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June 2013

GCE Biology 6BI05 01

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Introduction

This 6BI05/01 paper offered a diverse array of question styles, covering a variety of unit 5 topic areas. The paper allowed candidates to showcase their knowledge and understanding in both familiar and unfamiliar situations, as well as within the context of *How Science Works*. Further, many candidates were able to approach confidently the synoptic elements covered in this paper. Credit should go to both the candidates and their teachers for this.

Question 1 (b)

Most candidates displayed a good understanding of the role of the radial and circular muscles and delivered answers appropriate to the context of decreasing light intensity.

This answer initially offers a comment when the light level is high. It then refers to radial muscles when the light level is reduced but there is no reference to contraction of the radial muscles.

(b) Decreasing the intensity of light entering the eye causes pupil dilation.
Describe the roles of the circular and radial muscles in pupil dilation.

(2)

The ~~ex~~ circular muscles contract pupil making them smaller when there is too much light, the radial muscles make pupil dilate when there is not enough light to get more light into eye.

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Examiner Comments

No marks awarded.

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Examiner Tip

Look to make sure that the answer relates to the context of the question.

Question 2 (a)

This question focused on the use of CT and MRI to study brain structure and quite a large number of candidates suggested appropriate comparisons.

This response illustrates two errors seen quite frequently.

Firstly, the reference to magnets rather than a magnetic field (or radio waves) as a comparison with X-rays.

Secondly, the final sentence discusses function, but the question considers structure.

2 There are various ways of investigating brain structure and function.

(a) Compare the use of computed tomography (CT) with magnetic resonance imaging (MRI) for studying brain structure.

(3)

CT scans use x rays to create cross section images of the brain which when added together can create a picture of the brain, from which abnormalities can be seen. Whereas, MRI uses a magnet which moves around the persons head, with abnormalities such as tumors appearing different from the rest of the brain. Both can be used to create an image of the brain however they are not very effective as showing its function.

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Examiner Comments

No marks are awarded for this answer.

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Examiner Tip

Make sure when comparing, that both are considered. For example, the resolution of the image is higher in MRI than CT, rather than the resolution is high in MRI.

This answer initially offers an incorrect statement but then delivers three different and appropriate comparative points.

2 There are various ways of investigating brain structure and function.

(a) Compare the use of computed tomography (CT) with magnetic resonance imaging (MRI) for studying brain structure.

(3)

In Computed tomography, ~~x-rays~~ radiowaves are used & the signal is attenuated depending on the tissue's density, thus allowing a 3D image to form on the computer. CT scans produce a less clearer images than MRI & thus it's hard to use it to distinguish between the brain parts. CT scans like$ MRI produce a still image & so cannot be used to monitor brain function in response to different stimuli. MRIs are noisy and require the patient to be still throughout entire procedure, whilst CT scans aren't noisy. MRIs use radio-waves and magnetic fields.

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Examiner Comments

The second sentence achieves marking point 1.

The next sentence correctly considers marking point 7.

The penultimate sentence gives one limitation of MRI.

Full marks are awarded.

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Examiner Tip

This example illustrates that *compare* can consider both similarities and differences.

Question 2 (b)

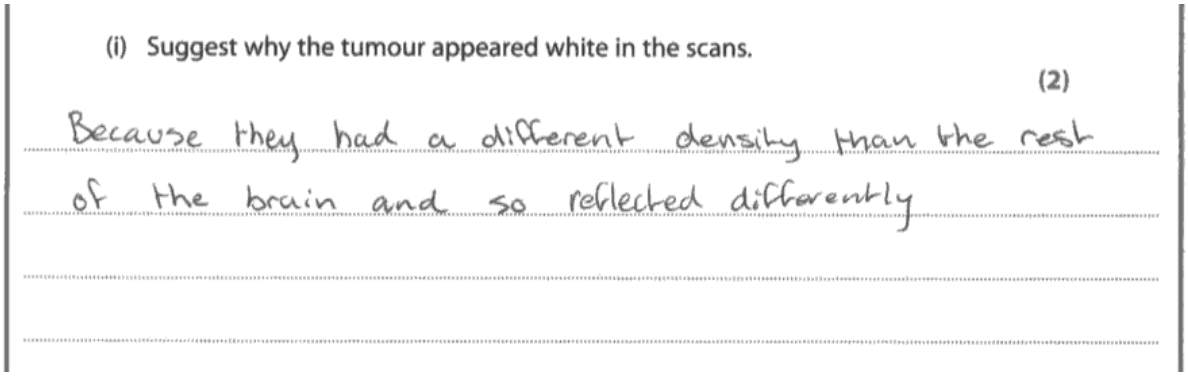
This question item required candidates to suggest why MRI was better than CT for studying brain function.

The most common marking point achieved was marking point 1, and was usually offered in the context of more oxygen uptake or more blood flowing to the active area.

Question 2 (c) (i)

In this question candidates had to suggest why the tumour present in the MRI scan appeared white.

This candidate achieved 1 mark.



(i) Suggest why the tumour appeared white in the scans.

(2)

Because they had a different density than the rest of the brain and so reflected differently

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Examiner Comments

The stem of the question refers to the tumour, so the reference to different density from the rest of the brain can be awarded: marking point 1.
However, the *reflected differently* comment is too general for marking point 2.

