mutualistic relationships and reducing the need to add nitrate fertiliser to the soil.

(c) Farmers use crop rotation to reduce the need to add nitrate fertilisers to the soil.

Plants such as peas and beans have a mutualistic relationship with nitrogen-fixing bacteria.

Explain why farmers use these plants in their crop rotation cycle.

(3)

When a plant is growing it absorbs ^{nitrates} ~~nitrogen~~ from the soil. When it is harvested and not allowed to compost, this nitrogen is not returned to the ground and so there is a lack of it in the soil. Planting peas and beans with the nitrogen fixing bacteria means that nitrogen in the air is absorbed into the soil and then 'fixed' by the bacteria into usable nitrates, this raising the nitrate content of a field.



ResultsPlus
Examiner Comments

This scored full marks for the idea that nitrogen is converted into nitrates by nitrogen fixing bacteria, increasing the nitrate levels.

Question 5 (a) (i)

Many candidates were able to describe the graph, saying that as light intensity increases the rate of photosynthesis increases until a point; fewer were able to describe that this occurs when light is no longer a limiting factor. Some stated that something else became a limiting factor which was also acceptable.

- 5 (a) Figure 9 shows the effect of light intensity and temperature on the rate of photosynthesis.

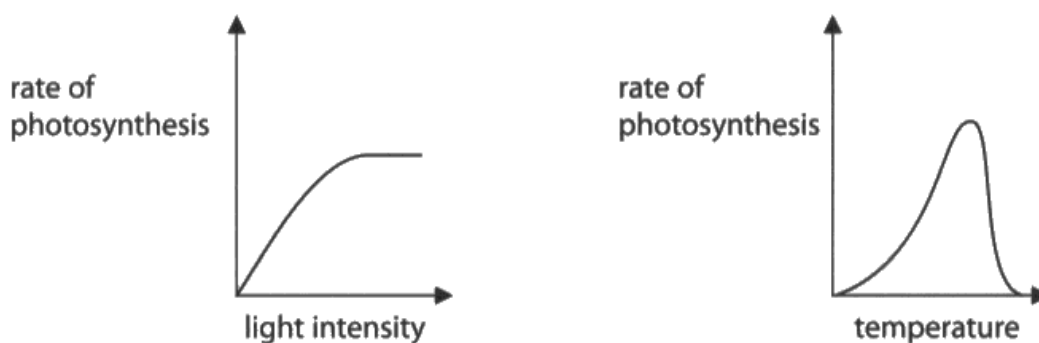


Figure 9

- (i) Describe the effect of light intensity on the rate of photosynthesis.

As the light intensity increases ^{so does} the rate of photosynthesis⁽²⁾, this ends up levelling out due to other factors limiting it like temperature.



ResultsPlus
Examiner Comments

This was worth two marks for the increase in the rate of photosynthesis until another factor limits it, and temperature is named.

- 5 (a) Figure 9 shows the effect of light intensity and temperature on the rate of photosynthesis.

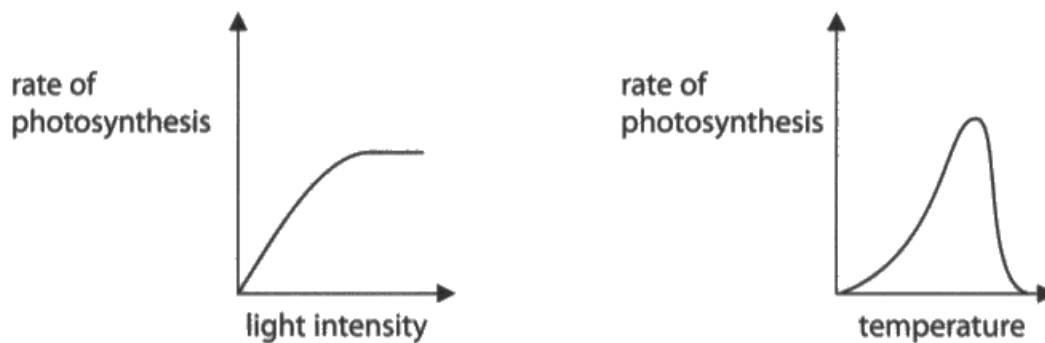


Figure 9

- (i) Describe the effect of light intensity on the rate of photosynthesis.

