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Anthropology 1: Introduction to Physical Anthropology
University of California, Berkeley

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Spring 2001

EXAM 1: 100 POINTS

Instructions:

1. Write your **name, section day/time, GSI** on the **front side** of the Scantron form. Only use a **number #2 pencil!**
2. Write your **name and student ID** number at **top of pages 8-13** of the exam.
3. There will be **no talking** once the first exam is handed out.
4. If you have a **question, raise your hand** and someone will come to help you. Respect your fellow students in this process.
5. If you are **suspected of cheating**, you will be given a **warning, or asked to move, or asked to leave the exam and surrender your exam**. You may receive **zero points** on the exam.
6. **Questions 1-40:** put your answers on the Scantron form using a #2 pencil.
7. **Questions 41-50,** answer the questions **directly on the exam** in the **space provided**. These questions can only be answered in **ink**.

Page	Score
2-7	36
8	17
9	10
10	3.5
11	10
12	3.5
13	5.75

85.75

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Use only the space provided to answer the questions. Answers on the back of the page will not be read.

41) Define and clearly outline the differences and similarities between the following pairs of concepts. (4 points each question)

A) Principle of Segregation / Principle of Independent Assortment

Both ~~principles~~ identified by Mendel. Princ of seg says that homologous pairs of chromosomes segregate during meiosis. Princ of Ind Assort says this occurs independently of other chromosomes (so segregation of alleles for one ~~gene~~ is independent of those for another)

B) Lamarkian Evolution / Darwinian Evolution

Both concepts recognize the dynamic relationship between an individual and its environment. Lamarkian ev. says that somatic traits acquired during an individual's lifetime can be inherited (eg, if a giraffe stretches its neck during its lifetime, its offspring will have longer necks). Darwinian Ev. says natural selection ~~passes~~ on favorable traits to next generations.

C) Hypothesis / Theory

³ Hypothesis is a guess, a possible explanation of an observed phenomenon. Theory is a hypothesis that ~~has~~ has not been proved false (null hypothesis has been proved false).

D) Gene Flow / Genetic Drift

Both can contribute to evolution. Gene flow is defined as ~~population~~ exchange of genetic material between populations. Genetic drift is ~~also~~ a change in the gene pool due to random events (flood, earthquake, for example, ~~could~~ result in geographic isolation). ~~Genetic drift is a change in the gene pool due to random events (flood, earthquake, for example, could result in geographic isolation).~~

E) RNA / DNA

"founder's effect" is an example of genetic drift. Both contained in cells. DNA is double-stranded, contains an individual's genetic material. Composed of Adenine, Guanine, Thymine, and Cytosine. RNA aids in protein synthesis and ~~participates~~ in transcription and translation for DNA replication. RNA contains Uracil instead of Thymine.

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45) You are using the MN blood types as a basis for a disputed paternity case. In this system, the alleles M and N are codominant. In addition, in order to ensure results you also look at secretor locus for which the secretion (Q) of substances into the body fluids other than the blood is dominant to non-secretions (q). The mother and the child both have N blood type. The mother is homozygote dominant for the secretor and the child is heterozygote at this locus. The husband has type MN blood and is homozygous recessive for the secretor whereas the alleged father has type N blood and is homozygous dominant for the secretor.

Child: NN Qq

What would you advise the court about the possible paternity of the child? **You MUST show your work in the Punnett squares for full credit. Label your axes. (5 points)**

(husband)

~~MN~~ q ~~NN~~ q

(mother) N,Q

MN Qq	NN Qq		
MN Qq	NN Qq		

The husband could be the father.

"NN Qq" is a possibility

(alleged father)

N, Q N, Q

(mother) N,Q

NN QQ	NN QQ		
NN QQ	NN QQ		

The alleged father is not the father.

"NN QQ" is not a possibility.

Complete the ...

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46) Match each individual in column A to the appropriate concept in column B (1 point each, 8 points total)

Column A

- H Gregor Mendel
A George Cuvier
F Stephen J. Gould
C Jean Baptiste Lamarck
G Alfred Wallace
E Charles Lyell
D Francis Crick
B Thomas Malthus

Column B

- ~~A~~ Catastrophism
~~B~~ Populations increase in size exponentially
~~C~~ Inheritance of acquired characteristics
~~D~~ Structure of DNA
~~E~~ Uniformitarianism
~~F~~ Punctuated equilibrium
~~G~~ Evolution by natural selection
~~H~~ Principle of segregation

47) Match the following conditions in Column A with the appropriate concept or cause in Column B. (4 points)

Column A

- C Sickle Cell Anemia
A Hemophilia
B Down syndrome
D Achondroplasia dwarfism

Column B

- ~~A~~ Autosomal Dominant trait
~~B~~ Nondisjunction
~~C~~ Heterozygote advantage
~~D~~ X-linked trait

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48) Tay-Sachs disease is caused by a recessive allele. Individuals who are homozygous for this recessive allele die of Tay-Sachs before the age of four. Two theories are presented in the Park reader to explain the high incidence of Tay-Sachs in the Ashkenazi Jew population. In the space provided, briefly outline the theory presented by each author. (4 points)

A. Diamond

Diamond feels that ~~selection~~ historically Tay-Sachs heterozygotes ~~could~~ could have been more resistant to tuberculosis, a disease that was rampant in the urban areas where Ashkenazi Jews lived historically. He feels selection favored the heterozygote, which is why the allele has survived at such a large frequency. +2

B. Glausiusz

Glausiusz says that there hasn't been enough time for ~~selection~~ ~~evolution to act~~ natural selection to ~~have occurred~~ have occurred (Diamond's theory). +1.5
Genetic drift and the founder's effect, due to an original mutation, is the way she explains this population's susceptibility to Tay-Sachs.

DO NOT WRITE BELOW THIS LINE!

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49) Using a scientific perspective, as outlined by Stephen J. Gould in your Park reader, discuss why "creation science" is not a scientific explanation. What would be necessary for it to be a scientific explanation? (4 points)

Creation science is faith-based. It is not falsifiable, and is based on no observable evidence. Observable data in favor of creationism is necessary, says Gould, to qualify creation science as an actual scientific explanation.

- 1 not testable

50) Fill in the following chart. (5 points)

	Replication	Transcription	Translation	Meiosis	Mitosis
Where does it take place?	cells' DNA	cell nucleus	outside cell nucleus	gametes	somatic cells
What is the end product?	double the amount of chromosomes 2 DNA	mRNA	replicated DNA	4 haploid gametes	2 diploid somatic cells