Alignment of

DEVELOPMENTAL APPROACHES TO SCIENCE, HEALTH, AND TECHNOLOGY

with the

Hawai‘i Content Standards - HCPS II

Alignment of

DEVELOPMENTAL APPROACHES TO SCIENCE, HEALTH, AND TECHNOLOGY (DASH)

with the

Hawai‘i Content Standards - HCPS II

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Developmental Approaches to Science, Health, and Technology

DASH is a comprehensive, user friendly program for grades K–6 that provides instruction in 3 content areas: science, health, and technology. DASH is designed to reach a broad spectrum of learners through over 650 interconnected, developmentally appropriate, hands-on activities that use a wide variety of teaching strategies to better address the diversity of student learning styles. Activities are designed to articulate well with other subject areas.

The program uses a carefully planned sequence of activities involving both students and teachers in defining concepts, generating and testing ideas, correcting misconceptions, and ultimately coming to a consensus on the adequacy of explanations. Students engage in classroom activities, field studies, data collecting, small group and class discussion, home projects, and writing, drawing, or otherwise recording finding. Each activity results in a student invention or other products. The problem-solving activities are organized into 10 clusters at each grade level under the titles Learning; Time, Weather, and Sky; Animals; Plants; Food and Nutrition; Health and Safety; Wayfinding and Transportation; Energy and Communication; Conservation, Recycling, and Decomposition; and Matter, Space, and Construction. Specific career roles that students are engaged in are identified with each activity. DASH is designed as a sequential, multi-grade, spiral curriculum that enables students to construct their understanding of the basic concepts and skills of science, health and technology. Assessment is integrated with instruction. Family and administrator components are included. DASH is currently being used by over 10,000 teachers in 26 states and has earned these recognitions:

- validated as an effective program by the Program Effectiveness Panel (PEP) of the U.S. Department of Education
- recognized as an exemplary program by the National Diffusion Network
- described in *Promising Practices in Mathematics and Science Education*, published by the U.S. Department of Education, as addressing Goals 2000 and meeting the new standards in science education.
- identified as one of five effective science programs in *Results Based Practices Showcase 1997–1998* (1997), a nationwide search by the Kentucky Department of Education.
- identified as one of three research-based, effective science “skill and content” reform models in a nationwide search by the Northwest Regional Educational Laboratory for the U.S. Department of Education’s *Catalog of School Reform Models* (1998).
- selected and featured as one of eight school programs that offer solid proof of their success in the classroom by *Parent’s Magazine* (1998).
- cited as an example of high-quality intensive technical assistance in the U.S. Department of Education’s report to Congress titled *Federal Education Legislation Enacted in 1994: An Evaluation of Implementation and Impact* (1999).
- cited as an innovative curricula by the Eisenhower National Clearinghouse *in ENC Focus: A Magazine for Classroom Innovators* (1999).
- described as a curriculum package with a strong assessment component in *ENC Focus: A Magazine for Classroom Innovators* (2000).

Curriculum Research & Development Group

The Curriculum Research & Development Group (CRDG), including the University Laboratory School, conducts systematic research, design, development, publication, staff development, and related services for elementary and secondary schools. The CRDG has curriculum development projects in science, mathematics, English, Pacific and Asian studies, marine studies, environmental studies, Hawaiian and Polynesian studies, Japanese language and culture, music, nutrition, art, drama, technology, health, and computer software. Research and school service projects focus on educational evaluation, teacher development, reduction of in-school segregation of students, and programs for students educationally at risk.

The CRDG is the senior member of a cooperative program of thirteen universities in the United States to improve schooling in science, health, and technology in elementary and secondary schools. It is a founding member of the Pacific Circle Consortium of universities, major school systems, and educational ministries in Australia, Canada, Japan, New Zealand, and the United States.

CRDG-developed programs are being used experimentally throughout the United States and in other countries, including Australia, Israel, New Zealand, Russia, Indonesia, Singapore, and Slovakia. The CRDG provides professional development institutes and support services for all its projects. CRDG publishes and distributes its materials nationally and internationally.

