

# Revision questions for mcb 3020 fall 2012

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1. A portion of specific DNA molecule consists of the following sequence of nucleotide triplets. TAC GAA CTT GGG TCC This DNA sequence codes for the following short polypeptide. methionine - leucine - glutamic acid - proline - arginine Describe the steps in the synthesis of this polypeptide. What would be the effect of a deletion or an addition in one of the DNA nucleotides? What would be the effects of a substitution in one of the nucleotides?
2. Describe the operon hypothesis and discuss how it explains the control of messenger RNA production and the regulation of protein synthesis in bacterial cells.
3. Scientists seeking to determine which molecule is responsible for the transmission of characteristics from one generation to the next knew that the molecule must (1) copy itself precisely, (2) be stable but able to be changed, and (3) be complex enough to determine the organism's phenotype.
  - a. Explain how DNA meets each of the three criteria stated above.
  - b. Select one of the criteria stated above and describe experimental evidence used to determine that DNA is the hereditary material.
4. Describe the biochemical composition, structure, and replication of DNA. Discuss how recombinant DNA techniques may be used to correct a point mutation.
5. Describe the production and processing of a protein that will be exported from a eukaryotic cell. Begin with the separation of the messenger RNA from the DNA template and end with the release of the protein at the plasma membrane.
6. Describe the steps of protein synthesis, beginning with the attachment of a messenger RNA molecule to the small subunit of a ribosome and ending generalized with the release of the polypeptide from the ribosome. Include in your answer a discussion of how the different types of

RNA function in this process. 7. By using the techniques of genetic engineering, scientists are able to modify genetic materials so that a particular gene of interest from one cell can be incorporated into a different cell. a. Describe a procedure by which this can be done. b. Explain the purpose of each step of your procedure. c. Describe how you could determine whether the gene was successfully incorporated. d. Describe an example of how gene transfer and incorporation have been used in biomedical or commercial applications. 8. Explain how aerobic organisms tolerate the presence of oxygen in their metabolic pathways despite its toxic properties. 9. Explain how temperature and pH levels can influence microbial infections in the human body. 10. Describe the basic similarities and differences between DNA replication and transcription. 11. Describe the various types of nucleic acids that are typically found in cells. 12. What is reverse transcriptase, and why is it an important tool of recombinant DNA technology? 13. Compare and contrast the types of vectors used in recombinant DNA technology. 14. Some sterilization procedures do not kill all the microbes that may be present. Explain how these procedures can still be considered sterilization. 15. Describe the cellular structures or processes that can be targets of antimicrobial agents.