

Heredity Test

Ladera Vista

EACH QUESTION IS WORTH 1 POINT UNLESS OTHERWISE STATED

- 1) List each blood type and the types of blood it can receive (5 points)
- 2) What is the difference between blood types?
- 3) What is Chargaff's first rule?
- 4) Which sex determines the sex of the offspring?

Use the following prompt for 5-7 and for the next prompt:

Imagine you are an alien. You are given one male and one female human to keep track of. The male one has black hair (*Hb*) and the female has red hair (*b*). After copulation, a child is born.

- 5) Create the Punnett square. (3 points)
- 6) Find the probability of the child having black hair.
- 7) Find the probability of the child having red hair.

From the last prompt:

The child grows up and is paired with another adult of the opposite sex. Assume the dominant gene shows up in the adult's phenotype and the other adult has red hair (*b*). After copulation, a child is born.

- 8) Create the Punnett square. (3 points)
- 9) Find the probability of the child having red hair.
- 10) The probability of the child having black hair?
- 11) The probability of the child having blonde hair?
- 12) Who was the Punnett square named after, and how was he important to genetics?
- 13) Name the three main characteristics of sexual reproduction that create genetic diversity.

- 14) What is DNA made of?
- 15) What is pangenesis?
- 16) Who proposed pangenesis?
- 17) Is pangenesis proven correct or incorrect?
- 18) Which Augustinian monk began the modern science of genetics?
- 19) What did he do?
- 20) What are the parental plants called in breeding terms?
- 21) The hybrid offspring?

Use the following prompt to answer 20-24

You are given the control of two wolves. One has black fur (Hh) whereas another has gray fur (h). The first wolf also has short fur (s) whereas the other wolf has long fur (Ss). The wolves mate and bear 1 (ONE) pup.

- 22) Create a Punnett square for the given information.
- 23) What is the probability that the pup will have long and black fur?
- 24) Short and gray fur?
- 25) Long and gray fur?
- 26) Short and black fur?
- 27) If the wolves had a litter of 16 pups, what would each pup look like? (1 pup would be dark and have short fur etc.)
- 28) Approximately what percent of the typical cell cycle is spent in interphase.
- 29) Crossing over occurs in what phase of meiosis?
- 30) In meiosis one, _____ separate, while in meiosis two,

_____ separate.

31) What does homozygous mean?

32) What is epistasis?

33) For the Hardy-Weinberg Law to exist, what 5 factors MUST NOT exist?

34) What are the 2 equations used in the Hardy-Weinberg law?

Use the following prompt for questions 35-38

In a certain population, the percentage of the homozygous recessive genotype (aa) is 41.4%. Using only that information, find:

35) The frequency of the dominant genotype

36) The frequency of the recessive allele

37) The frequency of the dominant allele

38) The proportion of the heterozygous individuals

Use the following prompt for questions 39-42

In a certain population, the percentage of the homozygous recessive genotype (aa) is 12%. Using only that information, find:

39) The frequency of the dominant genotype

40) The frequency of the recessive allele

41) The frequency of the dominant allele

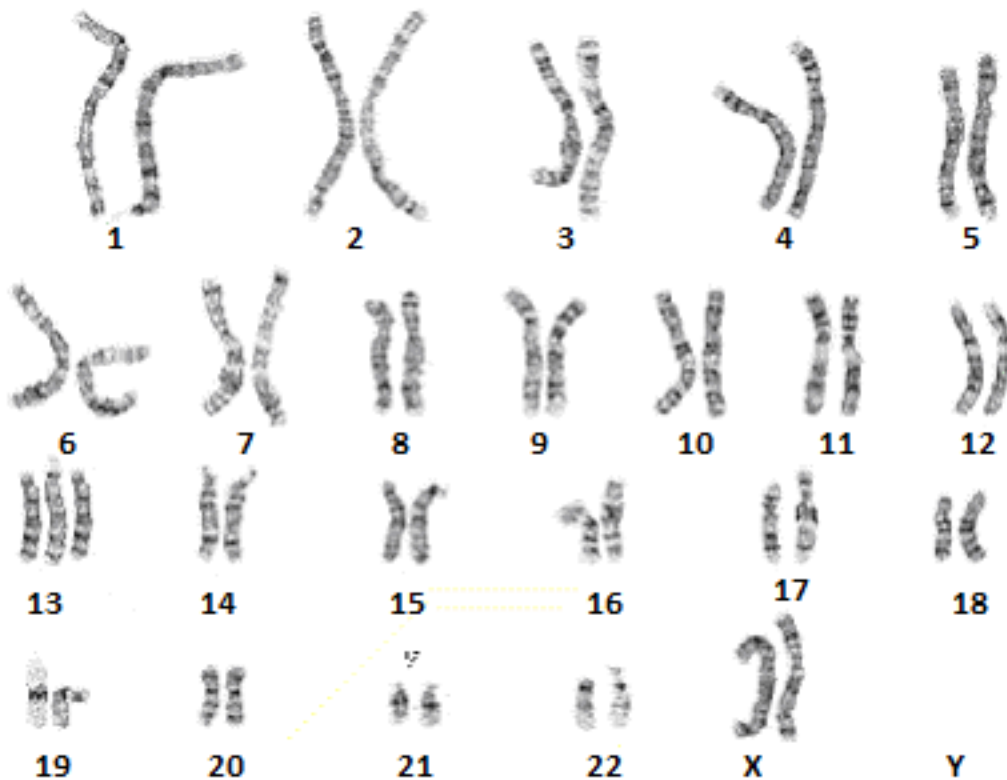
42) The percent of the heterozygous individuals

43) What is a somatic cell?

44) What are the phases of mitosis? EXPLAIN EACH ONE.

45) What are the phases of meiosis? EXPLAIN EACH ONE.

