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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | Pea plants were particularly well suited for use in Mendel's breeding experiments for all of the following reasons ***except***that   |  | | --- | |  | | a. | it is possible to completely control matings between different pea plants. | | b. | it is possible to obtain large numbers of progeny from any given cross. | | c. | peas have an unusually long generation time. | | d. | many of the observable characters that vary in pea plants are controlled by single genes. | |
| 2. | A plant with purple flowers is allowed to self-pollinate. Generation after generation, it produces purple flowers. This is an example of   |  |  | | --- | --- | | a. | hybridization. | | b. | incomplete dominance. | | c. | true-breeding. | | d. | polygenetics | |  |  | |
| 3. | Which of the following statements about Mendel's breeding experiments is *correct*?   |  |  | | --- | --- | | a. | None of the parental (P) plants were true-breeding. | | b. | All of the F2 progeny showed a phenotype that was intermediate between the two parental (P) phenotypes. | | c. | Half of the F1 progeny had the same phenotype as one of the parental (P) plants, and the other half had the same phenotype as the other parent. | | d. | All of the F1 progeny resembled one of the parental (P) plants, but only some of the F2 progeny did. | |
| 4. | What is the difference between a monohybrid cross and a dihybrid cross?   |  |  | | --- | --- | | a. | A monohybrid cross involves a single parent, whereas a dihybrid cross involves two parents. | | b. | A monohybrid cross involves organisms that are heterozygous for a single character, whereas a dihybrid cross involves organisms that are heterozygous for two characters. | | c. | A monohybrid cross is performed only once, whereas a dihybrid cross is performed twice. | | d. | A monohybrid cross results in a 9:3:3:1 ratio whereas a dihybrid cross gives a 3:1 ratio. | |  |  | |
| 5. | A cross between homozygous purple-flowered and homozygous white-flowered pea plants results in offspring with purple flowers. This demonstrates   |  |  | | --- | --- | | a. | the blending model of genetics. | | b. | true-breeding. | | c. | dominance. | | d. | the mistakes made by Mendel. | |  |  | |
| 6. | The F1 offspring of Mendel's classic pea cross always looked like one of the two parental varieties because   |  |  | | --- | --- | | a. | one allele was completely dominant over another. | | b. | each allele affected phenotypic expression. | | c. | the traits blended together during fertilization. | | d. | different genes interacted to produce the parental phenotype. | |  |  | |
| 7. | What was the most significant conclusion that Gregor Mendel drew from his experiments with pea plants?   |  |  | | --- | --- | | a. | There is considerable genetic variation in garden peas. | | b. | Traits are inherited in discrete units, and are not the results of "blending." | | c. | An organism that is homozygous for many recessive traits is at a disadvantage. | | d. | Genes are composed of DNA. | |  |  | |
| 8. | Which of the following is (are) true for alleles?   |  |  | | --- | --- | | a. | They can be identical or different for any given gene in a somatic cell. | | b. | They can be dominant or recessive. | | c. | They can represent alternative forms of a gene. | | d. | A, B, and C are correct. | |  |  | |
| 9. | What is genetic cross between an individual showing a dominant phenotype (but of unknown genotype) and a homozygous recessive individual called?   |  |  | | --- | --- | |  |  | | a. | a testcross | | b. | a hybrid cross | | c. | an F1 cross | | d. | a dihybrid cross | |
| 10. | How many unique gametes could be produced through independent assortment by an individual with the genotype *AaBbCCDdEE?*   |  |  | | --- | --- | |  |  | | a. | 8 | | b. | 16 | | c. | 32 | | d. | 64 | |
| 11. | Two plants are crossed, resulting in offspring with a 3:1 ratio for a particular trait. This suggests   |  |  | | --- | --- | | a. | that the parents were true-breeding for contrasting traits. | | b. | that each offspring has the same alleles | | c. | that a blending of traits has occurred. | | d. | that the parents were both heterozygous. | |  |  | |
