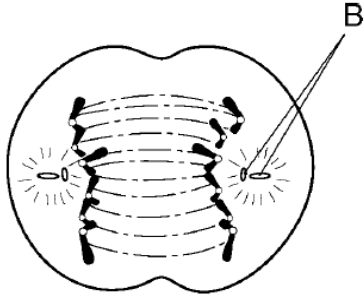


Chapter 8 Practice Test

Mitosis

1

The cell in the diagram below illustrates a stage of mitotic cell division.



Letter *B* indicates the

- A. paired chromosomes
- B. centrioles
- C. cell plate
- D. endoplasmic reticulum

3

Which mitotic event in the chart occurs after the other three events have taken place?

| | |
|----------|--|
| <i>A</i> | Appearance of spindle fibers |
| <i>B</i> | Separation of chromatids by the action of spindle fibers |
| <i>C</i> | Disintegration of the nuclear membrane |
| <i>D</i> | Replication of chromosomes |

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

2

Which two processes are involved in mitotic cell division?

- A. nuclear duplication and cytoplasmic division
- B. nuclear duplication and cytoplasmic duplication
- C. spermatogenesis and cytoplasmic duplication
- D. oogenesis and cytoplasmic division

4

The phrases below describe several events that occur during the process of mitosis.

- A) attachment of double-stranded chromosomes to the spindle apparatus
- B) formation of single-stranded chromosomes, which are moved to opposite ends of the cell
- C) disintegration of the nuclear membrane
- D) nuclear membrane formation around each set of chromosomes, forming two nuclei
- E) synthesis of a spindle apparatus

Which sequence represents the correct order of these events?

- A. $A \rightarrow B \rightarrow C \rightarrow D \rightarrow E$
- B. $B \rightarrow D \rightarrow A \rightarrow C \rightarrow E$
- C. $A \rightarrow D \rightarrow E \rightarrow B \rightarrow C$
- D. $C \rightarrow E \rightarrow A \rightarrow B \rightarrow D$

5

A student using a compound light microscope is observing cells undergoing mitotic cell division. If the cells are from a bean plant, which process could the student observe?

- A. the formation of a cell plate between two new cells
- B. the replication of centrioles
- C. a pinching-in of the cell membrane to form two cells
- D. the pairing of homologous chromosomes

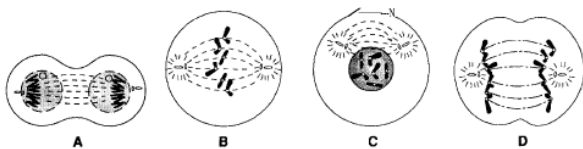
7

The process of mitosis usually involves

- A. chromosome duplication and synapsis
- B. DNA replication and separation of chromatids
- C. tetrad formation and fertilization
- D. reduction in chromosome number and formation of cell plate

9

The diagrams shown represent stages of a cellular process. Which is the correct sequence of these stages?



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

6

What would most likely result if mitosis was *not* accompanied by cytoplasmic division?

- A. two cells, each with one nucleus
- B. two cells, each without a nucleus
- C. one cell with two identical nuclei
- D. one cell without a nucleus

8

What is one difference between mitotic cell division in plants and mitotic cell division in animals?

- A. Chromosomes are replicated in plants but not in animals.
- B. The replicated chromosomes separate in plants but not in animals.
- C. A cell plate divides the cytoplasm in plants but not in animals.
- D. The nuclear membrane reforms in plants but not in animals.

10

In the diagrams of mitotic cell division shown, which structure is present in diagram B but *not* in diagram A?



- A. centriole
- B. cell plate
- C. cell membrane
- D. cytoplasm

11

How many chromosomes will be found in each of the two new cells formed as a result of mitotic cell division?

- A. only one-half as many chromosomes as the parent cell
- B. twice as many chromosomes as the parent cell
- C. three times as many chromosomes as the parent cell
- D. the same number of chromosomes as the parent cell

13

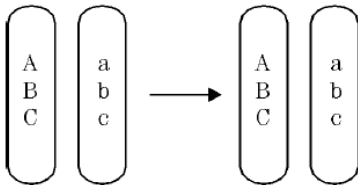
The diagram shown represents a microscopic structure observed during the process of cell division. Letter *B* indicates a

- A. centrosome
- B. spindle fiber
- C. chromatid
- D. cell plate



15. Occurs in meiosis- not mitosis

Which process, occurring during synapsis, would result in the chromosomal changes illustrated in the diagram.



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

12

Which is a characteristic of the group of diseases known as cancer?

