

Science 10

Genetic Basics Worksheet

Name: _____

Date: _____

Assignment Expectations:

- When answering the questions in this assignment, be sure to answer in full sentences. A good idea is to rephrasing the question as the opening sentence to your answer.
- Some of the questions have multiple parts, please be sure to answer all them.
- Some of the questions are opinion based. When answering such questions be sure to support your opinion with what you have learned. If you do outside research to support your answer please be sure to include the references.

Topic 1.1: How does an understanding of DNA help us investigate living things?

1. Read textbook pages 10-11. Why is there variation among organisms on Earth?

2. What is the role of DNA in the variety of Earth's organisms? Do you think it is the only factor?

3. WATCH the YouTube video "What is DNA and How Does it Work?"
<https://youtu.be/zwibgNGe4aY>

4. Read textbook pages 12-13. What are the three components of a nucleotide?

I.

II.

III.

5. What are the four nitrogenous bases in DNA?

I. _____
II. _____
III. _____
IV. _____

6. Of the four nitrogenous bases in DNA, which are the complementary bases?

I. _____
II. _____

7. What is the function of DNA?

8. STOP HERE AND COMPLETE THE "MAKING A MODEL OF DNA" ASSIGNMENT

9. WATCH the YouTube video "What is a Chromosome?" <https://youtu.be/lePMXxQ-KWY>

10. Read textbook pages 14-15. How many chromosomes do somatic cells have? _____

11. What are the sex chromosomes called? _____ and _____

12. A genetic female has two _____ sex chromosomes. While a genetic male has an _____ and _____ set of sex chromosomes.

13. Describe the relationships among chromatin, a chromosome, DNA and a gene.

14. Read textbook page 16. Explain how the structure of DNA is related to how genetic materials is passed from one generation to the next.

15. Read textbook pages 17-18. This is a refresh of your substantial assignment.

16. Read textbook page 19. Use the Internet to research the answer to the following questions. Be sure to list the website link (ie. resource) that you got your answer from.

a. Who owns and controls genetic information?

Resource:

b. How will the genetic information of individuals be used, and by whom?

Resource:

Topic 1.2: How is hereditary information passed from one generation to the next?

19. WATCH Youtube video “How Mendel's pea plants helped us understand genetics”

<https://youtu.be/Mehz7tCxjSE>

20. Read textbook pages 26-27. In Figure 1.10 why are all the F₁ flowers purple?

21. Read textbook pages 28-29. Define **phenotype**:

22. Define **genotype**:

23. WATCH the video “Things You May Not Know About DNA”

<https://learn.genetics.utah.edu/content/basics/dnathings>

24. Take a moment now to write a definition of genetics in YOUR OWN WORDS.

25. Read textbook pages 31-32.

26. STOP HERE AND COMPLETE THE “MENDILIAN GENETICS WORKSHEET”

<https://in01001403.schoolwires.net/cms/lib/IN01001403/Centricity/Domain/299/punnett%20square%20worksheet.doc>

27. Read textbook pages 33-34. Hypothesize why the frequency of the sickle cell allele is much higher in Africa than in other areas of the world.

28. Read textbook page 35. What is the difference between incomplete dominance and codominance?

29. A plant that produces white flowers is crossed with a plant that produces purple flowers. Describe the phenotype of the offspring if the inheritance pattern for flower colour is:

a. Incomplete dominance

b. Codominance

30. Read textbook page 36. Read textbook page 37. Use the pedigree chart on page 37 to answer the following questions.

- a. Use a Punnett square to determine whether Alice (the daughter of Leopold, Duke of Albany) had hemophilia, was a carrier, or did not have the illness. (Hint: What is Alice's genotype?)

Alice, the daughter of Leopold Duke of Albany,

- b. If Alice had a son with hemophilia, would that change or confirm your decision? Explain why. (Assume the father did not have hemophilia).

Topic 1.3: How can natural and artificial selection influence changes in populations?

31. Read textbook pages 46. What is mutation? Are all mutations harmful? Explain

32. Read textbook page 47. What are the advantages of genetic mutations?

33. Read textbook pages 48-49. Why does genetic variation make it possible for changes in populations to occur through natural selection? Explain your answer.

34. Using the example shown in in Figure 1.23, list the steps by which natural selection favours a population of plants to grow in a shady environment.

35. WATCH the YouTube video “Evolution by Natural Selection” <https://youtu.be/s64Y8sVYfFY>

36. Read textbook pages 50-51. Use Figure 1.25 to answer the following questions about the 14 species of finches on the Galapagos Islands.

a. What is the major physical difference among the species illustrated?

- b. Form a hypothesis that might explain the difference between the large tree finch and the cactus finch.

- c. Ground finches that depend primarily on seeds as a source of food mostly live on solidified lava beds. How can you explain the differences in beak size and shape among the different types of ground finches?

- d. How can you explain the differences in beak size and shape among the different types of tree finches?

37. Read textbook page 52-53. What is adaptive radiation?

38. Explain why it would have been possible for an ancestral finch species, having arrived on one of the Galapagos Islands, to have diversified and evolved into other species over time.

39. How is extinction related to selective pressure?

40. Read textbook page 54. What is a mutagen?

41. Explain how mutagens and the production of proteins are related.

42. Read textbook pages 55-57. What is artificial selection?

43. What are some benefits and risks associated with artificial selection of agricultural crops?

Topic 1.4: How and why are the genes of organisms manipulated?

44. Read textbook pages 72-75. What is the function of a vector in gene cloning?

45. Make a T-chart to list the different uses of transgenic plants and transgenic animals.

46. Read textbook pages 76-79. Compare and contrast artificial insemination and in vitro fertilization.

47. Choose one of the uses of biotechnology discussed in the text and describe the benefits of its use. Do you think there are any disadvantages to its use? Explain.

48. Read textbook pages 80-81. Why should environmental, social, and economic issues be considered when deciding how to use biotechnology?

49. Discuss one thing that concerns you about the use of biotechnology. Justify your concern with evidence collected from this concept.
