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Examiners' Report
January 2010

GCE Biology 6BI02

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January 2010

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6BI02 Enhance Examiners' Report January 2010

Maximum mark	80
Mean mark	46.3
Standard deviation	10.5

General comments

It was most gratifying to see many candidates displaying good knowledge and understanding of the unit 2 material tested in this examination. In particular, responses to the core practical questions were tackled confidently and with an increasing appreciation of How Science Works. Both candidates and their teachers should be congratulated on this.

In some cases, candidates delivered detailed and comprehensive answers but their responses did not match the command word of the question. It is imperative that candidates consider carefully the instructions given in a question so that they can tailor their answers accordingly.

Question 1

Most candidates displayed a good grasp of the various cell aspects tested. A minority of responses to part (b) gave a description of the structures rather than just naming them as requested. There was some confusion between cisterna and crista, membrane and cell surface membrane when identifying part Y.

Question 2

Whilst many candidates recognised and described the differences between identical and non-identical twins, the differences between genotype and phenotype were perhaps less well understood in (a). On several occasions, candidates only dealt with one aspect, as illustrated in the answer below.

Explain how the data in the table show the effects that genotype and the environment have on the phenotypes. (3)

The phenotype

The data in the table shows that ~~genotype~~ for identical twins ~~is~~ ~~personality~~ does not have exactly the same (Mean) height + mass. This is because these genotypes are continuous and polygenic. Meaning that they can be influenced by environmental factors. Such as a height, ~~the~~ if a person is under ~~malnourished~~ nourished then they will not reach their potential height. For mass, this can depend on how much a person's eats and how much they exercise.

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Examiner Comments

In this example, the candidate has correctly linked the mass and height differences of the identical twin to the environment for mp3. This was the only mark achieved.

It was most encouraging to see that many candidates had a very clear and detailed appreciation of phase 1 and phase 2 drug testing, though a minority felt that double-blind trials were a feature of phase 2. However, the need for testing on animals was undertaken less confidently with many suggesting that humans and rats were similar because they had the same DNA.

(i) Suggest why a drug can be tested on rats before testing on humans.

(2)

- Rats have a similar genetic code to humans
- Less ethical issues for rats than humans

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Examiner Comments

This answer achieved one mark as it makes a relevant reference to ethics (for mp5).

Question 3

Many candidates confidently took the novel approach to this question comfortably in their stride. Xylem was correctly named by most as the tissue in photograph A. Part (a)(ii) elicited the full mark range and enabled some candidates to showcase a thorough knowledge of the relationship between the structure and function of xylem.

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Examiner Tip

A breakdown of the question shows that candidates needed to offer a description and an explanation for two different functions to gain 4 marks.

*(ii) Describe and explain how this tissue is adapted for the transport of water and support in a plant.

(4)

An xylem vessel is a long tube that has lost its top & bottom cell walls after lignin has been added and also lost in cell organelles. It has pits in the side of it to allow water molecules to move across different vessels. It is made of a strong sugar called cellulose which helps it to keep a strong structure to support the plant. microfibrils are strands within the vessel that also keep in strong. It pulls water up the vessel via ~~a process~~ of its transpiration stream.

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Examiner Comments

This is a good answer but only achieved three marks. Whilst a reference is made to the loss of end walls there is no related explanation. However, the second sentence delivers a water transport description (pits) and a clear explanation (water moves across different vessels). The reference to lignin is the only valid support comment since the details given relating to cellulose do not imply additional cellulose.

Part (b) gave a pleasing number of candidates the opportunity to write detailed and clear descriptions. The most common misconception was that cells were activated and transcribed.

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Examiner Comments

As this is a question with a logical sequence to the answer, the majority of candidates that scored full marks gave their answer in a sequential manner beginning with genes being activated or deactivated.

Many candidates clearly relished part (c) and wrote very coherent and full responses. In most cases, they were able to modify their experience of the core practical to this situation. A few viewed it incorrectly as a root tip squash.

