

Unit 6—Reproduction and Development

Living Environment Standards

Standard 1: Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.

Key Idea 3 The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into natural phenomena.

Standard 4: Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Key Idea 1 Living things are both similar to and different from each other and from nonliving things.

Key Idea 2 Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.

Key Idea 4 The continuity of life is sustained through reproduction and development.

Key Idea 5 Organisms maintain a dynamic equilibrium that sustains life.

Chapter 11: Meiosis and Sexual Reproduction

Chapter 23: Reproduction and Development

Living Environment Standards[†]

- 4.2.1c Hereditary information is contained in genes, located in the chromosomes of each cell. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait. A human cell contains many thousands of different genes in its nucleus.
- 4.2.1d In asexually reproducing organisms, all the genes come from a single parent. Asexually produced offspring are normally genetically identical to the parent.
- 4.2.1e In sexually reproducing organisms, the new individual receives half of the genetic information from its mother (via the egg) and half from its father (via the sperm). Sexually produced offspring often resemble, but are not identical to, either of their parents.
- 4.3.1c Mutation and the sorting and recombining of genes during meiosis and fertilization result in a great variety of possible gene combinations.
- 4.4.1b Some organisms reproduce asexually with all the genetic information coming from one parent. Other organisms reproduce sexually with half the genetic information typically contributed by each parent. Cloning is the production of identical genetic copies.
- 4.4.1c The processes of meiosis and fertilization are key to sexual reproduction in a wide variety of organisms. The process of meiosis results in the production of eggs and sperm which each contain half of the genetic information. During fertilization, gametes unite to form a zygote, which contains the complete genetic information for the offspring.
- 4.4.1d The zygote may divide by mitosis and differentiate to form the specialized cells, tissues, and organs of multicellular organisms.

[†] Stem cells will be covered in Unit 7 (Chapter 15, Section 2).

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- 4.4.1e Human reproduction and development are influenced by factors such as gene expression, hormones, and the environment. The reproductive cycle in both males and females is regulated by hormones such as testosterone, estrogen, and progesterone.
- 4.4.1f The structures and functions of the human female reproductive system, as in almost all other mammals, are designed to produce gametes in ovaries, allow for internal fertilization, support the internal development of the embryo and fetus in the uterus, and provide essential materials through the placenta, and nutrition through milk for the newborn.
- 4.4.1g The structures and functions of the human male reproductive system, as in other mammals, are designed to produce gametes in testes and make possible the delivery of these gametes for fertilization.
- 4.4.1h In humans, the embryonic development of essential organs occurs in early stages of pregnancy. The embryo may encounter risks from faults in its genes and from its mother's exposure to environmental factors such as inadequate diet, use of alcohol/drugs/tobacco, other toxins, or infections throughout her pregnancy.
- 4.5.2b Viruses, bacteria, fungi, and other parasites may infect plants and animals and interfere with normal life functions.
- 4.5.2f Some viral diseases, such as AIDS, damage the immune system, leaving the body unable to deal with multiple infectious agents and cancerous cells.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
81	Chapter 11 Opener, pp. 244-46			Inquiry Lab, p. 245, “Pollen Up Close”	Reading Toolbox, p. 246, Using Words, Using Language, Taking Notes.
82	Chapter 11 Section 1, pp. 247-49	<ol style="list-style-type: none"> 1. In asexual reproduction, how does the offspring compare to the parent? 2. In sexual reproduction, how does the offspring compare to the parent? 3. Why are chromosomes important to an organism? 	4.2.1c 4.2.1d 4.2.1e 4.4.1b	Math Skills, p. 248 (Teachers Edition), “Asexual Reproduction in Bacteria”	Read Chapter 11, Section 1, pp. 248-249. Section 1 Review, p. 249, questions 1-4.
83	Chapter 11 Section 1 (cont.)			Reading Toolbox, p. 249, “Key-Term Fold”	Section 1 Review, p. 249, questions 5-7.
84	Chapter 11 Section 1 (cont.)			“Mixing the Gene Pool,” http://www.stanford.edu/group/Urchin/whysex.htm#mt (from SciLinks code HX8136, p. 248)	Read Chapter 11, Section 2, pp. 250-254. Reading Toolbox, p. 252, “Comparisons.”
85	Chapter 11 Section 2, pp. 250-55	<ol style="list-style-type: none"> 1. What occurs during the stages of meiosis? 2. How does the function of mitosis differ from the function of meiosis? 3. What are three mechanisms of genetic variation? 	4.2.1e 4.3.1c 4.4.1c	QuickLab, p. 253, “Crossing-over Model”	Section 2 Review, p. 254, questions 1-3.