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

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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.	• Generate ideas, questions, and/or predictions about objects, organisms, events, places, and/or relationships in the environment. • Design and conduct simple investigations using systematic observations. • Collect and organize data using simple tools, equipment, and techniques. • Analyze data to construct a reasonable explanation.	*DASH* uses a series of devices to ensure that students generate ideas and questions. These include the *Wonder and Discover Book* used in all levels of *DASH*, challenges that are a part of most *DASH* activities, and most important, the opportunity for students to explore and create further questions as they pursue the open ended activities that make up *DASH*. Predictions about objects, organisms, events, places, and/or relationships in the environment are a part of *DASH*. See *DASH* K–3, Clusters 1 LEARNING; 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 5 FOOD AND NUTRITION; 6 HEALTH AND SAFETY; 7 WAYFINDING AND TRANSPORTATION; 8 ENERGY AND COMMUNICATION; 9 CONSERVATION, RECYCLING, AND DECOMPOSITION; 10 MATTER, SPACE, AND CONSTRUCTION. *DASH* students are organized to operate as communities of scientists and technologists and to work at knowledge construction in the ways these communities construct knowledge. Therefore, *DASH* students design and conduct investigations from the very beginning of *DASH* K and through *DASH* 6. *DASH* students collect data using tools they make, including their own measuring equipment. This equipment is used in a wide range of investigations to gather data for long- and short-term investigations.	• Explain how the question or problem arose. Develop a hypothesis or prediction based on the question. • Design and conduct simple investigations to answer their questions or to test their ideas about the environment. • Collect and organize data for analysis, using simple tools and equipment. • Use appropriate models to summarize data and construct conclusions based on observations and findings.	*DASH* 4–5 activities are open-ended. Thus problems within problems are identified that require multiple hypotheses. The history of a student's quest for validation of hypotheses is recorded and explained in the personal record book. See *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 5 FOOD AND NUTRITION; 6 HEALTH AND SAFETY; 7 WAYFINDING AND TRANSPORTATION; 8 ENERGY AND COMMUNICATION; 9 CONSERVATION, RECYCLING, AND DECOMPOSITION; and 10 MATTER, SPACE, AND CONSTRUCTION. *DASH* 4–5 activities involve students in creating investigations using their own ideas and hypotheses. See *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS, 5 FOOD AND NUTRITION; 6 HEALTH AND SAFETY; 7 WAYFINDING AND TRANSPORTATION; 8 ENERGY AND COMMUNICATION; 9 CONSERVATION, RECYCLING, AND DECOMPOSITION; and 10 MATTER, SPACE, AND CONSTRUCTION. Equipment used in *DASH* is invented and made by students from found materials. They are relatively simple, though sophisticated. Data collection and analysis are standard parts of *DASH* investigations. See *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 5 FOOD AND NUTRITION; 6 HEALTH AND SAFETY; 7 WAYFINDING, TRANSPORTATION; 8 ENERGY AND COMMUNICATION; 9 CONSERVATION, RECYCLING, AND DECOMPOSITION; and 10 MATTER, SPACE, AND CONSTRUCTION. *DASH* investigative activities conclude with a report of findings and a drawing of conclusions based on data using the report models appropriate to the discipline used in guiding the study. See *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY, 3 ANIMALS, 4 PLANTS, 7 WAYFINDING, TRANSPORTATION, 8 ENERGY AND COMMUNICATION, 9 CONSERVATION, RECYCLING, DECOMPOSITION, and 10 MATTER, SPACE, AND CONSTRUCTION.	• 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.	*DASH* 6 activities are designed to cause the students to pursue investigations in an open-ended format. Students identify problems within problems and seek answers to their own hypotheses. See *DASH* 6, Clusters 1–10. Designing and conducting experiments and finding answers to questions raised is central to activities in *DASH* 6. See *DASH* 6, Clusters 1–10. The *DASH* classroom uses a research community model. Investigative techniques are modeled after those used in the discipline or disciplines. Tools used by students are made by students. Investigations result in data that are analyzed and displayed for community critiquing. See *DASH* 6, Clusters 1–10. Conclusions and explanations from *DASH* 6 investigations are grounded in evidence and are recorded in the Student Record Book and reported in class debriefing of activities. See *DASH* 6, Clusters 1–10.

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

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
	• Appropriately communicate their investigations and explanations to an audience. • Defend explanations based on evidence and revise explanations when they are faulty and inadequate.	In *DASH* analysis of data and simple explanation is part of each investigation and data collection. Since *DASH* students are working in knowledge-making communities, they constantly communicate their findings and explanations As explanations are offered, alternatives are discussed and defended, both logically and with further investigation. Examples of these open-ended investigations are found in *DASH* K–3, in all Clusters.	• Communicate investigations and results appropriately to an audience. • Defend conclusions based on evidence; reflect and revise conclusions based on recommendations from other points of view.	Communication is ongoing in a *DASH* classroom, from observational and instructional exchanges during investigation to final reports. The audience will normally be peers and teachers. See all activities in *DASH* 4 and 5. Other classes are sometimes involved as in *DASH* 5 weather station activities in Cluster 2 TIME, WEATHER, AND SKY and activities dealing with diseases in Cluster 6 HEALTH AND SAFETY. Advancing conclusions, defending them, and modifying them as appropriate is part of the ongoing *DASH* debriefing in all investigative activities. See Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 7 WAYFINDING AND TRANSPORTATION; 8 ENERGY AND COMMUNICATION, 9 CONSERVATION, RECYCLING, DECOMPOSITION, and 10 MATTER, SPACE, AND CONSTRUCTION.	• 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.	Because of the scientific research model used in the *DASH* classroom, conclusions and explanations are defended before peers. See *DASH* 6, Clusters 1–10. Conclusions and explanations are revised in the light of community criticism as needed. This is critical since students are generating basic scientific knowledge. This approach is used throughout the program. See *DASH* 6, Clusters 1–10.

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

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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 charac-teristic in life and in experimenting; value critical-mindedness as an important way of evaluating information; value the need for evidence to support statements of beliefs and explanations; value objectivity as a criteria necessary for problem-solving; value the quality of open-mindedness as a means of evaluating their/others' ideas; realize that a questioning attitude is necessary to validate, contradict, clarify, or expand on an idea or statement; believe in oneself and are self-directed; and value science as a way of thinking and knowing.	HONESTY • Report observations accurately CRITICAL–MINDEDNESS • Ask many questions starting with What, Where, Why, Whom, and How to gather information about "wondering". OBJECTIVITY • Examine many perspectives of a question, situation or problem. OPEN-MINDEDNESS • Examine ideas presented by others. QUESTIONING • Ask wondering questions. SELF-DIRECTED • Share new experiences and knowledge learned from individual investigations. VALUE SCIENCE • Ask questions and describe the wonderings about the world around us.	*DASH* uses the models of scientific and technological communities to guide the structure of classroom interaction. *DASH* students, therefore, are expected to become *self-directed* in taking on the values, attitudes, and styles of operation that characterize these communities. Since all work is reported openly, inaccuracies intentional or unintentional become obvious and are open to correction. *Honesty* is reinforced. *Critical-mindedness* and *questioning* are reinforced by the use of the *Wonder and Discover Book* and Socratic inquiry directed by teachers and replicated by students in discussion. *Objectivity* is fostered by debriefing of investigations. Debriefing allows the identification of variant perspectives which must be processed in finding agreement and opposition. Simultaneously this requires *open-mindedness.* In all of the above, students learn to *value science.*	HONESTY • Report all observations accurately and precisely. • Acknowledge work done by others. CRITICAL–MINDEDNESS • Validate and evaluate multiple sources of information (texts, periodicals, web sites, and people) to support research. OBJECTIVITY • Examine many perspectives of a question, situation, or problem and consider many possible solutions.	Accuracy and precision are stressed in all *DASH* activities and reflected in student records. A high degree of accuracy is achieved by using a team in organizing and carrying out activities so that there are many members to verify observations. Precision is achieved by having the students make their own measuring instruments; thus the place of precision and reproducibility are understood. See *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 7 WAYFINDING, TRANSPORTATION, 8 ENERGY AND COMMUNICATION; and 10 MATTER, SPACE, AND CONSTRUCTION. The work team structure of *DASH* lends itself to recognition of the contributions of others. See all activities in *DASH* 4 and 5. A major emphasis of *DASH* is its use of standard reference works ranging from newspapers, magazines, handbooks and texts to the Internet. Outside experts are regularly called on. See *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 5 FOOD AND NUTRITION; 6 HEALTH AND SAFETY; 7 WAYFINDING, TRANSPORTATION; 8 ENERGY AND COMMUNICATION; 9 CONSERVATION, RECYCLING, DECOMPOSITION; and 10 MATTER, SPACE, AND CONSTRUCTION. When acting as technologists solving problems with many possible solutions, *DASH* students begin their work with inventive brainstorming and exploration reflecting the multiple perspectives of the class. See *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 7 WAYFINDING, TRANSPORTATION; 8 ENERGY AND COMMUNICATION; and 10 MATTER, SPACE, AND CONSTRUCTION.	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.	The classroom is organized as a scientific community; therefore all data are honored, including that which conflicts with hypotheses. See *DASH* 6, Clusters 1–10. The scientific community classroom collaborates on the work; thus credit sharing is natural to the reporting process. See *DASH* 6, Clusters 1–10. *DASH* students rely on standard references, both to check their conclusions and to advance their investigations. See *DASH* 6, Clusters 1–10.

