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National Science Education Standards
Grades 5-8

National Science Education Standards Grades 5-8	Scholastic <i>ReadAbout</i> ©2005
Physical Science	
CONTENT STANDARD B:	
As a result of their activities in grades 5-8, all students should develop an understanding of	
Motions and forces	
<ul style="list-style-type: none"> The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph. 	The following SmartFiles and software passages address this objective: <i>Secrets of Thrill Rides</i>
<ul style="list-style-type: none"> An object that is not being subjected to a force will continue to move at a constant speed and in a straight line. 	The following SmartFiles and software passages address this objective: <i>Secrets of Thrill Rides</i>
<ul style="list-style-type: none"> If more than one force acts on an object along a straight line, then the forces will reinforce or cancel one another, depending on their direction and magnitude. Unbalanced forces will cause changes in the speed or direction of an object's motion. 	The following SmartFiles and software passages address this objective: <i>Secrets of Thrill Rides</i>
Transfer of Energy	
<ul style="list-style-type: none"> Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways. 	The following SmartFiles and software passages address this objective: <i>High-Speed Sports</i>
<ul style="list-style-type: none"> The sun is a major source of energy for changes on the earth's surface. The sun loses energy by emitting light. A tiny fraction of that light reaches the earth, transferring energy from the sun to the earth. The sun's energy arrives as light with a range of wavelengths, consisting of visible light, infrared, and ultraviolet radiation. 	The following SmartFiles and software passages address this objective: <i>Sun, Moon & Stars</i>

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Life Science	
CONTENT STANDARD C:	
As a result of their activities in grades 5-8, all students should develop understanding of	
Structure and function in living systems	
<ul style="list-style-type: none"> • Living systems at all levels of organization demonstrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems. 	The following SmartFiles and software passages address this objective: <i>Bionic Parts for People; Inside Your Brain</i>
<ul style="list-style-type: none"> • Specialized cells perform specialized functions in multicellular organisms. Groups of specialized cells cooperate to form a tissue, such as a muscle. Different tissues are in turn grouped together to form larger functional units, called organs. Each type of cell, tissue, and organ has a distinct structure and set of functions that serve the organism as a whole. 	The following SmartFiles and software passages address this objective: <i>Bionic Parts for People; Inside Your Brain</i>
<ul style="list-style-type: none"> • The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control, and coordination, and for protection from disease. These systems interact with one another. 	The following SmartFiles and software passages address this objective: <i>Bionic Parts for People; Inside Your Brain</i>
<ul style="list-style-type: none"> • Disease is a breakdown in structures or functions of an organism. Some diseases are the result of intrinsic failures of the system. Others are the result of damage by infection by other organisms. 	The following SmartFiles and software passages address this objective: <i>Plant Planet; Super Vision</i>

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Reproduction and heredity	
<ul style="list-style-type: none"> Reproduction is a characteristic of all living systems; because no individual organism lives forever, reproduction is essential to the continuation of every species. Some organisms reproduce asexually. Other organisms reproduce sexually. 	The following SmartFiles and software passages address this objective: <i>Plant Planet</i>
<ul style="list-style-type: none"> In many species, including humans, females produce eggs and males produce sperm. Plants also reproduce sexually—the egg and sperm are produced in the flowers of flowering plants. An egg and sperm unite to begin development of a new individual. That new individual receives genetic information from its mother (via the egg) and its father (via the sperm). Sexually produced offspring never are identical to either of their parents. 	The following SmartFiles and software passages address this objective: <i>Plant Planet</i>
<ul style="list-style-type: none"> Every organism requires a set of instructions for specifying its traits. Heredity is the passage of these instructions from one generation to another. 	The following SmartFiles and software passages address this objective: <i>Plant Planet</i>
<ul style="list-style-type: none"> Hereditary information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. 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. 	The following SmartFiles and software passages address this objective: <i>Plant Planet</i>
<ul style="list-style-type: none"> The characteristics of an organism can be described in terms of a combination of traits. Some traits are inherited and others result from interactions with the 	The following SmartFiles and software passages address this objective: <i>Plant Planet</i>

