Examiners' Report

June 2014

GCE Biology 6BI05 01

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Introduction

Paper 6BI05/01 enabled candidates to display their understanding of a wide range of material from Unit 5. It was pleasing to note that many were able to do this, offering a good level of supporting factual content to their answers.

Whilst the synoptic elements were dealt with in an encouraging manner by some candidates, others appeared to find it difficult to deliver responses with the necessary precision to access the higher marks.

A particularly pleasing aspect was the good grasp that many candidates demonstrated for those question items relating to *How Science Works,* although there was some confusion over the differences between accuracy, reliability and validity.

There were few scripts that were incomplete and this suggested candidates had a good appreciation across the specification for Unit 5 and thanks should go to both the candidates and their teachers for this.

Question 1 (b) (i)

The majority of candidates were able to give two suitable reasons why a lack of sufficient exercise may not be good for health.

This is a short answer that delivers the necessary information.

(i) Give **two** reasons why too little exercise may not be good for the health of a person.

(2)

· increases blood pressure
· increases risk of obesity
· increases risk of CHD

ResultsPlus
Examiner Comments

The response achieved both marks and indeed offered three suitable answers (as marking points 4, 1 and also 2).

ResultsPlus
Examiner Tip

As in this response, there is no need to repeat the question.

This example illustrates a rather general response that lacks the required precision and factual detail.

(2)

Too little exercise is not good for your health because it does not allow you to strengthen your heart which is a muscle and needs to be worked. Also it allows fat stores to build up this can put pressure on your organs and stop them functioning normally.

ResultsPlus
Examiner Comments

The response gained no marks.

ResultsPlus
Examiner Tip

Always look to offer an appropriate level of knowledge and understanding to a question, as requested in that question. This item asked for two reasons for two marks.

Question 1 (b) (ii)

A pleasing number of candidates supplied credit-worthy answers to this question about why too much exercise may not be good for health.

This example starts by offering marking point 2 as immune system suppression and then supplies detailed alternatives which would also have gained the same mark. It then suitably considers marking point 2.

> (ii) Give **two** reasons why too much exercise may not be good for the health of a
> person.
>
> (2)
>
> 1. Too much exercise can suppress the immune system. It can lower the levels of B cells, T helper cells, natural killer cells and phagocytes, this means infection is more likely.
>
> 2. - Too much exercise can lead to wear and tear of joints, can lead to
>
> (Total for Question 1 = 7 marks)
>
> to articular cartilage wearing away, patellar tendonitis.

ResultsPlus
Examiner Comments

Both marks achieved.
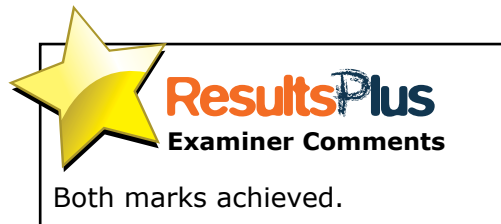
Question 2 (a) (i)

This question item required candidates to use the data supplied to support a given conclusion. Whilst the full mark range was seen, most answers tended to limit themselves to marking points 1 and 2.

This answer initially refers to the data and gains the two most popular marking points (1 and 2). It then goes on to state accurately that identical twins are genetically the same but non-identical twins are not. This is marking point 4.

Explain how these results support this conclusion.

(4)

There is a higher mean percentage agreement in face identification in identical twins than non-identical twins (41% higher). This the data shows the percentage to be more than double. Identical twins are genetically identical, whereas non-identical are not. The fact that percentage is higher for identical twins suggests that genetics is a reason for their agreement.

ResultsPlus
Examiner Comments

Three marks out of four awarded. Note that marking point 2 was awarded for a manipulation of the provided data.

ResultsPlus
Examiner Tip

A number of responses to this question item suggested some confusion over the differences between DNA, genes, and alleles. Make sure the differences are known.

Question 2 (a) (ii)

Candidates had to consider how the data presented earlier may differ when an environmental component was involved.

In some cases, for example below, there was ambiguity in a response such that the mark could not be awarded.

In this case, the candidate would have got the mark had they finished the sentence after non-identical twins. However, suggesting the result would be higher than the identical twins negated the mark.

Suggest how the results of this investigation might differ from the results shown in the table.

(1)

The results in this investigation would show a higher percentage for non-identical twins ~~that~~ ~~too~~ than for identical twins.

