

The Cell Cycle & Cancer – Online Lab

Name: _____

In this internet lesson, you will review the steps of the cell cycle, view a video simulations of cell division, and view an onion root tip and calculate the percentage of cells at each of the stages of cell division. Afterwards you will observe the stages of the cell cycle in a variety of tissues and compare normal cells to cancerous cells.

Part I: Cell Cycle Review

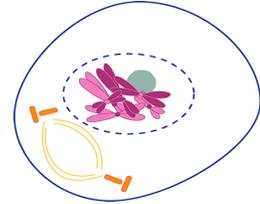
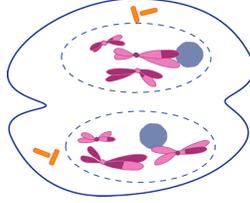
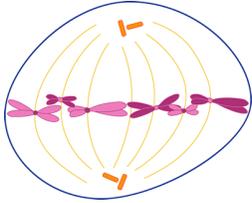
- Go to http://highered.mheducation.com/sites/0072495855/student_view0/chapter2/animation_how_the_cell_cycle_works.html
 - Watch and listen to the animation, or read the transcript. Take the quiz at the end of the page and submit answers to find out if you were right. Then answer the following questions:
1. What are the stages of Interphase? What happens during each phase?
 2. What is another name for nuclear division?
 3. What is another name for cytoplasmic division?
 4. What is the order of mitosis?
 5. When does DNA replication occur in the cell cycle?
 6. What is the final product of mitosis?

Part II: Mitosis Review

- Go back to <http://www.cellsalive.com/>
 - Under Interactive Eukaryotic Cell Cycle, Click on “Mitosis”
 - Click “Start the Animation.” Read the text on this page and view the animation, you can slow down the video by clicking step by step through the phases.
1. Identify the stages of the cell cycle:
 - Chromatin condenses into chromosomes _____
 - Chromosomes align in center of cell. _____
 - Longest part of the cell cycle. _____
 - Nuclear envelope breaks down. _____
 - Cell is cleaved into two new daughter cells. _____
 - Daughter chromosomes arrive at the poles. _____

Watch the animation carefully.

2. The colored chromosomes represent chromatids. There are two chromatids attached together to form a chromosome.
 - a. How many chromatids are visible at prophase? _____
 - b. How many chromatids are in each daughter cell at the end of mitosis? _____
3. The little green T shaped things on the cell are _____.
 - a. Describe what happens to them during mitosis? _____
4. Label each of the following phases.



5. What is a eukaryote?
6. What is a non-reproductive cell?

Part III: The Cell Cycle in an Onion Root Tip

To calculate percentages:

$$\frac{\text{Number of cells in a phase}}{\text{Total number of cells}} \times 100$$

- Go to www.biology.arizona.edu
- Click on the link on the left hand side "onion root tip"
- Read the introduction, then click the "next" button.
- Read about each phase of the cell cycle. Click "next" when finished.
- Click "next" until you have to identify each cell into a phase. You will have 36 cells to classify.
- When you're finished, record your data in the chart below. Determine the percentage of each cell phase.
- Answer the question below.

	Interphase	Prophase	Metaphase	Anaphase	Telophase	Total
Number of cells in phase						36
Percent of cells						100 %

1. Give a brief explanation of each phase:
 - a.
 - b.
 - c.
 - d.
 - e.

Part IV: Cell Cycle and Cancer

- Go to: http://www.mhhe.com/biosci/genbio/virtual_labs_2K8/labs/BL_03/index.html
- **Click on the microscope** to begin learning about the phases of mitosis
- **Click and drag the Phase Names** (at the top of the screen) to the corresponding blank space under the cell on the slide.
- Record the number of cells in each phase of mitosis in the tissue sample. You can use the calculator to determine the percentage of cells dividing and the percentage of cells at rest. When you have counted all the cells in the particular sample. **Click the "Tissue Slides"** and select a new sample. You can choose from normal or cancerous tissues. Answer the questions below about the cells you observed.

	Cells At Rest	Cells dividing				# of cells dividing/ total # of cells	# of cells at rest/ total # of cells
	Interphase	Prophase	Metaphase	Anaphase	Telophase	Percent of Cells dividing	Percent of Cells at Rest
Normal Lungs	19	1	0	0	0	1/20 = 5%	19/20 = 95%
Cancerous Lungs							
Normal Stomach							
Cancerous Stomach							
Normal Ovary							
Cancerous Ovary							

1. Based on your data and observations, what are some of the differences between normal cells and cancer cells?

2. When studying cell division in tissue samples, scientists often calculate a mitotic index, which is the ratio of dividing cells to the total number of cells in the sample. Which type of tissue would have a higher mitotic index, normal tissue or cancerous tissue? Explain.

3. Different types of normal tissues in the human body have different mitotic indices. From the following list, which normal tissues would you expect to have the highest mitotic index: muscle, skin, kidney, or lung? Explain your answer.

Part V: Cancer Causes & Risks

- Go to <http://www.cancer.gov/cancertopics/cancerlibrary/what-is-cancer>
1. Give a definition of cancer.
 2. What is leukemia?
 3. Explain how a normal cell becomes a cancer cell.
 4. What is a tumor?
 5. What is the difference between a benign tumor and a malignant tumor?
 6. What are the drivers of cancer?
 7. How does cancer spread?
 8. How are cancers named?
 - Go to: <https://www.cancer.gov/about-cancer/causes-prevention/patient-prevention-overview-pdq>
 9. Are doctor's always able to determine the cause of someone's cancer? Why or why not?
 10. What does it mean when we say something is a risk factor?
 11. List several risk factors that people have no control over.
 12. List several risk factors that people may be able to avoid.