

Biology Lab Activities: Mitosis

How to use this manual

This lab manual is intended for use with the [Visible Biology](#) product.

Where to find 3D models

Units Study My Library

Flashcard Decks Flashcards Quizzes **Lab Activities**

Lab activities that correspond to the following views are available as PDFs.

Get Labs

Prokaryotic and Eukaryotic Cells Lab

1. Bacterial Cell 2. Animal Cell 3. Plant Cell

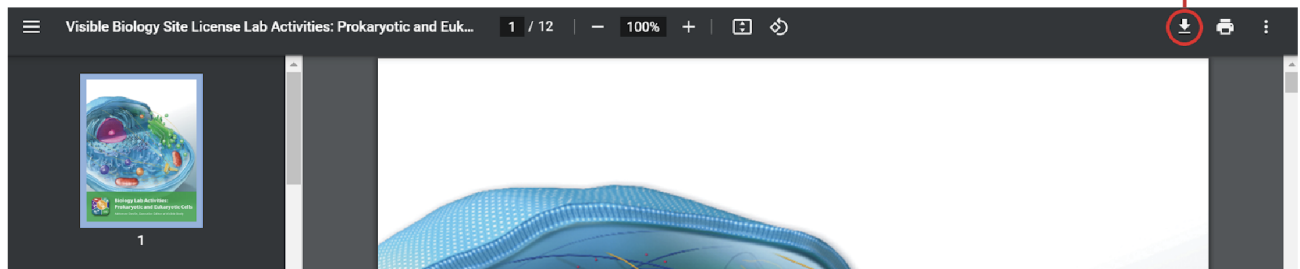
Under the Study section of Visible Biology, there is a Lab Activities tab.

Select "Get Labs" to download the lab activities.

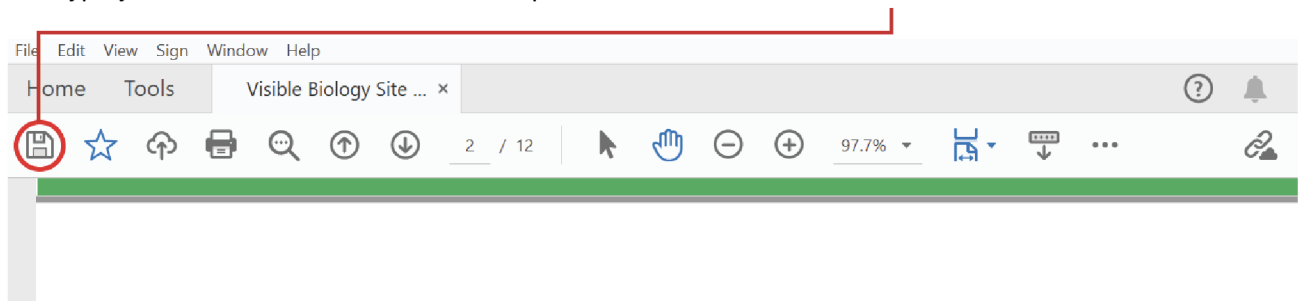
Find the row of 3D views that corresponds to each lab manual and use the views to investigate and find answers.

How to save answers

1. Have Adobe Reader installed on your computer.
Windows: <https://get.adobe.com/reader/>
Mac: <https://helpx.adobe.com/acrobat/kb/install-reader-dc-mac-os.html>
2. Download each lab file to your computer.



3. Open the downloaded file in Adobe Reader.
Right-click on the file. In the menu that appears, go to "Open with..." and select Adobe Reader from the submenu.
4. Type your answers into the boxes to complete the lab and select the "Save" icon to save the lab.



5. Submit your saved version of the lab to your instructor via email, dropbox, Google Drive, or however your instructor has requested.

Any questions? visiblebiology.com

Name:

Date:

Biology Lab Activities: Mitosis

Background Questions

Based on what you've learned in class, in your textbook, and from using Visible Biology, answer the following questions about mitosis.

1. Which type of cells divide via mitosis?
2. What are the names of the five stages of mitosis?
 - a.
 - b.
 - c.
 - d.
 - e.
3. New cells are produced through cell division. However, before cell division can occur, the cell needs to grow and duplicate its DNA and organelles. The phase before mitosis begins, where the cell spends 90% of its time, is called _____.
4. In mitosis, the phase in which the cell divides is called _____. The cell divides into _____ daughter cells.
5. In 1–2 sentences, describe the main goal of mitosis.