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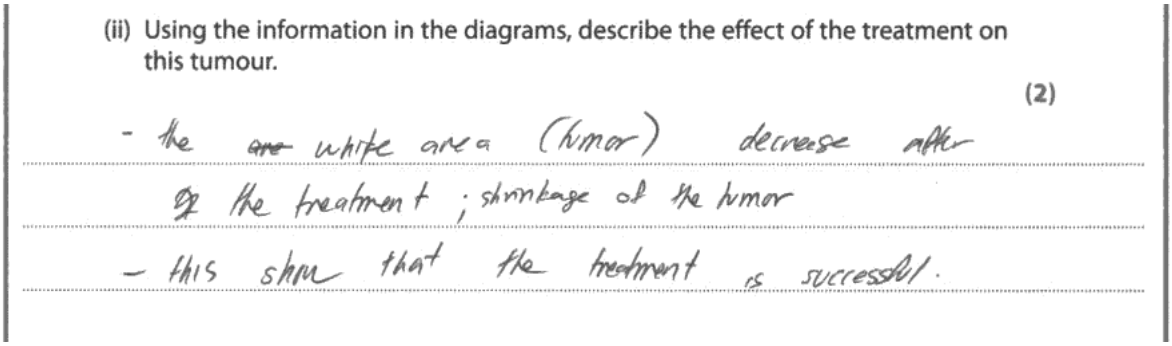
Examiner Tip

Always look to offer sufficient detail in answers.

Question 2 (c) (ii)

Most candidates made some use of the two scans shown, as requested, to comment on the effect of a treatment on the brain tumour.

This example was typical of many candidate responses and achieved one mark.



(ii) Using the information in the diagrams, describe the effect of the treatment on this tumour.

(2)

- the ~~one~~ white area (tumor) decrease after of the treatment ; shrinkage of the tumor
- this show that the treatment is successful.

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Examiner Comments

The reference to tumour shrinkage can be awarded marking point 2.

More detail is required, such as the degree of shrinkage, for marking point 3.

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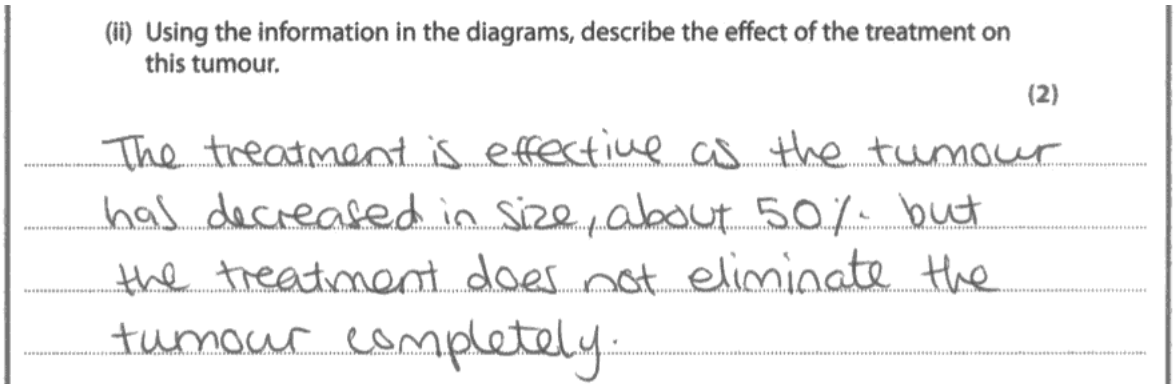
Examiner Tip

Look to match the number of points written with the number of marks allocated to the question.

This is a thorough answer that considers all three marking points.



(ii) Using the information in the diagrams, describe the effect of the treatment on this tumour.

(2)

The treatment is effective as the tumour has decreased in size, about 50%. but the treatment does not eliminate the tumour completely.

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Examiner Comments

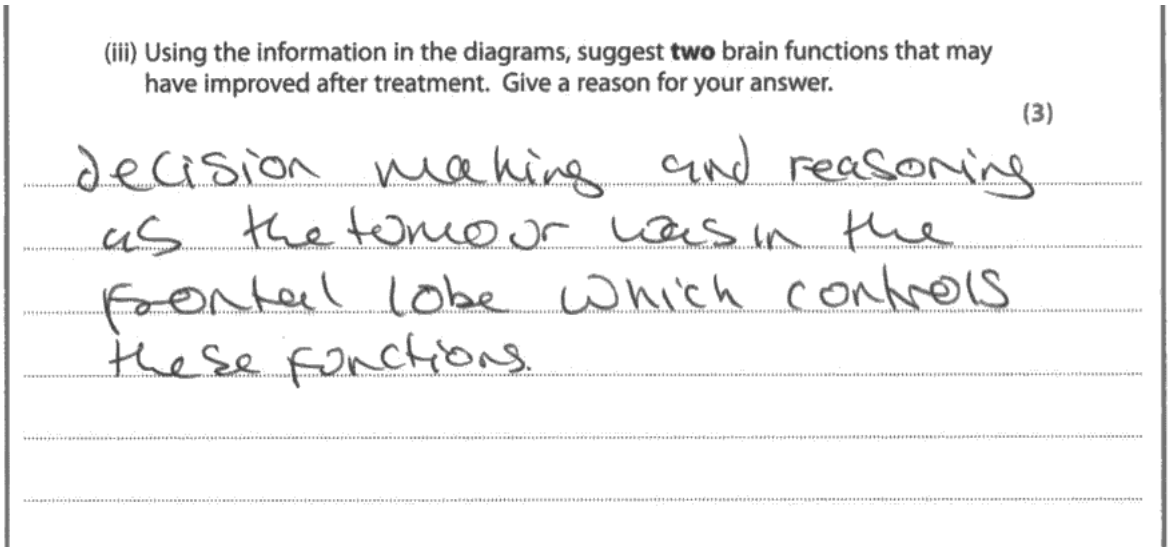
The second line of this response gains both marking points 2 and 3.

