

Student: \_\_\_\_\_

1. Two chromatids are connected by a
  - A. centromere.
  - B. spindle.
  - C. centriole.
  - D. chromosome.
2. Fibers extending from cell pole to cell pole are called the
  - A. cleavage furrow.
  - B. cell plate.
  - C. cell equator.
  - D. spindle.
3. An organelle found in animals and involved in cell division is the
  - A. lysosome.
  - B. mitochondrion.
  - C. Golgi apparatus.
  - D. centriole.
4. During prophase \_\_\_\_\_ are formed.
  - A. nucleoli
  - B. new chromosomes
  - C. spindles
  - D. centromeres
5. Chromosomes align along the equator during
  - A. metaphase.
  - B. anaphase.
  - C. telophase.
  - D. prophase.
6. In a human, the 46 chromosomes would be at the equator during
  - A. interphase.
  - B. prophase.
  - C. anaphase.
  - D. metaphase.
7. Daughter cells are formed during
  - A. metaphase.
  - B. anaphase.
  - C. prophase.
  - D. telophase.
8. Chromosomes move toward the poles during
  - A. metaphase.
  - B. telophase.
  - C. anaphase.
  - D. interphase.
9. Chromosomes first become visible during
  - A. telophase.
  - B. prophase.
  - C. anaphase.
  - D. metaphase.
10. When the chromosomes have moved around so that they all lie on a plane in the middle of the cell, the stage is called
  - A. anaphase.
  - B. metaphase.
  - C. prophase.
  - D. telophase.
11. The stage during which chromosomes shorten by condensing their nucleoprotein is called
  - A. anaphase.
  - B. metaphase.
  - C. prophase.
  - D. telophase.
12. In what mitotic stage does the cytoplasm divide?

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

13. Which of the following is NOT true concerning mitosis?

- A. It insures the immortality of the genetic information possessed by an organism.
- B. The DNA molecule replicates before any chromosomes can be seen.
- C. It is the process that heals a wound.
- D. It accounts for most of the increase in size of growing plants and animals.

14. The most important result of mitosis is the

- A. production of new varieties of cells to meet changes in the environment.
- B. exact duplication of the parent cell's genetic information.
- C. equal division of the parent cell's genetic information between the two daughter cells.
- D. equal distribution of the parent's cytoplasm between the two daughter cells.

15. During prophase of mitosis, the

- A. nucleus is preparing for the beginning stage of mitosis that will follow.
- B. chromosomes are so loosely coiled and stretched out that they are not yet visible.
- C. nucleoli and nuclear membrane disappear.
- D. zygote is formed.

16. The metaphase stage of mitosis is characterized by the

- A. arrangement of chromosomes along a line.
- B. arrangement of chromosomes on a plane.
- C. division of the centromeres.
- D. duplication of genetic information.

17. Which of the following does NOT distinguish mitosis in plant cells from mitosis in animal cells?

- A. production of a cell plate
- B. production of a furrow
- C. presence of centrioles
- D. presence of centromeres

18. During anaphase of mitosis, the

- A. nuclear membranes begin to reappear around each of the patches that will soon be daughter nuclei.
- B. number of distinct chromosomes present is twice the number that was present before mitosis started.
- C. centromeres have not divided.
- D. chromosomes replicate by making exact copies of themselves.

19. During telophase of mitosis the

- A. chromosomes have ended their move toward the poles.
- B. daughter cells separate themselves from each other.
- C. DNA of the chromosomes duplicates in preparation for the cell division.
- D. cell's genetic characteristics modify to meet any change in the environment.

20. After cell division, some cells become differentiated. This means that they

- A. become different shapes.
- B. become different sizes.
- C. perform different functions.
- D. become different in all these ways.

21. The time it takes for cells to divide

- A. varies, but it takes sophisticated equipment to measure this small difference.
- B. depends on the health and environment of the cell.
- C. does not vary at all, but is controlled by an internal clock.
- D. varies widely and unpredictably in cells of the same local area of the same organism during any specific time period.

22. The order in which the stages of mitosis proceed is

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

23. \_\_\_\_ is not part of interphase.

- A. Gap 1
- B. Gap 2
- C. Cytokinesis
- D. DNA synthesis

24. DNA replication occurs during

- A. prophase of mitosis.
  - B. metaphase of mitosis.
  - C. gap 1 of interphase.
  - D. S phase of interphase.
25. Centromeres are
- A. composed of microtubules.
  - B. two identical sides of a metaphase chromosome.
  - C. regions that attach chromosomes.
  - D. the structures that contain genetic material.
26. Which of the following is NOT true of cytokinesis?
- A. Cytokinesis is the division of cytoplasm and its contents.
  - B. The formation of a cell plate in plants results in cytokinesis.
  - C. The formation of a cleavage furrow in animals results in cytokinesis.
  - D. Cytokinesis occurs during interphase.
27. \_\_\_\_ is NOT an event of telophase.
- A. Uncoiling of chromosomes
  - B. Disappearance of spindles
  - C. Nuclear membranes forming to create daughter nuclei
  - D. Breaking down of nucleoli
28. A cell that contains eight chromosomes and is undergoing mitosis will produce \_\_\_\_ daughter cell(s); each daughter cell will contain \_\_\_\_ chromosomes.
- A. two; eight
  - B. two; four
  - C. four; four
  - D. one; eight
29. Chromosomes are composed of two chromatids during
- A. gap 1.
  - B. telophase.
  - C. metaphase.
  - D. anaphase.
30. The process of cell specialization within a multicellular organism is
- A. cancer.
  - B. cytokinesis.
  - C. mitosis.
  - D. determination.
31. In which of the following stages of the cell cycle would you find chromosomes separated into individual chromatids?
- A. prophase
  - B. metaphase
  - C. telophase
  - D. cytokinesis
32. The normal outcome of mitosis is
- A. to make cells smaller.
  - B. to produce genetically identical copies of cells.
  - C. to reduce the amount of DNA in daughter cells.
  - D. differentiation.
33. In which of the following stages of the cell cycle does the cell contain chromosomes consisting of 2 chromatids joined by a centromere?
- A. anaphase
  - B. metaphase
  - C. cytokinesis
  - D. telophase
34. Which of the following is typical of interphase?
- A. DNA replicates.
  - B. The chromosomes get short and thick.
  - C. The nucleolus disappears.
  - D. The cell does nothing.
35. A dividing cell lacks a nuclear membrane, contains chromosomes consisting of two chromatids, and has clearly visible chromosomes. It is in which one of the following stages?
- A. metaphase
  - B. anaphase
  - C. interphase
  - D. telophase

36. "I can tell this cell is in metaphase because . . ."
- A. the chromatids are dividing.
  - B. the spindle is being formed.
  - C. the chromosomes are aligned on the equator of the cell.
  - D. the nuclear membrane is forming.
37. \_\_\_\_\_ may cause cancer.
- A. Chemotherapeutic agents
  - B. Mutagenic agents
  - C. Meiosis
  - D. Cytokinesis
38. Cells spend most of their life
- A. in the  $G_0$  phase.
  - B. dividing.
  - C. in metaphase.
  - D. undergoing differentiation.
39. DNA is synthesized in which stage of the typical cell cycle?
- A. prophase
  - B.  $G_1$
  - C. S
  - D.  $G_2$
40. The whole point of mitosis is to
- A. be sure that DNA is replicated.
  - B. reproduce the parent cell into genetically identical daughter cells.
  - C. reproduce the parent cell into similar but not identical daughter cells.
  - D. produce sex cells (gametes).
41. Which of the following techniques would be useful in controlling cancer once it has formed an abnormal growth?
- A. Prevent mutations from occurring in the cancer cells.
  - B. Treat the cancer with drugs or other therapies that selectively kill dividing cells.
  - C. Increase the mutation rate to kill the cancer cells.
  - D. Increase the rate of mitosis in the cancer cells.
42. During which of the following stages of the cell cycle does DNA replication take place?
- A. prophase
  - B. interphase
  - C. telophase
  - D. anaphase
43. Controlled cell death is termed
- A. apoptosis.
  - B. metastasis.
  - C. malignancy.
  - D. tumor formation.
44. Tumors that are harmful, non-encapsulated growths of cells are known as
- A. benign.
  - B. malignant.
  - C. metastasized.
  - D. carcinogenic.
45. The physician explained that her cancer had metastasized or
- A. spread from its original site.
  - B. shrunk in size.
  - C. become benign.
  - D. stopped growing.
46. A normally functioning muscle cell is in which stage of its cycle?
- A.  $G_2$
  - B. anaphase
  - C.  $G_0$
  - D. cytokinesis
47. Proteins required for the spindles are synthesized in the
- A.  $G_2$  stage.
  - B. S stage.
  - C.  $G_0$  stage.

D. G<sub>1</sub> stage.

48. Radiation most likely destroys cancer cells by inducing a process called

- A. cytokinesis.
- B. protein disintegration.
- C. differentiation.
- D. apoptosis.

