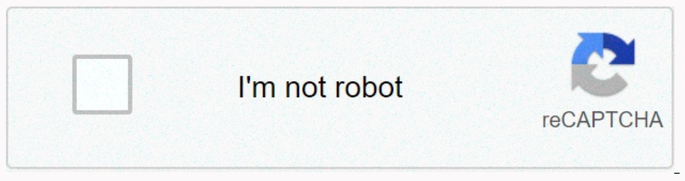

Continue

Mendelian genetics problems and solutions pdf

1A. The hair dye gene in rabbits has two alla Q and q. Q is dominant and codes for brown hair. q is recessive and codes for white hair. Write all possible genotypes and phenotypes. There are three possible genotypes: QQ, Qq, qq There are two possible phenotypes: brown and white 1B. With the example above fill punnett market of offspring genotypes if one parent is heterozygous and the other is white hair. If two rabbits have 24 infants lying down, please note in the table below the expected number of each genotype and phenotype. heterozygous parent Q q white haired parent q Qq q q q Qq Genotype Fenotype Expected number Qq Brown 12 qq White 12 2A. The gene for plant height in sunflowers has two codeminant allela, T1 for tall plants and T2 for short plants. If a tall plant crosses with a short plant, fill in the table below. High parent T1 T1 short parent T2 T1T2 T1T2 T2 T1T2 T1T2 Genotype: T1T2 Phenotype: Medium height (100%) 2B. Take any two of the seedings from Part 2A and cross them. Fill out the results below. T1 T2 T1 T1 T1 T1 T2 T2 T2 T2 T2 T2 T2 Genotip Phenotype Expected Number T1T1 High 25% T1T2 Medium 50% T2T2 Short 25% 3A. Sexual expression in mammals (also in humans) is controlled by X and Y chromosomes. Because the body's cells contain 46 chromosomes, the mother must give 23 to the child, and the father must also give 23. Mom gives 1 sex chromosome to each of her eggs along with 22 body chromosomes. The father gives each of his sperm 1 sexual chromosome along with 22 body chromosomes. In the table below fill out possible sexual chromosomes that contributed to sperm and egg. If the mother and father have 8 children, show the expected number of boys and girls below: Father X Y Mom X XX XY XY Genotip Phenotip Expected Number XX Female 4/8 (50%) XY men 4/8 (50%) 3B. Why do some families end up with unequal sex relationships (more boys or girls)? With small sample sizes, you can get larger deviations from the expected probabilities. While the city's population is likely to have a gender ratio very close to 50:50, a certain family may not. 3C. Colorblindness is a recessive thing caused by a defect on the X chromosome. XA=Normal Vision and Xa=Colorblind. If mom is normal (not bracket) and dad is color black, fill in the table below: Father Xa Y Mama XA XAXa XAY XAXa XAY Genotype Phenotype Expected Number of XAXa Woman, Normal 2/4 (50%) XAY male, normal 2/4 (50%) None of the children will be coloured, but the girls are carriers and can be passed on to half of their children. 3d. Let's have the same problem again, but this time with mom carrier and normal dad. None of the parents are colored. XA=Normal Vision and Xa=Colorblind. Father XA Y Mom XAXA XAY XAY XAXA XAY Genotype Fenotype Expected number of XAXA female, normal 1/2 (50%) XAXa XAY male, normal 1/4 (25%) XaY Men, ColorEd Blind (25%) Girls are normal, and half of them are carriers. Half the boys are normal and half are colored. 3E. Why are there more male shades of color in the population than females? Since color ing is transmitted to the X chromosome and men have only one X, they only need one copy of the defective X to have color. Females have two X chromosomes, so they would need two copies of the defective X to be colored. There are only two genotypes for males (XAY and XaY), but there are three female genotypes (XAXA, XAXa, XaXa). Males cannot be carriers; Either they have it or they don't. 4A. In guinea pigs, two different genes affect the mantle. One genetic code for the color of the coat and there are 2 codeminant allela C1=Brown and C2=White. The heterozygous shape is tanned. Other genetic codes for the presence of hair with H=hairy (dominant) and h=hairless (recessive). If mom C1C2hh and dad is brown and heterozygous for hairiness, fill in the table below. Father C1H C1h C1h C1h Mama C1h C1C1Hh C1C1hh C1C1hH C1h C1hHH C1C1hh C1C1hh C1C1Hh C1C1Hh C1C1Hh C1C1Hh C1C1Hh C1C1Hh C1C1Hh C1C1Hh C1C1Hh C1C1Hh C1C1HHH C1C1HHH C1C1HH C1C1HH C1C1HHH C1C1HHH C1C1HH C1C1HHH C1C1HHH C1C1HHH C1C1HH C1C1HHH C1C1HH C1C1HH C1C1HH C1C1HH C1 2h C1C2Hh C1C2hh C1C2hh C1C2Hh C1C2hh C1C2hh C1C2hh Genotype phenotypical fraction produced C1C1HH Brown, 4/16 (25%) C1C2Hh Tan, hairy 4/16 (25%) C1C1hh hairless 8/16 (50%) C1C2hh 4B. If you didn't know the genotypes of the parents, but mom is hairless and dad is tanned, and the babies that were produced were brown, tanned, white and hairless, can you guess the genotypes of the parents? Mom has to be hh because she's hairless. If there are brown and white hairy babies, It must be C1C2 If tata is browned, tata must be heterozyggan for mantila color, so it's C1C2 If some of the bebe are hairless but tata is hairy, then he must be heterozygous for hair, Hh He's tata C1C2Hh Home Subjects If you're seeing this message, it means we're having trouble toloading external resources on our website. If you are behind a web filter, make sure *.kastatic.org and *.kasandbox.org unblocked. This section in each section contains some solved problems that show how to approach NATO problems that follow. The purpose of the problems is to challenge your understanding of the genetic principles that they learned in the chapter. The best way to demonstrate an understanding of an object is to use this knowledge in a real or simulated situation. Be predicted that there is no machinery to solve these problems. The three main sources at your disposal are the genetic principles that have just been learned, common sense, and experiment and error. Here are some general tips before you start. Firstly, it is necessary to read and understand all the questions. Find out exactly what facts are provided, what assumptions should be made, what traces are given in the question and