The qualification of *the treatment is effective* by *but the treatment does not eliminate the tumour completely* could have been awarded marking point 1, had the maximum not already been achieved.

Question 2 (c) (iii)

Candidates were required to offer two functions that may have improved due to the reduction in tumour size and to justify their choice. Most approached this item effectively.

This response was typical of many and gained all three marks.



(iii) Using the information in the diagrams, suggest **two** brain functions that may have improved after treatment. Give a reason for your answer.

(3)

decision making and reasoning as the tumour was in the frontal lobe which controls these functions.

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Examiner Comments

Decision-making, showing emotions, problem solving and reasoning were, perhaps, the examples quoted most often.

This candidate offered two of these, along with identifying the region of the brain where the tumour was located, hence all three marks were gained.

Question 3 (a)

This item elicited the full range of marks from candidates.

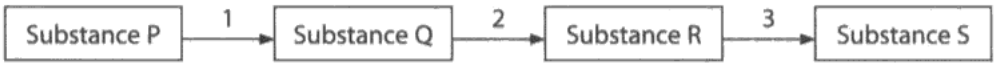
Candidates could have approached this four-mark question either by using the diagram provided or by considering elements of respiration, such as glycolysis or the Kreb's cycle. Whichever approach was taken, the question required the candidates to describe and explain the functions of the associated enzymes.

This example illustrates a general approach to the importance of enzymes in metabolic processes.

3 Respiration is a metabolic process which consists of many steps.

(a) The diagram below shows a metabolic process consisting of three steps.

Each letter represents a different substance and each number a different enzyme.



Describe and explain the functions of enzymes in this metabolic process.

(4)

Enzymes speed up reactions. Enzymes ^(active site's) bond with ~~to~~ substrates to form enzyme-substrate complexes. This can lower the activation energy of a reaction and thus allow more collisions to occur therefore increasing the rate. The rate is fastest when the temperature matches the enzyme's optimum temperature.

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Examiner Comments

The first sentence correctly refers to the catalytic properties of enzymes, which is marking point 5.

The second sentence does not offer sufficient detail to award the specificity marking point (marking point 3).

The third sentence comment can be awarded marking point 6.

2 marks

Question 3 (b) (i)

Candidates were required to use the diagram to identify substance W and to explain its formation. The full mark range, from zero to three, was seen.

A typical answer worth 2 marks.

(i) Using the information in the diagram, name substance **W** and explain how it is formed.

(3)

• NAD is substance W, coenzyme.

• NAD is oxidised, by loss of hydrogens.

reduced

• NAD releases hydrogens which then split into protons H+ and electrons e-

part of oxidative phosphorylation in mitochondria.

~~substrate level phosphorylation is how the ATP is formed by~~

reduced NAD formed as it accepts hydrogen in glycolysis, link reaction or Krebs cycle and NAD is formed when these hydrogens are passed onto oxidative phosphorylation.

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Examiner Comments

This candidate scored marking point 1 and then marking point 2.

This is a good answer that elicited the maximum of three marks.

(i) Using the information in the diagram, name substance **W** and explain how it is formed.

(3)

Reduced NAD is oxidised and becomes NAD. It loses a Hydrogen. The hydrogen atom then splits into an electron & a proton (H^+). The é enters the electron transport chain. The H^+ is actively pumped across the membrane using energy from the é. To build an

electrochemical gradient in the ~~ant~~ inter mitochondrial space.

Substance W = NAD.

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Examiner Comments

The reference to reduced NAD being oxidized by releasing hydrogen was marking point 2.

The candidate then describes the splitting into protons and electrons and their destination. As electrons were considered first, marking point 3 was given.

Marking point 4 cannot be awarded as only a maximum of two was allowed for the explanation. The final statement of W being NAD enabled all three marks to be given.

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Examiner Tip

Be careful of ambiguity as a number of responses to this question did not make the destination of the electrons/protons clear.

Question 3 (b) (ii)

Candidates generally displayed an encouraging appreciation of the link between the formation of ATP and the electrochemical gradient in the inter-mitochondrial space.