(2)

As light intensity increases, rate of photosynthesis increases. At a certain point, when the graph plateaus, light is no longer the limiting factor.



ResultsPlus
Examiner Comments

This also scored both marks as it links in the increase in light intensity to the increase in rate of photosynthesis up to the point that light is no longer the limiting factor.

Question 5 (a) (ii)

In order to attain the marks here the candidate had to explain the graph rather than describe the graph and many candidates lost marks here as they did not do this. The idea that at lower temperature reactions are slower due to fewer collisions was rarely seen. Several candidates identified the optimum point of photosynthesis but did not link this to enzymes. The most common answer was after the optimum there is reduced photosynthesis as enzymes are becoming denatured. Some candidates failed to write **after** the optimum and also lost this mark as they implied that enzymes denature at the optimum.

(ii) Explain the effect of temperature on the rate of photosynthesis.

(2)

Initially, as ~~photo~~ temperature increases, so does photosynthesis. At the optimum point, the enzyme denatures because temperature is too high and the rate begins to fall rapidly.



ResultsPlus
Examiner Comments

There is no explanation for why there is an increase in rate with increasing temperature in the first marking point. The enzyme denaturing at the optimum is incorrect so this response scored zero.



ResultsPlus
Examiner Tip

Think about the phrasing of your answers and check them carefully.

(ii) Explain the effect of temperature on the rate of photosynthesis.

(2)

The rate of photosynthesis
~~Temperature increases~~ as temperature increases as the enzymes that catalyse
the reaction of photosynthesis have more energy and meet their substrates
faster. The rate is highest at the optimum temperature. After 45°C the
temperature is too high and the enzymes are denatured, as shown by
the plateau on the graph.



This is the first marking point for as the rate of photosynthesis increases, the enzymes meet their substrate faster, which is the idea of collisions. They have not referred to the optimum temperature for enzymes for the second marking point, and have indicated that photosynthesis plateaus rather than decreases, so are awarded one mark.

Question 5 (c)

There was a wide range of knowledge level shown by candidates on this question. It is clear that some candidates have a good understanding of the transport of substances through a plant and there was evidence of some excellent understanding of the structure and function of the xylem and phloem which was very pleasing to see. Those candidates who separated transpiration and translocation into separate paragraphs generally got less confused than those who tried to mix the two.

*(c) Explain how substances are moved through a plant by transpiration and translocation. (6)

Water and minerals are ^{at} first in the soil. Root hair cells absorb water particles and minerals through osmosis into the plant. These substances are then transported up the xylem vessel due to the transpiration pull. The water coming out of the xylem, the water vapour now diffuses out of the stomata when it is open and the plant has a loss of water and this is called transpiration.

Sucrose ~~goes~~ in soil is ~~also~~ picked up by the root hair cells and therefore the sucrose diffuses by active transport into the plant. The sucrose then travels through the phloem vessel in all different directions and this as a result supplies the plant with food ~~as~~ because due to the ~~phloem~~ ^{phloem}, it transports food (sucrose) around the plant in order to keep the plant alive and this process is called translocation.



ResultsPlus
Examiner Comments

This is a level 3 response. They have linked transpiration to water and the use of xylem vessels and they have linked translocation and phloem to the transport of sugar (sucrose). The active uptake of sucrose from the soil is scientifically incorrect so 5 marks are awarded as the response loses the coherency required by the level descriptors in the mark scheme.

*(c) Explain how substances are moved through a plant by transpiration and translocation.

(6)

The transpiration stream is the movement of water from the roots of the plant, through the stem and then out of the stomata on the underside of the leaves. Water is moved through xylem tubes which are made out of dead cells and are hard and rigid. These ~~also~~ tubes are made from dead cells so that there is less cytoplasm for the water to get stuck to or absorbed by.