* A Day equals a 45-minute period.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
86	Chapter 11 Section 2 (cont.)			Teaching Key Ideas, p. 254 (Teachers Edition) “Distinguishing Between Mitosis and Meiosis”	Section 2 Review, p. 254, questions 4-6.
87	Chapter 11 Section 2 (cont.)			Weird Science, p. 255, “Research” Reading Toolbox, p. 255 (Teachers Edition), “Visual Literacy”	Read Chapter 11, Section 3, pp. 256-257.
88	Chapter 11 Section 3, pp. 256-60	1. What is a diploid life cycle? 2. What is a haploid life cycle? 3. What is alternation of generations?	4.2.1e 4.4.1b 4.4.1c	Reading Toolbox, p. 258, “Two-column notes”	Section 3 Review, p. 258 questions 1-4.
89	Chapter 11 Section 3 (cont.)			QuickLab, p. 257, “Chromosome Combinations”	Section 3 Review, p. 258 questions 5-7.
90	Chapter 11 End of Chapter Review and Assessment, pp. 261-63			Chapter 11 Lab, p. 259, “Meiosis Model”	Regents Exam Practice, p. 261, questions 1-7.
91	Chapter 11 End of Chapter Review and Assessment (cont.)			Super Summary, (p. 260). http://go.hrw.com , keyword HX8MEIS	Regents Exam Practice, p. 262, questions 8-16.
92	Chapter 11 End of Chapter Review and Assessment (cont.)			Reteaching Key Ideas, p. 260 (Teachers Edition), “Asexual Reproduction Models”	Regents Exam Practice, p. 262, questions 17-19.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
93	Chapter 11 End of Chapter Review and Assessment (cont.)			Reteaching Key Ideas, p. 260 (Teachers Edition), “Meiosis”	Review Key Terms, p. 260.
94	Chapter 11 End of Chapter Review and Assessment (cont.)			Reteaching Key Ideas, p. 260 (Teachers Edition), “Organizing Concepts”	Review Key Ideas, p. 260.
95	Chapter 11 End of Chapter Review and Assessment (cont.)			Practice Assessment	Per teacher evaluation
96	Chapter 11 End of Chapter Review and Assessment (cont.)			Chapter Assessment	
97	Chapter 11 End of Chapter Review and Assessment (cont.)			Per teacher evaluation	Reading Toolbox, p. 548, “Using Words,” “Using Language.”
98	Chapter 23 Opener and Section 1, pp. 546-51	<ol style="list-style-type: none"> 1. Where are male gametes produced? 2. What path do sperm take to exit the body? 3. What occurs as sperm move into the urethra? 4. What happens to sperm after they exit the body? 	<p>4.4.1e 4.4.1g</p>	<p>Reading Toolbox, p. 548, “Using FoldNotes”</p> <p>Inquiry Lab, p. 547, “A Closer Look at Gametes”</p>	Read Chapter 23, Section 1, pp. 546-551.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
99	Chapter 23 Opener and Section 1 (cont.)			Differentiated Instruction, p. 550, “K-W-L Chart”	Section 1 Review, p. 551, questions 1-7.
100	Chapter 23 Section 2, pp. 552-56	<ol style="list-style-type: none"> 1. What are the functions of the ovaries? 2. How does the female body prepare for pregnancy? 3. What changes occur in the female’s body when an ovum is not fertilized? 	4.4.1e 4.4.1f		Read Chapter 23, Section 2, pp. 552-556.
101	Chapter 23 Section 2 (cont.)			Math Skills, p. 554, “Calculating Percent”	Section 2 Review, p. 556, questions 1-7.
102	Chapter 23 Section 3, pp. 557-60	<ol style="list-style-type: none"> 1. How does fertilization occur? 2. What important events occur in the first trimester of pregnancy? 3. What important event occurs at the end of the third trimester of pregnancy? 	4.4.1c 4.4.1d 4.4.1f 4.4.1h	Teaching Key Ideas, p. 557 (Teachers Edition), “Rates of Development”	Read Chapter 23, Section 3, pp. 557-560.
103	Chapter 23 Section 3 (cont.)			Reading Toolbox, p. 558, “Recognizing Main Ideas”	Section 3 Review, p. 560, questions 1-6.
104	Chapter 23 Section 3 (cont.)			QuickLab, p. 559, “An Amniotic Shock Absorber”	Read Chapter 23, Section 4, pp. 561-566.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
105	Chapter 23 Section 4, pp. 561-66	<ol style="list-style-type: none"> How can you avoid being infected by an STI? What are some common STIs in the United States? 	4.5.2b 4.5.2f	QuickLab, p. 562, “STI Rates”	Section 4 Review, p. 563 questions 1-6.
106	Chapter 23 End of Chapter Review and Assessment, pp. 567-69			Why It Matters, p. 564, Research	Super Summary, (p. 566). http://go.hrw.com , keyword HX8RPRS.
107	Chapter 23 End of Chapter Review and Assessment (cont.)			Chapter 23 Lab, p. 565, “Sonography”	Regents Exam Practice, p. 567-568, questions 1-9.
108	Chapter 23 End of Chapter Review and Assessment (cont.)			Practice Assessment	Regents Exam Practice, pp. 568-569, questions 10-14.
109	Chapter 23 End of Chapter Review and Assessment (cont.)			Chapter Assessment	
110	Reteaching/ Remediation			Per Teacher Evaluation	Read Chapter 12, Section 1, pp. 267-7.

