

Name: _____

CIBI3031-070

Midterm Examination III

November 2005

Multiple Choice

In each blank, identify the letter of the choice that best completes the statement or answers the question.

- _____ 1. If a parent cell has 16 chromosomes, how many sister chromatids will be present after duplication of the chromosomes?
 - a. 64
 - b. 32
 - c. 16
- _____ 2. Chromosomes other than those involved in sex determination are known as
 - a. alleles.
 - b. autosomes.
 - c. chromatids.
- _____ 3. In eukaryotic cells, which can occur during the stages of mitosis?
 - a. the replication of DNA
 - b. fragmentation and disappearance of the nuclear envelope
 - c. both of these
- _____ 4. Sex chromosomes
 - a. determine gender.
 - b. carry some genes that have nothing to do with sex.
 - c. both of these
- _____ 5. Which of the following designates a normal human male?
 - a. XX
 - b. YY
 - c. XY
- _____ 6. If R is dominant to r , the offspring of the cross of RR with rr will
 - a. display the same phenotype as the rr parent.
 - b. display the same phenotype as the RR parent.
 - c. have the same genotype as the RR parent.
- _____ 7. Genes that are located on the same chromosome
 - a. will be separated during gamete formation.
 - b. tend to be inherited together.
 - c. both of these
- _____ 8. Which of the following designates a normal human female?
 - a. XX
 - b. XO
 - c. XY
- _____ 9. Hybrid organisms produced from a cross between two pure-breeding organisms belong to which generation?
 - a. P_1
 - b. A_1
 - c. F_1
- _____ 10. If alleles L , M , and N are on the maternal chromosome and l , m , and n are on the paternal chromosome, the only way that a gamete from a heterozygote will produce a gamete with alleles l , m , and N is through
 - a. the law of independent assortment.
 - b. crossing over.
 - c. nondisjunction.

- _____ 11. An organism with genotype $AaBb$ is
- homozygous dominant.
 - heterozygous.
 - homozygous recessive.
- _____ 12. The ABO blood types have _____ different genotypes.
- 6
 - 4
 - 8
- _____ 13. Sexual reproduction
- produces genetic clones.
 - leads to uniform characteristics in a population.
 - results in new combinations of genetic traits.
- _____ 14. If short hair (S) is dominant to long hair (s), then what fraction of the offspring produced by a cross of $Ss \times ss$ will be homozygous dominant?
- none (no chance of this offspring)
 - $1/4$
 - $1/2$
- _____ 15. If two genes are almost always found in the same gamete,
- they are located far apart on the same chromosome.
 - they are located on nonhomologous chromosomes.
 - they are located close together on the same chromosome.
- _____ 16. When a cell undergoes mitosis,
- the daughter cells have identical genes.
 - the daughter cells have genes identical to those of the mother cell that produced them.
 - both of these
- _____ 17. In comparing mitosis and meiosis, which of the following statements is true?
- Crossing over occurs in both.
 - Meiosis II resembles mitosis.
 - Both processes result in four cells.
- _____ 18. Different, or alternative, forms of the same gene are called
- chromatids.
 - alleles.
 - genetomorphs.
- _____ 19. Through meiosis,
- the diploid chromosome number is reduced to haploid.
 - parental DNA is divided and distributed to forming gametes.
 - both of these
- _____ 20. Which is NOT a typical site for the occurrence of meiosis?
- plant ovary
 - human nose cells
 - human testis
- _____ 21. According to Mendel, what kind of alleles are masked, or "disappear," in F_1 pea plants?
- dominant
 - recessive
 - codominant
- _____ 22. The spindle apparatus is made of
- Golgi bodies.
 - microtubules.
 - endoplasmic reticulum.

- _____ 23. Which of the following is NOT associated with meiosis?
- sperm and egg
 - somatic cells
 - reduction of the chromosome number
- _____ 24. If a daughter expresses an X-linked recessive gene, she inherited the trait from
- her mother.
 - both parents.
 - her father.
- _____ 25. If two genes are on the same chromosome,
- they are in the same linkage group.
 - they assort independently.
 - crossing over occurs frequently.
- _____ 26. When chromosomes become visible during prophase of mitosis, it is the result of
- addition of proteins to the DNA.
 - DNA replication.
 - condensation of DNA and associated proteins.
- _____ 27. If ALL offspring of a cross have the genotype Aa , the parents of the crosses are most likely
- $Aa \times aa$.
 - $AA \times aa$.
 - $Aa \times Aa$.
- _____ 28. The chromatids separate from one another and become individual chromosomes during
- metaphase.
 - prophase.
 - anaphase.
- _____ 29. Mendel found that pea plants expressing a recessive trait
- were pure-breeding.
 - appeared only in the first generation offspring of a cross between two pure-breeding plants expressing contrasting forms of a trait.
 - both of these
- _____ 30. In mitosis, if a parent cell has 16 chromosomes, each daughter cell will have how many chromosomes?
- 16
 - 32
 - 8
- _____ 31. Sister chromatids are separated from each other during
- metaphase I.
 - anaphase II.
 - metaphase II.
- _____ 32. Which of the following is NOT true of human chromosomes?
- Human gametes have two of each type of 23 chromosomes.
 - The haploid number is 23.
 - Human gametes have one of each type of 23 chromosomes.
- _____ 33. If a child has an AB blood type, the parents
- can have different blood types, but neither can be blood type O.
 - must be A and B, but not AB.
 - must both be AB.
- _____ 34. Crossing over is one of the most important events in meiosis because
- it produces new combinations of alleles on chromosomes.
 - homologous chromosomes must be separated into different daughter cells.
 - the number of chromosomes allotted to each daughter cell must be halved.

