Stage 2 Biology

Assessment Type 3: 2013 Examination Extended Response

Question 37

**Knowledge and Understanding**

Response highlights student’s confusion with meiosis and mitosis. The response correctly conveys that meiosis has 2 phases of cell division resulting in the formation of gametes. However, it misinterprets meiosis by stating that it produces identical daughter cells rather than daughter cells with genetic variability. Diagram provided is of no value nor is it explained within the response (KU1).

*This text is an actual student response. It has been word processed in the interests of legibility. Errors in punctuation, spelling and sentence structure reflect the student’s own work without correction.*

Meiosis is the cell division that produces egg cells and sperm cells. It occurs in small steps, Prophase, Metaphase, Anaphase, Telophase, Prophase II, Metaphase II, Anaphase II, and Telophase II. Meiosis the identical genetic material is passed down to each daughter cell to create identical cells which have undergone meiosis successfully. The egg and sperm cells ~~give~~ create a zygote when they fuse together during cell division with both the egg and the sperm being haploid carrying half the genetic information required to create a diploid cell that is formed during the fusion of the zygote during meiosis. This type of cell division allows an equal amount of genetic material to be supplied from both of the egg and sperm cells. Ultimately creating a zygote which is gentically identical to the original parent cells.

**Knowledge and Understanding**

Although it attempts to communicate information about biology (KU3), the diagram provided has no labels and it is a poor representation of the process of meiosis. It is neither explained nor referred to within the text of the response KU3).



**Analysis and Evaluation**

Initially repeats the information provided in the question. Provides a partial answer regarding how benzamidine works but neglects to mention the active site of acrosin. Implies that fertilisation cannot occur but answer is hampered by the inclusion of the incorrect conclusion that ‘contraception cannot be achieved’ (AE1).

four daughter cells

Acrosin is an enzyme which is found on the surface membrane of sperm cells. The contraceptive cream Deflan, which contains a chemical called benzamidine that acts as and inhibitor to acrosin. Benzamidine could inhibit acrosin due to its ability to bind to acrosin ~~complementary shape~~ and to alter its complementary shape. The alteration of the sperm cells complimentary shape stops the sperm cell from being able to find and ultimately fertilise the females egg cells.

Both egg cells and sperm cells carry the haploid number of chromosomes needed to create a zygote after cell division. Without the sperm cells ability to successfully bind to the egg cell, the egg cell will remain with the haploid amount of chromosomes and remain un-fertilised. Therefore the restoration of the diploid number of chromosomes is incomplete and contraception cannot be achieved.

**Note the following excerpt from the 2013 Chief Assessor’s Report:**

(In an examination), an extended-response question is marked out of 15, with 12 marks being allocated for content (each well-made point is worth 2 marks) and 3 marks for communication. This question has two content parts, with each part being marked out of 6.

In awarding a communication mark, the following factors are taken into account:

* Is the response at least half a page in length and is it structured in the form of sentences and paragraphs?
* Does the response use correct grammar and spelling?
* Does the response clearly explain concepts using relevant and concise biological language?

Students should be able to fully answer an extended-response question in about one page of writing. It is unnecessary for students to re-write the question or to provide an introduction to their response. Both of these practices are time-wasting, receive no credit, and may even result in a reduction in the communication mark.

**Additional comments**

A review of this student’s response shows that the biological concepts have been communicated with some general effectiveness in the written communication (KU3). There is an attempt to communicate using a diagram (KU3). The response is structured in the form of sentences and paragraphs and is at least half a page (of handwriting) in length. Correct grammar and spelling is demonstrated with general effectiveness. Biological concepts within the response have been explained using some appropriate biological terms (A2).