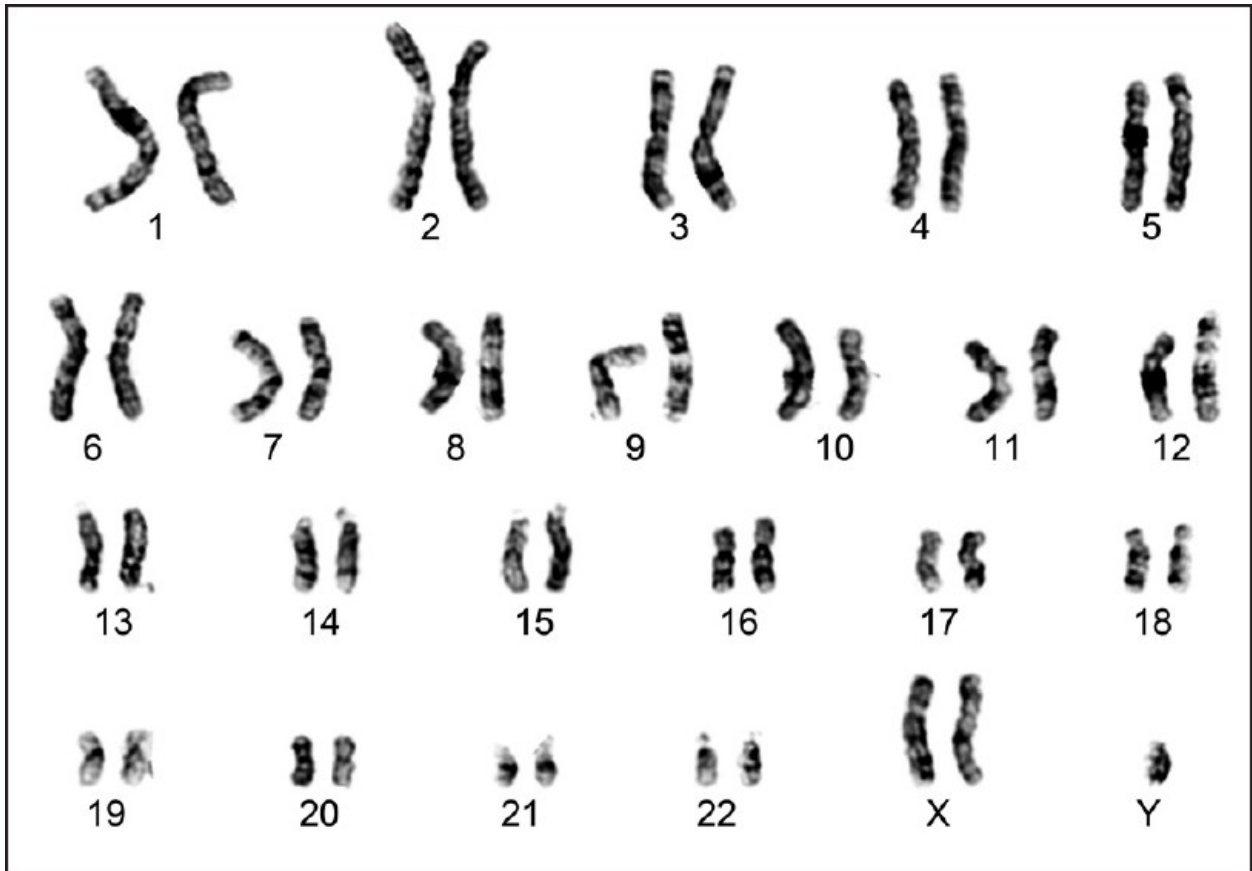
- 46) What stage precedes meiosis and mitosis?
- 47) How long does prophase I take in meiosis percentage-wise?
- 48) Which chromosome in males differs from females?
- 49) Define pleiotropy, and give an example.
- 50) What is a lethal allele?
- 51) How many daughter cells are formed with meiosis?
- 52) What are 3 differences between meiosis and mitosis?
- 53) What is a haploid cell?



Prompt: Use the karyotype above to answer 52-54

- 54) Does the karyotype depict a female or male?
- 55) What is wrong with the karyotype above, if anything at all?

56) What syndrome is depicted, if any at all?



Prompt: Use the karyotype above to answer 55-57

57) Does the karyotype depict a female or male?

58) What is wrong with the karyotype above, if anything at all?

59) What syndrome is depicted, if any at all?

60) Does this karyotype represent a male or a female?

61) What is wrong with this karyotype?

62) What is the name of the syndrome this person would have?

63) Name two characteristics of the above



syndrome

64) When was the human genome project completed?

65) Give two examples of sex-linked traits. Do they generally affect males or females? Explain.

66) What is a Barr body and in which sex do they form?

For the following 8 questions, match the term to its definition.

67) Nondisjunction	A) A syndrome resulting in excessive mucus produced by the respiratory system, usually fatal to young children
68) Inversion	B) The casings at the ends of chromosomes, protecting them from decay.
69) Translocation	C) When sections from two nonhomologous chromosomes are exchanged.
70) Cystic Fibrosis	D) When a section of DNA is copied more than once- for instance, CAAGCC becomes CAAAAGCC
71) Tay-Sachs Disease	E) When the heterozygous expression of a gene is different from either homozygous form.
72) Kinetochores	F) A syndrome where the body cannot metabolize certain lipids, resulting in death early in childhood.
73) Telomere	G) When both alleles for a gene are expressed
74) Incomplete Dominance	H) When a part of a gene sequence gets copied backwards
75) Codominance	I) The protein "handle" on chromosomes that microtubules grasp during mitosis
76) Duplication	J) When homologous chromosomes or sister chromatids fail to separate in anaphase
77) Klinefelter's Syndrome	K) A person with sex chromosomes XXY has this.