The response below was typical of a number of candidates and suggests some ambiguity between totipotent and pluripotent.

*(ii) Describe and explain how this tissue is adapted for the transport of water and support in a plant.

(4)

Xylem is long cylinders it has open ends which enables it to carry and deliver water and minerals to the plant.

It also has lignin present in its cell walls therefore providing strong support thraugh out the stem and plant.

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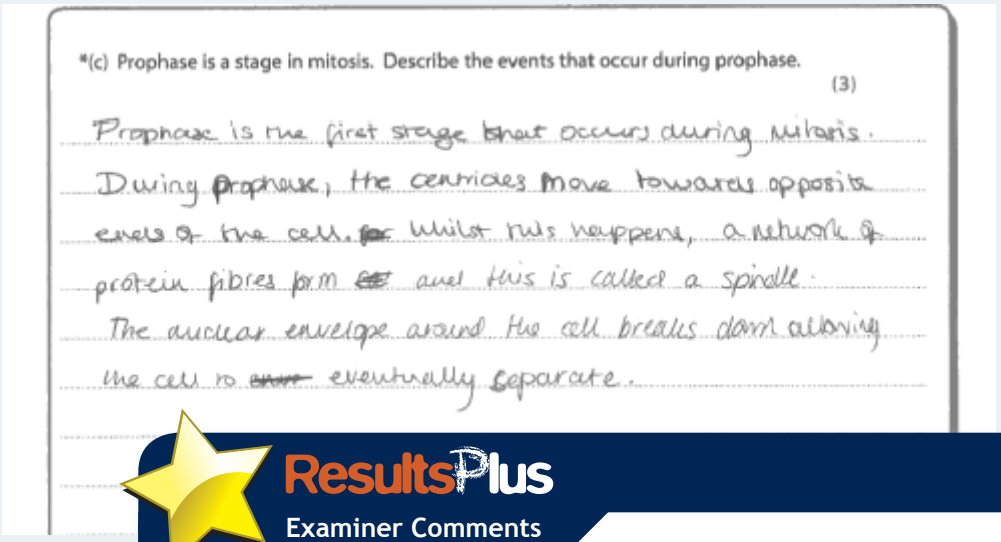
Examiner Comments

One mark was awarded for this answer. Mp1 was gained in the first sentence but mp5 was not achieved in the third sentence as the context was incorrect.

Question 4

This question proved challenging for some candidates and a wide array of scores was seen. Whilst part (a) was done well by the majority of candidates, only a minority achieved both marks for (b)(i). In the latter, this was often due to candidates describing the DNA content doubling rather than giving an explanation of why it does double. Many candidates found the duration of mitosis calculation challenging.

Part (c) was particularly well done. Congratulations to both candidates and their teachers as few confused prophase with any other phase. A few incorrectly referred to DNA coiling and becoming visible.



*(c) Prophase is a stage in mitosis. Describe the events that occur during prophase.

(3)

Prophase is the first stage that occurs during Mitosis. During prophase, the centrioles move towards opposite ends of the cell. Whilst this happens, a network of protein fibres form and this is called a spindle. The nuclear envelope around the cell breaks down allowing the cell to eventually separate.

