AP Biology - Genetic Practice Problems

Choose the answer which best completes each of the following statements or answers the following questions. Place the number corresponding to that response in the appropriate blank on your student answer sheet as well as on this paper. (2.5 pts. each)

1. Two different traits on different chromosomes have no influence on each other's inheritance. This best provides a statement of the (1.) law of dominance (2.) law of segregation (3.) law of independent assortment (4.) law of incomplete dominance (5.) law of disjunction


3. The appearance of an individual is referred to as a(n) (1.) centromere (2.) phenotype (3.) genotype (4.) expression (5.) locus

4. A man of blood type A, whose mother had blood type O, marries a woman of blood type AB. The chances of this couple's having a child with blood type O are (1.) 25% (2.) 50% (3.) 75% (4.) 100% (5.) 0%

5. The gene for Rh+ blood is dominant over the gene for Rh- blood. An Rh- woman whose mother was Rh- marries a Rh+ man, both of whose parents were Rh+. What percentage of their children will be expected to be Rh+? (1.) 0 (2.) 25% (3.) 50% (4.) 100%

6. Pea plants are tall if they have the genotype TT or Tt, and they are short if they have genotype tt. A tall plant is mated with a short plant. Half the offspring are tall, and half are short. This allows us to conclude that the tall plant (1.) was homozygous (2.) was heterozygous (3.) had two tall parents (4.) all of the above (5.) none of the above

7. If a homozygous dominant is crossed with a homozygous recessive for a given trait, the offspring will be (1.) all of the dominant phenotype (2.) 1/4 of the recessive phenotype (3.) all homozygous dominant (4.) all homozygous recessive (5.) present in a 9:3:3:1 ratio

8. Michelle and Keith are apparently normal, but their daughter was born with alkaptonuria, an inherited metabolic disorder. If alkaptonuria is like most other human hereditary disorders, the probability of their next child being born with alkaptonuria is (1.) 0 (2.) 1/4 (3.) 1/2 (4.) 2/3 (5.) 3/4

9. Hemophilia is a genetic disease that has plagued the royal houses of Europe since the time of England's Queen Victoria, who was a carrier. Her granddaughter Alexandra married Nicholas II, the last Tsar of Imperial Russia. Alexandra was a carrier of the gene for hemophilia; Nicholas was normal. Their son, the Tsarevich Alexis, was afflicted with the disease. Alexis and his four sisters are all thought to have been killed at the
outbreak of the Revolution of 1917. It is likely that (1.) one or more of the sisters may have been carriers of hemophilia (2.) all of the sisters were carriers of hemophilia (3.) one or more of the sisters may have had hemophilia (4.) all of the sisters had hemophilia (5.) all four sisters were fully normal (XX) with regard to hemophilia

10. Theoretically, if a carrier hemophiliac married a normal male, what percentage of their male offspring would be expected to be carriers? (1.) 100% (2.) 50% (3.) 25% (4.) 0%

11. A man with red-green colorblindness marries a woman who is neither colorblind nor a carrier for this trait. Which statement would best describe their probable offspring? (1.) All of their children would be colorblind. (2.) Fifty percent of their sons would be colorblind. (3.) Fifty percent of their daughters would be colorblind. (4.) None of their children would be colorblind but all of their daughters would be carriers. (5.) All of their sons would be colorblind.

Use the following information to do questions 12 through 19.

Match each of the following genetic phenomena with the condition creating the phenomenon. Some choices may be used more than once or not at all. (In some cases more than one answer may be acceptable... you need list only one correct answer to receive credit for this question ... if you list additional answers which are incorrect, your answer will be marked as incorrect!

A = codominance
B = recessive condition
C = sex linkage
D = lethal gene
E = multiple loci (polygenes)
F = nondisjunction
G = gene linkage
H= incomplete dominance

12. Types A and B blood.
13. Type O blood.
14. Japanese four o' clocks and snapdragons
15. Hemophilia, red-green colorblindness, tortoise shell cats.
16. 2:1 phenotypic ratio
17. Andalusian fowl
18. Sickle-cell anemia
19. Roan cattle

20. Jane Smith has type A blood and Jim Smith has B type blood. They have a baby with O type blood. What blood types could additional children have? (1.) A (2.) B (3.) 0 (4.) All types

21. Genetic diseases carried on the X-chromosome are said to be (1.) Dominant (2.) recessive (3.) sex-linked (4.) Lethal
Use the following lettered choices to answer questions 22 through 25 which follow.


22. Organism in which the paired genes for a specific trait are different.
23. A grid system used in figuring possible results of various genetic problems.
24. Organism in which the paired genes for a specific trait are the same
25. The outward expression of a gene on an organism.

Use the pedigree chart below and your knowledge of biology to answer questions 26 through 28 which follow.