Unit 7—Genetics and Biotechnology

Living Environment Standards

Standard 1: Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.

Key Idea 3 The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into natural phenomena.

Standard 4: Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Key Idea 1 Living things are both similar to and different from each other and from nonliving things.

Key Idea 2 Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.

Key Idea 3 Individual organisms and species change over time.

Key Idea 4 The continuity of life is sustained through reproduction and development.

Key Idea 5 Organisms maintain a dynamic equilibrium that sustains life.

Chapter 12: Mendel and Heredity

Chapter 13: DNA, RNA, and Proteins

Chapter 14: Genes in Action

Chapter 15: Gene Technologies and Human Applications

Living Environment Standards

- 1.1.1c Science provides knowledge, but values are also essential to making effective and ethical decisions about the application of scientific knowledge. Hone ideas through reasoning, library research, and discussion with others, including experts.
- 1.3.2 Apply statistical analysis techniques when appropriate to test if chance alone explains the results.
- 4.1.2e The organs and systems of the body help to provide all the cells with their basic needs. The cells of the body are of different kinds and are grouped in ways that enhance how they function together.
- 4.1.2i Inside the cell a variety of specialized structures, formed from many different molecules, carry out the transport of materials (cytoplasm), extraction of energy from nutrients (mitochondria), protein building (ribosomes), waste disposal (cell membrane), storage (vacuole), and information storage (nucleus).
- 4.2.1a Genes are inherited, but their expression can be modified by interactions with the environment.
- 4.2.1b Every organism requires a set of coded instructions for specifying its traits. For offspring to resemble their parents, there must be a reliable way to transfer information from one generation to the next. Heredity is the passage of these instructions from one generation to another.
- 4.2.1c Hereditary information is contained in genes, located in the chromosomes of each cell. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait. A human cell contains many thousands of different genes in its nucleus.

