

Name: _____

AP Biology

Chapter 9 Active Reading Guide **The Cell Cycle**

1. Give an example of the three key roles of cell division.

Key Role	Example
Reproduction	
Growth and Development	
Tissue Renewal	

2. What is meant by the cell cycle?

Section 1

3. What is the meaning of genome?
4. How many chromosomes are in a human somatic cell? _____
5. Name two types of somatic cells in your body.
6. What is a gamete?
7. Name the two types of gametes. _____ and _____
8. How many chromosomes in a human gamete? _____
9. Define chromatin.
10. Think carefully, now. How many DNA molecules are in each of your somatic cells?

11. You are going to have to learn the difference between several similar-sounding terms. Figure 9.4 represents a replicated chromosome that has two sister chromatids. The narrow “waist” represents the location of the centromere. Students often get all these terms confused, so take time now to draw a quick sketch of a chromosome and label the following areas: chromosome, chromatid, centromere, chromatin.
12. Study Figure 9.5 in your text. Summarize what occurs at the DNA level in each stage.
13. What is mitosis? How is it different from cytokinesis?
14. What occurs in meiosis? How is the chromosome number of daughter cells different?
15. Select either mitosis or meiosis to answer the following questions.
- _____ By what process are the damaged cells in a wound replaced?
 - _____ By what process are eggs formed?
 - _____ By what process does a zygote develop into a multicellular organism?
 - _____ In which process are identical daughter cells produced?
 - _____ Which process reduces chromosome number of daughter cells?
16. A hedgehog has 90 chromosomes in its somatic cells.
- How many chromosomes did the hedgehog inherit from each parent _____
 - How many chromosomes are in each of the hedgehog’s gametes? _____
 - How many chromosomes will be in each somatic cell of the hedgehog’s offspring _____

Section 2

17. Give a brief explanation of what happens in each phase of the cell cycle listed.

Phase	Explanation
G ₁	
S	
G ₂	
M	

18. What are the components of the mitotic spindle? What is the source of these components?

19. In animal cells, the assembly of spindle microtubules starts at the centrosome. What is another name for the centrosome?

20. Sketch and label a centrosome with two centrioles.

21. What are the components of the mitotic spindle?

22. Describe what happens to the centrosome during interphase and then prophase.

23. What is a kinetochore? Read your text carefully, and then make a labeled sketch that shows a replicated chromosome with two kinetochores and some attached spindle fibers. Figure 9.8 in your text may help.

24. Explain the difference between kinetochore and nonkinetechore microtubules. What is the function of each?
25. At which end do kinetochore microtubules shorten during anaphase? Explain the Inquiry Figure (Figure 9.9) that supports where this shortening occurs.
26. Describe cytokinesis in an animal cell. Use a labeled sketch that shows the cleavage furrow.

27. Describe cytokinesis in a plant cell. Use a labeled sketch that shows the cell plate.

28. How is the cell plate formed? What is the source of the material for the cell plate?

29. Prokaryote reproduction does not involve mitosis, but instead occurs by binary fission. This process involves an origin of replication. Describe binary fission.

30. Notice that now you are learning a number of differences between prokaryotic and eukaryotic cells. Besides the fact that prokaryotes lack a membrane-bounded nucleus, describe the following differences:
Mode of reproduction?

Number of chromosomes?

Shape of the bacterial chromosome?

Section 3

31. What controls the cell cycle? Study the Inquiry Figure 9.14 in your text to help you answer this question.

32. What is a cell cycle checkpoint?

33. Summarize what happens at each checkpoint. You may add to this chart as you study this section.

Checkpoint	What Happens?	How Is It Controlled?
G ₁		
S		
G ₂		
M		

34. What is the G₀ phase? Describe this phase.

35. What is a protein kinase?

36. Kinases drive the cell cycle, but they must be activated by attachment of a _____.

37. The activity of cyclin-dependent kinases (CDks) rises and falls. Why?

38. What does MPF trigger? What are some specific activities that it triggers?

39. What happens if all the chromosome kinetochores are not attached to spindle fibers? When this occurs, which checkpoint is not passed?

40. What are growth factors? How does platelet-derived growth factor (PDGF) stimulate fibroblast division?

41. Cancer cells exhibit different behaviors than normal cells. Here are two normal behaviors they no longer show. Explain each behavior.
density-dependent inhibition:

anchorage dependence:

42. Cancer cells also show loss of cell cycle controls and may divide without being checked. The story of HeLa cells is worth noting. What is their source? How old are they? Note that, unlike normal cells, HeLa cells are immortal!

43. What is transformation? What is metastasis?

44. Distinguish between a benign tumor and a malignant tumor.

45. List two specific cancer treatments, and tell how each treatment works.