

Chapter 2. Basic Genetics

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ____ 1. When 1,000 donors were tested, 75% were positive for C and 25% were negative for C; the gene frequency of C is:
- a. 10.
 - b. 1.
 - c. 0.5.
 - d. 25.
- ____ 2. All of the following may cause an alteration in DNA, *except*:
- a. ultraviolet light.
 - b. alkylating agents.
 - c. antibodies.
 - d. enzymes.
- ____ 3. How is it genetically possible for a child to type Rh-negative?
- a. Both parents are Dd.
 - b. Both parents are DD.
 - c. Mom is DD and Dad is Dd.
 - d. Sibling is Rh-positive.
- ____ 4. All of the following are included in transcription *except*:
- a. mRNA terminates at the 5' end.
 - b. RNA polymerase II binds to a promoter.
 - c. it proceeds from the 3' end to the 5' end.
 - d. the 5' end is capped with a methyl residue.
- ____ 5. Which of the following best describes the structure of human chromosomes?
- a. Linear strands of DNA wound around histones
 - b. Linear strands of RNA wrapped around histones
 - c. Tertiary structure of DNA wound around histones
 - d. Quaternary structure of DNA wound around histones
- ____ 6. In Mendel's law of separation, the first-filial generation is:
- a. recessive.
 - b. homozygous.
 - c. heterozygous.
 - d. autologous.
- ____ 7. A father carries the Xg^a trait and passes it on to all of his daughters but none of his sons. What type of inheritance does this represent?
- a. Autosomal dominant
 - b. X-linked dominant
 - c. X-linked recessive
 - d. Autosomal recessive
- ____ 8. Methods to isolate intact DNA in order for it to be studied include all of the following *except*:
- a. pH changes.
 - b. enzyme activation.
 - c. detergent lysis.
 - d. heat treatment.
- ____ 9. Point mutations include which of the following?
- a. Substitutions
 - b. Insertions
 - c. Deletions
 - d. Substitutions, insertions, and deletions
- ____ 10. Which of the following best describes the process of mitosis?
- a. Cell division by which only one-half of the daughter cells produced are identical to the parent cell

- b. Cell division of germ cells by which two successive divisions of the nucleus produce cells that contain half the number of chromosomes of somatic cells
 - c. Cell division that produces two daughter cells having the same number of chromosomes as the parent
 - d. Cell division that produces four daughter cells ($4n$)
- _____ 11. All of the following processes occur in replication, *except*:
- a. the two DNA strands separate via helicase.
 - b. DNA polymerase acts on the 5' to 3' parent strand to produce an anticomplementary duplicate strand.
 - c. DNA polymerase acts on the 3' to 5' parent strand to produce an anticomplementary duplicate strand.
 - d. replication of the 3' to 5' parent strand is initiated by the enzyme primase, which anneals to the parent strand.
- _____ 12. Which type of genetic change (mutation) is incapable of reverting back to the original phenotype?
- a. Duplication
 - b. Deletion
 - c. Recombination
 - d. Insertion
- _____ 13. In the MN blood group system, a person who inherits an "M" allele and an "N" allele expresses both M and N antigens on the RBCs. Which of the following is true?
- a. M is dominant to N.
 - b. N is dominant to M.
 - c. M and N are codominant alleles.
 - d. M and N are located on the same chromosome.
- _____ 14. A gene, such as the *O* gene, that produces no detectable product is called:
- a. an amorph.
 - b. a trait.
 - c. an allele.
 - d. recessive.
- _____ 15. What blood group is the best example of codominantly inherited blood group genes?
- a. Rh
 - b. MN
 - c. Lewis
 - d. ABO
- _____ 16. When an individual is said to have blood group A, it refers to the individual's:
- a. alleles on the chromosome.
 - b. genotype.
 - c. phenotype.
 - d. haplotype.
- _____ 17. The two strands of DNA are: _____; one runs in a 5' to 3' direction, and the other runs in a 3' to 5' direction.
- a. parallel
 - b. antiparallel
 - c. somatic
 - d. zigzag
- _____ 18. In what stage of mitosis is DNA *not* actively dividing?
- a. Interphase
 - b. Prophase
 - c. Metaphase
 - d. Anaphase
- _____ 19. How many chromosomes do somatic cells of humans have?
- a. 46
 - b. 50
 - c. 23
 - d. 100
- _____ 20. The diploid chromosome number in humans is:
- a. 12
 - c. 46

