Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period\_\_\_\_ Date\_\_\_\_\_\_\_

Genetics Study Guide

**The Father of Genetics" Review:**

1. Heredity factors (now called genes) were first investigated by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. The results of his first experiment showed that 100% of the offspring had the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ trait.
3. In his second experiment, \_\_\_\_\_ fourths of the offspring had the dominant phenotype and \_\_\_\_\_fourth had the recessive phenotype.
4. If a homozygous Tall pea plant is crossed with a homozygous short pea plant, 100%

of the offspring will have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ genotype.

(adjective)

5. In order for a pea plant to be short, its genotype must be \_\_\_\_\_\_\_.  
6. Combining or uniting the 2 gametes is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Match the term from column A to its definition in column B.**

1. Alleles
2. Homozygous
3. Heterozygous
4. Dominant
5. Recessive
6. Genotype
7. phenotype

\_\_\_\_\_\_7. Different versions of the same gene.  
\_\_\_\_\_ 8. Individuals having two copies of different alleles.  
\_\_\_\_\_ 9. An organisms genetic make-up.  
\_\_\_\_\_ 10. An organisms physical appearance.  
\_\_\_\_\_ 11. The allele that is represented with a capital letter.  
\_\_\_\_\_ 12. The allele that is represented with a lower case letter.

**Punnett Practice**

Construct Punnett squares for the following crosses and report the predicted percentages for the offspring.

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1. A mother with attached earlobes (Ee) X A father with free earlobes (ee)

EE ‑\_\_\_\_\_\_\_%

Attached earlobes –\_\_\_\_\_\_%

Ee‑\_\_\_\_\_\_\_\_%

ee -\_\_\_\_\_\_\_\_% Free earlobes - \_\_\_\_\_%

1. A pea plant with wrinkled seeds (rr) X A pea plant homozygous for round seeds

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RR‑\_\_\_\_\_%

Round seeds - \_\_\_\_\_% Rr-\_\_\_\_\_%

rr - \_\_\_\_\_% Wrinkled seeds -\_\_\_\_%

1. Green pods are dominant to yellow pods. Two pea plants were crossed. They produced 379 offspring with green pods and 127 offspring with yellow pods. This is approximately a 3:1 ratio, or 75% to 25%.

What were the **genotypes** of the parents in the cross? \_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_  
What were the **phenotypes** of the parents in the cross? \_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_

**Define the following on a separate sheet of paper:**  
Pedigree  
Polygenic Inheritance  
Antibody  
Sex-Linked Traits  
Trisomy

Incomplete Dominance

Multiple Alleles

Autosomes

Monosomy

Agglutination

Codominance

Antigen

Sex Chromosomes

Karyotype

Aneuploidy

Carrier

**Genetic Disorders/Diseases:**

Fill in the blank below with D if it is a dominant disorder and R if it is a recessive disorder.

Hemophilia \_\_\_\_\_

Red-Green Colorblindness \_\_\_\_\_

XO (monosomy X) \_\_\_\_\_

Cystic Fibrosis \_\_\_\_\_

Huntington’s \_\_\_\_\_

Sickle Cell Anemia Co-Dominant

PKU \_\_\_\_\_

**Explain each of the following disorders:**  
1. Huntington’s Disorder- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Cystic Fibrosis - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. PKU- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Hemophilia - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Incomplete Dominance vs. Codominance**  
6. A mating between a black goose and a white goose produces blue-gray offspring. (Blue-gray is an intermediate color between black and white.) Is this an example of incomplete dominance or codominance?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
7. Fill in the phenotypes below for the geese in problem **6**.

B B = black  
BB’=\_\_\_\_\_\_\_\_\_\_\_\_  
B'B'=\_\_\_\_\_\_\_\_\_\_\_\_

8. Make a Punnett square showing a cross between a black goose and a blue-gray goose. What percentage of offspring would be black?

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Answer:\_\_\_\_\_\_\_\_\_\_%

9. A reddish/brown-haired cow when crossed with a white-haired cow produces offspring that have reddish/brown hairs AND white hairs (This color is called roan). Is this an example of incomplete dominance or codominance? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Fill in the missing genotype and phenotype below for problem **9**.

