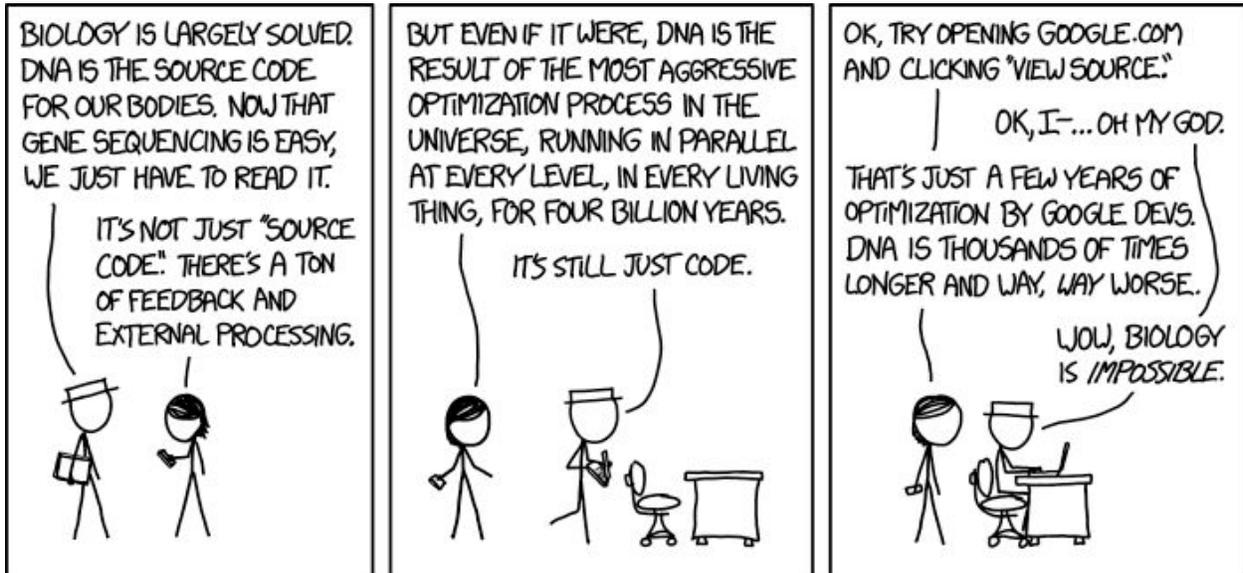


# Designer Genes C Practice Test

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Time limit: 50 minutes

Resources: 2 non-programmable calculators & 1 sheet of notes

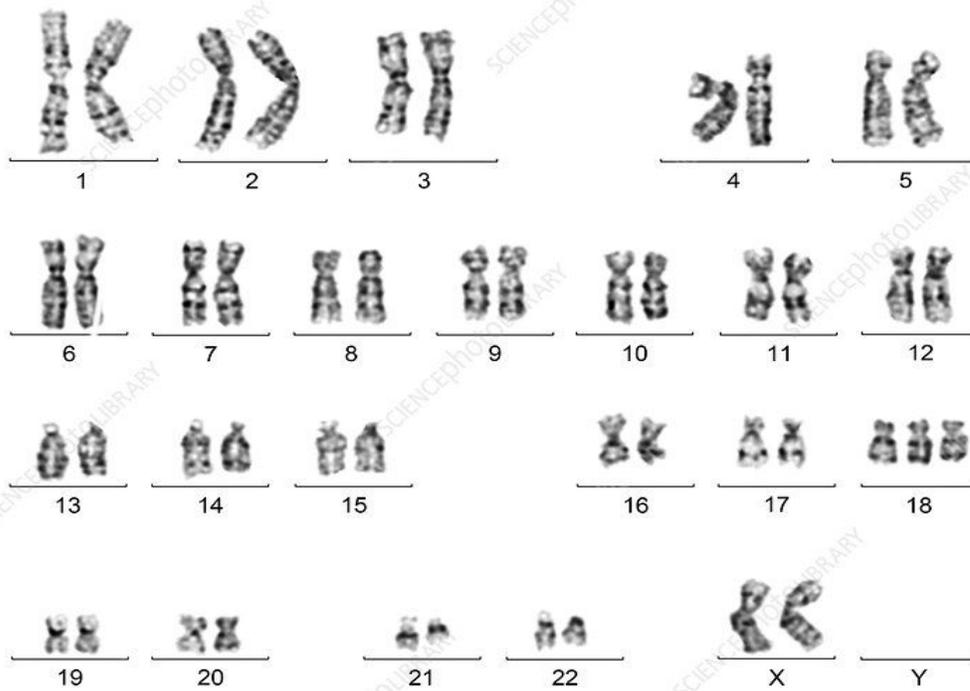
Names: \_\_\_\_\_ Score: \_\_\_\_/87

School & Team #: \_\_\_\_\_

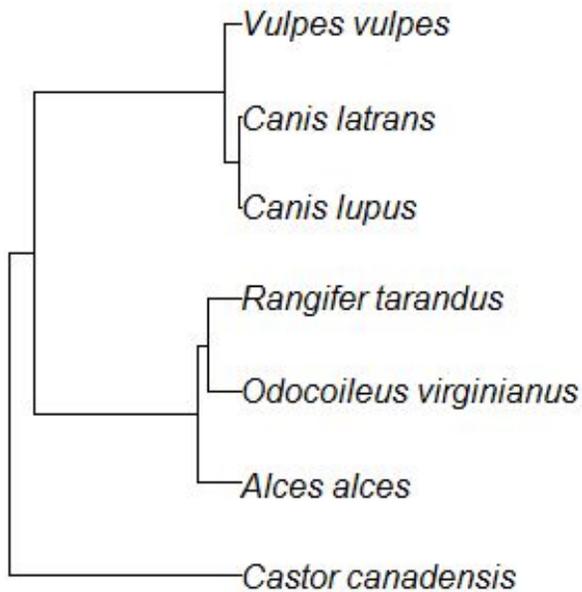
## Section 1: Multiple Choice Questions & Fill in the Blank (2 pts each)

- Bob decides to do gel electrophoresis. After running the gel, he starts to stain his DNA. What dye should he use?
  - Coomassie Blue
  - Ethidium bromide
  - Crystal Violet
  - Safranine
  - Acridine Orange
- Adenine is 13% of DNA. What is the percentage of Guanine in the cell?
  - 13%
  - 26%
  - 37%
  - 74%
  - 87%

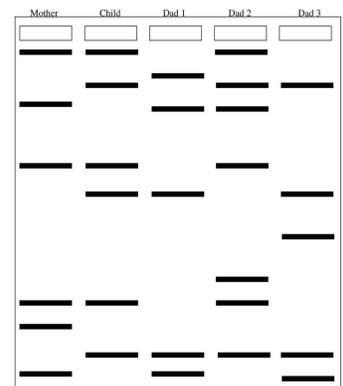
3. A female has trisomy X. How many barr bodies will she have in her somatic cells?
  - a. 0
  - b. 1
  - c. 2
  - d. 3
  - e. 4
4. 1 in 3500 newborns have Tay Sachs disease. Calculate the frequency of carriers in the population.
5. When do chromosomes condense during prophase I of meiosis?
  - a. Diakinesis
  - b. Diplotene
  - c. Zygotene
  - d. Leptotene
  - e. Pachytene
6. There are two true breeding peas with the following traits: one has purple flowers, and produces green and round seeds, while another pea has white flowers, and produces yellow and wrinkled seeds. P is for purple flowers, G is for green seeds, and R is for rounded seeds. They cross to produce an F1 generation, and then are bred again to produce an F2 generation. Calculate the probability of producing a flower with the genotype PppgRR in the F2 generation.



