

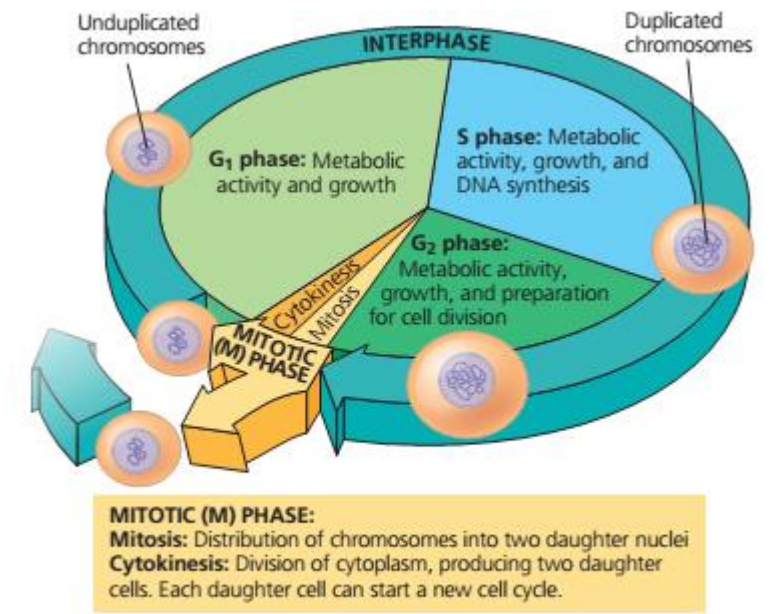
# Cell cycle

The cell cycle is the sequence of events between one cell division and the next. It has two main phases: **interphase** and **cell division**.

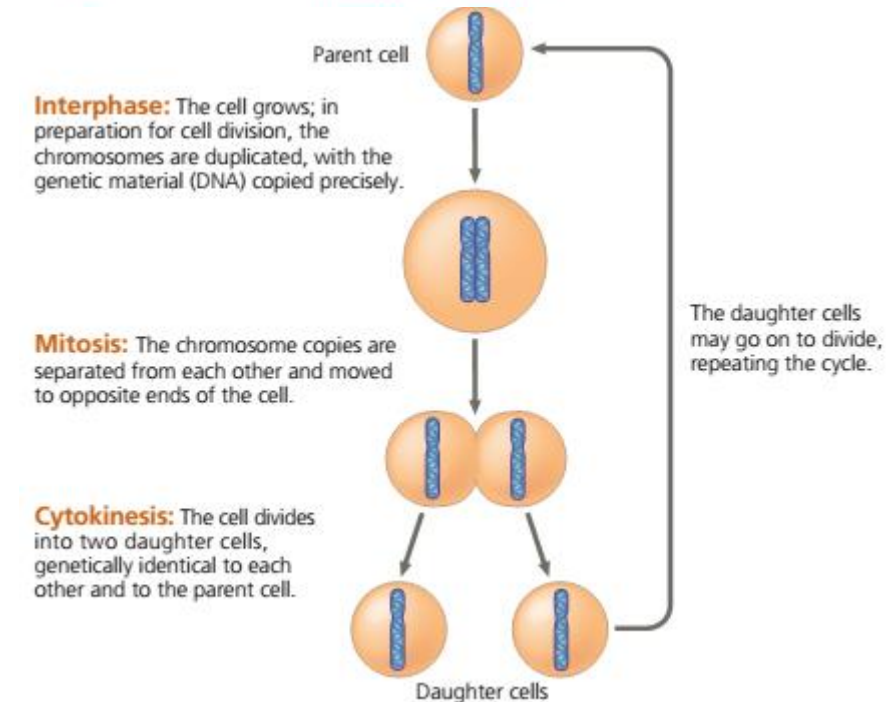
## Interphase

**Interphase is a very active phase of the cell cycle with many processes occurring in the nucleus and cytoplasm.**

Interphase is a very active phase in the life of a cell when many metabolic reactions occur. Some of these, such as the reactions of cell respiration, also occur during cell division, but DNA replication in the nucleus and protein synthesis in the cytoplasm only happen during interphase. Interphase consists of three phases, the **G<sub>1</sub> phase**, **S phase** and **G<sub>2</sub> phase**. In the S phase the cell replicates all the genetic material in its nucleus, so that after mitosis both the new cells have a complete set of genes. Some do not progress beyond G<sub>1</sub>, because they are never going to divide so do not need to prepare for mitosis. They enter a phase called G<sub>0</sub> which may be temporary or permanent.