Translocation is the movement of substances, nutrients - mainly sucrose, around the plant. The nutrients are made in the leaves via photosynthesis and then travel around the rest of the plant. The nutrients travel through phloem tubes which are columns of cells with small holes so that the nutrients can diffuse through. ~~The~~ The sucrose travels up and down the plant to different parts of the cell to be used as energy for cell growth.



This is a good level 3 response scoring 6 marks. The two processes have been separated into different paragraphs.



Think about how to construct and present answers to six mark questions.

*(c) Explain how substances are moved through a plant by transpiration and translocation.

(6)

Water is absorbed into a plant through roots that are in the soil. The water molecules then travel through the xylem, a tube-shaped structure that is made out of dead cells which makes the plant rigid. The xylem goes all the way up the plant to supply the water molecules to the leaves so they are able to use the water molecules for photosynthesis. The phloem is used to transport nutrients to each part of the plant - it has holes in its structure to easily do this. The nutrients are used for food in the plant which creates energy for the cells which makes the plant grow faster as cells are dividing.



ResultsPlus
Examiner Comments

This is a level 2 response worth 4 marks. There is insufficient detail on translocation and the processes are not linked to the substances for a level 3 response.

Question 6 (a) (i)

The majority of candidates were able to extract the information from the graph that there were low levels of oestrogen. Only the better candidates were able to link the fact that low levels of oestrogen meant that LH could not be released and LH is needed for ovulation.

- 6 (a) Figure 10 shows the concentration of the hormones oestrogen and progesterone in the blood of women of different ages.

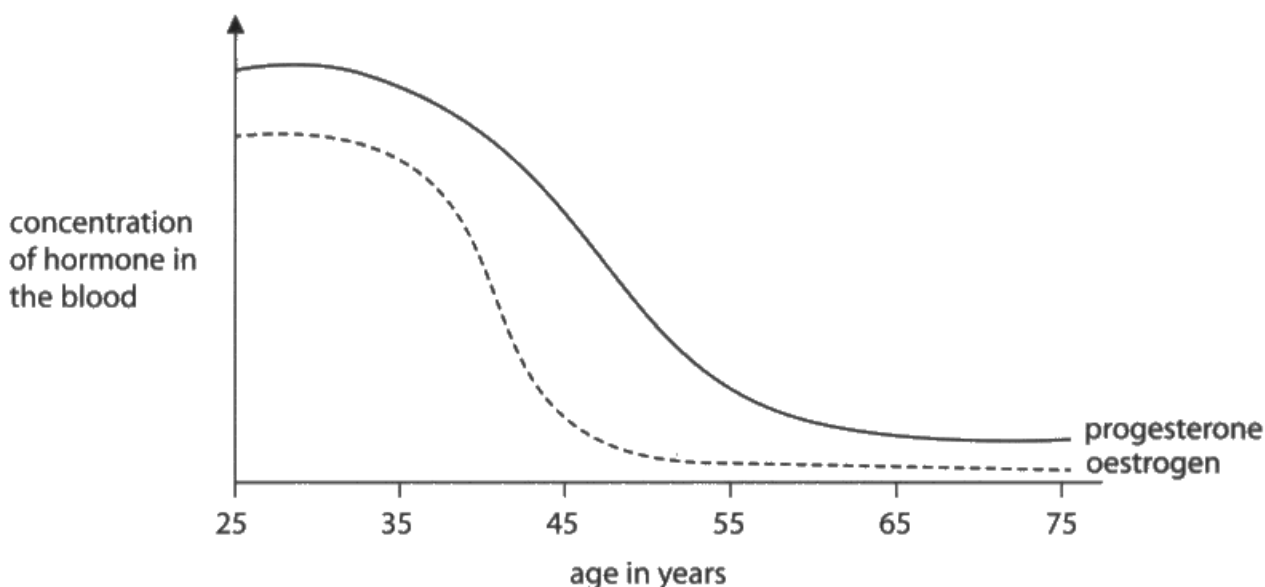


Figure 10

- (i) Use information from Figure 10 to explain why women over the age of 50 are less likely to ovulate.

