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Examiners' Report
June 2024

GCSE Combined Science 1SC0 1BH

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June 2024

Publications Code 1SC0_1BH_2406_ER

Introduction

The Pearson Edexcel GCSE (9-1) Paper 1BH Science (Higher tier) paper is the first of six papers taken as part of the GCSE (9-1) Combined Science qualification. This is the seventh assessment of the GCSE (9-1) which takes place in May each year, with the exception of 2020 and 2021 where the paper was sat in the autumn with a much lower entry. In 2022 to compensate for lost learning candidates had access to an advanced information document for this paper which detailed some of the content that would be included in the exam and some that was not included. In line with last year, candidates this year did not have advanced information and had to prepare for questions from all the topics of the specification included in this paper.

The Combined Science specification and the qualification follows a linear assessment model whereby candidates must complete the six papers, worth 60 marks each, in the same single year of certification. Paper 1BH is the first of two Biology (Higher tier) papers and 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 15 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. There is one such question in this paper. 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 6 mandatory core practicals which candidates must complete prior to the examination, as aspects of working scientifically are also assessed in questions throughout the paper. Paper 1BH: Biology (Higher tier) contains questions assessing the content from Topics 1 to 5, as identified in the specification.

In this examination series, candidates were required to respond to questions that tested their knowledge and understanding of Charles Darwin and the processes behind the stages of evolution, enzymes and the effect of pH on their activity, the communicable diseases of malaria and measles, the immune system, the structure of DNA, human evolution and stone tools. The extended open-response assessed knowledge on mitosis. Questions designed to assess practical skills included the use of a water bath to control temperature, the use of a microscope to view cells, the extraction of DNA from cells and designing a method that could be used to monitor growth in a child. The maths skills assessed in this paper related to calculating percentage probabilities, ratios, magnification calculations, percentages and giving numbers to a specific number of significant figures.

There are now many past papers with mark schemes and examiners' reports available as well as practical support booklets for this qualification and it is clear that these resources are being utilised as part of the candidates revision process. The use of scientific terminology in responses continues to improve, not just in higher ability candidates. Most candidates were able to access the extended writing responses and the responses to practical questions on microscopes and DNA extraction, showing improved understanding. Candidates were able to effectively explain the decrease in the number of cases of measles as a result of vaccination and analyse differences in stone tools linked to human evolution. They were also able to describe changes that have occurred during human evolution and the outcomes of the Human Genome Project. The question on evolution indicated some confusion between causes of variation and the role of selection pressures. Candidates struggled to expand explanations on the role of biological control beyond the idea that it would increase crop yield.

There was an improvement in the level of detail given in answers to practical questions. It is clear that many candidates had completed the practical to extract DNA from cells and used a microscope. In general, maths questions showed a good level of understanding, although some candidates did not give answers to the correct order of magnitude when calculating the actual size of a mitochondrion, when given the image size and magnification. When calculating the number of people involved in a trial, some candidates did not give the answer to the correct number of significant figures requested in the question.

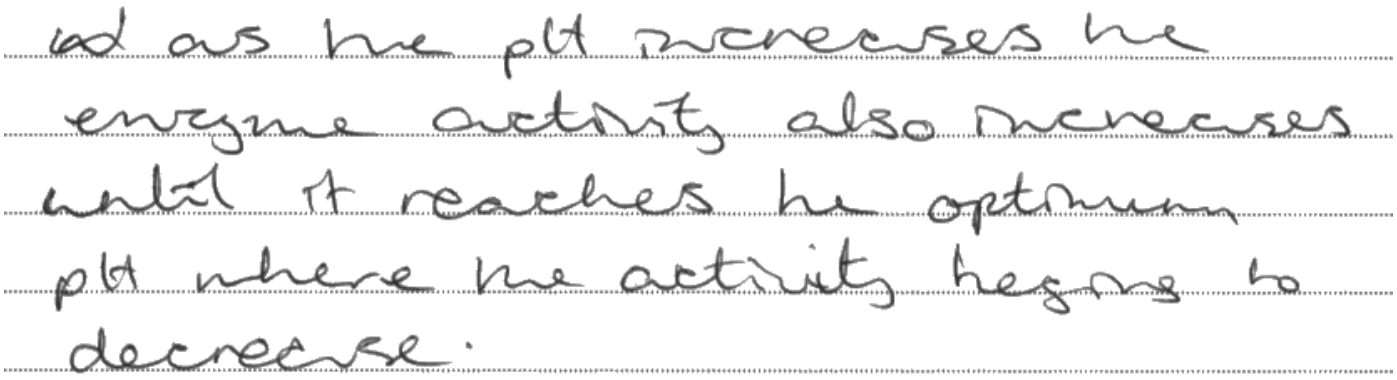
Question 1 (a)(ii)

This question asked for a description of the trend from the graph for the enzyme pepsin. Marks were awarded for the idea the activity increased up to pH2, that pH2 was the optimum and at a pH higher than this, the activity decreased again. Nearly all candidates identified pH2 as the optimum or the most effective pH. Candidates did not always gain full marks when they tried to explain the trend as they often did not give a sufficient description of the trend increasing and then decreasing. Very few candidates described the trend for trypsin indicating that they had read the question correctly.

(ii) **Describe the trend in the graph for the enzyme pepsin.**

Use data from the graph to support your answer.

(3)



ResultsPlus
Examiner Comments

Activity increases is MP1. There are no numbers quoted so no further marks can be awarded. Whenever there is graphical data ensure that the numbers are quoted correctly to attain all the marks.

ResultsPlus
Examiner Tip

Remember to quote data when questions are based on graphical or tabulated data.

(ii) Describe the trend in the graph for the enzyme pepsin.

Use data from the graph to support your answer.

