

1. What are the three key roles of cell division? State each role and give an example.

Key Role	Example

2. What is meant by the *cell cycle*?

3. What is the meaning of genome?

4. How many chromosomes are in a human somatic cell? Name **two** types of somatic cells in your body.

5. What is a gamete? Name the **two** types of gametes.

6. How many chromosomes are present in a human gamete?

7. Describe a eukaryotic chromosome.

8. How many DNA molecules are in each of your somatic cells? Think carefully!

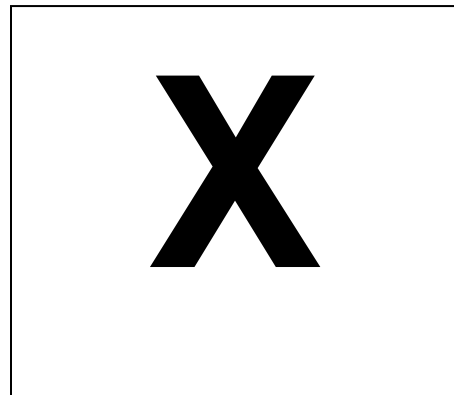
9. You are going to have to learn the difference between several similar-sounding terms. The following sketch that looks like an X represents a *replicated chromosome* that has two *sister chromatids*. The narrow waist represents the location of the *centromere*. The centromere is a region of the DNA, a part of the chromosome where one sister chromatid will attach to the other sister chromatid. A single chromosome has one centromere: replicated chromosomes, therefore, have two centromeres, adhering to each other in this region. Label the figure and define each of the terms below.

Chromosome

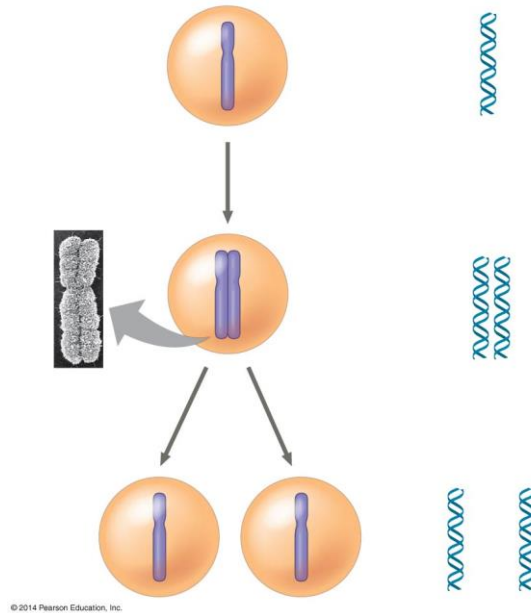
Chromatid

Centromere

Chromatin



10. Using Fig 12.5, label the following figure and summarize what occurs at the DNA level in each stage.

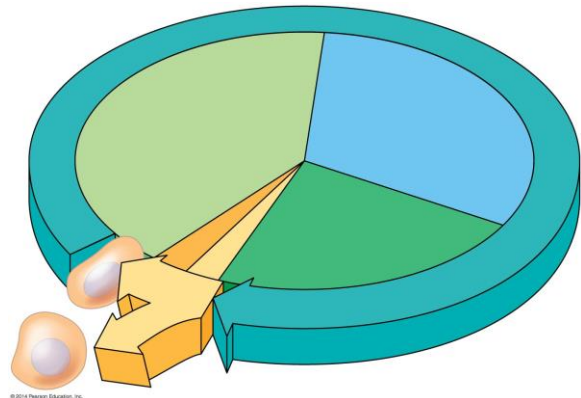


11. What is *mitosis*? How is it different from *cytokinesis*?

12. What occurs in *meiosis*? How is the chromosome number of daughter cells different?

13. Label each of the parts of the cell cycle listed below and give a brief explanation of what happens in each phase.

G₁
S
G₂
M



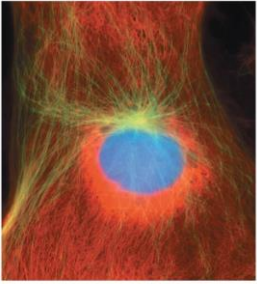
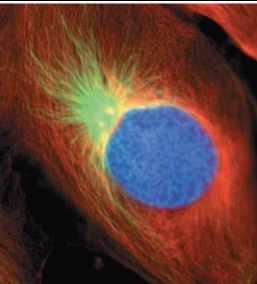
14. What are the components of the mitotic spindle? What is the source of these components?

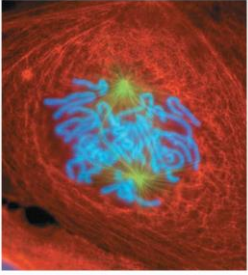
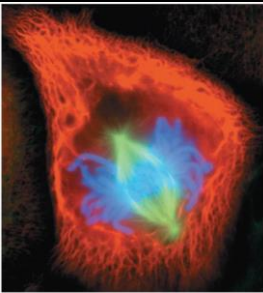
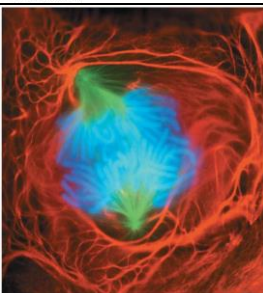
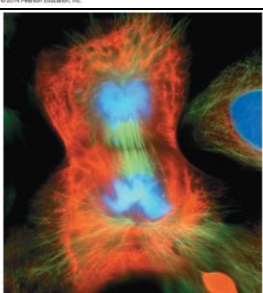
15. In animal cells, the assembly of spindle microtubules starts at the *centrosome*. What is another name for the centrosome? _____

16. Sketch and label a centrosome with two centrioles.

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

18. Use Figure 12.7 in your text to help you complete this chart. Label each phase by name; then label the smaller structures. Finally, make two or three summary statements that indicated important features to note about the phase.

	Phase	Important Features of Phase
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	Phase	Important Features of Phase

19. 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. Fig 12.8 in your text will help.

20. Explain the difference between kinetochore and nonkinetochore microtubules. What is the function of each?

21. Using Fig 12.9, explain how evidence was gathered to justify the claim that microtubules depolymerize from the kinetochore end during anaphase.

22. Describe *cytokinesis* in an animal cell. Draw and label a sketch that shows the *cleavage furrow*.

23. Describe cytokinesis in a plant cell. Draw and label a sketch that shows the *cell plate*.

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

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

26. 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?

27. What controls the cell cycle? (Inquiry Fig 12.14 will help with this)

28. What is a cell-cycle *checkpoint*?

29. Summarize what happens at each checkpoint.

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

30. What is the function of a *protein kinase*?

31. Kinases drive the cell cycle, but they must be activated by attachment of what molecules? _____

32. The activity of *cyclin-dependent kinases (Cdks)* rises and falls. Why?

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

34. What is the *G₀ phase*? Describe this phase. What cell types remain in this phase throughout their life spans?

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

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

37. Cancer cells exhibit different behaviors than normal cells. Here are two normal behaviors they no longer show. Explain each behavior and tell how its loss affects normal cell behavior.

Density-dependent inhibition

Anchorage dependence

38. Cancer cells also show loss of cell-cycle controls and may divide with 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!

39. What is transformation? What is metastasis?

40. Distinguish between a benign tumor and malignant tumor.

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