| 12. | Two characters that appear in a 9:3:3:1 ratio in the F2 generation should have which of the following properties?   |  |  | | --- | --- | | a. | Each of the characters is controlled by a single gene. | | b. | The genes controlling the characters obey the law of independent assortment. | | c. | Each of the genes controlling the characters has two alleles. | | d. | A, B, and C are correct. | |  |  | |
| 13. | A 9:3:3:1 phenotypic ratio is characteristic of which of the following?   |  |  | | --- | --- | | a. | a monohybrid cross | | b. | a dihybrid cross | |  |  | | c. | linked genes | | d. | both A and C | |
| 14. | A sexually reproducing animal has two unlinked genes, one for head shape (*H).* and one for tail length *(T)*. Its genotype is *HhTt*. Which of the following genotypes is possible in a gamete from this organism?   |  |  | | --- | --- | | a. | *HT* | | b. | *Hh* | | c. | *HhTt* | | d. | *tt* | |  |  | |
| 15. | It was important that Mendel examined not just the F1 generation in his breeding experiments, but the F2 generation as well, because   |  |  | | --- | --- | | a. | he obtained very few F1 progeny, making statistical analysis difficult. | | b. | parental traits that were not observed in the F1 reappeared in the F2, suggesting that the traits did not truly disappear in the F1. | | c. | analysis of the F1 progeny would have allowed him to discover the law of segregation, but not the law of independent assortment. | | d. | the dominant phenotypes were visible in the F2 generation, but not in the F1. | |  |  | |
| 16. | When crossing a homozygous recessive with a heterozygote, what is the chance of getting an offspring with the homozygous recessive phenotype?   |  |  | | --- | --- | | a. | 0% | | b. | 25% | | c. | 50% | |  |  | | d. | 100% | |
| 17. | *P* = purple, *pp* = white. The offspring of a cross between two heterozygous purple-flowering plants (*Pp* X *Pp)* results in   |  |  | | --- | --- | | a. | all purple-flowered plants. | | b. | purple-flowered plants and white-flowered plants. | | c. | two types of white-flowered plants: *PP* and *Pp.* | | d. | all pink-flowered plants | |  |  | |
| 18. | Mendel accounted for the observation that traits which had disappeared in the F1 generation reappeared in the F2 generation by proposing that   |  |  | | --- | --- | | a. | new mutations were frequently generated in the F2 progeny, "reinventing" traits that had been lost in the F1. | | b. | the mechanism controlling the appearance of traits was different between the F1 and the F2 plants. | | c. | traits can be dominant or recessive, and the recessive traits were obscured by the dominant ones in the F1. | | d. | the traits were lost in the F1 due to blending of the parental traits. | |  |  | |
| 19. | What are Punnett squares used for?   |  |  | | --- | --- | | a. | predicting the result of genetic crosses between organisms of known genotypes | | b. | determining the DNA sequence of a given gene | | c. | identifying the gene locus where allelic variations are possible | | d. | testing for the presence of the recessive allele | |  |  | |
| 20. | The fact that all seven of the pea plant traits studied by Mendel obeyed the principle of independent assortment means that   |  |  | | --- | --- | | a. | none of the traits obeyed the law of segregation. | | b. | the diploid number of chromosomes in the pea plants was 7. | | c. | all of the genes controlling the traits were located on the same chromosome. | | d. | all of the genes controlling the traits behaved as if they were on different chromosomes. | |  |  | |
| 21. | Black fur in mice (*B)* is dominant to brown fur (*b)* Short tails (*T)* are dominant to long tails *(t).* What fraction of the progeny of the cross BbTt X BBtt will have black fur and long tails?   |  |  | | --- | --- | | a. | 1/16 | | b. | 3/16 | |  |  | | c. | 1/2 | | d. | 9/16 | |
| 22. | In certain plants, tall is dominant to short. If a heterozygous plant is crossed with a homozygous tall plant, what is the probability that the offspring will be short?   |  |  | | --- | --- | | a. | 1/2 | | b. | 1/4 | | c. | 0 | | d. | 1 | |  |  | |
| 23. | A couple has three children, all of whom have brown eyes and blonde hair. Both parents are homozygous for brown eyes (*BB)* but one is a blonde (rr) and the other is a redhead *(Rr).* What is the probability that their next child will be a brown-eyed redhead?   |  |  | | --- | --- | | a. | 1/16 | | b. | 1/8 | | c. | 1/4 | | d. | 1/2 | |  |  | |
