

G11 Biology: Class 4 Homework

1. A researcher crossed a homozygous yellow seed plant (YY) and a heterozygous yellow seed plant (Yy). Draw a Punnett Square and determine the genotype and phenotype ratios of the offspring. **[3 marks]**

2. A researcher crossed a heterozygous yellow seed plant (Yy) and a recessive green seed plant (yy). Draw a Punnett Square and determine the genotype and phenotype ratios of the offspring. **[3 marks]**

3. The gene for whisker length in seals occurs in two different alleles. The dominant allele (W) codes for long whiskers and the recessive allele (w) codes for short whiskers.
 - a. If one parent is heterozygous long-whiskered and the other parent is short-whiskered, what percentage of offspring would you expect to have short whiskers? Draw a Punnett Square to justify your answer. **[3 marks]**

- b. A male long-whiskered seal is mated in captivity with a number of different females. With some females all their offspring are long-whiskered, and with some females there are both long- and short-whiskered offspring.
- i. What is the genotype of the male? Draw two possible Punnett Squares to justify your answer. **[3 marks]**
- ii. Would it be possible to find a female mate that would produce only short-whiskered offspring? Explain. **[2 marks]**
4. Mendel found that crossing wrinkle-seeded (rr) plants with homozygous round-seeded (RR) plants produced only round-seeded plants. What genotype ratio and phenotype ratio can be expected from a cross between a wrinkle-seeded plant and a heterozygous plant for this characteristic? **[3 marks]**

5. The round pea seed allele (R) is dominant, while the wrinkled pea seed allele (r) is recessive. A heterozygous round-seeded pea plant is crossed with a wrinkle-seeded pea plant. Use a Punnett Square to solve the following:
- a. Determine the predicted genotype ratio of the offspring. **[2 marks]**

 - b. Determine the predicted phenotype ratio of the offspring. **[1 mark]**

 - c. If this cross produced 50 plants, how many plants would you predict would be wrinkle-seeded pea plants? **[1 mark]**
6. Humans who have an abnormally high level of cholesterol are said to suffer from familial hypercholesterolemia. The gene for this disorder is dominant (C). A man who is heterozygous for familial hypercholesterolemia marries a woman who is homozygous for the recessive allele. What is the probability that they will have children that suffer from this disorder? **[3 marks]**
7. Why is blood type inheritance an example of both codominance and complete dominance? **[2 marks]**

8. In some chickens, the gene for feather colour is controlled by codominance. The allele for black is F^B and the allele for white is F^W . The heterozygous phenotype is known as erminette.

- a. What is the genotype for black chickens? **[2 mark]**
- b. What is the genotype for white chickens? **[2 marks]**
- c. What is the genotype for erminette chickens? **[1 mark]**
- d. If two erminette chickens are crossed, what is the probability that they would have a black chick? A white chick? An erminette chick? **[4 marks]**

9. Suppose a father of blood type A and a mother of blood type B have a child of type O. What are the possible genotypes of the mother and father? **[3 marks]**

10. Suppose a father of blood type B and a mother of blood type O have a child of type O. What are the chances that their next child will be blood type O? Type B? Type A? Type AB? **[5 marks]**