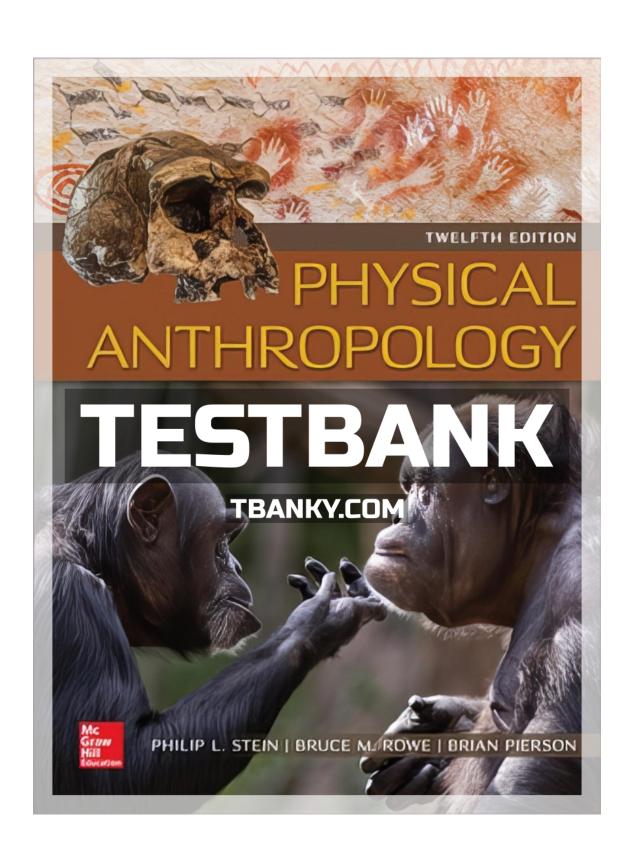
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Chapter 02 - The Study of Heredity

		Cl	hap	ter	02
The	Study	of	He	red	ity

Multiple Choice Questions
 The blending theory is the idea that: A. inherited characteristics of offspring are intermediate between maternal and paternal characteristics B. individuals inherit some traits from the mother and some from the father C. inherited traits can be altered by the environment D. none of these
Accessibility: Keyboard Navigation
 2. Pangenesis is: A. based on the principle that acquired characteristics can be passed on B. a "Noah's Ark" explanation for the origin of life C. an explanation for the origin of all life D. none of these
Accessibility: Keyboard Navigation
3. The basic principles of heredity were first worked out by: A. Charles Darwin B. Gregor Mendel C. Carolus Linnaeus D. Jean Lamarck
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	4.	Gregor	Mendel's	work,	published:	in	1866,	was:
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A. not generally known until 1900

- B. immediately accepted by Mendel's contemporaries
- C. footnoted extensively by Charles Darwin in The Origin of Species
- D. used by Francis Galton in his studies on human heredity

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- 5. Gregor Mendel's success was the result, in part, of the fact that he:
- A. used pairs of sharply contrasting features
- B. precisely defined the traits he studied
- C. quantified the results of the breeding experiments
- D. all of these

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- 6. True-breeding means:
- A. hybrid
- **B.** bred only with the same kind and shows the same trait or traits over many generations
- C. only the dominant characteristics will express themselves
- D. only the recessive traits will express themselves

Accessibility: Keyboard Navigation

- 7. One of Gregor Mendel's major contributions to science was his:
- A. explanation of the mechanisms of heredity
- B. discovery of the process of mutation
- C. description of chromosomes
- D. discovery of DNA within the nucleus of the cell

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8. Gregor Mendel demonstrated that the hereditary units: A. are discrete B. blend with one another C. are composed of DNA D. all of these
Accessibility: Keyboard Navigation
9. Male sex cells are called: A. pollen B. sperm C. ova D. pollen and sperm
Accessibility: Keyboard Navigation
10. In the production of sex cells, paired hereditary units separate into different sex cells. This is termed the principle of: A. segregation B. hybridization C. independent assortment D. heterozygosity
Accessibility: Keyboard Navigation
11. When Mendel crossed a true-breeding tall plant with a true-breeding dwarf plant, all of the F_1 generation was tall. Therefore, we may conclude that the allele for dwarfism in the plant is:

- A. recessive B. codominant
- C. dominant
- D. intermediate in expression

12. The inheritance patterns of differing traits are unconnected. This is the principle of:

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A. segregation
B. independent assortment
C. dominance
D. recessiveness
Accessibility: Keyboard Navigation
13. "A simplified representation of a real-world phenomenon" best defines a(n):
A. theory
B. model
C. experiment
D. control
Accessibility: Keyboard Navigation
icessionally. Itologowa i languation
14. In 1900, important differences among red blood cells were discovered by:
A. Gregor Mendel
B. Karl Landsteiner
C. James Watson
D. Francis Galton
D. Francis Ganon
Accessibility: Keyboard Navigation
15. Proteins whose primary function is to destroy or neutralize foreign substances that have
entered the body are called:
A. enzymes
B. antigens
C. antibodies
D. hormones
Accessibility: Keyboard Navigation

Chapter 02 - The Study of Heredity 16. A substance that stimulates the production or mobilization of antibodies is called a(n): **A.** antigen B. allele C. nucleotide D. enzyme Accessibility: Keyboard Navigation 17. How many major alleles are involved in the inheritance of ABO blood types? A. one B. two C. three D. four Accessibility: Keyboard Navigation 18. In the presence of anti-A, type A red blood cells will undergo: A. agglutination B. hydrolysis C. lysis D. fusion Accessibility: Keyboard Navigation 19. If a person with type A blood receives a transfusion of type B blood, the recipient's blood would experience: A. heavy agglutination of the donor's cells B. light agglutination of the donor's cells C. no agglutination of the recipient's cells D. no agglutination of the donor's cells

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20. An individual whose blood contains the antibodies anti-A and anti-B would be of the blood type: A. A B. B C. AB D. O
Accessibility: Keyboard Navigation
21. In the context of the ABO blood-type system, when two different alleles of the same generate present, both alleles are expressed in the phenotype. Such alleles are called: A. codominant alleles B. recessive alleles C. polymorphic alleles D. dominant alleles
Accessibility: Keyboard Navigation
22. Which of the following is true of erythroblastosis fetalis? A. It is a recessive genetic abnormality in which the retina of the eye lacks the cones that are necessary for color vision and for seeing fine details. B. It is a late-onset genetic disease characterized by a loss of motor control resulting in jerky movements and is associated with psychiatric symptoms. C. It is a hemolytic disease affecting unborn or newborn infants and is caused by the destruction of the infant's Rh+ blood by the mother's anti-Rh antibodies. D. It is a genetic disease caused by the absence of the enzyme responsible for the conversion of the amino acid phenylalanine to tyrosine.
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23.	Which	of the	follow	ing is tr	ue of t	he re	lations	hip t	between	the	ABO	and R	th bl	lood-t	ype
sys	tems?														

- A. Individuals who are O are always Rh-.
- B. Individuals who are O are more likely to be Rh-.
- C. The genes for the two blood systems are linked.
- **<u>D.</u>** The two systems are inherited independently.

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- 24. The phenotype is the result of:
- A. the genotype
- B. the environment
- C. traits
- **<u>D.</u>** the genotype and the environment

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- 25. The term phenotype refers to:
- A. physical traits
- B. physiological traits
- C. personality traits
- **D.** all of these

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- 26. An individual's phenotype would include that individual's:
- A. stature
- B. blood type
- C. skin color
- **D.** all of these

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27.	A trait is:
<u>A.</u>	one aspect of the phenotype
В.	one aspect of the genotype
C. :	not influenced by the environment
D.	one aspect of the genotype and not influenced by the environment

Accessibility: Keyboard Navigation

- 28. Which of the following characteristics is least influenced by the environment?
- A. skin color
- B. stature
- C. PTC tasting
- D. intelligence

Accessibility: Keyboard Navigation

- 29. The term genotype refers to:
- A. an individual's appearance
- **<u>B.</u>** an individual's genetic makeup C. an individual's observable and measurable characteristics
- D. all of these

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30. An allele is:

A. a specific type of trait

B. an alternate form of a gene

- C. the dominant form of a gene only
- D. the recessive form of a gene only

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31. Cytogenetics is defined as the study of: A. cells B. zygotes C. hereditary mechanisms within the cell D. the genetics of cytoplasm
Accessibility: Keyboard Navigation
32. The chromosomes are located within the cell's: A. cytoplasm B. nucleus C. ribosome D. endoplasm
Accessibility: Keyboard Navigation
33. The standardized classification and arrangement of photographed chromosomes is known as a: A. karyotype B. cytoplasm C. cytology D. chromotype
Accessibility: Keyboard Navigation
34. Different organisms: A. may have different number of chromosomes, ranging from 2 to 1,260 B. usually have over 1,000 chromosomes per cell C. have between 40 and 50 chromosomes per cell D. have half of their chromosomes in the nuclei and half in the cytoplasm of their cells
Accessibility: Keyboard Navigation

Chapter 02 - The Study of Heredity 35. A human body cell has the following number of chromosomes: A. 48 **B.** 46 C. 44 D. 23 Accessibility: Keyboard Navigation 36. A human body cell has the following number of autosomes: A. 48 B. 46 <u>C.</u> 44 D. 23 Accessibility: Keyboard Navigation 37. The chromosomes that make up a pair are called: **A.** homologous B. linked C. associated D. homozygous Accessibility: Keyboard Navigation 38. Genes that are located on the same chromosome are said to be: A. associated **B.** linked C. homologous D. homozygous

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39	The	Y	chromos	ome.

- A. carries no genes
- B. is larger than the X chromosome
- **C.** is smaller than the X chromosome
- D. carries no genes and is smaller than the X chromosome

Accessibility: Keyboard Navigation

- 40. X-linked means:
- A. the site of the gene is unknown
- B. the gene lies on "x" number of chromosomes
- **C.** the gene lies on the X chromosome
- D. the gene is only inherited by women

Accessibility: Keyboard Navigation

- 41. Mitosis is the process by which:
- A. single-cell organisms reproduce
- B. growth and replacement of cells occur in multicellular animals
- C. gametes are produced
- $\underline{\mathbf{D}}$. single-cell organisms reproduce and growth and replacement of cells occur in multicellular animals
- E. all of these

Accessibility: Keyboard Navigation

- 42. A chromosome consists of two strands held together by the:
- A. nucleolus
- B. centromere
- $\overline{\mathbb{C}}$. centriole
- D. spindle

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 43. The proper sequence of phases of division in mitosis is: A. prophase, anaphase, telophase, metaphase B. prophase, metaphase, anaphase, telophase C. prophase, telophase, anaphase, metaphase D. metaphase, prophase, telophase, anaphase
Accessibility: Keyboard Navigation
 44. In mitosis, the chromosomes first become visible during: A. anaphase B. prophase C. metaphase D. telophase E. interphase
Accessibility: Keyboard Navigation
 45. Which of the following statements about meiosis is correct? A. Meiosis takes place only in the testes and the ovaries. B. The chromosome number is cut in half. C. There are two cycles of division. D. All of these are correct.
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46. Meiosis differs from mitosis in that in meiosis:

- A. there are two cycles of division
- B. the chromosome number is cut in half
- C. crossing-over can occur
- **D.** all of these

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 48. At the end of the first division of meiosis, each second-generation cell contains: A. 46 double-stranded chromosomes B. 46 single-stranded chromosomes C. 23 double-stranded chromosomes D. 23 single-stranded chromosomes
Accessibility: Keyboard Navigation
 49. In meiosis, crossing-over refers to: A. one type of chromosomal mutation B. a process whereby alleles from homologous chromosomes are exchanged C. a process that occurs only on the X chromosome D. a type of gene mutation
Accessibility: Keyboard Navigation
50. New combinations of alleles on the same chromosomes as a result of crossing-over is referred to as: A. recombination B. linkage C. mitosis D. homology
Accessibility: Keyboard Navigation

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- 51. Like the production of ova, the production of sperm:
- A. begins during fetal development
- **B.** is a product of meiosis
- C. is a product of ovogenesis
- D. none of these

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- 52. Oogenesis differs from spermatogenesis in that oogenesis:
- A. leads to sex cells that, if fertilized, will contribute mtDNA to the zygote
- B. begins in fetal life
- C. usually produces only one mature ovum at any one time
- D. all of these