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- 4.2.1f In all organisms, the coded instructions for specifying the characteristics of the organism are carried in DNA, a large molecule formed from subunits arranged in a sequence with bases of four kinds (represented by A, G, C, and T). The chemical and structural properties of DNA are the basis for how the genetic information that underlies heredity is both encoded in genes (as a string of molecular 'bases') and replicated by means of a template.
- 4.2.1g Cells store and use coded information. The genetic information stored in DNA is used to direct the synthesis of the thousands of proteins that each cell requires.
- 4.2.1h Genes are segments of DNA molecules. Any alteration of the DNA sequence is a mutation. Usually, an altered gene will be passed on to every cell that develops from it.
- 4.2.1i The work of the cell is carried out by the many different types of molecules it assembles, mostly proteins. Protein molecules are long, usually folded chains made from 20 different kinds of amino acids in a specific sequence. This sequence influences the shape of the protein. The shape of the protein, in turn, determines its function.
- 4.2.1j Offspring resemble their parents because they inherit similar genes that code for the production of proteins that form similar structures and perform similar functions.
- 4.2.1k The many body cells in an individual can be very different from one another, even though they are all descended from a single cell and thus have essentially identical genetic instructions. This is because different parts of these instructions are used in different types of cells, and are influenced by the cell's environment and past history.
- 4.2.2a For thousands of years new varieties of cultivated plants and domestic animals have resulted from selective breeding for particular traits.
- 4.2.2b In recent years new varieties of farm plants and animals have been engineered by manipulating their genetic instructions to produce new characteristics.
- 4.2.2c Different enzymes can be used to cut, copy, and move segments of DNA. Characteristics produced by the segments of DNA may be expressed when these segments are inserted into new organisms, such as bacteria.
- 4.2.2d Inserting, deleting, or substituting DNA segments can alter genes. An altered gene may be passed on to every cell that develops from it.
- 4.2.2e Knowledge of genetics is making possible new fields of health care; for example, finding genes which may have mutations that can cause disease will aid in the development of preventive measures to fight disease. Substances, such as hormones and enzymes, from genetically engineered organisms may reduce the cost and side effects of replacing missing body chemicals.
- 4.3.1b New inheritable characteristics can result from new combinations of existing genes or from mutations of genes in reproductive cells.
- 4.3.1c Mutation and the sorting and recombining of genes during meiosis and fertilization result in a great variety of possible gene combinations.
- 4.3.1d Mutations occur as random chance events. Gene mutations can also be caused by such agents as radiation and chemicals. When they occur in sex cells, the mutations can be passed on to offspring; if they occur in other cells, they can be passed on to other body cells only.
- 4.4.1b Some organisms reproduce asexually with all the genetic information coming from one parent. Other organisms reproduce sexually with half the genetic information typically contributed by each parent. Cloning is the production of identical genetic copies.
- 4.5.2e Vaccinations use weakened microbes (or parts of them) to stimulate the immune system to react. This reaction prepares the body to fight subsequent invasions by the same microbes.
- 4.5.2i Gene mutations in a cell can result in uncontrolled cell division, called cancer. Exposure of cells to certain chemicals and radiation increases mutations and thus increases the chance of cancer.
- 4.5.2j Biological research generates knowledge used to design ways of diagnosing, preventing, treating, controlling, or curing diseases of plants and animals.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
111	Chapter 12 Opener and Section 1, pp. 264-71	<ol style="list-style-type: none"> 1. Why was Gregor Mendel important for modern genetics? 2. Why did Mendel conduct experiments with garden peas? 3. What were the important steps in Mendel's first experiments? 4. What were the important results of Mendel's first experiments? 	4.2.2a	Inquiry Lab, p. 265, "What Are the Chances?"	Section 1 Review, page 270, questions 1-7.
112	Chapter 12 Section 1 (cont.) Section 2, pp. 272-75	<ol style="list-style-type: none"> 1. What patterns of heredity were explained by Mendel's hypotheses? 2. What is the law of segregation? 3. How does genotype relate to phenotype? 4. What is the law of independent assortment? 	4.2.1b 4.2.1c 4.2.1j	QuickLab, p. 270, "Mendel's Ratios"	Read section 2, pp. 272-275.
113	Chapter 12 Section 2 (cont.)			QuickLab, p. 273, "Dominant and Recessive Traits"	Section 2 Review, p. 275, questions 1-8.
114	Chapter 12 Section 3, pp. 276-81	<ol style="list-style-type: none"> 1. How can a Punnett square be used in genetics? 2. How can mathematical probability be used in genetics? 3. What information does a pedigree show? 	1.3.2 4.2.1c	QuickLab, p. 277, "Testcross"	Read Chapter 12, Section 3, pp. 276-281.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
115	Chapter 12 Opener and Section 4, pp. 282-86	<ol style="list-style-type: none"> 1. Are there exceptions to the simple Mendelian pattern of inheritance? 2. How do heredity and the environment interact to influence phenotype? 3. How do linked genes affect chromosome assortment and crossover during meiosis? 	4.2.1a 4.2.1c	QuickLab, p. 281 “Pedigree Analysis”	<p>Section 3 Review, p. 281, questions 1-8.</p> <p>Read Chapter 12, Section 4, pp. 282-286.</p>
