

# The Cell Cycle

# THINK ABOUT IT

What role does cell division play in your life?

Why would cells grow and divide?



Students, write your response!

# Why do cells divide?

- Cell division occurs for three main reasons:
  1. **Replace cells**
    - Cells divide to replace old, dead, or damaged cells
  2. **Organism growth**
    - Organisms grow because cells divide, not because the cells themselves grow larger
    - In human bodies, nearly two trillion cells divide every day
  3. **Reproduction**
    - Cell division creates egg and sperm cells

# THINK ABOUT IT

What do you think takes longer- cell growth or cell division?

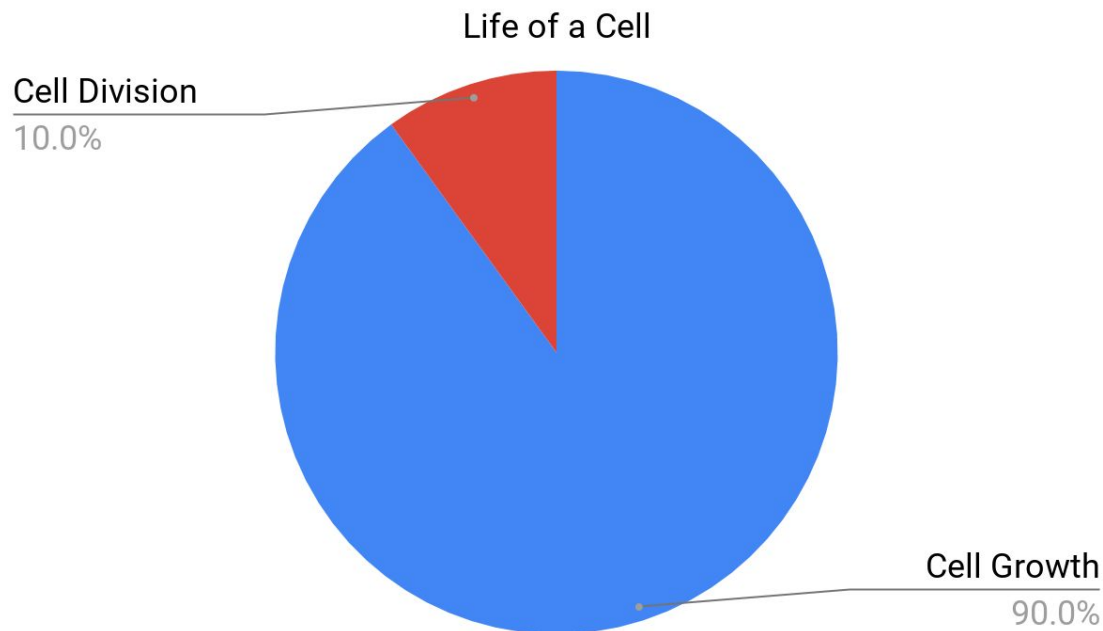
Why?



Students, write your response!

# Cell Growth and Division

- Cell division is only 10% of a cell's life
  - 90% of the time, cells are not actually dividing
- Cells have to grow and prepare before they divide

