

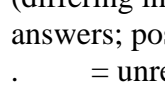
Part I – Multiple choice – 1 pt. each.

1. Which of the following does not occur during prophase? A) spindle forms
B) chromosomes uncoil C) nuclear membrane disappears D) all of the above
E) none of the above
2. How many chromatids would you expect to find in a cell whose diploid parent number of chromosomes is 20 when it is in prophase I of meiosis? A) 0 B) 5
C) 10 D) 20 E) 40
3. The 2 different alleles in a heterozygote: A) are synonymous for genes
B) are linked C) are inherited from the same parent D) are located at the same points on two homologs E) none of the above
4. If crossing-over (recombination) occurs in meiosis, then: A) homologs will be genetically identical B) non-homologs will be genetically identical
C) two attached chromatids will be genetically identical D) all of the above
E) none of the above
5. Following replication, all other materials needed for mitosis are synthesized in: A) prophase B) the S stage C) the G1 stage D) telophase E) the G2 stage
6. A cell plate can be found in: A) prophase in all cells B) telophase in plant cells
C) telophase in animal cells D) prophase I of meiosis E) interphase during the S stage

In questions 7-9, use these choices: A) leptotene B) diakinesis C) pachytene
D) zygotene E) diplotene

7. _____ Stage in which homologs break synapsis and separate
8. _____ Chronologically, the latest of the stages
9. _____ Stage at which synapsis begins
10. All of the above stages occur in _____ of meiosis: A) prophase II
B) prophase I C) prometaphase I D) interphase I E) anaphase I
11. A parent has the genotype AaBBCC. How many different types of gametes could it form, assuming that all 3 genes are independent? A) 1 B) 2 C) 3 D) 4
E) 6 F) 8

12. Using the choices in question 11, how many types of gametes could the parent form if all 3 genes were linked? _____
13. White rats are crossed with black rats. Half of the offspring have black hair. Which trait is recessive? A) white B) black C) they are codominant D) there is not enough information given to answer the question
14. Hemophilia is sex-linked and recessive. If a hemophiliac woman marries a normal man, what percentage of their daughters would you expect to be hemophiliacs? A) 100 B) 75 C) 50 E) 25 F) 0
15. The law of independent assortment is true: A) only if genes are linked B) only if genes are unlinked C) only if genes are sex-linked D) in all typical crosses

In questions 16 through 21, use the following diagrams as your choices. Each shows chromosomes in a cell; the parent cell is diploid with two pairs of homologs (differing in length). Use chromosome number and replication state for your answers; position in the cell is unimportant.

 = replicated chromosome.
 . = unreplicated.

16. _____ shows a cell in prophase II of meiosis
17. _____ shows an offspring cell after the completion of meiosis I
18. _____ shows a cell in anaphase of meiosis
19. _____ shows a cell in prometaphase of mitosis
20. _____ shows an offspring cell after completion of mitosis
21. _____ shows an offspring cell after completion of meiosis II

In questions 22 through 27, use the following choices: A) interphase B) metaphase
C) anaphase D) prometaphase E) telophase F) prophase G) none of the
above

22. _____ Phase in which nuclear membranes break down
23. _____ Phase in which centromeres split
24. _____ Phase in which chromosomes approach center of the spindle.
25. _____ Phase in which segregation of chromosomes occurs
26. _____ Phase in which cytokinesis occurs
27. _____ Phase in which a non-reproductive cell exists

Part II – Fill-in – 1 pt. each blank.

1. A mitotic spindle is an array of _____ in a reproducing cell. many cells, there will be _____ at either end of the spindle.
2. Chromosomes other than sex chromosomes are called _____.
3. In a test cross, the genotype of one parent is unknown. The genotype of the other parent is _____. Then if all of the offspring have the same phenotype, the unknown parent was _____.
4. All phenotypic traits develop under the influence of both an organism's _____ and its _____.
5. If we do a classical monohybrid cross and then we switch the phenotypes of the sexes and do the cross again, we are doing a(n) _____ cross. If the results of the 2 crosses differ from each other, then the gene in question is _____.

Part III – True-false – 1 pt. each.

1. If intelligence were due to a sex-linked recessive allele, then there would be more intelligent women than men.
2. Recessive phenotypes are always less common than dominant phenotypes in a population of organisms.
3. A man with blood type AB cannot be the father of a child with blood type O.

4. We cross two parents with the same phenotype, and 75% of the offspring show that same phenotype. The parents must both have been heterozygotes.
5. Barring rare mutations, we would expect two attached chromatids in a mitotic cell to be genetically identical to each other.
6. The X-chromosome contains only genes that influence sexual characteristics in an organism.

Part IV – Short answer – pts as indicated.

1. Define: (3 pts each)
 - A. haplodoploidy

 - B. incomplete dominance

 - C. homozygous

 - D. pleiotropy

2. What is the law of independent assortment? Under what conditions is it true? (8 pts)

3. Distinguish between continuous and discrete traits. (8 pts)

3. We grow tomatoes considering two phenotypic traits—stem color and leaf margin. Purple stem is dominant to green, and cut leaf is dominant to entire. We do a test cross to a purple, cut plant and get the following offspring phenotypes:

110 purple, cut
90 green, cut

What is the genotype of both parent plants? (10 pts)