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- 53. Cytogenetics shows that Mendel's principle of segregation:
- A. does not work on the molecular level
- **B.** is based on the separation of chromosomes during meiosis
- C. is based on the separation of chromosomes during mitosis
- D. is based on the linkage of genes on a single chromosome

Accessibility: Keyboard Navigation

- 54. The study of cytogenetics:
- A. contradicts Mendelian inheritance
- B. is unrelated to Mendelian inheritance
- C. grounds Mendelian genetics in biology
- D. contradicts Mendelian inheritance and is unrelated to Mendelian inheritance

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 55. In general, half of the human babies born are males and half are females because: A. the sex chromosomes segregate in the formation of sperm in males B. the sex chromosomes segregate in the formation of ova in females C. one half of the ova carry the male-determining gene D. none of these
Accessibility: Keyboard Navigation
 56. Which of the following statements is <i>correct</i> about human chromosomes? A. A human karyotype shows 46 chromosomes. B. Humans and chimpanzees possess the same number of chromosomes in each body cell. C. DNA, a special coding protein, is located within the chromosome. D. In humans, an individual who possesses a sex chromosome count of XXY is a female.
Accessibility: Keyboard Navigation
57. Large molecules, characteristic of living organisms, are based upon the tendency to form long chains of the atom: A. nitrogen B. hydrogen C. carbon D. oxygen
Accessibility: Keyboard Navigation
58. The genetic material is classified chemically as a: A. nucleic acid B. protein C. carbohydrate D. lipid
Accessibility: Keyboard Navigation

Chapter 02 - The Study of Heredity 59. The basic building blocks of the nucleic acids are: A. amino acids **B.** nucleotides C. fatty acids D. peptides Accessibility: Keyboard Navigation 60. A nucleotide is composed of: A. a five-carbon sugar B. a phosphate C. a nitrogenous base **D.** all of these Accessibility: Keyboard Navigation 61. Ribose and deoxyribose are: A. sugars B. lipids C. amino acids D. fatty acids Accessibility: Keyboard Navigation 62. The nucleotides that make up the RNA contain the pyrimidines uracil and cytosine and the purines guanine and: A. thymine B. proline C. adenine D. tyrosine Accessibility: Keyboard Navigation

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between a cytosine and a guanine. These are said to be: A. polar bodies B. chromatids C. hybrids D. base pairs
Accessibility: Keyboard Navigation
64. In the DNA molecule, the base adenine always forms a complementary pair with: A. another adenine B. guanine C. thymine D. cytosine
Accessibility: Keyboard Navigation
65. The basic sugar-phosphate-base unit is called a(n): A. polypeptide B. protein C. nucleotide D. amino acid
Accessibility: Keyboard Navigation
66. The two categories of bases are: A. purines and pyrimidines B. proteins and lipids C. ribose and deoxyribose D. peptides and phosphates
Accessibility: Keyboard Navigation

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67. Physically, the nuclear DNA molecule can be described as a: A. single-stranded chain B. double helix C. two-dimensional ladder D. sphere	
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68. Proteins are chains of: A. nucleotides B. amino acids C. lipids D. nucleic acids	
Accessibility: Keyboard Navigation	
69. Chains of amino acids are referred to as: A. polypeptides B. carbohydrates C. lipids D. nucleic acids	
Accessibility: Keyboard Navigation	
70. In DNA replication: A. messenger RNA translates each triplet into the corresponding amino acid B. transfer RNA translates each triplet into the corresponding amino acid C. the bonds holding the bases together are broken and the exposed bases attract complementary bases D. mitochondrial DNA is formed based on the template of nuclear DNA	
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71. Proteins are manufactured within the cell in structures called: A. mitochondria B. nuclei C. nucleoli D. ribosomes
Accessibility: Keyboard Navigation
72. Enzymes are: A. nucleic acids B. proteins C. carbohydrates D. lipids
Accessibility: Keyboard Navigation
73. Which of the following sequences is correct in relationship to protein synthesis? A. nDNA-mRNA-tRNA-protein synthesis B. mRNA-nDNA-tRNA-protein synthesis C. nDNA-tRNA-mRNA-protein synthesis D. tRNA-nDNA-mRNA-protein synthesis
Accessibility: Keyboard Navigation
74. The nuclear DNA molecule controls the manufacture of proteins by the following process: A. pieces of the DNA molecule break off and travel to the site of protein manufacture B. the appropriate code is copied and transported by messenger RNA to the site of protein manufacture C. the appropriate code is copied and transported by transfer RNA to the site of protein manufacture D. none of these
Accessibility: Keyboard Navigation