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

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
For example, students demonstrate that they value honesty when they report data accurately even when the data contradict their hypothesis. Students demonstrate that they value open-mindedness when they consider and evaluate ideas presented by other points of view.			OPEN-MINDEDNESS • Acknowledge that ideas, conclusions, and expectations may change. QUESTIONING • Ask questions to clarify and expand an idea or statement. SELF-DIRECTED • Plan and carry out tasks as an individual and as a member of a group. VALUE SCIENCE • Ask questions and give examples of how science explains what is happening in the world around us.	Modification to conclusions in the light of class discussion during the debriefing of activities is encouraged. See all Clusters *DASH* 4 and 5. Change in scientific astronomical models is studied in the astronomy activities of *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 7 WAYFINDING, TRANSPORTATION. *DASH* teachers use questioning for clarification and expansion of ideas, and students who strive to become teachers of the concepts and skills of the program practice replicating this behavior in teaching their peers. *DASH* activities are designed around a scientific community organization. As such there are tasks directed to both individual and group. See all *DASH* 4 and 5 Clusters. Assessment of self-direction is one of the primary areas of evaluation. See *DASH* 4 and 5, Concept and Skills Inventory from Cluster 1 LEARNING. A regular entry on the *DASH* Learning Calendar is a recording about science in the news. Students' own questions about science are kept in the *Wonder and Discover Book*. See *DASH* 4 and 5, Cluster 1 LEARNING.	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 and explain findings and answer scientifically.	The scientific community classroom of *DASH* causes students to consider a variety of options at all stages of an investigation, from question identification to interpretation of data. The student community is schooled in distinguishing between facts and speculation. See *DASH* 6, Clusters 1–10. The community of student researchers is practiced in evaluating evidence that both supports and contradicts hypotheses. See *DASH* 6, Clusters 1–10. The teacher, as director in the classroom research community, sets the example of questioning all interpretations, situations, and solutions. Students learn to emulate this role as they seek to master the researcher role. See *DASH* 6, Clusters 1–10. *DASH* student researchers use a wide variety of materials including newspapers, research, reference works, and the Internet. They also call upon the knowledge of experts. See *DASH* 6, Clusters 1–10. As part of its theme of learning to learn, *DASH* student researchers are caused to reflect on the nature of scientific knowledge-making. See *DASH* 6, Cluster 1 LEARNING.

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

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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, length of day, and pollinators.	SYSTEM • Identify the components of a system that interact to perform a function (examples of systems are the human body, clock, solar system, or automobile). CHANGE • Observe and describe changes that occur in nature. SCALE • Describe changes in the size, weight, color, or movement of things, and note which of their other qualities remains the same. MODEL • Use a model, such as a toy or picture, to describe the feature or function of the original object, device, thing, etc.	The concept of *system* is used from *DASH* K on. Animal body systems are studied in *DASH* K–3, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 7 WAYFINDING, TRANSPORTATION; 8 ENERGY AND COMMUNICATION. *Change* is embedded in all investigations of events over time and are found in *DASH* K–3. *Scale* as indicated by change in one or more of the following —size, color, temperature, movement, mass etc.—are covered throughout *DASH* K–3. As a part of the general inquiry style non-involved features of changed things are also noted by students. The term *model* as pictures, representation, replica, mental construct, is used from *DASH* K on. Examples are found in *DASH* K–3, CLUSTERS 1 LEARNING; 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 7 WAYFINDING, TRANSPORTATION; and 8 ENERGY AND COMMUNICATION.	SYSTEM • Observe and describe how parts influence one another in a system. CHANGE • Identify patterns of change in things (such as steady, repetitive, or irregular change) using data as evidence. SCALE • Measure things that are difficult to measure because they are very large or very small (e.g., buildings, trees, seeds, pinhead). MODEL • Use geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, or stories to represent corresponding features of objects, events, and processes in the real world. Identify ways in which the representations do not match their original counterparts.		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.	The idea of *system* is first developed in *DASH* 1 and is used thereafter. In *DASH* 6 students are developing a survival system for a space mission to Mars. In that development they create several sub-systems, including aquaculture and communication, and use models of the solar system, thereby reviewing the nature of systems developed earlier. See *DASH* 6, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 5 FOOD AND NUTRITION; 7 WAYFINDING AND TRANSPORTATION; 8 ENERGY AND COMMUNICATION; 9 CONSERVATION, RECYCLING, DECOMPOSITION; and 10 MATTER, SPACE, AND CONSTRUCTION Patterns of change and their implication for a system are observed in climate studies and aquaculture studies. See *DASH* 6, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 5 FOOD AND NUTRITION. Large numbers, especially planetary distances, are used in description and calculation. See *DASH* 6, Cluster 7 WAYFINDING AND TRANSPORTATION. *DASH* 6 students use many different models including those of spacecrafts and airplanes, models of gases, models of the solar system, and models of the photosynthesis-respiration cycle. These are evaluated for their power, limits, and inherent complexity. See *DASH* 6, Clusters 1 LEARNING; 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 5 FOOD AND NUTRITION; 7 WAYFINDING AND TRANSPORTATION; 8 ENERGY AND COMMUNICATION; 9 CONSERVATION, RECYCLING, DECOMPOSITION; and 10 MATTER, SPACE, AND CONSTRUCTION.