(2)

There is less oestrogen being secreted so there's not enough for the LH surge which causes ovulation^{day 14} therefore a woman over 50 is less likely to ovulate as an egg can't be released.



ResultsPlus
Examiner Comments

This was awarded full marks for linking the low oestrogen levels to a lack of LH surge which is required for ovulation.

- 6 (a) Figure 10 shows the concentration of the hormones oestrogen and progesterone in the blood of women of different ages.

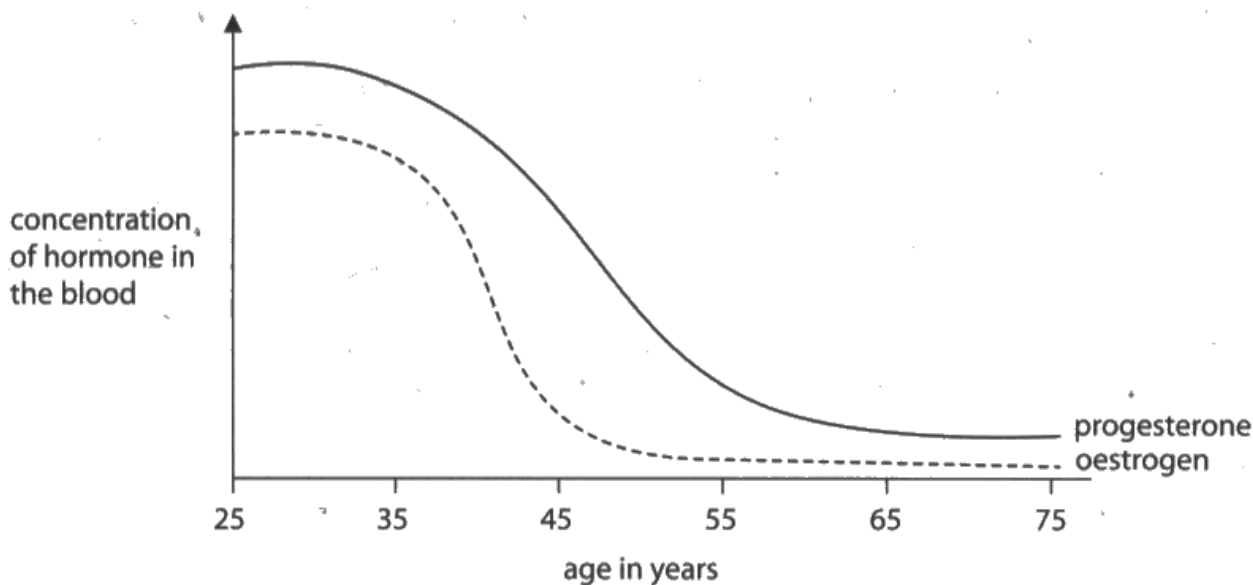


Figure 10

- (i) Use information from Figure 10 to explain why women over the age of 50 are less likely to ovulate.

Because as they get older, the concentration of hormones in the blood in their body decrease and more specifically decrease drastically at the age of 45+.



ResultsPlus
Examiner Comments

This response lacks detail; although it recognises that there is a decrease in hormone levels it does not specify which hormones.



ResultsPlus
Examiner Tip

Use information from graphs and tables in your answers.

- 6 (a) Figure 10 shows the concentration of the hormones oestrogen and progesterone in the blood of women of different ages.

