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June 2019

GCSE Combined Science 1SC0 1BF

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Introduction

Paper 1SC0 1BF is taken by candidates who have followed the GCSE Combined Science specification.

The paper consists of 60 marks assessed by a mixture of different question styles, including multiple-choice questions, short answer questions, calculations and one extended open-response question. All questions should be answered in the allowed time of 1 hour 10 minutes. The extended open-response question is identified by an asterisk (*) in the question paper to indicate that marks are also awarded for the ability to structure a response logically.

The Combined Science Biology papers assess aspects of working scientifically and mathematical skills, the requirements of which are given in the specification. There are six core practicals in the biology content which must be completed prior to sitting the examination.

Paper 1SC0 1BF assesses content from Topic 1 and Topics 2 - 5. The 2019 paper covered areas of the specification including mitosis, chlamidya, proteases, sex inheritance, mitochondria, DNA structure, immunisation and antibiotic resistance.

The extended open-response question was based on how the complexity of different aged stone tools give evidence for evolution.

Questions assessing practical skills included focusing a microscope and the extraction of DNA. Mathematical skills tested included interpretation of graphs, probability, unit conversion and number of people with chlamidya / mass of DNA calculations.

There were several questions that tested candidates' ability to apply their knowledge to different situations but in these cases, all the information needed to lead candidates to the required responses was supplied in the stems of the questions. Candidates could still benefit from practising reading the stem and considering which parts are key to stimulate the connections to areas of the specification covered. It was pleasing to see examples where candidates had underlined the command words and key words as well as writing key words by the question for extended prose responses.

The more straightforward questions where marks could be gained by interpreting given information were answered well although it was pleasing to see some excellent, coherent answers accurately applying relevant scientific terminology to all items that required extended prose. It was encouraging that some candidates used the scaffolding provided to guide their responses. Even when candidates scored low or no marks there was clear use by a reasonable number of candidates of using the diagrams, graphs and information in the stem of the question to guide their responses. Some candidates confused the requirements for describe and explain. Explain items were often partly answered as the candidate had only included a description in their response and it was also not uncommon to see a question using the command word describe being extended to include an explanation.

There seemed to be a reduction in the number of blank responses seen which could reflect better preparation of candidates by teachers.

Question 1 (a) (i)

This item required candidates to explain why the tip of roots were used in an investigation into mitosis. Many responses referred to mitosis in the root tip, but this fact was given in the stem of the question so was not credited. The term meristem was seen occasionally, but many candidates knew that growth occurs in root tips and were, therefore, awarded marking point 2. The majority of candidates found this item relatively hard to access with a significant number misinterpreting the question and describing the function of roots in terms of absorbing water and mineral ions.

1 (a) A student investigated mitosis in the root tip of a garlic plant.

(i) Explain why the student used the tip of the root.

(2)

As it is growing at the roots and producing cells due to meristem in plant growth due to the stem cells they divide and continue to grow grow within the bottom of the plant

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Examiner Comments

This candidate scores both available marks for stating that the root is growing and the reference to being a meristem.

ResultsPlus
Examiner Tip

Underline key words to help you focus on what the question is asking. Read this example and match where 'growing' and 'meristem', which is where the candidate gained marks, match the key points in the question.

Question 1 (a) (ii)

This question was based on the first core practical listed in the specification, which requires knowledge of how to use a microscope to obtain a clear image of cells. Some candidates included how to prepare the slide which was not required as the question starts at placing the slide on the microscope. Candidates with a good knowledge of the parts of a light microscope and how a light microscope works were able to score two marks. There were many muddled references to eyepiece and objective lenses which could not be awarded marking point 2. References to zooming in and out were not credited, but different ways of describing how to focus on the cells were accepted for marking point 3, such as moving the stage up and down, or turning the focusing wheel. Candidates that did score two marks often did so by reference to turning the light on / adjusting the mirror and using the focusing wheel.

(ii) The student squashed the root tip on a microscope slide to spread out the cells.

The slide was placed on the stage of a microscope.

Describe how to use the microscope to obtain a clear image of the cells.

(2)

first when you have put iodine on the microscope root tip and used the lowest objective lens you can then make the magnification bigger by zooming in. You use the coarse turning wheel to focus ~~on~~ the slide and the smaller wheel below to focus on the cells

ResultsPlus
Examiner Comments

This candidate gains their two marks for reference to starting with the lowest objective lens and using the coarse / fine focusing wheels.

ResultsPlus
Examiner Tip

Read the question carefully. The introduction says the slide has been placed on the stage of the microscope so do not spend time on describing how to prepare the slide but use the time to take the 'story' on from that point.

(ii) The student squashed the root tip on a microscope slide to spread out the cells.

The slide was placed on the stage of a microscope.

Describe how to use the microscope to obtain a clear image of the cells.

(2)

Turn the light on and move the focus wheel until the image is clear.

ResultsPlus
Examiner Comments

Short and succinct for two marks.

ResultsPlus
Examiner Tip

This item uses the command word describe and the candidate has clearly focused on what is required to answer the question and stated two ways to obtain a clear image.

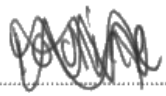
Question 1 (a) (iii)

This question was also based on the same core practical and was accessed by the vast majority of candidates with almost half of candidates gaining the mark available, giving the correct answer of add a stain or dye, with many giving iodine (solution) and methyl blue which were accepted as examples of stains. Common errors were where candidates confused indicators and other chemicals, for example ethanol, with stains.

(iii) The student could not see the chromosomes inside the cells.

State what can be added to the root tip squash to make the chromosomes visible.

(1)



ResultsPlus
Examiner Comments

If an answer is crossed out and the candidate has not written anything else in its place we will look at the response and mark it in line with the mark scheme. Here it clearly says iodine under the scribble and so gets the mark.

ResultsPlus
Examiner Tip

We mark crossed out work if nothing else is written in its place so just cross through clearly so that we can still see what you have written or leave it anyway as it may be creditworthy.

(iii) The student could not see the chromosomes inside the cells.

State what can be added to the root tip squash to make the chromosomes visible.

(1)

You Could add ~~the~~ iodine to make it visible and to stain the cells, making them stand out.

ResultsPlus
Examiner Comments

This is a good answer as it clearly says iodine and that it is used to stain the cells. The rest would be good if the question was an explain.

ResultsPlus
Examiner Tip

The command word here is describe and so the last part, although good science is not needed as it is explaining why a stain is added.