(3)

As the pH increase the enzyme activity for pepsin increases and it reaches its optimum at 2pH and starts to denature which decrease its enzyme activity. After pH 5 the enzyme activity for trypsin increases and reaches its optimum at pH 8 then begins to denature which causes its enzyme activity to decrease

ResultsPlus
Examiner Comments

We can ignore the description of trypsin and mark the answer for pepsin. As pH increases enzyme activity increases is MP1, to an optimum of 2 is MP2 and MP3. 3 marks awarded. If the response is only about trypsin then only MP1 can be awarded for increases.

(ii) Describe the trend in the graph for the enzyme pepsin.

Use data from the graph to support your answer.

(3)

The enzyme pepsin has an optimum pH of 2 and denatures at a pH of 3.4. It also works at a pH of 0

ResultsPlus
Examiner Comments

Optimum pH of 2 is MP3. There is no reference to increase and decrease so no further marks can be awarded. There is no mark for enzyme denaturing as this is a describe question. 1 mark awarded.

ResultsPlus
Examiner Tip

If the question asks you to describe a graph it is the trends of the graph that are needed. Always quote data to achieve the maximum mark.

Question 1 (a)(iii)

Nearly all candidates were able to identify that pH8 was the optimum for the enzyme trypsin. Those candidates who did not gain the mark gave pH2 which is the optimum for pepsin.

Question 1 (a)(iv)

This question was answered well by most candidates, they were asked to explain why there is no trypsin activity at pH5. Marks were credited for a linked explanation that included points from pH5 being too acidic, that the active site had changed, so the substrate would not fit, resulting in no enzyme substrate complexes forming and that this meant that the enzyme was denatured. Most candidates linked pH5 being too acidic to cause the enzyme to denature and the active site to change shape.

(iv) Explain why there is no trypsin activity at pH 5.

(3)

There is no trypsin activity at pH 5 because at this pH, the active site of trypsin does not work. This means that the substrate for trypsin cannot bind to its active site. As a result, the substrate is not broken down and no enzyme activity occurs.

ResultsPlus
Examiner Comments

The substrate cannot bind to the active site of trypsin is a mark. No mention of denaturation or enzyme-substrate complexes so no further marks can be awarded. Note we accepted against the first marking point pH is not high enough.

(iv) Explain why there is no trypsin activity at pH 5.

(3)

there is no activity as trypsin is more alkaline meaning it has more OH^- ions making the pH higher. At a pH of 5, trypsin's active site is denatured so ~~enzyme~~ isn't ~~complimentary~~ complimentary to the substrate meaning ~~it~~ trypsin can't help speed up the proteins breaking down to form amino acids ~~because~~ as no enzyme substrate complex is formed

ResultsPlus
Examiner Comments

We can ignore the first sentence as it does not affect the rest of the answer it is just further information. 2 marks are awarded for the active site of the enzyme is denatured. No enzyme-substrate complexes is also a mark so all 3 marks can be given.

(iv) Explain why there is no trypsin activity at pH 5.

(3)

pH 5 is to low so the enzyme ~~with~~ would not fit complementary into the active site ~~at the pH.~~

ResultsPlus
Examiner Comments

pH is too low is acceptable against the first marking point. The enzyme would not fit into the active site, is incorrect and a common error – the enzyme has the active site and the substrate binds to it. 1 mark awarded.

ResultsPlus
Examiner Tip

Key words to remember when answering questions on enzymes are: active site, denaturing, enzyme substrate complexes – try to include these in any explanation of enzyme action.

Question 1 (a)(v)

This practical based question asked how temperature could be controlled in an investigation. The marks were awarded for using a water bath or incubator. Other methods that indicated how temperature would be controlled were credited. It was not sufficient just to state that it would be done in the same room or that a thermometer would be used as these do not indicate how temperature is controlled.

(v) Temperature is a variable that should be controlled in this investigation.

Give **one** way the temperature could be controlled.

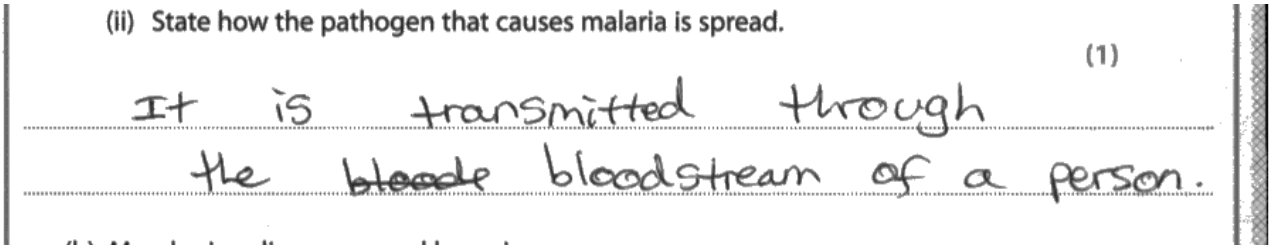
using test tubes in a water bath.

ResultsPlus
Examiner Comments

Using a water bath is the marking point for 1 mark.

Question 2 (a)(ii)

Many candidates gained the mark for knowing that malaria is transmitted by mosquitoes or vectors. Through the blood, blood transfusions or needle sharing was also accepted. Incorrect answers that were commonly seen were airborne, by water or body fluids.



(ii) State how the pathogen that causes malaria is spread.

(1)

It is transmitted through the bleede bloodstream of a person.

ResultsPlus
Examiner Comments

We can accept that malaria is passed through the bloodstream for the mark as the plasmodium protist does indeed travel to and from the liver in the blood.

Question 2 (b)

This question had a table of data on the number of measles cases reported between 1985 and 2015 which showed a significant decrease in the number of cases over time. Candidates were asked to explain one conclusion with most candidates gaining full marks. The marks were awarded for recognising the decreased number of cases and giving the cause as immunisation or the idea of being immune. Herd immunity was accepted but the idea of better medicines, hygiene or treatment was not.