49. When the gene p53 initiates apoptosis, the cell's DNA causes the cell to

- A. enter prophase.
- B. spontaneously break down the cell membrane.
- C. become differentiated.
- D. digest itself from the inside out.

50. A cell mass that does NOT fragment and spread beyond its original area of growth is known as a(n)

- A. benign tumor.
- B. atumoron.
- C. malignant tumor.
- D. nodule.

51. The \_\_\_\_\_ on the chromosome is where the spindle fibers bind to the chromosome and is responsible for the shortening of spindle fibers during anaphase.

- A. chromatin
- B. centromere
- C. tubulin
- D. kinetochore

52. Homologous chromosomes **separate** during

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

53. This is the type of cell division used by most prokaryotes.

- A. mitosis
- B. binary fission
- C. binary fusion
- D. meiosis

54. In meiosis, centromeres split in

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

55. Crossing-over occurs in

- A. prophase I.
- B. prophase II.
- C. metaphase II.
- D. Both prophase I and II.

56. The exchange of chromosome parts may occur during

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

57. When homologous chromosomes are at the equator of the cell, it is in

- A. telophase.
- B. metaphase I.
- C. metaphase II.
- D. Any of these stages.

58. Cytokinesis may occur during

- A. prophase I.
- B. metaphase I.
- C. anaphase I.
- D. telophase I.

59. The spindle begins to form in

- A. telophase I.
- B. prophase I.

- C. interphase.
- D. telophase II.

60. Two nuclei are formed during

- A. prophase I.
- B. metaphase I.
- C. anaphase I.
- D. telophase I.

61. Chromosomes first become visible during

- A. prophase I.
- B. metaphase I.
- C. anaphase I.
- D. telophase I.

62. Chromosomes move toward the poles during

- A. anaphase II.
- B. metaphase II.
- C. prophase II.
- D. telophase II.

63. The centromere divides during

- A. metaphase II.
- B. telophase II.
- C. anaphase II.
- D. prophase II.

64. Spindles disappear during

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

65. During metaphase I of meiosis,

- A. individual chromosomes line up at the poles.
- B. homologous pairs are aligned at the equator.
- C. pairs of chromosomes separate from other pairs by spindle rays.
- D. only one member of each pair is in each cell.

66. During anaphase II of meiosis,

- A. the centrioles form.
- B. daughter cells form.
- C. chromosomes move to poles.
- D. chromatids exchange parts.

67. During which stage does cytokinesis happen?

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

68. Independent assortment refers to the fact that

- A. a cell will divide and produce various offspring regardless of whether any other cell is dividing.
- B. mitosis normally produces cells that are like each other and like the parent cell.
- C. the daughter cell that receives the maternal #1 chromosome will not necessarily receive the maternal #2.
- D. a crossover between two chromosomes will produce offspring unlike either parent.

69. Segregation

- A. happens whenever a cell is fertilized.
- B. happens when chromosomes separate and move to the poles.
- C. is the separation between daughter cells after cell division.
- D. None of these answers define segregation.

70. Equivalent segments of DNA are exchanged between chromosomes as a result of

- A. segregation.
- B. crossing-over.
- C. fertilization.
- D. independent assortment.

71. The separation of homologous chromosomes is called

- A. synapsis.
- B. segregation.

- C. mitosis.
- D. fertilization.

72. Sometimes the gene for blue eye color is in the same gamete as the gene for curly hair, but they are in different gametes just as often. Why?

- A. crossing-over
- B. independent assortment
- C. fertilization
- D. segregation

73. Normally, a gamete gets only one of a pair of alleles. This is true because of

- A. crossing-over.
- B. independent assortment.
- C. fertilization.
- D. segregation.

74. Crossing-over results in

- A. chromosome duplication.
- B. new combinations of genes.
- C. point mutations.
- D. All of these answers are true.

75. Segregation refers to the separation of

- A. linked genes from each other.
- B. alleles.
- C. dominant genes from the rest of the chromosome.
- D. assorted structures in the cell.

76. If the blood type and the number of fingers are inherited independently, this means

- A. they are on the same chromosome.
- B. they are linked to each other.
- C. they segregate randomly.
- D. B blood and six fingers are rare.

77. Nondisjunction is the process

- A. in which homologous chromosomes fail to segregate normally.
- B. in which abnormal cytokinesis occurs.
- C. in which metaphase is not allowed to occur.
- D. described by two of these statements.

78. Nondisjunction results in

- A. two small daughter cells that disappear and two normal-sized cells.
- B. two polar bodies.
- C. daughter cells with different numbers of chromosomes.
- D. two cells with equal numbers of chromosomes.

79. Nondisjunction may result in a person with twenty-three pairs of chromosomes

- A. plus an extra chromosome.
- B. minus a sex chromosome.
- C. with an extra chromosome number 21.
- D. All of these answers are true.

80. If segregation does NOT occur, the result will be

- A. crossing-over.
- B. independent assortment.
- C. nondisjunction.
- D. fertilization.

81. An excess number of chromosomes in a gamete results from

- A. mutation.
- B. nondisjunction.
- C. crossing-over.
- D. fertilization.

82. The process of cell specialization within a multicellular organism is

- A. cancer.
- B. cytokinesis.
- C. mitosis.
- D. determination.

83.

The cell below is in



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

84. The cell below is in



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

85. Two genes that are located in close proximity to one another on the same chromosome are said to be

- A. mutated
- B. linked
- C. grouped
- D. homologous

86. Synapsis is the

- A. exchange of genetic material between homologous chromosomes.
- B. condition in which homologous chromosomes pair and lie close to each other.
- C. independent assortment of homologous chromosomes.
- D. separation and movement of homologous chromosomes to the poles.

87. The sex organ in plants that produces the male gamete is called the

- A. pistil.
- B. autosome.
- C. anther.
- D. testes.

88. \_\_\_\_ does not contribute to genetic variety.

- A. Independent assortment
- B. Cytokinesis
- C. Sexual reproduction
- D. Crossing-over

89. Which of the following is **false** regarding nondisjunction?

- A. Nondisjunction results in sex cells having too few or too many chromosomes.
- B. The frequency of nondisjunction increases in women over the age of 37.
- C. Nondisjunction is a cause of Down syndrome.
- D. A cell with one too few chromosomes is trisomic.

90. If the haploid number of an organism is 6, the diploid number will be

- A. 3.
- B. 6.
- C. 9.
- D. 12.

91. If the haploid number for an organism is 20, the number of chromosomes in each gamete will be

- A. 5.
- B. 10.
- C. 20.
- D. 40.

92. Chromosome number reduces during

- A. mitosis.
- B. interphase.
- C. meiosis I.



D. meiosis II.

93. Chromatids separate and move toward opposite poles during

- A. mitosis only.
- B. meiosis I and meiosis II.
- C. mitosis and meiosis II.
- D. mitosis, and meiosis I and meiosis II.

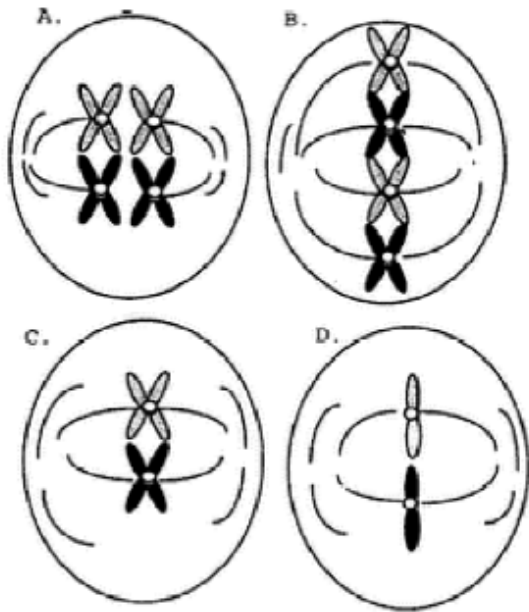
94. A pair of chromosomes that contain alleles for the same genes at the same locations are

- A. haploid.
- B. homologous.
- C. homozygous.
- D. synapsed.

95. Crossing-over and synapsis occur during

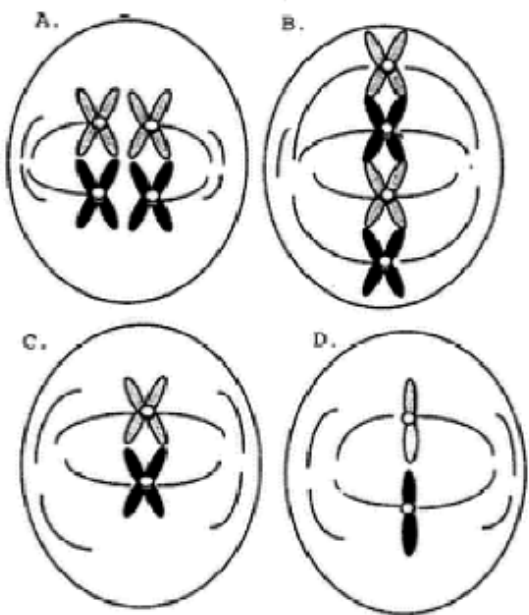
- A. prophase of mitosis only.
- B. prophase I of meiosis only.
- C. prophase II of meiosis only.
- D. prophase I and prophase II of meiosis.

