

Blood Types Review

Codominance (Blood types)

Human blood types are determined by genes that follow the CODOMINANCE pattern of inheritance. There are two dominant alleles (I^A and I^B) and one recessive allele (i).

Blood Type (Phenotype)	Genotype	Can donate blood to:	Can receive blood from:
O	ii	A,B,AB and O (universal donor)	O
AB	$I^A I^B$	O, AB	A,B,AB and O (universal receiver)
A	$I^A I^A$ or $I^A i$	AB, A	O,A
B	$I^B I^B$ or $I^B i$	AB,B	O,B

- Write the genotype for each person based on the description:
 - Homozygous for the "B" allele _____
 - Heterozygous for the "A" allele _____
 - Type O _____
 - Type "A" and had a type "O" parent _____
 - Type "AB" _____
 - Blood can be donated to anybody _____
 - Can only get blood from a type "O" donor _____
- Pretend that Brad Pitt is homozygous for the type B allele, and Angelina Jolie is type "O." **What are all the possible blood types of their baby?**
- Draw a Punnett square showing all the possible blood types for the offspring produced by a type "O" mother and an a Type "AB" father
- Mrs. Clink is type "A" and Mr. Clink is type "O." They have three children named Matthew, Mark, and Luke. Mark is type "O," Matthew is type "A," and Luke is type "AB." Based on this information:
 - Mr. Clink must have the genotype _____
 - Mrs. Clink must have the genotype _____ because _____ has blood type _____
 - Luke cannot be the child of these parents because neither parent has the allele _____.
- Two parents think their baby was switched at the hospital. Its 1968, so DNA fingerprinting technology does not exist yet. The mother has blood type "O," the father has blood type "AB," and the baby has blood type "B."
 - Mother's genotype: _____
 - Father's genotype: _____
 - Baby's genotype: _____ or _____
 - Punnett square showing all possible genotypes for children produced by this couple
 - Was the baby switched?
- Identify which men in the table below **could not** be the father of a baby with type B blood if the mother has type A blood? Justify your answer with a Punnett square.

Name	Blood Type
Sammy the player	Type O
George the sleeze	Type AB
The waiter	Type A
The cable guy	Type B

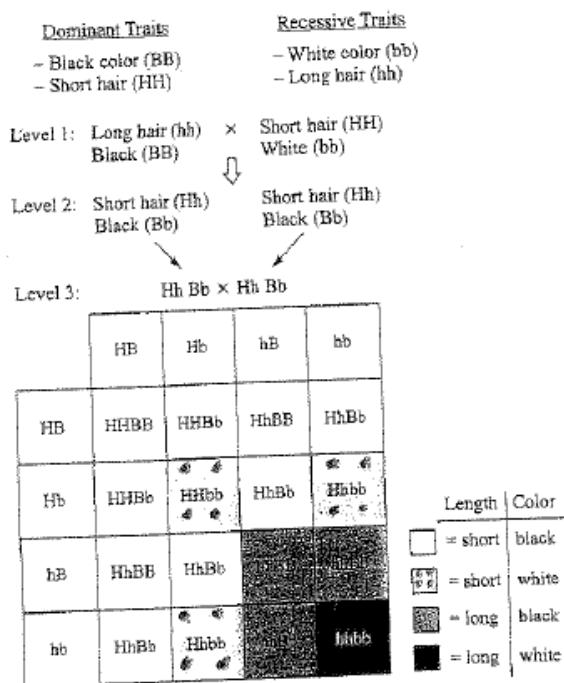
ACT Practice (2-Trait Genetics) BTR _____

PASSAGE V

Gregor Mendel is known for his work in genetics. He is credited with discovering how traits (characteristics) are passed from one generation to the next. After his observations of inherited traits, Mendel concluded that each organism carries two sets of information about a certain trait. If the two sets differ about the same trait, one set dominates the other. That way, information can be passed on through the generations, even if the trait is not expressed.

It has since been determined that the presence of certain traits is attributed to *genes*, and the different forms that genes can take, known as *alleles*. Dominant alleles (*D*) produce dominant characteristics; recessive alleles (*d*) produce recessive characteristics. Dominant alleles are expressed whenever present (*DD*, *Dd*) but recessive alleles are expressed only when the dominant allele is absent (*dd*).

A study was done in which the independence of two traits was tested. In this study, a rabbit with long black hair was mated with a rabbit with short white hair. The dominant trait for hair length is short (*H*). The dominant trait for hair color is black (*B*). If the two initial rabbits (level 1 in the figure below) are *homozygous* for their traits, meaning that the two alleles for each trait are the same, breeding them will result in offspring that have both a dominant and recessive allele for each trait. Such a pairing of alleles is known as *heterozygous*. If, as in level 2 of the figure, two heterozygous rabbits are bred, the chart (level 3) contains all the possibilities for their offspring.



25. In the figure shown, each numbered level represents:
- different generations.
 - different members of the same generation.
 - which rabbits have dominant alleles.
 - which rabbits have recessive alleles.

26. Which of the following statements best explains the observation that offspring of the two rabbits in level 1 must have short black hair?
- If parents have a certain trait, their offspring must also possess the same trait.
 - There is a 75% chance that the offspring will have short, black hair.
 - Because offspring receive one allele per trait from each parent, the only possible outcome of the mixing is to have one dominant and one recessive allele for each trait.
 - Because offspring receive one allele per trait from each parent, the recessive alleles are not transmitted to the offspring.

27. What is the probability that offspring of the level 2 rabbits will have white hair?
- 75%
 - 25%
 - 6.25%
 - 0%

28. If several pairs of heterozygous rabbits were mated (as in level 2), what would be the expected ratio for the traits of the offspring (express as a ratio of short black hair: long black hair: short white hair: long white hair)?
- 16:4:4:1
 - 16:3:3:1
 - 9:4:4:1
 - 9:3:3:1

29. Which of the following statements might be a reasonable generalization made after examining this study?
- If heterozygous rabbits with opposite traits are bred, the recessive traits will not be visible in the immediate generation, but may be visible in the second generation.
 - If heterozygous rabbits with opposite traits are bred, the recessive traits might be visible in the immediate generation, but will not be visible in the second generation.
 - If heterozygous rabbits with opposite traits are bred, the recessive traits will be visible in the immediate generation and in the second generation.
 - If heterozygous rabbits with opposite traits are bred, the recessive traits will not at all be visible in future generations because they are overcome by the dominant traits.

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