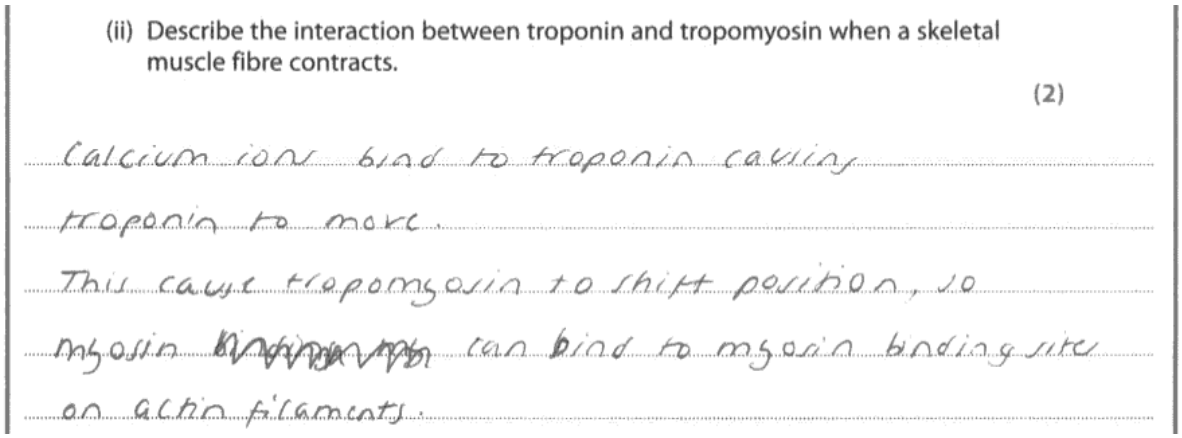
Question 4 (a) (i)

Most candidates were able to identify the protein correctly in each of the two filaments.

Question 4 (a) (ii)

Generally, candidates had a most encouraging understanding of the interaction between troponin and tropomyosin.

This response displays a clear and detailed understanding of the interaction.



(ii) Describe the interaction between troponin and tropomyosin when a skeletal muscle fibre contracts.

(2)

Calcium ions bind to troponin causing troponin to move. This cause tropomyosin to shift position, so myosin binding sites can bind to myosin binding site on actin filaments.

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Examiner Comments

The first sentence achieves both marks (marking points 1 and 2). However, shifting of tropomyosin would have been worthy of marking point 3.

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Examiner Tip

A common error was to refer to myoson rather than tropomyosin. Make sure the various proteins are known.

Question 4 (a) (iii)

A wide variety of suggestions was offered for this item, including a host of hormones.

This was the correct answer seen most commonly by examiners.

(iii) In the chart, some of the other proteins are neurotransmitter receptors. These are found on the cell surface membrane of cardiac muscle cells in the sinoatrial node (SAN).

Suggest **one** neurotransmitter substance that might bind to these receptors.

(1)

Acetylcholine

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Examiner Comments

1 mark

Question 4 (b)

Whilst most candidates dealt with the prediction soundly, a number found it hard to offer creditworthy associated comments.

This is a sound example, which makes appropriate references to reliability and links it with the prediction and range of data.

(b) Troponin T is found in cardiac muscle cells. It can leak into the blood if the heart is damaged as a result of cardiovascular disease.

Testing for troponin T in blood can be used to study patients with damaged hearts.

The table below shows the concentration of troponin T in the blood of patients. The table also shows the mean number of days in hospital and the range of stay.

Concentration of troponin T in the blood / arbitrary units	Mean number of days of stay in hospital and the range
6.0 +	9 ± 2.0
4.0 – 5.9	6 ± 1.0
1.0 – 3.9	3 ± 0.5

Using the information in the table suggest what prediction a doctor could make and comment on the reliability of this prediction for patients with damaged hearts.

(3)

The doctor could predict that the more troponin T a patient had in the blood, the longer they would have to stay in the hospital. The reliability of their prediction would decrease with more troponin T as the range increases. ~~The reliability of this prediction also cannot be~~ This prediction is not very reliable as there is no mention of how large or representative the sample size was, or if other possible variables were controlled to show a causal relationship as it may just be a correlation.

(Total for Question 4 = 8 marks)

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Examiner Comments

The first sentence delivers the prediction and gains marking point 1.

The second sentence achieves two marking points: marking point 2 and then 3.

There were no further marking points considered in the remainder of the answer.

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Examiner Tip

The final sentence offers some suggestions but the question asks candidates to use the information in the table.

Always make sure that the instructions given are followed.

Question 5 (a)

Most candidates were able to identify the two structures labelled on a sensory neurone. A few failed to take note of the bracket for structure A.

Question 5 (b) (i)

This was a relatively straightforward 'describe' question, set in the context of a graph. Most candidates found that they were able to achieve both marks, either via the marking point 1 and 2 combination, or marking point 1 and 3 combination.

This answer gained both marks and gave one of the most common correct manipulations of the data.

(i) Describe the relationship between the concentration of eugenol and the percentage inhibition of sodium ion movement.

(2)

There is a positive correlation between them because as concentration of eugenol increases so does the percentage inhibition of Na ion movements. At 0·1 mmol dm^{-3}, there is 25% of inhibition and at 1·0 mmol dm^{-3}, there is 80%, 55% inhibition of Na ion movement more.

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Examiner Comments

The first sentence gives a clear description of the overall trend for marking point 1.

The second sentence starts by repeating the data already presented in the table but then a correct data manipulation is carried out for marking point 3.

ResultsPlus
Examiner Tip

Make sure that data are not simply repeated.