Name:

Date:

Lab 1: Mitosis

Activity 1: Label a cell going through mitosis

1. Launch the view
 - Launch Visible Biology.
 - Navigate to Study/Lab Activities, and find the Mitosis Lab section.
 - Select view 14. Mitosis.
2. Label the image below
 - Explore the 3D model of a body cell dividing through mitosis to find the structures you need to label.
 - Fill in the blanks to label the structures from the list below.

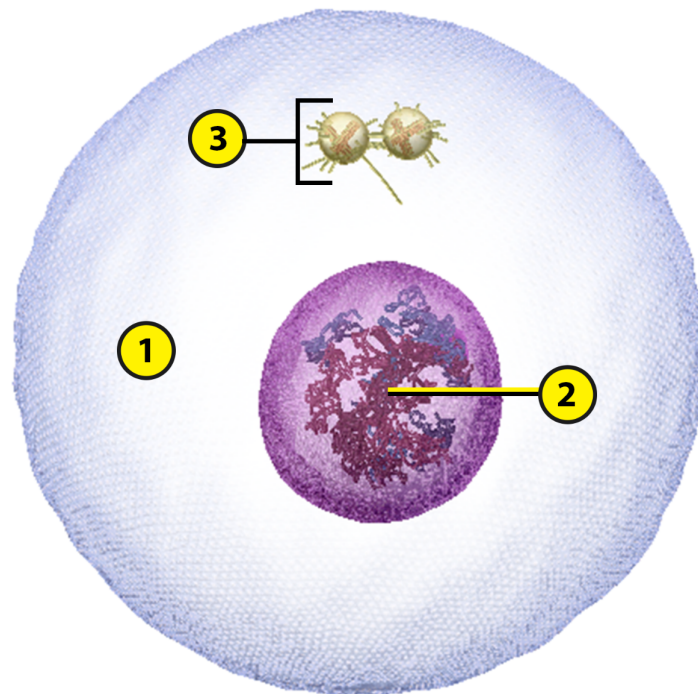
Part A: Label the cell structures during interphase.

Word List:

Chromatin

Mitotic spindles (centrosomes)

Plasma membrane



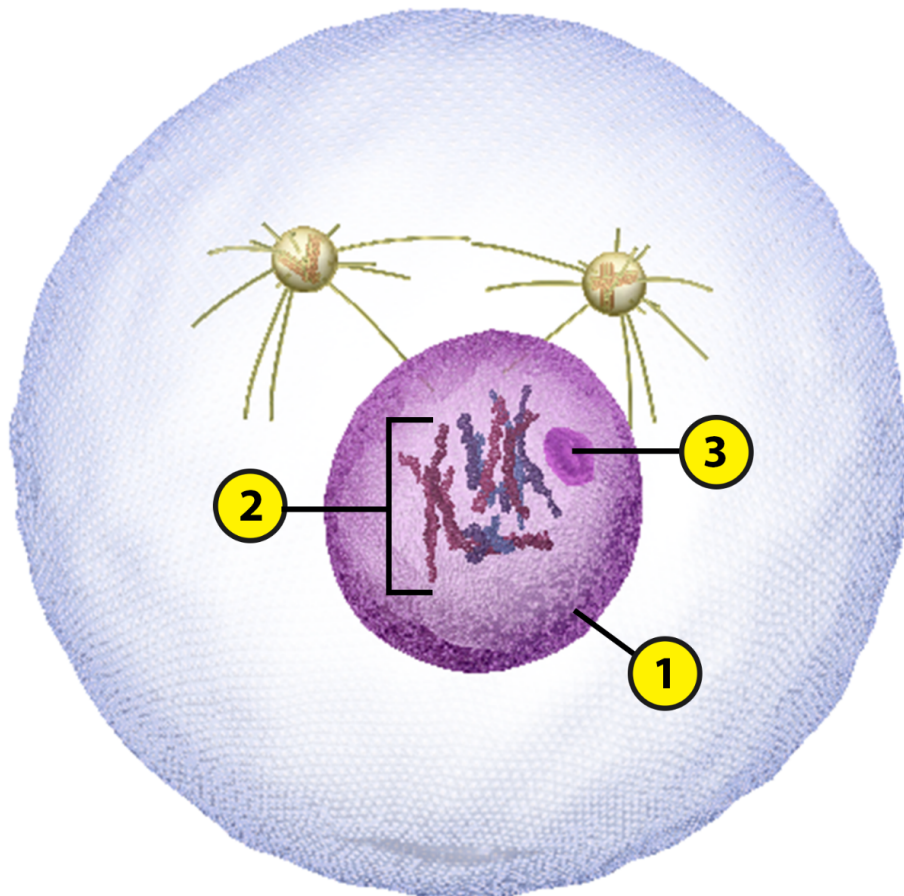
Part B: Label the cell structures during prophase.