Figure 2

Explain **one** conclusion that can be made about the change in the number of measles cases reported from 1985 to 2015.

(2)

- number of cases reported from 1985 to 2015 has decreased by 96215

- Scientist have found a vaccine that can prevent measles

ResultsPlus
Examiner Comments

The first marking point is for the idea that the cases have decreased so this can be awarded. The second marking point is the reason why, in this case a new vaccine, this is in the additional guidance column for 1 mark.

Explain **one** conclusion that can be made about the change in the number of measles cases reported from 1985 to 2015.

(2)

That the virus has stopped being as common due to better medication as there's been a 98.8% drop in the number of cases in 1985 compared to 2015.

ResultsPlus
Examiner Comments

Better medication is not enough for the second marking point but 1 mark can be awarded for the decrease in the number of cases.

Question 2 (c)

Most candidates gained full marks on this question by giving two different methods in which the immune system responds to infection. Creditworthy ideas included white blood cells destroying pathogens or phagocytosis, the production of antibodies or antitoxins, or the production of memory lymphocytes. Some responses confused antibodies with antigens. Ideas that are correct but not covered on the specification including the production of more white blood cells and inflammation were credited as an additional marking point.

(c) Describe **two** ways the immune system will respond to an infection by a pathogen.

(2)

1 White blood cells will release antibodies and destroy pathogens

2 The respitory system will try to remove the pathogen by coughing as cilliated cells trapped the pathogen

ResultsPlus
Examiner Comments

White blood cells release antibodies, is the first marking point. White blood cells destroy pathogens is also a mark. You can award 2 marks on the same line.

Symptoms of infection such as coughing or vomiting were not credited.

(c) Describe **two** ways the immune system will respond to an infection by a pathogen.

(2)

1 white blood cells called B lymphocytes will produce antigens to engulf pathogens.

2 Memory lymphocytes will kill the pathogen quicker because they already have the antigen made. If the same pathogen returns.

ResultsPlus
Examiner Comments

B lymphocytes do not produce antigens, antigens do not engulf pathogens. The correct answer would be white blood cells engulf pathogens. Memory lymphocytes is a standalone mark. As memory lymphocytes are white blood cells this gets a further mark for memory lymphocytes kill pathogens. 2 marks awarded.

Question 2 (d)

This question asked why Beriberi is not a communicable disease and candidates were required to communicate that it was not spread from person to person or between people or that it was not caused by a pathogen. That it was a deficiency or caused by lifestyle was not credited as this was indicated in the question. Many candidates of all abilities were able to obtain this mark.

(d) Beriberi is a disease caused by a lack of vitamin B1 in the diet.

Give **one** reason why beriberi is classed as a non-communicable disease.

because it can not be spread by individuals

ResultsPlus
Examiner Comments

Cannot be spread by individuals is just enough for not spread from person to person. 1 mark. Note in order to award the mark we are looking for the two parts: the idea of spreading and between people or individuals.

Question 3 (a)(i)

The question on precautions links to general practical skills covered in working scientifically. For taking a swab of cheek cells the appropriate precautions that were credited included using a sterile swab, the idea of not coming into contact with another surface, disposing of the swab or not swabbing too hard. Sanitised and disinfected were accepted for sterile but clean was insufficient. Many candidates identified one of these points but marks were lost where gloves, which is given in the question, a face mask or details on slide preparation were the only answer given as these were not credited.

3 (a) A student made a microscope slide of cells taken from the inside of their mouth.

(i) The student wore gloves while using a swab to collect cells from their mouth.

Give **one** other safety precaution the student should take.

(1)

Sterilise equipment

ResultsPlus
Examiner Comments

Use a sterile swab or sterilise equipment was acceptable for 1 mark.

3 (a) A student made a microscope slide of cells taken from the inside of their mouth.

(i) The student wore gloves while using a swab to collect cells from their mouth.

Give **one** other safety precaution the student should take.

(1)

wear safety goggles

ResultsPlus
Examiner Comments

There are no marks for standard lab procedures here such as wearing safety goggle, this also applies to core practical questions – the answer needs to be specific precautions not general lab procedures.

ResultsPlus
Examiner Tip

Try to avoid answering any practical question on safety by referring to common procedures such as tying hair back – this is expected for any practical situation and therefore will not be credited.

Question 3 (a)(ii)

One of the core practicals for Topic 1 is the use of a microscope and this question required detail on how to view cells with a magnification of x400. This question was generally well-answered and candidates who correctly named both lenses usually obtained 2 marks. Candidates who didn't name a lens were able to obtain 1 mark for using the lowest power lens or focusing the microscope. It was possible to gain marks for different magnification combinations which totalled x400 with x20 and x20 the most commonly seen alternatives.

Describe how the student used the light microscope to view these cells at a magnification of ×400.

(3)

A student has placed the cells onto a microscope slide and placed some solution onto the slide before placing the cells onto the slide and then they would place a cover slip slide over the cells and place it onto the stand. The student then looks through the eye peice then when the magnification is on the lowest one magnification and the student then slowly builds up magnification while looking through the eye peice.

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Examiner Comments

This is awarded 1 mark for starting with the lowest objective lens. There are no marks for the preparation of the slide as the question is about the use of the microscope. Slowly building up the magnification is not enough for focusing.

ResultsPlus
Examiner Tip

Read the question carefully – this is about microscope use not slide preparation.

Describe how the student used the light microscope to view these cells at a magnification of ×400.

(3)

the student would take the swab and put it onto a slip that has been cleaned with water. the student would then add a stain onto the cells so properly see them and then add a coverslip ~~onto~~ on top of the cells. they would then turn on the microscopes light and use the lowest objective lens to focus and magnify to the cells initially and then increase the magnificati by switching to the other lenses.

