



# PORTFOLIO OF EVIDENCES

EXTRAORDINARY 2° OPPORTUNITY

## FUNDAMENTALS OF GENETICS AND BIOTECHNOLOGY

Student name: \_\_\_\_\_

Group: \_\_\_\_\_

Student ID: \_\_\_\_\_ Date: \_\_\_\_\_

Teacher: \_\_\_\_\_

The present portfolio is part of 50% of your grade. This value will be obtained as long as it meets the following requirements:

1. Write your complete identification data.
2. The portfolio must be delivered person as a requirement the day of the exam.

**FOLLOW THE INSTRUCTIONS PROVIDED BY YOUR TEACHER FOR THE COMPLETION OF THIS PORTFOLIO**

**!!!WARNING!!!**

Plagiarisms and trade of academic material contained in this portfolio will be punished under the terms of the University Legislation.

# FUNDAMENTALS OF GENETICS AND BIOTECHNOLOGY

## Second-opportunity portfolio

INSTRUCTIONS: ANSWER AS COMPLETELY AND CORRECTLY AS POSSIBLE THE FOLLOWING EXERCISES ACCORDING TO YOUR TEXTBOOK ON FUNDAMENTALS OF GENETICS AND BIOTECHNOLOGY

### GUIDELINES:

- The work must be answered with BLUE PEN.
- Include your name on each sheet.

### STAGE 1. CELL REPRODUCTION

*Learning objective: To examine the basis and biological significance of the cell cycle and its relationship with the processes of mitosis and meiosis at the cellular level in the organism; highlighting the importance of both processes in growth, development and inheritance, and in turn relate it to stem cell research and bioethics.*

#### DIMENSION 1. Relates the following columns

1. Reproduction that involves two parents, provides genetic diversity and involves searching for a mate.	( ) Binary fission
2. Name given to the diploid cell resulting from the union of male (sperm) and female (egg) sex cells.	( ) Sexual
3. It is the set or series of successive events of growth and division that the cell undergoes throughout its life.	( ) Asexual
4. It is defined as the process of cell division, in which a progenitor cell gives rise to two daughter cells with the same genetic information and functions as itself.	( ) Cell cycle
5. Reproduction that starts from a single stem cell and obtains new cells genetically identical to it and to each other.	( ) Zygote
6. Asexual reproduction in prokaryotes where each daughter cell has a DNA copy identical to that of the parent cell.	( ) Mitosis

#### DIMENSION 2. Correctly answer the following questions regarding the Phases of Mitosis

1. Name the 4 phases of mitosis in order of their occurrence.

\_\_\_\_\_

2. Chromatin condenses to form chromosomes, which are easily visible under a light microscope. \_\_\_\_\_

3. Phase of mitosis in which the chromosomes separate into their two component chromatids. \_\_\_\_\_

4. At this stage of cell division, chromosomes are arranged in the center or equatorial plane of the cell. \_\_\_\_\_

5. Phase where microtubules are disassembled, the nuclear membrane is restructured around each group of chromosomes \_\_\_\_\_

5. Once mitosis is complete, the cytoplasm is divided by a process called: \_\_\_\_\_

**DIMENSION 3. Correctly match the columns.**

1. Disorder that occurs when the body's cells lose the ability to control their growth.	( ) Cancer
2. Name given to programmed cell death.	( ) Apoptosis
3. A mechanism of asexual reproduction in prokaryotes in which each daughter cell has a copy of DNA identical to that of the mother cell	( ) Angiogenesis
4. Process that occurs when cancer cells have altered their ability to adhere, invade healthy tissues and organs.	( ) Binary fission
5. Name of the process that occurs when cancer cells generate their own growth factors and substances that stimulate the cells to divide and grow.	( ) Metastasis
6. What is the female gamete formed by 23 chromosomes known as?	( ) Ovule

**DIMENSION 4. Correctly describe the phases of interphase, which is the first phase of the cell cycle.**

Phase G1:

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Phase S:

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Phase G2:

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RUBRIC	Very Good Level 12 POINTS	Good Level 9 POINTS	Sufficient Level 6 POINTS	Insufficient Level 3 POINTS
Correctly answers the requested exercises	Correctly answers ALL the requested exercises	Correctly answers MOST of the requested exercises	Correctly answers HALF of the requested exercises	Incorrectly answers the requested exercises
The answers match those found in the textbook.	All the answers were taken from the textbook	Most of the answers were taken from the textbook	Half of the answers were taken from the textbook	No answers were taken from the textbook
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## **STAGE 2. MENDELIAN GENETICS**

*Learning objective: Use the basic concepts that explain the fundamental principles and laws of inheritance to explain how biological information passes from one generation to the next. Also explains the relationship of human genetic disorders caused by individual genes and the process of nondisjunction to assess its importance.*

### **DIMENSION 1. Correctly answer the following questions:**

1. He is considered the father of genetics.

A= \_\_\_\_\_

2. They are the non-visible characteristics of a living being, i.e., its genetic composition.

A= \_\_\_\_\_

3. A segment of DNA that is responsible for influencing the activities of cells or the characteristics of an organism.

A= \_\_\_\_\_

4. Concept that refers to the physical characteristics of a living being.

A= \_\_\_\_\_

5. Name given to organisms that exhibit unique and invariant traits because they are the offspring of genetically pure progenitors.

