Science Content Standards
Domain I: How Humans Think While Understanding the Natural World
Science as Inquiry Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
DOING SCIENTIFIC INQUIRY 1. Students demonstrate the skills necessary to engage in scientific inquiry. **In other words,** inquiry is a process that scientists use to generate new knowledge. Students ask questions, plan and conduct investigations, use appropriate tools and techniques to gather and organize data, analyze and interpret data logically and critically, communicate findings clearly, and defend and revise conclusions based on evidence. **For example,** students inquire about and investigate their wonderings about things occurring in and outside the classroom.	· Develop questions and hypotheses that can be answered through scientific investigations. · Design and conduct scientific investigations to answer questions or to test hypotheses. · Collect, organize, analyze and display data/information, using tools, equipment, and techniques that will help in data collection, analysis, and interpretation. · Develop conclusions and explanations showing the relationship between evidence and results drawn. · Communicate and defend scientific procedure used and conclusion and explanation drawn from evidence. · Reflect and revise conclusion and explanation based on new evidence given from other valid points of view.	In *FAST* students conduct inquiry laboratory and field investigations about 80% of the time. Throughout *FAST* students design and carry out their own investigations. Careful attention is paid to experimental design including the use of controls, replication of experimental results, and setting of proper standards. *FAST* investigations rely on replication of data and group consensus on the interpretation of results. Throughout *FAST* attention is given to observations, interpretations and graphic analysis as influenced by expectations. Specific examples where students examine bias include: the use of the cold water potometer; data collection on air and water quality in *FAST* 1; development of the fluid model of heat in *FAST* 2; the histories on the development of the theories of plate tectonics and on the origins of the universe in *FAST* 3; as well as logic for replication of experimentation throughout *FAST*.

Science Content Standards
Domain I: How Humans Think While Understanding the Natural World
Habits of Mind Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
LIVING THE VALUES, ATTITUDES, AND COMMITMENTS OF THE INQUIRING MIND 2. Students apply the values, attitudes, and commitments characteristic of an inquiring mind. **In other words,** students value honesty as an important characteristic in life and in experimenting; they value critical-mindedness as an important way of evaluating information; they value the need for evidence to support statements of beliefs and explanations; they value objectivity as criteria necessary for problem-solving; they value the quality of open-mindedness as a means of evaluating their/other's ideas; they realize that a questioning attitude is necessary to validate, contradict, clarify, or expand on an idea or statement; they believe in themselves and are self-directed; and students value science as a way of thinking and knowing. **For example,** students demonstrate that they value honesty when they report data accurately even when the data contradicts their hypothesis. Students demonstrate that they value open-mindedness when they consider and evaluate ideas presented by other points of view.	HONESTY · Report observations even when they contradict a hypothesis. · Acknowledge references, contributions, and work done by others. CRITICAL-MINDEDNESS · Evaluate empirical evidence to develop reasonable conclusions and explanations and compare them to current scientific knowledge. OBJECTIVITY · Examine several possible options when investigating a problem. Distinguish between facts and speculations/inferences. OPEN-MINDEDNESS · Evaluate all evidence that support or contradict the hypothesis. QUESTIONING · Ask questions to understand the multiple perspectives and interpretations of a problem, situation, or solution. SELF-DIRECTED · Locate, identify, and use a wide variety of appropriate information to draw conclusions in a research project. VALUE SCIENCE · Ask questions, explain, and elaborate how science is a way of thinking and knowing the world around us.	Evidence from student-generated data and interpretation of that evidence is the primary focus of all levels of *FAST*. The student book is a guide to laboratory inquiry, and contains student-generated data that provides the substance for small group and class discussion. Interpretation and explanation are a matter of class consensus, just as they are in science. Throughout *FAST* there is a continuing major focus on "how do we know what we think we know." Communication through oral and written scientific reports, simulations, displays, projects, inventions, student seminars, and debates form a central focus in *FAST*. Just as in science, communication is essential to students in constructing their knowledge of science. *FAST* emphasizes: intellectual honesty and knowing why it is important to keep honest, clear, and accurate records; knowing that hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations; and knowing that often different explanations can be given for the same evidence, and it is not always possible to tell which one is correct. *FAST* organizes classes into research teams in which students develop their own hypotheses, experimental designs, and explanations. The teacher's role is that of a research director. Explanation must be supported by evidence and openly communicated to peer groups for support. Though the hypotheses of student colleagues are courteously recognized, skeptical critical analysis is encouraged. Healthy skepticism is part of the learning environment. *FAST* recognizes that science requires different abilities, depending on such factors as the field of study and type of inquiry. Science is very much a human endeavor, and the work of science relies on basic human qualities, such as reasoning, insight, energy, skill and creativity—as well as on scientific habits of mind, such as intellectual honesty, tolerance of ambiguity, skepticism and openness to new ideas. Ambiguity is the hallmark of first inquiry into ecological problems and each level of *FAST* culminates in an investigation of such problems.