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environment.	
Regulation and behavior	
<ul style="list-style-type: none"> All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment. 	The following SmartFiles and software passages address this objective: <i>Extreme Survival</i>
<ul style="list-style-type: none"> Regulation of an organism’s internal environment involves sensing the internal environment and changing physiological activities to keep conditions within the range required to survive. 	The following SmartFiles and software passages address this objective: <i>Extreme Survival</i>
<ul style="list-style-type: none"> Behavior is one kind of response an organism can make to an internal or environmental stimulus. A behavioral response requires coordination and communication at many levels, including cells, organ systems, and whole organisms. Behavioral response is a set of actions determined in part by heredity and in part from experience. 	The following SmartFiles and software passages address this objective: <i>Animal Journeys; Animals in Danger; Creature Teachers; Life in the Everglades; Extreme Survival; Living With Wild Animals; Animal Heroes</i>
<ul style="list-style-type: none"> An organism’s behavior evolves through adaptation to its environment. How a species moves, obtains food, reproduces, and responds to danger are based in the species’ evolutionary history. 	The following SmartFiles and software passages address this objective: <i>Animal Journeys; Living With Wild Animals; Extreme Survival; Animal Heroes</i>

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Populations and ecosystems	
<ul style="list-style-type: none"> A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem. 	<p>The following SmartFiles and software passages address this objective: <i>Animals in Danger; Life in the Everglades</i></p>
<ul style="list-style-type: none"> Populations of organisms can be categorized by the function they serve in an ecosystem. Plants and some micro-organisms are producers—they make their own food. All animals, including humans, are consumers, which obtain food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. Food webs identify the relationships among producers, consumers, and decomposers in an ecosystem. 	<p>The following SmartFiles and software passages address this objective: <i>Animals in Danger; Life in the Everglades</i></p>
<ul style="list-style-type: none"> For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs. 	<p>The following SmartFiles and software passages address this objective: <i>Plant Planet; Life in the Everglades</i></p>
<ul style="list-style-type: none"> The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem. 	<p>The following SmartFiles and software passages address this objective: <i>Life in the Everglades</i></p>

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Diversity and adaptations of organisms	
<ul style="list-style-type: none"> • Millions of species of animals, plants, and microorganisms are alive today. Although different species might look dissimilar, the unity among organisms becomes apparent from an analysis of internal structures, the similarity of their chemical processes, and the evidence of common ancestry. 	<p>The following SmartFiles and software passages address this objective: <i>Extreme Survival</i></p>
<ul style="list-style-type: none"> • Biological evolution accounts for the diversity of species developed through gradual processes over many generations. Species acquire many of their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations in populations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment. 	<p>The following SmartFiles and software passages address this objective: <i>Extreme Survival</i></p>
<ul style="list-style-type: none"> • 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 the earth no longer exist. 	<p>The following SmartFiles and software passages address this objective: <i>Animals in Danger; Fossil Finders</i></p>

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Earth and Space Science	
CONTENT STANDARD D:	
As a result of their activities in grades 5-8, all students should develop an understanding of	
Structure of the earth system	
<ul style="list-style-type: none"> Lithospheric plates on the scales of continents and oceans constantly move at rates of centimeters per year in response to movements in the mantle. Major geological events, such as earthquakes, volcanic eruptions, and mountain building, result from these plate motions. 	The following SmartFiles and software passages address this objective: <i>Deep in the Earth; Earth Shakers; Disasters!</i>
<ul style="list-style-type: none"> Land forms are the result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, while destructive forces include weathering and erosion. 	The following SmartFiles and software passages address this objective: <i>Deep in the Earth; Earth Shakers; Disasters!</i>
<ul style="list-style-type: none"> Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle." Water evaporates from the earth's surface, rises and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil, and in rocks underground. 	The following SmartFiles and software passages address this objective: <i>Killer Snow</i>
<ul style="list-style-type: none"> Water is a solvent. As it passes through the water cycle it dissolves minerals and gases and carries them to the oceans. 	The following SmartFiles and software passages address this objective: <i>Killer Snow</i>
<ul style="list-style-type: none"> The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations. 	The following SmartFiles and software passages address this objective: <i>Balloons & Zeppelins</i>
<ul style="list-style-type: none"> Clouds, formed by the condensation of water vapor, affect weather and climate. 	The following SmartFiles and software passages address this objective: <i>Killer Snow; Balloons & Zeppelins</i>

