

Practice Genetic Problems

- The genetic cross between a homozygous recessive individual and one of an unknown genotype is referred to as:
a) a self-cross; b) a test cross; c) a hybrid cross; d) an F1 cross; e) a dihybrid cross.
- In crossing a homozygous recessive with a heterozygote, what is the chance of getting a homozygous recessive phenotype in the F1 generation?
a) zero; b) 25%; c) 50%; d) 75%; e) 100%.
- In snapdragons, heterozygotes have pink flower, whereas homozygotes have either red or white flowers. When plants with red flowers are crossed with plant with white flowers, what proportion of the offspring will have pink flowers?
a) zero; b) 25%; c) 50%; d) 75%; e) 100%.
- Black fur in mice (B) is dominant to brown fur (b) short tails (T) is dominant of long tails (t). What proportion of the progeny of the cross BbTt x Bbtt will have black fur and long tails?
a) 1/16; b) 3/16; c) 3/8; d) 1/2; e) 9/16.
- A couple has three children, all of whom have brown eyes and blond hair. Both parents are homozygous for brown eyes (BB), but one is blond (rr) and the other is a redhead (Rr). What is the probability that the next child will be a brown-eyed redhead?
a) 1/16; b) 1/8; c) 1/4; d) 1/2; e) 1.
- A 9:3:3:1 ratio is characteristic of the: a) F2 generation of a monohybrid cross;
b) F2 generation of a momhybrid cross; c) F1 generation of a dihybrid cross;
d) F2 generation of a dihybrid cross; e) F2 generation of a trihybrid cross.
- How many unique gametes could be produced through independent assortment by an individual with the genotype Aa Bb CC Dd EE?
a) 4; b) 8; c) 16; d) 32; e) 1/64.
- In cattle, roan color (mixed red and white hairs) occurs in the heterozygous (Rr) offspring of red (RR) and white (rr) homozygotes. When two roan cattle are crossed, the phenotypes of the progeny are found to be in the ratio of one red: two roan: one white. Which of the following crosses could produce the highest percentage of roan cattle?
a) red x white; b) roan x roan; c) white x roan; d) red x roan
e) all of the above crosses would give the same percentage of roan.
- Roan color in cattle is the result of absence of dominance between red and white color genes. How would one produce a herd of pure-breeding roan-color cattle? **Explain.**
a) cross roan with roan; b) cross red with white; c) cross roan with red;
d) cross roan with white; e) it cannot be done.
- An animal has the genotype AaBbCcDd. Relative to these four unlinked loci, how many unique gametes can be produced by this individual?
a) 1; b) 2; c) 4; d) 8; e) 16.
- In some cats, black color is due to a sex-linked (X-linked) recessive gene (b); the dominant allele (B) produces orange color. The heterozygote (Bb) is calico. What kinds of offspring would be expected from the cross of an orange male and a black female?
a) black females, orange males; b) orange females, black males;
c) calico females, black males; d) black females, calico males;
e) orange females and males.
- People who have red hair usually have freckles. This can be explained by?
a) linkage; b) reciprocal translocation; c) independent assortment;
d) sex-influenced inheritance; e) nondisjunction.
- In humans, the allele for short fingers is dominant over that for long fingers. If a person with short fingers who had a parent with long fingers marries a person with long fingers, what are the chances for each child to have short fingers?
a) zero; b) 25%; c) 50%; d) 75%; e) 100%.

14. If a woman who is re-green colorblind mates with a man with normal vision, what phenotypes would one expect their children to have?
- a) all their children would be color blind;
 - b) all their daughters will be color-blind, but all their sons will have normal vision.
 - c) all their daughters will be carriers and all their sons will be color-blind.
 - d) all their daughters will have normal vision and will not be carriers, but all their sons will be color-blind.
 - e) half their daughters will be carriers and the other half will be fully normal; half their sons will be color-blind and the other half will have normal vision.
15. If a child has AB blood type, the parents:
- a) must both have different blood types;
 - b) must be A and B but not AB;
 - c) must both be AB;
 - d) can be any blood type, but must be different;
 - e) can both be AB or must be different and neither can be type O.
16. Two individuals that are heterozygous for A and B blood types respectively have children. Which of the following are possible blood types of their children?
- a) A;
 - b) B;
 - c) AB;
 - d) O;
 - e) all of these are possible.
17. Ellie May, a mother with type B blood, has a child with type O blood. She claims that Jethro, who has type A blood, is the father. He claims that he cannot possibly be the father. Further, blood tests ordered by the judge reveal that the father is homozygous. The judge rules that:
- a) Ellie May is right and Jethro must pay up.
 - b) Jethro is right and is a winner-winner (chicken dinner).
 - c) Ellie May cannot be the real mother of the child. There must have been an error made at the hospital.
 - d) It is impossible to reach a decision based on the limited data available.
 - e) none of these are correct.
18. If a daughter expresses a sex-linked recessive gene, she inherited the trait from:
- a) her mother;
 - b) her father;
 - c) both parents;
 - d) neither parents.
19. A blue-eyed, left-handed woman marries a brown-eyed, right handed man who is heterozygous for both traits. If blue eyes and left-handedness are recessive, how many different phenotypes are possible in their children?
- a) one;
 - b) two;
 - c) three;
 - d) four;
 - e) six;
 - ab) eight;
 - ac) nine;
 - ad) too many.
20. What are the phenotypes from question #19?
21. A married couple both has normal color vision, but their daughter has red-green colorblindness, a X-linked recessive trait. The husband sues the wife for divorce on grounds of infidelity. Can genetics provide evidence supporting his case? **Explain.**
22. Joe Bob has unattached earlobes like his father, but his mother has attached earlobes. Give the genotypes of each of the three. Unattached ear lobes are dominant to attached earlobes.
23. IN guinea pigs, black hair (B) is dominant to white (b). Two black guinea pigs of the same genotype were mated and produced 29 black and 9 white offspring. What would you predict the genotypes of the parents to be? **Explain.**
24. Two individuals are both heterozygous for a single pair of genes (Tt). During the course of their marriage, they produced 8 offspring. Approximately how many (give me a number, not a percentage) of the offspring can be expected to display the dominant phenotype?