*This is the **Higher Separate** version — includes all Higher Tier content (marked ★) and all Separate Science content.*

Mitosis produces genetically identical cells for growth and repair. It is tightly controlled to prevent cancer.

- Cell cycle: G1 (growth) → S (DNA replication) → G2 (preparation) → M (mitosis) → cytokinesis
- Mitosis: chromosomes condense, line up at equator, pulled to poles, cell divides → 2 identical diploid cells
- Cell cycle checkpoints prevent damaged DNA from being copied. Cancer = checkpoints fail
- Stem cells: embryonic (any cell type — totipotent), adult (limited types, e.g. blood cells in bone marrow)
- Stem cell therapy: potential treatment for Parkinson's, diabetes, spinal cord injuries

Key Terms

Mitosis	Cell division producing 2 identical diploid cells
Stem cell	Undifferentiated cell that can divide and specialise
Totipotent	Can differentiate into any cell type (embryonic stem cells)

■ **Exam Tip:** Cancer results from mutations in CHECKPOINT genes — cells divide without proper DNA checks. Benign = stays localised. Malignant = spreads (metastasises).