

Exam

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) In the 1600s, William Harvey studied reproduction and development. What is the term given to the theory which states that an organism develops from the fertilized egg by a succession of developmental events that lead to an adult? 1) _____
- A) sequential pattern formation
 - B) preformation
 - C) equational transformation
 - D) epigenesis
 - E) transduction

Answer: D

- 2) What is the term given to the theory which states that the fertilized egg contains a complete miniature adult? 2) _____
- A) transformation
 - B) transduction
 - C) cell theory
 - D) conjugation
 - E) preformation

Answer: E

- 3) What is the term given to the theory which put forth the idea that living organisms could arise by incubating nonliving components? 3) _____
- A) preformation
 - B) spontaneous generation
 - C) evolution
 - D) collective combination
 - E) natural selection

Answer: B

- 4) Who, along with Alfred Wallace, formulated the theory of natural selection? 4) _____
- A) Charles Darwin
 - B) Louis Pasteur
 - C) William Harvey
 - D) Gregor Mendel
 - E) James Watson

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 5) Name one of the botanists who, in 1900, rediscovered the work of Gregor Mendel. 5) _____

Answer: Carl Correns, Hugo de Vries, Erich Tschermak

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 6) Who was the Augustinian monk that conducted a decade of experiments on the garden pea, eventually showing that traits are passed from parents to offspring in predictable ways? 6) _____
- A) Alfred Wallace
 - B) Gregor Mendel
 - C) Aristotle
 - D) Francis Crick
 - E) Hippocrates

Answer: B

- 7) In many species, there are two representatives of each chromosome. In such species, the characteristic number of chromosomes is called the _____ number. It is usually symbolized as _____. 7) _____
- A) haploid; n
 - B) haploid; $2n$
 - C) diploid; n
 - D) diploid; $2n$
 - E) None of the answers listed is correct.

Answer: D

- 8) Genetics is the study of _____. 8) _____
- A) diploid and haploid
 - B) mutation and recession
 - C) replication and recombination
 - D) heredity and variation
 - E) transcription and translation

Answer: D

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 9) Early in the twentieth century, Walter Sutton and Theodor Boveri noted that the behavior of chromosomes during meiosis is identical to the behavior of genes during gamete formation. They proposed that genes are carried on chromosomes, which led to the basis of the _____. 9) _____

Answer: Chromosome Theory of Inheritance

- 10) What is a mutation? 10) _____

Answer: A mutation is defined as any heritable change in the DNA sequence.

- 11) What is a simple definition of an allele? 11) _____

Answer: An allele is a variant form of a gene.

- 12) Until the mid-1940s, many scientists considered proteins to be the likely candidates for the genetic material. Why? 12) _____

Answer: Proteins are the most abundant, universally distributed components in cells. They were considered likely candidates because of their great structural and functional diversity.

- 13) Name the individual who, while working with the garden pea in the mid-1850s, demonstrated quantitative patterns of heredity and developed a theory involving the behavior of hereditary factors. 13) _____
Answer: Gregor Mendel
- 14) What does the term *genetics* mean? 14) _____
Answer: Genetics is a subdiscipline of biology concerned with the study of heredity and variation at the molecular, cellular, developmental, organismal, and populational levels.
- 15) Name two individuals who provided the conceptual basis for our present understanding that genes are on chromosomes. 15) _____
Answer: Walter Sutton and Theodor Boveri
- 16) What term is used to describe the fact that different genes in an organism often provide differences in observable features? 16) _____
Answer: phenotype
- 17) What term refers to the similarity between parents and offspring and what term refers to the lack of similarity between parents and offspring? 17) _____
Answer: Heredity refers to the similarity between parents and offspring and the similarity of members of the same species. Variation refers to the lack of similarity between parents and offspring and members of the same species.
- 18) Alternative forms of a gene are called _____. 18) _____
Answer: alleles
- 19) The various characteristics of organisms that result from their genetic makeup are collectively referred to as an organism's _____. 19) _____
Answer: phenotype
- 20) Name the substance that serves as the hereditary material in eukaryotes and prokaryotes. 20) _____
Answer: DNA, or deoxyribonucleic acid
- 21) In nonviral systems, what is the nature of the hereditary substance? 21) _____
Answer: DNA (deoxyribonucleic acid) is a double-stranded polymer organized as a double helix.
- 22) A fundamental property of DNA's nitrogenous bases that is necessary for the double-stranded nature of its structure is _____. 22) _____
Answer: complementarity
- 23) Distinguish the functions of DNA and RNA in a eukaryote. 23) _____
Answer: DNA is responsible for the storage and replication of genetic information; RNA is involved in the expression of stored genetic information.

