Week 14: Heredity

Student _____

Exercise 1. Understanding Definitions

- 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)

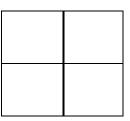
Laboratory Report

 Draw a pair of homologous chromosomes. Label the sister chromatids. Color the maternal (mom) chromosome redand 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

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 <u>expected</u> 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

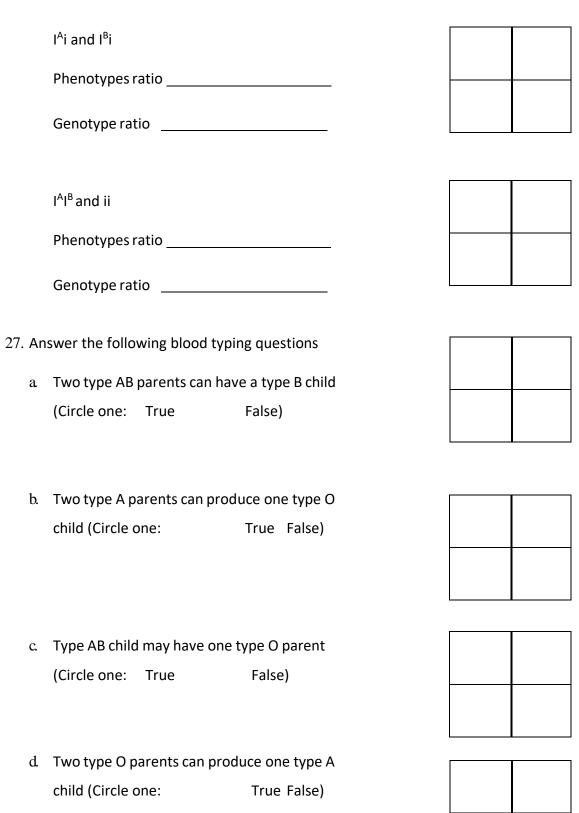
22. Knowing that snapdragons exhibit <u>incomplete dominance</u>, obtain the phenotype and genotype ratios for the offspring of <u>two pink</u> (C^RC^W) snapdragon parents.

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?

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



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