**AP CR – DNA, Proteins, and Gene Expression (chapters 16-18)**

**Chapter 16**

1.Describe the contributions of the following people: Griffith; Avery, McCary, and MacLeod; Hershey and Chase; Chargaff; Watson and Crick; Franklin; Meselson and Stahl.

2. In the DNA of fruit flies the percentages of nucleotides in DNA is as follows:

27.3% A, 27.6%T, 22.5%G and 22.5% C. How do these numbers demonstrate Chargaffs rules?

3.Describe the structure of DNA. Describe the structure of a nucleosome, the basic unit of DNA packing in eukaryotic cells.

4.Describe the process of DNA replication; include the following terms: antiparallel structure, DNA polymerase, leading strand, lagging strand, Okazaki fragments, DNA ligase, primer, primase, helicase, topoisomerase, single-strand binding proteins. What role does complementary base pairing play in the replication of DNA?

5.Describe the function of telomeres.

6.Compare a bacterial chromosome and a eukaryotic chromosome.

7. What two properties distinguish heterochromatin from euchromatin?

**Chapter 17**

**1.**Describe the contributions made by Garrod, Beadle, and Tatum to our understanding of the relationship between genes and enzymes.

2.Briefly explain how information flows from gene to protein.

3.Compare transcription and translation in bacteria and eukaryotes.

4.Explain what it means to say that the genetic code is redundant and unambiguous.

5.Include the following terms in a description of transcription: mRNA, RNA polymerase, the promoter, the terminator, the transcription unit, initiation, elongation, termination, and introns.

6.Include the following terms in a description of translation: tRNA, wobble, ribosomes, initiation, elongation, and termination.

**Chapter 18**

1.Explain the concept of an operon and the function of the operator, repressor, and corepressor

2.Explain the adaptive advantage of grouping bacterial genes into an operon

3.Explain how repressible and inducible operons differ and how those differences reflect differences in the pathways they control

4.Explain how DNA methylation and histone acetylation affect chromatin structure and the regulation of transcription

5.Define control elements and explain how they influence transcription

6.Explain the role of promoters, enhancers, activators, and repressors in transcription control

7.Explain how eukaryotic genes can be coordinately expressed

8.Describe the roles played by small RNAs on gene expression

9.Explain why determination precedes differentiation

10.Describe two sources of information that instruct a cell to express genes at the appropriate time

11.Explain how maternal effect genes affect polarity and development in *Drosophila* embryos

12.Explain how mutations in tumor-suppressor genes can contribute to cancer

13.Describe the effects of mutations to the *p53* and *ras* genes

**Vocabulary**

**chapter 16**

Transformation

Bacteriophage

Semiconservative model

Origins of replication

Replication fork

Helicases

Single-strand binding proteins

Topoisomerase

Primase primer

DNA polymerases

Leading strand

Lagging strand

Okazaki fragments

DNA ligase

Mismatch repair

Nuclease

Nucleotide excision repair

Telomeres

Telomerase

Nucleoid

Chromatin

Heterochromatin

Euchromatin

**chapter 17**

Gene expression

Transcription

Messenger RNA

Translation

Ribosomes

Primary transcript

Triplet code

Template strand

Codons

Reading frame

RNA polymerase

Promoter

Terminator

Transcription unit

Transcription factors

Transcription initiation comples

TATA box

Poly-A tail

RNA splicing

Introns

Exons

Ribozymes

Alternative RNA splicing

Transfer RNA

Spliceosome

Ribozymes

Alternative RNA splicing

Transfer RNA

Anticodon

Aminoacyl-tRNA synthetases

Wobble

Ribosomal RNAs (rRNAs)

P-site

A-site

Polyribosomes (polysomes)

Signal peptide

Signal-recognition particle (SRP)

Point mutations

Base-pair substitution

Missense mutations

Nonsense mutation

Frameshift mutation

Mutagens

**Chapter 18**

Repressor

Regulatory gene

Inducer

Cyclic AMP (camp)

Differential gene expression

Histone acetylation

Genomic imprinting

Cell differentiation

Morphogenesis

Cytoplasmic determinants

Induction

Determination

Pattern formation

Positional information

Homeotic genes

Embryonic lethals

Egg polarity genes

Morphogens

Oncogenes

Proto-oncogenes