Chapter 10: Chromosomes, Mitosis, and Meiosis

Name DUE: MONDAY, NOVEMBER 16, 2009 Mrs. Laux Take home test #7 **MULTIPLE CHOICE QUESTIONS**

- 1. A bacterial chromosome consists of:
 - Α. a linear DNA molecule many times larger than the cell.
 - В. a circular DNA molecule many times larger than the cell.
 - C. a circular DNA molecule smaller than the cell.
 - a linear DNA molecule smaller than the cell. D.
 - a linear or circular DNA molecule smaller than the cell. E.
- 2. Eukaryotic chromosomes consist of:
 - circular DNA molecules complexed with positively charged nonhistone proteins. A.
 - circular DNA molecules complexed with negatively charged histone proteins. В.
 - C. linear DNA molecules complexed with positively charged histone proteins.
 - D. linear DNA molecules complexed with negatively charged histone proteins.
 - E. circular DNA molecules.
- 3. What is the function of nucleosomes?
 - To prevent DNA strands from tangling. A.
 - To help DNA replicate. В.
 - C. To make RNA synthesis possible.
 - To prevent RNA from tangling with DNA during transcription. D.
 - E. None of these.
- 4. Nucleosomes are organized into large coiled loops in visible chromosomes by:
 - A. histones.
 - В. centromeres.
 - C. kinetochore proteins.
 - D. scaffolding proteins.
 - condensins. E.
- 5. The M phase of the cell cycle involves two main processes:
 - mitosis and cytokinesis. A.
 - meiosis I and meiosis II. B.
 - homologous pairing and crossing-over. C.
 - D. interphase and mitosis.
 - E. mitosis and meiosis.
- 6. Once nerve cells become mature, they don't usually undergo cell division. Based on your knowledge of the cell cycle, you would predict that mature nerve cells become arrested in the of the cell cycle.
 - A. G₀ phase
 - В. S phase
 - C. prophase
 - G_1 phase D.
 - E. G_2 phase
- 7. Chromosomes are duplicated during ______ of the cell cycle.
 - A. G_1 phase
 - B. G₂ phase
 - C. S phase
 - D. metaphase
 - E. prophase

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- 8. Which of the following represents the sequence of events during mitosis?
 - A. prophase metaphase anaphase telophase
 - B. interphase metaphase anaphase telophase
 - $C. \quad anaphase-telophase-metaphase-interphase$
 - $D. \quad interphase-prophase-anaphase-metaphase$
 - E. metaphase telophase anaphase prophase
- 9. If a cell is in G_2 :
 - A. it has twice the amount of DNA present in a telophase nucleus.
 - B. it has visibly distinct chromosomes.
 - C. it lacks a visible nuclear membrane.
 - D. it is in mitosis.
 - E. it is in cytokinesis.
- 10. The ______ is responsible for the separation of the chromosomes during ______ of mitosis.
 - A. cell wall; anaphase
 - B. flagellum; metaphase
 - C. mitotic spindle; anaphase
 - D. kinetochore; prophase
 - E. centromere; telophase
- 11. _____ contain identical DNA sequences and are held together by _____ during mitosis.
 - A. Daughter chromosomes; hydrogen bonding
 - B. Daughter chromosomes; ionic bonding
 - C. Sister chromatids; spindle fibers
 - D. Sister chromosomes; histone proteins
 - E. Sister chromatids; centromeres
- 12. The mitotic spindle is made of:
 - A. collagen.
 - B. condensin.
 - C. histones.
 - D. keratin.
 - E. microtubules.
- 13. The kinetochore serves which of the following functions?
 - A. Kinetochores anchor spindle fibers to the centrioles.
 - B. Kinetochores are the site of DNA synthesis.
 - C. Kinetochores regulate the length of the cell cycle.
 - D. Kinetochores attach to microtubules during mitosis.
 - E. Kinetochores are involved in cytokinesis.

14. All of the following events occur during prometaphase EXCEPT:

- A. the nuclear envelope breaks down.
- B. the nucleoli disappear.
- C. the mitotic spindle is completely assembled.
- D. the spindle fibers "capture" chromosomes.
- E. the duplicated chromosomes become visible with the light microscope.

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- 15. Duplicated centrioles move to opposite poles of a dividing ______ cell during ______ of the cell cycle.
 - A. plant; metaphase
 - B. plant; anaphase
 - C. prokaryotic; metaphase
 - D. animal; interphase
 - E. animal; prophase

16. The chromosome makeup of an individual organism is called a:

- A. kinetochore.
- B. chromosome plot.
- C. centromere.
- D. karyotype.
- E. centriole.