ResultsPlus
Examiner Comments

This response is awarded 2 marks. Starting with the lowest objective lens is the first marking point. The candidate has mentioned focusing so can be awarded a further mark. Any mention of focus can be awarded a mark as this shows knowledge of microscope use.

Question 3 (b)

This question was answered well by most candidates who explained the role of either mitochondria or ribosomes. It should be noted that the cytoplasm itself is not a structure. Producing or creating energy was not credited, it needed to be released. Some candidates stated that a chloroplast was a structure in animal cells, this did not gain any marks.

(b) The cytoplasm of a cell contains a nucleus.

* Explain the role of **one** other structure in the cytoplasm of a human cell.

(2)

a cytoplasm contains chromosomes containing important DNA and genetic information for the human cell

ResultsPlus
Examiner Comments

Cytoplasm is not a cell organelle and therefore cannot be credited.
Chromosomes / DNA are found in the nucleus so are also not credited.
0 marks awarded.

(b) The cytoplasm of a cell contains a nucleus.

Explain the role of **one** other structure in the cytoplasm of a human cell.

(2)

The mitochondria allows for the cells to respire and produce TPH

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1 mark for mitochondria as the organelle. 1 mark for to respire (in the additional guidance column). We would not accept respirate for the second marking point as this is incorrect science. 2 marks awarded here.

Question 3 (c)

Although not a core practical, the specification requires candidates to explain the process of DNA extraction. This question was answered with detailed responses indicating that most candidates had completed the practical and were able to gain full marks. Although not required for the marks, many candidates gave the reasons for each step in the method.

(c) DNA can be extracted from human cells in a similar way to the method used to extract DNA from fruits. *

Describe the stages of the method used to extract DNA from cells.

(3)

The stages used to extract DNA from cells would be that they would take the gene from the cell by placing it in a lipase solution they would the add ice ~~cold~~ cold ethanol to the solution so that they could precipitate the DNA. And then they would be able to extract the DNA.

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Examiner Comments

This response is muddled but the candidate has correctly identified the addition of ice-cold ethanol for 1 mark. No credit for lipase we need protease or a named protease such as pepsin for the mark.

(c) DNA can be extracted from human cells in a similar way to the method used to extract DNA from fruits.

Describe the stages of the method used to extract DNA from cells.

(3)

mix the DNA with dergent and salt
dergent will seperate cells and DNA
salt will make all DNA stick together
separate the froth and big ,insoluble bits
with tweezer remove DNA

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Mix with detergent/salt is a mark point. The response then goes on to describe a method of filtering ie separating the big insoluble bits which is the equivalent of filtering for 1 mark. 2 marks awarded.

Question 3 (d)

The Human Genome Project has not been examined on this paper for a number of years, meaning there were less past paper questions for revision. However, many candidates were able to give two outcomes of the project with the most common answers being the idea of increased understanding or testing for genetic diseases and ideas that related to personalised medicines. The idea of it being used to track migration or ancestry was seen quite frequently. The most common incorrect idea was that it identified the cause of genetic variation.

(d) The Human Genome Project sequenced the order of the bases in the human genome.

Give **two** other outcomes from the Human Genome Project.

(2)

1 identification of the faulty alleles that could lead to an inherited disorder.

2 development of new medicines that could treat the faulty alleles

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Identification of faulty alleles is in the additional guidance column for 1 mark. Development of new medicines is also a mark. 2 marks awarded.

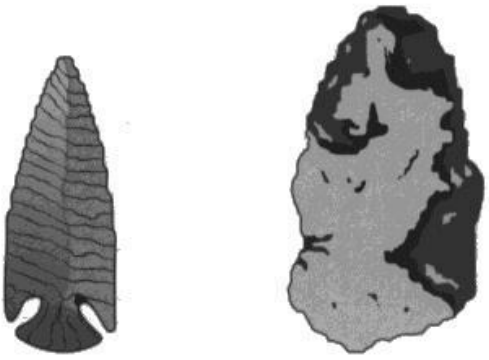
Question 4 (a)(i)

For this question candidates were given images of two tools and asked to suggest why one was used by a more recent human ancestor. Most candidates were awarded this mark for stating that it was sharper, more complex, more carved or related ideas.

4 (a) Figure 4 shows images of two stone tools.

Scientists think that tool A was probably used by *Homo erectus* around 1.6 million years ago.

Tool B was probably used by *Homo habilis* around 2 million years ago.



tool A tool B

Figure 4

(i) Give **one** reason, using Figure 4, why scientists think that tool A was used by a more recent human ancestor.

(1)

more sharper tool A is sharper than tool B.

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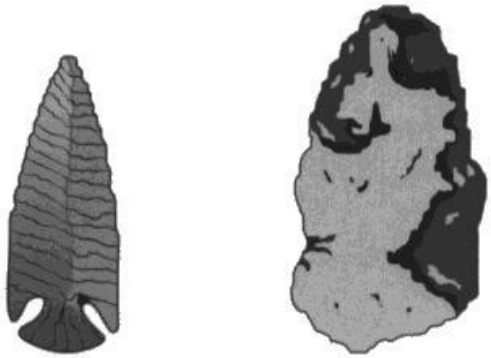
Examiner Comments

Tool A is sharper is on the mark scheme for 1 mark.

4 (a) Figure 4 shows images of two stone tools.

Scientists think that tool A was probably used by *Homo erectus* around 1.6 million years ago.

Tool B was probably used by *Homo habilis* around 2 million years ago.



tool A tool B

Figure 4

(i) Give **one** reason, using Figure 4, why scientists think that tool A was used by a more recent human ancestor.

(1)

It hasn't been worn out and is in good conditions than B. Made of stone which is chiped for a certain reason.