Science Content Standards
Domain I: How Humans Think While Understanding the Natural World
Habits of Mind Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
USING UNIFYING CONCEPTS AND THEMES 3. Students use concepts and themes such as system, change, scale, and model to help them understand and explain the natural world. **In other words,** students understand the natural world more meaningfully when they use concepts and themes to make the connections between objects, events, and experiences. **For example,** in studying the unifying concept of systems, as in ecosystem, students make connections between the physical and biological factors that affect mango yield. Mango yield is dependent on temperature, wind, water, and length of day and pollinators.	SYSTEM · Explain how a given system works. CHANGE · Identify patterns of change and the implications on a system. SCALE · Calculate very large or very small numbers using exponential numbers. (e.g., distances to other planets). MODEL · Identify several different models that could be used to represent the same thing, and evaluate their usefulness, taking into account such things as the model's purpose and complexity.	See *FAST* 1, *The Local Environment*—RS Unit 1, Air Pollution; RS Unit 2, Water Resource Management. *FAST* 2, *Matter and Energy in the Biosphere*—RS Unit 1, Productivity in Ecosystems; RS Unit 2, World Food Production. *FAST* 3, *Change over Time*—Unit 6, Changing Ecosystems; Unit 7, Humans in the Environment.

Science Content Standards

Domain I: How Humans Think While Understanding the Natural World

Safety Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
DOING SAFETY 4. Students demonstrate the importance of safety skills in all activities. **In other words,** students safely engage in science investigations inside and outside the classroom by following safety rules and guidelines. **For example,** students review safety rules of conduct before engaging in scientific investigations of the natural environment. One rule to follow is to wear proper footwear and attire.	· Apply school, classroom, laboratory, and field trips rules, as appropriate, to maintain a safe learning environment. · Identify potentially unsafe conditions prior to the activity and explain how accidents can be prevented. · Use supplies, chemicals, and equipment as instructed and for the purposes they were intended under teacher supervision. · Operate emergency equipment, such as eyewash, shower, and fire blanket when needed. · Assist teacher as requested in case of emergency. · Document and apply appropriate safety protocols when conducting scientific activities in and out of the classroom.	*FAST* has been carefully designed to give students hands-on experiences in the sciences in a safe environment. The Professional Development component of *FAST* has been designed to include safety in every investigation. FAST teachers are given experience in taking steps to provide safe laboratory and field experiences for students and themselves by minimizing heath and safety risks. *FAST* also recommends each teacher complete • a science safety course • a first aid course, and • a CPR course.

Science Content Standards
Domain I: How Humans Think While Understanding the Natural World
Science and Technology in Society
Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
RELATING THE NATURE OF TECHNOLOGY TO SCIENCE 5. Students use the problem-solving process to address current issues involving human adaptation in the environment. **In other words,** students identify problems, seek alternative solutions from various perspectives, determine solutions with consequences in mind, and evaluate the process and solution, considering the effect of the action on self, others, and the environment. **For example,** students can investigate different alternatives to make the classroom cooler, considering cost, benefits, constraints, and possible trade-offs. Students may eventually design and propose possible modifications to their existing classroom.	· Identify and elaborate on a problem or issue. · Collect and analyze information to identify alternative solutions. · Apply appropriate criteria for evaluating alternative solutions in solving a problem or issue. · Select and carry out action steps for the most suitable alternative solution. · Evaluate the effectiveness of the processes and actions used in solving the problem or issue.	The place of technology in investigation includes all magnitudes of objects and events (atomic through the big bang) as an operational part of the study of the contribution of technology throughout *FAST*. Since the program relies on the students' own inquiry, students are constantly applying the use of both their scientific learning and using technological equipment. History and the practical here-and-now use of technology are stressed throughout *FAST*. The role of technology in enabling humans to transition from wandering hunters to dwellers in homes and cities is traced. Risks and benefits of technologies are identified and weighted and the role of civil society in deciding what direction science and technology takes is considered. See the following: *FAST* 1, *The Local Environment*—PS Unit 1, Introduction to the Properties of Matter; PS Unit 2, Changes of State in Matter; PS Unit 3, Temperature and Heat; E Unit 1, Plant Growth; E Unit 2, The Physical Environment; E Unit 3, Animal Care; E Unit 4, Field Ecology; RS Unit 1, Air Pollution; RS Unit 2, Water Resource Management. *FAST* 2, *Matter and Energy in the Biosphere*—PS Unit 1, Light and Heat; PS Unit 2, Evidence for an Atomic Theory; PS Unit 3, A Model of Matter; E Unit 1, Primary Production; E Unit 2, Respiration; E Unit 3, The Cycling of Matter; RS Unit 1, Productivity in Ecosystems; RS Unit 2, World Food Production. *FAST* 3, *Change over Time*—Unit 1, Force, Work and Energy; Unit 2, The Changing Earth; Unit 3, The Changing Universe; Unit 4, Life on Earth; Unit 5, Continental Drift; Unit 6, Changing Ecosystems; Unit 7, Humans in the Environment.