116	Chapter 12 Section 4 (cont.)			Chapter 12 Lab, p. 285, “Plant Genetics”	Chapter 12 Regents Exam Practice, pp. 287-288, questions 1-9.
117	Chapter 12 End of Chapter Review and Assessment, pp. 287-89			Chapter practice test	Chapter 12 Regents Exam Practice, pp. 289, questions 10-11.
118	Chapter 12 End of Chapter Review and Assessment (cont.)			Chapter Assessment	Reading Toolbox, p. 292, Using Words, Using Language, Using Foldnotes.
119	Chapter 13 Opener and Section 1, pp. 290-99	<ol style="list-style-type: none"> 1. What is genetic material composed of? 2. What experiments helped identify the role of DNA? 3. What is the shape of a DNA molecule? 4. How is information organized in a DNA molecule? 5. What scientific investigations led to the discovery of DNA’s structure? 	4.2.1c 4.2.1f 4.2.1h	Inquiry Lab, p. 291, “Code Combinations”	Read Chapter 13, Section 1, pp. 292-299.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
120	Chapter 13 Section 1 (cont.)			QuickLab, p. 297, “DNA’s Structure”	Section 1 Review, p. 299, questions 1-8.
121	Chapter 13 Section 2, pp. 300-03	<ol style="list-style-type: none"> 1. How does DNA replicate, or make a copy of itself? 2. What are the roles of proteins in DNA replication? 3. How is DNA replication different in prokaryotes and eukaryotes? 	<p>4.2.1b 4.2.1f</p>	QuickLab, p. 303, “DNA Replication Rate”	<p>Read Chapter 13, Section 2, pp. 300-303.</p> <p>Section 2 Review, p. 303, questions 1-5.</p>
122	Chapter 13 Section 3, pp. 304-12	<ol style="list-style-type: none"> 1. What is the process of gene expression? 2. What role does RNA play in gene expression? 3. What happens during transcription? 4. How do codons determine the sequence of amino acids that results after translation? 5. What are the major steps of translation? 6. Do traits result from the expression of a single gene? 	<p>4.1.2i 4.2.1a 4.2.1g 4.2.1i</p>	QuickLab, p. 310, “Genetic Code of Keratin”	Chapter 13 Regents Exam Practice, pp. 313-314, questions 1-13.
123	Chapter 13 End of Chapter Review and Assessment, pp. 313-15			Chapter 13 Lab, p. 311, “DNA Extraction from Wheat Germ”	Chapter 13 Regents Exam Practice, pp. 314-315, questions 14-20.
124	Chapter 13 End of Chapter Review and Assessment, (cont.)			Chapter Assessment	Read Chapter 14, Section 1, pp. 319-324.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
125	Chapter 14 Opener and Section 1, pp. 316-24	<ol style="list-style-type: none"> 1. What is the origin of genetic differences among organisms? 2. What kinds of mutations are possible? 3. What are the possible effects of mutations? 4. How can genetic change occur on a larger scale? 	4.2.1h 4.2.2d 4.3.1c 4.3.1d 4.5.2i	Inquiry Lab, p. 317, “Where’s the Protein?”	Section 1 Review, p. 324, questions 1-7.
126	Chapter 14 Section 2, pp. 325-29	<ol style="list-style-type: none"> 1. Can the process of gene expression be controlled? 2. What is a common form of gene regulation in prokaryotes? 3. How does gene regulation in eukaryotes differ from gene regulation in prokaryotes? 4. Why are proteins so important and versatile? 	4.2.1a 4.2.1g 4.2.1i 4.2.1k	QuickLab, p. 321, “Make a Model of Mutations”	Read Chapter 14, Section 2, pp. 325-329. Section 2 Review, p. 329, questions 1-6.
127	Chapter 14 Section 2 (cont.)			QuickLab, p. 328, “A Model of Introns and Exons”	Read Chapter 14, Section 3, pp. 330-338.
128	Chapter 14 Section 3, pp. 330-38	<ol style="list-style-type: none"> 1. What can we learn by comparing genomes? 2. Can genetic material be stored and transferred by mechanisms other than chromosomes? 3. What are the roles of genes in multicellular development? 	4.1.2e 4.2.1k 4.3.1b	Why It Matters, p. 334, Quick Project	Section 3 Review, p. 334, questions 1-6.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
129	Chapter 14 End of Chapter Review and Assessment, pp. 339-41			Chapter 14 Lab, pp. 336-337, “Protein Detection”	Chapter 14 Regents Exam Practice, pp. 339-341, questions 1-18.
130	Chapter 14 End of Chapter Review and Assessment (cont.)			Chapter Assessment	Read Chapter 15, Section 1, pp. 345-349. Section 1 Review, p. 348, questions 1-5.
131	Chapter 15 Opener and Section 1, pp. 342-49	<ol style="list-style-type: none"> 1. Why is the Human Genome Project so important? 2. How do genomics and gene technologies affect our lives? 3. What questions about the human genome remain to be studied? 	1.1.1c 4.2.2e 4.5.2e 4.5.2j	Inquiry Lab, p. 343, “Code Comparisons”	Read Chapter 15, Section 2, pp. 350-354. Section 2 Review, p. 354, questions 1-5.
132	Chapter 15 Section 2, pp. 350-54	<ol style="list-style-type: none"> 1. For what purposes are genes and proteins manipulated? 2. How are cloning and stem cell research related? 3. What ethical issues arise with the uses of gene technologies? 	1.1.1c 4.2.2b 4.2.2c 4.2.2d 4.4.1b	QuickLab, p. 347, “Forensic DNA Fingerprints”	Read Chapter 15, Section 3, pp. 355-366.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
133	Chapter 15 Section 3, pp. 355-66	<ol style="list-style-type: none"> 1. What are the basic tools of genetic manipulation? 2. How are these tools used in the major processes of modern gene technologies? 3. How do scientists study entire genomes? 	4.2.2c	QuickLab, p. 356, “Gel Electrophoresis Model”	Section 3 Review, p. 363, questions 1-7.
134	Chapter 15 End of Chapter Review and Assessment, pp. 367-71			Chapter 15 Lab, p. 364-365, “DNA Fingerprint Analysis”	Chapter 15 Regents Exam Practice, pp. 367-369, questions 1-18.
135	Chapter 15 End of Chapter Review and Assessment (cont.)			Chapter Assessment	