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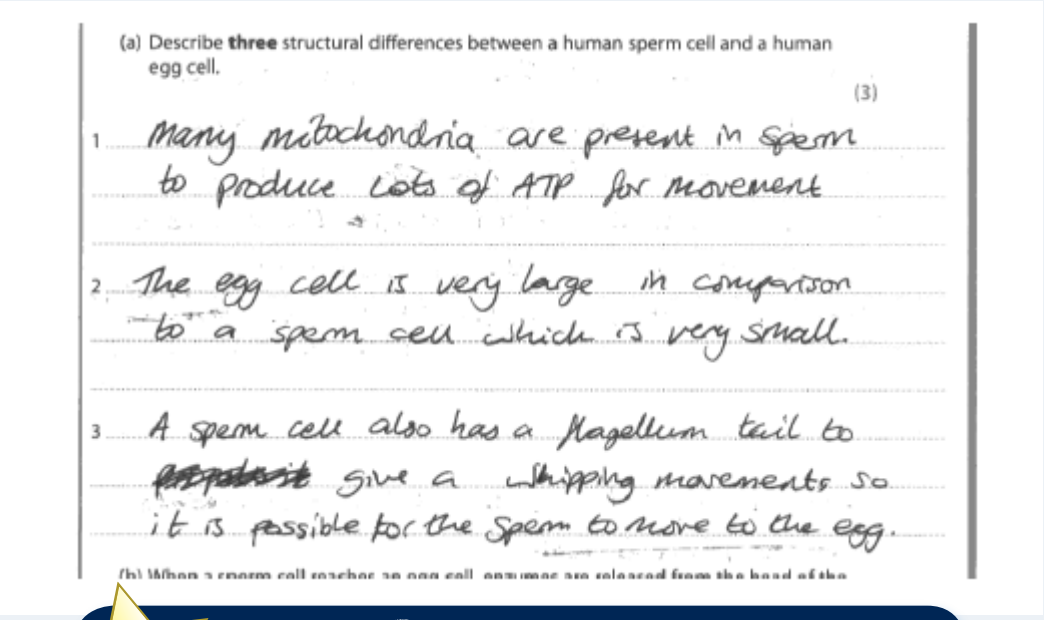
Examiner Comments

This is a nice answer giving good detail about centrioles and the spindle. However, the reference to nuclear envelope in the final sentence was inaccurate so only 2 marks were awarded (mp4 and mp5) for this response.

Question 5

Part (a) required candidates to supply three structural differences between a sperm cell and an egg cell. It was rare to encounter a response that referenced a structure to both cells such as an acrosome was present in the sperm cell but absent in the egg cell. However, it was assumed that if a candidate stated the presence of a structure in one cell, the implication was that it was absent from the other cell. There was evidence in this question item that some candidates seemed a little unsure of what constituted a structural point.



(a) Describe **three** structural differences between a human sperm cell and a human egg cell.

(3)

1 Many mitochondria are present in sperm to produce lots of ATP for movement

2 The egg cell is very large in comparison to a sperm cell which is very small.

3 A sperm cell also has a flagellum tail to ~~[illegible]~~ give a whipping movements so it is possible for the sperm to move to the egg.

(b) When a sperm cell reaches an egg cell enzymes are released from the head of the

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Examiner Comments

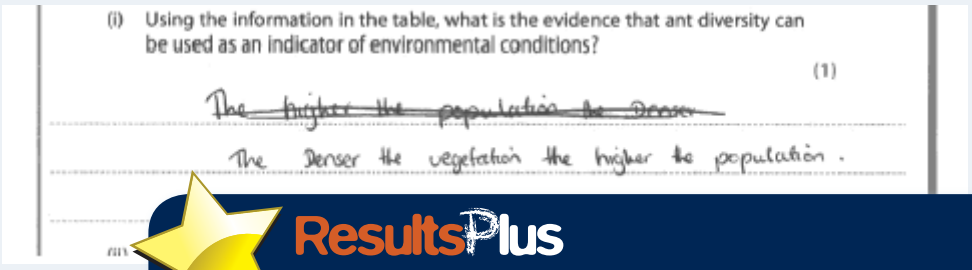
One mark was awarded for this answer. Mp1 was gained in the first sentence but mp5 was not achieved in the third sentence as the context was incorrect.

By contrast, parts (b) and (c) were tackled nicely by the majority of candidates. In the latter case, the near universal emphasis was on the zona pellucida thickening to inhibit polyspermy. Only a few references to how the zona becomes thickened (mp3) or the completion of meiosis II (mp1) were seen.

