*This is the **Higher Combined** version — includes Higher Tier content. Some Separate-only details are omitted.*

Mitosis is the type of cell division used for growth, repair and asexual reproduction. It produces two genetically identical daughter cells.

- Before mitosis, DNA replicates so each chromosome is copied — the cell has double the DNA.
- In mitosis: chromosomes condense → line up at the equator → spindle fibres pull copies to opposite poles → cytoplasm divides → two identical daughter cells produced.
- Each daughter cell has the same number of chromosomes as the parent cell (diploid).
- Humans: 46 chromosomes in 23 pairs in body cells.
- Uses of mitosis: growth (increasing cell number), repair (replacing damaged cells), asexual reproduction.
- Cancer: mutations cause cells to lose normal cell cycle control → uncontrolled division → tumour formation.
- Benign tumour: stays in one place, does not invade other tissue, usually not life-threatening.
- Malignant tumour: invades surrounding tissue, can spread via blood or lymph to form secondary tumours (metastasis) — cancer.
- Risk factors for cancer: UV radiation (skin cancer), smoking (lung cancer), obesity, some viruses (HPV), asbestos.

★ **HT** The cell cycle has checkpoints that normally prevent damaged DNA from being copied — cancer arises when these checkpoints fail.

Key Terms

Mitosis	Cell division producing 2 genetically identical diploid daughter cells — for growth and repair
Diploid	Having two sets of chromosomes (46 in humans)
Cancer	Uncontrolled cell division caused by mutations in genes controlling the cell cycle
Benign tumour	Non-cancerous — stays localised, does not spread
Malignant tumour	Cancerous — invades tissue, can metastasise (spread) to other parts of body
Metastasis	The spread of cancer cells from the original tumour to other parts of the body via blood

■ **Exam Tip:** Key phrase: mitosis makes 2 IDENTICAL cells. If asked to describe mitosis, always mention: DNA replication BEFORE division, chromosomes line up at equator, pulled to poles, two identical cells result. Mitosis ≠ meiosis — know the difference.