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<ul style="list-style-type: none"> Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat. 	The following SmartFiles and software passages address this objective: <i>Balloons & Zeppelins</i>
Earth's history	
<ul style="list-style-type: none"> The earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past. Earth history is also influenced by occasional catastrophes, such as the impact of an asteroid or comet. 	The following SmartFiles and software passages address this objective: <i>Deep in the Earth</i>
<ul style="list-style-type: none"> Fossils provide important evidence of how life and environmental conditions have changed. 	The following SmartFiles and software passages address this objective: <i>Fossil Finders</i>
Earth in the solar system	
<ul style="list-style-type: none"> The earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons, and smaller objects, such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system. 	The following SmartFiles and software passages address this objective: <i>Mars; Sun, Moon & Stars</i>
<ul style="list-style-type: none"> Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses. 	The following SmartFiles and software passages address this objective: <i>Sun, Moon & Stars</i>
<ul style="list-style-type: none"> Gravity is the force that keeps planets in orbit around the sun and governs the rest of the motion in the solar system. Gravity alone holds us to the earth's surface and explains the phenomena of the tides. 	The following SmartFiles and software passages address this objective: <i>Mars; Secrets of Thrill Rides</i>

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<ul style="list-style-type: none"> The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day. 	<p>The following SmartFiles and software passages address this objective: <i>Sun, Moon & Stars</i></p>
Science and Technology	
CONTENT STANDARD E:	
As a result of activities in grades 5-8, all students should develop	
Abilities of technological design	
Understanding about science and technology	
<ul style="list-style-type: none"> Many different people in different cultures have made and continue to make contributions to science and technology. 	<p>The following SmartFiles and software passages address this objective: <i>Animal Journeys; Inside Your Brain; Life Savers; Shocking Discoveries; Animal Rescuers</i></p>
<ul style="list-style-type: none"> Science and technology are reciprocal. Science helps drive technology, as it addresses questions that demand more sophisticated instruments and provides principles for better instrumentation and technique. Technology is essential to science, because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable due to factors such as quantity, distance, location, size, and speed. Technology also provides tools for investigations, inquiry, and analysis. 	<p>The following SmartFiles and software passages address this objective: <i>Super Vision</i></p>
<ul style="list-style-type: none"> Perfectly designed solutions do not exist. All technological solutions have trade-offs, such as safety, cost, efficiency, and appearance. Engineers often build in back-up systems to provide safety. Risk is part of living in a highly technological world. Reducing risk often results in new technology. 	<p>The following SmartFiles and software passages address this objective: <i>Life Savers; Shocking Discoveries</i></p>