It was pleasing to see many candidates display a good appreciation of this aspect of plant fertilisation but a number suggested that a zygote and a seed were the same and used both in their answers.

Question 6

This question proved a challenging one and elicited the full mark range. In part (a)(ii) many recognised that the ant species abundance may be related to the amount of vegetation present but rather fewer considered the link between vegetation and copper level.


(i) Using the information in the table, what is the evidence that ant diversity can be used as an indicator of environmental conditions?

(1)

~~The higher the population the Denser~~

The Denser the vegetation the higher the population.

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Examiner Comments

This response was typical as it focused on one aspect only. It gained mp 1 towards the end of the first sentence.

Whilst most candidates understood that drying and cooling would inhibit germination in (b)(i), many felt it was also to either clean the seeds or to denature enzymes. In (b)(ii) the most common correct answer related to mp1.

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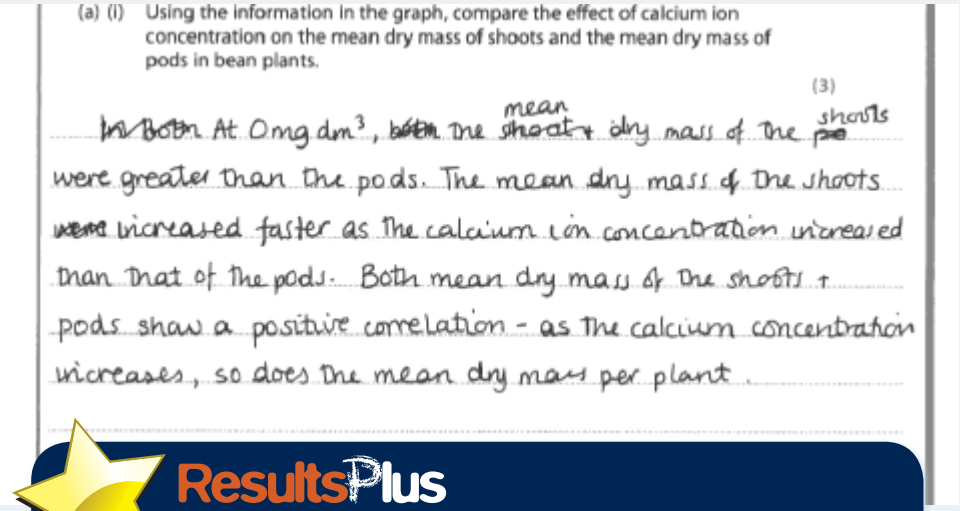
Examiner Tip

In (b)(ii) there are two marking points so candidates should offer two suggestions as to why seed germination is tested.

The majority of candidates appear to have a good knowledge of the various roles of a zoo and most expressed themselves clearly and succinctly. A few limited themselves by only offering one way that zoos conserve endangered species and then gave an expansion rather than supplying a second way as requested.

Question 7

This question tested knowledge, understanding and data interpretation and almost the full range of possible marks was seen. Some candidates delivered excellent comparisons of the effect of shoot and pod mass as calcium ion concentration increased in part (a)(i). However, a common response was to repeat the results.



(a) (i) Using the information in the graph, compare the effect of calcium ion concentration on the mean dry mass of shoots and the mean dry mass of pods in bean plants.

(3)

At 0mg dm^3, the mean dry mass of the shoots were greater than the pods. The mean dry mass of the shoots increased faster as the calcium ion concentration increased than that of the pods. Both mean dry mass of the shoots + pods show a positive correlation - as the calcium concentration increases, so does the mean dry mass per plant.

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Examiner Comments

This candidate answer illustrates the frequent trait amongst of giving a correlation response and then repeating it again in a different manner. In this case the correlation is correct so it gains mp1.

