1. Which of the below is the best description of **microRNAs**
   (a) coordinately transcribed clusters of genes in bacteria
   (b) regulatory sequence to which transcriptional regulators bind, which can be thousands of base pairs away from the transcriptional start site
   (c) molecules that control gene expression by base-pairing with specific mRNAs
   (d) regulatory sequence that mediates binding of RNA polymerase and initiation of transcription
   (e) process mediated by changes in gene expression by which precursor cells become specialized cell types

2. Which of the following RNA's primary function is to translate the genetic code
(a) mRNA (b) snRNA (c) tRNA (d) rRNA (e) microRNA

3. Which of the following is the main function of Ubiquitin?
   (a) parts of mRNA that must be removed during processing
   (b) large complex of proteins and RNAs necessary for mRNA processing
   (c) large complex of proteins and RNAs necessary for translation
   (d) marks cellular proteins for destruction
   (e) enzyme where the catalysis is carried out by RNA molecules

4. Which RNA is necessary for translation?
   (a) mRNA
   (b) tRNA
   (c) rRNA
   (d) a and b
   (e) all of the above

5. DNA replication and transcription are similar to each other in that both of these
   (a) begin at origins
   (b) add nucleotides in a 5' to 3' direction on the new strands
   (c) lead to the synthesis of two new strands
   (d) require a promoter
   (e) use ATP hydrolysis for energy at each step

6. What does the operon model attempt to explain?
   (a) the coordinated control of gene expression in bacteria
   (b) bacterial resistance to antibiotics
   (c) how genes move between homologous regions of DNA
   (d) the mechanism of viral attachment to a host cell
   (e) horizontal transmission of plant viruses

7. The mRNA is read by the ribosome in the _____direction and *proteins are synthesized* _____
   a. N-terminus to C-terminus/ 5' to 3'
   b. C-terminus to N-terminus / 5' to 3'
   c. 3' to 5'/ C-terminus to N-terminus
   d. 5' to 3'/ N-terminus to C-terminus
   e. none of the above

13.) The mRNA sequence that would be encoded by the DNA coding strand ATGGGCCATAC is
   a.) ATGGGCCATAC
   b.) TACCCGGTATC
   c.) UACCCGGUAUC
   d.) AUGGGCCAUAC

14.) The expressed sequence of DNA that codes for a protein is known as a _____.
   a.) Promoter
   b.) Exon
   c.) Intron
   d.) Anticodon

15.) The lac operon is present in some _____, and is an example of _____.
   a.) Eukaryotes, regulation of gene expression
   b.) Eukaryotes, regulation of DNA synthesis
   c.) Prokaryotes, regulation of gene expression
   d.) Prokaryotes, regulation of DNA synthesis

16.) The direction of synthesis of an RNA transcript is,
   a.) 1`→5`
   b.) 5`→3`
   c.) 5`→1`
   d.) 3`→5`

17.) The functioning of enhancers is an example of
   a.) Transcriptional control of gene expression.
   b.) Post-transcriptional regulation of gene expression.
   c.) Post-translational regulation of protein function.
   d.) Stimulation of translation by initiation factors.

18.) What would occur if the repressor of an inducible operon were mutated so it could not bind the operator?
   a.) Irreversible binding of the repressor to the promoter.
   b.) Reduced transcription of the operon's genes.
   c.) Continuous transcription of the operon's genes.
   d.) Buildup of a substrate for the pathway controlled by the operon.

19.) Which of the following statements about the DNA in one of your brain cells is true?
   a.) Most of the DNA codes for protein.
   b.) The majority of genes are likely to be transcribed.
   c.) Many genes are grouped into operon-like clusters.
   d.) It is the same as the DNA in one of your heart cells.

23. Gene regulation can occur through:
    A) DNA modification.
    B) histone modification.
    C) RNA modification.
    D) All of these choices are correct.

24. In humans and other mammals, dosage compensation is achieved by:
    A) males transcribing twice the normal amount of copies of *X*-chromosome genes.
    B) females decreasing transcription of both *X* chromosomes by half.
    C) females eliminating one *X* chromosome in each cell.
    D) females inactivating the paternal *X* chromosome in each cell.
    E) females randomly inactivating one *X* chromosome in each cell.

25. The human body contains approximately 200 major cell types. They look and function differently from one another because each:
    A) has a slightly different genome.
    B) expresses a different set of genes.
    C) expresses the same set of genes, but in different orders at different times.
    D) has a slightly different genome and each expresses a different set of genes.

26. What happens when the *Xist* gene from an *X* chromosome is inserted into an autosome?
    A) Gene activity in the autosome remains normal.
    B) The autosome with *Xist* is inactivated like an *X* chromosome.
    C) The autosome with *Xist* is inactivated in half the cells, and the homologous autosome is inactivated in the other half.
    D) Both the autosome and its homologous chromosome are inactivated.

27. The enzymatic processing of a polypeptide chain is an example of:
    A) signal transduction.
    B) post-transcriptional modification.
    C) dosage compensation.
    D) epigenetic modification

28. Small regulatory RNAs work in conjunction with:
    A) RNA polymerase.
    B) nucleosomes.
    C) RISC proteins.
    D) ribosomal RNA.