ResultsPlus
**Examiner Comments**

Mark could not be given.
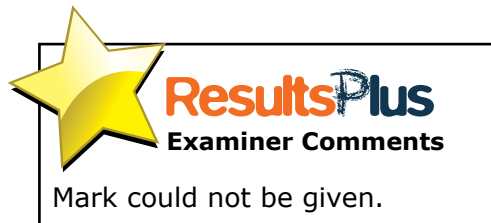
This expressed the marking point in two different ways.

Suggest how the results of this investigation might differ from the results shown in the table.

(1)

The identical and non identical twins would have a more similar percentage. The percentage for non identical twins would be higher.

ResultsPlus
Examiner Comments

Candidate gained the mark.
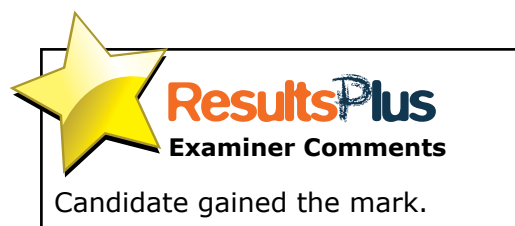
Question 2 (b)

In this question, candidates were expected to apply their knowledge of fMRI to the example of face identification. It was not uncommon to see generic responses that extolled the virtue of fMRI over MRI or CT.

This is a clear answer which demonstrates the application of knowledge about fMRI to this unfamiliar situation.

(b) Functional magnetic resonance imaging (fMRI) was used in another investigation. Brain activity was recorded whilst carrying out face identification.

Suggest why fMRI was used in this investigation.

(4)

Because FMRI uses radio waves and a a magnetic field to identify the areas of the brain that are most active during face identification, in real time. If the most active areas will 'light up' on the scanner, because these areas require more ~~oxygerated~~ oxygen, so more oxygenated blood will flow to these areas, appearing white on the image, as they absorb less.

ResultsPlus
Examiner Comments

The candidate was awarded marking points 2 and 5 in the first sentence and then marking point 1 in the second sentence.

ResultsPlus
Examiner Tip

Areas of the brain that were not active in face identification would require oxygen so, to achieve marking point 1, it had to be clear that more oxygen or more oxygenated blood was required by the active areas.

Question 3 (a)

This item required candidates to suggest why muscles with a predominance of fast twitch muscle fibres appeared less red that those muscles with a predominance of slow twitch muscle fibres. It was generally handled well by candidates. All marking points were seen regularly.

This is a good answer that offers three reasons. Firstly it gave the most common response. Then, in the second sentence it referred appropriately to less capillaries present and then to less blood.

(a) The skeletal muscles of elite sprinters are likely to have many fast twitch muscle fibres. Suggest why these muscles are less red in colour than muscles with many slow twitch muscle fibres.

(2)

> Fast twitch muscle fibres have less myoglobin compared to slow twith.
> Also they do not have many capillaries, decreasing their blood supply and therefore do not appear as red.

ResultsPlus
Examiner Comments

Marking points 1, 3 and then 2, gained.

ResultsPlus
Examiner Tip

Always take note of the mark allocation in a question.

Question 3 (b) (i)

A wide variety of answers was proffered for this item, with about half stating correctly the homeostatic control mechanism.

Question 3 (b) (ii)

This 5 mark item was also the first with marks for *Quality of Written Communication* (QWC). Candidates were expected to explain how a lowered human blood pH was returned to its original pH. It delivered the full mark range.

The mark scheme allowed candidates to approach this from the perspective of the fate of lactate or dissolved carbon dioxide.

Whilst this is a short response it delivered three credit-worthy points.

*(ii) Explain how the pH of the blood of a sprinter is returned to its original level after a race.

(5)

Increase in CO_2 in blood, blood pH drops. Chemoreceptors detect changes and send in pH and send impulses to medulla. In turn medulla respond and sends more impulses to intercostal muscles and diaphram to increase breathing rate

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Examiner Comments

The first sentence correctly links the increase in carbon dioxide, as an alternative to acid, with a decrease in pH for marking point 1.

The second sentence correctly refers to the chemoreceptor detecting a change in the pH. This is marking point 8.

The third sentence expresses marking point 9 in two different, and acceptable, ways. The addition of the word 'more' was important with reference to impulses from the medulla for this marking point. Likewise, the candidate then refers to an increase in breathing rate rather than just affecting breathing.

