

Mitosis Lab Onion Root Tip Answers

Name: _____ Period _____

Online Onion Root Tip Assignment

Go to: http://www.biology.arizona.edu/cell_bio/activities/cell_cycle/cell_cycle.html

Determining time spent in different phases of the cell cycle

Growth in an organism is carefully controlled by regulating the cell cycle. In plants, the roots continue to grow as they search for water and nutrients. These regions of growth are good for studying the cell cycle because at any given time, you can find cells that are undergoing mitosis.

In order to examine cells in the tip of an onion root, a thin slice of the root is placed onto a microscope slide and stained so the chromosomes will be visible. The cells you'll be looking at in this activity were photographed with a light microscope and then digitized so you can see them on the computer.

Quick review:

Interphase is divided into 3 phases:

- 1) G1
- 2) S
- 3) G2

The Mitotic phase is divided into 2 phases:

- 1) Mitosis
- 2) Cytokinesis

Mitosis is divided into 4 phases:

- 1) Prophase
- 2) Metaphase
- 3) Anaphase
- 4) Telophase

The final process that splits the cytoplasm in two is called: cytokinesis.

The assignment:

In this activity, you will be presented with cells from the tip of an onion root. You will classify each cell based on what phase it is in. At the end you will count up the cells found in each phase and use those numbers to predict how much time a dividing cell spends in each phase. So, with those numbers, calculate the percentage of time that a cell spends in each phase.

Click "Next" to continue to the cell pictures.

	Interphase	Prophase	Metaphase	Anaphase	Telophase	Total
# of cells	20	10	3	2	1	36
% of cells	55.6%	27.8%	8.3%	5.6%	2.8%	100%

Mitosis Lab Onion Root Tip Answers: A Comprehensive Guide

Unlocking the secrets of cell division can be challenging, especially when navigating the complexities of a mitosis lab using onion root tips. This comprehensive guide provides detailed answers and explanations to common questions surrounding this crucial biological experiment. We'll walk you through the process, highlighting key observations, potential pitfalls, and offering strategies to ensure accurate results and a thorough understanding of mitosis. Whether you're a student grappling with your lab report or a teacher seeking resources to enhance your curriculum, this post is your one-stop shop for all things "mitosis lab onion root tip answers."

Understanding the Onion Root Tip: The Perfect Mitosis Specimen

Onion root tips are ideal for observing mitosis because the cells in this region are actively dividing. This high rate of cell division allows for easy visualization of the different stages of mitosis (prophase, metaphase, anaphase, and telophase), making it a popular choice for educational labs.

Why Onion Root Tips?

Rapid Cell Division: The root tip's meristematic tissue contains cells undergoing continuous division, maximizing the chances of observing all mitotic phases.

Ease of Access and Preparation: Onions are readily available and relatively simple to prepare for microscopic observation.

Clear Cell Structure: The cells in the onion root tip are relatively large and well-defined, facilitating easy identification of different mitotic stages.

Cost-Effectiveness: Onions are inexpensive, making this lab experiment accessible to a wide range of educational settings.

Mitosis Lab: Step-by-Step Procedure and Expected Results

Successfully conducting a mitosis lab requires meticulous attention to detail. Here's a breakdown of the common procedure:

- 1. Sample Preparation:** The onion root tip is treated with a pre-treatment solution (e.g., acetic orcein) to soften the tissue and stain the chromosomes, making them visible under the microscope.
- 2. Squash Preparation:** The root tip is then carefully squashed onto a microscope slide to create a single layer of cells, preventing overlapping and improving visibility.
- 3. Microscopic Observation:** The prepared slide is viewed under a microscope at different magnifications. Students should systematically scan the slide to find cells in various stages of mitosis.

Identifying Mitosis Stages: Key Characteristics

Prophase: Chromosomes condense and become visible; the nuclear envelope begins to break down.

Metaphase: Chromosomes align along the metaphase plate (the center of the cell).

Anaphase: Sister chromatids separate and move towards opposite poles of the cell.

Telophase: Chromosomes decondense; the nuclear envelope reforms; cytokinesis (cell division) begins.

Interphase: While not technically a stage of mitosis, interphase (the period between cell divisions) is often observed and characterized by the presence of uncondensed chromatin.

Expected Results: Successful lab work should reveal a clear observation of each mitotic phase, allowing for accurate calculation of the mitotic index (the percentage of cells actively undergoing

mitosis).

Calculating the Mitotic Index: A Crucial Analysis

The mitotic index is a critical aspect of analyzing your onion root tip data. It provides a quantitative measure of cell division activity. The calculation involves counting the number of cells in mitosis and dividing it by the total number of cells observed, then multiplying by 100 to express it as a percentage.

Interpreting the Mitotic Index:

A higher mitotic index suggests rapid cell growth and division, while a lower index indicates slower growth. Factors such as environmental conditions and the age of the onion can influence the mitotic index.

Common Challenges and Troubleshooting in the Mitosis Lab

Several challenges can arise during the mitosis lab experiment. Here are some common issues and how to address them:

Overlapping Cells: Careful squashing of the root tip is crucial to avoid overlapping cells.

Poor Staining: Using the correct stain concentration and incubation time is critical for clear visualization.

Difficulty Identifying Stages: Practice and referencing detailed images of each mitotic phase can greatly assist identification.