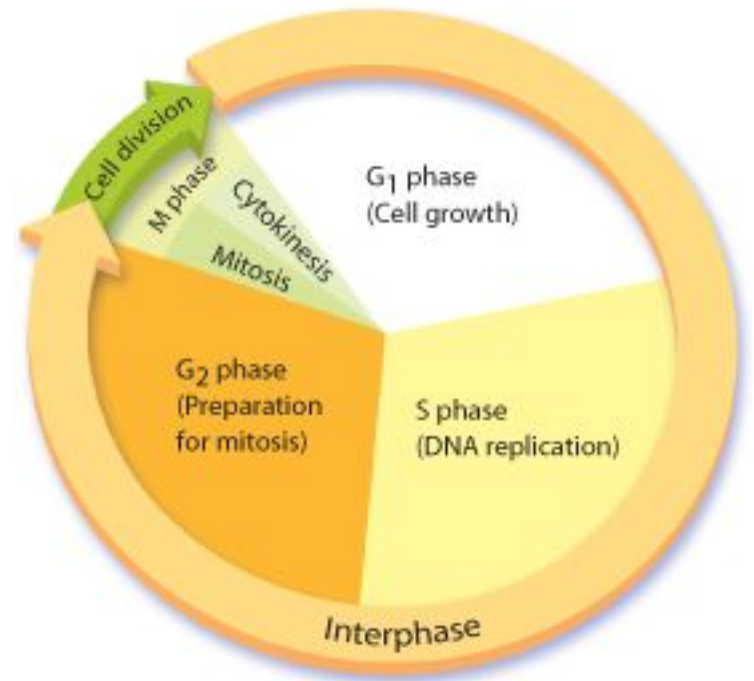


# The Cell Cycle

The cell cycle is often illustrated as a pie chart.

The cell cycle can first be divided into two phases:

- 1. Interphase**
- 2. M phase**



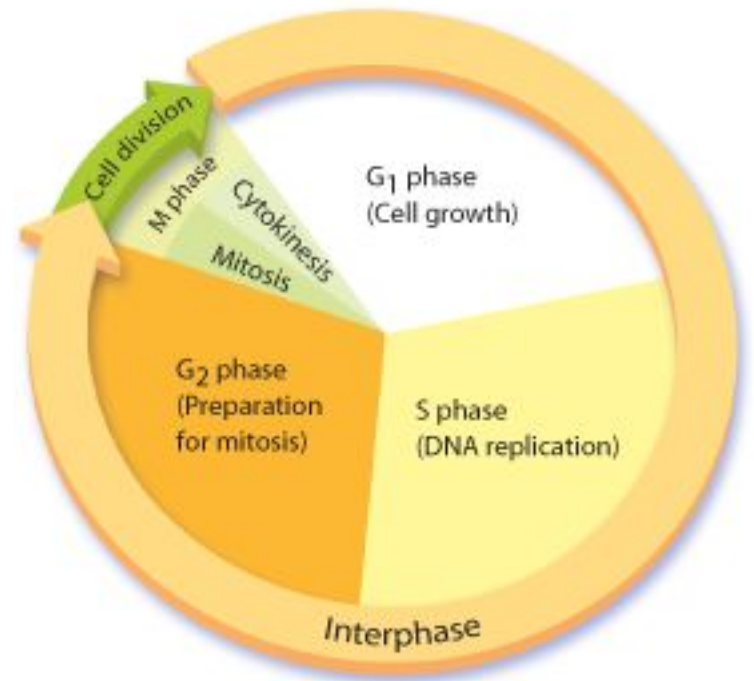
# The Cell Cycle

Interphase is the time between cell divisions. It is further divided into three phases:

1. **G1 phase**
2. **S phase**
3. **G2 phase**

The M phase is the period of cell division. It is further divided into two phases:

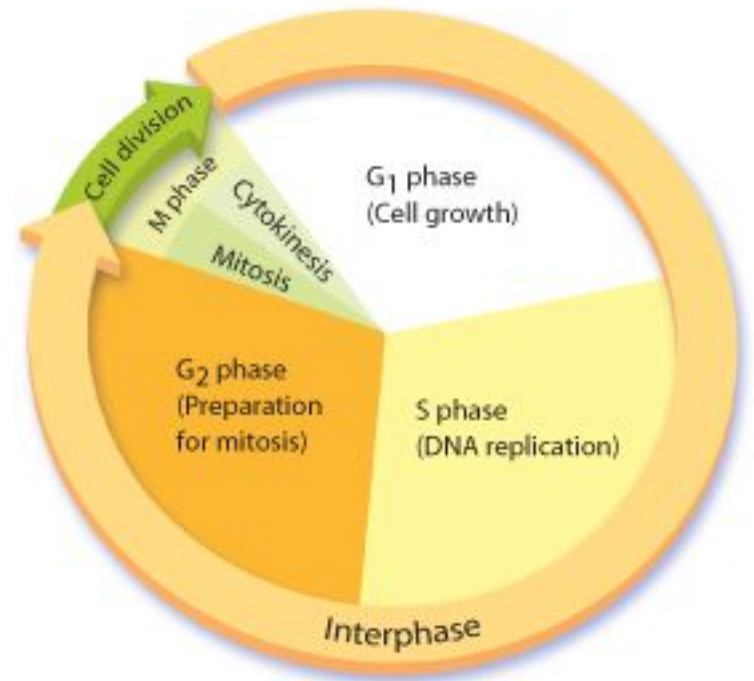
1. **Mitosis**
2. **Cytokinesis**



# What happens during Interphase?

The cell spends **most of its time in Interphase.**

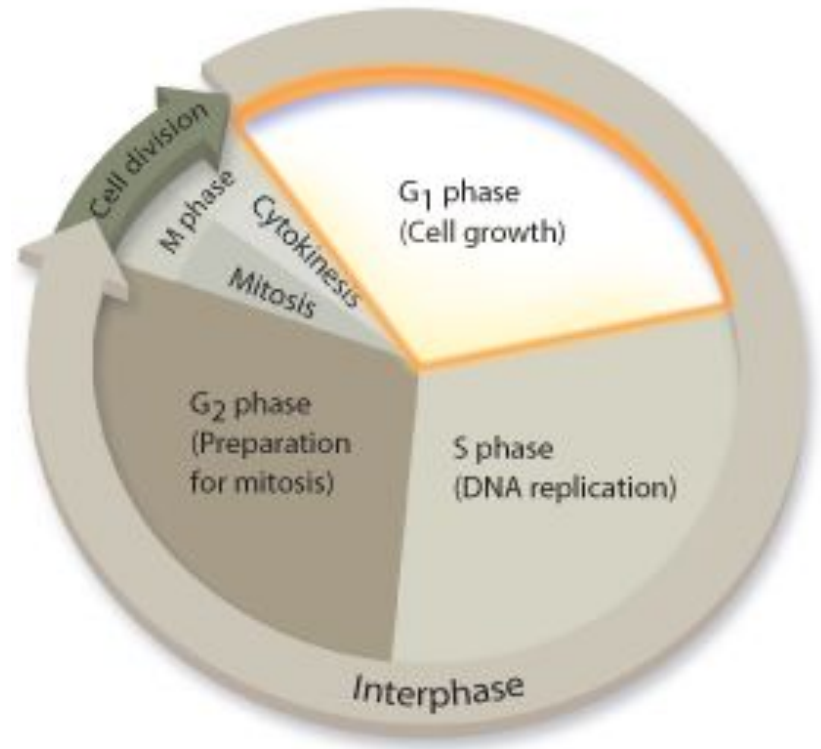
In Interphase, the cell is growing, replicating its DNA, and preparing to divide.





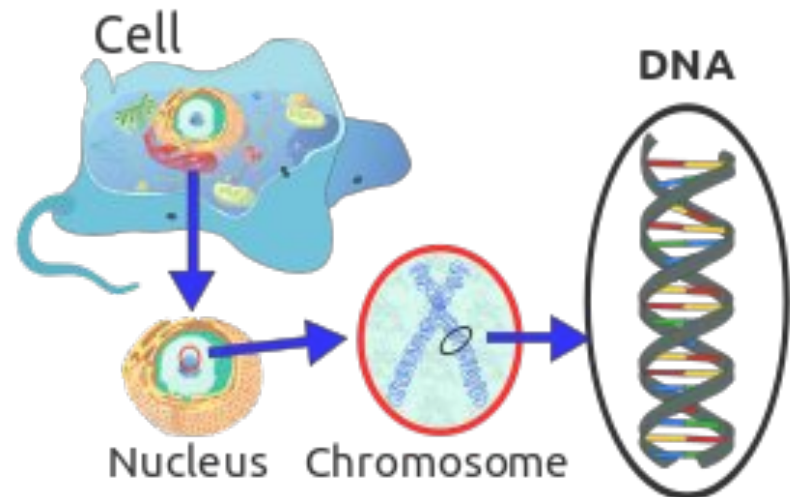
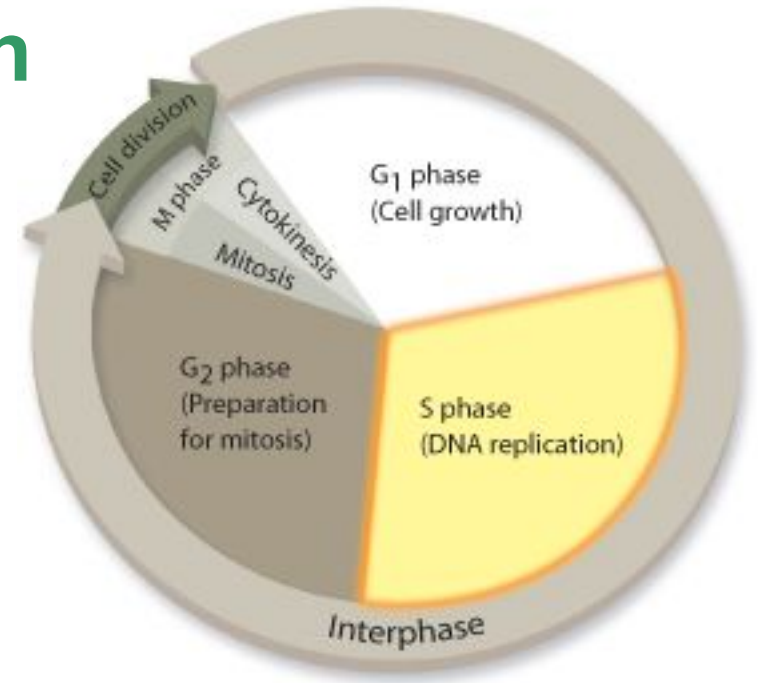
# G<sub>1</sub> Phase: Cell Growth