Unit 8—Evolution

Living Environment Standards

Standard 1: Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.

Key Idea 1 The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing and creative process.

Key Idea 2 Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.

Standard 4: Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Key Idea 2 Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.

Key Idea 3 Individual organisms and species change over time.

Key Idea 4 The continuity of life is sustained through reproduction and development.

Key Idea 6 Plants and animals depend on each other and their physical environment.

Chapter 16: Evolutionary Theory

Chapter 17: Population Genetics and Speciation

Living Environment Standards

1.1.1a Scientific explanations are built by combining evidence that can be observed with what people already know about the world.

1.1.4a Well-accepted theories are ones that are supported by different kinds of scientific investigations often involving the contributions of individuals from different disciplines.

4.2.1h Genes are segments of DNA molecules. Any alteration of the DNA sequence is a mutation. Usually, an altered gene will be passed on to every cell that develops from it.

4.2.2a For thousands of years new varieties of cultivated plants and domestic animals have resulted from selective breeding for particular traits.

4.3.1a The basic theory of biological evolution states that the Earth's present-day species developed from earlier, distinctly different species.

4.3.1b New inheritable characteristics can result from new combinations of existing genes or from mutations of genes in reproductive cells.

4.3.1c Mutation and the sorting and recombining of genes during meiosis and fertilization result in a great variety of possible gene combinations.

4.3.1d Mutations occur as random chance events. Gene mutations can also be caused by such agents as radiation and chemicals. When they occur in sex cells, the mutations can be passed on to offspring; if they occur in other cells, they can be passed on to other body cells only.

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- 4.3.1e Natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life-forms, as well as for the molecular and structural similarities observed among the diverse species of living organisms.
- 4.3.1f Species evolve over time. Evolution is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection by the environment of those offspring better able to survive and leave offspring.
- 4.3.1g Some characteristics give individuals an advantage over others in surviving and reproducing, and the advantaged offspring, in turn, are more likely than others to survive and reproduce. The proportion of individuals that have advantageous characteristics will increase.
- 4.3.1h The variation of organisms within a species increases the likelihood that at least some members of the species will survive under changed environmental conditions.
- 4.3.1i Behaviors have evolved through natural selection. The broad patterns of behavior exhibited by organisms are those that have resulted in greater reproductive success.
- 4.3.1k Evolution does not necessitate long-term progress in some set direction. Evolutionary changes appear to be like the growth of a bush: Some branches survive from the beginning with little or no change, many die out altogether, and others branch repeatedly, sometimes giving rise to more complex organisms.
- 4.3.1l Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival. Fossils indicate that many organisms that lived long ago are extinct. Extinction of species is common; most of the species that have lived on Earth no longer exist.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
136	Chapter 16 Opener and Section 1, pp. 372-79	<ol style="list-style-type: none"> 1. Why is evolutionary theory associated with Charles Darwin? 2. How was Darwin influenced by his personal experiences? 3. How was Darwin influenced by the ideas of others? 	1.1.1a 1.1.4a 4.2.2a 4.3.1a	Inquiry Lab, p. 373, “Scientific Inference”	Read Chapter 16, Section 1, pp. 375-379. Section 1 Review, p. 379, questions 1-5.
137	Chapter 16 Section 1 (cont.)			QuickLab, p. 378, “Two Kinds of Growth”	Read Chapter 16, Section 2, pp. 380-385. Section 2 Review, p. 385, questions 1-5.
138	Chapter 16 Section 2, pp. 380-85	<ol style="list-style-type: none"> 1. What does Darwin’s theory predict? 2. Why are Darwin’s ideas now widely accepted? 3. What were the strengths and weaknesses of Darwin’s ideas? 	4.3.1e 4.3.1f 4.3.1g 4.3.1h 4.3.1i	Interact online, p. 381, “Evolution by Natural Selection” (http://go.hrw.com – code HX8EVOF6) Teaching Key Ideas, p. 381 (Teachers Edition), “Process of Natural Selection”	Read Chapter 16, Section 3, pp. 386-392. Section 3 Review, p. 389, questions 1-3.
139	Chapter 16 Section 3, pp. 386-92	<ol style="list-style-type: none"> 1. How has Darwin’s theory been updated? 2. At what scales can evolution be studied? 	4.3.1b 4.3.1f 4.3.1g 4.3.1k	QuickLab, p. 387, “Selection Model”	Chapter 16 Regents Exam Practice, p. 393, questions 1-7.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
140	Chapter 16 End of Chapter Review and Assessment, pp. 393-95			Chapter 16 Lab, pp. 390-391, “Natural Selection Simulation”	Chapter 16 Regents Exam Practice, pp. 394-395, questions 8-12.
141	Chapter 16 End of Chapter Review and Assessment (cont.)			Reteaching Key Ideas, p. 392 (Teachers Edition), “Models” and “Crossword Study Tool”	Super Summary, http://go.hrw.com , keyword HX8EVOS.
142	Chapter 16 End of Chapter Review and Assessment (cont.)			Chapter Assessment	Read chapter 17, Section 1, pp. 396-403. Section 1 Review, p. 403, questions 1-4.
143	Chapter 17 Opener and Section 1, pp. 396-403	<ol style="list-style-type: none"> 1. How is microevolution studied? 2. How is phenotypic variation measured? 3. How are genetic variation and change measured? 4. How does genetic variation originate? 	<p>4.2.1h</p> <p>4.3.1b</p> <p>4.3.1c</p> <p>4.3.1d</p> <p>4.3.1f</p>	QuickLab, p. 403, “Alleles: The Next Generation”	<p>Section 1 Review, p. 403, questions 5-7</p> <p>Read chapter 17, Section 2, pp. 404-410.</p>
144	Chapter 17 Section 1 (cont.) Section 2, pp. 404-10	<ol style="list-style-type: none"> 1. What does the Hardy-Weinberg principle predict? 2. How does sexual reproduction influence evolution? 3. Why does population size matter? 4. What are the limits of the force of natural selection? 5. What patterns can result from natural selection? 	<p>4.3.1b</p> <p>4.3.1c</p> <p>4.3.1f</p> <p>4.3.1g</p> <p>4.3.1i</p>	Math Skills, p. 405, “Hardy- Weinberg Equation”	Section 2 Review, p. 409, questions 1-7.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
145	Chapter 17 Section 2 (cont.)			QuickLab, p. 407, “Genetic Risk Assessment”	Read chapter 17, Section 3, pp. 411-416.
146	Chapter 17 Section 3, pp. 411-16	<ol style="list-style-type: none"> 1. How can species be defined? 2. How do we know when new species have been formed? 3. Why is studying extinction important to understanding evolution? 	4.3.11	Demonstration, p. 412 (Teachers Edition), “Forming a New Species”	Section 3 Review, p. 414, questions 1-6.
147	Chapter 17 End of Chapter Review and Assessment, pp. 417-19			Chapter 17 Lab, p. 415, “Genetic Drift”	Chapter 17 Regents Exam Practice, p. 417, questions 1-8.
148	Chapter 17 End of Chapter Review and Assessment (cont.)			Why it Matters, p. 410, “Quick Project” (Best scheduled in a computer Lab)	Chapter 17 Regents Exam Practice, pp. 418-419, questions 9-17.
149	Chapter 17 End of Chapter Review and Assessment (cont.)			Practice Test	Teacher discretion — based on practice test outcomes.
150	Chapter 17 End of Chapter Review and Assessment (cont.)			Chapter Assessment	