ResultsPlus
Examiner Tip

If tempted to write that something changes, perhaps consider the direction of that change eg heart rate increases rather than heart rate alters.

Question 3 (b) (iii)

This question focussed on how the smooth muscle surrounding blood vessels in the skin could help increase heat loss.

Whilst there was a number of very accomplished answers, it was not uncommon for candidates to refer to muscles in capillaries and blood vessels moving closer to the skin.

This is a short but precise answer that gained four marks.

(iii) During the race, heat is generated and is lost from the body through the skin.

Describe how muscle, present in blood vessels in the skin, helps to increase heat loss from the body.

(4)

Arterioles dilate causing vasodilation. More blood flows to capillaries. More heat is lost by radiation, as More blood flows closer to the skin.

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Examiner Comments

The short first sentence gained marking points 1 and 2 whilst the second sentence was sufficient to achieve marking point 5. The third sentence suitably referred to more heat loss through radiation for marking point 6.

ResultsPlus
Examiner Tip

Precision in answers is important. A number of candidates referred to blood being directed onto the skin surface, which would not qualify for marking point 5.

Question 4 (a)

This is the first *How Science Works* item in the paper and required candidates to suggest why mice were fed epicatechin at a concentration of 1mg per kg of their body mass rather than at a concentration of 1mg per mouse.

All mark scheme points were encountered but marking points 1 and 2 were, perhaps, the most common.

This response offers a description which conveys the idea of epicatechin concentration being a controlled variable as well as referring to the variation in body mass between mice.

(a) Suggest why the mice in group A were given water containing epicatechin at a concentration of 1 mg per kg of their body mass rather than at a concentration of 1 mg per mouse.

(3)

The mice's body masses would all be slightly different, depending on their genetics and environmental factors. Therefore if you gave them 1mg per mouse of epicatechin, you may give one smaller mouse a higher dosage in proportion to their body mass, compared to a mouse of a larger size who would therefore get a slightly lower dosage in comparison to their body mass.

ResultsPlus
Examiner Comments

This candidate gained marking point 1 and then 2 for this answer.

Question 4 (b) (i)

Generally candidates were able to offer two salient descriptive points in relation to the graphical data provided about the effect of epicatechin on the relative size of mitochondrial membranes.

This answer illustrates one commonly-encountered incorrect view. However, it is still able to gain one mark.

Use the information in the bar chart to describe the effect of epicatechin on the mitochondria.

(2)

- Epicatechin increases the surface area of the membrane of the mitochondria.
- whereas, the group B with no epicatechin has the ratio of 1.7 and group A with the epicat-echin has a ratio of 2.0
- The difference of 0.3

ResultsPlus
Examiner Comments

The first bullet point does not identify which membrane has the increased surface area so marking point 3 cannot be awarded.

The second bullet point repeats the data already presented but the third manipulates the data so gains marking point 2.

ResultsPlus
Examiner Tip

Make sure that the concept of a ratio is understood fully.

This candidate starts their response by considering the effect of epicatechin on the inner membrane and then on the ratio.

Use the information in the bar chart to describe the effect of epicatechin on the mitochondria.

(2)

Epicatechin has the effect of increasing the surface area of the inner membrane of the mitochondria as the ratio of inner to outer membrane is 0.4 larger in Group A than in the Group B mice.

ResultsPlus
Examiner Comments

The first line-and-a-half of this answer offers a sensible description and gains marking point 3.

The rest of the answer gains marking point 1 despite the incorrect calculation, which can be ignored.

Question 4 (b) (ii)

This question required candidates to consider three elements. They were to refer back to the bar chart and their own knowledge, to offer an explanation for the data provided in a table about time for muscle fatigue to set in.

Whilst there were some splendid and thorough answers, this item proved challenging for a number of candidates.

This response supplied the three most commonly-recorded marking points.

> Using information from the bar chart and your knowledge of respiration, suggest an explanation for the results shown in the table.
>
> (5)
>
> Group A muscles took longer to fatigue than in group B by 34 seconds. This is because the area it had more energy as the area of mitochondria is bigger than in group B so can produce more ATP, which is used for energy. Respiration allows it to use ~~sugar~~ pyruvate to produce ATP in the Krebs cycle which takes place in the matrix of mitochondria.