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Examiner Comments

This answer does not convey the idea that it is more complex or sharper so cannot be awarded the mark. 0 marks scored. Evidence that the tool is more sophisticated is needed to score.

Question 4 (a)(ii)

This question required candidates to describe how stone tools could be dated, based on where they were discovered. Most candidates identified that this could be done based on rock layers with some going on to describe that older tools were deeper, gaining 2 marks. A few responses also gained credit for the idea that other fossils from the location could be used. Radiometric dating was accepted but not the idea of just measuring the radioactivity of rocks. Carbon dating was not credited.

Question 4 (b)

Candidates demonstrated good knowledge on the structural changes that have occurred during human evolution, with many gaining full marks on this question. Marks were awarded for larger skull or brain, bipedalism or more upright walking, taller or structural changes that occurred as result of the change in habitat from trees to land including opposable thumbs, shorter toes, arched feet or changes in arm:leg ratios.

(b) Differences in fossilised bones indicate structural changes that have occurred during the evolution of humans.

Describe **two** structural changes that have occurred during human evolution.

(2)

1 Human ~~be~~ Skeleton as has become taller

2 less hair on the body

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Examiner Comments

Human becoming taller is a marking point as this is a trend over time. The idea of hair is not a structural change so is not credited. 1 mark awarded.

(b) Differences in fossilised bones indicate structural changes that have occurred during the evolution of humans.

Describe **two** structural changes that have occurred during human evolution.

(2)

1 Skull ~~the~~ Shape ~~has got bigger~~

2 the brain is bigger

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Examiner Comments

Skull shape is in the additional guidance column against the first marking point for 1 mark. The brain is bigger is also against mark point 1 so only 1 mark awarded, the same marking point twice.

Question 4 (c)(i)

This question examines the application of maths to a magnification calculation. Given an image length, candidates had to use the magnification to calculate the actual size of a mitochondrion, giving the answer in micrometres. Candidates' ability to calculate magnification is improving year on year and many candidates obtained full marks. The most commonly seen error was the unit conversion and the answer of 7 given to the incorrect order of magnitude was awarded 2 marks in recognition that only one error had been made in the calculation.

(c) The migration patterns of humans can be tracked by analysing DNA in mitochondria.

Figure 5 shows a mitochondrion viewed using an electron microscope.

(Source: © CNRI/SCIENCE PHOTO LIBRARY)

Figure 5

(i) At a magnification of ×62 000 this mitochondrion has a length of 434 mm.

Calculate the actual length of this mitochondrion.

Give your answer in micrometres (µm).

(3)

$\frac{434}{62\,000} = 7 \times 10^{-3}$

$7 \times 10^{-3} \times 1000 = 7$

~~Adc~~

mm → µm = ×1000

7 µm

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Examiner Comments

Correct answer for 3 marks – this would be given 3 marks even if there was no working.

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Examiner Tip

Always show working in your answer as there may be marks to be gained even if the final answer is incorrect.

(c) The migration patterns of humans can be tracked by analysing DNA in mitochondria.

Figure 5 shows a mitochondrion viewed using an electron microscope.

(Source: © CNRI/SCIENCE PHOTO LIBRARY)

Figure 5

(i) At a magnification of ×62 000 this mitochondrion has a length of 434 mm.

Calculate the actual length of this mitochondrion.

Give your answer in micrometres (μm).

43.4 cm

×1000

43.4 × 1000 = 43400 (3)

A I M

actual length = image size / magnification

→ 43400 / 62000 = 0.7

0.7 μm

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Correct division by 62000 but there is an incorrect conversion. 2 marks can be awarded to any answer with 7 to any power of 10 except 7 on its own which is the correct answer for 3 marks. 2 marks awarded.

Question 4 (c)(ii)

Following on from the electron microscope image of the mitochondrion, candidates were asked to explain why an electron microscope is used to see mitochondria clearly. The main marking points were for greater resolution and greater magnification. Frequently candidates only gave one of these and just linked it to the idea of being able to see more detail. Some higher ability candidates explained that an electron beam has a shorter wavelength than light, accounting for the increased resolution.

(ii) Explain why an electron microscope is used to see mitochondria clearly.

(2)

an electron microscope has much more detail than a light microscope.

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Examiner Comments

We need the words magnification and resolution or a very good description of these for the marks. Just mentioning more detail is not sufficient for the mark.

(ii) Explain why an electron microscope is used to see mitochondria clearly.

(2)

- in a light microscope you cannot see subcellular structures
- electron microscope has a higher magnification and resolution so is able to see mitochondria.

(Total for Question 4 = 10 marks)

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Examiner Comments

Higher magnification and resolution is correct for both marks. Please note we can accept better/higher and even high for both magnification and resolution for the marks as well.

Question 5 (a)(i)

This question asked for the benefits of a double-blind trial. The question had already stated that neither the doctor nor the patient knew whether the patient had been given the statin or not so repeating this was not creditworthy. Many candidates scored 1 mark, most frequently awarded for the idea of avoiding bias. Higher level responses went on to gain further credit for the marking points of the placebo effect, knowing whether the muscle pains are due to statins or that the effectiveness of statins could be determined.

5 Statins are a type of medicine used to treat cardiovascular disease.

Some people taking statins have reported muscle pain as a side effect.

Scientists analysed data from double-blind trials to determine if there was a correlation between statin use and muscle pain.

In these double-blind trials, neither doctors nor patients knew whether the patient had been given statins or not.

(a) (i) Describe the benefits of using double-blind trials.

(2)

The benefit of using double-blind trials is that the doctor nor patient can lie about the results therefore they are 100% fair

ResultsPlus
Examiner Comments

We did not accept the idea of people not being able to lie about results, here it was the idea that the trial was unbiased that we wanted candidates to explain.

