

Lecture 12 and 13 Study Questions:

The following sequence of nucleotides in a DNA strand was used as a template to synthesize an mRNA that was then translated into protein:

5' – TTACTTAACGGCTTTTTTC – 3'

Predict the mRNA and polypeptide sequences (3 frames). Assume you are in the middle of a coding sequence.

If there were a point mutation in the stop codon what effect would this have on the peptide? Or if the mutation were in the start codon?

Which of the following mutational changes would be predicted to harm an organism? Explain your answers.

- A. Insertion of a single nucleotide near the end of the coding sequence
- B. Removal of a single nucleotide near the beginning of the coding sequence
- C. Deletion of three consecutive nucleotides in the middle of the coding sequence
- D. Deletion of four consecutive nucleotides in the middle of the coding sequence
- E. Substitution of one nucleotide for another in the middle of the coding sequence

Describe the hybridization technique and what is it used for.

What are the necessary steps to determine the length of a strand of DNA?

Compare genomic DNA with cDNA.

T/F Bacterial plasmids can be used to clone and amplify specific DNA fragments/sequences.

If you start with a single copy of a desired DNA sequence and run it through 30 cycles of PCR. How many copies will you have?

List and explain the three different sites on the ribosome.

Protein Synthesis is energetically expensive. How many ATPs and GTPs are used, and in what reaction steps.

How does the correct amino acid get added on to a tRNA with the respective anticodon?

Describe the mechanism used by eukaryotes to initiate translation.

Which aa would you expect a tRNA with the anticodon '5-CUU-3' to carry (see table of Codons in book).

Indicate whether the following are characteristics of transcription in prokaryotes (p), in Euk (E) or in both (B)

RNA Polymerase _____	RNA _____
Operons _____	polycystronic mRNA _____
Promoter _____	enhancers _____
Tata box _____	DNA template _____

You have a circular DNA molecule that you cut (digest) with EcoRI. You analyze the resulting DNA fragments by running them on an agarose gel; this analysis revealed that digestion with EcoRI resulted in 2 DNA fragments, one that is 3 kB and another that is 1.5 kB. You also digest that same circular DNA with BamHI and you get one band that is 4.5 Kb. When you carry out a double digest (EcoRI and BamHI), you end up with 3 DNA fragments, one that is 2.5 kb, one that is 1.5 kB, and one that is 0.5 kb.

A) From these data, you conclude that your circular DNA molecule contains _____ EcoRI sites, and _____ BamHI sites.

B) In addition, BamHI cuts within the _____ (size) EcoRI fragment.

Explain PCR using the terms denature, annealing and extension. Also, describe the role of primers in PCR.

What are the concerns over Genetically Modified Organisms (GMOs)?

What are the most common genetic modifications made to plants? How does this affect the plant as a food?