In part (b)(iii), most candidates gave the connection between high calcium ion concentration and protein content but only a minority pursued this to include a reference to high nitrogen uptake, etc. However, it was not uncommon to encounter candidates who felt obliged to write a converse answer. The most common error was for candidates to state that the protein content would be lower at high calcium ion concentrations as the latter had filled up the available space in the cells.

Question 8

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Examiner Comments

An encouraging number of candidates demonstrated a good practical, as well as theoretical, understanding of this core practical.

In part (a) candidates generally made reference to agar or/and aseptic techniques, though all marking points were seen. Whilst the function of a control was well understood, part (b)(ii) and (iii) proved more problematic. Very few recognised the importance of the word 'around' in the stem of question in item (b)(ii) so marking point 1 was rarely awarded. In (b)(iii), some candidates gave a complete answer but many more made a correct reference to taking more than one diameter reading but then completed their suggestion by stating that a mean of their readings should be made.

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Examiner Comments

It is imperative that a candidate carefully reads the question. On several occasions, candidates gave detailed descriptions of how they would use graph paper to measure the area of the clear zone.

Part (c) led to some very carefully constructed answers which displayed a thorough understanding of the core practical and an ability to apply it to this situation. About half of the candidates showed that only readings below 50% would be required (mp2). Some did this through a statement and others through giving examples of tea tree oil concentrations below 50%.

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Examiner Comments

Marking point 3 was rarely awarded. Many candidates described taking diameter readings for decreasing tea tree oil concentrations and felt that the first one that was smaller than the diameter at 50% was equally effective as the 100% tea tree oil.

(a) Suggest what is meant by the phrase **suitably-prepared Petri dish**.

A petri dish that has been filled with a solidified agar and bacterial solution. (2)

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Examiner Comments

This candidate answer illustrates, in the final sentence, another frequently encountered response that would not gain mp3. More detail would be required.

The final part of this question offered the full mark range but with a relatively small number achieving both marks as few made the link with body temperature. Many candidates thought that 37°C was very hot and would burn humans, melt Petri dishes or denature enzymes.

APPENDIX A

Unit Grade Boundaries And Uniform Marks

The raw mark obtained in each module is converted into a standardised mark on a uniform mark scale, and the uniform marks are then aggregated into a total for the subject. Details of the method of aggregation are given in Appendix B.

For AS examinations, the two examined unit tests (6BI01 & 6BI02) each have a weighting of 40% with a maximum of 120 uniform marks; and the coursework unit* (Unit 6BI03) has a weighting of 20% with a maximum of 60 uniform marks.

For the A2 units, the two examined unit tests (6BI04 & 6BI05) also each have a weighting of 40% with a maximum of 120 uniform marks; and the coursework unit* (Unit 6BI06) has a weighting of 20% with a maximum of 60 uniform marks.

Therefore, for candidates taking the full A level, the four examined unit tests (6BI01, 6BI02, 6BI04, 6BI05) each have a weighting of 20% with a maximum of 120 uniform marks; and the two coursework units* (Unit 6BI03 & 6BI06) have a weighting of 10% with a maximum of 60 uniform marks.

The table below shows the boundaries at which raw marks were converted into uniform marks in this examination. The A and E grade boundaries are determined by inspection of the quality of the candidates' work. The other grade boundaries are determined by dividing the range of marks between A and E. Marks within each grade are scaled appropriately within the equivalent range of uniform marks.

Unit Grade Boundaries

Unit	Max. Mark	A	B	C	D	E
	Uniform marks 120	96	84	72	60	48
6BI01 (Unit 1)	*Raw marks* 80	57	52	47	43	39
6BI02 (Unit 2)	80	57	52	48	44	40
6BI04 (Unit 4)	90	59	55	51	47	44

Unit	Max. Mark	A	B	C	D	E
	Uniform marks 60	48	42	36	30	24
6BI07 (International)	*Raw marks* 40	29	25	21	18	15

*or written alternative for International centres.

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