

## Chapter 11, 12 & 13 Review

### Unit 4

#### Chapter 11

1. Why do cells need to communicate?
2. Explain what happens during the three phases of signal transduction.
3. What is the purpose of second messengers?
4. Diagram the epinephrine signaling pathway. Diagram signal reception, transduction and response.
5. Define each of the following phenomena, identify the organisms that they occur in, and explain how cellular signaling is used in each of them:
  1. Quorum Sensing
  2. Mating in Yeast
  3. Apoptosis
6. Why do you think cellular signaling pathways and mechanisms are so universal among life's domains?

#### Chapter 12 The Cell Cycle

1. What has to occur for a cell to divide? What purposes do these divisions serve?
2. Why does the DNA condense into chromosomes during cell division?
3. The following terms as relate to DNA structures: chromosome, chromatid, centromere.
4. Explain what happens during each of the following phases of the cell cycle in a typical eukaryotic cell:
  1. Interphase
    - a. G1
    - b. S
    - c. G2
  2. Prophase
  3. Pro-Metaphase
  4. Metaphase

5. Anaphase
  6. Telophase
  7. Cytokinesis
5. What is different about cytokinesis in animal-like cells as compared to plant-like cells?
  6. If a cell has 12 pairs of chromosomes in G1 of interphase, how many chromosomes does it have during each of the following phases of the cell cycle?
    - a. G2
    - b. Metaphase
    - c. Immediately after cytokinesis.
  7. The differences between prokaryotic, and eukaryotic cell division
  8. Briefly discuss the evolutionary trend in mitosis shown in the protists.
  9. Why does a multicellular organism need to control and coordinate cell division?
    - a. What might be the consequences of uncontrolled cell division in a multicellular organism?
  10. What does it mean when we say that there are several “checkpoints” that occur during the cell cycle?
  11. What are the “Questions” that a cell must “answer” during each of the following checkpoints:
    - a. G1/S checkpoint
    - b. G2 checkpoint
    - c. spindle checkpoint
  12. Diagram the relationship between cdK, and cyclin.
  13. Give an example of an external signal that regulates cell division and explain how it works.
  14. Compare and contrast the functions of proto-oncogenes and tumor suppressor genes.
    - a. Give an example of each and explain why mutations in these genes can lead to cancer.
  15. The different requirements for cell division in unicellular and multicellular organisms, along with different parts of a multicellular organism.
  16. The relationship between cancer and cell division.
  17. How cancer develops in an organism.

18. How cancer is treated, and how those treatments affect cancer cells.

### Ch. 13 Meiosis and Sexual Life Cycle

1. Explain how asexual reproduction is different from sexual reproduction.
2. Explain what happens during crossing over and when it occurs in meiosis.
3. How is metaphase I different from metaphase of mitosis?
4. Explain why sexual reproduction increases variation among offspring much more than asexual reproduction does.
5. How many possible genetic variations can be produced during meiosis and sexual reproduction?
6. How is sexual reproduction related to gender determination in mammals?
7. If the progenitor cell of a gamete has 12 pairs of chromosomes during G1 of interphase, how many chromosomes will the following cells have?
  1. after S phase of interphase.
  2. a daughter cell immediately following cytokinesis I of meiosis.
  3. a daughter cell during anaphase II of meiosis.
  4. a daughter cell immediately following cytokinesis II of meiosis.
8. The relationship between homologous pairs of chromosomes.
9. How meiosis evolved and why it bears a strong resemblance to mitosis.
10. The major differences between mitosis and meiosis.
11. The process of karyotyping and why/when it is used