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

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
DOING SAFETY 4. Students demonstrate the importance of safety by applying 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 trip rules, as appropriate, to maintain a safe learning environment • Identify potential unsafe conditions prior to the activity and explain how accidents can be prevented. • Follow prescribed procedures of science activity under teacher supervision. • Handle live organisms only under proper supervision. • Apply appropriate safety protocols when conducting scientific activities in and out of the classroom.	Safety is a major concern in *DASH*. An entire Cluster is devoted to the health and safety of students, *DASH* K–3, Cluster 6 HEALTH AND SAFETY, The *DASH* classroom as a research community is organized so that concern for safety is a shared concern by teachers and students. All parties are responsible for identifying hazards. It is the teacher's role to act as senior supervising researcher with control of all operations. Animal care is specially monitored in *DASH* K–3, Cluster 3 ANIMALS. Sanitation is paramount in all animal care activities. Modeling a research community, students construct with the teacher rules and safety protocols covering behavior in the *DASH* classroom, including procedures for handling equipment and carrying out investigative techniques.	• Apply school, classroom, laboratory, and field trip rules, as appropriate, to maintain a safe learning environment. • Identify potentially unsafe conditions prior to the activity and explain how accidents can be prevented. • Conduct authorized science activities with teacher present. • Use supplies, chemicals, and equipment as instructed. • Document and apply appropriate safety protocols when conducting scientific activities in and out of the classroom.	Safety is a constant concern in all *DASH* activities. Aphorisms capturing the routines of safe behavior have been used since *DASH* K. It is suggested that the role of safety monitoring be assigned weekly to a student group. See *DASH* 4 and 5, Clusters 1 LEARNING and 6 HEALTH AND SAFETY. Teachers are cautioned about potential safety hazards where applicable. See all Clusters *DASH* 4 and 5. In *DASH*, identification of potential hazardous conditions is a joint responsibility of teachers and students. See *DASH* 4 and 5, Cluster 1 LEARNING. Teachers are cautioned about potential safety hazards where applicable. See all Clusters *DASH* 4 and 5. The teacher as director in a community of student researchers has control of all activities. Authorization is part of the normal procedure of the classroom. Supplies are under the control of the teacher, often through the agency of student monitors. Aphorisms are used to routinize safeity protocols in the class and field. See *DASH* 4 and 5, Cluster 1 LEARNING.	• 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.	Safety is a constant concern in all *DASH* Activities. Aphorisms capturing the routines of safe behavior have been used since *DASH* K. It is suggested that the role of safety monitor be assigned weekly to a student group. See *DASH* 6, Clusters 1 LEARNING and 6 HEALTH AND SAFETY. Teachers are cautioned about potential safety hazards where applicable. See *DASH* 6, Clusters 1–10. In *DASH,* identification of potential hazardous conditions is a joint responsibility of teachers and students. See *DASH* 6, Clusters 1 LEARNING. Teachers are cautioned about potential safety hazards where applicable. See *DASH* 6, Clusters 1–10. The teacher, as director in a community of student researchers has control of all activities. Authorization is part of the normal procedure of the classroom in this structure. Supplies are under the control of the teacher, often through the agency of student monitors. See *DASH* 6, Clusters 1 LEARNING and 6 HEALTH AND SAFETY. Students are taught to operate safety equipment. See *DASH* 6, Cluster 6 HEALTH AND SAFETY. One role in the research community is safety monitor. All students are aware of the need to help in an emergency. See *DASH* 6, Clusters 1 LEARNING and 6 HEALTH AND SAFETY. Aphorisms are used to routinize safety protocols in the class and field. See *DASH* 6, Clusters 1 LEARNING and 6 HEALTH AND SAFETY.

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

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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 a simple problem. • Gather information to solve a problem. • Determine relevant information, draw conclusions, and arrive at alternative solutions. • Make inferences for each alternative solution and select a solution based on information collected. • State solutions as a recommendation and give reasons for the decision.	*DASH* engages students in both scientific investigation and technological invention and creation of products. Technological problems are confronted in all *DASH* K–3 Clusters of activities. Students invent and make all equipment. In inventing model vehicles, for example, they *identify a host of problems,* from what shape should the vehicle have, to how to make it go. A device used throughout *DASH* is the Inventor's Box, which contains materials to clue the students in problem solving. In biological problem solving they *gather information* from library resources. Because of the research community structure of the *DASH* classroom, a given problem will have *multiple or alternate solutions.* and students learn to *evaluate* the usability of and practicality of inventions, *giving reason for their evaluations.*	• Identify and state a problem. • Collect, organize, and analyze information from various sources and identify possible alternatives based on the information. • Make inferences for each alternative solution and select a tentative solution. • Test the solution and document the results. • Analyze the results and propose recommendations/ modifications to the solution.	Technological problem solving is a major component in *DASH*. Students confront a range of problems from engineering and agricultural to social interaction. A problem of building a boat with found materials becomes a complex problem involving strategies such as how to attach parts; how to prevent capsizing; and how to maintain a constant course. In their reports, students identify their history of confounding problems and solutions. Students keep records of all work. Technological problems are found in *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 6 HEALTH AND SAFETY; 7 WAYFINDING, TRANSPORTATION; 8 ENERGY AND COMMUNICATION; and 10 MATTER, SPACE, AND CONSTRUCTION. In solving technological problems *DASH* students use a range of sources of information and ideas from resource books to the Internet. The research team organization causes a sharing of alternative solutions to problems and a necessary selection to direct work. Selected solutions to problems are tried and a record of results is kept in the Student Record Book. In all *DASH* technology problems the inventing, designing, making or doing, testing, and modifying processes are analyzed. Research groups' comments are noted and acted upon as appropriate. See *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 6 HEALTH AND SAFETY; 7 WAYFINDING, TRANSPORTATION; 8 ENERGY AND COMMUNICATION; and 10 MATTER, SPACE, AND CONSTRUCTION.	• 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.	*DASH* 6 presents students with many problems for solution. Each problem has many subordinate problems that students must identify, elaborate, and solve. See *DASH* 6, Clusters 1–10. *DASH* 6 students use a variety of informational sources, including experts, the Internet, and reference works, thereby looking at a variety of alternative solutions for their problems. See *DASH* 6, Clusters 1–10. Using the community of researchers, models for class organization, the technological perspective of a problem is identified (who does that kind of work) and tools of identified technologies are applied. See *DASH* 6, Clusters 1–10. The community of researchers model causes student technologists to consider and select suitable solutions from a variety of alternatives and to carry out steps of design and construction as appropriate. See *DASH* 6, Clusters 1–10. Once alternatives are identified, researchers pursue separate or common solutions, depending on the nature of the inventions. See *DASH* 6, Clusters 1–10. All solutions to problems are evaluated in terms of workability, relative effectiveness, ease of operation, construction, and maintenance. See *DASH* 6, Clusters 1–10.