- ___ 35. The chromosomes are aligned at the spindle equator during
- interphase.
 - metaphase.
 - anaphase.
- ___ 36. The number of different alleles for ABO blood types in the total human population is
- 4.
 - 9.
 - 3.
- ___ 37. The chromosomes have arrived at opposite poles during
- anaphase.
 - telophase.
 - metaphase.
- ___ 38. Homologous chromosomes
- have alleles for the same characteristics even though the gene expression may not be the same.
 - are derived only from the maternal parent.
 - both of these
- ___ 39. The chromosomes and genes are actually replicated during
- metaphase.
 - anaphase.
 - interphase.
- ___ 40. Which of the following genotypes is homozygous?
- aABB*
 - aaBB*
 - AaBB*
- ___ 41. Gene *A* is on chromosome #5, gene *B* is on chromosome #21. Therefore, these two parts of the chromosomes CANNOT be
- dominant.
 - recessive.
 - alleles.
- ___ 42. If tall (*T*) is dominant to dwarf (*t*), and two homozygous varieties *TT* and *tt* are crossed, then what kind of offspring will be produced?
- all dwarf
 - all tall
 - 1/2 tall, 1/2 dwarf
- ___ 43. The chromosomes are moving to opposite poles during
- metaphase.
 - anaphase.
 - interphase.
- ___ 44. Meiosis typically results in the production of
- four diploid cells.
 - four haploid cells.
 - two diploid cells.
- ___ 45. Which of the following does NOT produce variation?
- asexual reproduction
 - crossing over
 - random alignment of chromosomes during meiosis
- ___ 46. Which of the following events occurs in prophase I but does NOT occur in prophase II?
- spindle formation
 - crossing over
 - both of these

- _____ 47. Genetic recombination as a result of crossing over occurs more often in genes
- that are located on different chromosomes.
 - that are located close together on the same chromosome.
 - that are located far apart on the same chromosome.
- _____ 48. Red-green color blindness is an X-linked recessive trait in humans. A color-blind woman and a man with normal vision have a son. What is the probability that the son is color blind?
- 75 percent
 - 100 percent
 - 50 percent
- _____ 49. Which of the following statements is FALSE?
- Crossing over leads to variation.
 - The closer together genes are found on a chromosome the greater is the chance that crossing over will occur between them.
 - Independent assortment of homologous chromosomes during meiosis increases variation.
- _____ 50. Crossing over occurs during
- metaphase II.
 - prophase I.
 - anaphase I.

Extra Credit Problem

(2 points)

51. If a father and a son are both red-green color blind (an X-linked recessive trait) and the mother is normal, is it likely that the son inherited color blindness from his father?
- (a) **Yes** or **No** (*circle one*).
- (b) Explain your answer.

