Cell Cycle and Mitosis

6.2 Cell Cycle and Mitosis

1. The division of the nucleus, followed by cytoplasmic division (cytokinesis) that produces two genetically identical daughter nuclei.
2. Controlled by the cell cycle; interphase (G1, S, and G2 phase) and M phase.
3. After mitosis is completed, cytokinesis occurs to form two identical daughter cells.
4. Cytokinesis occurs in animal and plant cells.
5. Animal cells form a cleavage furrow to form two separated individual cells.
6. Plant cells form a cell plate to produce two separate cells.

The Cell Cycle and M phase:

Interphase

G1 phase

- Synthesized proteins and new organelles
- The metabolic rate of the cell is high
- Chromosomes are thin, known as chromatin

S phase

- Synthesized DNA
- Form two identical sister chromatids through DNA replication

G2 phase

- The cell continues to grow
- Enzymes for cell division are synthesised
- The cell accumulates energy

M phase

Prophase

- Chromosomes become condense and visible under the microscope
- Two sister chromatids joined at the centromere
- Centrioles move to the opposite poles
- Spindle fibres are formed
- Nucleolus and nuclear membrane disappear

Metaphase

- Chromosomes aligned on the metaphase plate
- Spindle fibres form completely

Anaphase

- Spindle fibres pull the two sister chromatids at the centromere
- Causing the two sister chromatids to separate

Telophase

- Begins when both chromosomes reached completely at the poles
- Chromosomes uncoiled and became chromatin again
- Spindle fibres disappear, and the nuclear membrane begins to form
- Now the M phase is complete

The necessity of mitosis:

- For embryo development and organism growth, mitosis ensures that rapid cell growth occurs.
- When the body is injured, mitosis will produce new cells to replace cells that are dead or damaged.
- Stem cell therapy uses stem cells from bone marrow to treat damaged cartilage.
- Through the mitosis process, the lizard is able to grow a new tail (regeneration) if the tail breaks.

Effects of Uncontrolled Mitosis:

1. Can produce cancer cells.
2. Cancer cells are abnormal cells that compete for nutrients and energy with the normal cells for growth, which cause the normal cells to malfunction and die.