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CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
UNDERSTANDING SCIENTIFIC INQUIRY AND THE CHARACTER OF SCIENTIFIC KNOWLEDGE 1. Students explain the process of how scientific knowledge is generated by scientific inquiry, and be 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 • Identify and describe the skills of inquiry including asking questions, doing a scientific investigation, and comparing the answers with what is already known. • Give examples where scientists use technology to increase their ability to observe, measure, and compare things more accurately. SCIENTIFIC KNOWLEDGE • Describe how scientists prove that their conclusions are valid.	*DASH* uses a scientific community organization for the classroom. In it students work at the tasks of scientists. They are meteorologists, astronomers, biologists, keepers of animals, engineers, and so forth. In these roles the students are made to be self-conscious of what they are doing. *DASH* students reflect on how they are inquiring, how they are using tools, how accurate and effective their tools are, how certain they are of their conclusions, and why they assume validity. This approach is suggested for all *DASH* investigations involving tools. The processes of validation are written into the teaching procedures of the activities in all Clusters, K–6.	SCIENTIFIC INQUIRY • Describe scientific inquiry including the asking of questions, conducting investigations, answering the questions, and presenting the results to others. • Explain how scientific methods for understanding are not perfect and results are not “magic.” SCIENTIFIC KNOWLEDGE • Explain how knowledge is acquired through scientific investigation. • Describe the events/people that made major contributions to science and technology throughout history.		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.	In science, inquiry is a way of knowing that flows out of the practice of reflections on investigations**.** Such reflections are initiated in debriefings of activities. See *DASH* 6, Clusters 1–10, particularly Cluster 1 LEARNING. The quality of the explanation is a function of success in prediction. The research community organization model of the classroom causes students to use logic, evidence, models, and established principles to construct arguments for their explanations. Reflection during debriefings of activities initiates a consciousness of these processes. See *DASH* 6, Clusters 1–10. Students are engaged in using, calibrating, and standardizing tools—technological products—that allow them to gather data and apply mathematical calculations and graphic pattern-finding in analysis. See *DASH* 6, Clusters 1 LEARNING; 2 TIME, WEATHER, AND SKY; 5 FOOD AND NUTRITION; and 10 MATTER, SPACE, AND CONSTRUCTION. In the research community organization model of the classroom, students regularly engage in questioning and are subject to questions about their work. Out of this they have many examples of how questions are used to advance scientific investigations. See *DASH* 6, Clusters 1–10. *DASH* students begin to collect working definitions in *DASH* K. Over time, the idea of scientific explanation emerges in the Working Dictionary. See *DASH* 6 Cluster 1 LEARNING.