Conclusion

The mitosis lab using onion root tips offers a valuable hands-on experience in understanding cell division. This guide has provided a detailed overview of the procedure, expected results, analysis, and potential troubleshooting steps. By understanding the process, mastering the techniques, and interpreting the data accurately, you'll gain a deeper appreciation for the fundamental process of life – cell division.

FAQs

1. Can I use other plant materials instead of onion root tips? Yes, other rapidly growing plant tissues,

like garlic root tips or the meristematic regions of other plants, can be used. However, onion root tips are preferred due to their ease of access and clear cell structure.

2. What is the ideal magnification for observing mitosis in onion root tips? A high magnification, typically 400x or higher, is necessary for clear visualization of individual chromosomes and the various stages of mitosis.
3. How many cells should I count for accurate mitotic index calculation? A minimum of 200-300 cells is generally recommended for statistically significant results.
4. What are some sources of error in this lab? Inaccurate staining, improper squashing leading to overlapping cells, misidentification of mitotic stages, and insufficient cell counting are all potential sources of error.
5. Where can I find more detailed images of onion root tip mitosis? Online resources like educational websites, scientific journals, and microscopy image databases provide high-quality images. Consult your textbook or your teacher for reliable sources.

mitosis lab onion root tip answers: Mitosis/Cytokinesis Arthur Zimmerman, 2012-12-02
Mitosis/Cytokinesis provides a comprehensive discussion of the various aspects of mitosis and cytokinesis, as studied from different points of view by various authors. The book summarizes work at different levels of organization, including phenomenological, molecular, genetic, and structural levels. The book is divided into three sections that cover the premeiotic and premitotic events; mitotic mechanisms and approaches to the study of mitosis; and mechanisms of cytokinesis. The authors used a uniform style in presenting the concepts by including an overview of the field, a main theme, and a conclusion so that a broad range of biologists could understand the concepts. This volume also explores the potential developments in the study of mitosis and cytokinesis, providing a background and perspective into research on mitosis and cytokinesis that will be invaluable to scientists and advanced students in cell biology. The book is an excellent reference for students, lecturers, and research professionals in cell biology, molecular biology, developmental biology, genetics, biochemistry, and physiology.

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Concepts edition features a streamlined set of clearly written activities with abbreviated coverage of the biodiversity of life. These exercises emphasize the unity of all living things and the evolutionary forces that have resulted in, and continue to act on, the diversity that we see around us today.

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mitosis lab onion root tip answers: JLACE-PDF Jharkhand Lab Assistant Competitive Exam Biology Subject eBook Chandresh Agrawal, nandini books, 2024-06-27 SGN. The JLACE-PDF Jharkhand Lab Assistant Competitive Exam Biology Subject eBook Covers Objective Questions Asked In Various Competitive Exams With Answers.

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what level in the cell or organ the critical processes controlling development occur. Then, we will be better able to understand how development is controlled by the genes, whether directly by the continual production of new gene transcripts or more indirectly by the genes merely defining self-regulating systems that then function autonomously. This book is not a survey of the whole of plant development but is meant to concentrate on the possible component cellular and molecular processes involved. Consequently, a basic knowledge of plant structure is assumed. The facts of plant morphogenesis can be obtained from the books listed in the General Reading section at the end of Chapter 1. Although references are not cited specifically in the text, the key references for each section are denoted by superscript numbers and listed in the Notes section at the end of each chapter.

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used in classroom presentations with other teaching aids available online. This text is recommended for junior- and senior-level courses in plant biotechnology or plant genetics and for courses devoted to special topics at both the undergraduate and graduate levels. It is also an ideal reference for practitioners.

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Microtubules are at the heart of cellular self-organization, and their dynamic nature allows them to explore the intracellular space and mediate the transport of cargoes from the nucleus to the outer edges of the cell and back. In *Microtubule Dynamics: Methods and Protocols*, experts in the field provide an up-to-date collection of methods and approaches that are used to investigate microtubule dynamics in vitro and in cells. Beginning with the question of how to analyze microtubule dynamics, the volume continues with detailed descriptions of how to isolate tubulin from different sources and with different posttranslational modifications, methods used to study microtubule dynamics and microtubule interactions in vitro, techniques to investigate the ultrastructure of microtubules and associated proteins, assays to study microtubule nucleation, turnover, and force production in cells, as well as approaches to isolate novel microtubule-associated proteins and their interacting proteins. Written in the highly successful *Methods in Molecular Biology*TM series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Definitive and practical, *Microtubule Dynamics: Methods and Protocols* provides the key protocols needed by novices and experts on how to perform a broad range of well-established and newly-emerging techniques in this vital field.

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volume aims to present a large panel of techniques for the study of Plant Cell Division. *Plant Cell Division: Methods and Protocols* captures basic experimental protocols that are commonly used to study plant cell division processes, as well as more innovative procedures. Chapters are split into five parts covering several different aspect of plant cell division such as, cell cultures for cell division studies, cell cycle progression and mitosis, imaging plant cell division, cell division and morphogenesis, and cytokinesis. Written for the *Methods in Molecular Biology* series, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and practical, *Plant Cell Division: Methods and Protocols* is a valuable tool for the study of plant cell division at both the cellular and molecular levels, and in the context of plant development.

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La mitosis es un tipo de división celular en el cual una célula (la madre) se divide para producir dos nuevas células (las hijas) que son genéticamente idénticas entre sí.

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