Prophase:

- Supercoiling makes the chromosomes shorter and thicker.
- Centrioles move to the opposite poles of the cell and spindle fibres begin to form.
- Nuclear membrane is broken down.

Metaphase:

- Spindle fibres from the two centrioles attach to the centromere of the sister chromatids.
- Sister chromatids line up separately along the equator of the cell.

Anaphase:

- Sister chromatids are pulled apart, causing the splitting of the centromeres, and the sister chromatids (now called chromosomes) move to the opposite poles of the cell.

Telophase:

- New nuclear membrane forms around each set of chromosomes.
- The chromosomes decondense (uncoil).

Mitotic Index:

$$mitotic\ index = \frac{number\ of\ cells\ in\ mitosis}{total\ number\ of\ cells}$$

Cyclins:

Cyclins are compounds that control the cell cycle. Each phase has to be regulated to ensure everything is ready before progression into the next phase. Cyclins control enzymes called CDKs (cyclin dependent kinases) that direct cells through the cell cycle and control specific events such as spindle fibre formation and chromatic alignment.

Cancer and Cell Division:

Tumours are the result of uncontrolled cell division and these can occur in any organ or tissue. The cell cycle is usually under strict control by a complex chemical control system that responds to signals both inside and outside of the cell. Most normal cells, if damaged, undergo a programmed cell death (apoptosis). However, sometimes cell division may continue unchecked and produce an excess of cells which clump together forming a growth known as a tumour.

Tumour suppressor genes produces proteins which inhibit cell division, while proto-oncogenes produce proteins that promote growth and division.

Mutations to these genes result in uncontrolled cell division, resulting in the formation of a tumour.

Primary tumours can grow in size which causes damage to local tissue; they may also spread to other parts of the body through the blood (malignant tumours). This is known as metastasis. Here they form secondary tumours.