

SOLUTIONS TO THE STUDY GUIDE FOR MODULE #7

1. a. Genetics – The science that studies how characteristics get passed from parent to offspring
- b. Genetic factors – The general guideline of traits determined by a person’s DNA
- c. Environmental factors – Those “nonbiological” factors that are involved in a person’s surroundings such as the nature of the person’s parents, the person’s friends, and the person’s behavioral choices
- d. Spiritual factors – The factors in a person’s life that are determined by the quality of his or her relationship with God
- e. Gene – A section of DNA that codes for the production of a protein or a portion of protein, thereby causing a trait
- f. Messenger RNA – The RNA that performs transcription
- g. Anticodon – A three-nucleotide base sequence on tRNA
- h. Codon – A sequence of three nucleotide bases on mRNA that refers to a specific type of amino acid
- i. Chromosome – DNA coiled around and supported by proteins, found in the nucleus of the cell
- j. Mitosis – A process of asexual reproduction in eukaryotic cells
- k. Interphase – The time interval between cellular reproduction
- l. Centromere – The region that joins two sister chromatids
- m. Mother cell – A cell ready to begin reproduction, containing duplicated DNA and centrioles
- n. Karyotype – The figure produced when the chromosomes of a species during metaphase are arranged according to their homologous pairs
- o. Diploid cell – A cell with chromosomes that come in homologous pairs
- p. Haploid cell – A cell that has only one representative of each chromosome pair
- q. Diploid number (2n) – The total number of chromosomes in a diploid cell
- r. Haploid number (n) – The number of homologous pairs in a diploid cell
- s. Meiosis – The process by which a diploid (2n) cell forms gametes (n)
- t. Gametes – Haploid cells (n) produced by diploid cells (2n) for the purpose of sexual reproduction
- u. Virus – A non-cellular infectious agent that has two characteristics:
 - (1) It has genetic material (RNA or DNA) inside a protective protein coat.
 - (2) It cannot reproduce on its own.

- v. Antibodies – Specialized proteins that aid in destroying infectious agents
- w. Vaccine – A weakened or inactive version of a pathogen that stimulates the body's production of antibodies which can aid in destroying the pathogen
2. Guanine and cytosine can bond together, as can adenine and thymine. In RNA, however, uracil replaces thymine. Thus when DNA has an adenine, RNA will have a uracil. When DNA has a thymine, RNA will have an adenine. When DNA has a cytosine, RNA will have a guanine, and when DNA has a guanine, RNA will have a cytosine. This makes the mRNA sequence:
- a. cytosine, guanine, uracil, uracil, adenine, cytosine
- b. It takes three nucleotide bases to code for an amino acid. Since this has six, it will code for two amino acids.
- c. Each codon codes for one amino acid. Thus, there are two codons on the mRNA.
- d. When mRNA has an adenine, tRNA will have a uracil. When mRNA has a uracil, tRNA will have an adenine. When mRNA has a cytosine, tRNA will have a guanine, and when mRNA has a guanine, tRNA will have a cytosine. This makes the tRNA anticodons' sequences:
- guanine, cytosine, adenine and adenine, uracil, guanine
3. a. transcription b. translation
4. This is tRNA, because only tRNA has anticodons.
5. If it is occurring in the ribosome, the protein is actually being assembled. This is translation.
6. This would not mean that murders have no fault for what they do. Most genes only establish genetic trends. Environmental and spiritual factors affect the extent to which you follow those trends. Even if you have a genetic tendency to murder, the choices that you make can keep you from following that tendency.
7. It is not in interphase. Chromosomes only pack into their condensed form during reproduction.
8. Prophase, metaphase, anaphase, telophase
9. a. Notice how there are two distinct nuclei far apart from each other and the plasma membrane is beginning to constrict. This is telophase.
- b. The chromosomes are still in the nucleus, but they are distinct. This means that they are ready to start mitosis. Thus, this is prophase.
- c. The chromosomes are lined up on the equatorial plane. This is metaphase.
- d. The chromosomes are pulling away from each other, but they are not far apart. Also, the plasma membrane has not started to constrict. This is anaphase.

10. Diploid number is the total number of chromosomes in the cell. Haploid number is the number of homologous pairs. If there are a total of 16 chromosomes, then there must be 8 pairs. The haploid number is 8.
11. Since haploid number is the number of pairs, that tells us there are nine pairs. The diploid number is the total number of chromosomes in a diploid cell, which has *both members of each pair*. Since there are nine pairs, the diploid number is 9×2 , or 18.
12. A gamete is haploid while a regular animal cell is diploid. This means that a gamete has only one chromosome from each homologous pair. A regular cell always both members of each homologous pair.
13. prophase I, metaphase I, anaphase I, telophase I, prophase II, metaphase II, anaphase II, telophase II.
14. Meiosis II: It is essentially mitosis acting on two haploid cells.
15. In meiosis I, a single diploid cell splits into two haploid cells with duplicated chromosomes. Thus, there are two cells. Since they are haploid, they have one chromosome from each pair. Since there are seven pairs, each cell has seven chromosomes. The chromosomes are duplicated, because the purpose of meiosis II is to separate the duplicates from the originals.
16. Before any meiosis started, these cells had seven pairs of chromosomes. When they went through meiosis I, they became haploid, so they now have seven chromosomes in total. The chromosomes are duplicated. In meiosis II, the duplicate chromosomes are separated from the originals, producing haploid cells with no duplicated chromosomes. Since there are four cells going through meiosis II, there are eight cells produced, there are seven chromosomes in each, but the chromosomes are not duplicated.
17. Male gametes are called sperm, while female gametes are called eggs.
18. Male animals produce four useful gametes with each meiosis, while female animals produce only one.
19. A polar body is a non-functional female gamete, because it is far too small to function properly. An egg is the one female gamete produced by meiosis that is large enough to function properly.
20. Sperm have flagella; thus, the male gamete can move on its own.
21. The lytic pathway is the way in which viruses reproduce, killing the cells of its host.
22. No virus is alive, because a virus cannot reproduce on its own.
23. A vaccine is only good if you take it before getting infected, because it is meant to build up the antibodies that you need to fight the virus off before it overwhelms your body.