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Examiner Comments

The first sentence used the numerical data provided in the table and gained marking points 1 and 2.

Part of the third sentence identifies a common misinterpretation of the graph that the whole mitochondrion has enlarged. However, the latter part of this sentence referred to more ATP being synthesised, which is marking point 4.

Question 5 (a) (iii)

Most candidates were able to offer a description that considered two controlled variables.

A number referred to keeping the genetic composition constant but the question focussed on the growing regime to help ensure a valid study.

A very comprehensive list of controlled variables offered.

> (iii) Suggest how the plants were grown to ensure this study was valid.
> (2)
>
> In the same room; same CO_2 concentration, same light intensity, (wavelength) same type of light (red or far-red), ~~light~~
>
> same type of soil; same pH and mineral content.

ResultsPlus
Examiner Comments

Gained two marks (out of a maximum two).

This is a general answer that did not offer sufficient detail.

> (iii) Suggest how the plants were grown to ensure this study was valid.
> (2)
>
> In a controlled environment with variables controlled so you know that it is the hours in amount of light causing flowers to be produced

ResultsPlus
Examiner Comments

No marks could be awarded.

Question 5 (a) (iv)

This item highlighted confusion amongst some candidates with answers referring to repeats and/or variables being kept constant.

This is an example of a common response that could not be awarded the mark.

(iv) Suggest how this study could be changed to produce a more accurate conclusion.

(1)

By using a larger sample si size of plants for reliability or comparing different plant species.

ResultsPlus
Examiner Comments

No mark given.

ResultsPlus
Examiner Tip

Make sure that the difference between *accuracy*, *reliability* and *validity* is fully appreciated

Question 5 (b)

Most candidates were able successfully to offer a suitable environmental cue.

This example shows a common error.

(b) For some plant species, day length is not an environmental cue for the production of flowers.

Suggest **one** environmental cue, other than day length, that could stimulate plants of these species to produce flowers.

(1)

When pollenators eg insects are present eg what season.

ResultsPlus
Examiner Comments

No mark awarded.
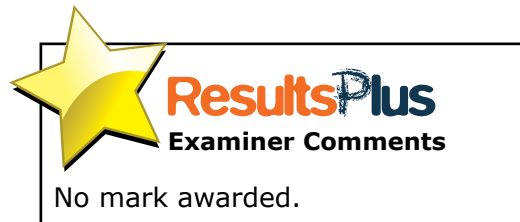
Question 5 (c) (i)

Many candidates found it hard to state accurately the location of rhodopsin. A number ignored that the question tried to restrict their answer to within the rod cell.

This type of answer was encountered frequently.

(c) Rhodospin is found in rod cells in the retina of mammalian eyes.

(i) State the location of rhodopsin within a rod cell.

(1)

~~In the bipolar neurone~~ Towards the tip g the rod cell

ResultsPlus
Examiner Comments

The mark could not be awarded. Other similar responses that were not credited included 'at the end' and 'at the top'.

ResultsPlus
Examiner Tip

Always check carefully what the question is asking. In this case, it is the location within the cell.

Question 5 (c) (ii)

Most candidates were able to gain at least 2 marks for this question, completing the table item relating to rhodopsin action.

Question 6 (a)

Generally, candidates had a good understanding of the structure and function of the various regions of the brain considered in this question. It was perhaps more common not to score full marks on the first row than on the second row.

This example illustrates perhaps the most common error in the first row - naming A as the hypothalamus.

Using the image and your knowledge, complete the table below.

(4)

Labelled structure	Name of structure	One function
A	hypothalamus	thermoregulation
C	frontal lobe	Feel emotions

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Examiner Comments

Both responses on the first row are incorrect but both are correct on the second row so two marks can be awarded.

ResultsPlus
Examiner Tip

In diagrams, photographs and images, labelling lines tend to terminate at the structure being considered.

Question 6 (b) (i)

Whilst many candidates appreciated why a restriction enzyme was used in stage one, a number described the role of other enzymes such as ligase or gave a general description of enzyme biology.

This response illustrated two elements seen on a number of occasions when marks could not be awarded.

The first related to the enzyme cutting a gene. The second was a description of general enzyme action rather than tailoring it to what is occurring in stage 1.

(i) A restriction enzyme is used in Stage 1.

Explain why only one restriction enzyme is used in stage 1.