CIBI3031-070
Answer Section

Midterm Examination III

November 2005

MULTIPLE CHOICE

1. ANS: B DIF: Easy
TOP: DIVIDING CELLS: THE BRIDGE BETWEEN GENERATIONS
2. ANS: B DIF: Easy TOP: CHROMOSOMES AND INHERITANCE
3. ANS: B DIF: Moderate TOP: MITOSIS
4. ANS: C DIF: Easy TOP: CHROMOSOMES AND INHERITANCE
5. ANS: C DIF: Easy
TOP: CASE STUDIES: CHANGES IN THE NUMBER OF SEX CHROMOSOMES
6. ANS: B DIF: Moderate TOP: MENDEL'S THEORY OF SEGREGATION
7. ANS: B DIF: Moderate
TOP: WHAT MENDEL DIDN'T KNOW: CHROMOSOMES AND RECOMBINATIONS
8. ANS: A DIF: Easy
TOP: CASE STUDIES: CHANGES IN THE NUMBER OF SEX CHROMOSOMES
9. ANS: C DIF: Moderate
TOP: MENDEL'S INSIGHT INTO INHERITANCE PATTERNS
10. ANS: B DIF: Difficult
TOP: WHAT MENDEL DIDN'T KNOW: CHROMOSOMES AND RECOMBINATIONS
11. ANS: B DIF: Moderate
TOP: MENDEL'S INSIGHT INTO INHERITANCE PATTERNS
12. ANS: DIF: Difficult TOP: DOMINANCE RELATIONS
13. ANS: C DIF: Moderate
TOP: COMPARING SEXUAL WITH ASEQUAL REPRODUCTION
14. ANS: DIF: Easy TOP: MENDEL'S THEORY OF SEGREGATION
15. ANS: C DIF: Moderate
TOP: WHAT MENDEL DIDN'T KNOW: CHROMOSOMES AND RECOMBINATIONS
16. ANS: C DIF: Moderate
TOP: DIVIDING CELLS: THE BRIDGE BETWEEN GENERATIONS
17. ANS: B DIF: Difficult TOP: MEIOSIS AND MITOSIS COMPARED
18. ANS: B DIF: Moderate
TOP: COMPARING SEXUAL WITH ASEQUAL REPRODUCTION
19. ANS: C DIF: Moderate
TOP: COMPARING SEXUAL WITH ASEQUAL REPRODUCTION
20. ANS: B DIF: Easy
TOP: COMPARING SEXUAL WITH ASEQUAL REPRODUCTION
21. ANS: B DIF: Moderate TOP: MENDEL'S THEORY OF SEGREGATION
22. ANS: B DIF: Easy TOP: MITOSIS
23. ANS: B DIF: Moderate
TOP: DIVIDING CELLS: THE BRIDGE BETWEEN GENERATIONS
24. ANS: B DIF: Moderate TOP: EXAMPLES OF INHERITANCE PATTERNS
25. ANS: DIF: Easy
TOP: WHAT MENDEL DIDN'T KNOW: CHROMOSOMES AND RECOMBINATIONS
26. ANS: C DIF: Easy
TOP: DIVIDING CELLS: THE BRIDGE BETWEEN GENERATIONS
27. ANS: B DIF: Moderate TOP: MENDEL'S THEORY OF SEGREGATION

28. ANS: C DIF: Moderate TOP: MITOSIS
29. ANS: DIF: Difficult
TOP: MENDEL'S INSIGHT INTO INHERITANCE PATTERNS
30. ANS: DIF: Easy
TOP: DIVIDING CELLS: THE BRIDGE BETWEEN GENERATIONS
31. ANS: B DIF: Moderate
TOP: HOW MEIOSIS HALVES THE CHROMOSOME NUMBER
32. ANS: DIF: Difficult TOP: FROM GAMETES TO OFFSPRING
33. ANS: DIF: Moderate TOP: DOMINANCE RELATIONS
34. ANS: DIF: Difficult
TOP: A CLOSER LOOK AT KEY EVENTS OF MEIOSIS I
35. ANS: B DIF: Easy TOP: MITOSIS
36. ANS: C DIF: Difficult TOP: DOMINANCE RELATIONS
37. ANS: B DIF: Easy TOP: MITOSIS
38. ANS: DIF: Moderate
TOP: HOW MEIOSIS HALVES THE CHROMOSOME NUMBER
39. ANS: C DIF: Easy TOP: THE CELL CYCLE
40. ANS: B DIF: Easy
TOP: MENDEL'S INSIGHT INTO INHERITANCE PATTERNS
41. ANS: C DIF: Difficult
TOP: MENDEL'S INSIGHT INTO INHERITANCE PATTERNS
42. ANS: B DIF: Moderate TOP: MENDEL'S THEORY OF SEGREGATION
43. ANS: B DIF: Easy TOP: MITOSIS
44. ANS: B DIF: Moderate TOP: FROM GAMETES TO OFFSPRING
45. ANS: DIF: Difficult TOP: MEIOSIS AND MITOSIS COMPARED
46. ANS: B DIF: Moderate
TOP: A CLOSER LOOK AT KEY EVENTS OF MEIOSIS I
47. ANS: C DIF: Moderate
TOP: WHAT MENDEL DIDN'T KNOW: CHROMOSOMES AND RECOMBINATIONS
48. ANS: B DIF: Moderate TOP: EXAMPLES OF INHERITANCE PATTERNS
49. ANS: B DIF: Difficult
TOP: WHAT MENDEL DIDN'T KNOW: CHROMOSOMES AND RECOMBINATIONS
50. ANS: B DIF: Easy
TOP: A CLOSER LOOK AT KEY EVENTS OF MEIOSIS I

PROBLEM

51. ANS:
(a) No.
- (b) Males inherit all X-linked traits from the mother: they must inherit their Y chromosome from their father, so they inherit their only X chromosome (and any X-linked traits) from the mother. See page 205.
- DIF: Difficult