

Actividades de verano 2019



4º ESO Biology & Geology



EUKARYOTIC AND PROKARYOTIC CELLS

Animal cell under light microscope

Bacterial cell under light microscope





Bacterial cell under electron microscope

Animal cell under electron microscope





- 1 Several components can *only* be seen on the electron micrographs. Circle those structures
- 2 Label all the structures you recognise on each diagram and their functions

Extra challenge

- **3** There are two main types of cells: prokaryotic and eukaryotic.
 - **a** What are the main differences between them?
 - **b** Explain the similarities between prokaryotic and eukaryotic cells

GENETICS

Mendel's Principles: Define the following phrases & terms
The principle of segregation
The principle of independent assortment. Explain the scientific evidence which
supports this model
Vocabulary for Mendelian Genetics
Gamete
Gene
Dominant allele

5.	Recessive allele
	<u> </u>
6.	Phenotype
7.	Genotype
	<u> </u>
Q	Homozygous
0.	Homozygous
0	
9.	Heterozygous
10.	Reciprocal cross
11.	Pure breeding
	line
	·····c
12.	F _x

MENDELIAN GENETIC PROBLEMS

A. Monohybrid Crosses

1. Albinism, the total lack of pigment, is due to a recessive gene. A man and woman plan to marry and wish to know the probability of their having any albino children. What are the probabilities if: a. both are normally pigmented, but each has one albino parent. b. the man is an albino, the girl is normal, but her father is an albino. c. the man is an albino and the girl's family includes no albinos for at least three generations.

2. In a certain plant, both purple x purple and purple x blue yield purple and blue colored progeny, but blue x blue gives rise only to blue.

a. What does this tell you about the genotypes of blue- and purple-flowered plants?

b. Which gene is dominant?

3. Two short-haired female cats are mated to the same long-haired male. Several litters are produced. Female No. 1 produced eight short-haired and six long-haired kittens. Female No. 2 produced 24 short-haired ones and no longhaired. From these observations, what deductions can be made concerning hair-length inheritance in these animals? Assuming the allelic pair S and s, give the likely genotypes of the two female cats and the male.

4. Rh negative children (those not producing rhesus antigen D) may be born to either Rh positive or Rh negative parents, but Rh positive children always have at least one Rh positive parent. Which phenotype is due to a dominant gene?

B. Dihybrid Crosses

1. In hogs, an allele that produces a white belt around the animal's body (W) is dominant over its allele for a uniformly colored body (w). The dominant allele of another gene (F) produces a fusion of the two hoofs on each foot. Suppose a uniformly-colored hog homozygous for fused hoofs is mated with a normal-footed hog homozygous for the belted character.

a. What are the genotypes of the parents?

b. What are the genotypic and phenotypic ratios of the F1?

c. If the F1 were allowed to interbreed, what are the genotypic and phenotypic ratios of the F2?

2. In watermelons, the genes for green color and for short length are dominant over their alleles for striped color and for long length. Suppose a plant with long striped fruit is crossed with a plant heterozygous for both of these characters. What phenotypes would this cross produce and in what ratios?

C. Modifications of Complete Dominance

1.For each of the following pairs of parental genotypes, calculate the phenotypic ratios for the F1 generation. a. IAIA x ii b. IAIA x IAIB c. IAIA x IBi d. IAIA x IAi e. IAi x IAi f. IAi x IAIB g. IAi x ii

2. Mrs. Smith and Mrs. Doe were roommates at Harris Hospital and both had daughters at about the same time. After Mrs. Smith took Susie home, she became convinced that the babies had been switched. Blood tests were performed with the following results: Mr. and Mrs. Smith were both type AB; Mr. and Mrs. Doe were both type A; Susie Smith was type A and Debbie Doe was type O. Had a switch occurred?

3. Mortimer has type B blood. His wife Murgatroyd is unsure of her blood type. If their first child, Magnifica, is type B, their second offspring, Maximum, is AB and the twins, Maud and Lyn, are A, can you determine the genotypes of Mort and Murg?