(2)

Restriction enzymes are used to cut the genes. Restriction enzymes are specific (have specificity) to only 1 substrate (gene) so they can only catalyse 1 reaction. They also have a specific active site due to their 3-D structure / shape and the primary structures and bonds such as hydrogen bonds in the tertiary structure.

ResultsPlus
Examiner Comments

No marks awarded.

ResultsPlus
Examiner Tip

Look to answer in the context of the question being asked.

Question 6 (b) (ii)

This item related to how the addition of a chemical to a modified bacterium switched on the incorporated gene.

This response suggests sensibly that the chemical is a transcription factor and can enable the human gene to be transcripted.

(i) A restriction enzyme is used in Stage 1.

Explain why only one restriction enzyme is used in stage 1.

(2)

Restriction enzymes are used to cut the genes. Restriction enzymes are specific (have specifility) to only 1 substrate (gene) so they can only catalyse 1 reaction. They also have a specific active site due to their 3-D structure/shape and the primary structures and bonds such as hydrogen bonds in the tertiary structure.

ResultsPlus
Examiner Comments

Marking points 1 and 5 were awarded. Two marks gained.

This answer starts by repeating the question but then identifies the chemical as a transcription factor and, indeed, towards the end suggests it is a hormone. Both of these are acceptable points for marking point 1.

(ii) Suggest how the addition of a chemical causes the human gene to be switched on in stage 2.

(3)

The chemical added can switch on the gene as it acts as a DNA transcription factor, it is normally a peptide hormone that is used.

ResultsPlus
Examiner Comments

One mark awarded.

Question 6 (b) (iii)

This question required candidates to describe the structure of an organelle in a bacterium involved in protein synthesis. A number of candidates found this challenging.

Whilst the question asked for a description of a ribosome, it did not name the organelle and a number of candidates felt that they should do so, as in this case.

> (iii) Describe the structure of an organelle found in a bacterial cell that is involved in synthesising human protein in stage 3.
>
> (1)
>
> ~~M̶r̶h̶u̶m̶m̶~~ Ribosome

ResultsPlus
Examiner Comments

No mark awarded.

ResultsPlus
Examiner Tip

Always check the question's command word.
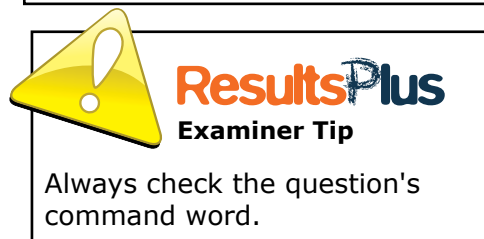
Question 6 (b) (iv)

In this item, candidates were asked to suggest two advantages of injecting the gene product into a vein rather than an artery. Whilst there were many mark-worthy answers, a sizeable minority focussed on the heart, as considered in the example below.

This response illustrates the reason why some candidates focussed on the heart.

> (iv) Suggest **two** advantages of injecting the protein into a vein rather than an artery in stage 4.
>
> (2)
>
> A Vein will take the protein into the heart which th will be pumped into all the arteries including the aorta which Supplies Supplies Most of the body.

ResultsPlus
Examiner Comments

No marks awarded.

Question 7 (a)

This first item of Question (Q) 7 asked candidates to explain the meaning of the term mitosis. This proved difficult for some.

This candidate initially offered a general introduction in the first sentence. The second then referred to the functions of mitosis. Subsequently the candidate gave the stages of mitosis correctly but also, incorrectly, included interphase.

(a) Explain what is meant by the term **mitosis** (paragraph 7).

(2)

Mitosis is Cell division. It is used for growth and repair. the it has 5 stages, Interphase, Prophase, metaphase, Anaphase and telophase

ResultsPlus
Examiner Comments

No marks awarded.

ResultsPlus
Examiner Tip

Make sure that material from other units is known, because Unit 5 contains synoptic elements.

This response also starts with a general statement and then concludes with an example of its function.

(a) Explain what is meant by the term **mitosis** (paragraph 7).

(2)

Cell division to produce identical cells, its a type of asexual reproduction.

ResultsPlus
Examiner Comments

No marks gained.

Question 7 (b)

This question focussed on how the cells of the SAN are involved in controlling heart rate. The majority of candidates were able to achieve at least one mark.

