

# Genetic Sequencing Notesheet

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Name: \_\_\_\_\_ Hour \_\_\_\_\_ Date: \_\_\_\_\_

Date Assignment is due: \_\_\_\_\_ Why late? \_\_\_\_\_ Score: + ✓ -  
Day of Week                      Date    If your project was late, describe why

**Directions:** Use the accompanying PowerPoint (*available online*) to complete this sheet. This sheet will be due upon the completion of the PowerPoint in class. These assignments are graded on a +/✓/- scale.

1. Gene sequencing is a process in which \_\_\_\_\_

\_\_\_\_\_

2. A gene is \_\_\_\_\_ that \_\_\_\_\_ for how to \_\_\_\_\_

\_\_\_\_\_

3. A genome is \_\_\_\_\_

4. Briefly summarize how genetic sequencing has improved each of the following:

a. Medicine: \_\_\_\_\_

\_\_\_\_\_

b. Agriculture: \_\_\_\_\_

\_\_\_\_\_

c. Evolutionary Biology: \_\_\_\_\_

\_\_\_\_\_

d. Environmental Science: \_\_\_\_\_

\_\_\_\_\_

5. What had made genetic sequencing exceptionally difficult is that DNA is \_\_\_\_\_

6. DNA is only \_\_\_\_\_ wide; a nanometer is \_\_\_\_\_

7. A human hair is \_\_\_\_\_.

8. T or F: DNA is smaller than a wavelength of light. \_\_\_\_\_

9. Summarize how a sample of DNA is acquired by summarizing what you need to know about how each of the following is performed:

Breakdown of the cellular membrane: \_\_\_\_\_

\_\_\_\_\_

Separation of the cellular components: \_\_\_\_\_

\_\_\_\_\_

Breakdown of the nuclear membrane: \_\_\_\_\_

\_\_\_\_\_

Separation of the DNA from the rest of the cellular components: \_\_\_\_\_

\_\_\_\_\_

10. What is the first step of the Sanger Method? \_\_\_\_\_

How is this accomplished? \_\_\_\_\_

How can bacteria be used to replicate DNA? \_\_\_\_\_

\_\_\_\_\_

11. After the DNA has been replicated, it has to be denatured. What does this mean? \_\_\_\_\_

\_\_\_\_\_

Why is this necessary? \_\_\_\_\_

12. After the sample of DNA has been replicated and denatured, explain the role that each of the following play:

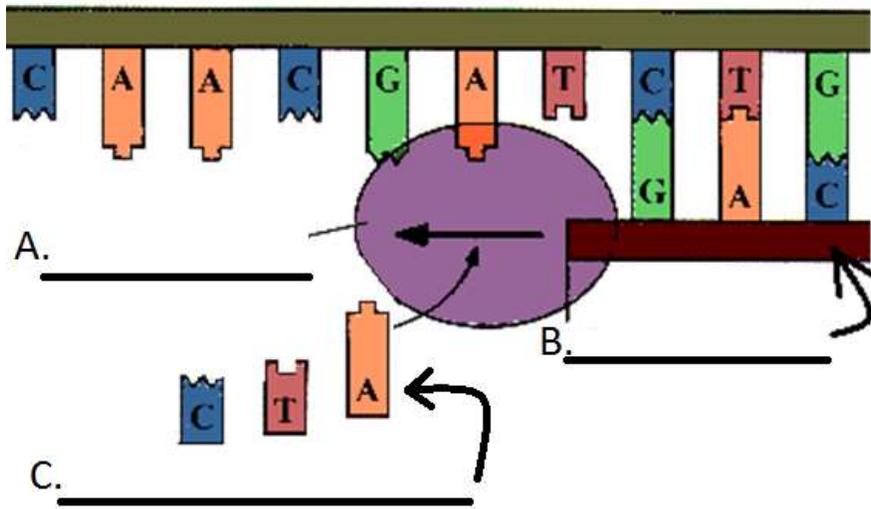
Polymerase: \_\_\_\_\_

Primer: \_\_\_\_\_

Nucleotide Bases: \_\_\_\_\_

ddNTP: \_\_\_\_\_

13. Label each of the following in the image below:



14. A primer is like \_\_\_\_\_ . How so? \_\_\_\_\_

\_\_\_\_\_

15. In what major ways is a ddNTP different from a nucleotide?

\_\_\_\_\_

\_\_\_\_\_

16. How do these differences between ddNTPs and nucleotides enable the Sanger Method to read DNA? Explain by summarizing how the Sanger Method works. Use all of the space provided.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

17. Draw how the Sanger Method functions in the space below.

18. Create a timeline of the Human Genome Project by explaining the significant steps that occurred for each year:

1970s: \_\_\_\_\_

1990: \_\_\_\_\_

1998: \_\_\_\_\_

1999: \_\_\_\_\_

2001: \_\_\_\_\_

Both reports found that there are about \_\_\_\_\_ genes in the human body and that human DNA is \_\_\_\_\_% identical from person to person.