96. Figure \_\_\_\_\_ represents meiosis II for an organism with a diploid number of 4.



- A. A
- B. B
- C. C
- D. D

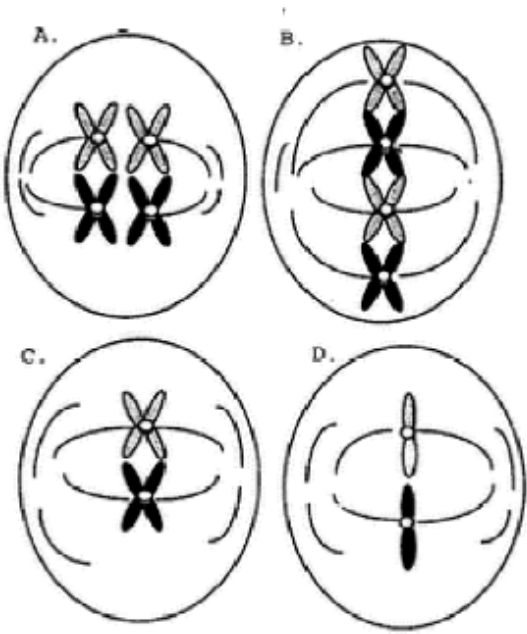
97. Which figure below represents meiosis I for an organism with a diploid number of 4?



- A. A
- B. B
- C. C
- D. D

98.

Diagram B in the figure below could represent the cell of an organism with a diploid number of \_\_\_\_ undergoing \_\_\_\_.



- A. 4; meiosis I
- B. 8; meiosis I
- C. 4; meiosis II
- D. 8; meiosis II

99. The process of producing sex cells is

- A. fertilization.
- B. mitosis.
- C. gametogenesis.
- D. ovulation.

100. The gonads of females are

- A. eggs.
- B. ovaries.
- C. semen.
- D. testes.

101. The male gametes are

- A. testes.
- B. zygotes.
- C. semen.
- D. sperm.

102. Fertilization produces

- A. eggs.
- B. zygotes.
- C. haploid cells.
- D. gametes.

103. Nondisjunction in humans can result in a person with

- A. twenty-two pairs of autosomes, an X chromosome, and a Y chromosome.
- B. twenty-two pairs of autosomes and two X chromosomes.
- C. forty-seven chromosomes.
- D. forty-six chromosomes.

104. \_\_\_\_ during prophase of prophase I.

- A. Chromosomes become visible
- B. Chromosomes synapse and cross-over
- C. Chromosomes separate
- D. DNA replication occurs

105. A zygote

- A. is haploid.
- B. contains all of the genes from each parent.
- C. is formed by meiosis.
- D. is genetically different from either parent.

106. During which of the following stages of meiosis is the cell haploid?

- A. prophase I
- B. anaphase II
- C. metaphase I
- D. anaphase I

107. If in male fruit flies, crossing-over does not occur during meiosis, while in females crossing-over does occur

- A. there is less genetic variety among sperm than among eggs.
- B. fewer sperm are produced than eggs.

- C. males are not necessary for fertilization in fruit flies.
- D. more female offspring will be produced than male offspring.

108. During which of the following stages of meiosis does the cell contain the LEAST amount of DNA?

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

109. Which of the following is necessary before any of the other events can occur?

- A. independent assortment
- B. segregation
- C. haploid cells
- D. pairing of homologous chromosomes

110. During which of the following stages of meiosis is the cell diploid?

- A. metaphase II
- B. anaphase II
- C. metaphase I
- D. prophase II

111. During which of the following stages of meiosis does the cell contain the greatest amount of DNA?

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

112. Which of the following does NOT occur during prophase I of meiosis?

- A. synapsis
- B. crossing-over
- C. independent assortment
- D. nuclear membrane disappears

113. Which one of the following is typical of meiosis? All the cells produced

- A. are identical.
- B. contain more genes than the parent cells.
- C. are haploid.
- D. have undergone nondisjunction.

114. During anaphase I of meiosis

- A. crossing-over occurs.
- B. homologous chromosomes pair up.
- C. mutations are common.
- D. segregation of alleles occurs.

115. In which of the following ways does an anaphase I cell differ from an anaphase II cell?

- A. Anaphase I cells have fewer chromosomes than Anaphase II cells.
- B. Anaphase I cells lack a nuclear membrane; anaphase II cells have a nuclear membrane.
- C. Anaphase I cells are capable of fertilization and anaphase II cells are not.
- D. Anaphase I cells have chromosomes separating; anaphase II cells have chromatids separating.

116. In which of the following ways does a telophase I cell differ from a telophase II cell?

- A. Telophase I cells have fewer chromosomes than telophase II cells.
- B. Telophase I cells lack a nuclear membrane; telophase II cells have a nuclear membrane.
- C. Telophase I cells are capable of fertilization and telophase II cells are not.
- D. Telophase I cells have chromosomes consisting of two chromatids; telophase II cells only have chromatids.

117. Which of the following represents normal fertilization in humans?

- A.  $2n + 2n = 4n$
- B.  $n + 2n = 2n$
- C.  $n + n = 2n$
- D.  $2n = n$

118. Meiosis is necessary if

- A. the chromosome number of a sexually reproducing species is to remain the same generation after generation.
- B. life is to continue on the planet.
- C. all organisms of a species are to remain the same.
- D. mutations are to be stopped.

119. If an organism proceeds through meiosis and produces sex cells with 32 chromosomes (e.g., a horse), the cells of the horse's brain will each contain \_\_\_\_\_ chromosomes.

- A. 32

- B. 16
- C. 64
- D. 12

120. If a body cell has 8 chromosomes (e.g., fruit fly), how many pairs will form during Prophase II?

- A. 4
- B. 8
- C. 2
- D. None of these is correct.

121. "She looks a little like her dad and a little like her mom." This may have resulted from

- A. crossing-over.
- B. genetic recombination.
- C. independent assortment.
- D. All are possible.

122. "Boy! You can line up all these homologous pairs of chromosomes in a lot of different ways!" This process is referred to as

- A. segregation.
- B. synapse.
- C. independent assortment.
- D. crossing-over.

123. "She got some chromosomes from her grandfather and some from her grandmother." This is best explained by

- A. independent assortment.
- B. cross-over.
- C. mitosis.
- D. linked genes.

124. Segregation is a source of variety in gametogenesis because

- A. it is during segregation that chromosomes from the parents are separated at random into the gametes.
- B. crossing-over during segregation mixes genes from the parents into the offspring.
- C. all the genes from one parent are separated from the other parents.
- D. new gene combinations are formed by the parent.

125. Nondisjunction in humans can result in

- A. 22 pairs of autosomes, an X chromosome and a Y chromosome.
- B. 22 pairs of autosomes, and two X chromosomes.
- C. 47 chromosomes.
- D. 46 chromosomes.

126. This occurs when there is a problem with controlling how cells divide and replace themselves.

- A. crossing over
- B. nondisjunction
- C. cancer
- D. death

127. Centromeres separate allowing the chromatids to move toward the poles in

- A. Anaphase II.
- B. Anaphase I.
- C. Prophase I.
- D. Telophase II.

128. Homologous chromosomes recognize one another by their centromeres, move through the cell toward one another, and come to lie next to each other in a process called

- A. crossing over.
- B. synapsis.
- C. differentiation.
- D. trisomy.

129. Cells are constantly manipulating their DNA and histone proteins to regulate

- A. gene expression.
- B. mutation formation.
- C. crossing-over.
- D. segregation.

130. The difference among cell types is not in the genes they *possess*, but in the genes they *express*, i.e., through epigenetics.