78) What are the three parts of a nucleotide?

79) Explain the founder effect

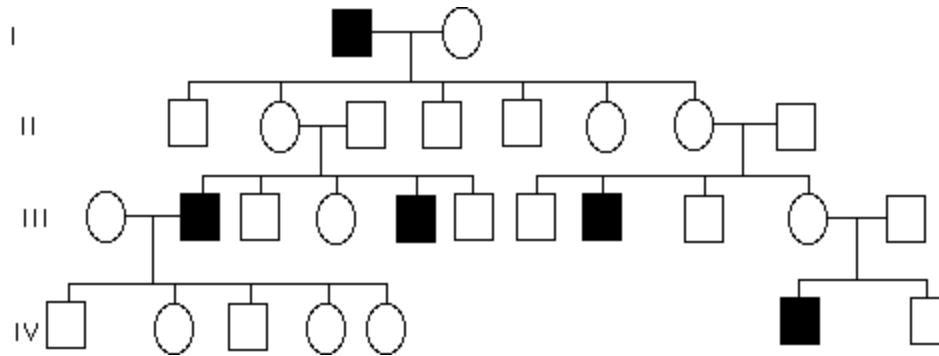
80) Explain the bottleneck effect

81) What five conditions are required for Hardy-Weinberg Equilibrium?

82) Many genetic diseases are prevalent among people of certain races or ethnicities. What groups are susceptible for the following diseases?

- a) Cystic Fibrosis
- b) Tay Sach's Disease
- c) Sickle-celled Disease

In the following pedigree, ovals represent females and squares represent males. White represents a person with a normal phenotype, and black represents a person with hemophilia.



83) IS hemophilia a sex-linked trait? Explain how you know. If so, is it carried on the X or Y chromosome?

84) What is the genotype of the female on the far right?

85) Locate the normal male at the far right of the pedigree (Gen IV). If this person married a female carrying this disease, what percent of their sons would have hemophilia?

86) What percent of the daughters born to the couple above would have hemophilia?

87) What did Linus Pauling do in relation to genetics? Was his initial hypothesis correct or incorrect?

88) What did Watson and Crick do?

- 89) What is the result of the genetic disease phenylketonuria? If identified early, how is this disease treated?
- 90) If an intestinal cell in a grasshopper contains 24 chromosomes, a grasshopper sperm cell would contain ___ chromosomes.
- 91) Which phase of mitosis is the opposite of prophase in terms of nuclear changes?
- 92) If a chromosome fragment breaks off and reattaches the other way, the abnormality is called _____.
- 93) Human ___ are diploid, and human _____ are haploid.
- 94) A human bone marrow cell, in prophase of mitosis, contains 46 chromosomes. How many chromatids does it contain altogether?
- 95) A cell biologist carefully measured the quantity of DNA in grasshopper cells growing in cell culture. Cells examined during the G₂ phase of the cell cycle contained 200 units of DNA. What would be the amount of DNA in one of the grasshopper daughter cells seen in telophase of mitosis.
- 96) True or false: DNA replication takes place in mitosis.
- 97) what is the result of a cell losing all control of its cell cycle? Name and describe.
- 98) Why is the gene P53 considered the “Guardian Angel of the cell”?
- 99) What is metastasis?
- 100) When a cell synthesizes proteins, the information passes in the following form: DNA
--->??-> protein
- 101) Where does actual protein synthesis take place?
- 102) What is a multifactorial trait? Explain how heart disease can be considered multifactorial.

TIEBREAKER:

- 1) You are given two dogs. One has the alleles for long fur (Ff), black eyes (Ee), and a short tail (t). The other dog has the alleles for short fur (f), brown eyes (e), and a long tail (TT).

a) Create a Punnett square

b) The probability for long fur, brown eyes, and a short tail.

c) The probability for black eyes, a long tail, and short fur.

2) Time