Unit 9—Human Influences on the Environment

Living Environment Standards

Standard 1: Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.

Key Idea 1 The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing and creative process.

Key Idea 2 Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.

Key Idea 3 The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into natural phenomena.

Standard 4: Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Key Idea 1 Living things are both similar to and different from each other and from nonliving things.

Key Idea 2 Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.

Key Idea 4 The continuity of life is sustained through reproduction and development.

Key Idea 5 Organisms maintain a dynamic equilibrium that sustains life.

Key Idea 6 Plants and animals depend on each other and their physical environment.

Key Idea 7 Human decisions and activities have had a profound impact on the physical and living environment.

Chapter 2: Applications of Biology

Chapter 6: The Environment (Review)

Living Environment Standards

1.1.1a Scientific explanations are built by combining evidence that can be observed with what people already know about the world.

1.1.1c In all environments, organisms compete for vital resources. The linked and changing interactions of populations and the environment compose the total ecosystem.

4.2.2b In recent years new varieties of farm plants and animals have been engineered by manipulating their genetic instructions to produce new characteristics.

4.2.2e Knowledge of genetics is making possible new fields of health care; for example, finding genes which may have mutations that can cause disease will aid in the development of preventive measures to fight disease. Substances, such as hormones and enzymes, from genetically engineered organisms may reduce the cost and side effects of replacing missing body chemicals.

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- 4.5.2e Vaccinations use weakened microbes (or parts of them) to stimulate the immune system to react. This reaction prepares the body to fight subsequent invasions by the same microbes.
- 4.5.2j Biological research generates knowledge used to design ways of diagnosing, preventing, treating, controlling, or curing diseases of plants and animals.
- 4.6.2b Biodiversity also ensures the availability of a rich variety of genetic material that may lead to future agricultural or medical discoveries with significant value to humankind. As diversity is lost, potential sources of these materials may be lost with it.
- 4.7.1a The Earth has finite resources; increasing human consumption of resources places stress on the natural processes that renew some resources and deplete those resources that cannot be renewed.
- 4.7.1b Natural ecosystems provide an array of basic processes that affect humans. Those processes include but are not limited to: maintenance of the quality of the atmosphere, generation of soils, control of the water cycle, removal of wastes, energy flow, and recycling of nutrients. Humans are changing many of these basic processes and the changes may be detrimental.
- 4.7.1c Human beings are part of the Earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems. Humans modify ecosystems as a result of population growth, consumption, and technology. Human destruction of habitats through direct harvesting, pollution, atmospheric changes, and other factors is threatening current global stability, and if not addressed, ecosystems may be irreversibly affected.
- 4.7.2a Human activities that degrade ecosystems result in a loss of diversity of the living and nonliving environment. For example, the influence of humans on other organisms occurs through land use and pollution. Land use decreases the space and resources available to other species, and pollution changes the chemical composition of air, soil, and water.
- 4.7.2b When humans alter ecosystems either by adding or removing specific organisms, serious consequences may result. For example, planting large expanses of one crop reduces the biodiversity of the area.
- 4.7.2c Industrialization brings an increased demand for and use of energy and other resources including fossil and nuclear fuels. This usage can have positive and negative effects on humans and ecosystems.
- 4.7.3a Societies must decide on proposals which involve the introduction of new technologies. Individuals need to make decisions which will assess risks, costs, benefits, and trade-offs.
- 4.7.3b The decisions of one generation both provide and limit the range of possibilities open to the next generation.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
151	Chapter 2 Opener and Section 1, pp. 26-32	<ol style="list-style-type: none"> How are biologists working to eliminate major diseases that affect human populations? How has our understanding of the biological nature of disease changed over time? How might medical advances improve and extend human lives? 	1.1.1a 4.2.2e 4.5.2e 4.5.2.	Inquiry Lab, p. 27, “Artificial Shark Skin”	Read Chapter 2, Section 1, pp. 26-32.
152	Chapter 2 Section 1 (cont.) Section 2, pp. 33-37	<ol style="list-style-type: none"> What is one way that genetic engineering affects our lives? How has biotechnology provided new tools for scientists to understand biological processes? How are biological factors used to verify an individual’s identity and to ensure public safety? What ethical issues are raised by the use of biotechnology? 	1.1.1c 4.2.2b 4.5.2j 4.7.3a	QuickLab, p. 31, “Model a Low-Tech Solution”	Section 1 Review, p. 32, questions 1-5. Read Chapter 2, Section 2, pp. 33-37.
153	Chapter 2 Section 2 (cont.)			QuickLab, p. 34, “Biomimetic Engineering”	Section 2 Review, p. 37, questions 1-6. Read chapter 2, Section 3, pp. 38-44.
154	Chapter 2 Section 3, pp. 38-44	<ol style="list-style-type: none"> How does biological research help protect the environment? How do new technologies help us study the environment? How do biologists rely on the contributions of community members to develop solutions for environmental problems? 		Reading Toolbox, p. 39, “Three-panel Flip Chart”	Section 3 Review, p. 40, questions 1-5.