- A. mutate, possess
- B. possess, express
- C. express, possess
- D. control, express

## 9 KEY

1. Two chromatids are connected by a

- A. centromere.
- B. spindle.
- C. centriole.
- D. chromosome.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #1  
Learning Outcome: Identify the types of cellular activities that occur during S phase.  
Section: 09.02  
Topic: Cell Cycle and Mitosis*

2. Fibers extending from cell pole to cell pole are called the

- A. cleavage furrow.
- B. cell plate.
- C. cell equator.
- D. spindle.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #2  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

3. An organelle found in animals and involved in cell division is the

- A. lysosome.
- B. mitochondrion.
- C. Golgi apparatus.
- D. centriole.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #3  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

4. During prophase \_\_\_\_\_ are formed.

- A. nucleoli
- B. new chromosomes
- C. spindles
- D. centromeres

*Blooms Level: 1. Remember  
Enger - Chapter 09 #4  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

5. Chromosomes align along the equator during

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

*Blooms Level: 1. Remember  
Enger - Chapter 09 #5  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

6. In a human, the 46 chromosomes would be at the equator during

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

*Blooms Level: 2. Understand  
Enger - Chapter 09 #6  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

7. Daughter cells are formed during

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

*Blooms Level: 1. Remember  
Enger - Chapter 09 #7  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

8. Chromosomes move toward the poles during

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

*Blooms Level: 1. Remember  
Enger - Chapter 09 #8  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

9. Chromosomes first become visible during

- A. telophase.
- B. prophase.**
- C. anaphase.
- D. metaphase.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #9  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

10. When the chromosomes have moved around so that they all lie on a plane in the middle of the cell, the stage is called

- A. anaphase.
- B. metaphase.**
- C. prophase.
- D. telophase.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #10  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

11. The stage during which chromosomes shorten by condensing their nucleoprotein is called

- A. anaphase.
- B. metaphase.
- C. prophase.**
- D. telophase.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #11  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

12. In what mitotic stage does the cytoplasm divide?

- A. prophase
- B. metaphase
- C. anaphase
- D. telophase**

*Blooms Level: 1. Remember  
Enger - Chapter 09 #12  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

13. Which of the following is NOT true concerning mitosis?

- A. It insures the immortality of the genetic information possessed by an organism.**
- B. The DNA molecule replicates before any chromosomes can be seen.
- C. It is the process that heals a wound.
- D. It accounts for most of the increase in size of growing plants and animals.

*Blooms Level: 2. Understand  
Enger - Chapter 09 #13  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.02  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

14. The most important result of mitosis is the

- A. production of new varieties of cells to meet changes in the environment.
- B. exact duplication of the parent cell's genetic information.**
- C. equal division of the parent cell's genetic information between the two daughter cells.
- D. equal distribution of the parent's cytoplasm between the two daughter cells.

*Blooms Level: 2. Understand  
Enger - Chapter 09 #14  
Learning Outcome: Describe the events that uniquely define each stage.  
Learning Outcome: List the stages of mitosis in their proper order.  
Section: 09.02  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

15. During prophase of mitosis, the

- A. nucleus is preparing for the beginning stage of mitosis that will follow.
- B. chromosomes are so loosely coiled and stretched out that they are not yet visible.
- C. nucleoli and nuclear membrane disappear.**
- D. zygote is formed.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #15  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

16. The metaphase stage of mitosis is characterized by the

- A. arrangement of chromosomes along a line.
- B.** arrangement of chromosomes on a plane.
- C. division of the centromeres.
- D. duplication of genetic information.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #16*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.03*  
*Topic: Cell Cycle and Mitosis*

17. Which of the following does NOT distinguish mitosis in plant cells from mitosis in animal cells?

- A. production of a cell plate
- B. production of a furrow
- C. presence of centrioles
- D.** presence of centromeres

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #17*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.03*  
*Topic: Cell Cycle and Mitosis*

18. During anaphase of mitosis, the

- A. nuclear membranes begin to reappear around each of the patches that will soon be daughter nuclei.
- B.** number of distinct chromosomes present is twice the number that was present before mitosis started.
- C. centromeres have not divided.
- D. chromosomes replicate by making exact copies of themselves.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #18*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.03*  
*Topic: Cell Cycle and Mitosis*

19. During telophase of mitosis the

- A.** chromosomes have ended their move toward the poles.
- B. daughter cells separate themselves from each other.
- C. DNA of the chromosomes duplicates in preparation for the cell division.
- D. cell's genetic characteristics modify to meet any change in the environment.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #19*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.03*  
*Topic: Cell Cycle and Mitosis*

20. After cell division, some cells become differentiated. This means that they

- A. become different shapes.
- B. become different sizes.
- C. perform different functions.
- D.** become different in all these ways.

*Blooms Level: 2. Understand*  
*Enger - Chapter 09 #20*  
*Learning Outcome: Explain the difference between a differentiated cell and a stem cell.*  
*Section: 09.06*  
*Topic: Cell Cycle and Mitosis*

21. The time it takes for cells to divide

- A. varies, but it takes sophisticated equipment to measure this small difference.
- B.** depends on the health and environment of the cell.
- C. does not vary at all, but is controlled by an internal clock.
- D. varies widely and unpredictably in cells of the same local area of the same organism during any specific time period.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #21*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.02*  
*Section: 09.03*  
*Topic: Cell Cycle and Mitosis*

22. The order in which the stages of mitosis proceed is

- A. anaphase, interphase, metaphase, prophase, telophase.
- B. interphase, anaphase, metaphase, prophase, telophase.
- C.** prophase, metaphase, anaphase, telophase, interphase.
- D. interphase, telophase, prophase, anaphase, metaphase.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #22*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.03*  
*Topic: Cell Cycle and Mitosis*

23. \_\_\_\_ is not part of interphase.

- A. Gap 1
- B. Gap 2
- C.** Cytokinesis
- D. DNA synthesis

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #23*  
*Learning Outcome: Identify the types of cellular activities that occur during G1.*

Section: 09.02  
Topic: Cell Cycle and Mitosis

24. DNA replication occurs during

- A. prophase of mitosis.
- B. metaphase of mitosis.
- C. gap 1 of interphase.
- D. S phase of interphase.**

Blooms Level: 1. Remember  
Enger - Chapter 09 #24  
Learning Outcome: Identify the types of cellular activities that occur during S phase.  
Section: 09.02  
Topic: Cell Cycle and Mitosis

25. Centromeres are

- A. composed of microtubules.
- B. two identical sides of a metaphase chromosome.
- C. regions that attach chromosomes.**
- D. the structures that contain genetic material.

Blooms Level: 1. Remember  
Enger - Chapter 09 #25  
Learning Outcome: Identify the types of cellular activities that occur during S phase.  
Section: 09.02  
Topic: Cell Cycle and Mitosis

26. Which of the following is NOT true of cytokinesis?

- A. Cytokinesis is the division of cytoplasm and its contents.
- B. The formation of a cell plate in plants results in cytokinesis.
- C. The formation of a cleavage furrow in animals results in cytokinesis.
- D. Cytokinesis occurs during interphase.**

Blooms Level: 2. Understand  
Enger - Chapter 09 #26  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis

27. \_\_\_\_ is NOT an event of telophase.

- A. Uncoiling of chromosomes
- B. Disappearance of spindles
- C. Nuclear membranes forming to create daughter nuclei
- D. Breaking down of nucleoli**

Blooms Level: 1. Remember  
Enger - Chapter 09 #27  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis

28. A cell that contains eight chromosomes and is undergoing mitosis will produce \_\_\_\_ daughter cell(s); each daughter cell will contain \_\_\_\_ chromosomes.

- A. two; eight**
- B. two; four
- C. four; four
- D. one; eight

Blooms Level: 4. Analyze  
Enger - Chapter 09 #28  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis

29. Chromosomes are composed of two chromatids during

- A. gap 1.
- B. telophase.
- C. metaphase.**
- D. anaphase.

Blooms Level: 1. Remember  
Enger - Chapter 09 #29  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.03  
Topic: Cell Cycle and Mitosis

30. The process of cell specialization within a multicellular organism is

- A. cancer.
- B. cytokinesis.
- C. mitosis.
- D. determination.**

Blooms Level: 1. Remember  
Enger - Chapter 09 #30  
Learning Outcome: Explain the difference between a differentiated cell and a stem cell.  
Section: 09.06  
Topic: Cell Cycle and Mitosis

31. In which of the following stages of the cell cycle would you find chromosomes separated into individual chromatids?

- A. prophase
- B. metaphase



- C.** telophase  
D. cytokinesis

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #31*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.02*  
*Section: 09.03*  
*Topic: Cell Cycle and Mitosis*

32. The normal outcome of mitosis is

- A. to make cells smaller.  
**B.** to produce genetically identical copies of cells.  
C. to reduce the amount of DNA in daughter cells.  
D. differentiation.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #32*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.01*  
*Section: 09.03*  
*Topic: Cell Cycle and Mitosis*

33. In which of the following stages of the cell cycle does the cell contain chromosomes consisting of 2 chromatids joined by a centromere?

- A. anaphase  
**B.** metaphase  
C. cytokinesis  
D. telophase

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #33*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.03*  
*Topic: Cell Cycle and Mitosis*

34. Which of the following is typical of interphase?

- A.** DNA replicates.  
B. The chromosomes get short and thick.  
C. The nucleolus disappears.  
D. The cell does nothing.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #34*  
*Learning Outcome: Identify the types of cellular activities that occur during S phase.*  
*Section: 09.02*  
*Topic: Cell Cycle and Mitosis*

35. A dividing cell lacks a nuclear membrane, contains chromosomes consisting of two chromatids, and has clearly visible chromosomes. It is in which one of the following stages?

- A.** metaphase  
B. anaphase  
C. interphase  
D. telophase

*Blooms Level: 2. Understand*  
*Enger - Chapter 09 #35*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.03*  
*Topic: Cell Cycle and Mitosis*

36. "I can tell this cell is in metaphase because . . ."