b. 23

d. 92

- ____ 21. Which constituent in the Hardy-Weinberg equation represents the total number of alleles?
- a. q
 - b. p
 - c. $2pq$
 - d. q^2
- ____ 22. In which of the following circumstances will Hardy-Weinberg's principle fail?
- a. Mutation
 - b. Genetic drift
 - c. Non-random mating
 - d. All the above
- ____ 23. What amino acid initiates translation by attaching to tRNA?
- a. Glycine
 - b. Alanine
 - c. Methionine
 - d. Lysine
- ____ 24. What is meant by the term *autosomal*?
- a. Trait is not carried on the sex chromosomes
 - b. Trait is carried on sex chromosomes
 - c. Trait is not expressed in the parents
 - d. Organism possesses different alleles for a given characteristic
- ____ 25. Which of the following best describes classical genetics?
- a. DNA alteration that is caused by a physical or chemical agent
 - b. Transmission of characteristics from parents to offspring
 - c. Possessing a pair of identical alleles
 - d. The synthesis of RNA from DNA requiring RNA polymerase
- ____ 26. How is RNA different from DNA?
- a. RNA usually exists as one strand
 - b. Ribose is substituted for deoxyribose
 - c. RNA incorporates uracil
 - d. All of the above
- ____ 27. Using the Hardy-Weinberg equation, if a total random population carried the dominant allele E and 20% carried the recessive allele e, what would the total percentage be for the recessive trait ee?
- a. 64%
 - b. 4%
 - c. 16%
 - d. 0.4%
- ____ 28. A triple set of nucleotides is a:
- a. helix.
 - b. base.
 - c. codon.
 - d. template.
- ____ 29. A human gamete (egg or sperm) contains how many chromosomes?
- a. 23 pairs
 - b. 46 pairs
 - c. 23 chromosomes
 - d. 46 chromosomes
- ____ 30. How do restriction endonucleases function?
- a. Disrupt hydrogen bonding in DNA structure
 - b. Promote digestion of RNA
 - c. Cut DNA into smaller fragments
 - d. Terminate translation of mRNA
- ____ 31. DNA is composed of all of the following *except*:
- a. adenine.
 - b. guanine.
 - c. cytosine.
 - d. uracil.

- _____ 32. A woman with blood group A marries a man with blood group O. Their firstborn child has blood group O. The mother's most probable genotype is:
- a. OO
 - b. AA
 - c. AB
 - d. AO
- _____ 33. A structural alteration of DNA in an organism that is caused by a physical or chemical agent is called:
- a. transcription.
 - b. translation.
 - c. mutation.
 - d. cloning.
- _____ 34. In a pedigree analysis, what do vertical lines indicate?
- a. Consanguineous mating
 - b. Offspring
 - c. Stillbirth
 - d. Deceased sibling
- _____ 35. What is a vector?
- a. Substance capable of catalyzing a reaction
 - b. Sequence of three bases in a strand of DNA
 - c. Extrachromosomal genetic element that can carry a recombinant DNA molecule into a host bacterial cell
 - d. Substance that can carry an electric current in solution
- _____ 36. Which of the following must be true when using the Hardy-Weinberg equation?
- a. The population must be large
 - b. Mutations cannot occur
 - c. Mating must occur randomly
 - d. All of the above
- _____ 37. Alternate forms of a gene that can occur at a single chromosome locus are referred to as:
- a. amorphs.
 - b. traits.
 - c. alleles.
 - d. recessive.
- _____ 38. The condition in which one chromosome has a copy of the gene and the other chromosome has that gene deleted or absent is referred to as:
- a. homozygous.
 - b. heterozygous.
 - c. hemizygous.
 - d. recessive.
- _____ 39. Most antigens in the various blood group systems follow what kind of inheritance patterns?
- a. Codominant
 - b. Homozygous
 - c. Dominant
 - d. Autosomal
- _____ 40. All of the following are consistent with Mendel's basic rules of inheritance *except*:
- a. the gene is transmitted through generations intact.
 - b. a pair of genes is always found in the same gamete.
 - c. different pairs of genes are assorted independently of each other.
 - d. a pair of genes is rarely found in the same gamete.