17. Chromosomes are condensed to their greatest extent during ______ of mitosis.

- A. metaphase
- B. prophase
- C. telophase
- D. interphase
- E. anaphase

18. Cytokinesis in animal cells involves contraction of a ring of ______ microfilaments.

- A. tubulin plus actin
- B. actin plus myosin
- C. cyclin plus myosin
- D. keratin plus actin
- E. cyclin plus actin

19. Cytokinesis in plant cell mitosis occurs initially by the formation of a(n):

- A. aster.
- B. mitotic spindle.
- C. Golgi complex.
- D. cell wall.
- E. cell plate.
- 20. Generation time refers to:
 - A. the number of years it takes for a generation to die.
 - B. the amount of time required to replicate the DNA in a cell.
 - C. the time it takes to complete one cell cycle.
 - D. the time required for an individual in a species to achieve sexual maturity.
 - E. None of the above.
- 21. If a cell is dividing by binary fission then you know that:
 - A. mitosis has taken place without cytokinesis.
 - B. homologous chromosomes have already paired.
 - C. the cyclin-Cdk complex is no longer phosphorylating enzymes.
 - D. the cell cycle is out of control.
 - E. the cell is prokaryotic.

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22. To prevent disastrous consequences, the eukaryotic cell cycle is controlled by:

- A. the mitochondria.
- B. helper viruses.
- C. environmental signals.
- D. a very detailed, rigid genetic program.
- E. a series of cell cycle checkpoints.

23. Which of the following statements concerning the cell cycle is FALSE?

- A. The activity of Cdks increases and decreases during the cell cycle.
- B. Cyclins fluctuate during the cell cycle.
- C. Cdks are active only when they bind to cyclins.
- D. The anaphase-promoting complex stimulates the separation of sister chromatids
- E. M-Cdk inhibits mitosis.
- 24. The correct number of chromosomes is maintained during sexual reproduction by:
 - A. a process by which one half of the chromosomes in gametes are removed.
 - B. chromosome doubling in the newly formed zygote.
 - C. meiosis, which reduces the chromosome number by half.
 - D. mitosis, which maintains the original chromosome number.
 - E. replication of chromosomes twice during meiosis.

25. Animal cells are stimulated to divide by mitosis by:

- A. colchicines.
- B. magnetic fields.
- C. mating.
- D. growth factors.
- E. nutrients.

26. If meiosis did not occur in sexually reproducing organisms, then:

- A. growth of the zygote would be halted.
- B. mitosis would be sufficient.
- C. gametes would remain haploid.
- D. chromosome number would double in each generation.
- E. eggs would be haploid, but sperm would be diploid.

27. What evolutionary advantage is provided by sexual reproduction?

- A. increased genetic diversity
- B. making clones
- C. making diploidy possible
- D. making polyploidy possible
- E. being able to work with chromosomes
- 28. Most human somatic cells are:
 - A. polyploid.
 - B. diploid.
 - C. aneuploid.
 - D. tetraploid.
 - E. haploid.

29. Homologous chromosomes undergo synapsis during:

- A. anaphase I.
- B. prophase I.
- C. anaphase II.
- D. telophase II.
- E. prophase II.

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- 30. During prophase I of meiosis, homologous chromosomes lie side by side. This phenomeon is known as:
 - A. chromatid pairing.
 - B. divalent formation.
 - C. tetrad formation.
 - D. paternal pairing.
 - E. parental pairing.

31. During which phase does crossing-over occur?

A. interphase

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- B. prophase I
- C. metaphase I
- D. prophase II
- E. metaphase II

32. A zygote contains the _____ complement of chromosomes.

- A. haploid
- B. diploid
- C. polyploid
- D. spermatogenesis
- E. None of these.

33. In a human cell at prophase I, there are ______ tetrads.

- A. 92
- B. 46
- C. 23
- D. 2
- E. 4

34. During prophase I, each chiasma represents:

- A. the remnants of the nuclear membrane.
- B. the remnant of the nucleolus.
- C. a newly formed haploid gamete.
- D. a site of crossing-over.
- E. the site where sister chromatids are connected.

35. During which of the following stages of meiosis do the sister centromeres separate?

- A. metaphase I
- B. anaphase I
- C. metaphase II
- D. anaphase II
- E. telophase II

36. Which of the following events does not occur in prophase II?

- A. formation of the spindle
- B. condensation of chromatin into chromosomes
- C. formation of chiasmata
- D. removal of the nuclear membrane
- E. None of the above, since all the events occur in prophase II.

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- 37. The sources of genetic variation during meiosis are:
 - A. crossing-over and the random assortment of maternal and paternal chromosomes.
 - B. crossing-over and random pairing of tetrads.
 - C. random pairing of tetrads and mutations.
 - D. polyploidy and random pairing of tetrads.
 - E. random pairing of tetrads and random assortment of maternal and paternal chromosomes.
- 38. Which of the following events does not occur during meiosis I?
 - A. DNA exchange
 - B. pairing of homologous chromosomes
 - C. separation of sister chromatids
 - D. separation of homologous chromosomes
 - E. crossing-over between homologous chromosomes

39, 40. Use the figure below to answer the corresponding questions.



- 39. Which of the following combinations of letters accurately represents two sister chromatids?
 - A. A and B
 - B. A and C
 - C. A and D
 - D. A and E
 - E. B and F
- 40. Which of the following combinations of letters accurately represents two homologous chromatids?
 - A. A and B
 - B. A and C
 - C. A and D
 - D. B and F
 - E. D and E

41. Which of the following are produced by meiosis?

- A. polar bodies
- B. animal eggs
- C. animal sperm
- D. plant spores
- E. All of these.

42, 43. Use the figure to answer the corresponding questions.

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