A= \_\_\_\_\_

6. A cellular organelle composed of DNA and a series of proteins called histones, which are packaged and organized.

A= \_\_\_\_\_

7. Its function is to represent the phenotypes and genotypes of a genetic cross, as well as the probability of each genotype and phenotype in the offspring.

A= \_\_\_\_\_

8. It is the process of an individual's sperm fertilizing its own ovule.

A= \_\_\_\_\_

9. A tool that allows the study of how a trait or characteristic is inherited from one generation to another.

A= \_\_\_\_\_

**DIMENSION 2- Read the following statements carefully and fill in the blanks with the corresponding terms.**

1. The \_\_\_\_\_ is a disease that occurs when the pair number 21 is added an extra chromosome.

2. The \_\_\_\_\_ states that alleles on the chromosomes of organisms segregate independently of other alleles.

3. The \_\_\_\_\_ is characterized by the fact that no allele is dominant over another.

4. The \_\_\_\_\_ are those that code for more than one characteristic in a population.

5. The \_\_\_\_\_ is produced by the absence of the enzyme phenylalanine hydroxylase responsible for the metabolism of the amino acid phenylalanine.

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### **STAGE 3: HEREDITARY MATERIAL: DNA, ARN AND PROTEIN SYNTHESIS**

*Formative purpose: Examine the structure and function of the DNA molecule as a carrier of genetic information, relating it to the processes of transcription, translation and protein synthesis, as well as the various types of mutations that result in gene and chromosomal alterations to explain the molecular basis of heredity in living beings.*

**DIMENSION 1: Write the type of mutation in each concept.**

( ) Type of mutation that occurs due to the variation of a single nucleotide in the DNA sequence or when there is a structural modification of a single gene.	a) Genetic or point mutations
( ) Type of mutation where the alteration of a base does not change the coding sense of the protein, but stops it.	b) Silent mutations
( ) Type of mutation where one amino acid is substituted by another, causing it to be used erroneously in protein synthesis.	c) Nonsense mutations
( ) Type of mutation characterized by a base change that does not modify the function of the protein, in spite of the mutation	d) Chromosomal mutations
	e) Missense mutations

**DIMENSION 2: Answer the following questions correctly.**

Write the 3 stages of translation and define them.

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_

**DIMENSION 3: Correctly select the answer.**

1. Name given to the short segments of DNA that form the lagging strand due to their slower synthesis.

- a) Okazaki fragments
- b) DNA polymerase
- c) Topoisomerases
- d) Leader strand

2. The process by which a copy of a DNA segment is made in the form of a complementary RNA strand that will act as a messenger and dictate the amino acid sequence of a protein.

- a) Transcription
- b) Translation
- c) Elongation
- d) Ribosomes

3. Process that aims to allow cell growth, repair damaged cells, replace lost cells, and form reproductive cells in multicellular organisms

- a) Cell cycle
- b) Asexual reproduction
- c) Binary fission
- d) Germination

4. These are the organelles where translation takes place and consist of two subunits, one small and one large.

- a) Anticodons
- b) Codons
- c) Ribosomes
- d) Primase

5. Type of chemical bond by which Adenine is linked to Thymine and Guanine is linked to Cytosine.

- a) Phosphodiester bond
- b) Hydrogen bond
- c) Covalent bond
- d) Ionic bond

6. It has the function of carrying the information from the DNA found in the nucleus to the ribosomes located in the cytoplasm and its function is to translate the information.

- a) rRNA
- b) tRNA
- c) mRNA
- d) RNA polymerase

7. Once mitosis is complete, the cytoplasm divides by a process called:

- a) Cytokinesis
- b) Kinetochore
- c) Apoptosis
- d) Karyokinesis

8. A process consisting of the mutual exchange of equivalent portions of DNA between homologous chromosomes.

- a) Cross-linking
- b) Synapsis
- c) Spermatogenesis
- d) Gametogenesis

9. Name of the process that consists of putting pollen from another plant directly into the ovules of the recipient plant, thus controlling the variables of its crosses.

- a) Cross fertilization
- b) Self-fertilization
- c) Heterozygous
- d) Hybrid

10. The specific location or site of a gene on a chromosome is called:

- a) Locus
- b) Allele
- c) Hybrid
- d) Dominant

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## **STAGE 4. BIOTECHNOLOGY**

*Formative purpose: Examines the applications of genetic engineering and biotechnology to relate it to bioethics.*

### **DIMENSION 1: Correctly define the following words:**

1. Antibiotic

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2. Biotechnology

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3. Selective breeding

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4. Polymerase Chain Reaction (PCR)

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5. Restriction enzymes

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6. Plasmids

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7. Insulin

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8. Cloning

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9. Gel electrophoresis

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10. Bioethics

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11. Hybridization

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12. Inbreeding

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13. Genetically modified organisms

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**Elaborated by:** MC.Evelyn Nallely Muñiz Guzmán (Coordinadora)  
**Approved by:** Miembros de Academia de Biología  
**Verified by:** Área de Apoyo y Desarrollo de Clase  
**Validated by:** ME.Nancy Elvira Tenorio Garza (Secretaria Académica)