



Level : 2nd Preparatory year in
Natural and Life Sciences
Matter : Genetic C
Date : 17 /01 /2024
Duration: 2 h

First Name :
Last Name :
Registration number :

First Semester ANSWER Exam (Ordinary Session)

I. Define the following term :(1 pts)

DNA. : or deoxyribonucleic acid, is a molecule that carries the genetic information responsible for the development and functioning of living organisms.

Bacterial Conjugation : is the process by which one bacterium transfers genetic material to another through direct contact.

I. Check the correct answer(s) : (3 pts)

❖ Prokaryotes? :

- 1) ☒ are small, single-celled organisms.
- 2) ☐ are organisms whose cells have a nucleus.
- 3) ☒ They have no internal membrane-bound organelles.
- 4) ☒ That have a relatively simple structure .

❖ Eukaryotes?

- 1) ☒ DNA is linear and bound up with special proteins called histones to make chromosomes.

- 2) ☒ Have membrane-bound organelles, such as mitochondria, chloroplasts
- 3) ☐ The absence of a nucleus.
- 4) ☒ Eukaryotic cells are larger and more complex than prokaryotic cells.

❖ Which characteristic is not a piece of information obtained from a karyotype?

- 1) ☐ Sex of the individual
- 2) ☐ Number of autosomes
- 3) ☐ Number of sex chromosomes
- 4) ☒ Number of Giemsa bands
- 5) ☐ Placement of centromere

II. Answer by putting a cross in front of the correct answer. (2 pts)

- 1) Mammals have a diploid life cycle, meaning that the organism is diploid and the only haploid cells are the gametes. (TRUE ☒ False ☐).
- 2) These include 22 pairs of **sex chromosomes** (numbered chromosomes) and one pair of **autosomes** (XX for females and XY for males). (TRUE ☐ False ☒).
- 3) The Y chromosome contains a variety of genes that are important for development and health. These genes include genes for intelligence, color vision, blood clotting, and many other traits (TRUE ☐ False ☒).

- 4) One of the genes on the Y chromosome is the SRY gene (that cause the embryo to develop certain sex characteristics, such as testes) (TRUE ☒ False ☐).

III. Answer the following questions :

- ❖ What are the different types of genetic mutations? (1 pts)

I. Small-scale mutations ; II. Large-scale mutations

- ❖ Examples of Aneuploidy (1 pts): Down syndrome

- ❖ The different sex chromosome systems (1 pts): Example: Mammals : XX/XY

Humans : XX/XY ; Insects :... X0 /XX;Birds :..... ZW / ZZ.....; Bees and ants..... haploid /diploid..

IV. Complete the table with the following keywords: (2.5 pts): (DNA replication ; A nucleotide ; DNA Repair; Chromosome ; A gene)

keywords	Definition
<i>Chromosome</i>	The main functions are to carry the genomic information from cell to cell and to ensure the proper distribution of genetic material during cell division.
<i>A gene</i>	is a fundamental unit of heredity and the basic physical and functional unit of genetic information.
<i>DNA replication</i>	is the process by which a cell's DNA is copied during cell division.
<i>A nucleotide</i>	is a nucleoside with one or more phosphate groups.
<i>DNA Repair</i>	Cells use mechanisms to correct mistakes in the base sequence of DNA molecules.

V. Complete the table with the key words (2 .5 pts)

keywords	Definition
Crossing over	Also known as genetic recombination, is a fundamental genetic process that occurs during prophase I of meiosis resulting in the formation of chiasmata and the exchange of genetic material
lac operon	Is an example of an inducible operon that is activated in the presence of lactose.
trp operon	Is an example of a repressible operon that is turned off in the presence of tryptophan
Transgenesis	Is a technique used to introduce foreign genetic material, known as a transgene, into the genome of an organism.

Karyotyping	is used to identify genetic disorders, birth defects (Genetic Testing) and Prenatal Testing: It can be used to check unborn babies for chromosome problems.
-------------	---

VI. Connect the following sentences with the corresponding key words (2 pts)

keywords	Definition
Prototrophs	Are mutant microorganisms that have lost the ability to produce a particular organic compound required for their growth.
In situ hybridization	Is the process of producing genetically identical copies of a biological entity.
Cloning	Is a technique that is used to detect and localize specific nucleic acid sequences in cells or tissues.
Auxotrophs	Are wild-type microorganisms that are capable of producing all required organic compounds.

VII. Complete the following diagrams (3 pts):

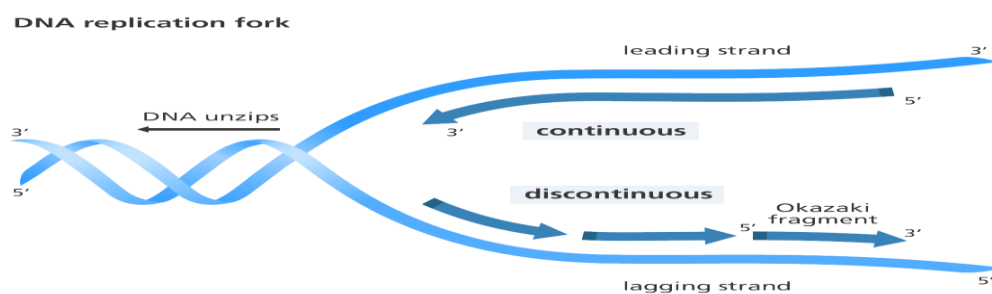
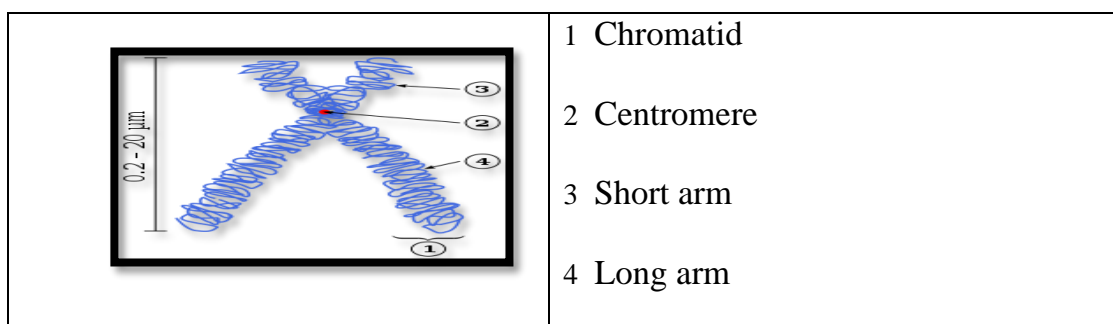


Diagram of a replicated eukaryotic chromosome



What are the four stages of mitosis?

