

(Remember: we will not collect these - the problem sets are for your *own* study for the exams.)

DNA SEQUENCING AND THE HUMAN GENOME:

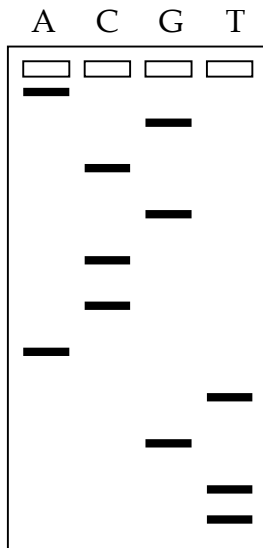
5' ATCCGATGCCTTTGCAATAATTGTTAAACAATGCGTGGCCCTTCATTTGAACCGAT 3'
3' TAGGCTACGGAAACGTTATTAACAATTTGTTACGCACCGGGGAAGTAAACTTGGCTA 5'

1. Imagine you are sequencing the DNA molecule shown above. Assume the primer 5' GATGCCT 3' is used to initiate DNA synthesis. You have a tube containing template, primer, millions of ACGT nucleotides and millions of dideoxyC nucleotides. (p. 387-393 of your textbook has a good review if you are having trouble)

a) How many different lengths of DNA strands will be represented in your tube?
(Assume that there are millions of each of them because you ran the replication reaction for a long time).

b) Predict the lengths (in nucleotides) of DNA strands you would find in this tube.

2. Read the sequencing gel below and write the DNA sequence in the blank.



5' _____ 3'

3. Read the real sequencing gel on page 393 of your textbook (fig. 23.12) and write the first 25 nucleotides below:

5' _____ 3'

4. What is the primary difference *chemically* between traditional DNA sequencing and modern, automated sequencing?

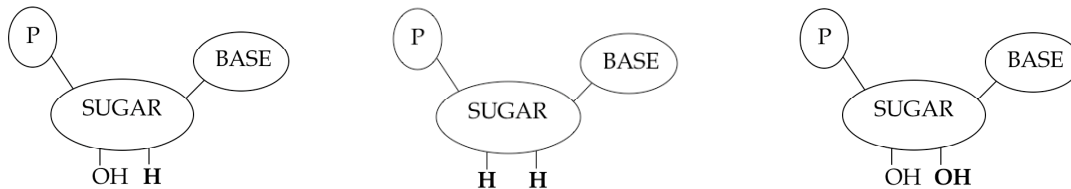
5. Which of the following statements are true about genome sequencing?

- a) After a genome is sequenced, you know exactly how many genes it contains.
- b) Genome sequencing requires the artificial synthesis of DNA (synthesis outside of a cell).
- c) The sequence of a genome tells you the exact sequence of nucleotides for all members of that species.
- d) Comparing the genomes of two organisms can give you an idea of how related they are.

6. Definitions:

- a) _____ : a sequence that immediately precedes a gene and indicates the start of transcription.
- b) _____ : a protein that synthesizes a new strand of DNA.
- c) _____ : a molecule which can terminate a growing DNA strand.

7. Which one of the following molecules is NOT found in a living cell:



8. If you have an unknown DNA double stranded molecule and you sequence one of the strands, do you have to sequence the other strand? Why or why not?

DIFFERENCES IN THE HUMAN GENOME:

- 1. When geneticists are comparing the human genome to other species' genomes, what kinds of differences might they be looking for that make us uniquely human?
- 2. Describe at least two ways that being able to rapidly and cheaply sequence an individual's entire genome may be *useful* to that person.
- 3. Describe at least two ways that being able to rapidly and cheaply sequence an individual's entire genome may be *detrimental* to that person.

REPRODUCTIVE TECHNOLOGIES:

1. For what reason(s) might someone choose to have their sperm sorted (for X or Y chromosomes) before fertilization?
2. How does the process of preimplantation genetic diagnosis (PGD) work?
3. For what reason(s) might a couple have to use PGD instead of sperm sorting? (i.e. What are the limitations of sperm sorting?)

CLONING:

1. What is the procedure to create a clone of a mammal using an adult somatic cell as a donor?
2. List three concerns people have with respect to human reproductive cloning.
3. List two potential reasons why someone might want to have human reproductive cloning done.