

Name \_\_\_\_\_ Block \_\_\_\_\_ Date \_\_\_\_\_

### Test 6 Study Guide – Genetics

Describe the “**Father of Genetics**”.

- Who was he? \_\_\_\_\_
- What kind of organism did he experiment with? \_\_\_\_\_
- What did he discover? \_\_\_\_\_

Explain the relationship between **genes** and **alleles**.

- A gene is \_\_\_\_\_
- An allele is \_\_\_\_\_
- Describe or draw an example or visual representation:

Explain the relationship between **genotype** and **phenotype**.

- A genotype is \_\_\_\_\_
- A phenotype is \_\_\_\_\_
- Describe or draw an example or visual representation:

Contrast two types of genotypes: **homozygous** and **heterozygous**.

- Homozygous means \_\_\_\_\_
- Heterozygous means \_\_\_\_\_
- Describe or draw an example or visual representation:

Contrast two types of alleles: **dominant** and **recessive**:

- Dominant alleles \_\_\_\_\_
- Recessive alleles \_\_\_\_\_
- Describe or draw an example or visual representation:

Use the information given to you below for each trait to answer the problems that follow.

Trait	Dominant Form	Recessive Form
Hair Color	Brown (B)	Blond (b)
Eye Color	Brown (E)	Blue (e)
Dimples	Dimples (D)	No Dimples (d)
Freckles	Freckles (F)	No Freckles (f)
Handedness	Right Handed (H)	Left Handed (h)

What is the genotype of a male who is homozygous recessive for hair color? \_\_\_\_\_

What is the genotype of a female who has blue eyes? \_\_\_\_\_

What is the genotype of a male who is heterozygous for dimples? \_\_\_\_\_

What is the genotype of a female who is homozygous dominant for handedness? \_\_\_\_\_

What is the genotype of a male who is left handed? \_\_\_\_\_

If a person has the genotype Bb, what is their phenotype? \_\_\_\_\_

If a person has the genotype FF, what is their phenotype? \_\_\_\_\_

What is the phenotype of a person with the genotype EE? \_\_\_\_\_

What is the phenotype of a person with the genotype ff? \_\_\_\_\_

What is the phenotype of a person with the genotype Dd? \_\_\_\_\_

If a man has the genotype Hh for handedness:

- Circle all possible allele combinations that could be found in each sperm cell. Remember – a father can only pass *one* allele on to his offspring.

H    HH    Hh    h    hh

- What are the chances (%) he passes on the dominant allele? \_\_\_\_\_
- The recessive allele? \_\_\_\_\_

If a woman has the genotype hh for handedness:

- Circle all possible allele combinations that could be found in each egg cell. Remember – a mother can only pass *one* allele on to her offspring.

H    HH    Hh    h    hh

- What are the chances (%) she passes on the dominant allele? \_\_\_\_\_
- The recessive allele? \_\_\_\_\_

Complete each of the following monohybrid crosses by

1. completing each Punnett Square
2. describing the ratios, percentages, or fractions of each offspring genotype
3. describing the ratios, percentages, or fractions of each offspring phenotype

2. A tall bean (Tt) is crossed with a short bean (tt).

Genotypes =

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


Phenotypes =

\_\_\_\_\_

\_\_\_\_\_

3. A red rose (Rr) is crossed with a red rose (RR).

Genotypes =

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


Phenotypes =

\_\_\_\_\_

\_\_\_\_\_

4. A black chicken (Bb) is crossed with a black chicken (Bb).

Genotypes =

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


Phenotypes =

\_\_\_\_\_

\_\_\_\_\_

In aliens, acidic blood (A) is dominant to neutral blood (a). Bald (B) is dominant to hairy (b). A dihybrid cross is shown below between 2 acidic, bald aliens (but one is heterozygous for both traits). Determine the percentages of genotypes and phenotypes in the offspring.

AABB x AaBb

	AB	AB	AB	AB
AB	AABB	AABB	AABB	AABB
ab	AaBb	AaBb	AaBb	AaBb
AB	AABB	AABB	AABB	AABB
ab	AaBb	AaBb	AaBb	AaBb

- \_\_\_\_\_ % AABB
- \_\_\_\_\_ % AaBb
- \_\_\_\_\_ % AABb
- \_\_\_\_\_ % AaBB
- \_\_\_\_\_ % acidic, bald
- \_\_\_\_\_ % acidic, hairy
- \_\_\_\_\_ % neutral, bald
- \_\_\_\_\_ % neutral, hairy

Imagine, instead, that two aliens, heterozygous for both traits, mate. *Determine the percentages of phenotypes in the offspring.*

AaBb x AaBb

	AB	Ab	aB	ab
AB	AABB	AABb	AaBB	AaBb
Ab	AABb	AAbb	AaBb	Aabb
aB	AaBB	AaBb	aaBB	AaBb
ab	AaBb	Aabb	aaBb	aabb

- \_\_\_\_\_ % acidic, bald
- \_\_\_\_\_ % acidic, hairy
- \_\_\_\_\_ % neutral, bald
- \_\_\_\_\_ % neutral, hairy

Complete the following chart to describe alternate forms of gene/trait inheritance.

Inheritance	Description	Example
Incomplete dominance		
Multiple alleles		
Sex-linked trait		
Polygenic trait		

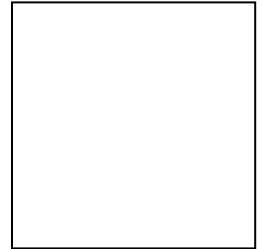
Punnett Square	<p>Red (R) and white (W) flowers</p>	<p>Not colorblind (B) is dominant to colorblind (b)</p>	<p>ABO blood type system</p>
Type of Inheritance			
Describe Offspring Phenotype Ratios/ Percentages	<p>_____ % Red</p> <p>_____ % Pink</p> <p>_____ % White</p>	<p>_____ % Normal male</p> <p>_____ % Normal female</p> <p>_____ % Colorblind male</p> <p>_____ % Colorblind female</p>	<p>_____ % AB blood</p> <p>_____ % A blood</p> <p>_____ % B blood</p> <p>_____ % O blood</p>

1. Describe the contributions of each scientist to the discovery of DNA's molecular structure.

Scientist	Contribution
Francis Crick and James Watson	
Rosalind Franklin	
Erwin Chargaff	

2. Draw Franklin's "Photo 51" and identify the scientific technique used to make it.

a. Technique: \_\_\_\_\_



3. Describe 2 important functions of DNA.

a. \_\_\_\_\_

b. \_\_\_\_\_

4. Describe 3 important structural characteristics of DNA.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

5. Identify and draw the monomer of nucleic acids, like DNA. Label its three parts (phosphate, sugar, nitrogen base).



6. Describe the meaning of complimentary base pairing

between the two DNA strands.

When adenine appears on a strand, \_\_\_\_\_ appears on the opposite strand.

When guanine appears on a strand, \_\_\_\_\_ appears on the opposite strand.

7. Put the following terms in order, from simplest to most complex: **chromosome, DNA, gene, genome, nucleotide.**

**Observe the karyotype at right.**

- Identify the gender: \_\_\_\_\_
- Draw a circle around where you found this information.
- Describe any chromosomal abnormalities:  
\_\_\_\_\_
- Draw a square around where you found this information.

