

Genetics Practice - Multiple Choice and Modified True/False Questions

The following is a sampling of the style of multiple choice and true / false questions to help you prepare for your upcoming test.

1. When analyzing the composition of a particular double stranded piece of DNA, you find that it contains 30 % Thymine. What is the percentage of **Cytosine** (assuming no mutations), and what is the rule that helps you determine this?
 - a. 20 %, Chargaff's Rule
 - b. 40 %, Chargaff's Rule
 - c. 30 %, Chargaff's Rule
 - d. 30 %, Base Complimentarity Theory
 - e. 20 %, Base Complimentarity Theory
2. Purines:
 - a. Are double ring structures
 - b. Always bind to other purines
 - c. Are single ring structures
 - d. Make up protein chains
 - e. Always form three hydrogen bonds to their complimentary base
3. Which of the following did Meselson and Stahl's experiment illustrate?
 - a. DNA replicates conservatively
 - b. RNA replicates semi-conservatively
 - c. DNA replicates semi-conservatively
 - d. DNA is the hereditary material
 - e. DNA is composed of a deoxyribose sugar, a phosphate group and a nitrogenous base.
4. You are working on research to study how certain chemicals affect DNA replication in *E. coli*. What would happen if a chemical denatured DNA polymerase I, and it was no longer functional?
 - a. Initiation would stop, therefore no DNA would be replicated.
 - b. RNA primers would not be replaced with DNA.
 - c. The final copy would contain more mutations than if Polymerase I was working.
 - d. b and c are both correct.
 - e. a, b and c are all correct.

5. Which of the following statements are true of Okazaki fragments?
 - a. Deoxyribonucleotides are added continuously in a 3' to 5' direction.
 - b. Deoxyribonucleotides are added discontinuously in a 5' to 3' direction.
 - c. Only one DNA primer is required, right at the initial origin of replication.
 - d. Only one RNA primer is required, right at the initial origin of replication.
 - e. None of the above.
6. Which of the following is **true** when referring to the Central Dogma theory?
 - a. RNA sequences encode DNA, which forms proteins.
 - b. DNA is only found in the nucleus, to protect it from damage in the cytoplasm.
 - c. A DNA sequence encodes an RNA sequence, which encodes a protein.
 - d. An mRNA transcript must undergo post-transcriptional modification to be recognized by the nuclear membrane.
 - e. An RNA sequence encodes a protein, which encodes DNA.
7. What would be the most immediate (first) effect if RNA polymerase was removed from a cell?
 - a. Transcription would fail to initiate.
 - b. Translation would fail to initiate.
 - c. The rate of transcription would increase.
 - d. The rate of transcription would decrease.
 - e. None of the above.
8. Put the following steps of transcription in the correct order from start to finish.
 - i. mRNA is synthesized in a 5' to 3' direction, replacing Thymine with Uracil.
 - ii. RNA polymerase is released into the nucleoplasm.
 - iii. RNA polymerase binds the promoter.
 - iv. Hydrogen bonds are broken in the double helix of DNA, exposing the DNA template.
 - a. iii, i, iv, ii
 - b. iii, iv, ii, i
 - c. iii, iv, i, ii
 - d. ii, iii, iv, i
 - e. ii, iii, i, iv
9. The trp-operon:
 - a. Is repressed by high levels of tryptophan.
 - b. Consists of five genes.
 - c. Uses tryptophan as a corepressor
 - d. Is an example of negative feedback
 - e. All of the above are true of the trp-operon.

10. Most bacteria are not naturally competent cells, how are they induced to undergo transformation?
- They are plated on petri dishes containing antibiotics.
 - They are subjected to an electric current that allows foreign DNA to enter the cell.
 - They are suspended in Calcium Chloride at 42 degrees celcius, followed by a cold shock of 0 degrees celcius.
 - They are suspended in Calcium Chloride at 0 degrees celcius, followed by a heat shock.
 - They are suspended in a sodium chloride solution to neutralize the charges on a bacterial cell membrane.
11. Which of the following is not involved in RFLP?
- Gel Electrophoresis
 - Radioactive DNA probes
 - X-Ray Film
 - Buffer Solution
 - Radioactive RNA probes

Modified True/False: Indicate whether the statement is true or false. If false, change the identified word or phrase to make the sentence or statement true.

- _____ 1. Cytosine and Thymine are *pyrimadines*. _____
- _____ 2. If the deoxyribonucleotide sequence in one strand of a DNA double helix is: 5'-ACTTGGA-3', the complimentary sequence in the opposite strand is *5'-TGAACCT-3'* _____.
- _____ 3. After one replication of double stranded DNA, one molecule of DNA is 50 % parental DNA, and 50 % new DNA. This is known as *conservative replication*. _____.
- _____ 4. Joachim Hammerling's experiment using *Acetabularia* revealed that the hereditary Information is found in the *cap of the algae where the nucleus is found*. _____.
- _____ 5. *Restriction Endonucleases* recognize, bind to and cut specific palindromic sequences Of DNA. _____