

共十題. 每題 10%

1. What are the genus name and species name of the following model organisms used for the studies of Molecular Biology?
 - A. yeast
 - B. *E. coli*
 - C. Fruit fly
 - D. Round worm
2. What is the role of a RNA promoter in DNA replication? How can it be removed?
3. Please draw a replication fork and indicate the sites of helicase and topoisomerase. Explain the functions of these two enzymes in DNA replication.
4. Several proteins exerting cellular functions are found associated with RNA molecules for splicing, translation, protein targeting. Please give all these examples and their functions as many as you know.
5. What is the significance of TATA box in transcription? What events occur in the initiation of transcription by pol II?
6. Why DNA contains thymine in stead of uracil?
7. Why cancer cells have long telomere?
8. The following table provides data concerning the effects of various deletions in a eukaryotic gene on the ability of this gene to be transcribed by RNA polymerase III.

<u>Nucleotides</u>	<u>Ability of this gene to be transcribed by RNA pol III</u>
<u>deleted</u>	
-45~-1	yes
+1~+47	yes
+10~+47	yes
+10~+63	no
+80~+123	no
+83~+123	yes

- A. What do these data tell you about the probable location of the promoter for this gene?
- B. If a similar experiments were carried out for a gene transcribed by Rna pol II, what kinds of results would you expect?

(背面仍有題目,請繼續作答)

9. The melting curves for two DNA samples that were thermally denatured under the same conditions are shown in the Figure 1.

- What conclusion can you draw concerning the base compositions of the two samples?
- How might you explain the steeper slope of the melting curve for sample A?
- Formamide and urea are agents known to form hydrogen bonds with pyrimidines and purines. What effect would be inclusion of a small amount of Formamide and urea in the incubation mixture have on the melting curves?

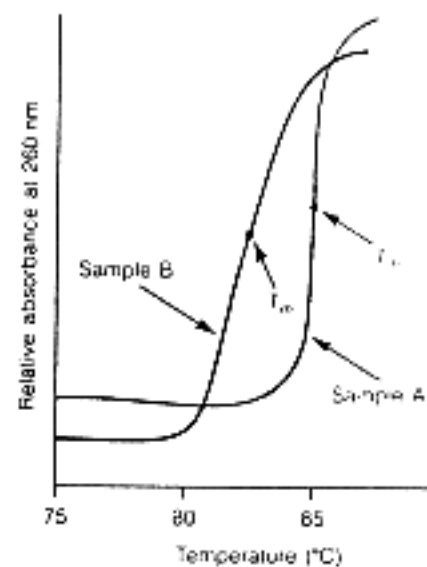


Figure 1. Thermal Denaturation of Two DNA Samples. See Problem 16-6.

10. Abnormalities in the Ras pathway are commonly observed in human cancers. The following questions focus on several experimental observations relating to this pathway.

- When epidermal growth factor (EGF) is added to epithelial cells, the Ras and Raf proteins are both activated. From this observation by itself, what conclusion can you draw about the relationship between Ras and Raf?
- In mutant cells containing a permanently inactivated Ras protein, addition of EGF does not activate the Raf protein as much as it does in normal cells. What conclusion can you draw from this observation?
- You discover a new type of cancer in which the enzymatic activity of the Raf protein is much higher than normal. Describe several distinct mechanisms that might have caused this.