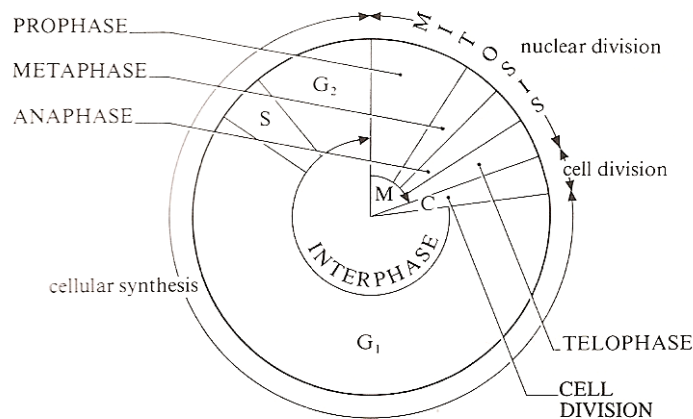


1.6 Cell Division

New cells are produced by division of existing cells. Cell division involves:

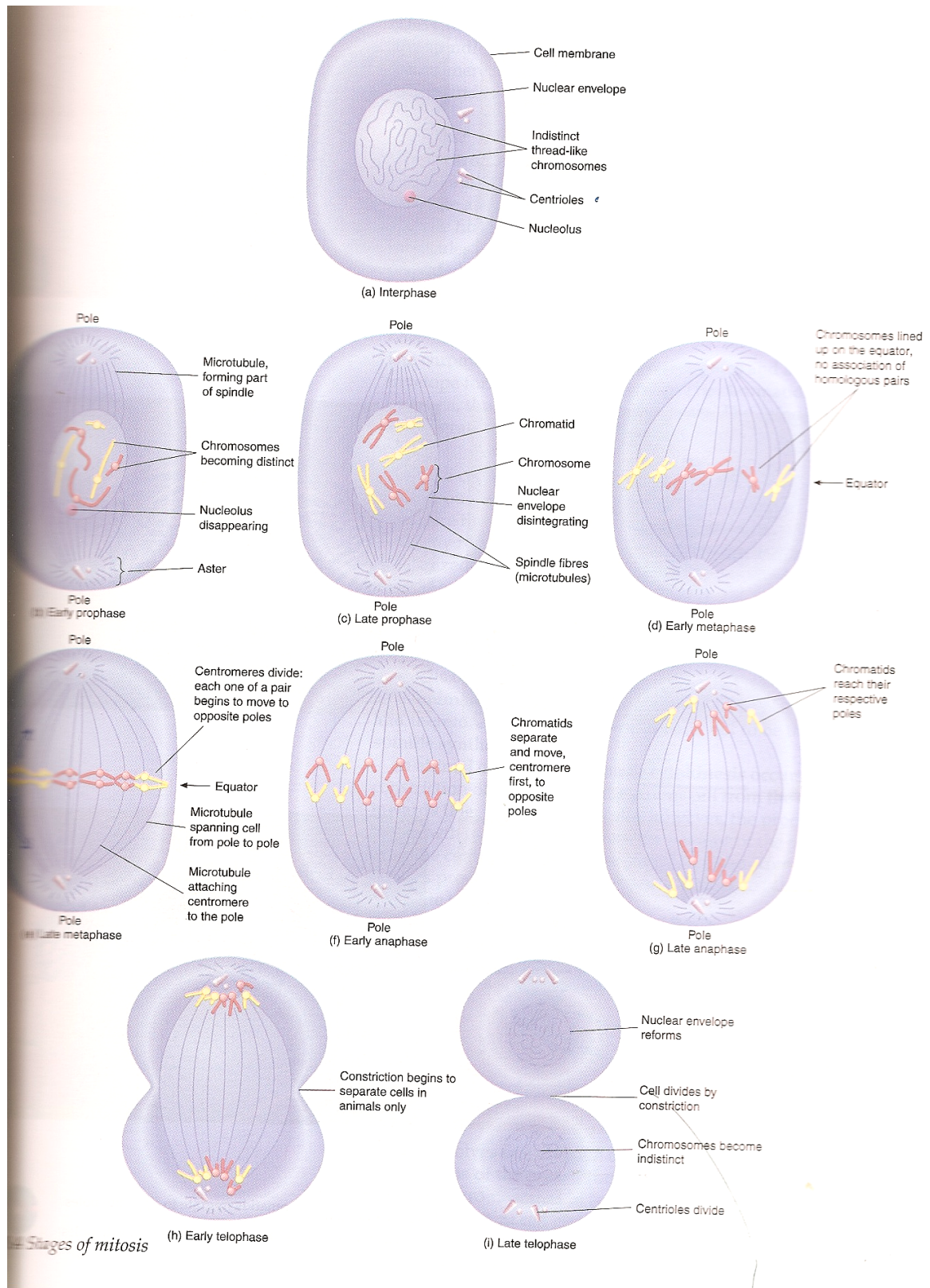
- Interphase
- Mitosis
- Cytokinesis



Phase	Events within cell
G ₁	Intensive cellular synthesis. Mitochondria, chloroplasts (in plants), ER, lysosomes, Golgi apparatus, vacuoles and vesicles produced. Nucleolus produces rRNA. mRNA and tRNA and ribosomes are synthesised. Cell produces structural and functional proteins. Cell metabolic rate high and controlled by enzymes. Cell growth occurs. Substances produced to inhibit or stimulate onset of next phase.
S	DNA replication occurs. Protein molecules called histones are synthesised and cover each DNA strand. Each chromosome has become two chromatids.
G ₂	Intensive cellular synthesis. Mitochondria and chloroplasts divide. Energy stores increase. Mitotic spindle begins to form.
M	Nuclear division occurs in four phases.
C	Equal distribution of organelles and cytoplasm into each daughter cell.

Interphase, the longest phase of the cycle, is an active period in the life of a cell when many metabolic reactions occur, including protein synthesis, DNA replication and transcription, cell growth and increase in mitochondria and/or chloroplasts.

Mitosis:



Mitosis is needed during:

- Growth
- Embryonic development
- Tissue repair when damaged
- Asexual reproduction

Cyclins:

They are proteins (accidentally discovered) involved in the control of the cell cycle. They 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.

Tumour (cancer) formation:

Uncontrolled cell division causes tumours that can occur in any organ or tissue.

Oncogenes are a few genes that can become cancer – causing after mutating and are involved in the development of primary tumours. **Metastasis** is the movement of cells from a primary tumour to set up secondary tumours in other parts of the body.

The mitotic index:

The mitotic index is the ratio between the number of cells in mitosis in a tissue and the total number of observed cells. It can be calculated using this equation:

Mitotic index = number of cells in mitosis / total number of cells

It is an important prognostic tool for predicting the response of cancer cells to chemotherapy.