(iii) The student could not see the chromosomes inside the cells.

State what can be added to the root tip squash to make the chromosomes visible.

(1)

microscopic

solution to see better.

ResultsPlus
Examiner Comments

This implies that the candidate knows what to do but lacks the biological terminology to gain the mark. Candidates need to invest time into learning the correct scientific terminology and phrases to gain marks.

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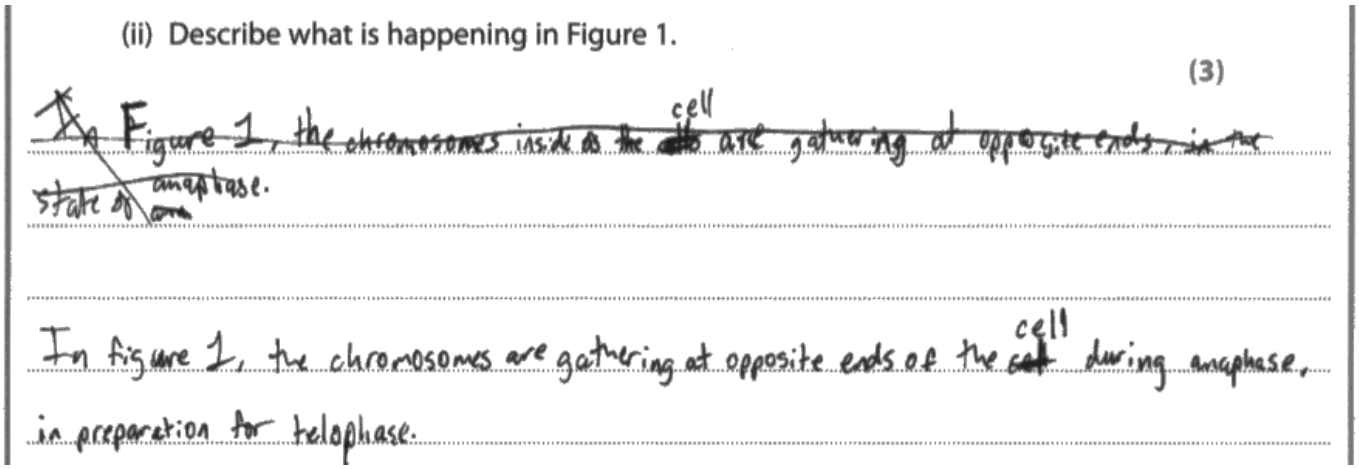
Examiner Tip

Learn the biological terms linked to the core practicals and use them when answering questions.

Question 1 (b) (ii)

This question continues from Q01(b)(i) asking candidates to identify the stage of mitosis in the photomicrograph in figure 1. The question was accessed well and it was encouraging to see that many candidates started by correctly listing the initial letters of the different stages of mitosis in order to organise their thoughts. A significant number chose the wrong stage and then described that stage rather than what they could see. Few candidates referred to the spindle fibres pulling the chromosomes and some candidates were not credited with marks as they could not describe 'to the poles / opposite ends of the cell' clearly. A small proportion of candidates wrote very succinct answers that scored all three marking points.



ResultsPlus
Examiner Comments

1 mark awarded for referring to the chromosomes 'gathering' at the opposite ends of the cell.

ResultsPlus
Examiner Tip

This item uses the command word **describe** and asks **what is happening** and there are three marks available. One mark is awarded for opposite ends of the cell but think: how are the chromosomes getting there?

(ii) Describe what is happening in Figure 1.

(3)

In this stage of ~~the cell cycle~~ mitosis the fibres pull the chromosomes apart from each other ~~possibly~~ and leading them to each end of the cell itself.

ResultsPlus
Examiner Comments

A good answer as it **describes** what is happening which is what is being asked in the stem of the question. This could be used to show what describe can mean.

Question 2 (b) (i)

This item required candidates to describe the trend shown in the graph of number of cases of chlamidya from 1960 to 2013. This was accessed well, with the majority of candidates gaining both marks and a further significant proportion gaining one mark.

A basic description of the number of cases of chlamidya increase, and then decrease scored two marks. Correct references to data on the graph gave marking point 3, such as 2011 being the year when the number of cases of chlamydia peak.

(b) Figure 2 shows the number of cases of chlamydia in the United Kingdom per 100 000 people between 1996 and 2013.

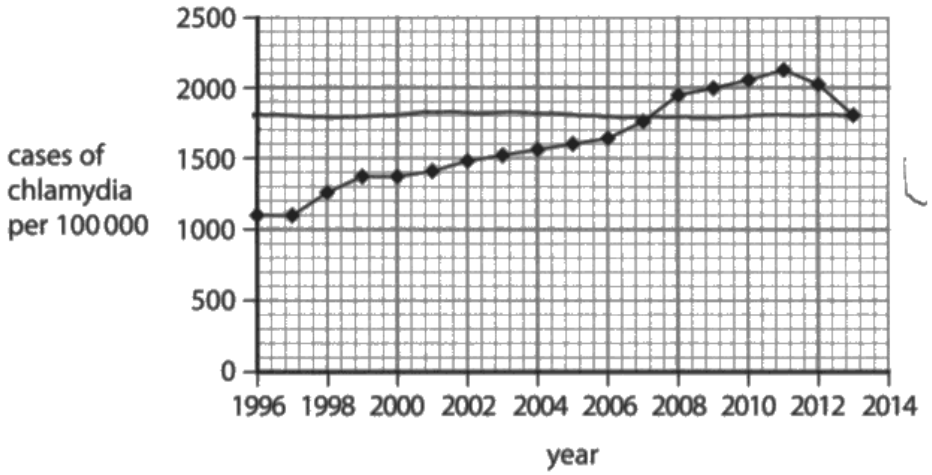


Figure 2

(i) Describe the trend in the number of cases of chlamydia between 1996 and 2013.

(2)

throught the years, each year more people get cases of clymidia, with the highest case being in 2011 where 2.1 thousand cases of clymidia where recorded with the lowest at 1996

ResultsPlus
Examiner Comments

This response scored both marks.

ResultsPlus
Examiner Tip

A describe command word and for describing trends shown in data of graphs or tables simply stating how the numbers increase and decrease, preferably with references to when they change is often enough to gain the marks available.

Question 2 (b) (ii) - (iii)

In Q02(b)(ii), candidates had to read a value from the graph. Almost half of the candidates were able to do this within the allowed tolerance.

