

Name _____

Course/Section _____

Date _____

Professor/TA _____



Activity 12.1 What is mitosis?

What is mitosis?

1. What is the overall purpose of mitosis?
2. In what types of organism(s) does mitosis occur? What type of cell division occurs in bacteria?

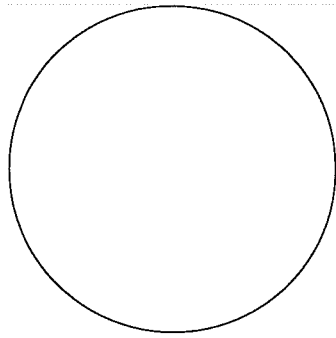
What are the stages of mitosis?



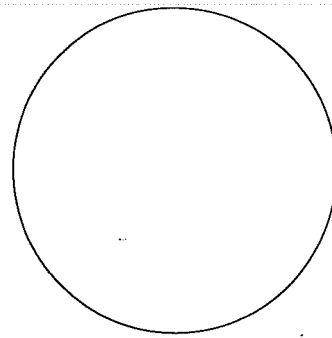
3. The fruit fly, *Drosophila melanogaster*, has a total of eight chromosomes (four pairs) in each of its somatic cells. Somatic cells are all cells of the body except those that will divide to form the gametes (ova or sperm). Review the events that occur in the various stages of mitosis.

Keep in mind that the stages of cell division were first recognized from an examination of fixed slides of tissues undergoing division. On fixed slides, cells are captured or frozen at particular points in the division cycle. Using these static slides, early microscopists identified specific arrangements or patterns of chromosomes that occurred at various stages of the cycle and gave these stages names (interphase, prophase, and so on). Later work using time-lapse photography made it clear that mitosis is a continuous process. Once division begins, the chromosomes move fluidly from one phase to the next.

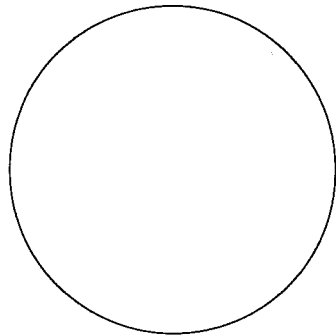
Assume you are a microscopist viewing fruit fly cells that are undergoing mitosis. In each of the circles (cell membranes) on the following page, draw what you would expect to see if you were looking at a cell in the stage of mitosis indicated. If no circle is present, draw what you would expect to see at the given stage.



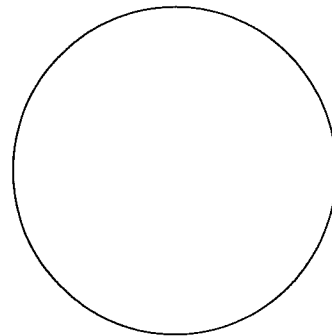
Prophase



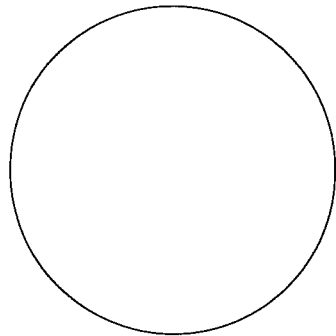
Prometaphase



Metaphase



Anaphase



Telophase

Cytokinesis

Daughter cells in interphase

What are the products of mitosis?

4. How many cells are produced at the end of a single mitotic division?
5. How many different kinds of cells are produced at the end of a single mitotic division?
6. Six centromeres are observed in a prophase cell from another species of insect.

a. How many pairs of chromosomes does this organism contain?

b. For each stage of mitosis, indicate the number of centromeres you would expect to find and the number of copies of chromosomes attached to each centromere.

Stage of mitosis:	Number of centromeres visible	Number of chromosome copies attached to each centromere
Prophase		
Anaphase		

What controls mitosis?

7. Checkpoints in the normal cell cycle prevent cells from going through division if problems occur—for example, if the DNA is damaged.
- a. What forms do the checkpoints take? That is, how do they control whether or not cell division occurs?



- b. On this page, develop a handout or diagram to explain how these checkpoints work under normal conditions. Your handout should include a description of each checkpoint, where it acts in the cell cycle, and what each does to control cell division.
- c. Cancer results from uncontrolled cell division. Explain how mutations in one or more of the checkpoints might lead to cancer.