**Name: KEY Date: Class:**

Genetics Test Study Guide

**Directions:** Write the following answers on a sheet of notebook paper.

***Part 1: Vocabulary-Define all of the following terms:***

1. **Gene-** the set of information that controls a trait; a segment of DNA on a chromosome that codes for a specific trait.
2. **Trait-** a characteristic that an organism can pass on to its offspring through its genes.
3. **Genotype-** an organism’s genetic makeup or allele combinations (ex: BB, Bb, or bb).
4. **Phenotype-** an organism’s physical appearance or visible trait (ex: brown eyes, brown eyes, blue eyes).
5. **DNA-** Deoxyribonucleic acid; the genetic material that carries information about an organism and is passed from parent to offspring.
6. **Dominant-** a trait that is always expressed in the phenotype of an organism; represented with a capital letter.
7. **Recessive-** a trait that is expressed ***only*** when two alleles are present; represented with a lowercase letter.
8. **Allele-** the different forms of a gene; offspring is given 1 allele from each parent for each trait.
9. **Chromosome-** a double rod of condensed chromatin in the nucleus that contains DNA, long strand of DNA coiled tightly (wrapped around) a protein.
10. **Heredity-** the passing of traits from parents to offspring.
11. **Genetics-** The study of how traits are inherited through the interactions of alleles.
12. **Heterozygous-** Having two *different* alleles for a trait. (EX: Rr –results in dominant phenotype)
13. **Homozygous-** Having two *identical* alleles for a trait. {Ex:RR (homozygous dominant) or rr (homozygous recessive)}
14. **Purebred-** 2 identical alleles (synonym for homozygous)
15. **Hybrid-** 2 different alleles for a trait (synonym (heterozygous)
16. **Carrier-** a person who has one (1) recessive allele for a trait, but does not have the trait.
17. **Sex-Linked Gene-** A gene that is carried on the X or Y chromosome.
18. **Multiple Alleles-** Any trait that is controlled by many alleles. (Ex: Blood)
19. **Incomplete Dominance-** the offspring of two homozygous parents show an “in-between” phenotype.
20. **Pedigree**- a chart or “family tree” that tracks which members of a family have a particular trait

***Part 2: Answer the following questions below:***

1. Who is considered the “father” of genetics?

Gregor Mendel

1. What are chromosomes made of?

Proteins with long strands of DNA coiled around it

1. What is the difference between ***mitosis*** and ***meiosis***?

Meiosis produces only sperm and egg cells (gametes) and ALL somatic cells (body cells) reproduce through mitosis.

1. Which cell process produces ONLY gametes, or sex cells?

Meiosis

1. What is haploid? Give an example of a haploid cell.

“half” the # chromosomes-23 in EACH gametes (or sex) cells (eggs and sperm)

1. What is diploid? Give an example of a diploid cell.

double” the # of chromosomes-46, or 23 pairs in EACH somatic (or body) cell

1. DNA consists of a repeating series of nucleotides .
2. What ***THREE*** components make up a nucleotide?

* Sugar group
* Phosphate group
* Nitrogen bases (4)

1. A genetic mutation is any change in a gene or chromosome.
2. What is a substitution mutation?

a base pair is substituted for another pair.

1. What is an addition mutation?

a base pair is added into the strand

1. What is a deletion mutation?

A base pair is removed from the strand

1. How many chromosomes are in every human ***somatic*** cell?

(somatic=body cell; any cell other than sex cells) 46 or 23 pairs

1. How many chromosomes are in every ***gamete***?

(gamete=sex cell; sperm or egg) 23 in EVERY gamete

1. In order to see a recessive trait in an organism’s phenotype, what must be the organism’s genotype?

Homozygous recessive (Ex: bb)

1. A plant with a dominant homozygous trait is crossed with a plant with a recessive homozygous version of that trait. What is the probability that the offspring will display the dominant trait in its phenotype?

100%

1. What is the genotype for females?

XX

1. What is the genotype for males?

XY

1. Sex chromosomes are located on which pair of chromosomes? (#)

The 23rd pair-the Y chromosome is much smaller than the X chromosome

1. An organism with TWO different alleles for a particular trait is considered to be heterozygous or hybrid .
2. Which answer correctly fills the empty box in the Punnett square? What is the phenotype expressed by this allele combination?

a

A

A

Aa

AA

aa

a

Aa

The phenotype=recessive trait shown for the missing genotype in the Punnett square.

1. Freckles=recessive. Cross a **heterozygous** parent with **NO** freckles with a parent with freckles. What is the probability that the offspring will have freckles?

50%

1. In dogs, long tails are dominant over short tails. Cross a ***heterozygous*** tailed dog with a ***homozygous recessive*** dog. What is the probability that the dog will have a long tail? What is the probability that the dog will have a short tail?

50%

1. In a pedigree, what symbols represent females?

Circles

1. In a pedigree, what symbols represent males?

Squares

1. In a pedigree, shaded in symbols mean what?

The person shows/has the particular trait

1. In a pedigree, symbols that are NOT shaded in mean what?

The person does not how the trait, nor are they a carrier

1. In a pedigree, half shaded in symbols mean what?

The person does not show the trait, but they are a carrier

1. Colorblind is a sex linked trait. Normal vision is dominant (N) or colorblind (n). Cross a female with normal vision and is heterozygous, with a colorblind male.

* What is the female’s genotype? XNXn
* What is the male’s genotype? XnY
* What are the chances of having a female child who is colorblind?

(1 out of 2) 50%

* What are the chances of having a male child who is colorblind?

(1 out of 2) 50%

1. Complete the Punnett square. What is the ratio for the phenotype and genotype? (2 answers!)

R

R

Rr

Rr

r

* 100% Rr-genotype

Rr

Rr

r

* 100% dominant trait expressed in the phenotype