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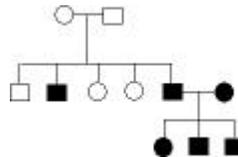
AP Biology Genetics Problems Practice

Terms and Basics

- Mendel proposed Three Laws of Genetics. They are:
 - Independent Assortment, Relativity, Natural Selection
 - Dominance, Allelic Combination, Independent Assortment
 - Heterozygosity, Segregation, Dominance
 - Dominance, Segregation, Independent Assortment
- Dominant traits are always more common in a population than recessive traits.
 - true
 - false
- Both your parents get migraine headaches, but you don't, so you know that getting a migraine must be a dominant trait.
 - true
 - false
- The inside of a punnett square shows:
 - all the possible gametes
 - all the possible parents
 - all the possible offspring
- What does "dihybrid" mean?
 - one trait that has three alleles
 - two traits are being examined at once
 - only one allele is dominant

6. In this pedigree, is the trait caused by a dominant or a recessive allele?

- dominant
- recessive
- can not be determined



Complete Dominance Problems - Monohybrid

- In peaches, the gene for fuzzy skin is dominant to the gene for smooth skin (resulting in peaches and nectarines, respectively). Two trees with fuzzy fruit are crossed and the offspring were in the ratio of 942 fuzzy to 298 smooth. What are the genotypes of the parents?
 - FF x Ff
 - Ff x Ff
 - Ff x ff
 - none of these
- The ability to taste PTC paper is caused by a dominant allele. You are a PTC taster, your brother is not, your father is, your mother is not. What is your genotype for this trait?
 - TT
 - tt
 - Tt
 - none of these is correct

9. In peas, a yellow pea color is caused by a dominant allele. Two yellow peas will therefore always have yellow offspring. a. true b. false
10. Also in peas, purple flower color is dominant to white. In a large field of peas that all came from the same parents, half the plants have purple flowers, half have white flowers. What color were the parents?
a. both purple b. one purple, one white c. both white
11. A purple-flowered pea that is heterozygous for color is crossed with another purple-flowered pea that is homozygous. What is the genotypic ratio of the offspring?
a. 1:1 b. 3:1 c. 1:2:1 d. none of these is the correct ratio

Incomplete Dominance Problems

12. What does the symbol GG' indicate?
a. that both alleles are recessive b. that both genes are expressed and blend together
c. that both genes are passed onto the offspring
13. In tobacco, there are three colors of leaves, green (GG), yellow-green (GG') and yellow (G'G'). To obtain all three colors from one cross, we would have to cross a green plant with a yellow. a. true b. false
14. Crossing a green plant with a yellow-green plant would never result in a yellow plant.
a. true b. false
15. If we obtain a phenotypic ratio of one yellow to one yellow-green, what color were the parents?
a. both yellow-green b. one yellow-green, one yellow c. both yellow
d. one green, one yellow-green

Dihybrid Crosses (HINT: Apply the Law of Independent Assortment)

16. In peas, the yellow color is dominant to green, and the round shape is dominant to wrinkled. If a yellow, wrinkled pea that is heterozygous for color is crossed with a green, wrinkled pea, what is the expected phenotypic ratio?
a. 9:3:3:1 b. 1:1 c. 3:1 d. 1:2:1 e. none of these
17. From the information in the problem above, if a yellow, round pea that is homozygous for both traits is crossed with a pea that is green and wrinkled, what phenotypes could you expect?
a. yellow/wrinkled only
b. half yellow/wrinkled and half green/wrinkled
c. green/wrinkled only
d. yellow/wrinkled; yellow/round; green/wrinkled; and green/round
e. yellow/round only
18. Alvin has free earlobes (caused by a dominant gene) and is unable to taste PTC (the ability to taste is dominant). Alvin's father had attached earlobes. Alvin marries Katrina who has free earlobes and is a taster (she is homozygous for both traits). Will all of their children be tasters and have free earlobes? a. yes b. no

19. Could they expect a child with attached earlobes who is a taster?
 a. yes b. no
20. Tallness in a particular plant is caused by a dominant allele, the flower color is determined by genes which exhibit incomplete dominance (resulting in the colors purple, lavender and white). A tall, purple-flowered plant (which is heterozygous for height) is crossed with a tall, lavender-flowered plant (also heterozygous for height). What is the genotypic ratio of the offspring?
 a. 3 TTPP : 1 TtPP : 3 TTPP' : 1 ttPP
 b. 1 TTPP : 2 TtPP : 1 TTPP' : 1 ttPP : 2 TtPP' : 1 ttPP'
 c. 9 TTPP : 3 TtPP : 3 ttPP : 1 ttPP'
 d. 1 TTPP : 1 TtPP : 1 TTPP' : 1 ttPP
21. What is the phenotypic ratio?
 a. 3 tall purple : 1 tall lavender : 3 short purple : 1 short lavender
 b. 3 tall purple : 3 tall lavender : 1 short purple : 1 short lavender
 c. 9 tall purple : 3 tall lavender : 3 short purple : 1 short lavender
 d. 1 tall purple : 1 tall lavender : 1 short purple : 1 short lavender
22. Are there any two offspring from this cross that could produce short, white flowered plants? a. yes b. no