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CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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 • Identify new and old technologies and the impact they have/had on society and the environment. TECHNOLOGICAL IMPACTS • Give examples of how various technologies such as agriculture, information, manufacturing, and communication have affected the students' lives. HEALTH TECHNOLOGIES • Explain how sanitary practices, vaccinations, medicines, and other scientific treatments keep people healthy.	*DASH* introduces technology in grade K and employs it at every grade level. Students are involved in a wide variety of technologies, some with ancient roots, some with modern, that affect their lives. These include fire fighting, police work, carpentry, engineering, agriculture, food preservation, fabrication, cooking, and computer use. Some technology appears in all K–3 Clusters. *DASH* students work at the roles of technologists and disciplinary scientists, they have visiting representatives of these work fields in their classroom, and are caused to reflect on and connect professional work to their lives inside and outside of school. See K–3 all Clusters. Health is a central component of *DASH* and sanitation and disease prevention are an ongoing part of *DASH* studies. See K–3 Clusters 5 FOOD AND NUTRITION and 6 HEALTH AND SAFETY.	INTERDEPENDENCE OF SCIENCE, TECHNOLOGY AND SOCIETY • Examine how technology influenced the economy, demography, and environment of the state and nation. TECHNOLOGICAL IMPACTS • Analyze how the various technologies have changed the nature of work and affected the economy, demography, and environment. HEALTH TECHNOLOGIES • Explain how technology provides clues about what is happening inside the body and improves the medical treatment of people.	*DASH* 4 includes a thematic strand concerned with Polynesian technology. This strand is designed to interface with the corresponding Hawaiian theme in social studies. Knowledge of the agricultural, food preparation and storage, wayfinding, and tool–making technologies of the early Hawaiians provides support for extended studies of the *ahupua'a* and pre-contact demographics and environments. See *DASH* 4, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 5 FOOD AND NUTRITION; 7 WAYFINDING, TRANSPORTATION; 8 ENERGY AND COMMUNICATION; and 10 MATTER, SPACE, AND CONSTRUCTION. *DASH* 5 studies conservation practices, medicine, nutrition, forestry, and the jobs that are available throughout the country in associated environmental fields, including Hawai'i. Local economic and demographic impact is discussed. See *DASH* 5, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 5 FOOD AND NUTRITION; 7 WAYFINDING, TRANSPORTATION; 8 ENERGY AND COMMUNICATION; and 10 MATTER, SPACE, AND CONSTRUCTION. Every *DASH* activity is organized around a job role or roles; thus the economics of work and its association with technology is recognized. Study includes effects of technology on these demographics. See *DASH* 4, Cluster 3 ANIMALS and *DASH* 5, Cluster 6 HEALTH AND SAFETY. Technological effects on environments are studied in *DASH* 4 and 5, Clusters 3 ANIMALS; 4 FOOD AND NUTRITION; and 6 HEALTH AND SAFETY. Human physiology—anatomy and function—and the impact of medical technology on medicine are extensively studied in *DASH* 4 and 5, Clusters 3 ANIMALS; 4 FOOD AND NUTRITION; and 6 HEALTH AND SAFETY.	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 know-ledge impact the monitoring of people's health and the diagnosis and treatment of illness and diseases.	In *DASH* 6 the year's work is developed around the theme "Mission to Mars." The national goal to place humans on Mars in the second decade of this century requires an obvious mixture of scientific knowledge, technological innovation, and social support. History of the adventure is being created before the students' eyes and they are made aware of it in these activities. See *DASH* 6, Cluster 1 LEARNING. Weekly, *DASH* students post current events of scientific, technological, and related societal significance on their Learning Calendar. A scrapbook is created to keep records of scientific progress and failures in fighting drug, alcohol, and tobacco abuse and sexually transmitted diseases (STDs). This includes records of social response through legislation, testimony, creating of non-governmental agencies (NGOs), for example, Mothers Against Drunk Driving (MADD), and others. See *DASH* 6, Clusters 1 LEARNING and 6 HEALTH AND SAFETY. The Internet is recommended for use as an information source throughout *DASH*. Its effect on research is discovered in its use. Health study is a part of all levels of *DASH*. Students keep a seven-year record of their growth and the health of their teeth. All major body systems are studied, along with many diseases, their diagnosis, transmission, and prevention. The knowledge of health professionals is regularly called on to augment studies. Out of this comes the capacity to describe the role of scientific knowledge in wellness. See *DASH* 6, Clusters 5 FOOD AND NUTRITION; and 6 HEALTH AND SAFETY.

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CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
"MĀLAMA I KA 'ĀINA": 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 • Trace food technology from planting to human consumption. CONSERVATION OF RESOURCES • Identify ways in which the natural resources can be conserved.	As a coordinated part of the *DASH* study of plants and animals, agriculture, and nutrition *DASH* activities involve aspects of food production, perpetuation, and consumption every year. See K-3 Clusters 3 ANIMALS; 4 PLANTS; and 5 FOOD AND NUTRITION. *DASH* students practice conservation of resources throughout the program. All equipment is made from discards and standard classroom materials. Energy, water, and paper conservation are explicitly studied at every grade level, along with recycling of paper, aluminum, glass, and plastics. Organic wastes are composted to provide fertilizer for class gardens. See K–3, Cluster 9 CONSERVATION, RECYCLING, AND DECOMPOSITION.	SUSTAINING FOOD SUPPLY • Explore how agricultural technology affect humans and the environment. CONSERVATION OF RESOURCES • Examine and explain why there is a need to conserve natural resources, including fossil fuel.	Polynesian fishing, agriculture, and food technologies are open to study in *DASH* 4, Clusters 3 ANIMALS; 4 PLANTS; 5 FOOD AND NUTRITION; 9 CONSERVATION, RECYCLING, AND DECOMPOSTION; and 10 MATTER SPACE AND CONSTRUCTION. Forestry and land conservation give insight into human technological use of environments and the utility of products. See *DASH* 5, Clusters 4 PLANTS and 9 CONSERVATION, RECYCLING, AND DECOMPOSITION. Conservation of resources is studied starting in *DASH* K and continues through *DASH* 6. See *DASH* 4 and 5, Cluster 9 CONSERVATION, RECYCLING, AND DECOMPOSITION.	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.	The theme "Mars Mission" allows students to use logic to make inferences about the potential impact of agriculture and manufacturing on the virgin Martian environment. Social implications are issues of study. Students then reflect on parallel impact on Earth's environments. See *DASH* 6 Cluster 1 LEARNING. The theme "Mars Mission" causes students to reflect first on the use of resources on Mars, then to use inferences to look back at our present societies' use of resources on Earth. See *DASH* 6 Cluster 1 LEARNING.

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CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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.	• Describe the similarities and differences of plants and animals in their appearances, behaviors, and habitats. • Identify the different structures and functions of organisms that allow them to survive in the environment.	*DASH* begins comparative study of plants and animals in Grade K and continues this line of investigation through grade 3. A dichotomous key for distinguishing plants and animals by form (appearance) and function is introduced in *DASH* K and developed through *DASH* 2. *DASH* K–2, Cluster 1 LEARNING. Different biological needs and behaviors, and habitats of plants and animals are contrasted from the beginning in both field and classroom studies. See K–3, Cluster 3 ANIMALS and 4 PLANTS. Investigation of survival and satisfaction of biological needs is a focus of the comparative study of plants and animals. These needs are discovered through both immediate and long-term observation. See K–2, Clusters 3 ANIMALS and 4 PLANTS.	• Explain how different organisms need specific environmental conditions in order to survive. • Explain the relationship between structure and function in living things.	Seasonal survival of animals and plants in environments is studied in *DASH* 4 and 5, Clusters 3 ANIMALS and 4 PLANTS. The particular problems of forests are studied in *DASH* 5 Cluster 4 PLANTS. Structure and function applied to living things is a major strand starting in *DASH* K. Working definitions are built around the idea of structure and function. Structure and function as found in major body systems are studied extensively in *DASH* 4 and 5, Clusters 3 ANIMALS; 4 PLANTS; and 5 FOOD AND NUTRITION.	• 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.	Study of differences in structures of organisms and their importance to survival is a central idea in *DASH* starting in *DASH* K. A range of organisms, including single-celled and other microscopic organisms, molds, green plants, worms, insects, amphibians, reptiles, birds, and mammals including humans are studied and their body structures are related to how they have adapted to their environments. In *DASH* 6 algae and other plants that can be grown in hydroponic and aquacultural environments, decomposing micro-organisms, worms, fish, and humans are the center of this continuing study. See *DASH* 6, Clusters 3 ANIMALS; 4 PLANTS; 5 FOOD AND NUTRITION; and 6 HEALTH AND SAFETY. As part of classification, starting in *DASH* K, the physical characteristics of organisms are compared. Drawing on this background, the anatomy of the worm and fish are investigated in *DASH* 6. See Cluster 3 ANIMALS.