Q02(b)(iii) tested the maths skill of calculating the number of people in the UK with chlamidya in 2013 from the data given and their reading from the graph. As is often the case with calculations, more candidates scored both marks here than scored just one, although a significant number did just gain their one mark by either dividing 64 000 000 by 1 000 000 or multiplying by their reading from the graph (answer to Q02(b)(ii)). Candidates did have problems knowing what to do with the data and the full range of addition and subtraction as well as multiplying and dividing wrong numbers were frequently seen.

(ii) State the number of cases of chlamydia per 100 000 in 2013.

(1)

1800

(iii) The population of the United Kingdom in 2013 was 64 000 000.

Calculate the number of people with chlamydia in 2013.

(2)

64,000,000 / 100,000

640

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Examiner Comments

A correct reading from the graph of 1800 gains one mark and then the candidate has correctly divided the the population of the UK (64 000 000) by 100 000 to gain a second mark.

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Examiner Tip

This candidate starts well and is just a short way from completing the calculation by multiplying by 1800. The clue here is that we have linked Q1(b)(ii) and Q1(b)(iii) together suggesting that you need to use your answer to (ii) in the calculation.

Question 3 (a) (i)

This question asked candidates to describe the trend in the activity of trypsin at different pH values and to use data from the graph.

Most candidates could access the question and were often awarded marking point 1 for referring to enzyme activity and marking point 3 for identifying the optimum pH for trypsin. Marking points 2 and 4 were awarded less frequently, sometimes because values taken from the graph were incorrect. For marking point 2 candidates had to state that enzyme activity increases from pH 5.8 ± 0.2 to pH 8 and for marking point 4 that enzyme activity decreases between pH 8 and pH 9.8 ± 0.2.

3 (a) Figure 3 shows the activity of the enzymes pepsin and trypsin at different pH levels.

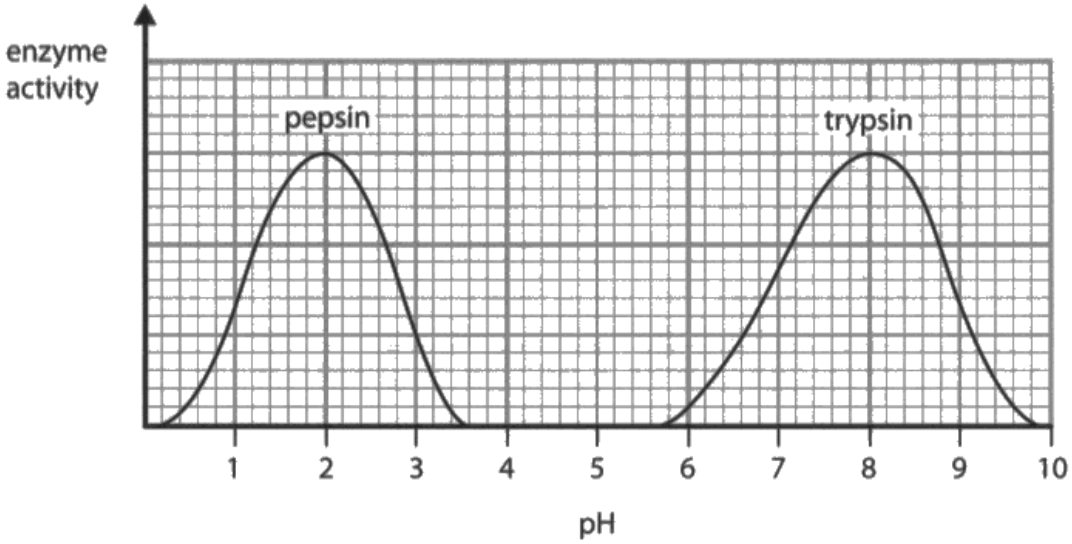

Figure 3

(i) Describe the trend in the graph for the enzyme **trypsin**.

Use data from the graph to support your answer.

(4)

Just before PH 6 the enzyme activity increases. The graph shows the optimum PH for enzyme activity is PH 8. After PH 8, enzyme activity gradually decreases and then theres eventually no activity ~~as the~~ at PH 10.

A four mark response hitting all the marking points and although just before pH 6 is a little vague, with our ±0.2 tolerance it is creditable.

There was a mark here for referring to enzyme activity, so when describing data from graphs and tables, take the axis label or column heading and use that in your response.

3 (a) Figure 3 shows the activity of the enzymes pepsin and trypsin at different pH levels.

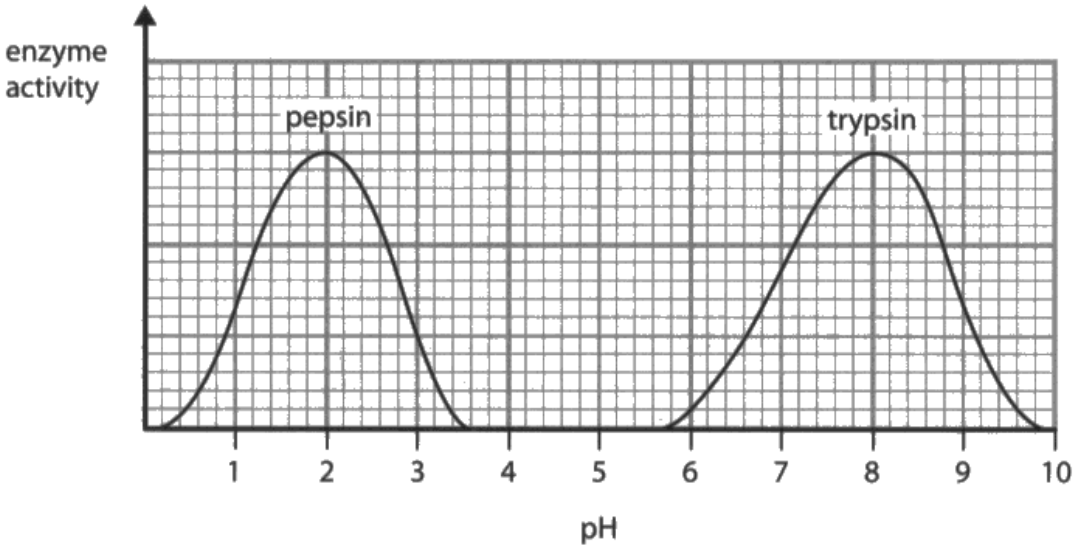

Figure 3

(i) Describe the trend in the graph for the enzyme **trypsin**.

Use data from the graph to support your answer.