5 Statins are a type of medicine used to treat cardiovascular disease.

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Scientists analysed data from double-blind trials to determine if there was a correlation between statin use and muscle pain.

In these double-blind trials, neither doctors nor patients knew whether the patient had been given statins or not.

(a) (i) Describe the benefits of using double-blind trials.

(2)

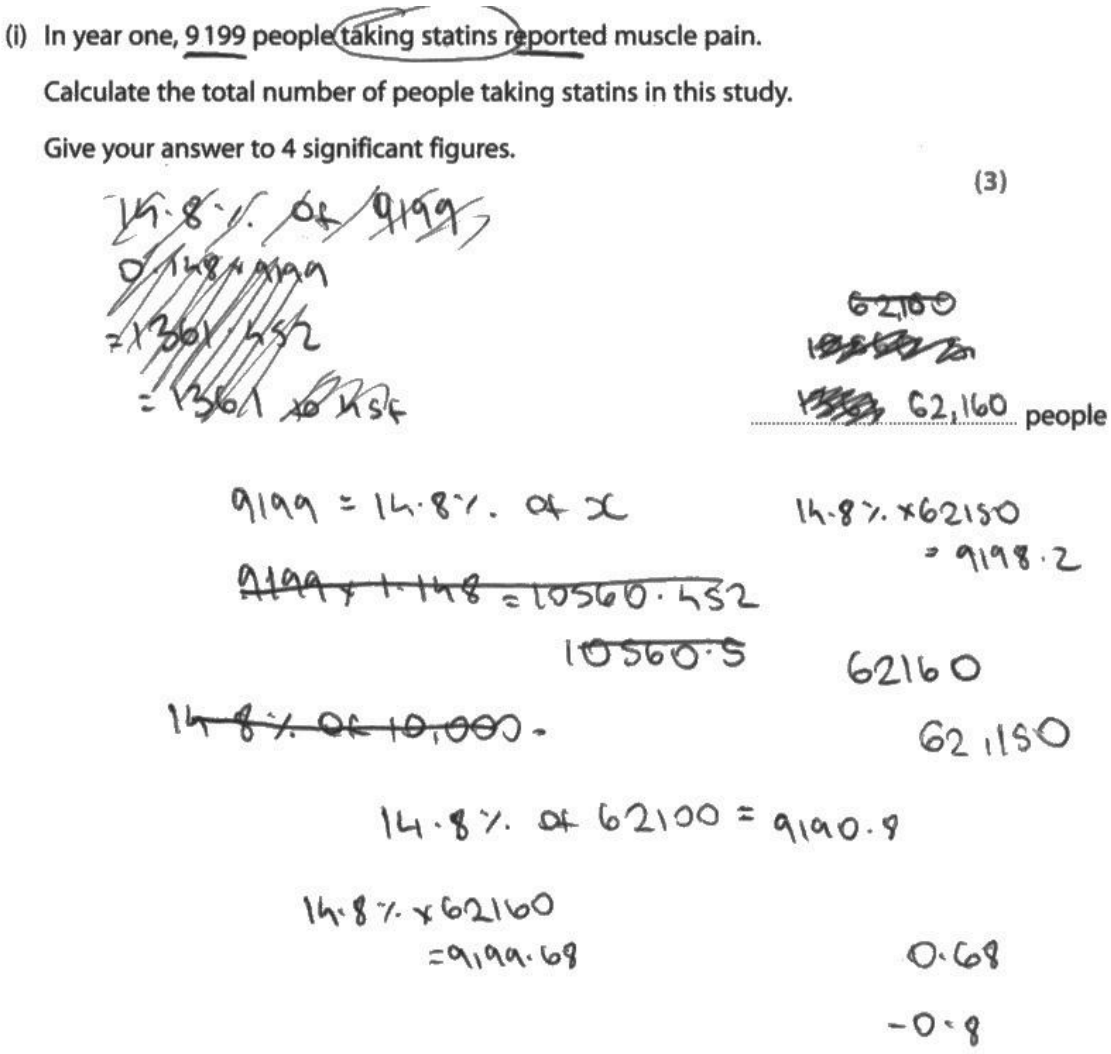
they are able to see if the medicines are having any effect on the patients or ie they aren't doing anything

ResultsPlus
Examiner Comments

To see if the medicine is having any effect is enough as we can accept medicine for statins as that is the only medicine in the question. 1 mark awarded.

Question 5 (b)(i)

This question required a mathematical manipulation using percentages to calculate the total number of people taking statins in the study, giving the answer to 4 significant figures. Many candidates correctly calculated the total number of people although some limited their marks to 2 by not stating the answer to 4 significant figures. An error carried forward was applied for those candidates with an incorrect calculation which demonstrated the mathematical skill of 4 significant figures, allowing them to gain 1 mark.



(i) In year one, 9199 people taking statins reported muscle pain.

Calculate the total number of people taking statins in this study.

Give your answer to 4 significant figures.

(3)

62,160 people

14.8% of 9199

0.148 × 9199

= 1361.452

= 1361

9199 = 14.8% of x

9199 × 1.148 = 10560.452

10560.5

14.8% of 10,000

62160

62,150

14.8% of 62100 = 9190.8

14.8% × 62160

= 9199.68

0.68

−0.8

ResultsPlus
Examiner Comments

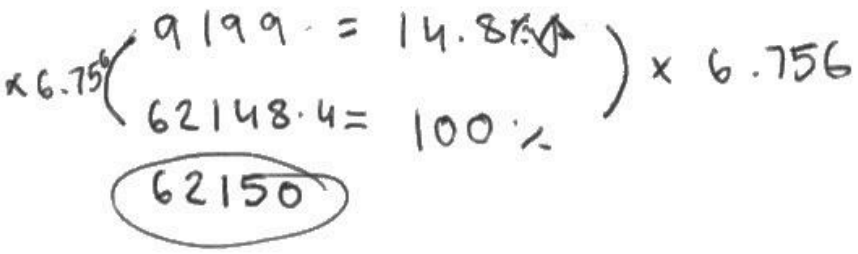
Correct answer on the answer line will always score full marks.

