

TOPIC 1: Mendelian Genetics/Monohybrid Crosses

1. Gregor Mendel is recognized as the Father of Modern Genetics. What type of organism did he study? _____
2. Mendel allowed some plants to self-pollinate and he cross-pollinated others. Explain what these terms mean:
 - a. Self-pollinate: _____
 - b. Cross-pollinate: _____
3. Mendel developed three laws within the field of genetics. Describe them below:
 - a. Law of _____: One version of a gene (allele) can completely mask the presence of another.
 - b. Law of Segregation: each organism has homologous chromosomes (one set from _____, the other from _____). These separate from one another in gamete production (what process yields gametes? _____). Half of the gametes will carry one allele and the other half will carry the other allele.
 - c. Law of _____: genes for different traits assort independently of one another in the formation of gametes.
4. Match the following vocabulary terms to their definition:

Term	Definition
____ Homozygous	a. A specific version of a particular trait
____ Heterozygous	b. Physical expression (what something looks like)
____ Allele	c. A form of a trait that is weaker/can be masked by another form
____ Heredity	d. The study of heredity
____ Genetics	e. A genetic cross that looks at/follows only one gene
____ Monohybrid	f. The alleles present for a particular trait
____ Dominant	g. A genotype containing two like (of the same) alleles
____ Recessive	h. A genotype containing two unlike (different) alleles
____ Phenotype	i. The passing of traits from parents to offspring
____ Genotype	j. A form of a trait that can overpower/mask a weaker form

5. Complete the following:

Round watermelon (F) are dominant over long, oval watermelon (f). Cross a pure round watermelon with a heterozygous round watermelon. Provide the following information:

round offspring: _____ # long/oval offspring: _____
 % FF: _____ %Ff: _____ %ff: _____

Dimpled cheeks are dominant over cheeks without dimples. Cross two heterozygotes and provide the genotypic and phenotypic ratios.

Genotypic Ratio: _____
 Phenotypic Ratio: _____

TOPIC 2: Variations/Dihybrid Crosses

1. Define incomplete dominance:

2. Define codominance:

3. The lubber grasshopper is a very large grasshopper, and is black with red and yellow stripes. Assume that red stripes are expressed from the homozygous RR genotype, yellow stripes from the homozygous rr genotype, and both from the heterozygous genotype.

a) Is this incomplete or complete dominance?

b) What will be the phenotypic ratio and genotypic ratio of the F₁ generation resulting from a cross of two grasshoppers, both with red and yellow stripes?

c) What would the phenotype and genotype ratios of the offspring be if a grasshopper with both color stripes is crossed with a grasshopper with yellow stripes only?

4. Yellow fruit and dwarf vines are recessive traits in tomatoes. Red fruit and tall vines are dominant. Complete a Punnett square and answer the questions for a completely dominant red and tall plant crossed with a heterozygous red and dwarf plant.

Parent genotypes:

of offspring red and tall: _____

of offspring yellow and tall: _____

of offspring red and short: _____

of offspring yellow and short: _____

5. John has type O blood. He knows his mother had type B blood. He does not know the identity of his father, however. What possible blood types could his father have had? Show your work.

6. A wealthy elderly couple dies together in an accident. A man comes forward, claiming that he is their long lost son and is entitled to their fortune. The couple were of blood types AB and O. The man has type O blood. Could he be the heir to the fortune? Show why or why not.

7. A cross between a black cat and a tan cat produces a tabby pattern (black and tan together).

a. What pattern of inheritance does this exhibit?

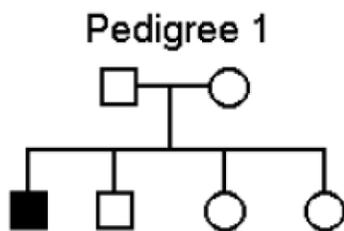
b. Cross a tabby cat with a tan cat. What could the kittens be?

TOPIC 3: Pedigrees

1. How are males represented on a pedigree? _____ Females? _____ Affected organisms? _____

Problems:

1. Pedigree 1 shows a family of parrots. Blue is shaded.



A. Do you think blue feathers are dominant or recessive? _____
 Why?

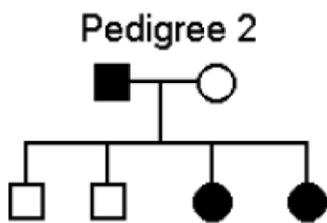
B. What must the genotypes of the parents be? _____

C. What two genotypes could the other offspring have? _____

D. How many children did the parrots have? _____

E. How many generations are shown?

2. Pedigree 2 shows two banana trees that were crossed to produce four F1 plants.



Shaded individuals have green leaves.

A. If green leaves are dominant, which parent has green leaves and which has yellow leaves? _____

B. Label all of the genotypes in Pedigree 2, circle any that may be ambiguous.