- 24) Name the bases in DNA and their pairing specificities. 24) _____
Answer: adenine:thymine, guanine:cytosine
- 25) What is meant by the term *genetic code*? 25) _____
Answer: The genetic code consists of a linear series of three adjacent nucleotides present in mRNA molecules.
- 26) List the two relatively complex processes in which genetic information is converted into functional products. 26) _____
Answer: transcription and translation
- 27) What is the composition of the genetic material? 27) _____
Answer: polymers of nucleotides making up DNA
- 28) What is meant by *complementarity* in terms of the structure of DNA? 28) _____
Answer: base pairing of A with T, and G with C
- 29) Reference is often made to *adapter molecules* when describing protein synthesis in that they allow amino acids to associate with nucleic acids. To what class of molecules does this term refer? 29) _____
Answer: tRNA
- 30) Given that DNA is the genetic material in prokaryotes and eukaryotes, what other general structures (macromolecules) and substances made by the cell are associated with the expression of that genetic material? 30) _____
Answer: RNA (messenger, ribosomal, transfer), ribosomes, enzymes, proteins
- 31) What is another term for a biological catalyst? 31) _____
Answer: enzyme
- 32) Research dealing with which human blood disorder was instrumental in linking the genotype to a specific phenotype, and what conclusion was reached? 32) _____
Answer: The work on sickle-cell anemia was instrumental in showing that a mutant gene produced a mutant protein molecule.
- 33) Recombinant DNA technology is dependent on a particular class of enzymes, known as _____ which cut DNA at specific nucleotide sequences. 33) _____
Answer: restriction enzymes
- 34) What represents an organism's genome? 34) _____
Answer: An organism's genome can be defined as the complete haploid DNA content of an organism.
- 35) What is a transgenic organism? 35) _____
Answer: A transgenic organism is an organism produced by biotechnology that involves the transfer of hereditary traits across species.

36) In 1996, a cloning experiment produced the sheep named Dolly. Contrary to the more traditional method of cloning by embryo splitting, Dolly was produced by which procedure? 36) _____

Answer: transfer of genetic material from an adult mammary cell

37) What term is applied to a variety of projects whereby genome sequences are deposited in databases for research purposes? 37) _____

Answer: bioinformatics

38) The human genome sequence was reported in 2003 by two groups, the publicly funded _____ and _____. 38) _____

Answer: Human Genome Project; a private, industry-funded project

39) A number of genomes have been sequenced in recent years: *Escherichia coli*, *Saccharomyces cerevisiae*, *Caenorhabditis elegans*, *Drosophila melanogaster*, and *Mus musculus*. What are the common names for these organisms? 39) _____

Answer: bacterium, yeast, roundworm, fruit fly, mouse

40) Organisms that are well understood from a scientific standpoint and are often used in basic biological research are often called _____. 40) _____

Answer: model organisms

41) *Arabidopsis* is a model organism for the study of _____. 41) _____

Answer: plants

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

42) True or False: Genetics is the study of heredity and variation. 42) _____

Answer: True False

43) True or False: Complementarity in a genetic sense refers to the polymerization of nucleotides in DNA. 43) _____

Answer: True False

44) True or False: Bioinformatics is a discipline involved in the development of both hardware and software for processing, storing, and retrieving nucleotide and protein data. 44) _____

Answer: True False