

## Cell Cycle and Meiosis Concept Questions

1. What are chromosomes other than sex chromosomes called?
2. Identify the difference between cytokinesis in animal cells and plant cells.
3. Why must cytokinesis occur after, rather than before, anaphase?
4. What functions does cell division accomplish?
5. Describe the functions of the mitotic spindle apparatus and the centromere.
6. Why is the replication process during interphase so important to cell division?
7. A cell with 10 chromosomes undergoes mitosis. Indicate the number of chromosomes you would expect in each of the daughter cells.
8. Imagine that a drug is developed that forces cells to remain in G1 of the cell cycle. What would be the effect on the cell? On the individual?
9. Do all of the cells in your body divide at the same rate? Explain.
10. What evidence suggests that cells contain a biological clock or counter?
11. What evidence suggests that the human body can only live a finite number of years even if disease was eliminated?
12. State the phase that is described by each of the following events during mitosis.
  - a) The chromosomes move apart and go to opposite poles of the cell.
  - b) The nucleolus and nuclear envelope reappear.
  - c) The centrioles complete their own replication.
  - d) The cell grows in size.
  - e) The spindle has reached its full development.
  - f) Chromosomes become shorter and thicker strands
13. Looking under a microscope, you notice that some cells have several nuclei within the cytoplasm of a single cell. Which phase of the cell cycle is not operating correctly to form such cells?
13. Match the events to the correct phase of meiosis.
  - a) pairs of homologous chromosomes line up along the equator of the cell
  - b) synapsis occurs and the four chromatids form a tetrad
  - c) replication of the genetic material
  - d) one member of the homologous pair segregates from the other and begins to move to opposite sides
  - e) sister chromatids split at the centromere and move toward opposite poles
14. List the differences between meiosis and mitosis.
15. Define the following
  - a) homologous pairs
  - (b) sister chromatids
  - (c) tetrad
16. Do homologous chromosomes have the same number of genes? Do they have identical genes? Explain.
17. A muscle cell of a mouse has 40 chromosomes. Indicate the number of chromosomes you would expect to find in each of the following cells of the same mouse
  - a) daughter cell formed after mitosis
  - (b) skin cell
  - (c) egg cell
  - (d) fertilized egg

18. Distinguish between haploid and diploid cells in humans. Apply them to the terms “somatic cell” and “sex cell.”
19. If a cell has a diploid number of 32, what would be the chromosome number of a cell in late Prophase I of meiosis?
20. How many chromosomes would each daughter cell in the previous question have at the end of Telophase II of meiosis?
21. State some ways cells can become cancerous.
22. Cancer cells are unusual in a variety of ways: they are immortal, they metastasize, don't perform their normal function, and they can form tumors. Explain each of these behaviors.
23. What signals control the growth and division of normal cells?
24. Explain how synapsis often leads to the exchange of genetic material between chromosomes.
25. Describe nondisjunction and its effect on the chromosomal composition of a cell.
26. Distinguish between trisomy and monosomy.
27. As any pair of chromatids can fail to separate during meiosis, theoretically there are 23 possible kinds of monosomy and trisomy. However, monosomies and trisomies for most of the 23 chromosome pairs are quite rare (or unheard of). Why do you think this is so?
28. What is a karyotype and where would one get the cells to make one?
29. Explain how the production of gametes and sexual reproduction increase genetic variation.
30. Would a skin cell mutation on your hand affect your offspring? Explain.