| 24. | Two true-breeding stocks of pea plants are crossed. One parent has red, axial flowers and the other has white, terminal flowers; all F1 individuals have red, axial flowers. If 1,000 F2 offspring resulted from the cross, approximately how many of them would you expect to have red, terminal flowers? (Assume independent assortment).   |  |  | | --- | --- | |  |  | | a. | 190 | | b. | 250 | | c. | 565 | | d. | 750 | |
| 25. | In a cross *AaBbCc X AaBbCc,* what is the probability of producing the genotype AABBCC?   |  |  | | --- | --- | | a. | 1/4 | | b. | 1/8 | | c. | 1/16 | | d. | 1/32 | | e. | 1/64 | |
| 26. | A 1:2:1 phenotypic ratio in the F2 generation of a monohybrid cross is a sign of   |  |  | | --- | --- | | a. | complete dominance. | | b. | multiple alleles. | | c. | incomplete dominance. | | d. | polygenic inheritance. | |  |  | |
| 27. | *Refer to the result below to answer the following questions.*  A tall plant is crossed with a short plant, and the progeny are all tall in size between the two parental plants. |
|  | This could be an example of   |  |  | | --- | --- | | a. | incomplete dominance. | | b. | polygenic inheritance. | | c. | complete dominance. | | d. | B and C | |  |  | |
| 28. | In snapdragons, heterozygotes have pink flowers, whereas homozygotes have red or white flowers. When plants with white flowers are crossed with plants with white flowers, what proportion of the offspring will have pink flowers?   |  |  | | --- | --- | | a. | 0% | | b. | 25% | | c. | 50% | | d. | 75% | |  |  | |
| 29. | Tallness (*T)* is dominant to dwarfness *(t),* while red *(R)* flower color is dominant to white *(r).* The heterozygous condition results in pink *(Rr)* flower color. A dwarf, red snapdragon is crossed with a plant homozygous for tallness and white flowers. What are the genotype and phenotype of the F1 individuals?   |  |  | | --- | --- | | a. | TTRR-tall and red | | b. | ttrr-dwarf and white | | c. | TtRr-tall and red | | d. | TtRr-tall and pink | |  |  | |
|  |
| 30. | In cattle, roan coat color (mixed red and white hairs) occurs in the heterozygous (*Rr)* offspring of red *(RR)* and white *(rr)* homozygotes.Which of the following crosses would produce offspring in the ratio of 1 red:2 roan:1 white?   |  |  | | --- | --- | | a. | red white | | b. | roan roan | | c. | white roan | | d. | red roan | |  |  | |
| 31. | A cross between a true-breeding sharp-spined cactus and a spineless cactus would produce   |  |  | | --- | --- | | a. | all sharp-spined progeny. | | b. | 50% sharp-spined, 50% dull-spined progeny. | | c. | 25% sharp-spined, 50% dull-spined, 25% spineless progeny | | d. | all spineless progeny | |  |  | |
| 32. | If doubly heterozygous *SsNn* cactuses were allowed to self-pollinate, the F2 would segregate in which of the following ratios?   |  |  | | --- | --- | | a. | 3 sharp-spined : 1 spineless | | b. | 1 sharp-spined : 2 dull-spined : 1 spineless | | c. | 1 sharp spined : 1 dull-spined : 1 spineless | |  |  | | d. | 9 sharp-spined : 3 dull-spined : 4 spineless | |
| 33. | *Use the information below to answer the following questions.*  Feather color in budgies is determined by two different genes Y and B. YYBB, YyBB, or YYBb is green; yyBB or yyBb is blue; YYbb or Yybb is yellow; and yybb is white. |
|  | A blue budgie is crossed with a white budgie. Which of the following results is *not possible?*   |  |  | | --- | --- | | a. | green offspring | | b. | yellow offspring | | c. | blue offspring | | d. | A and B | | e. | A, B, and C | |
| 34. | Two blue budgies were crossed. Over the years, they produced 22 offspring, 5 of which were white. What are the most likely genotypes for the two blue budgies?   |  |  | | --- | --- | | a. | *yyBB* and *yyBB* | | b. | *yyBB* and *yyBb* | | c. | *yyBb* and *yyBb* | | d. | *yyBb* and *yybb* | |  |  | |
| 35. | Three babies were mixed up in a hospital. After consideration of the data below, which of the following represent the correct baby and parent combinations?   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Couple # Blood Groups | | I B and B | II A and B | III A and O | | Baby # Blood Groups | | 1 B | 2 O | 3 AB | |  | |  |  |  | | a. | I-3, II-1, III-2 | | | | | b. | I-1, II-3, III-2 | | | | | c. | I-2, II-3, III-1 | | | | | d. | I-2, II-1, III-3 | | | | |  |  | | | | |