Chapter 2. Basic Genetics

Answer Section

MULTIPLE CHOICE

1. ANS: C	PTS: 1	KEY: Taxonomy Level: 3
2. ANS: D	PTS: 1	KEY: Taxonomy Level: 1
3. ANS: A	PTS: 1	KEY: Taxonomy Level: 2
4. ANS: A	PTS: 1	KEY: Taxonomy Level: 2
5. ANS: A	PTS: 1	KEY: Taxonomy Level: 1
6. ANS: C	PTS: 1	KEY: Taxonomy Level: 2
7. ANS: B	PTS: 1	KEY: Taxonomy Level: 2
8. ANS: D	PTS: 1	KEY: Taxonomy Level: 2
9. ANS: D	PTS: 1	KEY: Taxonomy Level: 1
10. ANS: C	PTS: 1	KEY: Taxonomy Level: 2
11. ANS: C	PTS: 1	KEY: Taxonomy Level: 2
12. ANS: B	PTS: 1	KEY: Taxonomy Level: 1
13. ANS: C	PTS: 1	KEY: Taxonomy Level: 2
14. ANS: A	PTS: 1	KEY: Taxonomy Level: 1
15. ANS: B	PTS: 1	KEY: Taxonomy Level: 1
16. ANS: C	PTS: 1	KEY: Taxonomy Level: 2
17. ANS: B	PTS: 1	KEY: Taxonomy Level: 2
18. ANS: A	PTS: 1	KEY: Taxonomy Level: 1
19. ANS: A	PTS: 1	KEY: Taxonomy Level: 1
20. ANS: C	PTS: 1	KEY: Taxonomy Level: 1
21. ANS: B	PTS: 1	KEY: Taxonomy Level: 1
22. ANS: D	PTS: 1	KEY: Taxonomy Level: 2
23. ANS: C	PTS: 1	KEY: Taxonomy Level: 1
24. ANS: A	PTS: 1	KEY: Taxonomy Level: 1
25. ANS: B	PTS: 1	KEY: Taxonomy Level: 1
26. ANS: D	PTS: 1	KEY: Taxonomy Level: 1
27. ANS: B	PTS: 1	KEY: Taxonomy Level: 3
28. ANS: C	PTS: 1	KEY: Taxonomy Level: 1
29. ANS: C	PTS: 1	KEY: Taxonomy Level: 1
30. ANS: C	PTS: 1	KEY: Taxonomy Level: 1
31. ANS: D	PTS: 1	KEY: Taxonomy Level: 1
32. ANS: D	PTS: 1	KEY: Taxonomy Level: 2
33. ANS: C	PTS: 1	KEY: Taxonomy Level: 1
34. ANS: B	PTS: 1	KEY: Taxonomy Level: 2
35. ANS: C	PTS: 1	KEY: Taxonomy Level: 1
36. ANS: D	PTS: 1	KEY: Taxonomy Level: 2
37. ANS: C	PTS: 1	KEY: Taxonomy Level: 1
38. ANS: C	PTS: 1	KEY: Taxonomy Level: 1
39. ANS: A	PTS: 1	KEY: Taxonomy Level: 1
40. ANS: B	PTS: 1	KEY: Taxonomy Level: 2