The first part of the first sentence does not convey that impulses are initiated in the SAN so it is myogenic. Subsequently, the sentence gives a partial description of the cardiac cycle but no reference to atrial contraction.

The second sentence appears to repeat the question, whilst the final sentence moves towards marking point 3 but does not refer to the SAN activity being changed by nerve impulses.

> Describe how cells in the sino-atrial node (SAN) are involved in controlling heart rate.
>
> (3)
>
> cells in the SAN allow impulses to be transmitted to the rest of the heart – to the AVN, Bundle of His, Purkyne fibres. The SAN acts as the pacemaker of the heart controlling the heart rate. Cells in SAN also detect electrical impulses from motor neurones.

ResultsPlus Examiner Comments

No marks scored.

Question 7 (c)

Whilst this question required candidates to suggest how Henrietta's cells may have digested lactose, it was not uncommon to see answers dealing with lactate. Few referred to either the gene for lactase being activated or indeed lactase itself.

This response illustrates a need for retaining factual knowledge from AS. The first suitably refers to the breaking of glycosidic bonds but only one of the two sugar products named was correct. Both are required to be correct to gain marking point 4.

(c) Henrietta's cells have 'been used to study lactose digestion' (paragraph 16).

Suggest how her cells may have digested lactose.

(3)

enzymes in the cell cytoplasm would have broken down glycosidic links in the lactose to form simple sugars glucose and sucrose.

ResultsPlus
Examiner Comments

One mark achieved.

Question 7 (d)

Most candidates were able to suggest two reasons why it was preferable to use Henrietta's cells over those from guinea pigs and mice.

The reference to cheaper due to the numbers produced would be an acceptable alternative for marking point 3.

The animal welfare description was sufficient for marking point 2.

(a) Suggest why the mice in group A were given water containing epicatechin at a concentration of 1 mg per kg of their body mass rather than at a concentration of 1 mg per mouse.

(3)

The mice's body masses would all be slightly different, depending on their genetics and environmental factors. Therefore if you gave them 1mg per mouse of epicatechin, you may give one smaller mouse a higher dosage in proportion to their body mass, compared to a mouse of a larger size who would therefore get a slightly lower dosage in comparison to their body mass.

ResultsPlus
Examiner Comments

Both marks gained.

Question 7 (e)

This proved a challenging item for a number of candidates. The context of the question required candidates to offer suggestions as to how poliovirus infection of motor neurones stops nerve transmission and leads to muscle paralysis.

It was not uncommon to see answers discussing sensory neurones or offering generic descriptions of nerve impulse transmission without relating it to the context of the question.

In this response the candidate seems to have confused the sequence of neurones involved in a reflex. However, the reference to motor neurones being destroyed is marking point 1.

The phrase 'effector muscle do not move or perform any functions' is not sufficient for marking point 9.

> Suggest how an infection of motor neurones by the virus can stop the transmission of nerve impulses and lead to muscle paralysis.
>
> (6)
>
> The virus would enter the centeral nervous system by means of the blood stream. The virus would then destroy the motor neurons. The motor neurones are used to transmit impulses from ~~receptor cells, to sensory neurons~~ sensory neurones to the centeral nervous system. As the motor neurones are destroyed the impulses cannot be sent from receptor cells through sensory neurons and motor neurones. This means that when receptor cells detect impulses they will not reach the centeral nervous system. Meaning the centeral nervous system does not send impulses through relay neurones and meaning effector muscles receive no impulses. Meaning that the effector muscles do not move or perform any functions which result in paralysis. The effect of destroying motor neurones is that impulses are never sent to the centeral nervous system so processing of impulses does not occur, ~~and effect~~ impulses in turn are not sent to effector muscles, resulting in no movement e.g paralysis.
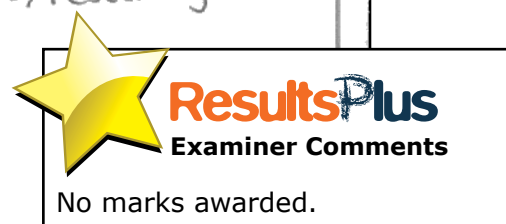
Question 7 (f)

Whilst the question informed candidates that poliovirus is a retrovirus like HIV, many felt that it contained DNA like HeLa cells. The question then asked for similarities in the structure of the genetic material of these two but a number of answers simply named them or considered functions.

