

THE CELL CYCLE

Introduction

Once a cell reaches its size limit, something must happen - either it will stop growing or it will divide. Most cells will eventually divide. Cell division not only prevents the cell from becoming too large, but it is also the way the cell reproduces. Cellular reproduction allows you to grow and heal from an injury. Cells reproduce by a cycle of growing and dividing called the **cell cycle**.

There are three main stages of the cell cycle. The first stage is called **interphase**. This is the stage during which the cell grows, carries out cellular functions, and makes copies of its DNA. The second stage is called **mitosis**. This is the stage of the cell cycle when the cell's nucleus and DNA divide. The third stage is called **cytokinesis**. This stage when the cell will divide to create a new cell. Each of these stages is explained in more detail below.

Interphase

Interphase is divided into three stages known as G_1 , S, and G_2 .

G_1 : During G_1 , a cell is growing, carrying out normal cell functions and preparing to copy the DNA in the cell's nucleus.

S: During S phase the cell will replicate (make a copy) of the DNA.

G_2 : During G_2 , the cell creates centrioles and checks to make sure it is ready to enter mitosis.

Mitosis

Like interphase, mitosis is divided into stages: prophase, metaphase, anaphase, and telophase.

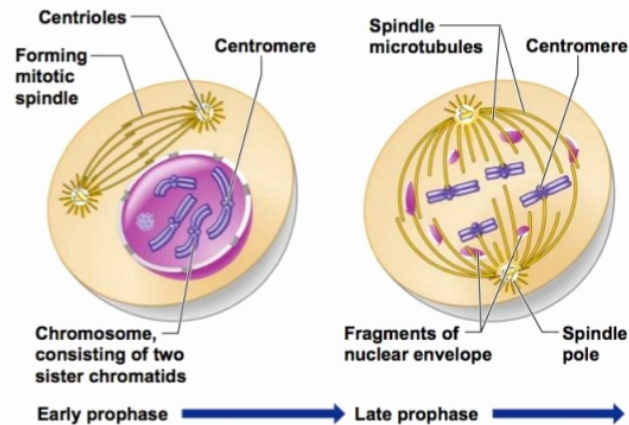
Prophase: During this phase, the cell tightens, or condenses the copied DNA into chromosomes. Because the chromosomes are a copy of each they will hook together and are shaped like an X as shown in the diagram below.



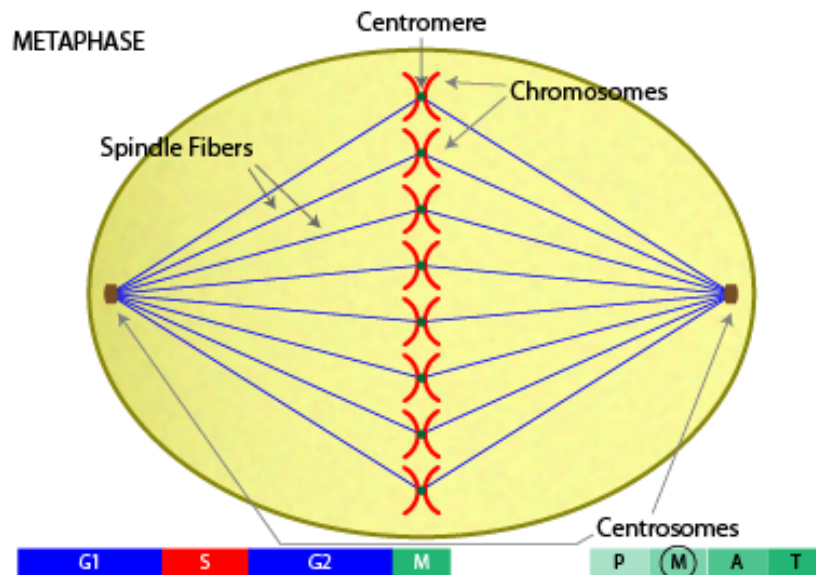
This structure is important because it ensures that a complete copy of the replicated DNA will become part of the new cell at the end of the cell cycle.

As prophase continues, the nucleus disappears and spindle fibers grow from the centrioles created during the G_2 phase. These spindle fibers will attach to the chromosomes to make sure each new cell will receive a copy of the DNA. The diagram on the next page shows an example of prophase.

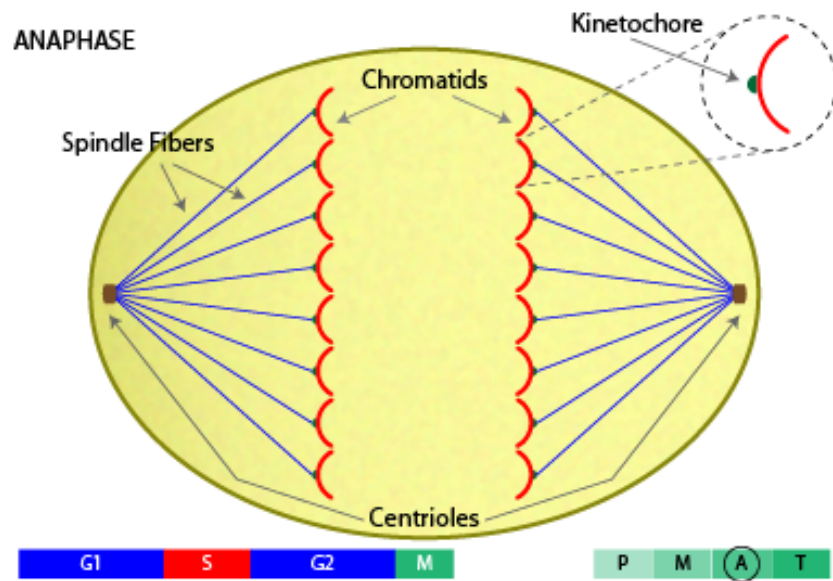
Prophase Diagram



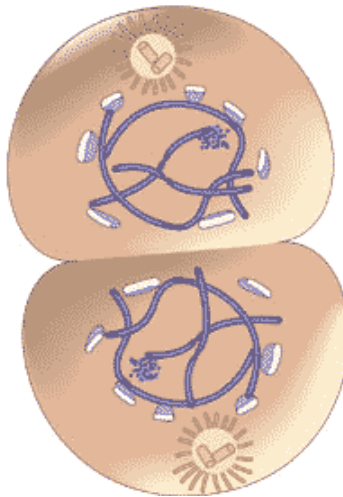
Metaphase: During metaphase, the replicated chromosomes are pushed and pulled by the spindle fibers toward the center of the cell and they line up in the middle of the cell. The diagram below shows an example of metaphase.



Anaphase: During anaphase, the replicated chromosomes are pulled apart and are moved towards opposite sides of the cell. The diagram on the next page shows an example of anaphase.



Telophase: During telophase the replicated chromosomes arrive at opposite sides of the cell. The chromosome will relax or decondense. A new nucleus will form around the DNA and the cell will make preparations to divide. The diagram below shows an example of telophase.



Cytokinesis

During cytokinesis the cell will divide. This results in two cells and each cell will have an identical copy of DNA. The diagram on the next page shows an example of cytokinesis.

CYTOKINESIS