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CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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.	• Identify and give examples of the various interactions within a local environment. • Explain interdependence in the environment by using photosynthesis as an example.	Field studies are started in *DASH* K and continue through *DASH* 6. Interactions include plants with soil, water, insects, and other animals; insects and their natural environments; frogs and toads with their environments; fish in aquariums and natural environments; pets in human constructed environments; and bacteria and molds in decomposition. See *DASH* K–3, Clusters 3 ANIMALS; 4 PLANTS; and 9 CONSERVATION, RECYCLING, AND DECOMPOSITION Study of light and photosynthesis begins in *DASH* 2 with Activity 2.4.11 PLANTS AND SUNLIGHT and continues through *DASH* 6. See *DASH* 2–3, Cluster 4 PLANTS.	• Identify how plants and animals depend on each other in the exchange of oxygen, carbon dioxide, and nutrients. • Explain how organisms respond to a constantly changing environment.	Study of respiration is begun in *DASH* K and continues in *DASH* 4, Cluster 3 ANIMALS and *DASH* 5, Clusters 3 ANIMALS and 4 HEALTH AND SAFETY. The study of the gases carbon dioxide and oxygen is undertaken in *DASH* 4, Cluster 10 MATTER, SPACE, AND CONSTRUCTION. Study of the dependency of plants and animals on each other for nutrients begins in *DASH* K and continues in *DASH* 4 and 5, Cluster 5 FOOD AND NUTRITION. Decomposition of plant and animal matter and nutrient contribution to plants is studied in *DASH* 4 and 5, Cluster 9 CONSERVATION, RECYCLING, DECOMPOSITION. Organisms' responses to changes in environment are extensively studied in *DASH* 4 and 5 in migrating and hibernating animals and a 2-year study of plants and birds. See *DASH* 4 and 5, Clusters 3 ANIMALS and 4 PLANTS.	• 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.	In *DASH* 6 students research closed biological systems that provide food and oxygen, remove carbon dioxide, and reprocess waste into usable plant nutrients. The closed system needed in a spacecraft is related to natural systems of producers, consumers, and decomposers in a food web. See *DASH* 6, Clusters 3 ANIMALS, 4 PLANTS, 5 FOOD AND NUTRITION, and 6 HEALTH AND SAFETY. A spaceship is a special example of a niche. Students are commissioned to maximize the productivity or carrying capacity of this niche. Both biological and abiologic factors effecting the system are investigated. See *DASH* 6, Clusters 3 ANIMALS; 4 PLANTS; 5 FOOD AND NUTRITION; and 6 HEALTH AND SAFETY.

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CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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.	• Compare and contrast the biological needs of plants and animals. • Give examples of matter or energy being recycled in the environment.	All animals and plants are compared by their different ways of satisfying biological needs. Animals in particular provide models of human satisfaction of these same needs. See *DASH* K–3, Clusters 3 ANIMALS and 4 PLANTS. Study of the energy component in food begins in *DASH* 1. Study of the photosynthetic system begins in *DASH* 2. The consumption of plant- and animal-produced foods is studied every year in activities involving animal care and human food needs. See *DASH* 1–3, Clusters 3 ANIMALS; 4 PLANTS; and 5 FOOD AND NUTRITION.	• Diagram how animals' food can be traced back to plants. • Explain how "energy" is needed for all organisms to stay alive and grow. • Give examples where organisms are reproducing, growing, dying, and decaying.	*DASH* uses nutrients as the chemical units that pass between soil and plants, which then produce food nutrients for animals. Diagramming begins in *DASH* 4 and continues through *DASH* 6. See *DASH* 4 and 5, Clusters 3 ANIMALS; 4 PLANTS; and 5 FOOD AND NUTRITION Energy needs are identified in *DASH* in the study of nutrient flow. See *DASH* 4 and 5, Clusters 3 ANIMALS; 4 PLANTS; and 5 FOOD AND NUTRITION Life cycles from birth (or germination) through death, including decomposition and decay, are studied starting in *DASH* K and continue through *DASH* 6; as is. See *DASH* 4 and 5, Clusters 3 ANIMALS; 4 PLANTS; and 9 CONSERVATION, RECYCLING, AND DECOMPOSITION.	• 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.	In *DASH* 6 photosynthesis is studied in relationship to the purging of the air of carbon dioxide, the production of oxygen, and the production of food for human survival. See *DASH* 6, Cluster 4 PLANTS. The closed system of the spaceship provides a classic example of conservation of matter as matter is transferred among living organisms and their environment. See *DASH* 6, Clusters 3 ANIMALS and 4 PLANTS.

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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.	• Give examples of organisms that lived on earth and are no longer present, and show how they might be related to organisms living today.	Animals no longer living are identified in *DASH* K and 1 in classification of animals activities. See *DASH* K–1, Cluster 3 ANIMALS.	• Compare fossils to one another and to living organisms and explain their similarities and differences. • Explain how certain organisms are more likely to survive and reproduce than others in the same environment.	Fossils are referenced in a comparative mode in *DASH* 4, Cluster 3 ANIMALS. Survival of animals and plants is studied in both *DASH* 4 and 5. Extensive studies are made of birds and of plants in various environments. See Clusters 3 ANIMALS and 4 PLANTS.	• 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.	Organisms' change over geologic time may be covered in reports of current scientific events on the Learning Calendar. See *DASH* 6, Cluster 1 LEARNING. Variation in body type and disease susceptibility in humans is studied in *DASH* 4 and 5. Susceptibility for alcohol and drug addiction are touched on in *DASH* 6, Cluster 6 HEALTH AND SAFETY. In their studies of closed systems students get a very clear picture of how pollution or other environmental changes can affect the survival of organisms. See *DASH* 6, Clusters 3 ANIMALS and 4 PLANTS.

