**Key Questions: Mitosis and the Cell Cycle**

**Explain the significance of cell division, with reference to the basic relationship between genes and proteins (i.e. genes code for proteins)**

1. Why do cells need to undergo cell division?

To repair and replace cells; Growth of organisms; reproduction in some simple organisms; regeneration

2. Why is it important that cells undergoing mitosis to produce genetically identical daughter cells?

Mitosis allows cells to replicate themselves with identical cells--- it ensures DNA is the same in all body (somatic) cells otherwise new cells would function differently than parent cells or not at all.

Mitosis ensures that copies of DNA are divided evenly between two daughter cells. So that daughter cells are genetically identical to the parent cell.

**Describe in sequence the features of the cell cycle, including interphase, mitosis and cytokinesis**

**1. List the stages of the cell cycle in order and the main events that occur during each stage.**

Interphase – DNA replication, growth of cell, replication of organelles, proteins produced, cell carries out regular functions and acquires nutrients required for cell division.

Mitosis- nuclear division

**Prophase**- chromatin condenses to form chromosomes, nuclear membrane breaks down, centrioles move to opposite poles and spindle fibres form and attach to chromosomes at centromeres

**Metaphase**-spindle fibres contract pulling X-shaped chromosomes into a single line across the equator of the cell.

**Anaphase**- chromatid pairs (on X-shaped chromosome) split into two chromosomes by the tightening of the spindle fibres. Each chromosome from each pair travels independently to opposite sides of cell

**Telophase**- one complete set of each chromosome is at each pole of cell, spindle fibres disappear, nucleolus reappears and nuclear membrane reforms

Cytokinesis – splitting of the cytoplasm to form two identical daughter cells each with a copy of the genetic information found in the parent cell.

2. What are two differences in the cell cycle between plant and animal cells.

Animals cells have centrioles that produce the spindle fibres plants do not have these structures.

During cytokinesis- in animals cells the cytoplasm pinches dividing the cells into two; in plants a cell wall forms in the centre of the parent cell to divide the cell into two cells.

3. How are daughter cells similar to the parent cells following cytokinesis.

Daughter cells are genetically identical to the parent cell. Each of two cells has one copy of each chromosome that was in the parent cell.

4. What are two processes that occur during interphase that are necessary for nuclear division to take place during mitosis?

DNA replication and growth of the cell