Review Questions for Lectures 10-11

1.During replication, the lagging strand is synthesized in the (3'-5'/5'-3') direction. Why is an RNA primer necessary for lagging strand synthesis? (e.g.- Why is the lagging strand synthesized as Okazaki fragments?)

2.Draw an origin of replication and:
a. label the right and left forks
b. label the leading and lagging strands of each fork
c. label the template strand of both
d. label the 3'-5' ends of all of the above
e. place an arrow in the direction of movement of DNA Polymerase
f. label the newest nucleotides added in each of the forks

3.List the proteins involved in DNA Replication in Prokaryotes. (and Eukaryotes)

4. DNA _____ performs the proofreading mechanism. It possesses both a 5' to 3' _____ activity and a 3' to 5' _____ activity.

5. Explain why DNA Polymerase synthesizes DNA only in the 5' to 3' direction.

6.Why does proofreading require 5'-3' synthesis?

7. Fill in the blanks with the appropriate letters

a. Replication
b. Transcription
c. Translation

_____ making another copy of DNA

_____ Prok. do at the same time

_____ RNA Polymerase used

_____ DNA Polymerase

_____ from DNA to mRNA

_____ from DNA to tRNA

_____ from DNA to rRNA

_____Proofreading

8. Permanent change in the DNA results in a _____ if the DNA replication and machinery fail.

9.Where does transcription occur in prokaryotes? Eukaryotes?

10.List the 4 classes of RNA and give a brief description of the function of each.

11.How are genes organized in prokaryotes? How does this make transcription different from eukaryotes?

12.How is the lac operon regulated? How is this eukaryotic transcriptional regulation unique? (e.g.- what are the roles of enhancers, activators, etc?)

13.Eukaryotic genes contain introns and exons. What is an intron? Exon? Why do you think we have adapted this RNA processing strategy? Why is it not necessary for prokaryotes to extensively process their mRNA? What is the destination of mRNA in eukaryotes?

14.Explain why people in their 80's are much more likely to get cancer than 20 year olds.

15.You are randomly inserting a gene of interest into the genome yeast. Later, you find that the gene is not expressed. What happened?

16.You are interested in studying the expression levels of a cell cycle regulatory gene. What two things could you monitor to determine how much of the gene is being expressed (Think molecularly)?

17.A scientist studying cancer cells from a patients tumor found a mutation in a gene important for cell cycle regulation. The scientist thought he had found the cause of the patients cancer, but later found that the mutation had no effect on cell growth. Why did the mutation have no effect on cell cycle regulation?

18.A scientist has genetically linked a disease to a single gene. To aid in studying the gene she decided to produce an antibody that would recognize the protein gene product. However, when she used the antibody, she discovered that it recognized 3 different sized proteins! What's going on?

19. Replication of the circular bacterial chromosome results into the formation of two interlocked DNA circles. How are these chromosomes unlinked so that they can be segregated into daughter cells.