Question 5 (b) (ii)

This 'Quality of Written Communication' (QWC) item required candidates to consider what happens at a synapse in the presence of the drug called Eugenol. Marks were seen across the full range.

Question 6 (a) (i)

Most candidates achieved this mark, with answers ranging from no agar blocks present to replacing the artificial IAA and natural IAA with water. A minority of candidates described variables that they felt should be controlled.

Question 6 (a) (ii)

This question considered what the student recorded and an explanation of how the IAA affected the shoot growth. The full mark range was seen in this six mark item.

A number of candidates referred to artificial auxin and natural auxin rather than IAA. This was considered an acceptable alternative.

This response offered good detail initially but then became a little too general.

2 marks

(ii) After 48 hours, the student recorded her observations of the growth of the shoots.
From her observations, she concluded that both natural and artificial IAA affected growth. She also concluded that the artificial IAA had a greater effect than the natural IAA.

Suggest what she recorded and explain how the IAA in the agar affected the growth of the shoot.

(5)

She probably recorded the length increase of the left side as and the length increase in the right side.
IAA is a type of ~~auxin~~ auxin. It promotes cell elongation. When cells elongate they their length increases.
It does this by breaking certain bonds in the cellulose cell wall which allow the cell to grow.
The shoot grew towards the light.
Cells grow vertically up towards light.

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Examiner Comments

The first sentence was a good answer for marking point 1.

The third sentence refers to cell elongation, which is marking point 4.

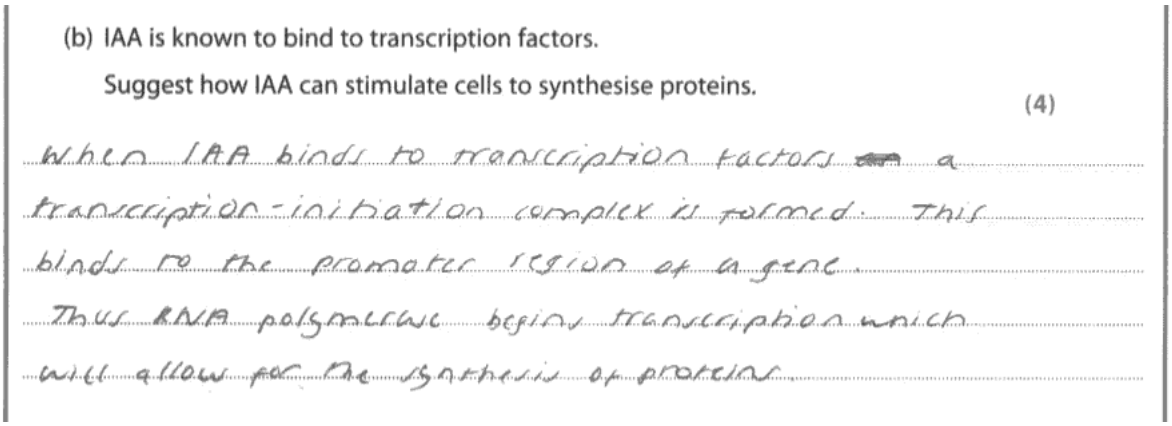
However, insufficient detail was then supplied in the next sentence. For example, what are the bonds that were broken?

The penultimate sentence reaffirmed the initial sentence.

Question 6 (b)

Whilst the full mark range was also seen in this four-mark item, a pleasing number of candidates displayed a good grasp of the transcription factors.

This is a typical answer, worthy of two marks.



(b) IAA is known to bind to transcription factors.

Suggest how IAA can stimulate cells to synthesise proteins. (4)

When IAA binds to transcription factors a transcription-initiation complex is formed. This binds to the promoter region of a gene. Thus RNA polymerase begins transcription which will allow for the synthesis of proteins

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Initially, the candidate refers to the formation of a transcription initiation complex, which is marking point 3. The subsequent sentence would have been a creditworthy alternative for marking point 3.

The reference to RNA polymerase activity in the next sentence achieves marking point 6.

However, the *synthesis of protein* statement is a repeat of the stem of the question and does not achieve marking point 7.

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Examiner Tip

Make sure that the answer does not just repeat the information already provided.

Question 7 (a)

This question required candidates to offer two structural differences between starch and cellulose. Whilst the majority gave at least one difference, a number of candidates felt that starch was a beta glucose polymer and cellulose an alpha glucose polysaccharide.

An encouraging and detailed answer, which achieves the maximum of 2 marks.

(a) The sweet potato eaten by naked mole rats (paragraph 3) is very rich in cellulose and starch.

Give **two** structural differences between cellulose and starch.

(2)

cellulose is made up of beta glucose whilst starch is made up of alpha glucose. Starch is made up of 2 polysaccharides (amylose and amylopectin), cellulose is only made of one. Cellulose does not have branches, starch does. Cellulose is made of microfibrils joined by hydrogen bonds. ~~Sat~~ Starch does not have microfibrils.

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Examiner Comments

The first sentence nicely describes one difference. This achieves marking point 1.

The second sentence is awarded marking point 3, whilst the next sentence offers marking point 2.
Maximum 2 marks

This response scored no marks but illustrates two important elements.

(a) The sweet potato eaten by naked mole rats (paragraph 3) is very rich in cellulose and starch.