- A. the chromatids are dividing.  
B. the spindle is being formed.  
**C.** the chromosomes are aligned on the equator of the cell.  
D. the nuclear membrane is forming.

*Blooms Level: 2. Understand*  
*Enger - Chapter 09 #36*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.03*  
*Topic: Cell Cycle and Mitosis*

37. \_\_\_\_\_ may cause cancer.

- A. Chemotherapeutic agents  
**B.** Mutagenic agents  
C. Meiosis  
D. Cytokinesis

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #37*  
*Learning Outcome: Describe how cancer is caused by a failure to control cell division.*  
*Section: 09.05*  
*Topic: Cell Cycle and Mitosis*

38. Cells spend most of their life

- A.** in the G<sub>0</sub> phase.  
B. dividing.  
C. in metaphase.  
D. undergoing differentiation.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #38*  
*Learning Outcome: Identify the types of cellular activities that occur during G<sub>1</sub>.*

Section: 09.02  
Topic: Cell Cycle and Mitosis

39. DNA is synthesized in which stage of the typical cell cycle?

- A. prophase
- B. G<sub>1</sub>
- C. S**
- D. G<sub>2</sub>

Blooms Level: 1. Remember  
Enger - Chapter 09 #39  
Learning Outcome: Identify the types of cellular activities that occur during S phase.  
Section: 09.02  
Topic: Cell Cycle and Mitosis

40. The whole point of mitosis is to

- A. be sure that DNA is replicated.
- B. reproduce the parent cell into genetically identical daughter cells.**
- C. reproduce the parent cell into similar but not identical daughter cells.
- D. produce sex cells (gametes).

Blooms Level: 2. Understand  
Enger - Chapter 09 #40  
Learning Outcome: List three important purposes of cell division.  
Section: 09.02  
Section: 09.03  
Topic: Cell Cycle and Mitosis

41. Which of the following techniques would be useful in controlling cancer once it has formed an abnormal growth?

- A. Prevent mutations from occurring in the cancer cells.
- B. Treat the cancer with drugs or other therapies that selectively kill dividing cells.**
- C. Increase the mutation rate to kill the cancer cells.
- D. Increase the rate of mitosis in the cancer cells.

Blooms Level: 1. Remember  
Enger - Chapter 09 #41  
Learning Outcome: Describe how cancer is caused by a failure to control cell division.  
Learning Outcome: Describe how chemotherapy and radiation can be effective treatments for cancer.  
Section: 09.05  
Topic: Cell Cycle and Mitosis

42. During which of the following stages of the cell cycle does DNA replication take place?

- A. prophase
- B. interphase**
- C. telophase
- D. anaphase

Blooms Level: 1. Remember  
Enger - Chapter 09 #42  
Learning Outcome: Identify the types of cellular activities that occur during S phase.  
Section: 09.02  
Topic: Cell Cycle and Mitosis

43. Controlled cell death is termed

- A. apoptosis.**
- B. metastasis.
- C. malignancy.
- D. tumor formation.

Blooms Level: 1. Remember  
Enger - Chapter 09 #43  
Learning Outcome: Describe the role of p53 in controlling cell division.  
Section: 09.04  
Topic: Cell Cycle and Mitosis

44. Tumors that are harmful, non-encapsulated growths of cells are known as

- A. benign.
- B. malignant.**
- C. metastasized.
- D. carcinogenic.

Blooms Level: 1. Remember  
Enger - Chapter 09 #44  
Learning Outcome: Describe how cancer is caused by a failure to control cell division.  
Section: 09.05  
Topic: Cell Cycle and Mitosis

45. The physician explained that her cancer had metastasized or

- A. spread from its original site.**
- B. shrunk in size.
- C. become benign.
- D. stopped growing.

Blooms Level: 1. Remember  
Enger - Chapter 09 #45  
Learning Outcome: Describe how cancer is caused by a failure to control cell division.  
Section: 09.05  
Topic: Cell Cycle and Mitosis

46. A normally functioning muscle cell is in which stage of its cycle?

- A. G<sub>2</sub>

- B. anaphase
- C.** G<sub>0</sub>
- D. cytokinesis

Blooms Level: 2. Understand  
 Enger - Chapter 09 #46  
 Learning Outcome: Identify the types of cellular activities that occur during G1.  
 Section: 09.02  
 Topic: Cell Cycle and Mitosis

47. Proteins required for the spindles are synthesized in the

- A.** G<sub>2</sub> stage.
- B. S stage.
- C. G<sub>0</sub> stage.
- D. G<sub>1</sub> stage.

Blooms Level: 1. Remember  
 Enger - Chapter 09 #47  
 Learning Outcome: Identify the types of cellular activities that occur during G2.  
 Section: 09.02  
 Topic: Cell Cycle and Mitosis

48. Radiation most likely destroys cancer cells by inducing a process called

- A. cytokinesis.
- B. protein disintegration.
- C. differentiation.
- D.** apoptosis.

Blooms Level: 1. Remember  
 Enger - Chapter 09 #48  
 Learning Outcome: Describe how chemotherapy and radiation can be effective treatments for cancer.  
 Section: 09.04  
 Topic: Cell Cycle and Mitosis

49. When the gene p53 initiates apoptosis, the cell's DNA causes the cell to

- A. enter prophase.
- B. spontaneously break down the cell membrane.
- C. become differentiated.
- D.** digest itself from the inside out.

Blooms Level: 2. Understand  
 Enger - Chapter 09 #49  
 Learning Outcome: Describe the events that uniquely define each stage.  
 Section: 09.03  
 Topic: Cell Cycle and Mitosis

50. A cell mass that does NOT fragment and spread beyond its original area of growth is known as a(n)

- A.** benign tumor.
- B. atumoron.
- C. malignant tumor.
- D. nodule.

Blooms Level: 1. Remember  
 Enger - Chapter 09 #50  
 Learning Outcome: Describe how cancer is caused by a failure to control cell division.  
 Section: 09.05  
 Topic: Cell Cycle and Mitosis

51. The \_\_\_\_\_ on the chromosome is where the spindle fibers bind to the chromosome and is responsible for the shortening of spindle fibers during anaphase.

- A. chromatin
- B. centromere
- C. tubulin
- D.** kinetochore

Blooms Level: 1. Remember  
 Enger - Chapter 09 #51  
 Learning Outcome: Describe the events that uniquely define each stage.  
 Section: 09.03  
 Topic: Cell Cycle and Mitosis

52. Homologous chromosomes **separate** during

- A. metaphase.
- B. anaphase.
- C.** anaphase I.
- D. anaphase II.

Blooms Level: 1. Remember  
 Enger - Chapter 09 #52  
 Learning Outcome: Describe the events that uniquely define each stage.  
 Section: 09.08  
 Topic: Meiosis

53. This is the type of cell division used by most prokaryotes.

- A. mitosis
- B.** binary fission
- C. binary fusion
- D. meiosis

Blooms Level: 1. Remember  
 Enger - Chapter 09 #53

*Learning Outcome: Explain the differences between asexual and sexual reproduction.  
Section: 09.01  
Topic: Cell Cycle and Mitosis*

54. In meiosis, centromeres split in

- A. telophase I.
- B. anaphase I.
- C. telophase II.
- D. anaphase II.**

*Blooms Level: 1. Remember  
Enger - Chapter 09 #54  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

55. Crossing-over occurs in

- A. prophase I.**
- B. prophase II.
- C. metaphase II.
- D. Both prophase I and II.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #55  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

56. The exchange of chromosome parts may occur during

- A. telophase II.
- B. anaphase II.
- C. prophase I.**
- D. metaphase II.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #56  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

57. When homologous chromosomes are at the equator of the cell, it is in

- A. telophase.
- B. metaphase I.**
- C. metaphase II.
- D. Any of these stages.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #57  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

58. Cytokinesis may occur during

- A. prophase I.
- B. metaphase I.
- C. anaphase I.
- D. telophase I.**

*Blooms Level: 1. Remember  
Enger - Chapter 09 #58  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

59. The spindle begins to form in

- A. telophase I.
- B. prophase I.**
- C. interphase.
- D. telophase II.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #59  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

60. Two nuclei are formed during

- A. prophase I.
- B. metaphase I.
- C. anaphase I.
- D. telophase I.**

*Blooms Level: 1. Remember  
Enger - Chapter 09 #60  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

61. Chromosomes first become visible during

- A. prophase I.**
- B. metaphase I.
- C. anaphase I.

