**7.1 Techniques for Producing and Analyzing DNA**

Your textbook P286 (read ENTIRE page):

Molecular Biology:

Recombinant DNA:

What are restriction enzymes? What organism manufactures them?

What is the importance of restriction endonucleases? How do they work? What is a restriction site?

Fig 7.1-summarize the two characteristics of restriction endonucleases which make them useful to researchers.

What is the benefit of a “sticky end” compared to the opposite “blunt ends”? Why do scientists sometime *like* blunt ends?

Look at Fig. 7.3-these are the basic steps for producing a recombinant DNA molecule. Notice that the restriction sites are “palindromic” regions. A palindrome is something that is the same forwards and backwards, e.g. race car, Madam I’m Adam, Do geese see God?, GAATTC /CTTAAG, etc.

Summarize these steps:

How many genes are estimated to be in the human genome? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, # of proteins? \_\_\_\_\_\_\_\_\_

**Gene Cloning-**why do scientists want to do this?

Which organisms are often used as host systems and why?

Work through the steps to gene cloning on page 289-90 and Fig. 7.4. You will NOT be asked to regurgitate this on a test, but as you READ through it….does it make sense?

Identify the stage at which the gene has been cloned. (question is asked under Fig. 7.4-answer at back of book)

What is DNA amplification?

What is PCR?

Work through the steps in PCR. Summarize them below.

Identify some applications of a DNA fragment that is generated by PCR.

P291-you be able to or have already answered all the Learning Check questions-check the back of the book for answers.

**Analyzing DNA Fragment Size**:

Once molecular biologists have amplified the DNA of interest, there are various methods to analyze it. One of these methods is called: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It uses an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ field to separate negatively charged DNA fragments according to \_\_\_\_\_\_\_\_\_\_\_\_ as they pass through a gel.

Fig. 7.7-identify the basic parts to the gel electrophoresis machine and their function.

P292: Summarize the 4 basic steps of gel electrophoresis.

P293: Describe the basis of DNA fingerprinting (or DNA profiling):

Old method: RFLP:

New method: STR:

Identify some common applications of DNA fingerprinting.

What is DNA sequencing?

Manual DNA sequencing-what is dideoxy sequencing?

How is the molecule in Fig. 7.11 different from a regular nucleotide, and how does it change its ability to bond to the next nucleotide.

Work through the steps in Dideoxy Sequencing (also called Sanger Method…after……. & Fig. 7.12. As you work through each step, reread it, look at Fig. 7.12…does the step make sense, if it does, go on to the next step, IF IT DOESN’T MAKE SENSE-reread and reread again!

What was the Human Genome Project?

Due to this project, what advancement in biotechnology came about?

What are “next-generation sequencing” techniques?

Why is the sequencing technique always trying to be improved?

Applications of….

What is “site-directed mutagenesis”?

What is the Canadian connection to this new technique?

You should be able to complete the review questions on page 300, some of these you may have completed already as you have worked through these sheets.