

## 1 | Mitosis

Mitosis is the process by which somatic cells (not sperm/egg) replicate itself — by duplicating its DNA and splitting itself into two cells. The process of mitosis happens in 4ish stages. Basically:

- **(P)rophase** — nucleus break down and DNA becomes bundled into chromosomes. The mitotic spindles began to form that will help pull the DNA away.
- **(M)etaphase** — capturing of bundled chromosomes to line them up along the metaphase plate at the equator. The kinetocore (center) of the chromosome become attached to the mitotic spindles in preparation for the anaphase.
- **(A)naphase** ("a for away") — the microtubules push poles apart and yank chromosomes by their kinetocore to opposite ends of the poles. Kinetocore senses tension, and when it is correct, molecules are sent down the microtubules to send a split signal
- **(T)elophase** — the spindle disappears and the microtubules break to form the cell wall of the two new cells. The chromosomes fall apart and the newly tangled bundle of DNA becomes encircled by the new nucleus.
- **Cytokinesis** — the two new cells separate

### 1.1 | Prophase

The cytoskeleton of a cell disassembles, and the spindles to separate the cell begins to form.

The centrioles, the proteins connecting all the spindles, separate to opposite poles of the cell and establishes the bridge of all the microtubules called the "spindle apparatus".

Protein "joints" in the centromeres of chromosomes called kinetocore attach to a spindle after the nuclear envelope erupts.

### 1.2 | Metaphase

The microtubules guide the proteins to align in the equator of the cell called the "metaphase plate".

Organelles are also moved by being pulled by the motor proteins and their spindles.

### 1.3 | Anaphase

The centromere's centre degrades, freeing the two halves of the chromosomes.

Kinetocore senses tension, and when it is correct, molecules are sent down the microtubules to send a split signal. Yanked by their kinetocores by the microtubules, each copy of the chromatid moves towards one pole of the cell.

### 1.4 | Telophase

A "cleavage furrow" forms in the centre of the cell created by actin on the circumference constricting. As this cleavage deepens (the actin constricting further), the chromosomes unravel whilst a new nuclear envelope forms.

The spindle apparatus now disassembles; the microtubules are broken down further into monomers that will eventually construct the exoskeleton of the new cells.

## 1.5 | Cytokinesis

In animals... the cleavage furrow deepens even more and **extends** to the point where the two cells fully separate. In plants... because there's no actin fibers to constrict the cell wall (it's too hard), vesicles between the new cells form that pad out the two newly-formed cells called the "cell plate." During cytokinesis, the cell plate widens to the point where two cells separate.