

CHAPTER 16	Chapter 16 Test Answer Key	BLM 16.5.1A
ANSWER KEY		

Answers to **Multiple Choice** Questions

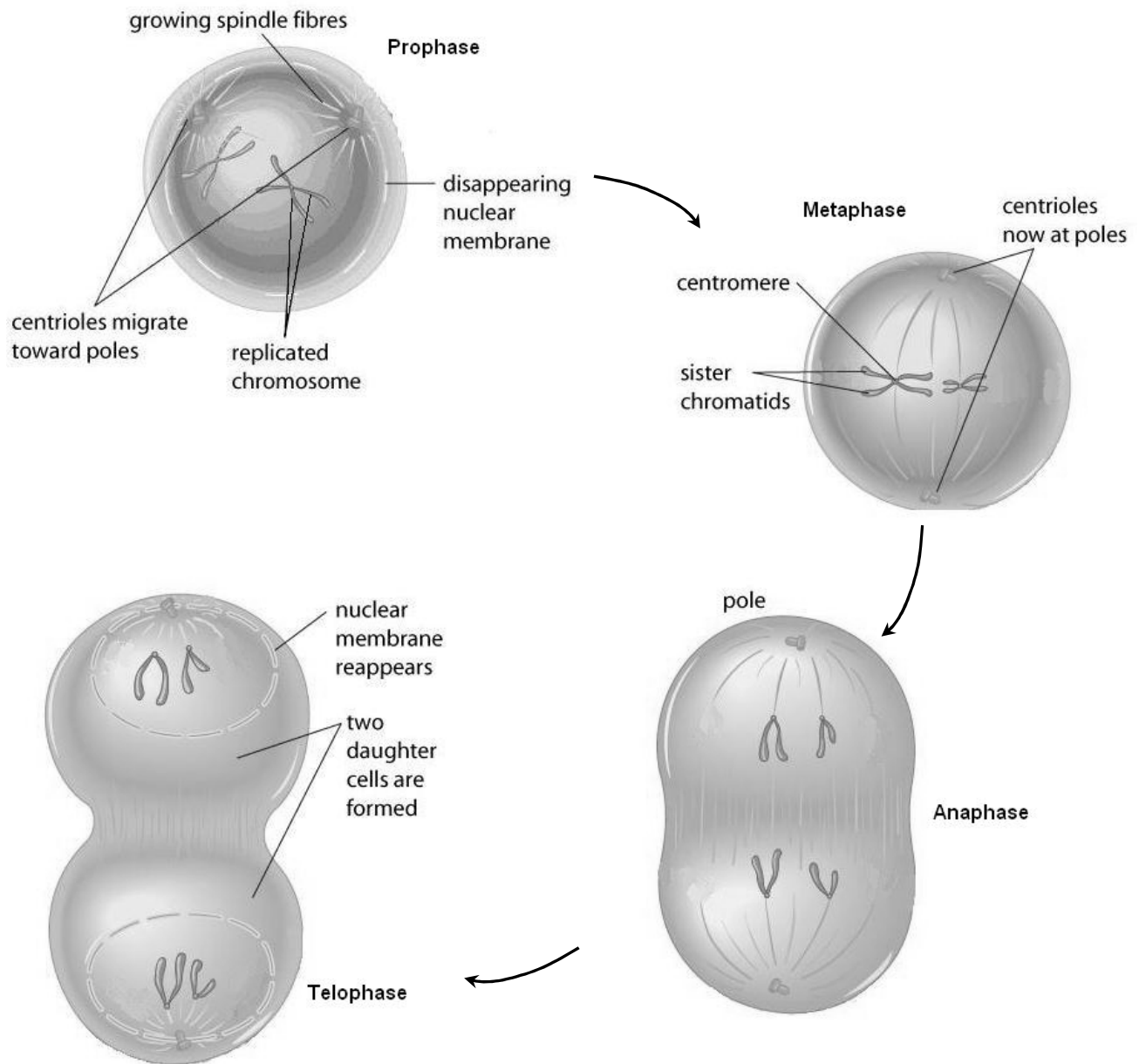
1. d
2. a
3. d
4. c
5. d
6. b
7. d
8. a
9. d
10. b
11. c
12. c
13. b
14. c
15. d
16. a
17. a
18. c
19. d
20. d
21. c
22. b
23. a
24. d
25. a
26. b
27. a
28. c
29. b
30. c