- A. uncontrolled cell division
- B. the formation of only monoploid cells
- C. meiotic cell division in body cells
- D. the rapid formation of zygotes

14

The diploid chromosome number in a certain species of fish is 20. How many chromosomes would normally be found in bone cell of this fish?

- A. 10
- B. 20
- C. 23
- D. 40

16

If the diploid chromosome number of a cloned plant is 12, the chromosome number of the plant cell used to produce the cloned plant is

- A. 3
- B. 6
- C. 12
- D. 24

Meiosis

1. Sexual reproduction requires more energy and resource, what's the advantage then?

- a. It increases genetic diversity.
- b. It can help prevent disease epidemics.
- c. It can help us cope with environmental changes.
- d. All of the above.

2. A diploid female lizard produces diploid offspring that are genetically identical to herself. This type of reproduction requires:

- a. Meiosis.
- b. Mitosis.
- c. Mitosis, then meiosis.
- d. None of the above.

3. Chromosome A contains genes for an eye color of hazel. Chromosome B contains genes for hair color of hazel, and chromosome C contains genes for an eye color of blue.

- a. Chromosomes A and B are homologous
- b. Chromosomes B and C are homologous
- c. Chromosomes A and C are homologous
- d. None of the chromosomes are homologous to one another

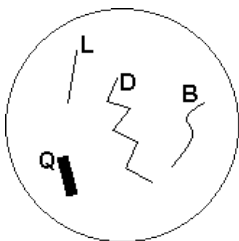
4. skip

5. Suppose that a cell is unable to replicate its DNA. Which of the following would NOT be present in this cell?

- a. sister chromatids
- b. centromere
- c. DNA
- d. genes
- e. homologous chromosomes

6. True/False: If a parent cell contained 30 chromosomes, its daughter cells would contain 15 following mitosis.

7. True/False: The cell below is diploid.



8. If a normal diploid cell has 8 chromosomes, then

- a. there are 8 homologous pairs of chromosomes per diploid cell
- b. there are 8 chromatids per diploid cell between S phase and the first division of meiosis
- c. there are 4 chromosomes per cell after meiosis I
- d. sperm cells made from this diploid cell would have 8 chromosomes

9. During meiosis, chromosome number

- a. Doubles from the original cell, then divides in four for each daughter cell.
- b. Divides in four for each daughter cell.
- c. Doubles, then divides in half.
- d. Divides in half.
- e. Doubles.

10. During meiosis I,

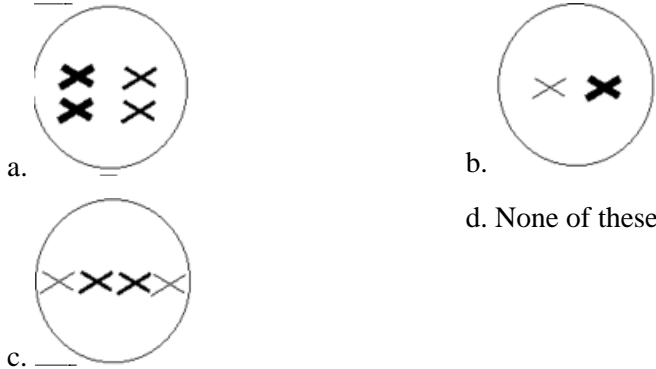
- a. Homologous chromosomes separate.
- b. Each sister chromatid becomes a chromosome.
- c. Sister chromatids separate.
- d. 4 daughter cells are formed from a single original cell.
- e. Two of the above.

11. The main difference between meiosis and mitosis is that

- a. DNA replicates during mitosis, but does not during meiosis.
- b. During mitosis, sister chromatids separate; they do not during meiosis.
- c. Mitosis makes genetically identical copies; meiosis does not.
- d. Mitosis increases chromosome number in each cell, while meiosis decreases it.
- e. None of the above.

12. True/False: A diploid parent cell is haploid after telophase I.

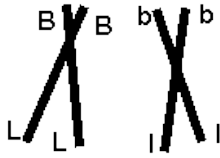
13. Which of these cells is shown during metaphase I of meiosis?



14. A cell has 40 chromosomes during G1 phase. How many sister chromatids does that cell have during prophase I of meiosis?

- a. 10
- b. 20
- c. 40
- d. 80

15. A cell has these chromosomes:



If crossing-over occurs between one chromatid of each chromosome, what gametes would be produced?

- a. BL, bl
- b. BBLL, bbl
- c. BL, Bl, bL, bl
- d. BbLl

16. **True/False:** Random alignment results in chromosomes that have different combinations of alleles than they had before.