RR = Reddish/Brown

\_\_\_=Roan

WW = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Make a Punnett square that shows the cross described in #**9**. What percentage of the offspring will be heterozygous?

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Answer: \_\_\_\_\_\_\_\_\_\_% %

1. The offspring of 2 short-tailed cats have the following phenotypic ratios:

1 no tail : 2 short tails : I long tail

Tail length in these cats is an example of which inheritance pattern?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Polygenic traits create a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ curve on a graph.
2. What is the purpose of a test cross?

**Karyotypes**

1. There are \_\_\_\_\_\_\_\_\_ chromosomes in a human somatic cell.
2. A male has \_\_\_\_\_\_\_\_\_ chromosomes for the 23rd pair and a female has \_\_\_\_\_\_\_\_\_ chromosomes for the 23rd pair.
3. A person with down syndrome has \_\_\_\_\_ total chromosomes. They have an extra chromosome in the \_\_\_\_\_\_\_\_\_\_\_ chromosome pair.
4. A person with Klinefelter’s syndrome has \_\_\_\_\_\_\_\_ total chromosomes. They have an extra chromosome in the \_\_\_\_\_\_\_\_\_\_ chromosome pair.
5. Both down syndrome and klinefelter’s syndrome are a form of \_\_\_\_\_\_\_\_\_\_\_because they have an abnormal number of chromosomes.
6. A person with Turner’s Syndrome has \_\_\_\_\_\_\_ total chromosomes. They are considered a \_\_\_\_\_\_\_\_\_\_\_\_\_ because they only have one chromosome 23.

**Sex-Linked Traits**

1. Chromosomes 1-22 are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Describe Hemophilia.
3. What does it mean if a person has red-green colorblindness?

**Multiple Allele Inheritance**

1. What makes a trait a multiple allele inheritance?
2. Who is Charles Drew?
3. What role do antigens and antibodies play in blood type?
4. Blood type \_\_\_\_ is considered a universal donor because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. Blood Type \_\_\_\_\_\_\_ is considered a universal recipient because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. If type A antigens come in contact with anti A antibodies, the blood will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, also called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
7. A known homozygous red-eyed female fruit fly is crossed with a white eyed male. What genotype and phenotype could they produce and what would be the expected %’s for each?  
   \*\**In fruit flies, eye color is a sex linked trait.*

**Phenotypes:**

F. Red Eyes –

F. White Eyes-

M. Red Eyes-

M. White Eyes-

**Genotypes:**

XRXR \_\_\_\_

XRXr \_\_\_\_

XrXr \_\_\_\_

XRY\_\_\_\_

XrY\_\_\_\_

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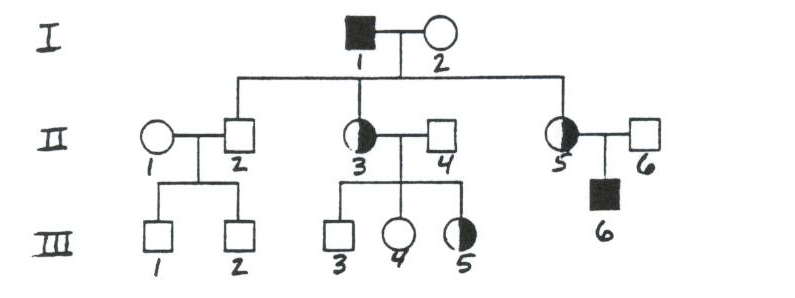
1. Male and female offspring from your punnett square in #**30** are mated with each other. What would be the expected %’s of genotypes and phenotypes?

**Genotypes: Phenotypes:**

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1. What is the genotype of a male with hemophilia? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What is the genotype of a female with hemophilia? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The pedigree below is for hemophilia within 3 generations of a family.



34. List the genotypes for the following individuals: I-1:\_\_\_\_\_\_\_\_\_\_\_, II-2: \_\_\_\_\_\_\_\_\_\_\_\_

II-5:\_\_\_\_\_\_\_\_\_\_\_, III-4:\_\_\_\_\_\_\_\_\_\_\_

35. Study the genotype for a male with hemophilia: XhY. Can a hemophiliac father pass   
 hemophilia on to his son? Explain why or why not.

36. How might you tell this was a pedigree (above) for a sex-linked trait if you were not   
 given that information?