Give **two** structural differences between cellulose and starch.

(2)

- Starch made up of amylose and amylopectin.
- cellulose beta β-glucose
- Starch has 1-4 and 1-6 ~~bon~~ hydrogen bond
- cellulose only 1-4 hydrogen bond ~~starch~~

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Examiner Comments

Neither of the first two points is a difference: they are factual statements.

The latter two statements offer a difference, although the reference to hydrogen bonds, rather than glycosidic bonds, is incorrect.

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Examiner Tip

It is important to have a thorough appreciation of the whole specification for unit 5.

A succinct answer that gains both marks.

(a) The sweet potato eaten by naked mole rats (paragraph 3) is very rich in cellulose and starch.

Give **two** structural differences between cellulose and starch.

(2)

starch is made of alpha glucose units but cellulose is made from beta glucose units.

starch can also be branched but cellulose cannot be branched.

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Examiner Comments

Marking points 1 and then 2 are achieved.

Question 7 (b) (i)

This question considered the role of the human nervous system in re-establishing a raised body temperature back to its normal level.

Whilst the full mark range was seen, two out of four marks was the most common result.

A clear and logical response that gains all four marks.

(b) Naked mole rats show evidence of poikilothermy (paragraph 5) whilst other mammals, such as humans, maintain a nearly constant body temperature.

(i) Describe the role of the human nervous system in returning a slightly raised body temperature to its normal level.

(4)

Receptors in ^The thermoregulatory centre in the hypothalamus in the brain detects changes in body temperature or recieves information from receptors else where in body about raised body temperature. Hypothalamus sends nerve impulses via a motor neurone to effectors (muscle e.g. sweat glands) to produce a response (e.g. sweating) - which

leads to energy / heat loss through evaporation from skin). Rise in temp avoided through negative feedback and temperature returns to set point / norm value.

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Examiner Comments

The first sentence gained marking point 1 but not marking point 2 as there is no reference to blood temperature.

The next sentence gains marking point 5, then 6 and finally 7.

This response was typical of many.

(b) Naked mole rats show evidence of poikilothermy (paragraph 5) whilst other mammals, such as humans, maintain a nearly constant body temperature.

(i) Describe the role of the human nervous system in returning a slightly raised body temperature to its normal level.

(4)

When the temperature rises above the norm, the body's thermoreceptors detect the change and the body brings about a negative feedback. Arterioles dilate to allow more blood to the capillaries which then the heat is radiated. Other fuctions like rapid muscle contractions and reaction in the liver are inhibited to reduce the amount of heat being produced.

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Examiner Comments

A general description is offered that does not focus on the nervous system. However, it does gain marking point 7 for the detail of heat loss.

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Examiner Tip

Always consider the focus of the question carefully.

Question 7 (b) (ii)

This item required candidates to explain how one process returns a slightly reduced human body temperature back to its normal level.

Most candidates recognised the link between respiration or cleaving ATP and the release of heat energy, although a sizeable minority made reference to energy being produced.

This is a sound answer that achieves both marks available.

(ii) Explain how shivering generates heat to return a slightly reduced body temperature to its normal level.

(2)

shivering is due to muscle contraction respiration initiates muscle contraction. This releases (heat) energy which increases body temperature so that temperature can return to its normal level.

ResultsPlus
Examiner Comments

Marking point 1 is seen in the first sentence and then marking point 3 in the third sentence.

Question 7 (c)

Candidates had to apply their knowledge to suggest how two researchers introduced cancer-causing genes into eukaryotic cells from the naked mole rat.

Whilst an encouraging number of candidates stated *a vector carrying the gene*, it was less common to encounter the other marking points.

Question 7 (d)

This proved a challenging five-mark item for a number of candidates, although the full mark range was seen.

This response does not reflect the focus of the question, but was quite commonly encountered.

*(d) If we had to breathe the 'rank air' found in the tunnels of naked mole rats, it would leave us 'gasping for air' (paragraph 33).

Describe how the mechanism involved in the control of breathing rate in humans would respond to this 'rank air'.

(5)

Breathing is controlled by medulla in the brain. Breathing in 'rank air' would send impulse to brain by sympathetic nerve which returns to the SAN by parasympathetic nerve. Breathing in this air which lacks oxygen would increase heart rate by SAN. Increased heart rate increasing blood pressure and provides body with oxygen. More ATP energy would be used. increase Metabolic reactions

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Examiner Comments

No marks awarded.

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Examiner Tip

It is important to tailor the response to the question being asked.

A sound description that gained four, out of the possible five, marking points.

*(d) If we had to breathe the 'rank air' found in the tunnels of naked mole rats, it would leave us 'gasping for air' (paragraph 33).

Describe how the mechanism involved in the control of breathing rate in humans would respond to this 'rank air'.

(5)

This air contains 5% CO_2 which is much higher than the concentration in normal air. This would cause a decrease in blood pH when breathed in, and this would be detected by chemoreceptors. Impulses would then be sent via sensory neurones to the Ventilation centre in the medulla in the brain. It would send a response via the Sympathetic nerve to effectors to increase the breathing rate in response to this air, as ~~more on the pH caused~~ this would mean more Oxygen was needed in the muscle cells as the air has a lower than normal concentration. The lungs would then increase the frequency of inhalation and exhalation and breathing rate would increase.