(4)

From ph 5.9 the trend in the graph for the enzyme trypsin, has increased until ph8, then decreased until ph 10.

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Examiner Comments

The candidate has described the graph but lost a mark as they have not said what the trend is about - ie enzyme activity.

Question 3 (a) (ii)

Most candidates could correctly state that the optimum pH for the enzyme pepsin is 2.

Question 3 (a) (iii)

In this question candidates had to describe the conditions in the stomach that allow pepsin to work effectively.

The idea that the stomach conditions are pH 2 or acidic gained marking point 1 for many candidates. However, relatively few were awarded marking point 2 for stating that these conditions are due to hydrochloric acid being present in the stomach.

(iii) Pepsin only works effectively in the stomach.

Describe the conditions in the stomach that allow pepsin to work effectively.

(2)

In the stomach, there is Hydrochloric acid which has a pH of 2; the most acidic part of the body. Therefore, because pepsin optimum pH for enzym activity is at pH 2, pepsin will work best in the stomach because has the pH of 2.

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Examiner Comments

2 marks awarded for hydrochloric acid being present in the stomach which covers both marking points.

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Examiner Tip

This item is part (iii) of a set about protein digestion and so use the previous parts to your advantage. Here the candidate gets both marks for stating the stomach is acidic / has hydrochloric acid in it but also uses the information in the graph, ie the optimum pH for pepsin is 2, to state that that will be the pH of the stomach.

Question 3 (c)

This question required candidates to state the products of protein digestion. The correct answer of amino acids was given by a significant minority of candidates.

Question 4 (a) (i)

In this item, candidates had to interpret a human karyogram and apply their knowledge to a different situation giving two reasons why the chromosomes shown were not from a gamete. Marking point one was scored by candidates who were able to count all the chromosomes correctly or identify that they are in pairs. Some candidates stated that there are 22 / 44 chromosomes because they did not recognise the X and Y chromosomes as pair 23. Marking point two was awarded for a comparative statement about gametes, such as they only have 23 chromosomes. Correct comments about the presence of an X and a Y chromosome were seen infrequently for marking point three.

4 (a) A karyogram is a picture of the chromosomes found in the nucleus of a single cell.

Figure 4 shows a human karyogram.

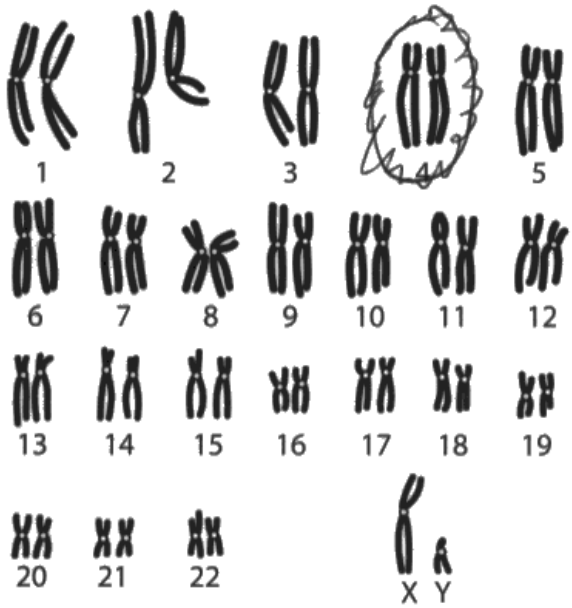

Figure 4

(i) State **two** reasons why this karyogram cannot be from a gamete (sex cell).

(2)

1 These are diploid whereas gametes are haploid

2 gametes have only one set of chromosomes

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Examiner Comments

Stating that this is diploid whereas gametes are haploid scores both marking points one and two. The candidate's second response is also marking point two.

Question 4 (a) (ii)

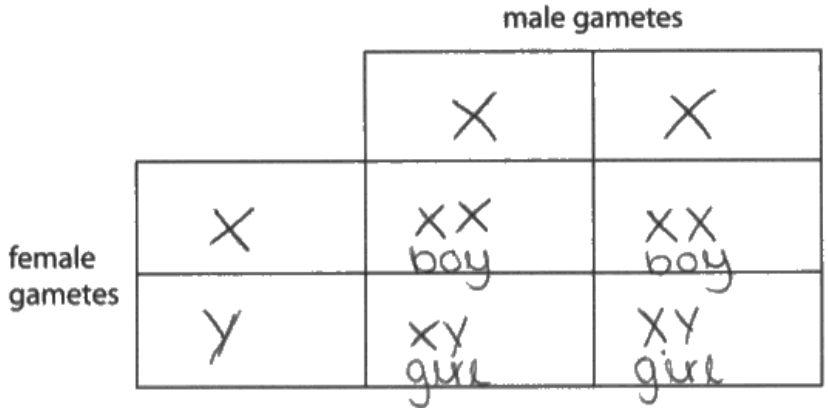
More candidates identified the gender of the person from whom the karyotype was taken as female than as male. This surprised examiners, but was perhaps explained by a response which said that all the chromosomes were x shaped so it must be a female, even though the X and the Y chromosome are clearly labelled.

Question 4 (a) (iii)

In this question candidates were asked to complete a Punnett square to show how gender is inherited. Marking point 1 was awarded for filling in the correct gametes and marking point 2 for the correct offspring genotypes. The chromosomes had to be X and Y for credit. A significant number of candidates used M and F presumably for male and female which was not creditworthy. Candidates who transposed the male and female gametes did not score marking point 1, but did achieve marking point 2 if the subsequent offspring genotypes were correct.

(iii) Complete the Punnett square to show how gender is inherited.

(2)



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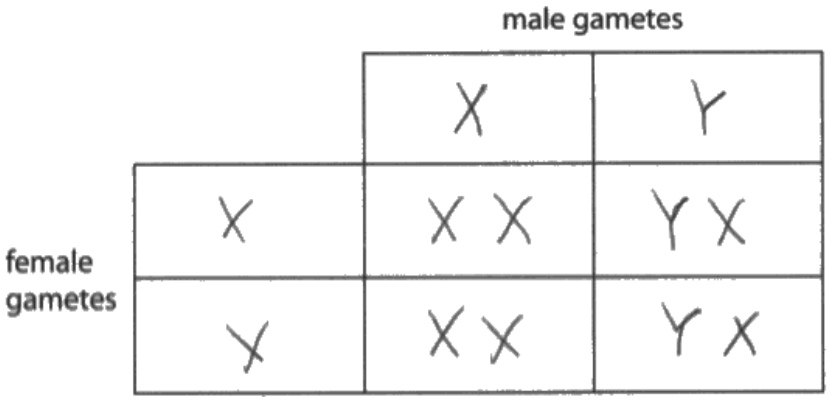
Examiner Comments

Getting the sex chromosomes the incorrect way round still allowed marking point two to be credited, so one mark scored.