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<ul style="list-style-type: none"> Technological solutions have intended benefits and unintended consequences. Some consequences can be predicted, others cannot. 	<p>The following SmartFiles and software passages address this objective: <i>Life Savers</i>; <i>Shocking Discoveries</i></p>
Science in Personal and Social Perspectives	
CONTENT STANDARD F:	
As a result of activities in grades 5-8, all students should develop understanding of	
Personal health	
<ul style="list-style-type: none"> Regular exercise is important to the maintenance and improvement of health. The benefits of physical fitness include maintaining healthy weight, having energy and strength for routine activities, good muscle tone, bone strength, strong heart/lung systems, and improved mental health. Personal exercise, especially developing cardiovascular endurance, is the foundation of physical fitness. 	<p>The following SmartFiles and software passages address this objective: <i>Ultimate Athletes</i>; <i>Young Superstars</i></p>
<ul style="list-style-type: none"> The potential for accidents and the existence of hazards imposes the need for injury prevention. Safe living involves the development and use of safety precautions and the recognition of risk in personal decisions. Injury prevention has personal and social dimensions. 	<p>The following SmartFiles and software passages address this objective: <i>Rules of Your Life</i></p>
<ul style="list-style-type: none"> Food provides energy and nutrients for growth and development. Nutrition requirements vary with body weight, age, sex, activity, and body functioning. 	<p>The following SmartFiles and software passages address this objective: <i>Super Foods</i></p>
<ul style="list-style-type: none"> Sex drive is a natural human function that requires understanding. Sex is also a prominent means of transmitting diseases. The diseases can be prevented through a variety of precautions. 	<p>The following SmartFiles and software passages address this objective: <i>Plant Planet</i>; <i>Super Vision</i></p>
Populations, resources, and environments	

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<ul style="list-style-type: none"> When an area becomes overpopulated, the environment will become degraded due to the increased use of resources. 	The following SmartFiles and software passages address this objective: <i>Animals in Danger; Living With Wild Animals</i>
Natural hazards	
<ul style="list-style-type: none"> Internal and external processes of the earth system cause natural hazards, events that change or destroy human and wildlife habitats, damage property, and harm or kill humans. Natural hazards include earthquakes, landslides, wildfires, volcanic eruptions, floods, storms, and even possible impacts of asteroid. 	The following SmartFiles and software passages address this objective: <i>Deep in the Earth; Earth Shakers; Killer Snow; Twisters</i>
<ul style="list-style-type: none"> Human activities also can induce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal. Such activities can accelerate many natural changes. 	The following SmartFiles and software passages address this objective: <i>Animals in Danger; Living With Wild Animals</i>

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Risks and benefits	
<ul style="list-style-type: none"> Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes, and volcanic eruptions), with chemical hazards (pollutants in air, water, soil, and food), with biological hazards (pollen, viruses, bacterial, and parasites), social hazards (occupational safety and transportation), and with personal hazards (smoking, dieting, and drinking). 	<p>The following SmartFiles and software passages address this objective: <i>Deep in the Earth; Earth Shakers; Killer Snow; Twisters</i></p>
Science and technology in society	
<ul style="list-style-type: none"> Science and technology have advanced through contributions of many different people, in different cultures, at different times in history. Science and technology have contributed enormously to economic growth and productivity among societies and groups within societies. 	<p>The following SmartFiles and software passages address this objective: <i>Animal Journeys; Inside Your Brain; Life Savers; Shocking Discoveries; Super Vision; From Hollywood to Hip-Hop; High-Tech Superstars; Secret Messages; Animal Rescuers</i></p>
<ul style="list-style-type: none"> Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies. 	<p>The following SmartFiles and software passages address this objective: <i>Cool Colleges; Cool Jobs</i></p> <p>In addition, the Featured Career section on each Science SmartFile offers students a summary of a different science career and asks questions to determine if the student would enjoy each job.</p>

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History and Nature of Science	
CONTENT STANDARD G:	
As a result of activities in grades 5-8, all students should develop understanding of	
Science as a human endeavor	
<ul style="list-style-type: none"> Women and men of various social and ethnic backgrounds—and with diverse interests, talents, qualities, and motivations—engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others. 	<p>The following SmartFiles and software passages address this objective: <i>Animal Journeys; Inside Your Brain; Life Savers; Shocking Discoveries; Animal Rescuers; Cool Colleges; Cool Jobs</i></p>
History of science	
<ul style="list-style-type: none"> Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society. 	<p>The following SmartFiles and software passages address this objective: <i>Animal Journeys; Inside Your Brain; Life Savers; Shocking Discoveries; Animal Rescuers</i></p>
<ul style="list-style-type: none"> In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture. 	<p>The following SmartFiles and software passages address this objective: <i>Animal Journeys; Inside Your Brain; Life Savers; Shocking Discoveries; Animal Rescuers</i></p>