

IBMYP Biology Sample Paper 3



Group 3: Biology On-Screen Examination

Total Marks: 100

Instructions

- The on-screen examination has not yet started.
- Your time will begin once you have clicked the Start button below. Do not click Start until instructed to do so.
- Before the examination begins you are given 5 minutes to become familiar with its structure. Please navigate around the examination, taking note of the length of each task and question. You have 2 hours to complete the examination.
- There are 10 separate questions in this examination. Each question may have sub-parts. Answer all the questions in the response boxes provided. The maximum mark for this examination is 100 marks.
- As you progress through the questions, your answers are automatically saved.
- When 2 hours has ended, you will no longer be able to answer any questions.

Question 1: 9 marks

1. a) Define the terms:

i) Mitosis(1 mark)

Answer: Mitosis is a type of cell division that results in the production of two genetically identical daughter cells, each having the same number of chromosomes as the parent cell.

ii) Chromosome(1 mark)

Answer: A chromosome is a thread-like structure made up of DNA and proteins. It carries genetic information in the form of genes.

iii) Cytokinesis(1 mark)

Answer: Cytokinesis is the final stage of cell division, where the cytoplasm of a parent cell is divided, resulting in the formation of two separate daughter cells.

A group of researchers conducted a study on the growth rate of plant root cells in different conditions.



Image from: <https://www.drugtargetreview.com/news/29772/studying-mitosis-structure/>

They measured the number of cells undergoing mitosis in the root tips of plants grown in optimal conditions (Control Group) and plants exposed to a high-stress environment (Experimental Group) over a 24-hour period. The data is summarized in the table below:

Group	Number of Cells Undergoing Mitosis
Control	35
Experimental	15

b) Analyze the data and calculate the percentage decrease in the number of cells undergoing mitosis in the Experimental Group compared to the Control Group. (3 marks)

Answer: To calculate the percentage decrease in the number of cells undergoing mitosis in the Experimental Group compared to the Control Group, use the following formula:

$$\text{Percentage Decrease} = \left[\frac{\text{Initial Value} - \text{Final Value}}{\text{Initial Value}} \right] * 100$$

$$\text{Percentage Decrease} = \left[\frac{35 - 15}{35} \right] * 100 \approx 42.86\%$$

The Experimental Group experienced a 42.86% decrease in the number of cells undergoing mitosis compared to the Control Group.

c) Discuss the possible reasons for the difference in the number of cells undergoing mitosis between the Control and Experimental Groups, based on the data and the concept of mitosis. (3 marks)

Answer:

High-stress environment: The high-stress conditions in the Experimental Group may have negatively affected cell division. Stressors such as nutrient deficiency, extreme temperatures, or exposure to toxins can disrupt normal cellular processes, including mitosis.



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