

# The Cell Cycle

Read the information in the paragraphs below and use it to answer the questions that follow. Please answer all questions completely and accurately.

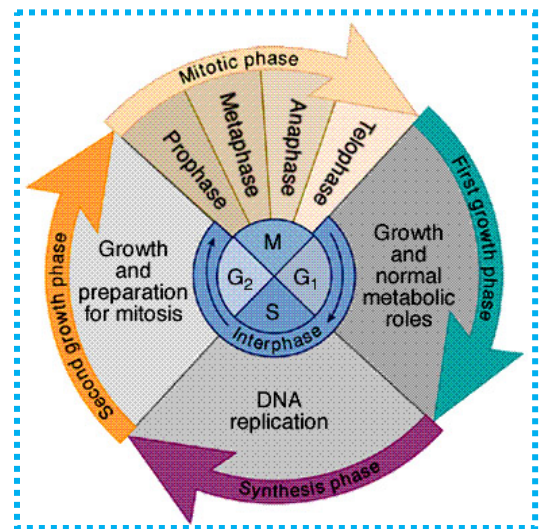
The **cell cycle** is the series of events that take place in a **eukaryotic cell** (cell containing a nucleus) between its formation and the moment it replicates itself. These events can be divided in two main parts: **interphase**, during which the cell is forming and carries on with its normal metabolic functions, and **M phase** (M for mitosis), during which the cell is replicating itself. Thus, the cell cycle is an essential process by which a single-cell fertilized egg develops into a mature organism and the process by which hair, skin, blood cells, and some internal organs are formed.

**Interphase** is a phase of the cell cycle, defined only by the absence of cell division. During interphase, the cell obtains nutrients and duplicates (copies) its genetic material (also called chromatin). The genetic material (chromatin) is located in the nucleus of the cell and is made of the molecule **DNA**.

Eukaryotic cells spend most of their time in interphase. For example, human skin cells, which divide about once a day, spend roughly 22 hours in interphase. Some cells, such as nerve cells, can stay in interphase for decades. There are 3 parts of interphase: **G<sub>1</sub>** (growth 1, in which the cell makes organelles and begins metabolism), **S phase** (DNA synthesis, in which the cell makes a copy of its DNA) and **G<sub>2</sub>** (growth 2 in which the cell grows in preparation for cell division).

Sometimes the cells exit the cell cycle (usually from G<sub>1</sub> phase) and enter the **G<sub>0</sub> phase**. In the G<sub>0</sub> phase, cells are alive and metabolically active but do not divide. In this phase cells do not copy their DNA and do not prepare for cell division. Many cells in the human body, including those in heart, eyes, and brain are in the G<sub>0</sub> phase. **If these cells are damaged they cannot be replaced.**

**Mitosis** is the process in which a **eukaryotic cell** separates its already duplicated chromosomes (copied during the S phase) into two sets of chromosomes so there will be **two identical nuclei**. It is followed by **cytokinesis** which divides the cytoplasm and cell membrane. This results in **two identical cells** (both have an identical set of chromosomes) with an equal distribution of organelles and other cellular components. Mitosis does NOT occur in prokaryotic cells that do NOT have a nucleus. In multicellular organisms, the **somatic cells** (body cells) undergo mitosis, while **germ cells** — cells destined to become sperm in males or ova (eggs) in females — divide by a related process called **meiosis**. **Prokaryotic cells** (such as bacteria), which lack a nucleus, divide by a process called **binary fission**.



Name: \_\_\_\_\_ Hour: \_\_\_\_\_

### Follow-up Questions:

1. What is the cell cycle?
2. Circle the type of cells that the cell cycle occurs in → Prokaryotic or Eukaryotic
3. Name the two main phases of the cell cycle and describe what occurs in the cell during each phase.
4. Cells obtain \_\_\_\_\_ and copy their \_\_\_\_\_ (genetic material) during interphase.
5. Where in the cell is chromatin and what is chromatin made of?
6. In what phase of the cell cycle do cells spend most of their time?
7. Which type of cells stay in interphase longer → skin cells or nerve cells? Why do you think this is the case?
8. List the 3 sub-phases of interphase in the correct order and explain what happens during each sub-phase.
9. What is  $G_0$  phase and which types of cells in the human body enter this phase?
10. Why is damage to cells in  $G_0$  phase dangerous?
11. The nucleus divides during \_\_\_\_\_, while the cytoplasm divides during \_\_\_\_\_.
12. *True or false*: Cells produced during mitosis are genetically different from one another.
13. Body cells are called \_\_\_\_\_ cells, while reproductive cells are known as \_\_\_\_\_ cells.