Answers to **Numerical Response** Questions

1. $2n = 22$
 $8n = 88$
 $4n = 44$
2. 3, 1, 5, 4, 2
3. 3, 5, 4, 6, 1, 2

CHAPTER 16**ANSWER KEY****Chapter 16 Test Answer Key****BLM 16.5.1A**Sample Answers to **Written Response** Questions

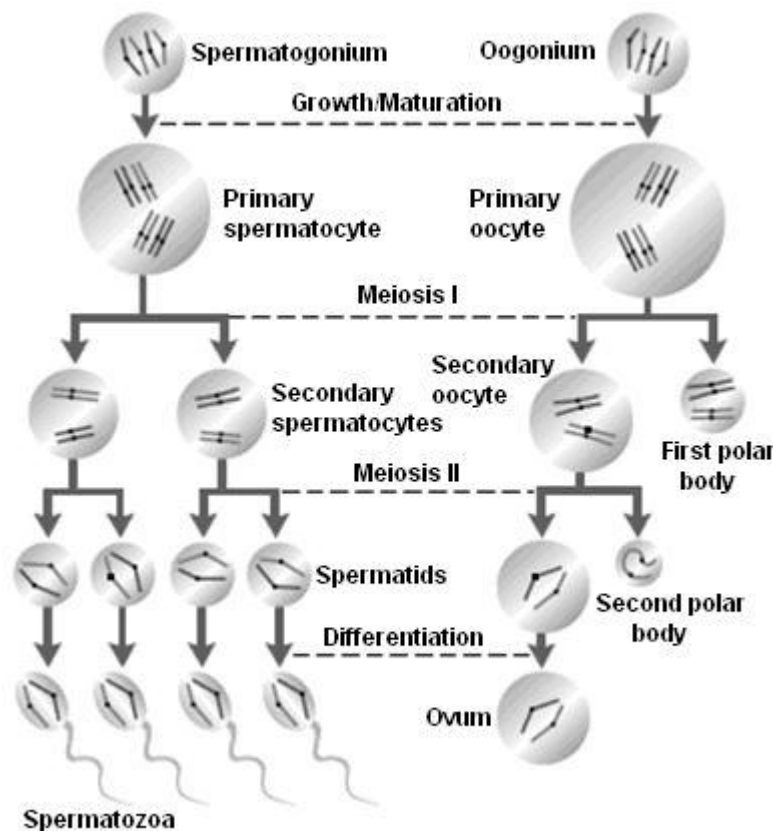
1. a) The chromosomes are held together during prophase and metaphase in mitosis. (2 marks)
If they are not held together, they attach independently, and often both sister chromatids can go to the same pole rather than to opposite poles. This creates chromosome imbalances that can lead to cancer or chromosomal abnormalities that cause birth defects. (2 marks)
- b) Student answers should look similar to the illustration below. (10 marks)



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- c) Accept any two of the following steps. (2 marks)
- a sample of cells is collected from an individual
 - cell division is stimulated and then stopped at mitotic metaphase
 - cells are then broken open and chromosomes are stained
 - cells are photographed under light microscope magnification
 - the homologous chromosomes are paired and numbered
- d) The “glue” that holds the sister chromatids together is the protein called cohesin. (1 mark)
- e) Their experiments revealed that it is the erosion of linkages between the chromatids, and not any tension exerted by the spindle, that causes the chromatids to separate. (2 marks)
- f) Students may have a variety of reasons why these scientists think they are doing good science. However, in the reading they should note, “But that’s the usual outcome of work in my laboratory and a sign that we’re doing good science since we raise new questions. We lay the mechanistic groundwork for the molecular explanations that have to be made. So, our colleagues who do molecular work are both provoked and challenged by us.” (2 marks)