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Examiner Comments

The first sentence is a good example of marking point 1.

The second sentence then describes the consequence on blood pH, which is marking point 2.

The reference to chemoreceptors does not warrant marking point 3, because no site is given.

The next sentence mentions the ventilation centre and its location for marking point 4 and also the effect on the breathing rate for the final marking point.

4 marks

A thorough, logical and detailed answer that gained full marks.

*(d) If we had to breathe the 'rank air' found in the tunnels of naked mole rats, it would leave us 'gasping for air' (paragraph 33).

Describe how the mechanism involved in the control of breathing rate in humans would respond to this 'rank air'.

(5)

The air has a high concentration of CO_2. This CO_2 would mean pH would fall. This fall in pH would be detected by chemoreceptors found in the aortic bodies, carotid bodies and medulla. Chemoreceptors would

send ~~imp~~ nerve impulses along sensory neurons to the ventilation centres in the medulla. The ventilation centres would then send more nerve impulses along motor neurones to the intercoastal muscles and diaphragm, causing them to contract. These impulses would be sent more frequently. As the intercoastal and diaphragm muscles contract more, breathing rate is increased.

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Examiner Comments

This response offered marking points 2, 3, 4, 5, 6 and 7, so gained the maximum score of five.

Question 7 (e)

This item required candidates to suggest why the study of naked mole rat incisors could be of use in prosthetic limb design.

This is a fairly typical response that scores 1 mark.

(e) Suggest how a study of the naked mole rat could help in the design of prosthetic limbs (paragraph 47).

(2)

Design prosthetic limbs by using idea that incisors grow right through the skin of the lips. New design by attaching prosthetics directly to the bone of the limb. Using naked mole develops a new coating or structure that allows a permanent seal where the skin and metal meets.

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Examiner Comments

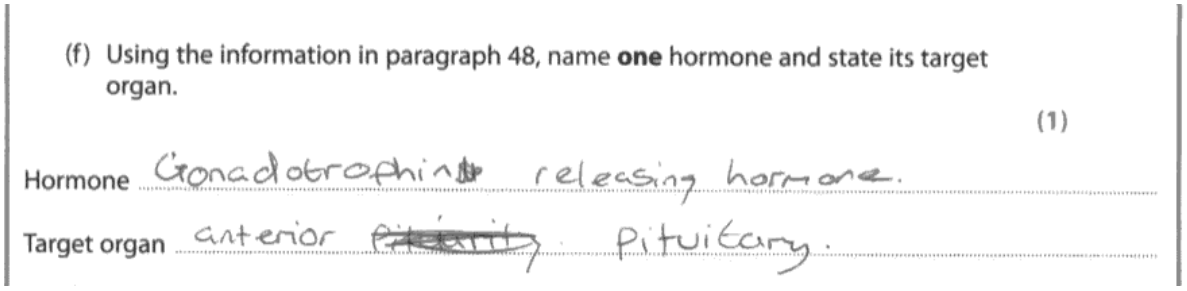
This candidate offered sufficient detail to be awarded marking point 2.

There was no reference to a lack of harm or infection due to the incisors growing through the lips for marking point 1. Likewise, there was no comment about reduced damage to soft tissue due to the prosthetic for marking point 3.

Question 7 (f)

Candidates were required to extract the name of a hormone and its target organ, from the text of the article. The majority of candidates were successful in doing this.

This answer correctly links a hormone given in paragraph 48 of the naked mole rat article with its target organ.


(f) Using the information in paragraph 48, name **one** hormone and state its target organ.

(1)

Hormone Gonadotrophin releasing hormone.

Target organ anterior ~~pituitary~~ pituitary.

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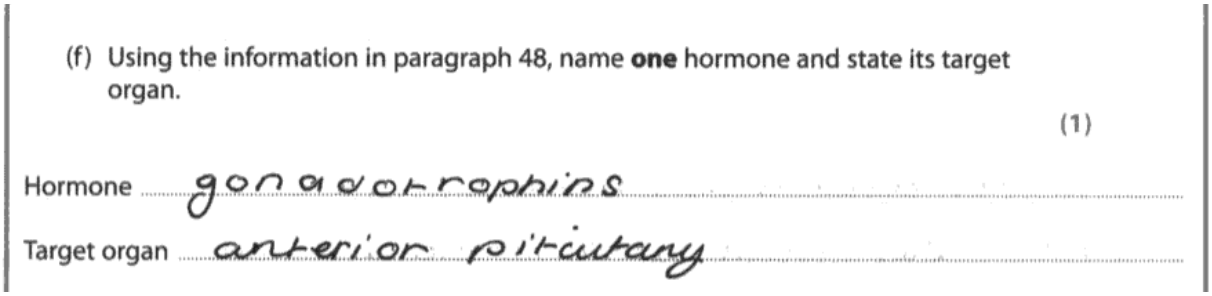
Examiner Comments

1 mark

This was perhaps the most common incorrect link.


(f) Using the information in paragraph 48, name **one** hormone and state its target organ.

(1)

Hormone gonadotrophins

Target organ anterior pituitary

ResultsPlus
Examiner Comments

No mark achieved.