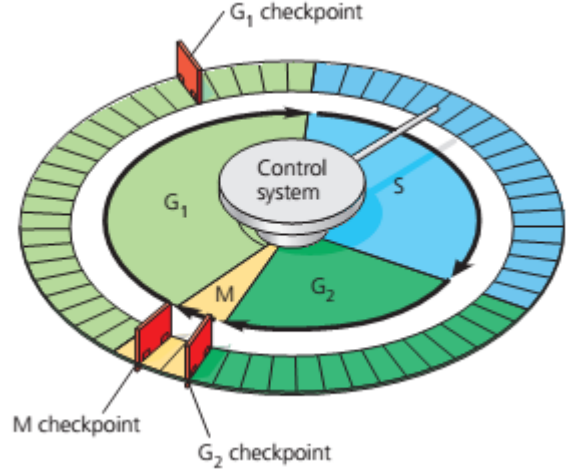
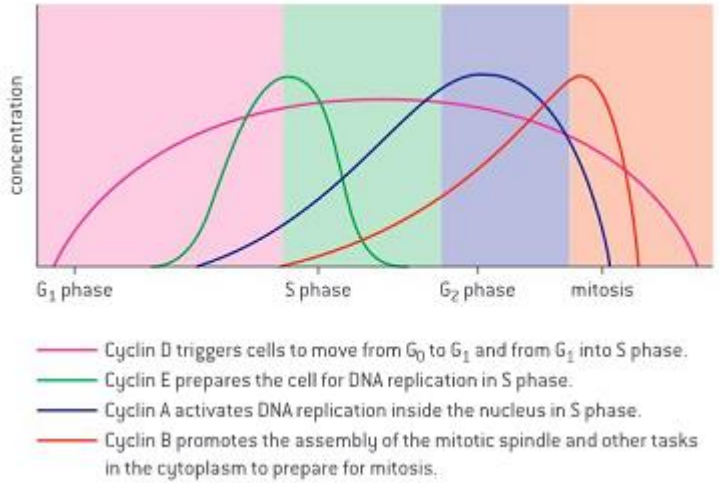


### Mastering Biology Animation: The Cell Cycle

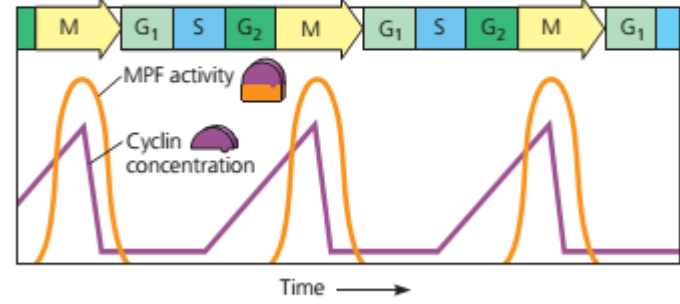


# → Cyclins are involved in the control of the cell cycle.

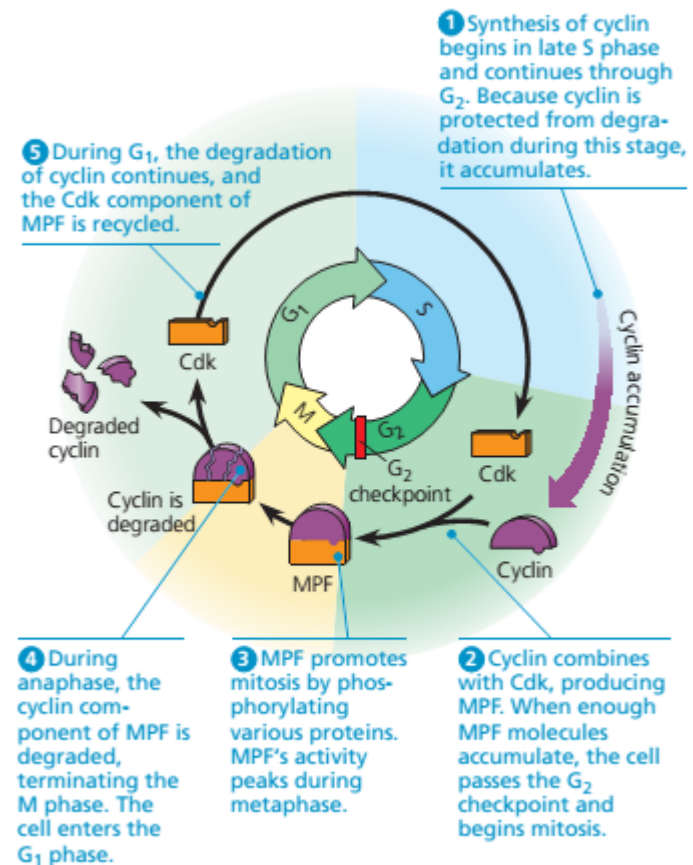
Each of the phases of the cell cycle involves many important tasks. A group of proteins called **cyclins** is used to ensure that tasks are performed at the correct time and that the cell only moves on to the next stage of the cycle when it is appropriate. Cyclins bind to enzymes called **cyclin-dependent kinases (Cdks)**. These kinases then become active and attach phosphate groups to other proteins in the cell. The attachment of phosphate triggers the other proteins to become active and carry out tasks specific to one of the phases of the cell cycle. There are four main types of cyclin in human cells.



▼ **Figure 12.16 Molecular control of the cell cycle at the G<sub>2</sub> checkpoint.** The steps of the cell cycle are timed by rhythmic fluctuations in the activity of cyclin-dependent kinases (Cdks). Here we focus on a cyclin-Cdk complex in animal cells called MPF, which acts at the G<sub>2</sub> checkpoint as a go-ahead signal, triggering the events of mitosis.



(a) Fluctuation of MPF activity and cyclin concentration during the cell cycle



(b) Molecular mechanisms that help regulate the cell cycle

