

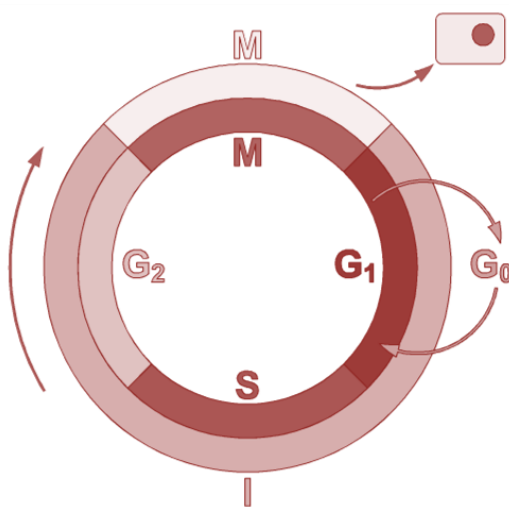
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# THE CELL CYCLE

## Parent cells, daughter cells and the cell cycle

Many organisms consist of millions of living cells. New **daughter cells** are constantly being formed from **parent cells** in a series of events which together make the **cell cycle**. A daughter cell must be able to carry out exactly the same functions as the parent cell, whether the daughter cell is a new cell in a growing organism, or a new cell simply replacing a worn-out cell, such as a dead skin cell.

All eukaryotic cells have **chromosomes** which contain one molecule of **DNA** each. These contain specific lengths of DNA called **genes**. The chromosomes hold the instructions, often called the "**blueprint**" for making new cells. Daughter cells produced during the cell cycle must contain a copy of all these instructions, so they must each carry a full set of chromosomes, copied exactly from the single set of the parent.



The diagram to the left shows the cell cycle:

**G1** indicates the first growth stage, this includes making new proteins and organelles

**S** indicates "synthesis" where each chromosome is duplicated so that each has two chromatids

The cell 'checks itself' after this stage to ensure it has two copies of each chromosome, if not, the cell cycle stops

**G2** indicates the second growth stage, the enlargement of the developing cell

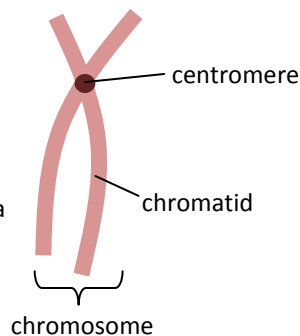
There is another 'checkpoint' next where the cell checks its progress

**M** is nuclear division (mitosis) where the cell eventually divides

The line at the end of mitosis marks **cytokinesis** (cleavage of cytoplasm)

The outside letters **M** and **I** represent mitosis (nuclear division) and **interphase**

Before a cell can divide, the DNA of each chromosome must be replicated. Two replicas are produced. Each is an exact copy of the original and they are held together at a point called the **centromere**. Each chromosome now consists of a pair of sister chromatids.



The DNA double helix, as shown in the right diagram, is coiled and wrapped in loops around cores of proteins. These are called **histones**.