Science Content Standards
Domain II: What We Know Today About the World Around Us
Historical Perspectives Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
UNDERSTANDING SCIENTIFIC INQUIRY AND THE CHARACTER OF SCIENTIFIC KNOWLEDGE 1. Students explain the process of how scientific knowledge is generated by scientific inquiry, and are able to critique a scientific investigation. **In other words,** scientific inquiry is a particular way of knowing about the structure and workings of the world and Universe beyond. It is not a magical process but one that follows strict rules and conventions; the knowledge generated is subject to scrutiny until accepted. **For example,** Galileo dropped two different balls at the same time and proved that all objects fell at the same rate.	SCIENTIFIC INQUIRY · Describe how scientific inquiry is a way of knowing. · Identify good scientific explanations and justify their soundness based on evidence, logical and consistent arguments, and use of scientific principles, models, or theories. · Give examples where scientists used mathematics and technology to gather, quantify, and analyze results of an investigation. SCIENTIFIC KNOWLEDGE · Give examples of how science advances through legitimate questioning. · Describe and exemplify the nature of scientific explanations.	*FAST* investigations rely on replication of data and group consensus on the interpretation of results. *FAST* is an integrated program involving students in investigations in the physical, biological, and earth sciences and in relational studies. Through their experimentation students come to understand that investigations are done for different purposes with different techniques and with different types of analyses. By investigating phenomena in each of the disciplines students experience first hand how different branches of science go about generating new knowledge. One of the functions of the relational study strand is to focus on the kinds of inquiry that characterize each science discipline. See *FAST* 1, *The Local Environment*—E Unit 2, The Physical Environment *FAST* 2, *Matter and Energy in the Biosphere*—PS Unit 3, A Model of Matter *FAST* 3, *Change over Time*—Unit 3, The Changing Universe

Science Content Standards
Domain II: What We Know Today About the World Around Us
Historical Perspectives Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
INTERDEPENDENCE OF SCIENCE, TECHNOLOGY, AND SOCIETY 2. Students analyze and evaluate the interdependence of science, technology, and society. **In other words,** students analyze societal uses of technological and scientific advancements to improve the quality of life. Such analysis creates opportunities to investigate the benefits, drawbacks, and trade-offs. **For example,** engineers use knowledge of science and technology and design strategies to solve problems such as improving world communication. However, improving this communication has its drawbacks and risks to society and the natural environment.	INTERDEPENDENCE OF SCIENCE, TECHNOLOGY AND SOCIETY · Give an example of the interdependence of science, technology, and society and how it changed the course of history. · Give examples of societal influence on the development and use of technology and peoples' responses to these developments (e.g., development of dynamite). TECHNOLOGICAL IMPACTS · Describe and exemplify how information and communication technologies affect research and work done in the field of science. HEALTH TECHNOLOGIES · Describe and elaborate how scientific knowledge impact the monitoring of people's health and the diagnosis and treatment of illness and diseases.	*FAST* investigations are designed to show the historical development of scientific knowledge. The history of science provides examples of how humans first dealt with foundational science concepts. Through the lens of history students confront ideas that have changed over time and how ideas have contributed to the way society thinks about nature, the universe, or our special human role. In parallel they study the contribution of science to the technologies of such fields as agriculture, engineering, and medicine. See *FAST* 1, *The Local Environment*—RS Unit 1, Air Pollution; RS Unit 2, Water Resource Management *FAST* 2, *Matter and Energy in the Biosphere*—RS Unit 1, Productivity in Ecosystems; RS Unit 2, World Food Production. *FAST* 3, *Change over Time*—Unit 7, Humans in the Environment.