2003: \_\_\_\_\_

19. The Human Genome Project was completed over \_\_\_\_\_ of schedule and \_\_\_\_\_ budget.

20. How significant was the Human Genome Project as an accomplishment? Explain: \_\_\_\_\_

\_\_\_\_\_

21. T or F: Now that the human genome has been sequenced, this work is complete. \_\_\_\_\_ Explain: \_\_\_\_\_

\_\_\_\_\_

-----*BREAK*-----

22. T or F: Next Generation Sequencing is one specific method for sequencing DNA. \_\_\_\_\_

23. NGS is a \_\_\_\_\_ term for all of the \_\_\_\_\_ of reading

genes and genomes that are \_\_\_\_\_ than the Sanger Method.

24. How does pyrosequencing differ from the Sanger Method? \_\_\_\_\_

\_\_\_\_\_

25. How can pyrosequencing be used to determine the order of bases in a sample of DNA? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

26. Summarize how each of the following functions in order to enable the sequence of bases in a sample of DNA to be read:

454-Roche Pyrosequencing: \_\_\_\_\_

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Illumina Bridge Sequencing: \_\_\_\_\_

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Ion-Torrent Sequencing: \_\_\_\_\_

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Nanopore Sequencing: \_\_\_\_\_

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27. T or F: most of the DNA in an organism like a human, a dog, or a cow does not code for anything. \_\_\_\_\_

28. What is an intron? \_\_\_\_\_

29. What is an exon? \_\_\_\_\_

30. What is an Open Reading Frame? \_\_\_\_\_

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31. How can an ORF be used to tell an intron from an exon? \_\_\_\_\_

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32. Once an exon has been identified, a researcher only knows \_\_\_\_\_

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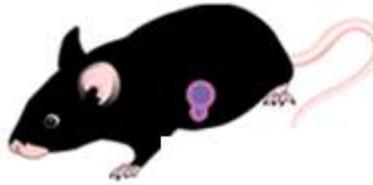
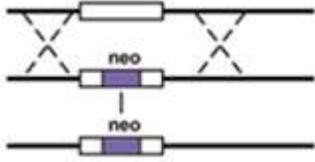
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33. One of the most widely-used methods to determine the function of a gene is called \_\_\_\_\_

34. What is a knockout mouse? \_\_\_\_\_

\_\_\_\_\_

35. Summarize how a knockout mouse is made by providing a caption for each of the images below:



\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_

36. A knockout mouse is a chimera. What does this mean? \_\_\_\_\_

\_\_\_\_\_

37. Why is it necessary for a knockout mouse to be a chimera? Why not replace the unknown gene in all of the cells?

\_\_\_\_\_  
\_\_\_\_\_

38. What is BLAST? \_\_\_\_\_

\_\_\_\_\_

39. How can BLAST be used to determine gene function? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_



This page is designed to help raise your grade while enabling you to develop skills you will need for after high school. You will need to complete every question and blank in order to receive full credit for your notes. Note: if you cannot come up with a strategy to remember a difficult concept on your own, see your instructor for help.

1. What is a topic or concept from this unit that you found to be more challenging? Write or describe below:

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In the space below, create a mnemonic, rhyme, analogy, or other strategy to help you remember this particular concept:

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2. What is a 2<sup>nd</sup> topic or concept from this unit that you found to be more challenging? Write or describe below:

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In the space below, create a mnemonic, rhyme, analogy, or other strategy to help you remember this particular concept:

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3. What is a 3<sup>rd</sup> topic or concept from this unit that you found to be more challenging? Write or describe below:

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In the space below, create a mnemonic, rhyme, analogy, or other strategy to help you remember this particular concept:

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4. Circle the most appropriate response. You will only be graded on whether or not you completed this section.

Circle one: I used my notes outside of class to prepare for the quiz.                      Definitely – Yes – Sort of - No

Circle one: I took extra notes in the margins for very difficult concepts.                      Definitely – Yes – Sort of - No

Circle one: I created a personal strategy for at least three difficult items.                      Definitely – Yes – Sort of - No

Circle one: I was very involved and actively studying during the quiz review.                      Definitely – Yes – Sort of - No

Circle one: I think I will be satisfied with the quiz grade I received this week.                      Definitely – Yes – Sort of - No

Circle one: I might need to meet with the instructor outside of class.                      Definitely – Yes – Sort of - No