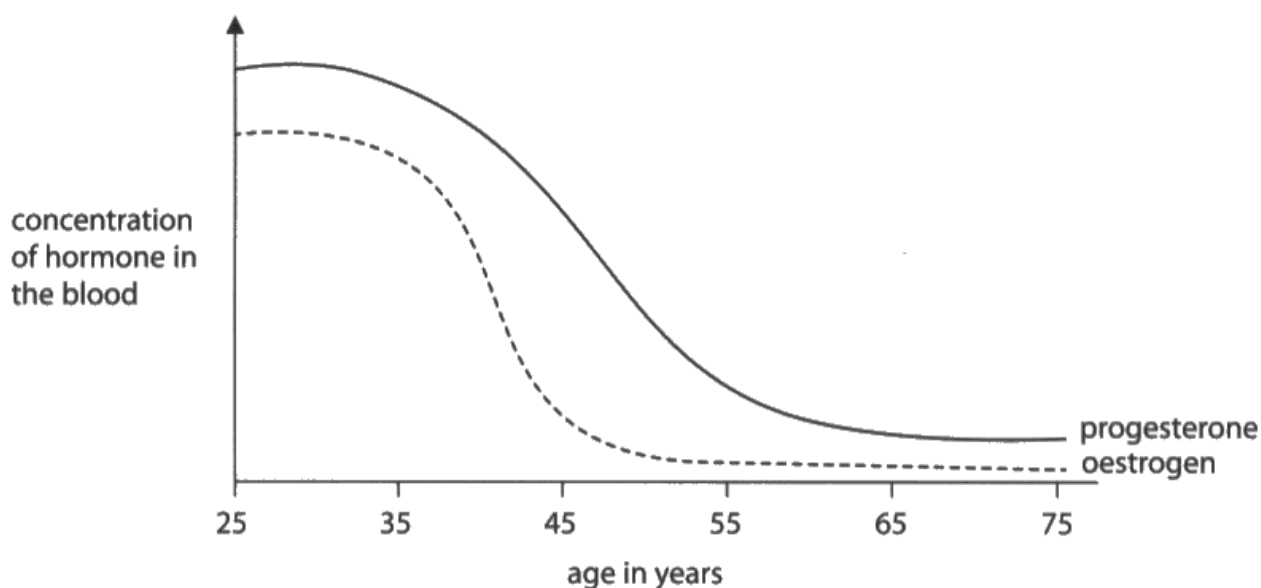


Figure 10

- (i) Use information from Figure 10 to explain why women over the age of 50 are less likely to ovulate.

(2)

This is because they have very low levels of oestrogen in their blood and therefore low levels of progesterone. And ovulation occurs when there is a high level of oestrogen in the blood.



This makes no connection between oestrogen and LH. It is not an explanation so only scored one mark.

Question 6 (a) (ii)

Candidates here generally tried to link low levels of progesterone meaning that the uterus lining would not be maintained which would lead to menstruation rather than the idea that low levels of oestrogen would not allow the uterus lining to build up in the first place thus there would be no menstruation.

- (ii) Use information from Figure 10 to explain why women are less likely to menstruate after the age of 60.

(2)

if there's less oestrogen in the blood ~~less~~ the uterus lining will not start to thicken, which means that during menstruation there won't be anything to break down as the lining was not produced and maintained by progesterone.



ResultsPlus
Examiner Comments

This was awarded two marks for the low levels of oestrogen and for the lining not thickening and therefore cannot break down.

Question 6 (a) (iii)

The introduction of ART and clomifene therapy into this specification seems to have been missed by some candidates. For this question we were looking for the effect of clomifene therapy. The mechanism is quite complicated but the effects are twofold and either of these was acceptable for the marks: increasing the release of FSH so more eggs are developed in the follicle or increasing the release of LH so there is more chance of ovulation. It is not the case that clomifene therapy injects these two hormones.

(iii) Explain how clomifene therapy may increase the chance of a woman over the age of 50 becoming pregnant.

(2)

Clomifene therapy increases FSH ~~due to~~
~~promotion~~ which means eggs can become
mature, as well as LH in order to trigger
ovulation. It also ~~to~~ helps maintain uterine wall.



This has both aspects of the answer and therefore got full marks

(iii) Explain how clomifene therapy may increase the chance of a woman over the age of 50 becoming pregnant.

