

Unit 6 – Genetics

Topic			
Gregor Mendel			
Punnet Square			
Homozygous vs. Heterozygous			
Mendel's Law's			
Incomplete Dominance and Codominance			
Multiple Alleles			

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Name: _____

Date: _____ Period: _____

Punnett Square Worksheet 1

Directions: Read each problem carefully. Make a "key" for the trait, identify the parents involved in the cross and the gametes each parent produces. Show the Punnett square and give the ratio of both genotype and phenotype.

Before you begin... Define the following terms from your notes...

- Homozygous
- Heterozygous
- Phenotype
- Genotype
- Dominant
- Recessive

1. In rabbits, black fur is dominant over white fur. Show the cross of a heterozygous black male with a homozygous white female.

Key:

Parents & Gametes:

2. Tall is dominant over short in pea plants. Show the cross of a homozygous short plant is crossed with a homozygous tall plant.

Key:

Parents & Gametes:

3. In humans, free-ear lobes are dominant to attached. Two parented that are both heterozygous free are expecting a child. What are the chances that the child will have free ear lobes of attached?

Key:

Parents & Gametes:

4. Wrinkled seed are recessive to smooth seeds. Show a plant that always produces wrinkled seeds crossed with a heterozygous smooth seeds producing plant.

Key:

Parents & Gametes:

5. As in the previous problem... Show a heterozygous smooth plant crossed with another heterozygous smooth seed producing plant.

Key:

Parents & Gametes:

6. Blue eyes are dominant to red eyes in rabbits. Show a heterozygous blue-eyed rabbit crossed with a red-eyed rabbit.

Key:

Parents & Gametes:

7. In fruit flies, red eyes are dominant over white eyes. Show a cross between two white-eye fruit flies.

Key:

Parents & Gametes:

Name: _____

A student crossed wrinkled-seeded (rr) pea plants with round-seeded (RR) pea plants. Only round seeds were produced in the resulting plants. This illustrates the principle of

- A) incomplete dominance
 B) independent assortment
 C) dominance
 D) segregation

2) Which genetic concept was proposed by Mendel?

- A) sex linkage
 B) multiple alleles
 C) chromosome nondisjunction
 D) independent assortment

3) A man heterozygous for blood type A marries a woman with blood type AB. The blood type of their offspring could *not* be

- A) B
 B) AB
 C) O
 D) A

4) A cross of a red cow with a white bull produces all roan offspring. This type of inheritance is known as

- A) multiple alleles
 B) sex linkage
 C) codominance
 D) mutation

5) In cabbage butterflies, white color (W) is dominant and yellow color (w) is recessive. If a pure white cabbage butterfly mates with a yellow cabbage butterfly, all the resulting (F_1) butterflies are heterozygous white. Which cross represents the genotypes of the parent generation?

- A) $WW \times Ww$
 B) $Ww \times Ww$
 C) $Ww \times ww$
 D) $WW \times ww$

6) Which represents the genotype of a homozygous condition?

- A) bc
 B) Bb
 C) bb
 D) BC

Gregor Mendel developed some basic principles of heredity based on his

- A) mathematical analysis of the offspring produced by crossing pea plants
 B) dissection of the flowers of both tall and short African violet plants
 C) biochemical analysis of DNA produced in the F_2 generations of roan cattle
 D) microscopic observation of the nuclei of fruit fly cells

8) Mendel's discovery that characteristics are inherited due to the transmission of hereditary factors resulted from his

- A) breeding experiments with many generations of fruit flies
 B) dissections to determine how fertilization occurs in pea plants
 C) careful microscopic examinations of genes and chromosomes
 D) analysis of the offspring produced from many pea plant crosses

9) The principles of dominance, segregation, and independent assortment resulted from studies by Mendel of the inheritance of traits in

- A) roan cattle
 B) fruit flies
 C) pea plants
 D) four-o'clock flowers

10) In a certain species of army ant, the gene for long mandibles (M) is dominant over the gene for short mandibles (m). If a biologist wants to produce ants with long mandibles only, which ants should be crossed?

- A) homozygous long-mandibled ants with heterozygous long-mandibled ants
 B) homozygous short-mandibled ants with homozygous short-mandibled ants
 C) heterozygous long-mandibled ants with homozygous short-mandibled ants
 D) heterozygous long-mandibled ants with heterozygous long-mandibled ants

11) What are the possible blood types of the children of a man with blood type A and a woman with blood type AB?

- A) A, B, or AB
 B) O or A, only
 C) AB, O, or A
 D) O or B, only

- 12) The best method for determining if a woman may be the carrier of the trait for color blindness is to
- A) check her family pedigree for the trait
B) analyze a sample of her urine
C) give her an eye examination
D) analyze a sample of her red blood cells
- 13) A colorblind woman marries a man who has normal color vision. What are the chances of having a colorblind daughter?
- A) 100%
B) 25%
C) 0%
D) 50%
- 14) In rats, black coat color is dominant over white coat color. If some of the offspring of a cross between a black rat and a white rat are white, the black rat must have been
- A) homozygous
B) a mutation
C) heterozygous
D) a polyploid
- 15) If a colorblind man marries a woman who is a carrier for color blindness, it is most probable that
- A) all of their sons will have normal color vision
B) half of their sons will be color blind
C) none of their children will have normal color vision
D) all of their sons will be color blind
- 16) Which statement describes how two organisms may show the same trait, yet have different genotypes for that phenotype?
- A) One is homozygous dominant and the other homozygous recessive.
B) Both are homozygous for the dominant trait.
C) Both are heterozygous for the dominant trait.
D) One is homozygous dominant and the other heterozygous.
- 17) Traits controlled by genes on the *X*-chromosome are said to be
- A) sex-linked
B) mutagenic
C) incompletely dominant
D) homozygous
- 18) When Mendel was experimenting with pea plants, he noted that the traits for seed color and plant height were inherited separately. This observation most directly contributed to an understanding of
- A) intermediate inheritance
B) codominance
C) independent assortment
D) dominance
- 19) Two mice with black fur were crossed and produced offspring with brown fur and offspring with black fur. If *B* represents the dominant allele for black fur and *b* represents the allele for brown fur, which would represent the most probable genotypes of the parental mice?
- A) $BB \times bb$
B) $BB \times BB$
C) $BB \times Bb$
D) $Bb \times Bb$
- 20) In chickens, rose comb (*R*) is dominant over single comb (*r*). When a heterozygous rose-combed rooster is mated with several single-combed hens, what is the expected phenotypic ratio of the offspring?
- A) 100% rose-combed
B) 75% rose-combed and 25% single-combed
C) 50% rose-combed and 50% single-combed
D) 100% single-combed

- 1) C 2) D 3) C 4) C 5) D
- 6) C 7) A 8) D 9) C 10) A
- 11) A 12) A 13) C 14) C 15) B
- 16) D 17) A 18) C 19) D 20) C