

The cell cycle



**ASSIGN
BUSTER**

1) Briefly describe all phases of the cell cycle and tell what happens in each.

a) Interphase: G1 phase, S phase, G2 phase

G1- the size of the cells increases, synthesize proteins and produce RNA. The DNA synthesis is also enhanced.

S phase- the replication of DNA takes place which produces the two similar daughter cells.

G2- this is the gap between mitosis and synthesis of DNA where the cells grows and produces proteins. It determines whether the cell can move to mitosis (CELL alive).

b) M phase

The production of protein and cell growth is terminated at this stage and the available energy is used in the division to produce similar daughter cells (CELL alive).

2) Which phase is the shortest?

M phase is the shortest (CELL alive).

3) What is G0 (Gap 0/Resting phase)?

G0 is the stage where the cell leaves the cycle and stops dividing.

4) If a cell never entered the resting phase would it be a problem? Why?

It would be a problem because the stage of development will be affected and division will be stopped (CELL alive).

5) Certain cells in the body stay in Gap 0 and rarely, if ever, divide. Name 2 cell types in the human body that do not divide.

Brain cells and nerve cells.

6) Other cell types in the body divide frequently (cycle fast). Name 1 tissue type in the body that divides often. Why does this tissue type need to divide frequently?

The intestinal wall cells divide often. It divides frequently to provide new surfaces since the surfaces are frequently worn out during digestion.

Mitosis

1) Explain the purpose of mitosis in the human body.

Mitosis helps in the replication of somatic cells in the body, growth and repair.

2) Briefly describe each phase of mitosis. (Basic genetics).

Interphase- in this stage, the DNA has replicated and they are in a chromatin. The nuclear membrane is present and it protects the DNA molecules from mutation.

Prophase- here, the DNA molecules shorten and coil forming chromosomes. The nuclear membrane is not visible at this stage and the spindles moves to the opposite cell poles.

Metaphase- at this stage, the spindles is attached to the chromosomes' centromeres and the chromosomes are aligned at the equatorial plate.

<https://assignbuster.com/the-cell-cycle-essay-samples-2/>

Anaphase- the spindle fibres become short and the centromere splits and the resulting chromatids are pulled behind the centromeres.

Telophase- the chromosomes moves to the poles and the disintegration of the spindle fibres takes place.

3) Describe and distinguish between replicated chromosomes and homologous chromosomes.

The homologous chromosomes are the ones that are in pairs and have diploid chromosome number ($2n$) while replicated chromosomes are the ones that have undergone the DNA replication and they have two sister chromatids.

4) How many pairs of homologous chromosomes are found in the nucleus of a human somatic tissue cell? How many homologous pairs are found in a human gamete?

Human gamete has 23 pairs and the human somatic cell has 23 pairs.

5) Anaphase is unique in chromosome number. Explain.

Anaphase has twice as many chromosomes as the previous phases.

6) Is a cell in anaphase diploid? Explain.

Meiosis I

1) What is the purpose of meiosis in the human body?

Production of gametes in human body.

2) Briefly describe the phases of Meiosis I.

Interphase I- in this stage, the DNA has replicated and they are in a chromatin. The nuclear membrane is present and it protects the DNA molecules from mutation

Prophase I- here, the DNA molecules shorten and coil forming chromosomes. The nuclear membrane is not visible at this stage and the spindles moves to the opposite cell poles

Metaphase I- Here, the homologous pairs of chromosomes line up next to each other.

Anaphase I- the homologous chromosome pairs moves to the opposite poles along the spindle fibres.

Telophase I- here, the cell undergoes division.

3) & Why is Meiosis I called reduction division? What is being reduced?

The number of chromosomes is reduced to half the original number.

4) What is crossing over? During which phase of Meiosis I does crossing over occur?

Crossing over is the genetic recombination and it occurs at metaphase I stage.

5) What is the significance of crossing over?

It allows for the shuffling of both parents' characteristics leading to the rise of a variety of possible combinations.

6) What is "Independent Assortment" of chromosomes? Who is associated with this theory? During what phase of Meiosis I does it occur?

Independent assortment is where the genes that represent contrasting trait pairs are segregated to gametes independently of each other and the person associated with the principle is called Mendel. The Independent Assortment of chromosomes occurs during prophase.

7) Both crossing over and "Independent Assortment" add genetic variation. How is genetic variation important to natural selection and adaptation?

Genetic variation is important for species to evolve the new mechanisms and to adapt. Natural selection is enhanced by the genetically un-identical characteristics.

Meiosis II

1) Briefly describe what happens in each phase of Meiosis II.

Prophase II- the nuclear envelope breaks down and the spindle fibres start to form.

Metaphase II- the lining up of the paired chromosomes takes place at this phase.

Anaphase II- the chromatids split and move to the opposite poles along the spindle fibres.

Telophase II- the cells in the center undergoes another division resulting to four cells each having half of the genetic material found in the original cell.

2) In a female, the products of meiosis are referred to as an egg. In a male these cells are referred to as sperms.

3) What is it called when chromosomes in meiosis fail to separate and travel together as the gametes are formed? Name 1 genetic condition caused by the failure of chromosomes to separate in Meiosis.

When chromosomes in meiosis fail to separate, it is called aneuploidy and the condition is called mutation.