Science Content Standards
Domain II: What We Know Today About the World Around Us
Historical Perspectives Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
MĀLAMA I KA ʻĀINA: SUSTAINABILITY 3. Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions. **In other words,** life depends on a healthy, sustaining environment. While humans use materials to improve the quality of life, care must be exercised to ensure that the natural resources are not exhausted and that the environmental conditions remain favorable for all living things to thrive. **For example,** as decisions are made for technology to extract resources from the planet, there must be measures taken to maintain the quality of air, land, and water to sustain life now and into the future.	SUSTAINING FOOD SUPPLY · Give scientific inferences regarding environmental and societal issues stemming from agriculture and manufacturing technology. CONSERVATION OF RESOURCES · Explain how methods for obtaining and using resources such as water, minerals, and fossil fuel have consequences on the environment.	Environmental stewardship is a central theme at all levels of *FAST*. This is especially reflected in the units listed below. *FAST* 1, *The Local Environment*—E Unit 1, Plants; E Unit 2 The Physical Environment; E Unit 3, Animal Care; E Unit 4, Field Ecology; RS Unit 1, Air Pollution; Unit 2. Water Resource Management. *FAST* 2, *Matter and Energy in the Biosphere*—E Unit 1, Primary Production; E. Unit 2, Respiration; E Unit 3, The Cycling of Matter; RS Unit 1, Productivity in Ecosystems; RS Unit 2, World Food Production. *FAST* 3, *Change over Time*—Unit 2, The Changing Earth; Unit 4, Life on Earth; Unit 6, Changing Ecosystems; Unit 7, Humans in the Environment.

Science Content Standards

Domain II: What We Know Today About the World Around Us

Organisms and Development Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
UNITY AND DIVERSITY 4. Students examine the unity and diversity of organisms and how they can be compared scientifically. **In other words,** there are millions of organisms living on Earth. Some are very similar and some are very different. In order to better understand them, scientists have developed a system of comparing, contrasting and classifying organisms. **For example,** whales and bats are more similar to each other than are whales and fish or bats and birds. The first pair has milk glands, hair and give birth to live babies.	· Compare and contrast the body structures of organisms that contribute to their ability to survive and reproduce. · Assess the degree of relatedness among selected organisms based on its similarities found in internal anatomical features.	The interaction between organisms and their environment is a central part of field and laboratory ecology studies. It is covered in early transect work, in studies of photosynthesis, decomposition and agricultural production, and in studies of environmental influence in the evolution of organisms. See, *FAST* 1, *The Local Environment*—E Unit 1, Plant Growth; E Unit 3, Animal Care; E Unit 4, Field Ecology; RS Unit 1, Air Pollution; RS Unit 2, Water Resource Management. *FAST* 2, *Matter & Energy in the Biosphere*—E Unit 1, Primary Production; Unit 2, Respiration; Unit 3, The Cycling of Matter; RS Unit 1, Productivity Project; RS Unit 2, World Food Production. *FAST* 3, *Change over Time*—Unit 2, The Changing Earth; Unit 4. Life on Earth; Unit 5, Continental Drift,; Unit 6, Changing Ecosystems; Unit 7, Humans in the Environment.
INTERDEPENDENCE 5. Students describe, analyze, and give examples of how organisms are dependent on one another and their environments. **In other words,** there are direct and indirect relationships between organisms that allow them to survive. **For example,** a macadamia nut tree provides food and shelter for bees. Bees help plants to reproduce through pollination. Decomposers break down waste products and help provide nutrients to the soil.	· Illustrate and explain the relationships among producers, consumers, and decomposers in a food web. · Identify and describe the biotic and abiotic factors that affect the carrying capacity of a specific niche.	The life structures, including the cellular natures, of plants and animals that are important in satisfying biological needs are identified through observation and investigation. Structure and its relationship to accommodation to habitat flows out of field and lab investigations. See *FAST* 1, *The Local Environment*—E Unit 1, Plant Growth; E Unit 3, Animal Care; E Unit 4, Field Ecology. *FAST* 2, *Matter and Energy in the Biosphere*—E Unit 1, Primary Production; E Unit 2, Respiration; E Unit 3, The Cycling of Matter; RS Unit 1, Productivity in Ecosystems; RS Unit 2, World Food Production. *FAST* 3, *Change over Time*—Unit 6, Changing Ecosystems; Unit 7, Humans in the Environment.