(i) In year one, 9 199 people taking statins reported muscle pain.

Calculate the total number of people taking statins in this study.

Give your answer to 4 significant figures.

(3)



62150 people

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Examiner Comments

This response has used 14.8%. They have completed the calculation but rounded up too early. We awarded 2 marks for answers on the answer line of 62155, 62150, and 62200. 2 marks awarded.

Question 5 (b)(ii)

Candidates found this question challenging with many only identifying one piece of evidence that supported the conclusion made by the scientists that the muscle pain was not due to statins. Marks were awarded for the idea that the data for the placebo and statins were very similar, that in year 1 more people reported pain on statins, a calculated difference for any year, that muscle pain decreased over time from taking statins and that after year 1 more people taking the placebo reported pain. The most frequently awarded marks were for the data being similar or that the number of people reporting muscle pain and taking statins decreased over time. Most candidates did not use the data from the table to calculate a difference between the two groups in the trial.

(ii) **The scientists concluded that most of the muscle pain reported was not due to the use of statins.**

Explain, using information from the table in Figure 6, why the scientists made this conclusion.

(3)

More People taking the placebo also reported the muscle pain a lot more than those taking the statin.

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Examiner Comments

There was no mark awarded for just linking taking the placebo with muscle pain. 0 marks awarded.

(ii) The scientists concluded that most of the muscle pain reported was not due to the use of statins.

Explain, using information from the table in Figure 6, why the scientists made this conclusion.

(3)

If you add all the percentages of the people who experiencad pain due to placebos it's more. This is because people are under the placebo effect.

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Examiner Comments

A higher percentage of people taking placebos overall reported muscle pain is incorrect if you look at the whole study, so no marks. If the response indicated a correct year then this could have been awarded the mark.

(ii) The scientists concluded that most of the muscle pain reported was not due to the use of statins.

Explain, using information from the table in Figure 6, why the scientists made this conclusion.

(3)

People taking placebo reported a similar amount of muscle pain during the study. As they got years into the experiment (from 14.8 in year 1 to 3.0 in year 4), significantly less people had reported muscle pains while still taking statins. This means that most of the pain is not due to statins

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Examiner Comments

People taking statins has similar pain to those taking the placebo is the first marking point. Over time muscle pain reduced in those taking statins is a second marking point. 2 marks awarded.

Question 5 (b)(iii)

This question enabled the practical skill of identifying and controlling variables to be demonstrated. Candidates were asked to describe two factors that should have been considered when people were selected for the trial. The marks were awarded for factors including age, sex, ethnicity, mass/weight, medical history and lifestyle.

(iii) The results of the study are reliable because the data was obtained from a large sample of people.

Describe **two** factors that should have been considered when selecting people for the study.

(2)

1 they needed to be health and not have muscle probles before hand

2 check if they had health issues before hand

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Examiner Comments

There is no mark for health on its own, it would need to be qualified but any health issues such as medical history can be awarded 1 mark.

(iii) The results of the study are reliable because the data was obtained from a large sample of people.

Describe **two** factors that should have been considered when selecting people for the study.

(2)

1 age group:

2 previous history with familial/Genetic history linked with muscle pain.

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Examiner Comments

Age is a mark point as is genetic history as it is the equivalent to genetic background. 2 marks awarded.

Question 6 (a)(i)

This was the extended open-response question of the paper. Candidates were given a diagram of the stages of the cell cycle and asked to describe the three stages. These items are marked using a level based mark scheme and not points based. To gain Level 1, only one stage of the cell cycle or some of the processes within a stage were needed. If there was linkage between a process at that stage and the name of the stage, the top of the level was awarded. For Level 2, candidates needed to describe processes within two stages of the cell cycle. If this was linked to the names of the stages of the cell cycle the top of the level was awarded. Level 2 was also awarded for a detailed description of mitosis in the absence of processes within interphase or cytokinesis. Many candidates gave very detailed and accurate descriptions and gained Level 3 by describing all three stages of the cell cycle including a complete description of mitosis. The top of Level 3 was awarded frequently, where all three stages of the cell cycle and the steps of mitosis were named. There were a number of responses that included steps of mitosis in stage 1 or stage 3 of the cell cycle, and these were limited to Level 2.

*(i) Describe the three stages of the cell cycle shown in Figure 7.

(6)

In the Interphase this is where the cells spend most of the time. the DNA / Chromosomes duplicate preparing for mitosis. the ~~Cell~~ Chromosomes then get split and get Pulled to each side of the cells. the cell finally divides into 2 genetically different daughter cells which are haploid cells as they are only two in dividual not pairs.

By them splitting it leaves the chromosomes to have sticky ends.

ResultsPlus
Examiner Comments

The description of the stages is what puts the answer into the level. The cells spend most of their time in interphase is enough for Level 1 and the response names the stage to go to the top of the level. There is a brief description of mitosis with the chromosomes being pulled to either side of the cell but this description is not detailed enough to go to Level 3 even though the stages have been named. The response correctly names mitosis and interphase so can go to the top of Level 2 for 4 marks.

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Examiner Tip

Always make an attempt at the 6 mark question as there are often 1-2 marks available for a very brief response.

*(i) Describe the three stages of the cell cycle shown in Figure 7.