Made-up Samples

23. In tribbles (fluffy critters from a Star Trek episode), crossing a white tribble with a black tribble results in all the offspring having black coats with white spots. What will be the expected phenotypic ratio from crossing a spotted tribble with a black tribble?
 a. 1:2:1 b. 1:1 c. 1:1:1:1 d. 9:3:3:1 e. none of the above
24. Crossing two spotted tribbles?
 a. 1:2:1 b. 1:1 c. 1:1:1:1 d. 9:3:3:1 e. none of the above
25. Also in tribbles, the trait of an extra long tail is dominant to having a short tail. Two long-tailed tribbles are crossed and you find that 352 offspring have long tails and 118 have short tails. What are the genotypes of the parents?
 a. both parents are homozygous
 b. both parents are heterozygous
 c. one parent is heterozygous and the other homozygous
26. A spotted tribble with a long tail (it is homozygous for that trait) is crossed with a black short-tailed tribble. What are the expected phenotypes?
 a. only spotted long-tailed kids
 b. only spotted short-tailed kids
 c. both spotted long-tailed and black long-tailed kids
 d. both spotted short-tailed and black short-tailed kids
 e. both spotted short-tailed and black long-tailed kids

Sex-linkage Problems (colorblindness and hemophilia are two you should know as recessive sex-linked traits)

27. Two colorblind people will have all colorblind kids. a. true b. false
28. A woman whose father was colorblind has a daughter who is colorblind. What is the genotype of her husband? a. $X^N Y$ b. $X^n Y$ c. impossible to tell
29. A woman has parents with normal color vision and a red-green colorblind brother. She marries a colorblind man and they have a colorblind daughter. What is the probability that a son will also be colorblind?
 a. 0% b. 25% c. 50% d. 75% e. 100%
30. A woman who is a carrier for hemophilia marries a man with normal blood clotting. Could they ever have a hemophiliac son? a. yes b. no
31. A male hemophiliac marries a woman that is homozygous dominant for blood clotting. What type of children could they expect?
 a. all children will be hemophiliacs
 b. hemophiliac daughters only, all sons would be normal
 c. they could have a hemophiliac son, but all daughters will be normal
 d. all their children will be normal
32. A colorblind woman marries a man with normal vision. Could they ever have a colorblind son? a. yes b. no

Co-Dominance - Blood Type Problems

33. If two people who have AB blood have four children, we know that one of the children will have type A blood, one will have type B and the other two will have type AB.
 a. true b. false
34. Olga is married for the second time. Her first husband was blood type A and her child by that marriage was type O. Her new husband is type B and their child is type AB. What is Olga's genotype and blood type?
 a. $I^A i$, blood type A b. $i i$, blood type O
 c. $I^A I^A$, blood type A d. $I^A I^B$, blood type AB
35. Is it possible for a type O woman to have a type A child? a. yes b. no
36. Is it possible for a type B woman to have a type A child? a. yes b. no
37. Is it possible for a type O man to have a type AB child? a. yes b. no

Assorted Problems

38. A woman who is a carrier for colorblindness and has five fingers marries a colorblind man with six fingers (his mother had five fingers and the gene for six fingers is dominant). What percent of the kids would you predict to be colorblind and have five fingers?
 a. 0% b. 25% c. 50% d. 75% e. 100%
39. What percent of the kids would have normal vision and five fingers?
 a. 0% b. 25% c. 50% d. 75% e. 100%

40. Defective dentine is a dominant sex-linked trait. A woman with normal teeth marries a man with bad teeth. Could they have a son with bad teeth? a. yes b. no
41. Could they have a daughter with bad teeth? a. yes b. no
42. Labrador Retrievers come in three colors: black, chocolate brown and yellow. The allele "B" causes black as long as the "E" gene is also present (E promotes color deposition allowing a dark color). If the E gene is not present (ee), then a dark color can not be deposited and this will result in a yellow lab. What is the genotype for a brown lab?
 a. BbEe or BBEE b. bb ee c. BBee d. bbEE or bbEe e. Bbee
43. Can two black labs have a yellow offspring? a. yes b. no
44. Can two yellow labs have a brown offspring? a. yes b. no
45. Can two brown labs have a black offspring? a. yes b. no
46. In leghorn chickens, colored feathers are due to a dominant gene, C and white feathers due to the recessive allele, c. The presence of a dominant gene, P, however, prevents color in feathers entirely producing a white chicken (the recessive allele (p) has no effect on color). A colored rooster is mated with a white hen and all the chicks (400 so far) are colored. What are the probable genotypes of the parents and the offspring?
 a. Rooster: Ccpp Hen: ccpp Offspring: Ccpp
 b. Rooster: Ccpp Hen: Ccpp Offspring: ccpp
 c. Rooster: CCpp Hen: ccpp Offspring: Ccpp
 d. Rooster: CCpp Hen: ccPp Offspring: ccpp
 e. none of these is the correct list of genotypes