|  | Investigation | Analysis and Evaluation | Application | Knowledge and Understanding |
| --- | --- | --- | --- | --- |
| A | Designs logical, coherent, and detailed biological investigations.Critically and logically selects and consistently and appropriately acknowledges information about biology and issues in biology from a range of sources.Manipulates apparatus and technological tools carefully and highly effectively to implement well-organised safe and ethical investigation procedures.Obtains, records, and displays findings of investigations using appropriate conventions and formats accurately and highly effectively. | Critically and systematically analyses data and their connections with concepts, to formulate logical and perceptive conclusions and make relevant predictions.Critically and logically evaluates procedures and suggests a range of appropriate improvements. | Applies biological concepts and evidence from investigations to suggest solutions to complex problems in new and familiar contexts.Uses appropriate biological terms, conventions, formulae, and equations highly effectively.Demonstrates initiative in applying constructive and focused individual and collaborative work skills. | Consistently demonstrates a deep and broad knowledge and understanding of a range of biological concepts.Uses knowledge of biology perceptively and logically to understand and explain social or environmental issues.Uses a variety of formats to communicate knowledge and understanding of biology coherently and highly effectively. |
| B | Designs well-considered and clear biological investigations.Logically selects and appropriately acknowledges information about biology and issues in biology from different sources.Manipulates apparatus and technological tools carefully and mostly effectively to implement organised safe and ethical investigation procedures.Obtains, records, and displays findings of investigations using appropriate conventions and formats mostly accurately and effectively. | Clearly and logically analyses data and their connections with concepts, to formulate consistent conclusions and make mostly relevant predictions.Logically evaluates procedures and suggests some appropriate improvements.  | Applies biological concepts and evidence from investigations to suggest solutions to problems in new and familiar contexts.Uses appropriate biological terms, conventions, formulae, and equations effectively.Applies mostly constructive and focused individual and collaborative work skills. | Demonstrates some depth and breadth of knowledge and understanding of a range of biological concepts. Uses knowledge of biology logically to understand and explain social or environmental issues.Uses a variety of formats to communicate knowledge and understanding of biology coherently and effectively. |
| C | Designs considered and generally clear biological investigations.Selects with some focus, and mostly appropriately acknowledges, information about biology and issues in biology from different sources.Manipulates apparatus and technological tools generally carefully and effectively to implement safe and ethical investigation procedures.Obtains, records, and displays findings of investigations using generally appropriate conventions and formats with some errors but generally accurately and effectively. | Analyses data and their connections with concepts, to formulate generally appropriate conclusions and make simple predictions, with some relevance.Evaluates some procedures in biology and suggests some improvements that are generally appropriate. . | Applies biological concepts and evidence from investigations to suggest some solutions to basic problems in new or familiar contexts.Uses generally appropriate biological terms, conventions, formulae, and equations with some general effectiveness. Applies generally constructive individual and collaborative work skills. | Demonstrates knowledge and understanding of a general range of biological concepts. Uses knowledge of biology with some logic to understand and explain one or more social or environmental issues.Applies different formats to communicate knowledge and understanding of biology with some general effectiveness. |
| D | Prepares the outline of one or more biological investigations.Selects and may partly acknowledge one or more sources of information about biology or an issue in biology.Uses apparatus and technological tools with inconsistent care and effectiveness and attempts to implement safe and ethical investigation procedures.Obtains, records, and displays findings of investigations using conventions and formats inconsistently, with occasional accuracy and effectiveness. | Describes basic connections between some data and concepts, and attempts to formulate a conclusion and make a simple prediction that may be relevant.For some procedures, identifies improvements that may be made. | Applies some evidence to describe some basic problems and identify one or more simple solutions, in familiar contexts.Attempts to use some biological terms, conventions, formulae, and equations that may be appropriate. Attempts individual work inconsistently, and contributes superficially to aspects of collaborative work. | Demonstrates some basic knowledge and partial understanding of biological concepts. Identifies and explains some biological information that is relevant to one or more social or environmental issues.Communicates basic information to others using one or more formats. |
| E | Identifies a simple procedure for a biological investigation.Identifies a source of information about biology or an issue in biology.Attempts to use apparatus and technological tools with limited effectiveness or attention to safe or ethical investigation procedures.Attempts to record and display some descriptive information about an investigation, with limited accuracy or effectiveness. | Attempts to connect data with concepts, formulate a conclusion, and make a prediction.Acknowledges the need for improvements in one or more procedures. | Identifies a basic problem and attempts to identify a solution in a familiar context.Uses some biological terms or formulae.Shows emerging skills in individual and collaborative work. | Demonstrates some limited recognition and awareness of biological concepts. Shows an emerging understanding that some biological information is relevant to social or environmental issues.Attempts to communicate information about biology. |