

Week 14: Heredity

Student _____

Exercise 1. Understanding Definitions

1. In Mendel's pea plants, height is controlled by one gene (T for tall and t for short). Answer the following questions. Remember the law of segregation. Gametes are represented by one letter per given gene and the parent and offspring are represented by two letters per given gene.
 - a. What is the genotype of a homozygous tall pea plant? _____
What types of gametes (represented by one allele) could this pea plant produce? _____
 - b. What is the genotype of a heterozygous pea plant? _____
What types of gametes (represented by one allele) could this pea plant produce? _____
 - c. What is the genotype of a short pea plant? _____
What types of gametes (represented by one allele) could this pea plant produce? _____
2. Using the introduction reading, write the correct term in for the following definition:
 - a. Alternate form of a gene _____
 - b. Character or trait seen in individual _____
 - c. The allele combination contained in someone's DNA _____
 - d. The trait that is expressed in the heterozygous individual _____
 - e. The trait that is masked in the heterozygous individual _____
 - f. When alleles of a gene pair are different _____
 - g. When alleles of a gene pair are identical _____
3. Describe the Law of Segregation (use an example or draw a picture)
4. Describe the Law of Independent Assortment (use an example or draw a picture)

Laboratory Report

5. Draw a pair of homologous chromosomes. Label the sister chromatids. Color the maternal (mom) chromosome red and the paternal (dad) chromosome blue. Add a trait (hair texture) to them, making the individual heterozygous for eye color (B – brown, b – blue).

This individual has _____ eye color

Exercise 2. Practicing Punnett Squares

6. In cats, longhaired allele (H) is dominant to shorthaired allele (h). If a cat heterozygous for hair length mates with a cat that is shorthaired, what are the phenotype and genotype of their offspring? Show work.

Phenotype Ratio:

Genotype Ratio:

7. In Albinism, no pigmentation is produced in the skin, hair, and eyes. This is due to a mutation for the gene that produces the enzyme tyrosinase which produces melanin. Albinism is a recessive trait. Two heterozygous parents (Aa), both with normal pigmentation, mate. What are the chances that their offspring will be albino? Show work (Punnett Square).

Chance offspring will be albino _____ %

Exercise 3. Fish Color Probably and Chi Square

8. What are the **phenotypes** of the two parent fish? _____ x _____

9. What are the genotypes of the two parent fish? _____ x _____

10. What kind of gametes (interms of alleles) can each parent produce?

Gametes from parent 1 _____ and _____

Gametes from parent 2 _____ and _____

11. How do we know that the gametes above are haploid?

12. Use this Punnett square to obtain the expected phenotype and genotype ratios of the F1 generation

Phenotype Ratio:

Genotype Ratio:

13. Before running the experiment, write the given null hypothesis you are testing (from reading) Null Hypothesis _____

14. During your experiment, tally the different genotypes you select in the space below

BB	Bb	bb

15. After running your experiment, write your obtained results in the form of ratios.

Observed (from experiment) F1 Phenotype Ratio _____

Observed (from experiment) F1 Genotype Ratio _____

16. Use this table to calculate your Chi Square

	BB	Bb	bb	
Expected number of zygotes (this is from the Punnett square)				= 100
Observed number of zygotes (this is from the experiment with cups/coins)				= 100
Deviation (d) = difference between expected and observed				
Deviation squared (d ²)				
d ² divided by expected (first row)				= Chi Sq.

To obtain a Chi-square, add up all the numbers on the last row. This is your Chi-Square value.

17. What is your Chi-Square? _____

18. Check the instructions in the lab reading to determine if your Chi Square is significant or not.

Chi Square significant? _____yes _____no

19. Do you *fail to reject* or *reject* your null hypothesis? _____

20. What is the class Chi-Square? _____ Is this result significant? _____

Exercise 4. Dihybrid Cross

21. Obtain F2 phenotypic ratios after completing the Punnett square:

Phenotypic Ratio

Round Yellow: _____

Round Green: _____

Wrinkled Yellow: _____

Wrinkled Green: _____

Exercise 5. Incomplete Dominance

22. Knowing that snapdragons exhibit incomplete dominance, obtain the phenotype and genotype ratios for the offspring of two pink ($C^R C^W$) snapdragon parents.

Phenotypes ratio _____

Genotype ratio _____

Exercise 6. Blood Typing and Co-Dominance

23. What are the three alleles involved in ABO blood typing? _____

24. Which of the alleles above are co-dominant? _____

25. Which allele above is recessive to the other two alleles? _____

Laboratory Report

26. Indicate the expected genotype and phenotype ratios for the following examples. Use Punnett squares for each.

$I^A i$ and $I^B i$

Phenotypes ratio _____

Genotype ratio _____

$I^A I^B$ and ii

Phenotypes ratio _____

Genotype ratio _____

27. Answer the following blood typing questions

- a. Two type AB parents can have a type B child
(Circle one: True False)

- b. Two type A parents can produce one type O child (Circle one: True False)

- c. Type AB child may have one type O parent
(Circle one: True False)

- d. Two type O parents can produce one type A child (Circle one: True False)

Exercise 7: Sex-linked traits

28. After looking at the color blindness questions, did the test results suggest you may have red-green colorblindness?

(always check with a physician – don't just rely on online tests for diagnosis)

Circle one:

None

Weak

Moderate

Strong

29. Colorblindness is a recessive sex-linked trait. It is on the X chromosome. If Maria is a carrier for colorblindness (is heterozygous) and Damion is not colorblind, what are the chances their daughter will be colorblind? Son? All children?

% colorblind son _____

% colorblind daughter _____

% colorblind children _____

30. Monica is colorblind. She knows that her mother is not colorblind (but may be a carrier). What does this tell us about her parent's genotypes?

Monica's mom's genotype _____

Monica's dad's genotype _____