17. If the sperm of an animal contains 5 chromosomes, which of the following is true?

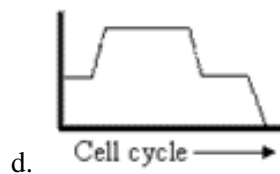
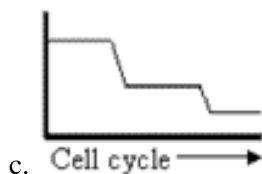
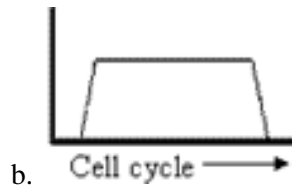
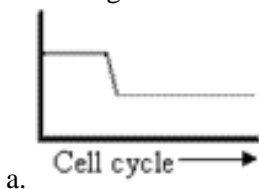
- a. The animal normally has 5 chromosomes in its body cells.
- b. Each sperm cell contains 10 sister chromatids.
- c. The animal's cells normally contain 10 homologous chromosome pairs.
- d. There are 20 sister chromatids per cell in G2 phase.

18. During meiosis, when does crossing over occur?

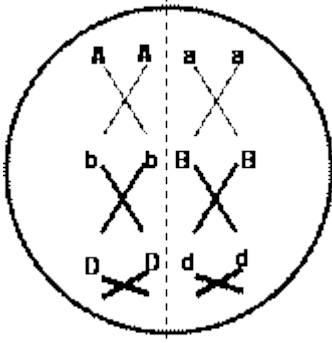
- a. Prophase I
- b. Anaphase I
- c. Prophase II
- d. Anaphase II

19. **True/False:** Many eggs from the same human woman will be genetically identical to each other.

20. Which of the graphs below best depicts change in chromosome number through the cell cycle, beginning at G1 and ending after meiosis?



21. The cell below is in metaphase I of meiosis. There is no crossing over. When this cell fully completes meiosis, what gametes will be formed?



- a. AAAbbDD, aaBBdd
- b. AaBbDd only
- c. ABD, abd
- d. AbD, aBd

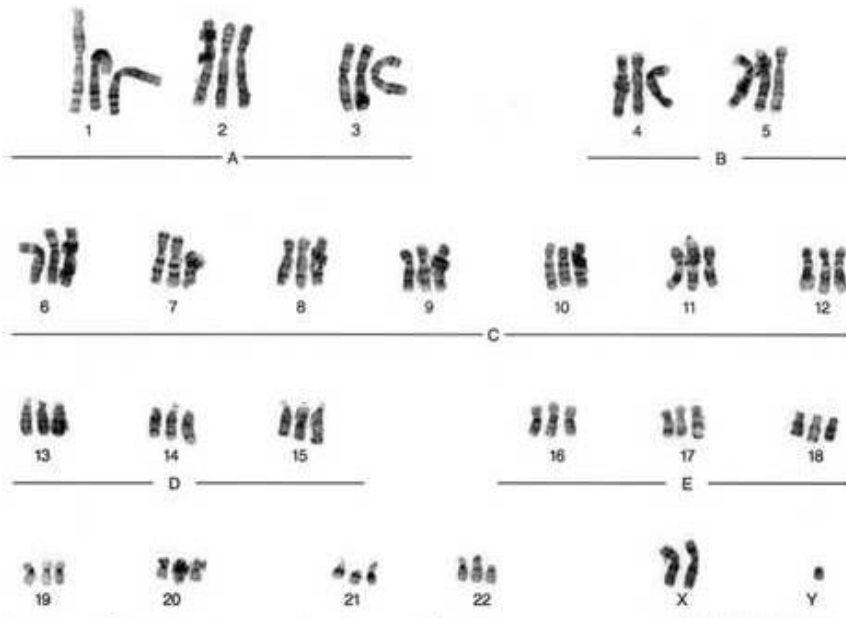
22. Which of the following happens during both meiosis and mitosis?

- a. Crossing over
- b. Random alignment of homologous chromosomes
- c. Sister chromatids separate
- d. Homologous chromosomes separate

Karyotypes

Answer the following questions based on the following karyotype either true or false.