- In the G<sub>1</sub> phase, **cells increase in size and synthesize new proteins and organelles**



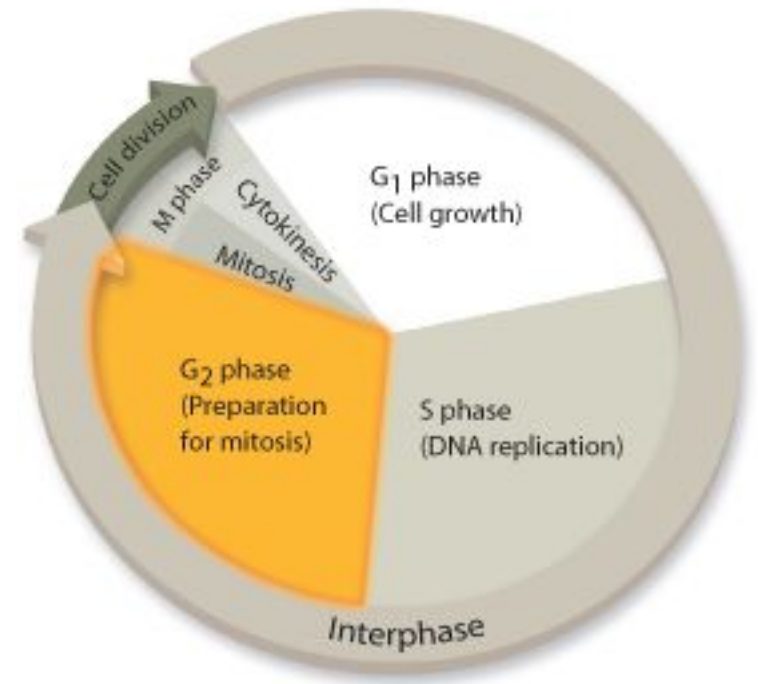
# S Phase: DNA Replication

- In the S (or synthesis) phase, **new DNA is synthesized when the chromosomes are replicated**
- Chromosomes are thread-like structures in which DNA is tightly packaged within the nucleus



# G<sub>2</sub> Phase: Preparing for Cell Division

- In the G<sub>2</sub> phase, many of the organelles and molecules required for cell division are produced



# THINK ABOUT IT

What organelle is being produced in the  $G_2$  phase?