(iii) Complete the Punnett square to show how gender is inherited.

(2)



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Examiner Comments

This response narrowly scored both marks.

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Examiner Tip

Make your X chromosomes and Y chromosomes clear. In this response is the lower X chromosome for the female an X or a Y. There is enough to accept it as an X as the offspring would be different if it were a Y. However if they had also been unclear, the candidate may have lost a mark.

(iii) Complete the Punnett square to show how gender is inherited.

(2)

		male gametes	
		Male	Male
female gametes	Female	~~M F~~ FM	M F
	Female	FM	M F

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Examiner Comments

A common error was for candidates to use words or letters for male and female as shown here, suggesting that some may not have practised using Punnett squares for XX / XY crosses.
0 marks scored.

Question 4 (a) (iv)

The majority of candidates could correctly state the probability of a child being male.

Question 4 (b) (i)

Only about one fifth of candidates could correctly name structure Z as the acrosome with common errors including head (of sperm), nucleus and mitochondria.

Question 4 (b) (ii)

The diagrams in the stem of the question showed two sperm cells with different size middle pieces. Candidates had to apply their knowledge of the structure of sperm cells to explain why one would be more likely to fertilise an egg than the other if they were both released at the same time. Marking point 1 was awarded for stating that the middle section contains mitochondria and marking point 2 for identifying that sperm B would have **more** mitochondria. Candidates who could give the function of mitochondria gained marking point 3. The most common way of gaining a mark was by hitting marking point 4: that sperm B would be able to swim faster. A common error was to presume that the tail of sperm B was longer (which it is not) although this would be neutral and did not disqualify Mp4.

(ii) Sperm B has a larger middle section than sperm A.

Explain why sperm B will be more likely to fertilise an egg than sperm A if they were both released at the same time.

(3)

Sperm b has more mitochondria so it will have more energy to go faster to the egg. Sperm A has less mitochondria so it will be slower.

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Examiner Comments

By saying that sperm B has more mitochondria, this candidate covers marking points one and two, with more energy hitting marking point three and go faster hitting marking point four. A good answer that gains all three available marks.

ResultsPlus
Examiner Tip

Look at this answer and identify the detail you have to learn to give such a good response.

(ii) Sperm B has a larger middle section than sperm A.

Explain why sperm B will be more likely to fertilise an egg than sperm A if they were both released at the same time.

(3)

Because sperm B is more versatile and adapted to doing its job. Having a larger middle section allows it to move faster.

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Examiner Comments

One mark is awarded here for marking point four - move faster. However with three marks available candidates need to be trained to make their responses less vague.

Question 5 (a) (ii)

This question was a good discriminator for the higher level candidates for this paper, with roughly equal numbers gaining no, one or two marks. The question asked candidates to interpret data shown in a bar chart of the percentage of bases in human DNA and describe how it provides evidence for base pairing. Many candidates scored marking point 1 by identifying that the percentage of A and T or C and G are the same. For marking point 2 candidates had to state that A pairs with T **and** C pairs with G. Marks were not awarded if candidates did not specifically mention which bases have the same percentages and which bases are paired up.

(ii) Figure 6 shows the percentage of each base in human DNA.

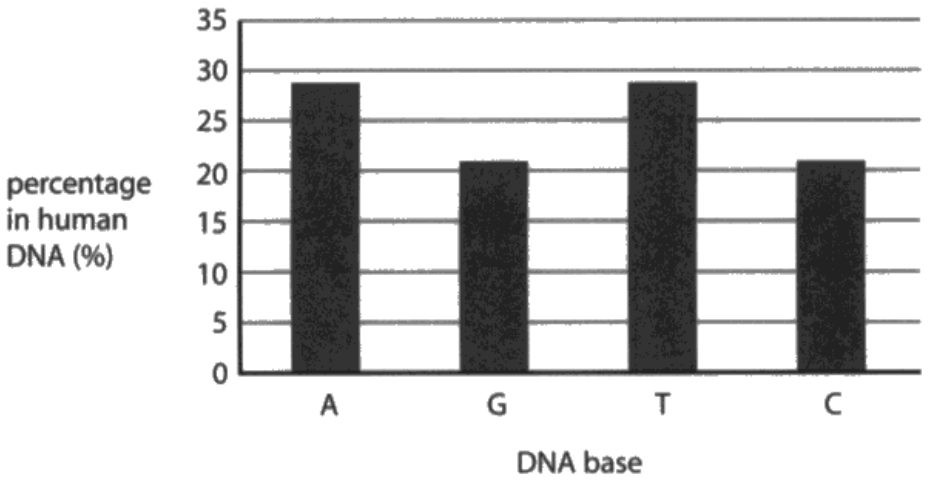

Figure 6

Describe how this data provides evidence for base pairing in DNA.

(2)

The bases are at similar levels.

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Examiner Comments

This is too vague for credit and does not score any marks.

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Examiner Tip

Be specific: use the axes labels and state which ones are similar / the same levels. For example, A and T are at the same percentage and G and C are at the same percentage.

(ii) Figure 6 shows the percentage of each base in human DNA.

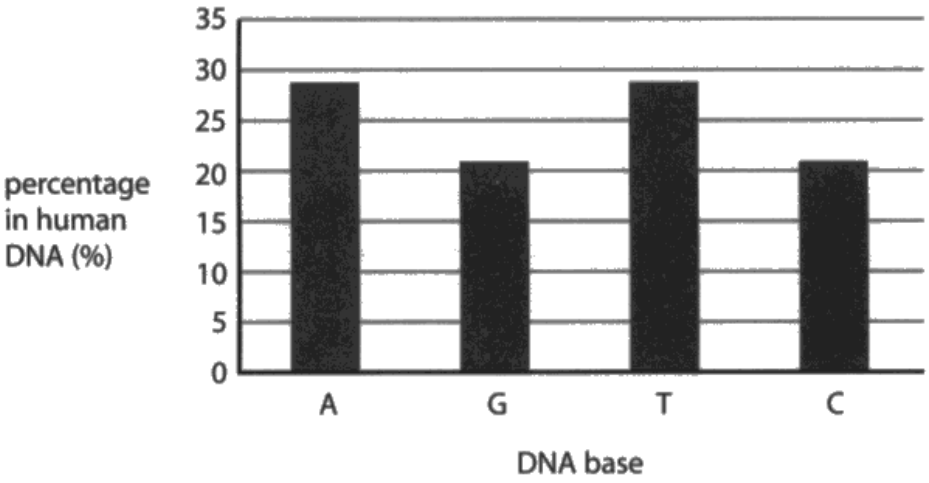

Figure 6

Describe how this data provides evidence for base pairing in DNA.

