G11 Biology: Class 6 Homework

1. What does DNA stand for? What are the three main components of DNA? **[4 marks]**

2. What is the complementary strand of TTGACAGTAAAA? **[1 mark]**

3. Examine the following DNA sequence and determine what type of mutation, if any, produced the sequences below: **[4 marks]**

   … T A A C G C A T T T …

   a) … T A A G G C A T T T …

   b) … T A A G C A T T T …

   c) … T A A C G C A T T T T …

   d) … T A C G C A G T T T …

4. a) What is lactose intolerance? **[1 mark]**

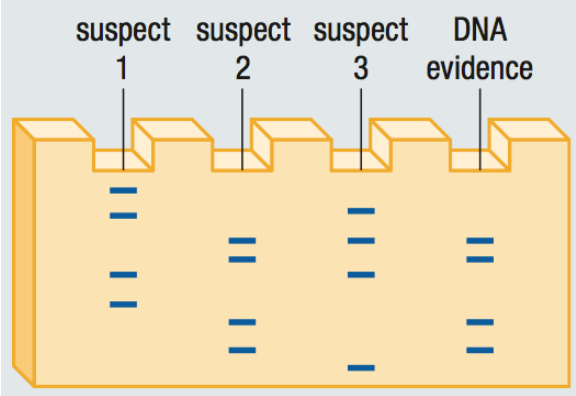
   b) What advantage do people who are lactose tolerant have compared to those who are lactose intolerant? **[1 mark]**

   c) Certain populations worldwide are much more lactose intolerant than other. Why might this be the case? **[1 mark]**

   d) Indigenous people of the Americas did not domesticate livestock for milk production. Predict whether or not these people will have a high or low incidence of lactose intolerance. **[1 mark]**

5. Why are mice a good model for studying human genes? **[2 marks]**

6. The DNA fingerprint shown below was produced after a crime had been committed. Which of the suspects could have committed the crime? **[1 mark]**



7. Distinguish between restriction enzymes and plasmids. **[2 marks]**

8. List two advantages and two disadvantages of using recombinant DNA technology in the food industry. **[4 marks]**

9. What characteristics enable viruses to be used as vector in gene therapy? **[2 marks]**

10. The number of base pairs in the human genome is about 150 000 times greater than the number of genes. This does not mean, though, that human genes average about 150 000 base pairs each. Explain why. **[3 marks]**

11. Tanning beds bathe the user in UV light to produce an artificial suntan. What danger might tanning beds pose? **[2 marks]**

12. In the past, antibiotics were prescribed for viral illnesses, which do not respond to antibiotics. The medical community currently discourages these practices. Why would they adopt such a position? **[3 marks]**

13. After a researcher uses a virus to introduce a normal copy of a gene into target cells in the mice, the mice showed no improvement. Assuming the vector was effective, what might account for the failure of the attempted therapy? **[2 marks]**

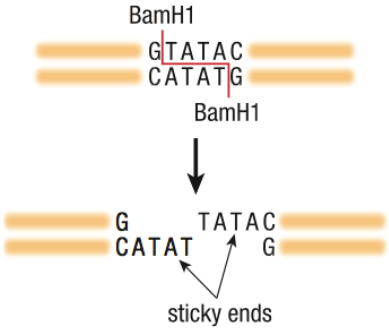
14. Describe three ways in which an attempted gene therapy using a virus vector could create even worse health problems. **[3 marks]**

15. A large number of identical strands of 42-base pair DNA are cut by a restriction enzyme whose cutting sequence is shown below. The cuts produce many copies of the following three DNA fragments, whose base sequences are shown:

Fragment 1
TATACACT
GTGA

Fragment 2
TACTGCCAGTATGATG
ATGACGGTCATACTACATAT

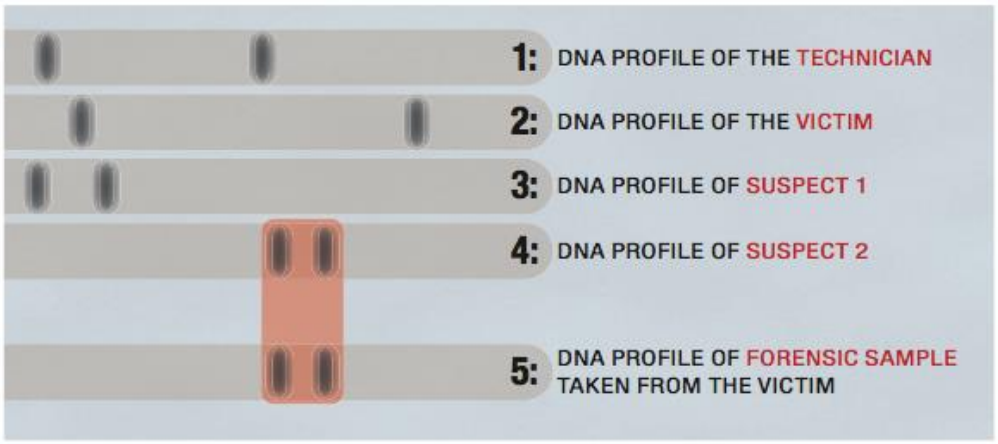
Fragment 3
TATACACGTGCCAGTATG
GTGCACGGTCATACATAT



a. From the structure of the DNA fragments deduce what the base sequence in the original DNA strands must have been and write it out. **[1 mark]**

b. In how many places was the original strand cut? How can you tell? **[2 marks]**

16. Examine the DNA fingerprints shown below.



a. Why would the profiles of the technician and the victim be included? **[1 mark]**

b. Based on the evidence, what can you say about the guilt or innocence of the two suspects? Defend your answer. **[2 marks]**