D. telophase I.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #61  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

62. Chromosomes move toward the poles during

- A. anaphase II.
- B. metaphase II.
- C. prophase II.
- D. telophase II.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #62  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

63. The centromere divides during

- A. metaphase II.
- B. telophase II.
- C. anaphase II.
- D. prophase II.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #63  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

64. Spindles disappear during

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

*Blooms Level: 1. Remember  
Enger - Chapter 09 #64  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

65. During metaphase I of meiosis,

- A. individual chromosomes line up at the poles.
- B. homologous pairs are aligned at the equator.
- C. pairs of chromosomes separate from other pairs by spindle rays.
- D. only one member of each pair is in each cell.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #65  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

66. During anaphase II of meiosis,

- A. the centrioles form.
- B. daughter cells form.
- C. chromosomes move to poles.
- D. chromatids exchange parts.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #66  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

67. During which stage does cytokinesis happen?

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

*Blooms Level: 1. Remember  
Enger - Chapter 09 #67  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

68. Independent assortment refers to the fact that

- A. a cell will divide and produce various offspring regardless of whether any other cell is dividing.
- B. mitosis normally produces cells that are like each other and like the parent cell.
- C. the daughter cell that receives the maternal #1 chromosome will not necessarily receive the maternal #2.
- D. a crossover between two chromosomes will produce offspring unlike either parent.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #68  
Learning Outcome: Describe how sexual reproduction increases genetic diversity through crossing over.  
Section: 09.09  
Topic: Meiosis*

69. Segregation

- A. happens whenever a cell is fertilized.
- B.** happens when chromosomes separate and move to the poles.
- C. is the separation between daughter cells after cell division.
- D. None of these answers define segregation.

Blooms Level: 1. Remember  
Enger - Chapter 09 #69

Learning Outcome: Describe how sexual reproduction increases genetic diversity through segregation.  
Section: 09.09  
Topic: Meiosis

70. Equivalent segments of DNA are exchanged between chromosomes as a result of

- A. segregation.
- B.** crossing-over.
- C. fertilization.
- D. independent assortment.

Blooms Level: 1. Remember  
Enger - Chapter 09 #70

Learning Outcome: Describe how sexual reproduction increases genetic diversity through crossing over.  
Section: 09.09  
Topic: Meiosis

71. The separation of homologous chromosomes is called

- A. synapsis.
- B.** segregation.
- C. mitosis.
- D. fertilization.

Blooms Level: 1. Remember  
Enger - Chapter 09 #71

Learning Outcome: Describe how sexual reproduction increases genetic diversity through segregation.  
Section: 09.09  
Topic: Meiosis

72. Sometimes the gene for blue eye color is in the same gamete as the gene for curly hair, but they are in different gametes just as often. Why?

- A. crossing-over
- B.** independent assortment
- C. fertilization
- D. segregation

Blooms Level: 1. Remember  
Enger - Chapter 09 #72

Learning Outcome: Describe how sexual reproduction increases genetic diversity through independent assortment.  
Section: 09.09  
Topic: Meiosis

73. Normally, a gamete gets only one of a pair of alleles. This is true because of

- A. crossing-over.
- B. independent assortment.
- C. fertilization.
- D.** segregation.

Blooms Level: 1. Remember  
Enger - Chapter 09 #73

Learning Outcome: Describe how sexual reproduction increases genetic diversity through segregation.  
Section: 09.09  
Topic: Meiosis

74. Crossing-over results in

- A. chromosome duplication.
- B.** new combinations of genes.
- C. point mutations.
- D. All of these answers are true.

Blooms Level: 2. Understand  
Enger - Chapter 09 #74

Learning Outcome: Describe how sexual reproduction increases genetic diversity through crossing over.  
Section: 09.09  
Topic: Meiosis

75. Segregation refers to the separation of

- A. linked genes from each other.
- B.** alleles.
- C. dominant genes from the rest of the chromosome.
- D. assorted structures in the cell.

Blooms Level: 1. Remember  
Enger - Chapter 09 #75

Learning Outcome: Describe how sexual reproduction increases genetic diversity through segregation.  
Section: 09.09  
Topic: Meiosis

76. If the blood type and the number of fingers are inherited independently, this means

- A. they are on the same chromosome.
- B. they are linked to each other.
- C.** they segregate randomly.
- D. B blood and six fingers are rare.

Blooms Level: 2. Understand  
Enger - Chapter 09 #76

Learning Outcome: Describe how sexual reproduction increases genetic diversity through segregation.  
Section: 09.09

77. Nondisjunction is the process

- A. in which homologous chromosomes fail to segregate normally.
- B. in which abnormal cytokinesis occurs.
- C. in which metaphase is not allowed to occur.
- D. described by two of these statements.

Blooms Level: 1. Remember

Enger - Chapter 09 #77

Learning Outcome: Explain how nondisjunction can result in loss of genetic material or the gain of genetic material.

Section: 09.10

Topic: Meiosis

78. Nondisjunction results in

- A. two small daughter cells that disappear and two normal-sized cells.
- B. two polar bodies.
- C. daughter cells with different numbers of chromosomes.
- D. two cells with equal numbers of chromosomes.

Blooms Level: 1. Remember

Enger - Chapter 09 #78

Learning Outcome: Explain how nondisjunction can result in loss of genetic material or the gain of genetic material.

Section: 09.10

Topic: Meiosis

79. Nondisjunction may result in a person with twenty-three pairs of chromosomes

- A. plus an extra chromosome.
- B. minus a sex chromosome.
- C. with an extra chromosome number 21.
- D. All of these answers are true.

Blooms Level: 1. Remember

Enger - Chapter 09 #79

Learning Outcome: Explain how nondisjunction can result in loss of genetic material or the gain of genetic material.

Section: 09.10

Topic: Meiosis

80. If segregation does NOT occur, the result will be

- A. crossing-over.
- B. independent assortment.
- C. nondisjunction.
- D. fertilization.

Blooms Level: 2. Understand

Enger - Chapter 09 #80

Learning Outcome: Explain how nondisjunction can result in loss of genetic material or the gain of genetic material.

Section: 09.10

Topic: Meiosis

81. An excess number of chromosomes in a gamete results from

- A. mutation.
- B. nondisjunction.
- C. crossing-over.
- D. fertilization.

Blooms Level: 1. Remember

Enger - Chapter 09 #81

Learning Outcome: Explain how chromosomal abnormalities can result in the loss of genetic material or the gain of genetic material.

Learning Outcome: Explain how nondisjunction can result in loss of genetic material or the gain of genetic material.

Section: 09.10

Topic: Meiosis

82. The process of cell specialization within a multicellular organism is

- A. cancer.
- B. cytokinesis.
- C. mitosis.
- D. determination.

Blooms Level: 2. Understand

Enger - Chapter 09 #82

Learning Outcome: Explain how the process of determination relates to stem cells and differentiated cells.

Learning Outcome: Explain the difference between a differentiated cell and a stem cell.

Section: 09.06

Topic: Cell Cycle and Mitosis

83. The cell below is in



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



Blooms Level: 4. Analyze  
 Enger - Chapter 09 #83  
 Learning Outcome: Describe the events that uniquely define each stage.  
 Section: 09.03  
 Topic: Cell Cycle and Mitosis

84. The cell below is in



- A. prophase.
- B. telophase.
- C. anaphase.
- D. metaphase.**

Blooms Level: 4. Analyze  
 Enger - Chapter 09 #84  
 Learning Outcome: Describe the events that uniquely define each stage.  
 Section: 09.03  
 Topic: Cell Cycle and Mitosis

85. Two genes that are located in close proximity to one another on the same chromosome are said to be

- A. mutated
- B. linked**
- C. grouped
- D. homologous

Blooms Level: 1. Remember  
 Enger - Chapter 09 #85  
 Learning Outcome: Describe how sexual reproduction increases genetic diversity through segregation.  
 Section: 09.10  
 Topic: Cell Cycle and Mitosis

86. Synapsis is the

- A. exchange of genetic material between homologous chromosomes.
- B. condition in which homologous chromosomes pair and lie close to each other.**
- C. independent assortment of homologous chromosomes.
- D. separation and movement of homologous chromosomes to the poles.

Blooms Level: 1. Remember  
 Enger - Chapter 09 #86  
 Learning Outcome: Describe the events that uniquely define each stage.  
 Section: 09.08  
 Topic: Meiosis

87. The sex organ in plants that produces the male gamete is called the

- A. pistil.
- B. autosome.
- C. anther.**
- D. testes.

Blooms Level: 1. Remember  
 Enger - Chapter 09 #87  
 Learning Outcome: Explain the differences between asexual and sexual reproduction.  
 Section: 09.07  
 Topic: Meiosis

88. \_\_\_\_ does not contribute to genetic variety.

- A. Independent assortment
- B. Cytokinesis**
- C. Sexual reproduction
- D. Crossing-over

Blooms Level: 2. Understand  
 Enger - Chapter 09 #88  
 Learning Outcome: List three important purposes of cell division.  
 Section: 09.03  
 Topic: Meiosis

89. Which of the following is **false** regarding nondisjunction?

- A. Nondisjunction results in sex cells having too few or too many chromosomes.
- B. The frequency of nondisjunction increases in women over the age of 37.
- C. Nondisjunction is a cause of Down syndrome.
- D. A cell with one too few chromosomes is trisomic.**

Blooms Level: 2. Understand  
 Enger - Chapter 09 #89  
 Learning Outcome: Explain how chromosomal abnormalities can result in the loss of genetic material or the gain of genetic material.  
 Learning Outcome: Explain how nondisjunction can result in loss of genetic material or the gain of genetic material.  
 Section: 09.10  
 Topic: Meiosis

90. If the haploid number of an organism is 6, the diploid number will be

- A. 3.
- B. 6.
- C. 9.