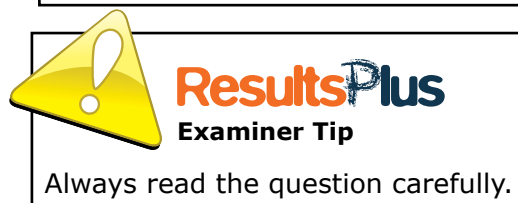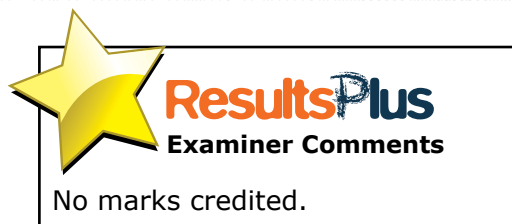This response has some correct factual elements but failed to score any marks.

Initially it tells us of the genetic material present in poliovirus and HeLa cells. It then names four bases but as thymine is referred to, marking point 1 cannot be awarded. Then it gives a brief description of function.

(f) Poliovirus, like Human Immunodeficiency Virus, is a retrovirus. Poliovirus was able to infect HeLa cells (paragraph 25).

Give **three** similarities between the structure of the genetic material in poliovirus and the genetic material in HeLa cells.

(3)

The genetic material in both cells are same made up of nucleic acids. The poliovirus contains RNA and the hela cells contain RNA and DNA. The genetic material in the virus and the Hela cells are made up of adenine, thymine, guanine and cytosine cytosine. The genetic material in both polioviruses and Hela cells code for proteins. The genetic material in both hela cells and polioviruses are

ResultsPlus
Examiner Comments

No marks credited.

ResultsPlus
Examiner Tip

Always read the question carefully.

Question 7 (g)

This monohybrid cross required candidates to work backwards for two generations and proved difficult for some.

The layout of some candidate answers was confusing, especially if no labelling was provided, such as F1 generation.

Generally the layout of this answer was clear. The top right hand corner offers marking point 1. The start can be assumed to be the original parental generation and, whilst different letters are used, it is obvious that both are homozygous, so marking point 2 can be awarded.
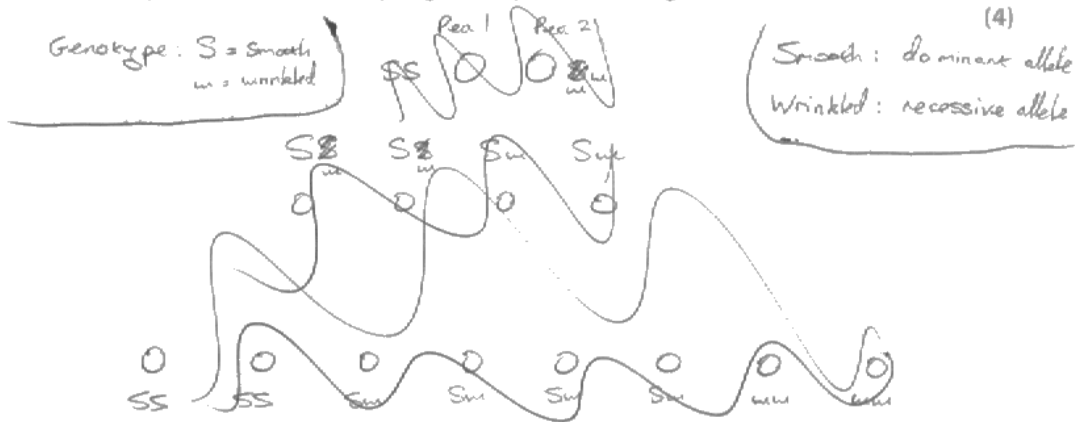
The outcome of this cross is 'all offspring Sw' which effectively describes the F1 as all being heterozygous (marking point 3).

Finally, the genotypes of the F2 generation are shown and how 75% of them are smooth is expressed clearly (marking point 4).

(g) Scientists had studied genes by breeding plants 'then breeding their offspring to see how genetic traits are passed from one generation to the next' (paragraph 33).

When this was done using a smooth pea and a wrinkled pea, it was found that in the F2 generation (second generation of offspring), 75% were smooth.

In the space below, draw genetic diagrams to describe and explain the genotypes of the parents and their offspring in the previous **two** generations.