I
II
III
Albert
Victoria
IV
V
VI
Elizabeth II
VII
VIII
Charles

26. How many males in generation IV are carriers of this trait?
   (1.) 0 (2.) 1 (3.) 2 (4.) 4

27. Describe the genetic makeup of the parents producing individual number 4 and show a Punnett square to indicate this is possible.

28. How many generations are found in the above family? __________

29. Fetal cells may be removed along with fluid from the womb by a process known as (1.) karyotyping (2.) uterine tapping (3.) amniocentesis (4.) sonogramming (5.) chorionic villus sampling

30. Suppose we have a pea plant with purple flowers, determined by the dominant allele P. How might you determine whether the plant is homozygous (PP) or heterozygous (Pp)? (1.) Perform a testcross: Cross the plant with a known heterozygote, Pp. (2.) Cross the plant with a true-breeding purple plant. (3.) Examine the plant’s chromosomes with a microscope. (4.) Perform a testcross: Cross the plant with a white one, which must be homozygous recessive, or pp. (5.) Attempt to cross the plant with a pink-flowered snapdragon.
31. If the two traits that Mendel looked at in his dihybrid cross of smooth yellow peas with wrinkled green peas had been controlled by genes that were located on the same chromosome, then the F2 generation (1.) would have contained four phenotypes in a 9:3:3:1 ratio (2.) would have contained only individuals that were heterozygous at both loci (3.) would have deviated from the 9:3:3:1 phenotypic ratio that is predicted by the law of independent assortment (4.) would have contained no individuals that were heterozygous at both loci (5.) none of the above

32. Huntington's disease is an example of a genetic disorder caused by (1.) late-acting lethal dominant allele (2.) a nonlethal dominant allele (3.) a late-acting recessive allele (4.) homozygous recessive alleles (5.) multiple alleles

33. Several inherited disorders are much more common in close-knit religious communities, such as the Amish, than in the general population. This is at least partly due to the fact that (1.) people in such communities are more likely to marry relatives (2.) shared environmental conditions such as diet can increase mutation rate (3.) modern medical care is not widely available in such communities (4.) community members care for each other, and such disorders are contagious (5.) individuals in such communities are more likely to have large families

34. Pea flowers may be purple (W) or white (w). Pea seeds may be round (R) or wrinkled (r). What proportion of the offspring from the cross WwRr x WwRr will have white flowers and wrinkled seeds?

(1.) 1/16 (2.) 3/16 (3.) 8/16 (4.) 9/16 (5.) all of them

35. A single genetic locus that controls more than one trait is said to be (1.) polygenic (2.) photogenic (3.) pleiotropic (4.) autotrophic (5.) somatic

36. A red bull is crossed with a white cow and all of the offspring are roan, a shade between red and white. This is an example of genes that are (1.) nonhomologous (2.) epistatic (3.) codominant (4.) incompletely dominant (5.) completely dominant

37. In human hypercholesterolemia, the ability of liver cells to remove cholesterol from the blood is controlled at one locus. People who are HH have normal cholesterol, those having Hh have heart attacks by age 30, and people who are hh have heart attacks by age 2. If an HH person mates with an Hh person, will that person have any severely afflicted (hh) offspring? (1.) no (2.) yes, 1/4 of their offspring (3.) yes, 1/2 of their offspring (4.) yes, 3/4 of their offspring (5.) yes, all of their offspring
38. In a certain plant, the alleles A, B, and C are completely dominant to the alleles a, b, and c. A plant with the genotype AABbcc will have the same phenotype as the plant with the genotype (1.) AAbbcc (2.) aabbcc (3.) AaBBcc (4.) AABBCc (5.) none of the above

39. Cystic fibrosis can be inherited even if neither parent has the disease. This is because the disease (1.) requires certain environmental conditions to be expressed (2.) occurs only in polyploid individuals (3.) is caused by a recessive allele (4.) is caused by a dominant allele (5.) occurs only in individuals who are already weak from other causes

40. Phenylketonuria (PKU) is an autosomal recessive disorder. Using "P" and "p" to represent the alleles, what is the genotype of an individual with PKU? (1.) PP (2.) Pp (3.) pp (4.) Pp or pp (5.) all of the above
AP Biology Genetics Practice Problems Set

Student Answer Sheet

1. _____ 11. _____ 21. _____ 31. _____
2. _____ 12. _____ 22. _____ 32. _____
3. _____ 13. _____ 23. _____ 33. _____
4. _____ 14. _____ 24. _____ 34. _____
5. _____ 15. _____ 25. _____ 35. _____
7. _____ 17. _____ 27. Show work below 37. _____
8. _____ 18. _____ 28. _____ 38. _____
10. _____ 20. _____ 30. _____ 40. _____