what conclusions can be inferred from the information available. Second, be methodical. the question rarely helps. The information in the question is again in your own way, preferably with a diagramming or flow chart to help you think about the problem. Good luck. 1. Consider three yellow, round peas with the markings A, B and C. Each was grown into a plant and crossed into a plant grown from green, wrinkled peas. Exactly 100 peas derived from each cross were classified into phenotypical classes as follows: What were the genotypes A, B and C? (Use the genetic symbols of your choice; definitely specify.) You notice that because all A, B and C have been crossed into the same plant, all the differences between the three offspring populations must be attributed to differences based on genotypes A, B and C. You may remember a lot about these analyses in the chapter, which is fine, but let's see how much data can be deducted. What about dominance? The key cross for the deduction of dominance is B. Here the hereditation pattern is both yellow and round must be the dominant phenotype, since domination is literally defined in terms of the phenotype of the hybrid. We now know that the green, wrinkled parent used in every cross must be completely recessive; we have a very handy position because it means that every cross is a cross test cross, which is generally the most informative type of cross. If we turn to offspring A, we see a ratio of 1:1 to yellow to green. This relationship is a demonstration of Mendel's first law (equal segregation) and shows that for the character of the color the cross had to be heterozyg×homozygous recessive. Najting Y = yellow and y = green, we have for character shape, because all descendants are round, the cross must be homozygous dominant×homozygous recessive. Let R = round and r = wrinkled, we have aggregation of two characters, we have now, cross B becomes crystal clear and must be, because any heterozygousness in pea B would result in more offspring of phenotypes, not just one. What about C? Here we see a ratio of 50 yellow:50 greens (1:1) and a ratio of 49 round:51 losers (also 1:1). Both genes in pea C had to be heterozygous and Cross C was good evidence of Mendel's second law (independent behaviour of different genes). How would a genetics man analyze these crosses? Basically in the same way as we did, but with fewer interventional steps. Maybe something like this: yellow and round dominant; single-gene segregation in A; B homozygous dominant; independent segregation of two genes in C.2. Phenylketonuria (PKU) is a human hereditnavable disease that results from the body's impossibility of processing the chemical phenylalane contained in the proteins we ine. PKU manifests itself at an early stage and, if left untreated, generally leads to mental retardation. PKU causes with a simple Mendel heritage. The couple plans to have children, but consults a genetic counsellor because the man has a sister with PKU and the woman has a brother with PKU. There are no other known cases in their families. They're asking a genetic counselor to determine the likelihood of their first child having a PKU. What's the odds? What can we do? If we allow allel to be that causes PKU phenotype p, and is the normal allel P in question, then the sister and brother must be male and female p /p . For the production of these affected persons, all four grandparents were heterozygous normal. The pedigree can be summarised as follows: Once these have been consistent, the problem is reduced to the application of the product rule. The only way in which a man and a woman can have a PKU child is if they are both heterozygous (obviously they themselves do not have the disease). Both old parental matings are simple Mendelian monohibrid crosses expected to produce offspring in the following proportions: We know that male and female are normal, so the odds of being heterozyg is 2/3 because within P/- class, 2/3 are P/p and 1/3 are P/P. The probability of male and female being heterozygous is 2/3 × 2/3 = 4/9 . If both are heterozygous, then one quarter of their children would have PKU, so the likelihood that their first child would have a PKU of 1/4 and the likelihood of being heterozygous and the first child having PKU, 4/9 × 1/4 = 4/36 = 1/9 , which is the answer. 3. Rare human disease has spared the family as shown in the pedigree provided. a.Subtract the most likely inheritance. b.What would be the results of cousin's marriages 1×9, 1×4, 2×3 and 2×8? a.The most likely succession is dominant, associated with X. It is assumed that the phenotype of the disease is dominant because, after a male has inooduous it into the pedigree in Generation II, it appears in each generation. We assume that phenotype X is connected because fathers can't tolerate it to their son. If you were autosomal dominant, father-to-son transmission would be common. In theory, autosomal recessive could work, but it's amazing. In particular, take into account marriages between affected family members and unmarried foreigners. If the situation were autosomal recessive, the only way in which these marriages could affect the offspring if each person who marries into a family is a heterozyg; then mating a /a (affected) should × A/a (without impact). However, we have been told that the disease is rare; in such a case, heterozygouss are highly unlikely to be so common. X-related recessive inheritance is impossible because mating the affected woman with a normal male could not produce the affected daughters. So you can A represents the disease causes aliel and represents normal allele. b.1×9: Number 1 must be heterozygous A/a because she had to get a from her normal mother. The number 9× ♀ ♂×× ♂ ♀ ×× must be A ♂ ♀ × /Y. 2×8: Must be /Y ♂× a /a ♀ (all offspring normal). normal).