**D.** 12.

*Blooms Level: 2. Understand*  
*Enger - Chapter 09 #90*  
*Learning Outcome: Identify if the cell is diploid or haploid for each stage.*  
*Section: 09.07*  
*Topic: Meiosis*

91. If the haploid number for an organism is 20, the number of chromosomes in each gamete will be

- A. 5.  
 B. 10.  
**C.** 20.  
 D. 40.

*Blooms Level: 2. Understand*  
*Enger - Chapter 09 #91*  
*Learning Outcome: Identify if the cell is diploid or haploid for each stage.*  
*Section: 09.07*  
*Topic: Meiosis*

92. Chromosome number reduces during

- A. mitosis.  
 B. interphase.  
**C.** meiosis I.  
 D. meiosis II.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #92*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.08*  
*Topic: Meiosis*

93. Chromatids separate and move toward opposite poles during

- A. mitosis only.  
 B. meiosis I and meiosis II.  
**C.** mitosis and meiosis II.  
 D. mitosis, and meiosis I and meiosis II.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #93*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.08*  
*Topic: Meiosis*

94. A pair of chromosomes that contain alleles for the same genes at the same locations are

- A. haploid.  
**B.** homologous.  
 C. homozygous.  
 D. synapsed.

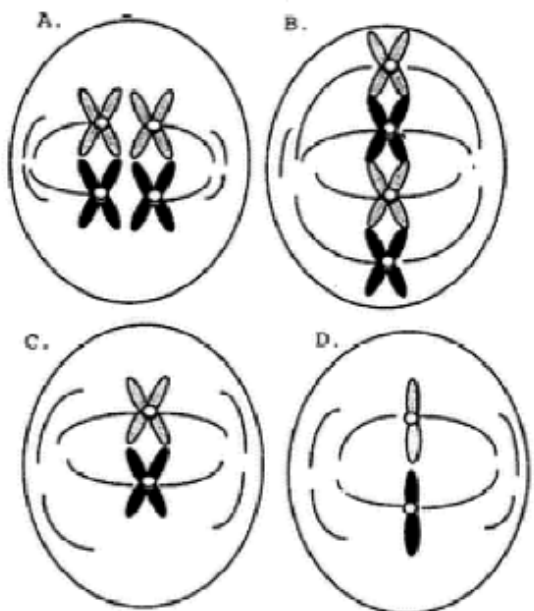
*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #94*  
*Learning Outcome: Explain the differences between asexual and sexual reproduction.*  
*Section: 09.07*  
*Topic: Meiosis*

95. Crossing-over and synapsis occur during

- A. prophase of mitosis only.  
**B.** prophase I of meiosis only.  
 C. prophase II of meiosis only.  
 D. prophase I and prophase II of meiosis.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #95*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.08*  
*Topic: Meiosis*

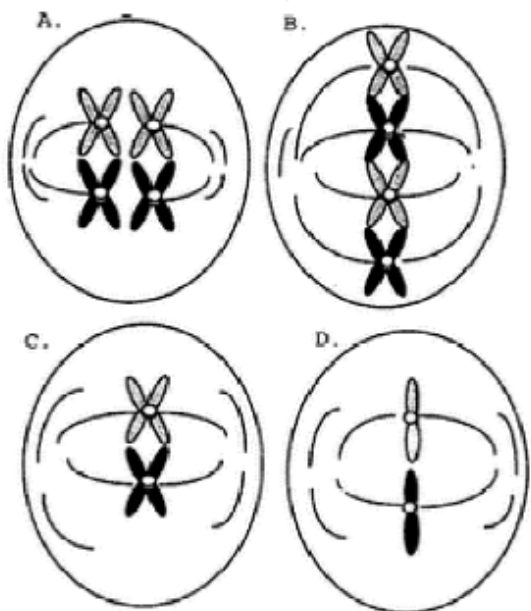
96. Figure \_\_\_\_\_ represents meiosis II for an organism with a diploid number of 4.



- A. A  
 B. B  
**C.** C  
 D. D

Blooms Level: 4. Analyze  
 Enger - Chapter 09 #96  
 Learning Outcome: Describe the events that uniquely define each stage.  
 Section: 09.08  
 Topic: Meiosis

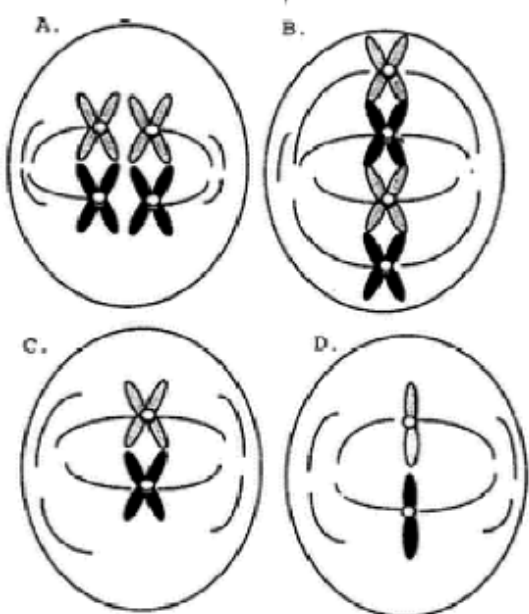
97. Which figure below represents meiosis I for an organism with a diploid number of 4?



- A. A  
 B. B  
 C. C  
 D. D

Blooms Level: 4. Analyze  
 Enger - Chapter 09 #97  
 Learning Outcome: Describe the events that uniquely define each stage.  
 Section: 09.08  
 Topic: Meiosis

98. Diagram B in the figure below could represent the cell of an organism with a diploid number of \_\_\_\_ undergoing \_\_\_\_.



- A. 4; meiosis I  
 B. 8; meiosis I  
 C. 4; meiosis II  
D. 8; meiosis II

Blooms Level: 4. Analyze  
 Enger - Chapter 09 #98  
 Learning Outcome: Describe the events that uniquely define each stage.  
 Section: 09.08  
 Topic: Meiosis

99. The process of producing sex cells is

- A. fertilization.  
 B. mitosis.  
C. gametogenesis.  
 D. ovulation.

Blooms Level: 1. Remember  
 Enger - Chapter 09 #99  
 Learning Outcome: Explain the differences between asexual and sexual reproduction.  
 Section: 09.07  
 Topic: Meiosis

100. The gonads of females are

- A. eggs.  
B. ovaries.  
 C. semen.  
 D. testes.

Blooms Level: 1. Remember  
 Enger - Chapter 09 #100  
 Learning Outcome: Explain the differences between asexual and sexual reproduction.  
 Section: 09.07  
 Topic: Meiosis

101. The male gametes are

- A. testes.
- B. zygotes.
- C. semen.
- D.** sperm.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #101*  
*Learning Outcome: Explain the differences between asexual and sexual reproduction.*  
*Section: 09.07*  
*Topic: Meiosis*

102. Fertilization produces

- A. eggs.
- B.** zygotes.
- C. haploid cells.
- D. gametes.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #102*  
*Learning Outcome: Explain the differences between asexual and sexual reproduction.*  
*Section: 09.07*  
*Topic: Meiosis*

103. Nondisjunction in humans can result in a person with

- A. twenty-two pairs of autosomes, an X chromosome, and a Y chromosome.
- B. twenty-two pairs of autosomes and two X chromosomes.
- C.** forty-seven chromosomes.
- D. forty-six chromosomes.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #103*  
*Learning Outcome: Explain how nondisjunction can result in loss of genetic material or the gain of genetic material.*  
*Section: 09.10*  
*Topic: Meiosis*

104. \_\_\_\_ during prophase of prophase I.

- A. Chromosomes become visible
- B.** Chromosomes synapse and cross-over
- C. Chromosomes separate
- D. DNA replication occurs

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #104*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.08*  
*Topic: Meiosis*

105. A zygote

- A. is haploid.
- B. contains all of the genes from each parent.
- C. is formed by meiosis.
- D.** is genetically different from either parent.

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #105*  
*Learning Outcome: Explain the differences between asexual and sexual reproduction.*  
*Section: 09.07*  
*Topic: Meiosis*

106. During which of the following stages of meiosis is the cell haploid?

- A. prophase I
- B.** anaphase II
- C. metaphase I
- D. anaphase I

*Blooms Level: 1. Remember*  
*Enger - Chapter 09 #106*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Section: 09.08*  
*Topic: Meiosis*

107. If in male fruit flies, crossing-over does not occur during meiosis, while in females crossing-over does occur

- A.** there is less genetic variety among sperm than among eggs.
- B. fewer sperm are produced than eggs.
- C. males are not necessary for fertilization in fruit flies.
- D. more female offspring will be produced than male offspring.