(2)

in human DNA the base's (A) and (T) join to gether and (G) and (C) join together this is supported by the bar chart because the amount of (A) and (T) are the same and the amount of (G) and (T) are the same.

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Examiner Comments

A good response which could only be improved by using percentage rather than amount. 2 marks.

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Examiner Tip

Rather than say amount - use the labels and use the term percentage.

Question 5 (b)

This question examined candidates' ability to convert units as well as their understanding of the difference between haploid and diploid cells. Marking point 1 was scored for either dividing the mass of DNA by two or for converting nanograms to picograms.

An answer of 6.2 was seen very frequently. This gained marking point 1 for converting the units, but not both marks as this answer had not been divided by two; many candidates forgot to take into account the fact that they were dealing with sperm which are haploid cells, not diploid.

(b) A scientist obtained a mass of 0.0062 nanograms of DNA from a diploid human cell.

Calculate the mass of DNA the scientist should obtain from a haploid human cell.

Give your answer in picograms.

(1 nanogram = 1000 picograms)

0.0062 x 1000 = 6.2

(2)

6.2 picograms

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One mark awarded for the conversion of nanograms to picograms.

(b) A scientist obtained a mass of 0.0062 nanograms of DNA from a diploid human cell.

Calculate the mass of DNA the scientist should obtain from a haploid human cell.

Give your answer in picograms. Haploid cells → half a diploid cell

(1 nanogram = 1000 picograms)

(2)

0·0062 / 2

0.0031 picograms

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Examiner Comments

One mark is awarded here for halving the amount of DNA which is part of the correct calculation as the haploid cell will have half the chromosomes of a diploid cell. However they have not converted the nanograms to picograms as instructed.

ResultsPlus
Examiner Tip

Always read the question carefully and underline the different key parts to help you ensure that you answer the question fully.

Question 5 (c) (i)

This question was based on the practical procedure of extracting DNA from fruit. A significant number of candidates showed that they had experience of the procedure as even though some did not gain the mark they did describe the method used. Rather than use the word precipitate which was seen regularly, candidates tended to say so that you can see the DNA / to make the DNA visible, again with some showing evidence of carrying out this procedure as they added 'as white strands'. Overall, a relatively small proportion of candidates gained the mark for this question.

(c) A student used the method shown in Figure 7 to compare the mass of DNA extracted from strawberry fruit cells and from kiwi fruit cells.

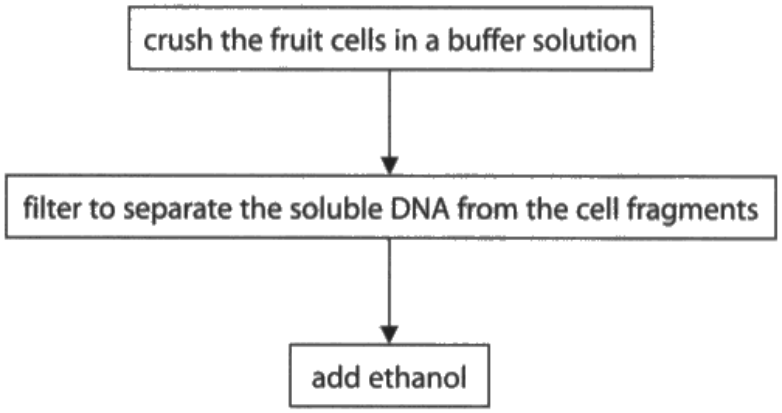


Figure 7

(i) State why ethanol is used.

(1)

ethanol makes the DNA strands visible

ResultsPlus
Examiner Comments

The commonest way that candidates gained the available mark.

(c) A student used the method shown in Figure 7 to compare the mass of DNA extracted from strawberry fruit cells and from kiwi fruit cells.

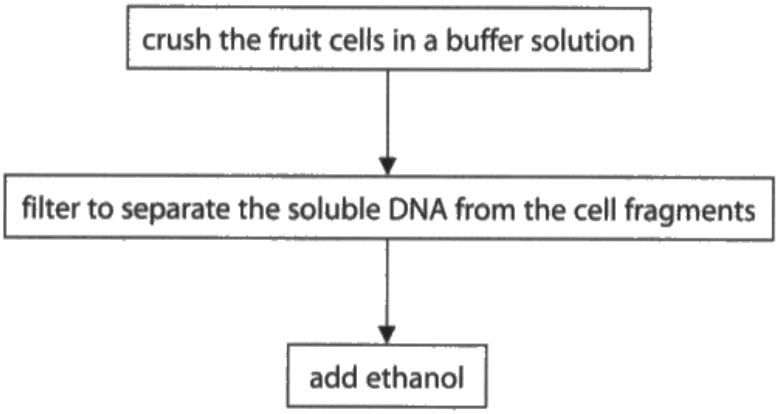


Figure 7

(i) State why ethanol is used.

(1)

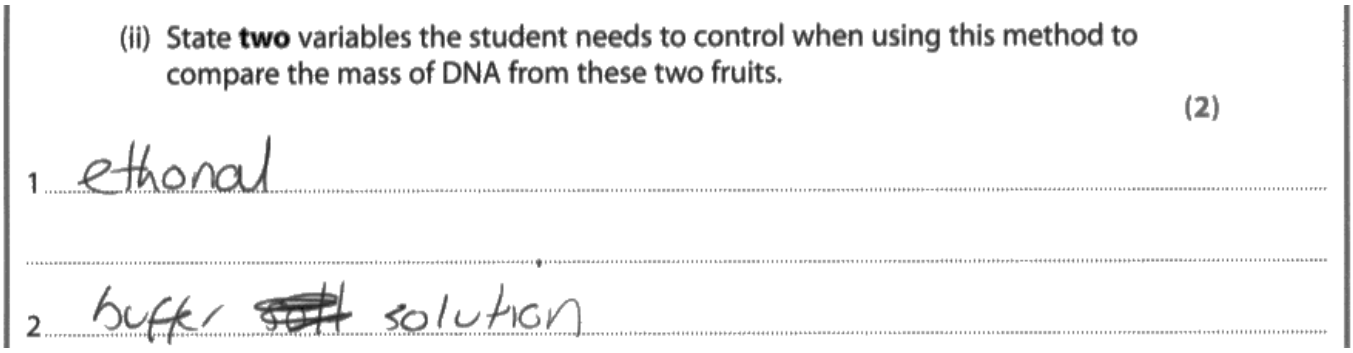
so that the cells are clearer to see.