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75.	Each	amino	acid is	determined	by s	pecific	three-	base	units	called:
, ,	Lucii	ammo	acia is	acterminea	$o_y b$	pecific	uncc	ouse	umus	cuiica.

- A. ribosomes
- B. nucleotides
- C. proteins
- **D.** codons

Accessibility: Keyboard Navigation

76. Identify the codons that code for the amino acid alanine.

A. GCT, GCC, GCA, GCG

B. GGT, GGC, GGA, GGG

C. ATT, ATC, ATA

D. TTT, TTC, TTA, TTG

Accessibility: Keyboard Navigation

- 77. Mitochondrial DNA is found in the:
- A. nucleus of the cell
- B. fat cells only
- C. cytoplasm
- D. X and Y chromosomes

Accessibility: Keyboard Navigation

78. Mitochondrial DNA is inherited from:

- A. the father only
- **B.** the mother only
- C. both the mother and the father
- D. neither the mother nor the father; it develops after conception

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79. The body uses amino acids: A. to build protein molecules B. to build nucleic acids C. both of these D. neither of these
Accessibility: Keyboard Navigation
80. When Mendel crossed a true-breeding violet with a true-breeding white plant, all of the F ₁ generation were violet. Therefore, we may conclude that the allele for violet in the pea plant is: A. recessive B. dominant C. codominant D. intermediate in expression
Accessibility: Keyboard Navigation Gradable: automatic
81. The term phenotype refers to: A. a trait that is dominant B. a trait that is recessive C. an individual's genetic makeup D. an observable or measurable characteristic of an individual
Accessibility: Keyboard Navigation Gradable: automatic

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82. The principle of independent assortment:

A. states that inheritance patterns of differing traits are independent of one another

- B. states that paired hereditary factors separate and form sex cells containing either one or the other factor
- C. applies only to humans
- D. states that paired hereditary factors separate and form sex cells containing either one or the other factor and applies only to humans only

Accessibility: Keyboard Navigation Gradable: automatic

83. Polymorphism refers to:

<u>A.</u> the presence of several distinct forms of a gene or a trait within a population

- B. a trait in which two alleles are codominant
- C. a single gene that affects multiple aspects of the phenotype
- D. multiple genes that affect a single aspect of the phenotype

Accessibility: Keyboard Navigation Gradable: automatic

84. An allele is:

- A. the complementary base to thymine
- B. the dominant form of a gene
- C. an alternate form of a gene
- D. an X-linked gene

Accessibility: Keyboard Navigation Gradable: automatic

85. The chromosomes are located within the cell's:

A. nucleus

- B. chromatids
- C. DNA
- D. cytoplasm

Accessibility: Keyboard Navigation Gradable: automatic

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- 86. Meiosis is the process by which:
- A. single-cell organisms reproduce
- B. growth and replacement of cells occur in multicellular animals
- C. gametes are produced
- D. all of these

Accessibility: Keyboard Navigation

Gradable: automatic

- 87. In the DNA molecule, the base cytosine always forms a complementary pair with:
- A. another cytosine
- **B.** guanine
- C. thymine
- D. adenine

Accessibility: Keyboard Navigation

Gradable: automatic

- 88. Physically, the nuclear DNA molecule can be described as:
- A. circular, like a snake eating its own tail
- B. many spheres linked end to end
- C. a two-dimensional ladder
- **D.** a double helix

Accessibility: Keyboard Navigation

 ${\it Gradable: automatic}$

True / False Questions

89. The blending theory of inheritance correctly describes the mechanisms by which offspring resemble their parents.

FALSE

Accessibility: Keyboard Navigation

Gradable: automatic

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90. The principles of heredity worked out by Gregor Mendel apply to all living organisms. **TRUE**