(6)

In the first phase of interphase, the chromosomes duplicate - but 75% of the time nothing happens. In prophase is where the nuclear membrane breakes down and Spindle fibres are formed. In metaphase the Chromosomes line up in the middle. Next comes Anaphase where the Spindle fibres pull the Chromosomes ~~genes~~ to the opposite poles. After that comes telophase where nuclei are formed around the 2 sets of Chromosomes. Finally cytokenisis, 2 new genetically identical daughter cells are formed.

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Examiner Comments

This candidate has given a thorough description of all three stages of the cell cycle and has included the 4 steps of mitosis PMAT. This means this response has achieved Level 3. Interphase and cytokinesis are named correctly in the text but have not linked stage 2 to mitosis. Mitosis is on the diagram but the stage isn't indicated so this cannot be credited. This response is awarded Level 3 for 5 marks.

*(i) Describe the three stages of the cell cycle shown in Figure 7.

(6)

Stage one = genetic materials are duplicated (interphase), nucleus membrane dissolves (prophase), two sets of chromosomes line up in the middle (metaphase)

Stage 2 = ~~genes~~ / chromosomes pulled to opposite sides of cell (telophase), mitochondria, ribosome and other organell are duplicated then formed around chromosomes to create new nuclei

Stage 3 = Spindle fibers pull them apart ~~make~~ ~~making~~ forming 2 daughter cells.

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Examiner Comments

The driver for this question is the description of the stage and to put this response at the top of the band they should have linked the description to the name of the stage. You will find quite a few muddled responses like this one but examiners always mark positively, so we disregard the incorrect information and mark the correct information. A muddled response cannot get to Level 3. This candidate has a description of interphase – genetic material being duplicated – which gets them into Level 1. They also have a description of mitosis albeit a partial description which they have incorrectly linked to telophase but the naming of the steps in mitosis is not required in Level 2, the rest they have incorrectly put into stage one. This means they have a partial description of two stages so can be put into Level 2. They have only named mitosis at the top and not interphase so cannot go to the top of the level. They are therefore awarded 3 marks.

Question 6 (a)(ii)

Nearly all candidates gained a mark for this question by stating that the cell cycle is more rapid or uncontrolled in cancerous cells. The idea that the cells divide quicker or don't stop was also accepted.

(ii) State what happens to the cell cycle in cancerous cells.

(1

One cancerous cell splits into two cancerous cells, and the process repeats, so the cancer spreads.

ResultsPlus Examiner Comments

There is no reference to cells dividing faster or being uncontrolled so no mark. 0 marks awarded. Just stating this process repeats is not enough as the process repeats during normal cell division.

(ii) State what happens to the cell cycle in cancerous cells.

(1)

The cells will be rapidly divide instead of going through the stages of the cell cycle.

ResultsPlus Examiner Comments

We will accept any explanation that implies the cells are dividing quickly or there is uncontrolled cell division. Ignore any references to stages of the cell cycle. 1 mark awarded for rapidly dividing.

Question 6 (b)(ii)

In this four-mark question candidates needed to describe how a doctor might determine if a child was growing as expected. To gain full marks, the response needed to refer to a measurement that could be taken, the use of a percentile chart, to make comparisons to children of the same age and the idea of monitoring the growth over time or by tracking a percentile. A very common misconception seen was that children above the 95th percentile or below the 5th percentile are not growing properly which limited many higher ability candidates to 3 marks maximum.

Describe how a doctor might determine if the child is growing as expected.

(4)

A way a doctor might determine if the childs growing as expected is by comparing the childs data to other childrens data therefore allowing to see if there are any anomdys such as the childs height or weight. By comparing data the trend of the analysis show the doctor what the average is so if the child is much below that mean this will determine whether the childs growing ~~fast~~ or not

ResultsPlus
Examiner Comments

Any mention of measurement of height, weight or mass, head circumference is the first marking point. 1 mark awarded.

(ii) A parent is concerned that their child is not growing as much as other children.

Describe how a doctor might determine if the child is growing as expected.

(4)

A percentile chart monitors the progress a child should grow depending on their mass at birth. For example if the baby is in the 50th percentile they are heavier than 50% of other children and ~~but~~ will grow more. If the child ~~grow~~ grows up a percentile they may be eating too much where as if it drop a percentile they may be eating to little. The doctor can compare the child's growth path to the percentile and if they've dropped out to a lower band it may cause concern. However lower percentiles are expected to grow slower and to a lesser extent than higher ones.

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Examiner Comments

A reference to percentile charts is enough for a mark. Mass is enough for the first marking point. A mark can be awarded for the idea that they stay on the same percentile (if they dropped off the percentile it would be a cause for concern). 3 marks awarded.

Paper Summary

Based on their performance on this paper, candidates should:

- Ensure they answer the actual question in the paper. Written responses to a number of questions indicated that candidates used past papers as part of their revision process, which is commendable, but care must be taken to ensure that candidates answer the actual question in the paper, as although the knowledge may be similar the question is rarely identical.
- Recognise that the word 'explain' means additional scientific information is needed that is linked to the answer given and the quantity of additional information given should reflect the number of marks awarded for the question.
- Read the information given in the introduction to the question but avoid repeating it in the answer as it will not gain credit. Candidates should also read mathematical questions carefully to note whether an answer is required in a specific format, such as number of significant figures. They should ensure they consistently apply rules for rounding up numerical answers.
- Ensure that when describing data from tables they identify as many different patterns as possible and avoid writing the same pattern multiple times. If data is numerical then a mathematical manipulation of the data is likely to be creditworthy.
- Make sure that key scientific terms from the specification are understood including variation, pathogen, sexual and asexual reproduction, vector and biological control.
- Always show the mathematical workings when doing calculations as a mark can be awarded for errors carried forward. Check the number of marks given for the question and ensure that they have included enough facts to match the marks awarded.
- Consider the context of the question to ensure they apply their scientific knowledge to the situation they are being asked about.

Grade boundaries

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