ResultsPlus
Examiner Comments

A common error saying that this allowed you to see the cells (or the cell fragments) missing the point of the procedure which they were told was to extract DNA.

Question 5 (c) (ii)

In this question candidates were asked to state two variables that need to be controlled in the DNA extraction procedure. This was an accessible question with some excellent, detailed responses seen and just over half of candidates gaining at least one mark. However, candidates were not awarded marking points 2 or 4 if they referred to amount of buffer or ethanol, instead of volume. Marking point 3 was awarded least often.


(ii) State **two** variables the student needs to control when using this method to compare the mass of DNA from these two fruits.

(2)

1 ethonal

2 buffer ~~soft~~ solution

ResultsPlus
Examiner Comments

This response could not be credited as these are chemicals, not variables.

ResultsPlus
Examiner Tip

Make sure you know what variables means.

(ii) State **two** variables the student needs to control when using this method to compare the mass of DNA from these two fruits.

(2)

1 add the same amount of buffer solution to each

2 add the same amount of ~~ethanol~~ ethanol

ResultsPlus
Examiner Comments

We do not credit amount of a liquid as a variable to control, so 0 marks.

ResultsPlus
Examiner Tip

Make sure that you refer to the volume, in this case the volume of ethanol and the volume of buffer solution.

Question 5 (c) (iii)

This question asked candidates to give a reason for repeating the experiment. This was another accessible question and a good discriminator, with roughly equal numbers of candidates able to answer the question sufficiently to gain the available mark. Candidates who commented on improving accuracy and fair testing did not score a mark.

(iii) The student repeated the experiment.

Give **one** reason why.

(1)

TO ensure that the variables within the expenment stayed the same and to ensure that it was an accurate answer.

ResultsPlus
Examiner Comments

Repeating an investigation does not make it accurate - the results from the repeated experiment are used to check that the results are similar to the first set of results which is an indicator that the results are valid. 0 marks scored.

(iii) The student repeated the experiment.

Give **one** reason why.

(1)

To see if they get similar or same results.

ResultsPlus
Examiner Comments

This candidate is awarded the available mark. They have not stated that they will compare these results to the first ones generated but in the context of this question, this is accepted.

Question 5 (d)

This question asked candidates to compare the outcomes of mitosis and meiosis.

The question allowed candidates to demonstrate their knowledge of the two processes, but marks were only awarded for comparative statements, such as mitosis produces 2 cells and meiosis produces 4 cells, for marking point 1. Candidates often stated that the cells produced are identical or the cells are different with respect to mitosis and meiosis, but for marking point 2 they had to state that cells are genetically identical or genetically different. Candidates that tabulated their comparisons tended to match the comments whereas candidates that wrote in free prose often missed out one of the points made.

(d) Mitosis and meiosis are processes that produce new cells.

Compare the outcomes of mitosis and meiosis.

(3)

Mitosis produces two genetically identical diploid daughter cell whereas Meiosis produces 4 not genetically identical gametes which are gym haploid so not paired and are single chromosomes.

ResultsPlus
Examiner Comments

A good response that covers three of the marking points.

(d) Mitosis and meiosis are processes that produce new cells.

Compare the outcomes of mitosis and meiosis.

(3)

mitosis	meiosis
* growth and repair	*sex cells or Gametes
* 100% DNA	*50% DNA
*Diploid	*haploid
*2 daught cells	*4 daughter cells
*identical	*non identical

ResultsPlus
Examiner Comments

This response also scored full marks.

ResultsPlus
Examiner Tip

When asked to give a comparison, it is a good idea to present this in a table. This means that you are more likely to match your comments thus gaining marks.

Question 6 (a)

In this question candidates had to explain why children who are vaccinated against tetanus do not get the infection if the bacteria enter their body through a cut in the skin. Many candidates scored marking point 1 for recognising that the children would be immune to *Clostridium tetani*. Marking point 4 was also frequently awarded for linking vaccination with the production of antibodies. The other marking points were awarded less often partly due to confusion about what the vaccination contained and references to memory cells rather than memory lymphocytes. Only a small proportion of candidates were able to make a correct reference to the secondary immune response.

6 (a) *Clostridium tetani* is a bacterium that can be found in soil.

It causes the infection tetanus.

Children are vaccinated against tetanus.

Explain why these children do not get tetanus if the bacteria enter their body through a cut in the skin.

(3)

Memory Lymphocytes have been created in the body, so if a tetanus pathogen is detected in the body, memory Lymphocytes will remember the vaccination of the tetanus and they will remember how they fought it off. They are prepared to destroy the tetanus before it causes harm to the person.

ResultsPlus
Examiner Comments

This candidate correctly uses the term memory lymphocyte but is limited to one mark as they are unclear about how this helps the immune system, missing out key words.

Question 6 (b)

This question required candidates to explain how bacteria become resistant to an antibiotic - Colistin. This 'explain' question is relatively complex and so it is not surprising that candidates across the ability range found the task challenging with a minority of candidates scoring one or more marks. Marking point one was the most often awarded, usually for stating that resistant strains increase when people do not finish their course of antibiotics, or that antibiotics are overused. Marking point two could be awarded for the idea that natural selection had occurred or the bacteria had evolved. Marking point three, the idea that some of the bacteria have a mutation and marking point four the idea that these bacteria with the mutation then multiplied were very rarely seen.

(b) Colistin is an antibiotic used to treat infections in the bloodstream.

Some bacteria are resistant to Colistin.

Explain how these bacteria have become resistant to Colistin.

(4)

taking Colishin too often can make the bacteria resistent to them. they get used to the antibiotic and ~~see~~ develop to not be affected by it. it can't be harmed by it no longer because its adapted and gotten used to the Colishin

ResultsPlus
Examiner Comments

Taking Colistin too often equates to overuse of the antibiotic so one mark is awarded. The rest of the answer is not specific enough for further credit.