4. It has long been known in the field of human genetics that wavy hair is the expression of a heterozygous genotype in which the allele for straight hair is paired with the allele for curly hair. Lucinda Lovelee married Larry Legg. Both of these charmers have wavy hair. What is the probability that their offspring, the littlest Legg, will have: a. wavy hair? b. curly hair? c. straight hair?

5. If pale colored horses are crossed with chestnut-colored horses to produce "palomino", an intermediate coat color: a. What type of expression is suggested? b. A number of matings between palominos produced 19 pale, 21 chestnut, and 44 palominos. Does this evidence support or contradict your answer to (a)? Why?

D. Sex-linked Genes

1. A man and his wife both have normal color vision, but a daughter has redgreen color blindness, a sex-linked recessive trait. The man sues his wife for divorce on grounds of infidelity. Can genetics provide evidence supporting his case?

2. In the mouse, the dominant sex-linked gene B results in a short, crooked tail. Its recessive allele b produces a normal tail. If a normal-tailed female is mated with a benttailed male, what phenotypic ratio should occur in the F1 generation?

3. In cats, a gene for coat color is sex-linked. Cats homozygous for allele A have yellow coats; those homozygous for allele a have black coats; and heterozygotes have tortoiseshell coats. What type(s) of offspring would result from a mating of a black male and a tortoise-shell female? Is it possible to obtain a tortoise-shell male?

GEOLOGICAL CROSS-SECTIONS

1. Write the geological history of the following cross-sections and identify the main principles you have used:

- Cross-section 1:



- Cross-section 2:



2. Draw the stratigraphic column of the previous cross-sections

FOSSILS AND EXTINCTION

1. The images below show different stages in the evolution of a horse. They are in the wrong order.

Put the images into the correct order, then annotate each image to describe what they show.



2. Prepare a visual summary by listing some of the reasons for the extinction of the dodo. You may need to carry out some research to gather some information on the extinction of the dodo. One idea has been done for you.



Student follow-up

Apply your knowledge of speciation to explain why dodos were only found on one island.

- Organ
 Name of the organ
 Function
 Place of secretion

 Image: Secretion
 Image: Secretion
 Image: Secretion
- 1. Complete the following table related to the digestive system:



2. Draw a diagram of an animal cell and label all the organelles saying the structure and mani functions of each organelle

3. What is the difference between mechanical and chemical digestion? Say in which parts of the digestive system does mechanical digestion take place and where does chemical digestion take place

4. Related to human defences, draw a diagram to represent the cells involved in innate immunity (2) and acquired immunity (2) and explain their main functions

- 5. Define the following terms:
 - a) Specific defences

b) Non-specific defences	g) Carbohydrate
c) Eating	h) Protein
d) Nutrition	i) Saturated fatty acids
e) Symptom	j) Non-saturated fatty acid
f) Sign	k) Lipid

1. Complete the table below, saying when do muscles contract or relax and the changes that happen in the respiratory system during inhalation and exhalation:

I) Vitamin

	INHALATION	EXHALATION
Intercostal muscles		
Diaphragm (muscle)		
Abdominal muscles		
Movement of ribs (up and out or down and inwards)		
Volume of chest cavity (increases or decreases)		
Movement of air (in or out)		

2. Say the main enzymes involved in the process of digestion and explain their main functions

3. Define the following terms:

a) Antigen

d) Blood rejection

b) Antibody

e) Transfusion

c) Agglutination

4. A patient has type B+ blood. If they received a transfusion of type AB+ blood, predict and explain what would happen.

5. Draw a diagram of the cardiac cycle and explain what happens on each stage according to:

- Movement of blood
- Contraction or relaxation of chambers
- Opening or closing of valves

1. Draw a nephron and label their main parts, giving a definition of the structure and function

2. Define the following terms:

a) Cortex

b) Medulla

c) Renal pelvis

d) Renal artery

e) Renal vein

f) Ureters

g) Urinary bladder

h) Urethra

3. Write a list of the 8 pituitary hormones and say their main functions:

4. What is the hypothalamus-pituitary axis? Draw a diagram to represent it showing with a "+" the activation of glands and with a "-" the inhibition.

5. What is the lymphatic system? What are its main functions?

6. Say the name of the glands labelled A to H and, for each gland, explain the hormones released by them and their main functions