Science Content Standards

Domain II: What We Know Today About the World Around Us

Organisms and Development Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
CYCLE OF MATTER AND ENERGY FLOW 6. Students trace the cycling of matter and the flow of energy through systems of living things. **In other words,** organisms are linked to each other and to their physical setting by the transfer and transformation of matter and energy. **For example,** energy from the sun is captured by grass, which converts it with water, nutrients from the soil and CO_2 from the air to make more plant material. A grasshopper gets its energy by eating some of the grass. A mynah bird then gets this energy by eating the grasshopper. Nutrients and energy are released to the environment when the grass, grasshopper and bird carry on life activities and when they die.	· Explain how plants use the energy from sunlight and matter from the atmosphere to make food that can be used for fuel or building materials. · Give examples of conservation of matter where matter is transferred within and among living organisms and their physical environment.	Detailed study of kinetic and potential energy is taken up in *FAST* 3, *Change over Time*—Unit 1, Force, Work and Energy. Conservation of energy is studied in all three levels of *FAST*. See *FAST* 1, *The Local Environment*—PS Unit 3, Temperature and Heat. *FAST* 2, *Matter and Energy in the Biosphere*—PS Unit 1, Light and Heat; PS Unit 3, A Model of Matter. Energy, Unit 1, Primary Production; E Unit 2, Respiration; *FAST* 3, *Change over Time*—Unit 1, Force, Work and Energy. Wave theory is covered in *FAST* 2, *Matter and Energy in the Biosphere*— PS Unit 1, Light and Heat; PS Unit 3, Unit 1, Primary Production; *FAST* 3, *Change over Time*—Unit 3, The Changing Universe. Application of the Second Law of Thermodynamics in convection and conduction experiments starts in *FAST* 1, *The Local Environment*—PS Unit 1, Introduction to the Properties of Matter; PS Unit 2, Changes of State in Matter; PS Unit 3, Temperature and Heat. It is also used in principle in *FAST* 2 and *FAST* 3. Flow of matter and energy in the environment is introduced in *FAST* 1, *The Local Environment* in the ecological studies. It is the organizing theme of *FAST* 2, *Matter and Energy in the Biosphere.* It is carried into *FAST* 3, *Change over Time* in Unit 4, Life on Earth; Changing Ecosystems; Unit 7, Humans in the Environment. The limited nature of energy resources is explored in Relational Study units of *FAST* 1, 2, and 3 along with advantages of different energy producing systems.

Science Content Standards
Domain II: What We Know Today About the World Around Us
Organisms and Development Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
BIOLOGICAL EVOLUTION 7. Students examine evidence for the evolution of life on earth and assess the arguments for natural selection as a scientific explanation of biological evolution. **In other words,** evolution is a series of changes, some gradual and some sporadic, that accounts for the present form and function of organisms in natural systems. Fossil records of ancient life forms and striking molecular similarities among diverse organisms provide evidence for natural selection and its evolutionary consequences. **For example,** continual evolution of human pathogens is posing a serious health problem. Many strains of bacteria have become increasingly resistant to once-effective antibiotics because natural selection has favored resistant strains.	· Describe and explain how living things have changed over geologic time by using fossils and other evidence. · Explain how small differences between parents and offspring can accumulate in successive generations so those descendants are different from their ancestors. · Relate how changes in the environment can affect the survival of individual organisms and entire species.	Classification, experiments on the interaction of organisms with the environment, and analysis of ecosystems in response to natural changes are studied in *FAST* 1, *The Local Environment*—E Unit 1, Plant Growth; E Unit 2, The Physical Environment; E Unit 3, Animal Care; E Unit 4, Field Ecology; RS Unit 1, Air Pollution; RS Unit 2, Water Resource Management. Experimental study of the interaction of organisms with their environments and tracing the flow of matter and energy through the ecosystem are provided in *FAST* 2, *Matter and Energy in the Biosphere*—E Unit 1, Primary Production; E Unit 2, Respiration; E Unit 3, The Cycling of Matter; RS Unit 1, Productivity; RS Unit 2, World Food Production. Study of the response of organisms to catastrophe, slower environmental change, competition, and limited resources through adaptation, mutation and evolution are studied in *FAST* 3, *Change over Time*—Unit 4, Life on Earth; Unit 6, Changing Ecosystems; Unit 7, Humans in the Environment.
HEREDITY 8. Students describe how variations in biological traits are passed on to successive generations. **In other words,** all life is based on genetic codes that give instructions for developing particular organisms. **For examples,** children may look like their mother, grandfather or others in their family lineage.	· Explain how heredity accounts for biological traits being passed on to successive generations.	Genetic change is studied at the macro level, leaving the study of DNA to the high school.