(4)

Genotype: S = Smooth
w = wrinkled

Pea 1   Pea 2
SS   ww

Smooth: dominant allele
Wrinkled: recessive allele

Sw   Sw   Sw   Sw

SS   SS   Sw   Sw   Sw   Sw   ww   ww

Start: (SS) and (ww)

all offspring: (Sw)

Take 2 Sw

↓
(Sw) (Sw)

SS   Sw   Sw   ww
↑   ↑   ↑   ↑
Smooth   wrinkled

¼ = 25%

∴ 75% Smooth

Question 7 (h)

This item considered the term 'human genome map'. The first marking point, which related to the human genome, was more often awarded than the second marking point, which focussed on the 'map' aspect.
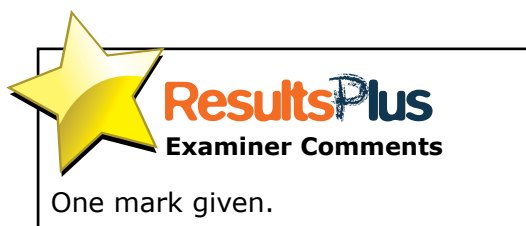
Whilst there were some very clear and accurate answers, quite frequently candidates gained neither mark.

A very short answer but one that covers marking point 1.

(h) Explain what is meant by the term **human genome map** (paragraph 37).

(2)

All the DNA in a human's body

ResultsPlus
Examiner Comments

One mark given.

Question 7 (i)

This question focussed on how the p53 suppressor gene may stop a potential tumour forming. This proved challenging for a number of candidates and the example below identifies one common response that was not credit-worthy. However, all marking points were seen.

This response was typical of many. The reference to 'it' at the start of the answer must be referring to the p53 suppressor gene mentioned in the question, rather than its product. As a consequence, marking point 1 was not awarded.

(i) Suggest how the 'p53 tumor suppressor gene' (paragraph 43) could stop a potential tumour cell forming.

(2)

It could prevent the division of the cells by mitosis to form other cells identical to it. In this way a tumor couldn't form.

(cancerous)

ResultsPlus
Examiner Comments

No marks given for this answer.
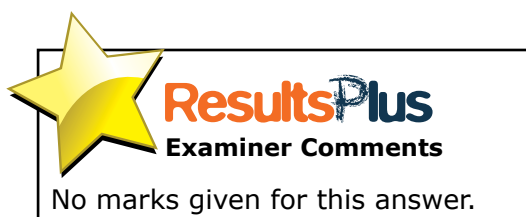
Question 7 (j)

It was generally most encouraging to read candidate responses to this item. Many gave suitable suggestions for what the 'specific gene sequence' coded for that came from a blood cell.

This response is illustrative of the above. It starts by suggesting what specifically is coded for (marking point 2) and then describes its function as a receptor for gp120 (marking point 4).

(j) Using paragraph 46, suggest what the 'specific DNA sequence from a blood cell' coded for.

(2)

~~Blood cells contain~~

> Specific DNA sequence may have been to code for a CD4 receptor - so the gp120 on the surface of HIV could bind with it and release its genetic material. CD4 receptors usually found on T helper cells and macrophages.

ResultsPlus Examiner Comments

Both marks achieved.

Question 7 (k)

Generally, candidates were able to use the information provided to calculate the number of telomere nucleotides lost per cell division.

Paper Summary

This paper elicited a range of marks for all question items, both within the context of Unit 5, as well as through a number of synoptic elements.

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

- If time allows, look to check answers because a number of ambiguous responses were encountered such as in Q2 (a)(ii)

- Make sure that the answer matches the question. For example, it was relatively common to see descriptions of the role of hair erector muscles in Q3 (b)(iii), which was about the muscle present in blood vessels

- When presented with numerical or graphical data, look to manipulate it rather than simply repeat it, as in Q4 (b)(i)

- Make sure of the differences between the terms accurate, reliable and valid because this was not always apparent in Q5 (a)(iv)

- Consider revisiting the material from other units due to the synoptic aspects of this paper. For example, Q7 (a) related to knowledge from Unit 2 and (c) to Unit 1

- When selecting a letter from the alphabet for genetics questions such as Q7 (g), make sure that the difference between an uppercase and lowercase is obvious such as 'A' and 'a' rather than 'S' and 's'

- It should be noted that there were some scripts where the quality of handwriting made it difficult to award marks

Grade Boundaries

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

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