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
155	Chapter 2 End of Chapter Review and Assessment, pp. 45-47			Skills Practice Lab, pp. 42-43, “Microbe Growth”	Chapter 2 Regents Exam Practice, pp. 45-46, questions 1-8.
156	Chapter 2 End of Chapter Review and Assessment (cont.)			Why It Matters, p. 41, “Quick Project” Skills Practice Lab, pp. 42-43, “Microbe Growth” – Day 2.	Chapter 2 Regents Exam Practice, pp. 46-47, questions 9-16.
157	Chapter 2 End of Chapter Review and Assessment (cont.)			Chapter Assessment	

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
158	Review of Chapter 6 Concepts	<ol style="list-style-type: none"> 1. How are humans and the environment connected? 2. What is the difference between renewable resources and nonrenewable resources? 3. How can the state of the environment affect a person’s health and quality of life? 4. What are the effects of air pollution? 5. How might burning fossil fuels lead to climate change? 6. What are some sources of water pollution? 7. Why is soil erosion a problem? 8. How does ecosystem disruption affect humans? 9. How do conservation and restoration solve environmental issues? 10. What are three ways that people can reduce the use of environmental resources? 11. How can research and technology affect the environment? 12. How do education and advocacy play a part in preserving the environment? 13. Why is it important for societies to consider environmental impact when planning for the future? 	<p>4.6.2b 4.7.1a 4.7.1b 4.7.1c 4.7.2a 4.7.2b 4.7.2c 4.7.1c 4.7.3a 4.7.3b</p>		

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DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
159	Review of Chapter 6 Concepts (cont.)				
160	Exploration Lab: Effects of Acid Precipitation (Chapter 6 – Chapter Resource File)				
161	Exploration Lab: Effects of Acid Precipitation (cont.)				
162	Exploration Lab: Effects of Acid Precipitation (cont.)				
163	Exploration Lab: Effects of Acid Precipitation (cont.)				
164	Inquiry Lab: How Pollutants Affect a Lake (Chapter 6 – Chapter Resource File)				
165	Inquiry Lab: How Pollutants Affect a Lake (cont.)				

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Unit 10—Review					
DAY*	CHAPTER/ SECTION	KEY IDEAS	NYS CORE CURRICULUM	HANDS ON	HOMEWORK SUGGESTIONS
150		First Term Topics Regents Exam Prep		Inquiry Lab: How Pollutants Affect a Lake (cont. data collection)	
151		First Term Topics Regents Exam Prep		Inquiry Lab: How Pollutants Affect a Lake (cont. data collection)	
152		First Term Topics Regents Exam Prep		Inquiry Lab: How Pollutants Affect a Lake (cont. data collection)	
153		First Term Topics Regents Exam Prep		Inquiry Lab: How Pollutants Affect a Lake (cont. data collection)	
154		First Term Topics Regents Exam Prep			
156		First Term Topics Regents Exam Prep			
157		First Term Topics Regents Exam Prep			
158		First Term Topics Regents Exam Prep			
159		First Term Topics Regents Exam Prep			

* A Day equals a 45-minute period.