Cell Division: Mitosis and Meiosis

How do eukaryotic cells divide to produce genetically identical cells or to produce gametes with half the normal DNA?

Name: _____ Date: _____ Class/period: _____

Dataset ID: _____

https://biologylabbench.com/lab07

How to use this guide

Check off each numbered step as you work in the online simulation. Follow your teacher's assigned sections and repeat counts. This guide explains the workflow; enter your measurements and responses in the lab or your assigned worksheet.

Use Data for tables and editable calculations, Graph for plots, and Scene for the simulation. Some controls are under More options. Write predictions before running an experiment and scroll below the simulation for response boxes.

Overview

- ☐ 1. Read the driving question and your teacher's assignment. Note which sections, optional extensions, and number of trials your teacher wants you to complete.
- ☐ 2. Sign in with your name and class period. Copy your Dataset ID onto this guide. Keep using the same dataset for the investigation; classmates may have different numbers.

Background

- ☐ 1. Read the background explanations, diagrams, and vocabulary. Review the reference formulas you will need and identify the variables you will measure.

Pre-lab

- ☐ 1. Complete the pre-lab questions and any practice activities. Use Check answer, read the feedback, and revise your reasoning before starting the investigation.

Mitosis model

- ☐ 1. Use the main stage button to replicate DNA and continue through mitosis. At metaphase, drag chromosomes to the plate; then move sister chromatids to opposite poles. The alternative alignment and pulling buttons can assist with dragging.
- ☐ 2. Complete every chromosome/DNA entry in Data and Check my table. Put the stained-cell cards in order and Check order. Explain what changes between stages.

Root tips

- ☐ 1. Write your prediction. Choose a jar and root tip, make the slide, and focus the microscope. Classify every whole cell using I, P, M, A, or T.
- ☐ 2. Record counts for this tip, then choose a different tip. Repeat for three tips in each jar. Do not record the same tip as another replicate.
- ☐ 3. Add class data if assigned. Calculate mitotic indices and use the chi-square tool with the expected values requested on the page. Record the statistic, degrees of freedom, and conclusion.

Cancer karyotypes

- ☐ 1. Write your hypothesis before examining the chromosomes. Inspect normal, HeLa, and CML cells, counting each chromosome once; use Karyotype if assigned.
- ☐ 2. Enter counts for all three cells in Data, use Check my counts, and recount flagged cells. Answer the HeLa and Philadelphia chromosome questions using the observed evidence.

Meiosis model

- ☐ 1. Write your prediction and use Next stage through meiosis I and II. Watch the homologs and sister chromatids separately.

- [ ] 2. Use Record these gametes when the four gametes appear. If assigned, change the crossover, orientation, or nondisjunction condition and record another run.
- [ ] 3. Run 200 meioses, inspect the gamete distribution in Graph and Data, and complete the requested comparisons and chi-square analysis.

Sordaria

- [ ] 1. Predict the outcome, focus the field, and score mature asci as 4:4 or crossover. Do not score immature or incomplete asci.
- [ ] 2. Record this field. Use New squash / next field and repeat until at least 50 asci have been recorded.
- [ ] 3. Calculate percent crossover and map units using the formulas on the page, check your calculations, and add class data if assigned. Explain sampling variation and your comparison.

Design

- [ ] 1. Write your question and hypothesis. Choose a factor and at least two levels including the control; use at least three root tips per level.
- [ ] 2. Grow, fix, and score roots. Compare mitotic indices in Graph and Data and explain the pattern, variability, and conclusion.

Analyze

- [ ] 1. Answer every assigned analysis question using your own recorded data. Include numbers, units, and comparisons from the appropriate Data and Graph panels.
- [ ] 2. Complete the requested calculations or statistical comparisons. Show your method and explain what the result means biologically. Write the claim, evidence, and reasoning response if shown.

Reflect

- [ ] 1. Compare your original predictions with your results. Explain any disagreement, limitations of the simulation, and one way to improve the investigation.
- [ ] 2. Complete the assigned reflection/evaluation questions and AP-style response if shown. Use your own data where requested. Rate your confidence if you wish; ask your teacher about any unfinished or unclear work.

Submit

- [ ] 1. Review the completion checklist and Preview my report. Check your name, period, Dataset ID, calculations, units, graphs, and written responses.
- [ ] 2. Download .docx or use Save as PDF as directed by your teacher. Open the downloaded file and check that it contains your work, then upload or hand it in where your teacher specifies. Downloading alone does not submit it.
- [ ] 3. Save a progress file using Move your work to another computer if you need a backup or will change devices. Keep recordings separately if assigned; a report cannot restore editable progress.

Teacher instructions / notes