(2)

The clomifene therapy increases the hormones concentrations in the
blood helping them ovulate and and become ~~pregnant~~ ~~pregnant~~ pregnant.



The hormones are not named but clomifene increases the chance of ovulation so one mark was awarded.

(iii) Explain how clomifene therapy may increase the chance of a woman over the age of 50 becoming pregnant.

(2)

As it is a type of injection that inserts the hormone FSH into the body, allowing it to go into the pituitary gland and reach hormone of progesterone.



ResultsPlus
Examiner Comments

There is no mark for this response as it indicates that FSH is inserted into the body.

Question 6 (b)

Some candidates produced some excellent responses to this question including the action on the heart increasing heart rate and blood pressure, and the action on the liver in the conversion of glycogen to glucose. These candidates were also able to relate this to the performance of the athlete in increasing reactants for respiration thus increased performance. There were many references to the flight or fight response but this did not answer the question. Candidates of lower ability were not specific in their responses and gave vague responses that referred to adrenalin increasing energy in the body which was not credit worthy.

(b) Explain how the release of adrenalin can result in the improved performance of an athlete.

(4)

Adrenaline is secreted from the adrenal glands and ~~binds~~^{binds} itself to the receptors of the heart, therefore this improves the athlete's performance because the adrenaline helps to increase blood pressure and heart rate, so that the working muscles can be supplied with lots of oxygen and blood to keep ~~is~~ going and working. The adrenaline also binds to receptors in the liver and this breaks down any glycogen stores in the liver and turns it back into blood glucose, therefore this helps the athlete because it helps cells and muscles to respire and they can keep working and moving ~~fast~~^{fast} and significant rate.
at a

(Total for Question 6 = 11 marks)



ResultsPlus
Examiner Comments

This has full marks for increased blood pressure and heart rate, muscles supplied with oxygen by the increased blood flow and the conversion of glycogen to glucose for respiration.

(b) Explain how the release of adrenalin can result in the improved performance of an athlete.

(4)

A release of adrenalin can result in the improvement of a performance for an athlete because it will increase their heart rate this will give them a sudden release in energy enabling them to go faster. Adrenalin gives them a flight or fight responses giving them the power and energy to perform better. A release of adrenalin will help to speed the athlete up and improve their performance as they have more energy.



This was awarded one mark for the increase in heart rates. The idea of sudden releases of energy was too vague for credit.

(b) Explain how the release of adrenalin can result in the improved performance of an athlete.

(4)

Adrenalin is released by the adrenal gland. It binds to receptors in the heart, allowing a greater blood flow to the body as it contracts more. This increases the amount of oxygen muscles and organs receive meaning the athlete can get more energy from aerobic respiration. Adrenaline also binds to receptors in the liver to turn glycogen back into glucose, increasing the blood glucose levels. This also increases respiration so the athlete will have more energy to perform. As there is more oxygen, more aerobic respiration can happen than anaerobic so that there is little lactic acid produced which leads to cramps as it builds up in the muscles. So the athlete can train for longer at better performance. Adrenaline is what causes the Fight or Flight response.



This is a high level response which was awarded full marks. They have used good scientific terminology and linked the release of energy to respiration.

Paper Summary

Paper Summary Based on their performance on this paper, candidates should:

- 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 them construct their answer but avoid repeating the information which has already been given and giving vague responses which will not gain credit
- Consider the context of the question to ensure they apply their scientific knowledge to the situation they are being asked about.
- Develop their practical skills knowledge to ensure they understand the difference between the factors being investigated and controlled variables.
- Check the number of marks given for the question and ensure that they have included enough facts to match the marks available.
- Use scientific terminology accurately where possible in responses.
- Always show the working when doing calculations as a mark can be awarded for errors carried forward in this case.
- Think about the structure of the answer before starting to write, especially when tackling the extended answers, to ensure that the answer shows clarity of writing and flows, while remembering that accurate spelling and grammar in these questions is also important.

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>