*Blooms Level: 2. Understand*  
*Enger - Chapter 09 #107*  
*Learning Outcome: Describe how sexual reproduction increases genetic diversity through crossing over.*  
*Section: 09.09*  
*Topic: Meiosis*

108. During which of the following stages of meiosis does the cell contain the LEAST amount of DNA?

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

*Blooms Level: 2. Understand*  
*Enger - Chapter 09 #108*  
*Learning Outcome: Describe the events that uniquely define each stage.*  
*Learning Outcome: List the stages of meiosis in their proper order.*

Section: 09.08  
Topic: Meiosis

109. Which of the following is necessary before any of the other events can occur?

- A. independent assortment
- B. segregation
- C. haploid cells
- D. pairing of homologous chromosomes**

Blooms Level: 2. Understand  
Enger - Chapter 09 #109  
Learning Outcome: List the stages of meiosis in their proper order.  
Section: 09.08  
Topic: Meiosis

110. During which of the following stages of meiosis is the cell diploid?

- A. metaphase II
- B. anaphase II
- C. metaphase I**
- D. prophase II

Blooms Level: 1. Remember  
Enger - Chapter 09 #110  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis

111. During which of the following stages of meiosis does the cell contain the greatest amount of DNA?

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

Blooms Level: 3. Apply  
Enger - Chapter 09 #111  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis

112. Which of the following does NOT occur during prophase I of meiosis?

- A. synapsis
- B. crossing-over
- C. independent assortment**
- D. nuclear membrane disappears

Blooms Level: 1. Remember  
Enger - Chapter 09 #112  
Learning Outcome: Describe the events that uniquely define each stage.  
Learning Outcome: List the stages of meiosis in their proper order.  
Section: 09.08  
Topic: Meiosis

113. Which one of the following is typical of meiosis? All the cells produced

- A. are identical.
- B. contain more genes than the parent cells.
- C. are haploid.**
- D. have undergone nondisjunction.

Blooms Level: 2. Understand  
Enger - Chapter 09 #113  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis

114. During anaphase I of meiosis

- A. crossing-over occurs.
- B. homologous chromosomes pair up.
- C. mutations are common.
- D. segregation of alleles occurs.**

Blooms Level: 1. Remember  
Enger - Chapter 09 #114  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis

115. In which of the following ways does an anaphase I cell differ from an anaphase II cell?

- A. Anaphase I cells have fewer chromosomes than Anaphase II cells.
- B. Anaphase I cells lack a nuclear membrane; anaphase II cells have a nuclear membrane.
- C. Anaphase I cells are capable of fertilization and anaphase II cells are not.
- D. Anaphase I cells have chromosomes separating; anaphase II cells have chromatids separating.**

Blooms Level: 2. Understand  
Enger - Chapter 09 #115  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis

116. In which of the following ways does a telophase I cell differ from a telophase II cell?

- A. Telophase I cells have fewer chromosomes than telophase II cells.
- B. Telophase I cells lack a nuclear membrane; telophase II cells have a nuclear membrane.
- C. Telophase I cells are capable of fertilization and telophase II cells are not.

**D.** Telophase I cells have chromosomes consisting of two chromatids; telophase II cells only have chromatids.

*Blooms Level: 2. Understand  
Enger - Chapter 09 #116  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

117. Which of the following represents normal fertilization in humans?

- A.  $2n + 2n = 4n$
- B.  $n + 2n = 2n$
- C.**  $n + n = 2n$
- D.  $2n = n$

*Blooms Level: 2. Understand  
Enger - Chapter 09 #117  
Learning Outcome: Explain the differences between asexual and sexual reproduction.  
Section: 09.07  
Topic: Meiosis*

118. Meiosis is necessary if

- A.** the chromosome number of a sexually reproducing species is to remain the same generation after generation.
- B. life is to continue on the planet.
- C. all organisms of a species are to remain the same.
- D. mutations are to be stopped.

*Blooms Level: 2. Understand  
Enger - Chapter 09 #118  
Learning Outcome: Describe the events that uniquely define each stage.  
Learning Outcome: List the stages of meiosis in their proper order.  
Section: 09.08  
Topic: Meiosis*

119. If an organism proceeds through meiosis and produces sex cells with 32 chromosomes (e.g., a horse), the cells of the horse's brain will each contain \_\_\_\_\_ chromosomes.

- A. 32
- B. 16
- C.** 64
- D. 12

*Blooms Level: 2. Understand  
Enger - Chapter 09 #119  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

120. If a body cell has 8 chromosomes (e.g., fruit fly), how many pairs will form during Prophase II?

- A.** 4
- B. 8
- C. 2
- D. None of these is correct.

*Blooms Level: 2. Understand  
Enger - Chapter 09 #120  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

121. "She looks a little like her dad and a little like her mom." This may have resulted from

- A. crossing-over.
- B. genetic recombination.
- C. independent assortment.
- D.** All are possible.

*Blooms Level: 2. Understand  
Enger - Chapter 09 #121  
Learning Outcome: Describe how sexual reproduction increases genetic diversity.  
Section: 09.09  
Topic: Meiosis*

122. "Boy! You can line up all these homologous pairs of chromosomes in a lot of different ways!" This process is referred to as

- A. segregation.
- B. synapse.
- C.** independent assortment.
- D. crossing-over.

*Blooms Level: 2. Understand  
Enger - Chapter 09 #122  
Learning Outcome: Describe how sexual reproduction increases genetic diversity.  
Section: 09.09  
Topic: Meiosis*

123. "She got some chromosomes from her grandfather and some from her grandmother." This is best explained by

- A.** independent assortment.
- B. cross-over.
- C. mitosis.
- D. linked genes.

*Blooms Level: 2. Understand  
Enger - Chapter 09 #123  
Learning Outcome: Describe how sexual reproduction increases genetic diversity.  
Section: 09.09  
Topic: Meiosis*

124. Segregation is a source of variety in gametogenesis because

- A.** it is during segregation that chromosomes from the parents are separated at random into the gametes.
- B. crossing-over during segregation mixes genes from the parents into the offspring.
- C. all the genes from one parent are separated from the other parents.
- D. new gene combinations are formed by the parent.

*Blooms Level: 2. Understand  
Enger - Chapter 09 #124  
Learning Outcome: Describe how sexual reproduction increases genetic diversity.  
Section: 09.09  
Topic: Meiosis*

125. Nondisjunction in humans can result in

- A. 22 pairs of autosomes, an X chromosome and a Y chromosome.
- B. 22 pairs of autosomes, and two X chromosomes.
- C.** 47 chromosomes.
- D. 46 chromosomes.

*Blooms Level: 4. Analyze  
Enger - Chapter 09 #125  
Learning Outcome: Explain how nondisjunction can result in loss of genetic material or the gain of genetic material.  
Section: 09.10  
Topic: Meiosis*

126. This occurs when there is a problem with controlling how cells divide and replace themselves.

- A. crossing over
- B. nondisjunction
- C.** cancer
- D. death

*Blooms Level: 1. Remember  
Enger - Chapter 09 #126  
Learning Outcome: Describe how cancer is caused by a failure to control cell division.  
Section: 09.05  
Topic: Cell Cycle and Mitosis*

127. Centromeres separate allowing the chromatids to move toward the poles in

- A.** Anaphase II.
- B. Anaphase I.
- C. Prophase I.
- D. Telophase II.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #127  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

128. Homologous chromosomes recognize one another by their centromeres, move through the cell toward one another, and come to lie next to each other in a process called

- A. crossing over.
- B.** synapsis.
- C. differentiation.
- D. trisomy.

*Blooms Level: 1. Remember  
Enger - Chapter 09 #128  
Learning Outcome: Describe the events that uniquely define each stage.  
Section: 09.08  
Topic: Meiosis*

129. Cells are constantly manipulating their DNA and histone proteins to regulate

- A.** gene expression.
- B. mutation formation.
- C. crossing-over.
- D. segregation.

*Blooms Level: 2. Understand  
Enger - Chapter 09 #129  
Learning Outcome: List three important purposes of cell division.  
Section: 09.01  
Section: 09.02  
Section: 09.03  
Topic: Cell Cycle and Mitosis*

130. The difference among cell types is not in the genes they *possess*, but in the genes they *express*, i.e., through epigenetics.

- A. mutate, possess
- B.** possess, express
- C. express, possess
- D. control, express

*Blooms Level: 1. Remember  
Enger - Chapter 09 #130  
Learning Outcome: Describe how cancer is caused by a failure to control cell division.  
Section: 09.05  
Topic: Cell Cycle and Mitosis*

## **9 Summary**

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Learning Outcome: Describe how chemotherapy and radiation can be effective treatments for cancer.	2
Learning Outcome: Describe how sexual reproduction increases genetic diversity through crossing over.	4
Learning Outcome: Describe how sexual reproduction increases genetic diversity through independent assortment.	1
Learning Outcome: Describe how sexual reproduction increases genetic diversity through segregation.	6
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Learning Outcome: Explain how chromosomal abnormalities can result in the loss of genetic material or the gain of genetic material.	2
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