| 36. | *Use the following information to answer the questions below.*  A woman who has blood type B, has a daughter who is type O and a son who is type A. |
|  | Which of the following is a possible genotype for the son?   |  |  | | --- | --- | | a. | *IAIA* | | b. | *IAIB* | | c. | *ii* | | d. | *IAi* | |  |  | |
| 37. | Which of the following is a possible genotype for the mother?   |  |  | | --- | --- | | a. | *IAIA* | | b. | *IBIB* | | c. | *ii* | | d. | *IBi* | |  |  | |
| 38. | Which of the following is a possible phenotype for the father?   |  |  | | --- | --- | | a. | A | | b. | O | | c. | B | | d. | AB | |  |  | |
|  |
| 39. | |  | | --- | | cystic fibrosis affects the lungs, the pancreas, the digestive system, and other organs, resulting in symptoms ranging from breathing difficulties to recurrent infections | | a. incomplete dominance  b. multiple alleles | | c. pleiotropy | | d. epistasis | |  | |
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| 40. | Which of the following is an example of polygenic inheritance?   |  |  | | --- | --- | | a. | pink flowers in snapdragons | | b. | the ABO blood groups in humans | | c. | skin pigmentation in humans | | d. | white and purple flower color in peas | |  |  | |
| 41. | Hydrangea plants of the same genotype are planted in a large flower garden. Some of the plants produce blue flowers and others pink flowers. This can be best explained by   |  |  | | --- | --- | | a. | environmental factors such as soil pH. | | b. | the allele for blue hydrangea being completely dominant. | | c. | the alleles being codominant. | | d. | the fact that a mutation has occurred. | |  |  | |
| 42. | *Use the information below to answer the following questions.* A woman and her spouse both show the normal phenotype for pigmentation, but both had one parent who was an albino. Albinism is an autosomal recessive trait. |
|  | What is the probability that their first child will be an albino?   |  |  | | --- | --- | | a. | 0 | | b. | 1/4 | |  |  | | c. | 3/4 | | d. | 1 | |
| 43. | If their first two children have normal pigmentation, what is the probability that their third child will be an albino?   |  |  | | --- | --- | | a. | 0 | | b. | 1/4 | | c. | 1/2 | | d. | 1 | |  |  | |
| 44. | Huntington's disease is caused by a dominant allele. If one of your parents has the disease, what is the probability that you, too, will have the disease?   |  |  | | --- | --- | | a. | 1 | | b. | 3/4 | | c. | 1/2 | | d. | 1/4 | |  |  | |
| 45. | A woman has only sons. The chance that her next child will be a daughter is   |  |  | | --- | --- | | a. | 1. | | b. | 0. | | c. | 1/2. | | d. | 1/6. | | e. | 5/6. | |
| 46. | *The pedigree chart below is for a family, some of whose members exhibit the recessive trait, wooly hair. Affected individuals are indicated by an open square or circle. Use the chart to answer the following questions.*  http://depts.washington.edu/genetics/courses/genet371b-aut99/problems/practice_2-6.gif |
| 47. | What is the genotype of individual II-5?   |  |  | | --- | --- | | a. | *WW* | | b. | *Ww* | | c. | *ww* | |  |  | | d. | *ww or Ww* | |
| 48. | What is the likelihood that the progeny of II-5 and II-6 will have wooly hair?   |  |  | | --- | --- | | a. | *0%* | | b. | *25%* | | c. | *50%* | | d. | *75%* | |  |  | |
| 49. | What is the probability that individual III-1 is *Ww*?   |  |  | | --- | --- | | a. | 3/4 | | b. | 1/4 | | c. | 2/4 | |  |  | | d. | 1 | |
|  | 50. People with sickle-cell trait   |  |  | | --- | --- | | a. | Can be heterozygous for the sickle-cell allele. | |  |  | | b. | have increased resistance to malaria. | | d. | produce normal and abnormal hemoglobin. | | d. | all of the above | |
| 51. | Which of the following terms is *least* related to the others?   |  |  | | --- | --- | |  |  | | a. | karyotype | | b. | amniocentesis | | c. | chorionic villus sampling | | d. | epistasis | |
| 52. | *Use the answers below to answer the following questions. Each answer may be used once, more than once, or not at all.*   |  | | --- | | A. Huntington's disease | | B. Tay-Sachs disease | | C. phenylketonuria | | D. cystic fibrosis | | E. sickle-cell disease | |  | |
| 53. | Substitution of the "wrong" amino acid in the hemoglobin protein results in this disorder.   |  |  | | --- | --- | | a. | A | | b. | B | | c. | C | | d. | D | | e. | E | |
|  |  |