(b) Colistin is an antibiotic used to treat infections in the bloodstream.

Some bacteria are resistant to Colistin.

Explain how these bacteria have become resistant to Colistin.

(4)

Some ~~some~~ bacteria developed mutations and became resistant to the antibiotic. When used, the non-resistant bacteria will die and the resistant ones will reproduce until ~~one~~ another new drug is invented. Each time, the bacteria will become more resistant, new drugs will have to be made to fight them off and so on.

ResultsPlus
Examiner Comments

This is a good competent response and is awarded two marks. These are for: bacteria develop mutations, and the idea of the resistant bacteria surviving and reproducing.

Question 6 (c)

This extended open-response question asked candidates to explain how information about tools found in different layers of rock provides evidence for human evolution. There are three areas of indicative content for this question: the age of the tools, the quality of the tools, and skills and intelligence. The level of the response is determined by the number of areas covered and the mark within the level is determined by how well the areas are linked together.

A Level 1 response required a simple observation from the diagram with a brief explanation from one of the three areas of indicative content.

A Level 2 response required a simple explanation from at least two areas of indicative content.

A Level 3 response required a detailed explanation linking ideas from all three areas of indicative content.

This was an excellent discriminator with the large majority of candidates accessing the question and reasonable percentages of candidates achieving each level and mark awarded, with 4 marks being slightly higher than the others.

*(c) Figure 8 shows three stone tools found in different layers of rock.

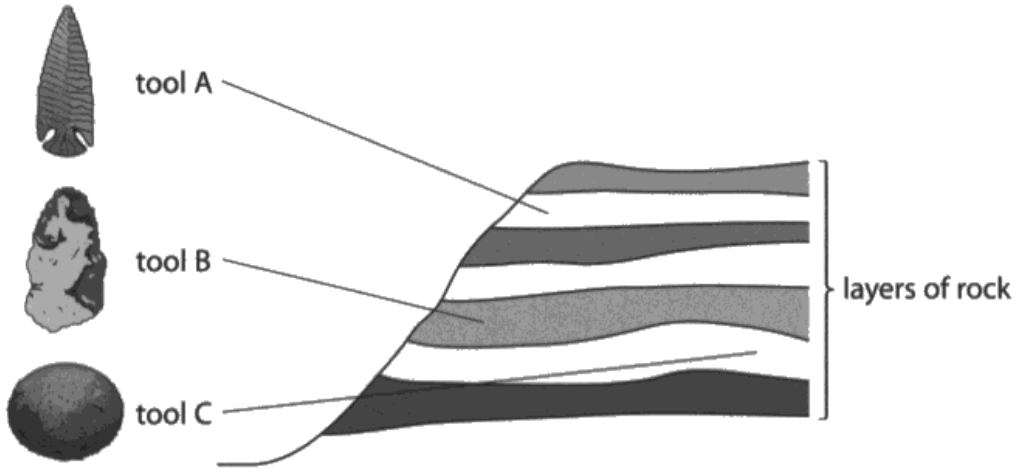


Figure 8

Explain how information from Figure 8 provides evidence for human evolution.

(6)

stone tool C is a lot more rounded and it is located deeper in the rock showing that it is a lot older and a lot less developed however tool B is located nearer to the middle of the rock and is begginning to look a lot sharper compared to stone tool C meaning that it is begging to become a lot more developed and ~~stone~~ newer. stone tool A is located at the top of the rock which shows that it is a lot newer and modern. the ~~spie~~ species that created stone tool A was more intelligent as the tool is sharper and smoother meaning that it is the most developed out of the three. This shows that the deeper the tool is in the rock the less developed it is and the nigher it is the more developed it is and that shows that humans evolved and became more intelligent in during human evolution.

(Total for Question 6 = 13 marks)

ResultsPlus
Examiner Comments

This comprehensive response covers all three areas of indicative content to a suitable depth and links them. A top Level 3 response, earning 6 marks.

*(c) Figure 8 shows three stone tools found in different layers of rock.

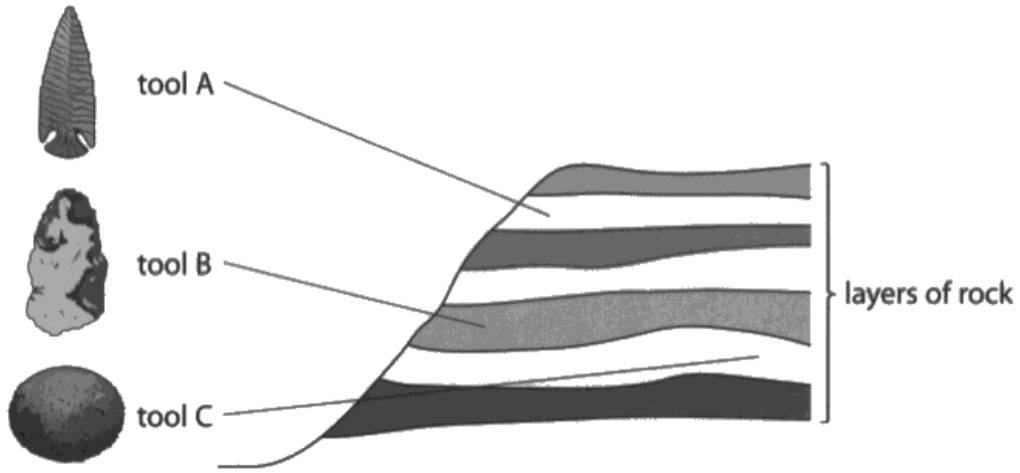


Figure 8

Explain how information from Figure 8 provides evidence for human evolution.

(6)

Tool A is stronger because it has less layers of rock causing the tool to be much more sharper. This changes with tool C as it is made of lots of layers of rock However it can't ~~can~~ cut through much due to it being round and not having sharp edges.

ResultsPlus
Examiner Comments

This enters Level 1 as there is information stating that tool A is sharper than tool C. This is just a simple observation without a valid explanation so Level 1 can be entered but the lack of linkage means that this is allocated as a low Level 1 and so one mark is awarded.

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 giving a justification or reason.
- Recognise that 'describe' requires candidates to give an account of something or to say how data in a table or graph changes.
- 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 question being asked.
- Develop their practical skills knowledge to ensure they can answer questions on the core practicals in detail.
- 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.
- Think about the structure of the answer before starting to write when tackling the extended answers, to ensure that the answer links points given to answer the question.

Grade Boundaries

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

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