

Genetics I Exam 1 Review Sheet

NOTE: These are just some of the important aspects presented for Test #1 that you should be familiar with. This Review Sheet DOES NOT represent all material that could be covered on the Exam. This Review Sheet is to help guide you in your preparation for the Exam. Be sure to fully study your class notes, slides (lectures 1-4), outside readings (The Importance of Context in Genetics), workbook (pages 1-65), and text book. Especially take time to work all example problems in the workbook.

1. Know who Gregor Mendel was and the important dates/events of his life.
2. Know the important dates/events of the post-mendelian era.
3. Explain the difference between genotype and phenotype.
4. What is a chromosome?
5. What are homologous chromosomes? Are homologous chromosomes identical?
6. What are sister chromatids? Are sister chromatids identical?
7. What is a tetrad?
8. What are the Mendelian and biological definitions for a gene?
9. Describe the difference between diploid and haploid cells.
10. Where is DNA located in a cell?
11. Define allele.
12. Define locus.
13. What is the difference between a homozygous individual and a heterozygous individual?
14. Explain the difference between a dominant and recessive allele.
15. What is a P generation cross?
16. What genotype is an F1 generation organism?
17. How is the F2 generation produced?
18. What is Mendel's First Law?
19. What is a purebred cross?
20. What is a backcross?
21. What is a testcross? What is the purpose of a testcross?
22. What is the difference between complete dominance, intermediate/semi-dominance, and codominance?
23. List examples of semi-dominance.
24. Is a test cross needed with semi-dominance? Why or why not?
25. Why do you think semi-dominant alleles are represented with capital letters and distinguished using prime symbols whereas genes that act by complete dominance are represented with capital and lower case letters for the different alleles?
26. If you are looking at a roan bull from far away, what kind of dominance are you observing? If you stand next to the bull and observe the roan bull's mixture of individual red and white hairs, what kind of dominance are you observing?
27. Why did the Fugate family of Kentucky have some members of the family that had blue skin?
28. How many chromosome pairs would be present on a human karyotype?
29. How many genes are in the human genome?

30. Know how to figure out the phenotypic and genotypic ratios of various crosses using Punnett squares.
31. Be able to think backward to determine parental genotypes or phenotypes based on the resulting offspring.
32. What are gametes?
33. What gametes would be produced by an AA individual? An Aa individual? An aa individual?
34. What gametes could be produced by a CcWw individual?
35. What is lethality?
36. List an example of a dominant lethality, a recessive lethality, and a semi-dominant lethality in humans.
37. What is the difference between a monohybrid cross and a dihybrid cross?
38. Is it possible for genes and the environment to interact and affect a certain trait?
39. Consider sickle cell anemia. What kind of dominance is present at the organism level? The cellular level? The molecular level?
40. Explain the difference between the polygene concept and pleiotropism.
41. Explain the difference between penetrance and expressivity.
42. What is Mendel's Second Law?
43. Understand how to do the Forkline Method and be able to derive genotypic and phenotypic ratios using the Forkline Method.
44. In multihybrid crosses, review the shortcut methods using n (the number of different heterozygous gene pairs in an F1 genotype) for determining:
 - # of different F1 gametes, # of different F2 phenotypes, and # of 1's in the phenotypic ratio resulting from the cross of an F1 parent and a testcross parent
 - # of different F2 genotypes
 - # of F2 progeny required to get all possible combinations in the correct proportions (aka the number of squares in a Punnett square for the particular cross)
 - Probability of getting one specific combination of alleles in a gamete
45. Remember the shortcut method only works with heterozygous gene pairs. Understand how to determine the above bullet points when gene pairs of the parents are not both heterozygous. Understand how to determine the above when the genes may exhibit different kinds of dominance (complete dominance and semi-dominance).
46. What is gene interaction?
47. List the two examples of gene interaction discussed in class.
48. Understand how to determine offspring phenotypic and genotypic ratios when dealing with a gene interaction problem. Be able to think backward to determine parental genotypes or phenotypes based on the resulting offspring.