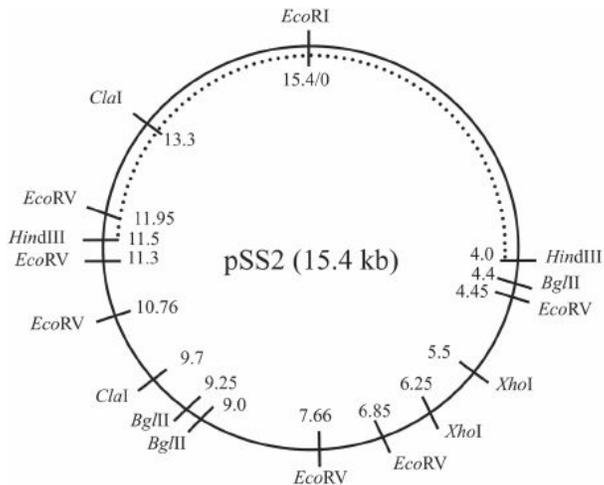
7. What syndrome does this person have?
  - a. Down Syndrome
  - b. Edward's Syndrome
  - c. Klinefelter's Syndrome
  - d. Turner's Syndrome
  - e. Edward's Syndrome
8. Based on the karyotype in question 7, what gender is this person?
  - a. Female
  - b. Male
9. In what phase of meiosis are pictures taken of the chromosomes for karyotypes?
  - a. Prophase
  - b. Cytokinesis
  - c. Anaphase
  - d. Metaphase
  - e. Telophase
10. What enzyme is used to join okazaki fragments together?
  - a. DNA gyrase
  - b. Topoisomerase
  - c. DNA polymerase I
  - d. DNA ligase
  - e. DNA polymerase III



11. Above is a phylogenetic tree containing a few mammalian species. What relationship does *Canis latrans*, *Canis lupus* and *Rangifer tarandus* have?
- They are a monophyletic group
  - They are a paraphyletic group
  - They are a polyphyletic group
  - None of the above
  - All of the above
12. Which of the following promotes chromatin condensation?
- Acetylation
  - Methylation
  - Phosphorylation
  - A and B
  - All of the above
  - None of the above
13. Which of the following refers to ABO blood types?
- Incomplete dominance
  - Sex-linked
  - Co-dominance
  - Multiple alleles
  - A and B
  - B and C
  - C and D
  - All of the above
  - None of the above
14. Which of the following is the most common cause of thymine dimers?
- Chemicals
  - Sleep deprivation
  - UV light
  - Toxins
15. Refer to the DNA agarose gel electrophoresis RFLP analysis. Who is the father of Juliet's child?
- Dad 1
  - Dad 2
  - Dad 3
  - secret dad
16. Anna has mitochondrial myopathy. Her mother and grandmother also has this disease. Why is this?



17. Which restriction enzyme should be used? The gene of interest is dotted.



18. Barr bodies are created in many animals. The gene, \_\_\_\_\_, is activated in order to condense the X chromosome into a barr body. Another gene, \_\_\_\_\_, is activated on the other X chromosome in order to prevent condensation into a barr body.

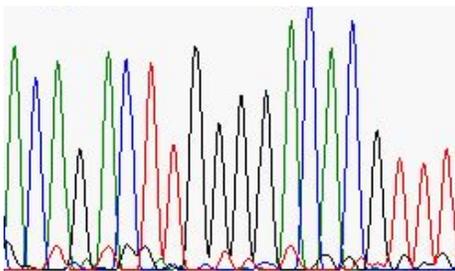
19. True/False: The terminator sequence is found in eukaryotes.

20. The enzyme \_\_\_\_\_ lengthens telomeres in eukaryotic \_\_\_\_\_ cells.

21. The promoter DNA sequence \_\_\_\_\_ is crucial in forming the initiation complex at a eukaryotic promoter.

22. True/False: Bacterial chromosomes have many origins of replication.

23. Write out the DNA strand for the following. Blue = cytosine, Green = adenine, Black = guanine, red = thymine



24. Define each of the following: nucleotide-pair substitution, silent mutation, missense mutation, frameshift mutation

25. Describe the 3 steps of PCR.

26. What is the role of dideoxynucleotides in Sanger sequencing?