Science Content Standards

Domain II: What We Know Today About the World Around Us

Organisms and Development Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
CELLS, TISSUES, AND ORGANS 9. Students explain the structure, functions, and reproduction of living cells. **In other words,** all multi-cellular organisms are made up of cells that are organized to form tissues, organs and systems with specialized functions. **For example,** humans are comprised of systems such as the digestive system, which break down food for use by the body.	· Describe and analyze structure and function at various levels of organization (cellular, tissue, organ, system, and organism). · Describe and explain the relationship and interactions of organ systems. · Identify the conditions for the fertilization of the egg to occur and strategies that may prevent it from happening.	The life structures, including the cellular nature, of plants and animals that are important in satisfying biological needs are identified through observation and investigation. Structure and its relationship to accommodation to habita flows out of field and lab investigations. See *FAST* 1, *The Local Environment*—E Unit 1, Plant Growth; E Unit 3, Animal Care; E Unit 4, Field Ecology. *FAST* 2, *Matter and Energy in the Biosphere*—E Unit 1, Primary Production; E Unit 2, Respiration; E Unit 3, The Cycling of Matter; RS Unit 1, Productivity in Ecosystems; RS Unit 2, World Food Production. *FAST* 3, *Change over Time*—Unit 6, Changing Ecosystems; Unit 7, Humans in the Environment.
HUMAN DEVELOPMENT 10. Students explain the important aspects of human development from fertilization to death and compare it with other organisms. **In other words,** a developing human body and mind is similar to other organisms with backbones. However, there are various stages in human develop-ment, which distinguish them from other species. **For example,** the behavior of many species is largely dependent upon their genetic programming. On the other hand, human's physical, emotional and intellectual development evolves over a longer period of time. This development is dependent upon learned behavior and culture, as well as genetic programming.	• Explain the sequence of embryonic development in human and other species as cells differentiate in form and function throughout each of the three trimesters. · Explain how the body changes as people age and the factors that may influence the length and quality of human life.	Human Biology Supplement. (optional) covers all major human anatomical systems. Particular human response to agricultural practices and toxins are studied in: *FAST* 2, *Matter and Energy in the Biosphere*—RS Unit 1, Productivity in Ecosystems; RS Unit 2, World Food Production *FAST* 3, *Change over Time*—Unit 4, Life on Earth.

Science Content Standards
Domain II: What We Know Today About the World Around Us
Understanding Ourselves and the World Around Us
Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
WELLNESS 11. Students appraise the relationships between their bodily functions and their physical and mental well being. **In other words,** students not only understand how their body functions but the implication and consequences of the choices they make with respect to their well being. **For example,** students make informed choices in relation to diet, exercise, coping skills, etc.	HUMAN BODY FUNCTIONS · Describe how an organ system functions interdependently with others to promote survival (i.e., how various body systems transfer energy). PHYSICAL HEALTH · Identify certain behaviors and practices that increase and decrease longevity (e.g., regular exercise, eating disorder, high fiber and vegetarian diet). · Explain the role of various mechanisms (such as white blood cells and vaccinations) in protecting the body. MENTAL HEALTH · Relate how external and internal conditions (body chemistry, personal history, and values) influence how people cope with disturbing emotions or stressful situations.	Human Biology Supplement. (optional) covers all major human anatomical systems. Students study the calorie and the Kilocalorie as it relates to energy. A calorimeter is designed and operated to investigate the relationship between stored energy and energy of motion. Particular human response to agricultural practices and toxins are studied in: *FAST* 2, *Matter and Energy in the Biosphere*—RS Unit 1, Productivity in Ecosystems; RS Unit 2, World Food Production; *FAST* 3, *Change over Time*—Unit 4, Life on Earth.
LEARNING AND HUMAN BEHAVIOR 12. Students explain what influences learning and human behavior. **In other words,** a person's innate ability, inherited disposition, culture and experiences influence human behavior. **For example,** changing one's behavior due to cultural experience can be described like this: Upon entering a home in Hawai'i, a visitor is asked to remove their footwear. On the next visit, the visitor automatically removes their footwear before entering.	LEARNING · Describe how inheritance and experience affects learning. · Describe how the extent to which a person achieves in any particular activity depends on innate abilities, perseverance, and motivation. BEHAVIOR · Identify situations where affiliation with a group can increase the power of members through pooled resources and concerted action. · Give examples of how each culture have distinctive patterns of behavior and within a large society, there may be many distinctly different subcultures.	*FAST* incorporates all learning styles and intelligences in the investigative process. The Professional Development component provides teachers with recent research on the appropriate developmental inquiry to address middle school needs. Students are provided with multiple avenues to express their knowledge and are given techniques to lead to their success.