2. The following diagram compares and contrasts spermatogenesis and oogenesis.



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- Without the Cks2 proteins, primary spermatocytes or primary oocytes do not progress from metaphase I to anaphase I (students may indicate that the processes are stopped during meiosis I). As a result, spermatogenesis or oogenesis cannot proceed, resulting in sterility. Students should also indicate that the homologous chromosomes would not separate and the resulting cell would have twice as many chromosomes (genetic material) as it needs.
- Students may provide any number of societal issues. One possible issue is that this work could provide a better understanding of sterility, which could be beneficial to parents who are unable to have children. Another possible issue that students could discuss is the role of this information in the study of cancer, as this protein is the same one that is required in mitosis. A third possible answer could be a better understanding of nondisjunction of chromosomes during meiosis and the associated birth defects. Students should justify their positions using arguments that are based on science and logic rather than on emotion.

Use the following Scoring Criteria to mark this question.

Science

Score	Scoring Criteria
5 Excellent	<ul style="list-style-type: none"> ■ diagrams of both spermatogenesis and oogenesis are complete and accurate ■ diagrams are clearly labelled and all labels are accurate ■ clearly identifies that blocking the Cks2 protein blocks meiosis between metaphase I and anaphase I, or indicates that if the block occurs during meiosis I it prevents the development of the primary spermatocyte or oocyte ■ clearly explains how blocking the Cks2 protein would result in the sterility of either the male or female
4 Proficient	<ul style="list-style-type: none"> ■ diagrams of both spermatogenesis and oogenesis are mostly complete and accurate ■ diagrams are clearly labelled and all labels are, for the most part, accurate ■ identifies that blocking the Cks2 protein blocks meiosis between metaphase I and anaphase I, or indicates that if the block occurs during meiosis I it prevents the development of the primary spermatocyte or oocyte ■ explains how blocking the Cks2 protein would result in the sterility of either the male or female
3 Satisfactory	<ul style="list-style-type: none"> ■ diagrams of both spermatogenesis and oogenesis are partially complete and partially accurate ■ diagrams are labelled but a number of labels are inaccurate ■ recognizes that meiosis I would be stopped but does not elaborate ■ partially explains how blocking the Cks2 protein would result in the sterility of either the male or female

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2 Limited	<ul style="list-style-type: none"> ■ attempts to draw events in spermatogenesis or oogenesis ■ there are many inaccuracies in the drawings and/or the labels ■ recognizes that something happens during meiosis but does not identify meiosis I and does not elaborate ■ poor explanation of how blocking the Cks2 protein results in sterility
1 Poor	<ul style="list-style-type: none"> ■ attempts to draw either spermatogenesis or oogenesis but obviously does not understand these processes ■ does not attempt to answer part 2 of the question or it is clear that the student really does not understand why blocking this protein would result in sterility
0	<ul style="list-style-type: none"> ■ does not attempt the question.

Societal Issues

Score	Scoring Criteria
5 Excellent	<ul style="list-style-type: none"> ■ clearly identifies two societal issues directly related to the article ■ clearly justifies both societal issues ■ uses two arguments to justify both societal issues
4 Proficient	<ul style="list-style-type: none"> ■ identifies two societal issues directly related to the article ■ justifies both societal issues ■ uses two arguments to justify the issues
3 Satisfactory	<ul style="list-style-type: none"> ■ identifies two societal issues, one of which may not be directly related to the article ■ justifies both societal issues ■ uses only one argument to justify the issues
2 Limited	<ul style="list-style-type: none"> ■ identifies only one societal issue directly related to the article ■ uses an argument to justify the societal issue
1 Poor	<ul style="list-style-type: none"> ■ identifies a societal issue but this issue is not related to the article ■ does not justify the issue or does not attempt to support it
0	<ul style="list-style-type: none"> ■ does not attempt this part of the question