Word List:

Duplicated chromosomes

Nuclear envelope

Nucleolus



Part C: Label the cell structures during prometaphase, metaphase, and anaphase.

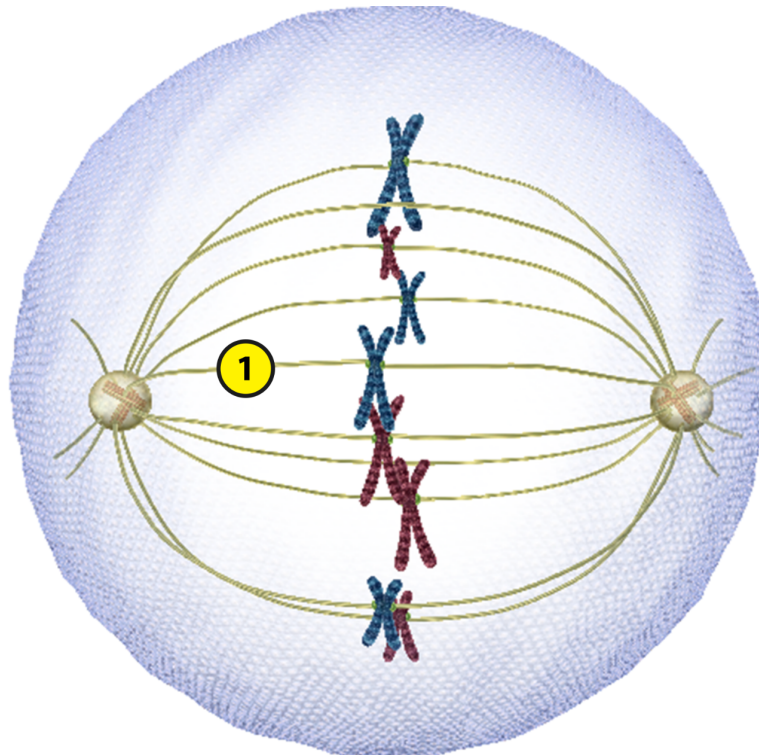
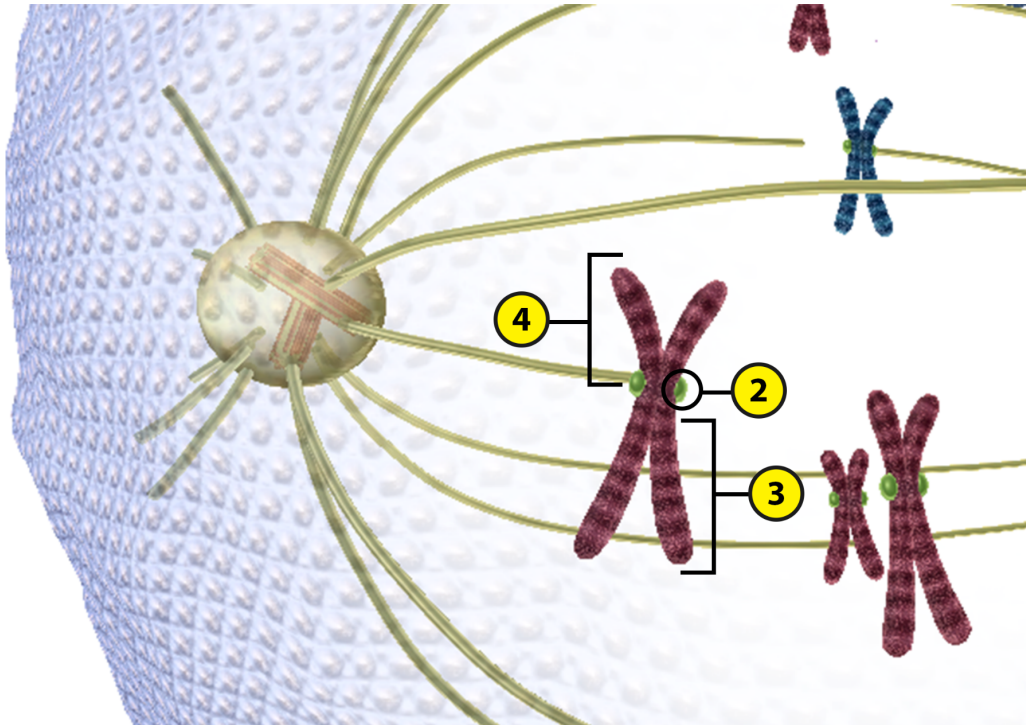
Word List:

Kinetochore

P arm

Q arm

Spindle fibers (microtubules)



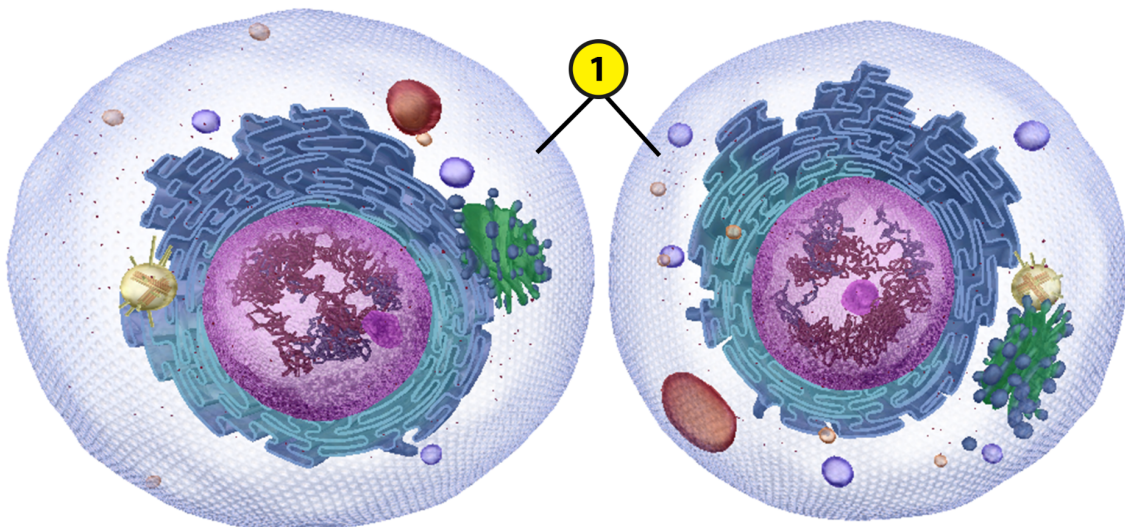
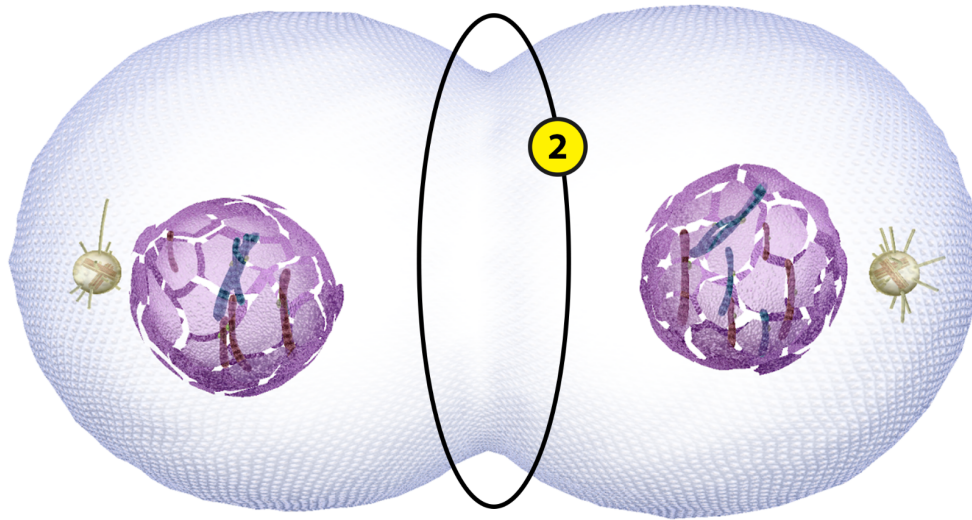
Part D: Label the cell structures during telophase and cytokinesis.

Word List:

Cleavage furrow

Daughter cells

—
—



Name:

Date:

Lab 1: Mitosis

Activity 2: Explore the roles cell structures play in mitosis

Refer to your labeled mitosis images from Activity 1 and the content in Visible Biology. Based on what you've learned, match each of the following structures with the brief description of its role in mitosis.