Human Karyotype #1 (questions #1-6)



1. There are 46 chromosomes in this karyotype.

2. This a male child.

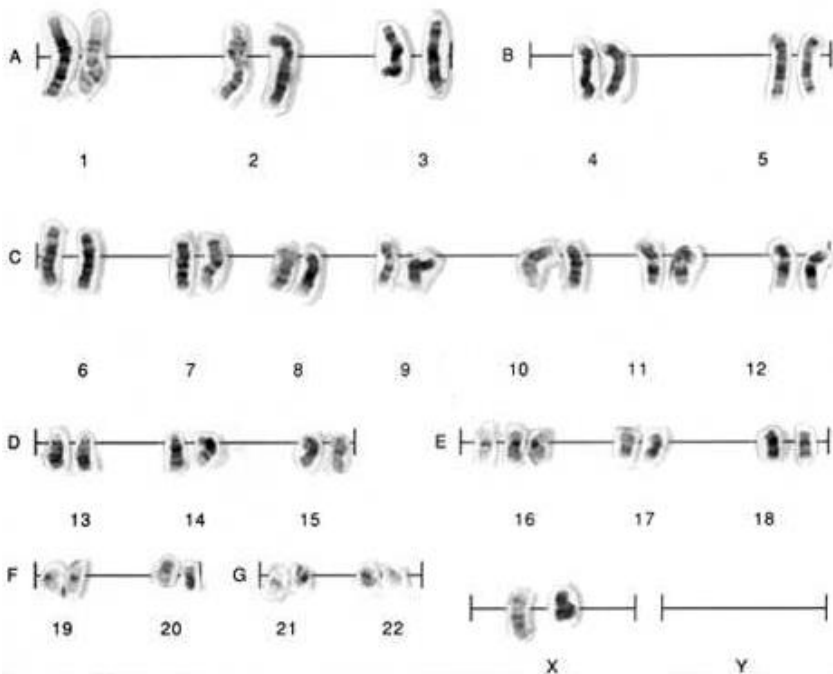
3. There are multiple trisomies in this individual.

4. This karyotype resulted from nondisjunction of an entire cell.

5. The haploid number of this person is 34 or 35.

6. This individual may have been miscarried.

Human Karyotype #2 (Questions #7-12)



7. The diploid number is 46.

8. The haploid number is 23 only.

9. There are 23 homologous pairs of chromosomes.

10. There are no trisomies in this karyotype.

11. The sex is male for this person.

12. This person may experience birth defects.

ANSWERS

| | |
|--|---|
| <p>Mitosis</p> <ol style="list-style-type: none"> 1.B 2.A 3.B 4.D 5.A 6.C 7.B 8.C 9.C 10.B 11.D 12.A 13.C 14.B 15.B 16.C | <p>Karyotypes</p> <ol style="list-style-type: none"> 1. False- 69 chromosomes 2. True 3. True 4. True 5. True 6. True 7. False- 47 8. False- 23 or 24 9. False-22, #16 is a trisomy 10. False- #16 11. False- female 12. True |
|--|---|

Meiosis

1. D
2. B – mitosis makes genetically identical cells.
3. C – both chromosomes A and C contain genes for eye color – they are homologous.
4. False – meiosis II and mitosis are most similar, because sister chromatids separate.
5. A – replication results in sister chromatids. Homologous chromosomes would still be present, just like right now every non-replicating cell in your body has 23 pairs.
6. False – mitosis results in identical daughter cells, so chromosome number would stay the same.
7. False – the cell is haploid, because it contains only 1 of each kind of chromosome. It is also not replicated (no sister chromatids).
8. C – Meiosis I divides chromosome number in half.
9. D
10. A
11. C – all of the rest of the characteristics are either the same between the 2 processes (A and B) or false (D).
12. True – Meiosis I reduces chromosome number in half. It stays the same through Meiosis II.
13. A – homologous chromosomes are lined up across from each other. Option B is metaphase II for a diploid organism, or mitosis for a haploid organism. Option C is mitosis for a diploid organism.
14. D – G1 phase is prior to replication. During prophase I, all chromosomes are composed of 2 sister chromatids and we have not yet divided the genetic material, so the correct answer is 40 chromosomes x 2 chromatids/chromosome = 80 chromatids.
15. C - All possible combinations would be possible – in order to see this, draw the crossed-over chromosomes.
16. False – Crossing over results in chromosomes with different combinations of alleles. Random alignment just mixes whole chromosomes, but doesn't mess with the genes on the chromosomes.
17. D – if sperm, which is a product of meiosis, contains 5 chromosomes, the normal animal cell contains 10 chromosomes. This means that there are 20 sister chromatids at G2.
18. A
19. False – meiosis generates genetic diversity
20. A – meiosis must decrease chromosome number in half. It does this once at Anaphase I.
21. D
22. C – during meiosis II.

