

Heredity

1. What phenotypes did Mendel work with?
Seed (endosperm) color, seed shape, seed coat color, flower position, stem length, pod color, pod shape
2. Define the following terms and concepts:
 - A. Principle of Segregation
A diploid organism with two alleles for a particular characteristic segregate (separate) when gametes are formed. One allele goes into each gamete.
 - B. Principle of Independent Assortment
In a cross of more than one gene, each gene segregates independently of each other.

Conditions of Principle of Independent Assortment:

- a. Genes are on separate chromosomes
 - b. Genes are on the same chromosome but far apart (crossing-over)
- C. Dominant genes- phenotypic traits that appear unchanged in the heterozygous offspring.
 - a. Represented by capitalized letters
 - D. Recessive genes- phenotypic traits that disappear in the heterozygous offspring
 - a. Represented by lowercase letters

Monohybrid Cross

3. Perform the following monohybrid crosses and write the genotypic and phenotypic ratios associated with each of the following crosses.

- a. AA x aa

	A	A
a	Aa	Aa
a	Aa	Aa

Genotypic ratio= 1

Phenotypic ratio= 1

- b. Aa x Aa

	A	a
A	AA	Aa
a	Aa	aa

Genotypic ratio= 1:2:2

Phenotypic ratio= 3:1

4. In flies, body color is represented by the letter “e”. The wild-type body color is gray and the mutant phenotype is ebony. If a gray fly (which is heterozygous for the allele) and an ebony fly are crossed, what will be the resulting genotypes and phenotypes of the offspring?

	e	e
E	Ee	Ee
e	ee	ee

Genotypic ratio= 2:2 or 1:1 (half heterozygous dominant, half homozygous recessive)

Phenotypic ratio= 2:2 or 1:1 (half gray half ebony)

Dihybrid Cross

5. The multiplication rule is used in 2 or more inclusive events and the addition rule is used in 2 or more exclusive events.
6. A rare species of llama has two genes that assort independently of each other during Meiosis. Gene “G” codes for eye color, where blue eyes are dominant to brown eyes. Gene “W” codes for fur color, where brown is dominant to white. Answer the following related to a cross between two llamas with the genotypes Ggww and GgWw.

	Gw	Gw	gw	gw
GW	GGWw	GGWw	GgWw	GgWw
Gw	GGww	GGww	Ggww	Ggww
gW	GgWw	GgWw	ggWw	ggWw
gw	Ggww	Ggww	ggww	Ggww

- a. What is the probability that the offspring will have the genotype GgWw?
4/16 or ¼
- b. What is the probability that the offspring will be white with brown eyes? What about brown with blue eyes

2/16 or 1/8

7. Fill in the following chart with the appropriate Sex Chromosome systems.

Sex System	Male	Female	Animal Example	Heterogametic sex
XX-XO system	XO	XX	Grasshoppers	Male
XX-XY system	XY	XX	Mammals	Male
ZZ-ZW system	ZZ	ZW	Birds, snakes, butterflies, fishes ect	Female
Haplodiploidy system	Haploid	Diploid	Bees, wasps, ants	----
Genetic Balance System	X: AA (1:2)	X:A (1:1)	<i>Drosophila melanogaster</i> (fruit flies)	----

8. Answer the following concerning sex determination in *Drosophila*.

a. What will the fly's gender be if it has the genotype XX and four haploid sets?

1:2 male

b. What will the fly's gender be if it has the genotype XXX and three haploid sets?

1:1 female

9. X-linked traits are found on the X chromosome and Y-linked traits are found on the Y chromosome.

10. Answer the following about a cross between a man who has red-green colorblindness (an X-linked trait) and a woman who is not colorblind (and has no family history of red-green colorblindness).

a. Although the man has an uncle who is colorblind, his mother and father are not colorblind. From which parent did the man inherit the mutated allele?

Colorblindness is a recessive and X-linked trait. Therefore the trait could not be inherited from the father because the father only contains one x and the trait is not expressed. The trait must be from the mother. The mother is heterozygous recessive for the gene therefore it is not expressed phenotypically in the mother.

b. What is the probability that the couple's son will be red-green colorblind?

	B	b
b	Bb	Bb
Y	BY	bY

1/2

c. What is the probability that the couple's son will be red-green colorblind?

0 chance