The Physical Environment Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
NATURE OF MATTER 13. Students examine the nature matter. **In other words,** objects can be described by the properties of matter from which they are made. Those properties can be used to sort objects and predict ways the material will behave. **For example,** a water molecule consists of two atoms of hydrogen and one atom of oxygen. Liquid water changes state to vapor at 100˚ C and to a solid at 0˚ C.	· Compare and contrast the physical and chemical properties of specific substances (e.g., growing crystals of common salts and sugars). · Explain common chemical reactions (e.g., electrolysis, replacement in acid/base reactions, oxidation).	Study of matter and energy are the grounding building blocks of *FAST*. Out of this emerge atoms the building blocks of nature, conservation of matter, and sources of energy in chemical, and nuclear events. *FAST 1*, *The Local Environment* provides the background definition of matter and energy. See PS Unit 1, Introduction to the Properties of Matter; PS Unit 2, Changes of State in Matter; PS Unit 3, Temperature and Heat. *FAST 2, Matter and Energy in the Biosphere* begins the study of atoms and the conservation of matter and energy. See PS Unit 1, Light and Heat; PS Unit 2, Evidence for an Atomic Theory; PS Unit 3, A Model of Matter; E. Unit 3, The Cycling of Matter. *FAST 3, Change over Time* continues the study of the atom, the molecule, the macromolecule, and matter of the super atom of the big bang. It continues energy transformation studies. Unit 1, Force, Work, and Energy; Unit 3, The Changing Universe; Unit 4, Life on Earth; Unit 7, Humans in the Environment.
ENERGY, ITS TRANSFORMATION AND MATTER 14. Students identify the different forms of energy and explain transformation of energy and its significance in understanding the structure of matter and the Universe. **In other words,** students study the various forms of energy – light, heat, sound, gravitational, electrical, mechanical and chemical. **For example,** energy provided by gas molecules used in the operation of a car, is disbursed by way of exhaust and friction and produces a warm car, road and air.	· Describe and explain an example of energy transfer and transformation. · Demonstrate how vibration in materials set up wavelike disturbances that spread away from the source. · Compare and contrast forms and behavior of various types of energy. · Describe and analyze examples of conservation of energy.	Detailed study of kinetic and potential energy is taken up in *FAST* 3, *Change over Time* —Unit 1, Force, Work and Energy. Conservation of energy is studied in all three levels: *FAST* 1, *The Local Environment*—PS Unit 3, Temperature and Heat. *FAST* 2, *Matter and Energy in the Biosphere*—PS Unit 1, Light and Heat; PS Unit 3, A Model of Matter. Energy, Unit 1, Primary Production; E Unit 2, Respiration *FAST* 3, *Change over Time*—Unit 1, Force, Work and Energy. Wave theory is covered in: *FAST* 2, *Matter and Energy in the Biosphere*—PS Unit 1, Light and Heat; PS Unit 3, Unit 1, Primary Production *FAST* 3, *Change over Time*—Unit 3, The Changing Universe. Application of the Second Law of Thermodynamics in convection and conduction experiments starts in: *FAST* 1, *The Local Environment*—PS Unit 1, Introduction to the Properties of Matter; PS Unit 2, Changes of State in Matter; PS Unit 3, Temperature and Heat. It is also used in principle in *FAST* 2 and *FAST* 3. Flow of matter and energy in the environment is introduced in: *FAST* 1, *The Local Environment* in the ecological studies. It is the organizing theme of *FAST* 2, *Matter and Energy in the Biosphere* It is carried into *FAST* 3, *Change over Time* in Unit 4, Life on Earth; Changing Ecosystems; Unit 7, Humans in the Environment.

Science Content Standards
Domain II: What We Know Today About the World Around Us
The Physical Environment Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
FORCES, MOTION, SOUND, AND LIGHT 15. Students explain the relationship between force, mass and motion of objects; they analyze the nature of sound and electromagnetic radiation. **In other words,** everything in our universe moves. Changes in motion such as speeding up, slowing down, and changing direction are due to the effects of forces. **For example,** a rolling ball slows down and changes direction because of friction and objects in its path.	MOTION AND FORCES · Explain the interaction between force and matter and the relationships among force, mass and motion. ELECTROMAGNETIC RADIATION · Explain that light from the sun is made up of a mixture of many different colors. • Explain how we detect and differentiate the range of energy in the electromagnetic spectrum.	Force, Work and Energy are a central theme in *FAST.* Minerals, soils, human uses of minerals are studied in *FAST* 1, *The Local Environment*—E Unit 2, The Physical Environment; E Unit 4, Field Ecology; RS Unit 1, Air Pollution; RS Unit 2, Water Resource Management. Energy requirements in converting resources to useful things, the history of the earth and plate tectonics, and the evolutionary processes at work in Hawaii's geology are studied in *FAST* 3, *Change over Time*—Unit 1, Unit 2 The Changing Earth; Unit 3, Unit 5, Continental Drift; Unit 6, Changing Ecosystems; Unit 7, Humans and the Environment.