Structures:

- a. Chromatin
- b. Cleavage furrow
- c. Daughter cells
- d. Duplicated chromosomes
- e. Kinetochore
- f. Mitotic spindles (centrosomes)
- g. Nuclear envelope
- h. P arm
- i. Plasma membrane
- j. Q arm
- k. Spindle fibers (microtubules)

Descriptions:

- ___ Once the cell's DNA replicates, it forms these X-shaped structures.
- ___ This forms when the plasma membrane pinches inward to separate the daughter cells.
- ___ These structures help organize the duplicated chromosomes at the midline of the cell.
- ___ Spindle fibers connect to these structures, located on each chromosome's centromere.
- ___ This is the long segment of the chromosome, separated from the other segment by the centromere.
- ___ This structure contains the chromatin that condenses during interphase, and it dissolves during prometaphase.
- ___ These structures move to each end of the cell during prophase and organize spindle fibers.
- ___ This is the short segment of the chromosome, separated from the other segment by the centromere.
- ___ This structure duplicates during interphase and condenses to form duplicated chromosomes.
- ___ These are the result of cell division via mitosis.

____ This structure encloses the parent cell, elongates during anaphase, pinches inward during telophase, and splits to enclose each daughter cell.

Name:

Date:

Lab 2: Cell Division via Mitosis

Refer to your labeled mitosis images from Lab 1, Activity 1.

1. In the space that follows, draw the chromosomes (or paste a screenshot of your drawing) and show what happens to them during each phase of mitosis. Your drawing should include the following structures: chromosomes, kinetochores, mitotic spindles (centrosomes), and spindle fibers (microtubules).

- a. Prophase

- b. Prometaphase

- c. Metaphase

- d. Anaphase

- e. Telophase and cytokinesis

2. Based on your drawings and what you've learned about mitosis, put the following phases of mitosis into the correct order (from 1–5).
- ___ The cleavage furrow forms and splits the parent cell into two daughter cells with a diploid number of single chromosomes.
 - ___ Spindle fibers arrange the duplicated chromosomes at the midline of the cell.
 - ___ Spindle fibers separate the duplicated chromosomes, pulling the sister chromatids to opposite sides of the cell.
 - ___ Chromatin condenses into duplicated chromosomes.
 - ___ Spindle fibers connect to the kinetochores of each chromosome.
3. The daughter cells that result from mitosis are genetically identical. Retaining the same genetic makeup as the parent cell allows the produced body cells to fulfill their roles in the body's processes. Fill in the blanks in the following sentences about the DNA found in cells undergoing mitosis.
- a. During interphase, the cell's _____ and organelles duplicate. During prophase, the chromatin condenses into _____.
 - b. During prometaphase, spindle fibers attach to _____ on the chromosomes.
 - c. During metaphase, these duplicated chromosomes, or _____, are lined up at the midline of the cell by spindle fibers. Then, during _____, the duplicated chromosomes are separated, pulling the chromosomes to opposite sides of the cell.
 - d. After the cell divides during telophase and cytokinesis, the resulting daughter cells contain _____ copy of the parent cell's DNA. Instead of duplicated chromosomes, each cell contains _____ chromosomes that decondense into chromatin within the _____ once mitosis has ended.
4. In 3–5 sentences, explain why the parent cell's DNA and organelles have to duplicate before mitosis can begin.

Name:

Date:

Lab 3: Compare Mitosis and Meiosis

Refer to your labeled mitosis images from Lab 1, Activity 1, as well as your labeled images from the meiosis lab, to answer the following questions.

1. Mitosis and meiosis are two types of cell division. These processes are similar in many ways. Fill in the blanks in the following sentences about their shared characteristics.
 - a. Both processes start off with the cell in _____. During this phase, the _____ and organelles duplicate in preparation for cell division.
 - b. Cells dividing via meiosis and mitosis both undergo these phases by the same names: _____, prometaphase, metaphase, _____, and telophase.
 - c. In mitosis and meiosis II, _____ are split between the resulting daughter cells.
2. Now, let's look at how mitosis and meiosis differ from each other. Fill in the blanks in the following sentences about their distinguishing characteristics.
 - a. Mitosis is how _____ cells divide, whereas meiosis is how _____ are produced.
 - b. Mitosis produces _____ daughter cells via one round of cell division, whereas meiosis produces _____ daughter cells in two rounds of cell division.
 - c. Mitosis produces _____ cells, which have the same number of chromosomes as the parent cell (two sets). On the other hand, meiosis produces _____ cells, meaning they have half the number of chromosomes as the parent cell (one set).
 - d. Mitosis produces cells that are genetically _____ to each other and the parent cell, whereas meiosis produces cells that are genetically _____.
3. In 2–3 sentences, explain why it is important for the cells produced by mitosis to be genetically identical, but this isn't the case for cells produced by meiosis.