Accessibility: Keyboard Navigation Gradable: automatic

91. A human body cell has 44 autosomes.

TRUE

Accessibility: Keyboard Navigation Gradable: automatic

92. X-linked traits will be expressed more commonly in females than males.

FALSE

Accessibility: Keyboard Navigation Gradable: automatic

93. Proteins are chains of nucleotides.

FALSE

Accessibility: Keyboard Navigation Gradable: automatic

94. The correct sequence for protein synthesis is nDNA-mRNA-tRNA-protein synthesis. **TRUE**

Accessibility: Keyboard Navigation Gradable: automatic

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Matching Questions

95. Match the concept to its definition:

1. independent	bred only with the same kind and shows the same	
assortment	trait over many generations	<u>2</u>
	in the production of sex cells, the paired hereditary	
2. true-breeding	units separate into different sex cells	<u>3</u>
	the inheritance patterns of differing traits are	
3. segregation	independent of one another	<u>1</u>

Accessibility: Keyboard Navigation

96. Match each term to its description:

1. autosomes	holds strands together 2
2. centromere	standardized arrangement of chromosomes 3
3. karyotype	chromosomal strand 5
4. sex chromosomes	22 pairs in humans <u>1</u>
5. chromatid	X and Y chromosomes 4

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97. Match each phase of mitosis with what occurs during that phase:

1. metaphase	the chromosomes line up	1
2. interphase	chromosomes becoming visible	<u>4</u>
3. telophase	chromatids pulled to opposite poles	<u>5</u>
4. prophase	interim period	<u>2</u>
5. anaphase	new nuclear membrane forming	<u>3</u>

Accessibility: Keyboard Navigation

98. Match each nucleic acid with its description:

1. mtDNA	located in the nucleus	<u>3</u>
2. mRNA	located in the mitochondria	1
3. nDNA	copies segments of the genetic code for protein manufacture	<u>2</u>
4. tRNA	transports amino acids into position	<u>4</u>



Essay Questions

99. Although Charles Darwin's concept of natural selection was partially based on the observation of variability within a species, Darwin did not develop an acceptable mechanism to explain this variability. How did the work of Gregor Mendel help explain a mechanism of biological evolution? Answers will vary. Accessibility: Keyboard Navigation 100. Charles Darwin attempted to explain variability in terms of the blending theory. Describe the blending theory and contrast it to the concepts developed by Gregor Mendel. Answers will vary. Accessibility: Keyboard Navigation 101. How does the concept of segregation differ from the concept of blending? Answers will vary. Accessibility: Keyboard Navigation 102. Although the basic Mendelian principles of genetics were discovered through experiments on pea plants, they also apply to all organisms, including humans. Illustrate the concepts of segregation, dominance, and independent assortment using human characteristics. Answers will vary. Accessibility: Keyboard Navigation

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103. The construction of karyotypes has become a routine diagnostic medical tool. What kind of information does a karyotype provide? Answers will vary.
Accessibility: Keyboard Navigation
104. Describe the processes that occur during meiosis that demonstrate the physical basis of independent assortment and segregation.
Answers will vary.
Accessibility: Keyboard Navigation
105. In what ways do mitosis and meiosis differ from each other?
Answers will vary.
Accessibility: Keyboard Navigation
106. What is the essential difference between a male and a female in cellular terms?
Answers will vary.
Accessibility: Keyboard Navigation
107. What has the study of cytogenetics added to our understanding of Mendelian genetics?
Answers will vary.
Accessibility: Keyboard Navigation

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108. In molecular terms, describe the differences between proteins and nucleic acids.
Answers will vary.
Accessibility: Keyboard Navigation
109. What are the two main types of DNA? In what ways do they differ in structure, function and mode of inheritance?
Answers will vary.
Accessibility: Keyboard Navigation
110. What is the concept of independent assortment? Are all traits independent from each other?
Answers will vary.
Accessibility: Keyboard Navigation
111. What are antigens and antibodies? Use the ABO blood-type system to explain these terms.
Answers will vary.
Accessibility: Keyboard Navigation Gradable: manual

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112. What are some of the major principles and facts about genetics that have been discovered since Mendel's time?

Answers will vary.

Accessibility: Keyboard Navigation Gradable: manual