Science Content Standards
Domain II: What We Know Today About the World Around Us
Earth Systems and the Universe
Grade Cluster Benchmarks

Content Standards	6 - 8	*FAST*
UNIVERSE 16. Students discuss current scientific views of the Universe. **In other words**, formation of the universe is based on 3 major theories: (1) the Big Bang theory (most prevalent), (2) Steady State theory, and (3) the Oscillating Universe theory. The Universe is made up of galaxies grouped into clusters and super clusters. Our knowledge of the Universe is a result of scientific observations and use of sensitive tools such as radio and x-ray telescopes, spectrographs, etc. **For example**, the Hubble Space Telescope is providing spectrographic imaging of material surrounding the 4 million year-old star, AB Aurigae. The collected information will help scientists piece together observations and data gathered to theorize how planets are formed.	· Give examples of objects in the solar system that are in regular and predictable motion. · Describe what constitutes the universe. · Describe how a telescope works and the optimal conditions for its use on Earth.	The study of the universe and the solar system is central to *FAST* 3, *Change over Time*. In the units below the conversion of energy, the motions of the heavenly bodies, the use of technology in exploring space, and the history of the universe are studied. Unit 1, Force, Work and Energy; Unit 2 The Changing Earth; Unit 3, The Changing Universe; Unit 4, Life on Earth; Unit 6, Changing Ecosystems.
FORCES OF THE UNIVERSE 17. Students explain the major forces in nature: gravitational, electrical and magnetic. **In other words**, forces affect everything in our Universe. **For example**, gravitational force helps us stay on the ground, electrical forces hold atoms and molecules together and magnetic forces attract or repel certain objects.	· Build a model that illustrates that every object exerts a gravitational force on every other object. · Illustrate and explain what holds the Earth and other planets in their orbits and keeps their moons in orbit around them. · Explain how electric currents and magnets exert a force on each other.	In *FAST* students construct their own force scale and apply it to various objects. They construct astrolabes and sun scopes to collect their own data on the movements of the sun and the moon. They then observe retrograde motion and discover how science describes the planets. The latest theories of the origin of the universe are studied through web searches and internet discussions with scientists.

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EARTH IN THE SOLAR SYSTEM 18. Students discuss how the Earth-moon-sun system causes seasons, moon phases, climate, weather and global changes. **In other words**, the relative position between the Earth, moon, and sun causes changes in the seasons, phases of the moon, changes in climate and weather locally and globally. **For example**, a new moon occurs when the moon is between the earth and sun.	· Describe how the Earth's motions and tilt on its axis lead to changes in seasons. · Explain the role of the sun as the major source of energy for plant growth, weather systems, ocean currents, and the water cycle.	Through observations, data collection, graphic analysis and discussions, students experience the relation of the Earth, sun and moon. Students calculate the solar constant and compare their data via the internet with schools throughout the world. See investigations below for detail: *FAST* 1, *The Local Environment*—Unit 2, The Physical Environment; RS Unit 1, Air Pollution; RS Unit 2, Water Resource Management. *FAST* 2, *Matter and Energy in the Biosphere*—Unit 1, Light and Heat; Unit 2, Evidence of an Atomic Theory; E. Unit 1, Primary Production; Unit 2, Respiration; Unit 3, The Cycling of Matter; RS Unit 1, Productivity in Ecosystems; Unit 2, World Food Production. FAST 3, *Change over Time*—Unit 1, Force, Work, and Energy; Unit 2, The changing Earth; Unit 3, The Changing Universe.
FORCES THAT SHAPE THE EARTH 19. Students analyze the scientific view of how the Earth's surface is formed. **In other words,** forces such as earthquakes, volcanic activity, waves, wind, water and ice help shape our earth surface. **For example,** an active volcano on the Big Island continues to change the shape of the island.	· Describe how different kinds of rocks are formed. · Compare different kinds of soil and their formation.	*FAST,* students study the rock-cycle extensively. They conduct scientific studies of weathering and erosion. Plate tectonics is charted throughout the school year by collecting data on Earthquakes and Volcanic eruptions. See investigations below for detail: *FAST* 1, *The Local Environment*—Unit 2, The Physical Environment; RS Unit 1, Air Pollution; RS Unit 2, Water Resource Management. *FAST* 2, *Matter and Energy in the Biosphere*—Unit 1, Light and Heat; Unit 2, Evidence of an Atomic Theory; E. Unit 1, Primary Production; Unit 2, Respiration; Unit 3, The Cycling of Matter; RS Unit 1, Productivity in Ecosystems; Unit 2, World Food Production. FAST 3, *Change over Time*—Unit 1, Force, Work, and Energy; Unit 2, The changing Earth; Unit 3, The Changing Universe.