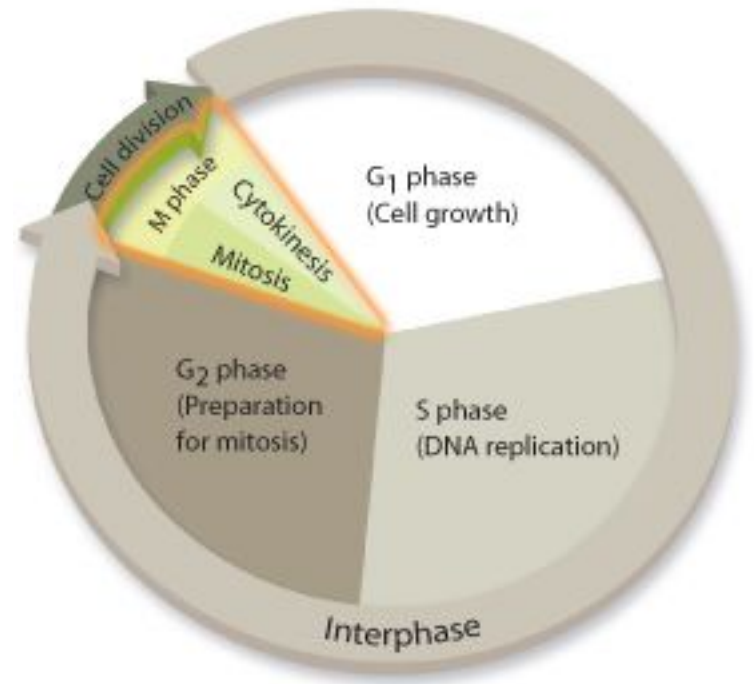
Why?



Students, write your response!

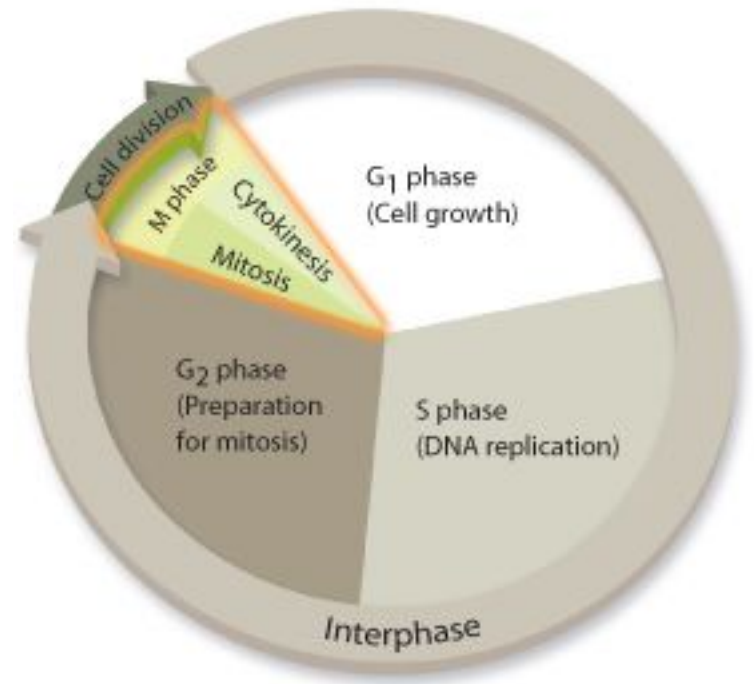
# M Phase: Cell Division

- Cell division occurs in two stages: mitosis and cytokinesis.
- Mitosis is the **division of the nucleus**
  - **Chromosomes divide**
  - Mitosis is divided into 4 phases:
    1. **Prophase**
    2. **Metaphase**
    3. **Anaphase**
    4. **Telophase**



# M Phase: Cell Division

- Cell division occurs in two stages: mitosis and cytokinesis.
- Cytokinesis is the **division of the cytoplasm**
  - **Parent cell divides into two daughter cells**



# G<sub>0</sub> Phase: Resting Phase

- Some adult cells do not undergo M phase or take long breaks in between
- These cells may exit the cell cycle and go into the G<sub>0</sub> phase where they are **neither dividing nor preparing to divide**
- *Example:* neurons never divide and always stay in G<sub>0</sub> phase
- *Example:* liver cells go to G<sub>0</sub> phase for approximately a year before returning back to G<sub>1</sub> phase

# Length of Cell Cycle

- Most of the time, a cell is in Interphase
- Different cell types will enter M phase more frequently than others
- Which type of cells in your body would need to divide frequently? Why?



Students, write your response!



# Length of Cell Cycle

- How long does it take a cell to complete one cell cycle?
  - It depends on the type of cell
  - On average, a human cell takes 24 hours to complete a cell cycle
  - Certain liver cells can take up to a year
  - Certain skin cells can take 6-8 hours

# Amoeba Sisters- Cell Cycle