Question 7 (g)

Whilst this item required candidates to suggest two structural reasons why a sperm may be non-motile, a number ignored the reference to 'structural'.

Like many others, this candidate gives a description of the situation when a sperm is motile.

However, they then give a reason for it being *non*-motile.

(g) Suggest **two** reasons why the structure of the sperm may make it non-motile (paragraph 48).

(2)

Sperm ~~has~~ has a tail, called a flagella which allows the sperm to swim from the testes to the egg in the ovaries during ~~a~~ mammalian fertilisation. If a sperm didn't have a tail, it would be non-motile as it couldn't move.

ResultsPlus
Examiner Comments

Marking point 1 awarded.

ResultsPlus
Examiner Tip

Make sure that the answer offered focuses on the question being asked.

This short answer delivered two correct statements and was awarded both marks.

(g) Suggest **two** reasons why the structure of the sperm may make it non-motile (paragraph 48).

(2)

– less mitochondria ∴ less energy for the sperm to swim

– absent of the tail ∴ the sperm non-motile.

ResultsPlus
Examiner Comments

Marking points 2 and then 1 were gained.

Question 7 (h)

This question required candidates to suggest reasons for a coefficient of band sharing within a single naked mole rat colony of between 0.93 and 0.99.

The first two marking points relate to why the coefficient was so high, whilst the remainder relate to why it was not 1.00.

This answer is likely to gain 1 mark.

(h) The 'coefficient of band sharing' (paragraph 49) is a measure of the number of bands that different DNA samples have in common. The higher the coefficient the more bands the samples share. The maximum coefficient is 1.00.

Suggest why the coefficient of band sharing ranges from 0.93 to 0.99 within a colony of naked mole rats.

(3)

- 0.93 to 0.99 ; close to 1.00 the maximum coefficient
- this suggest that the naked mole rats sharing almost identical ~~similar~~ bands.
- ~~this is because individuals from colony come fro~~
- due to the interbreeding in the colony
- ~~one fertile~~
- one fertile queen with few fertile (breeding) males. ∴ same maternal gene for the naked mole rats.

ResultsPlus
Examiner Comments

This response starts with repeating information presented in the question.

The final point offered discusses a single breeding female. This was considered as an acceptable alternative for marking point 1.

ResultsPlus
Examiner Tip

Be careful to use technical words appropriately: 'interbreeding' is not the same as 'inbreeding'.

This answer was typical of many. It focuses on the reasons for a high coefficient.

(h) The 'coefficient of band sharing' (paragraph 49) is a measure of the number of bands that different DNA samples have in common. The higher the coefficient the more bands the samples share. The maximum coefficient is 1.00. to get to the egg cell

Suggest why the coefficient of band sharing ranges from 0.93 to 0.99 within a colony of naked mole rats.

(3)

It ranges from 0.93 to 0.99 because most naked mole rates are likely to inbreed & rather than outbreed which means that the genetic diversity within the colony is low. This means that most of the naked mole rats within the colony are genetically similar ~~which means it~~

ResultsPlus
Examiner Comments

Marking points 1 and 2 were supplied in the first sentence.

2 marks

Question 7 (i)

Candidates were expected to suggest the importance of disperser mole rats.

This is a nice answer that gained both marks available.

(i) Suggest the importance of dispersers in naked mole rat colonies (paragraphs 50, 51 & 52).

(2)

Dispersers only solicit matings with non-colony members & so thus promote outbreeding, introducing new alleles into their already-limited gene pool. This dying from new promotes variation & reduces chances of diseases, (chronic) and other problems associated with inbreeding.

ResultsPlus
Examiner Comments

The first half of the first sentence gains marking point 2.

The second half offered a good and acceptable alternative for marking point 3.

ResultsPlus
Examiner Tip

Marking point 3 is awarded because the candidate uses the term 'alleles' rather than 'genes' appropriately, in their answer. Make sure the difference between the two is thoroughly understood.

Question 7(j)

Most candidates were able both to describe and explain at least one adaptation of naked mole rats to their environment.

This answer gained 3 marks.

(j) Describe and explain **two** ways in which naked mole rats are adapted to their environment.

(4)

One way they're adapted to their enviroment is a lack of receptor regarding chemical pain. This enables them to stay fine at higher levels of carbon dioxide in the atmosphere. This means that there can be more of them living in a burrow at any given time, as high CO_2 levels in the blood don't bother them.

They are also are adapted to the low light levels.

ResultsPlus
Examiner Comments

The first sentence offers an acceptable alternative for marking point 1.

Marking point 2 was subsequently achieved.

The final sentence offers marking point 16.

Paper Summary

This paper allowed candidates to demonstrate their biological knowledge within the framework of unit 5, as well as through a number of synoptic elements.

Whilst the number of ambiguous answers seen was few, candidates should try to check their answers, if they have time at the end.

In some cases, the quality of handwriting made it difficult to award marks and candidates should take note of this.

Some other points to be considered by candidates:

- Look to manipulate numerical data, rather than simply repeat it
- Answer the question that is being asked such as not giving functional differences when the question asked for structural ones
- Use technical terms, such as 'inbreeding' rather than 'interbreeding', correctly
- Always look at the mark allocation for the question item

Grade Boundaries

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

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

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