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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.	• Identify ways in which some offspring are very much like their parents, although not exactly.	Similarities between adults and offspring are studied starting in *DASH* K when pets are introduced into the classroom. Identification of similarities of adult and progeny is a continuing technique in classification of organisms starting in *DASH* K. See *DASH* K–3, Clusters 3 ANIMALS and 4 PLANTS.	• Explain how inheritance determines the characteristics of the organism. • Explain how new variations of cultivated plants and domestic animals have resulted from selective breeding for particular traits.	Inheritance and reproduction are studied in *DASH* 4 and 5, Cluster 3 ANIMALS. Domesticated plants and animals and mechanisms for improving species are studied in *DASH* 3, Cluster 4 PLANTS and continues in *DASH* 4, Cluster 3 ANIMALS.	• Explain how heredity accounts for biological traits being passed on to successive generations.	Study of heredity starts in *DASH* 3 and is extended in *DASH* 4 and 5. Genetic susceptibility for alcohol and drug addiction and inheritance of body type are touched on in *DASH* 6, Cluster 6 HEALTH AND SAFETY.
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.	No Benchmarks for this Cluster.		• Explain how living things have basic parts that work together to sustain life.	In *DASH* 4 students study the respiratory system, the circulatory system, and the digestive system. See *DASH* 4, Clusters 3 ANIMALS and 5 FOOD AND NUTRITION. In *DASH* 5 they study the skeletal, muscular, sensory, and reproductive systems. In all these studies models are used to explain interaction of parts. See *DASH* 5, Clusters 3 ANIMALS; 5 FOOD AND NUTRITION; and 10 MATTER, SPACE, AND CONSTRUCTION.	• 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.	Structure and function studies start in *DASH* K. The idea of different functions at different levels of organization–cellular, tissue, organ, system, and organism—is begun in *DASH* 4, continues in *DASH* 5, and is carried on at the organism level in *DASH* 6, Clusters 3 ANIMALS; 4 PLANTS; and 6 HEALTH AND SAFETY. The interaction of organ systems begins in *DASH* 3 and is extensively studied in *DASH* 5, continuing in the disease prevention section of *DASH* 6, Cluster 6 HEALTH AND SAFETY. Human reproduction is studied extensively in *DASH* 5, including mechanisms for the prevention of pregnancy. It is suggested that if the reproduction activities are not used in *DASH* 5 that they be used in *DASH* 6. Reproduction and sexually transmitted disease are studied in *DASH* 6. See *DASH* 6, Cluster 6 HEALTH AND SAFETY.

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Organisms and Development Grade Cluster Benchmarks

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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 development, 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.	No Benchmarks for this Cluster.		• Compare and contrast the development (i.e., time and nourishment) of the human embryo with other species. • Explain the major stages in physical and mental development in human beings, with an understanding that there are variations between individuals.	In *DASH* 4 students observe the developing chick embryo. See *DASH* 4, Cluster 3 ANIMALS. In *DASH* 5 a nine-month study is made of the developing human embryo. See *DASH* 5, Cluster 3 ANIMALS. The two embryologies are compared with observation of developing fish, frogs, and insects (see *DASH* 2, *DASH* 3, and *DASH* K–3) as well as developing plant seeds (See *DASH* K–3). Differing nutritional sources are noted in chick and human fetal development. Human development after birth is studied starting in *DASH* K and continues in growth studies through *DASH* 6. Detailed study of body and mental changes is undertaken in *DASH* 4 and 5, Clusters 1 LEARNING and 3 ANIMALS.	• 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 reproduction is studied extensively in *DASH* 5. Students follow the development of the embryo from fertilization on a daily basis and development of a fetus on a weekly basis for the full period of a natural pregnancy. As the daily diagram is presented, the function of developing structures is discussed. See *DASH* 5, Cluster 3 ANIMALS. It is suggested that if the activities are not used in *DASH* 5 that they be used in *DASH* 6. Growth is a subject of study from *DASH* K. Personal height, weight, foot and hand size measurements and a chart of the developing dentition are kept from year to year. These are given a final analysis in *DASH* 6, Cluster 6 HEALTH AND SAFETY. Other studies of aging are done in *DASH* 4.

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	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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 • Identify the sensory organs that enable the human body to respond to its needs (e.g., skin responds to pain; eyes and nose in finding food.) PHYSICAL HEALTH • Identify elements that will lead to maintaining a healthy body (e.g., personal hygiene, balanced diet). • Describe how tobacco, alcohol, other drugs, and certain toxic materials can harm human beings. MENTAL HEALTH • Give examples of how different people handle their feelings or behave differently.	The roles of sensory organs in gathering information about the environment is studied starting *DASH* K (see Cluster 1 LEARNING) and is included in further studies of human biological needs through *DASH* 6. See *DASH* K–3, Cluster 3 ANIMALS. Food and nutrition and factors leading to bodily health are the in the spotlight of study at all grade levels. See *DASH* K–3, Cluster 5 FOOD AND NUTRITION and 6 HEALTH AND SAFETY. Study of alcohol, tobacco, drugs, and toxic materials is begun in *DASH* 3, Cluster 6 HEALTH AND SAFETY and are a continuing emphasized study from that point on. As part of the health component of *DASH* , mental health begins in *DASH* K and continues through *DASH* 6. It is a component of every activity driving the orderly interpersonal, cooperative operations of the classroom. See *DASH* K–3, Cluster 1 LEARNING.	HUMAN BODY FUNCTIONS • Explain how people obtain energy and materials for survival (e.g. body repair and growth). PHYSICAL HEALTH • Explain the need for proper diet and exercise to maintain a healthy body over time. • Explain how a healthy body can fight most germs that get inside the body and identify some germs that interfere with the body's defenses. MENTAL HEALTH • Give examples that show how physical health can affect people's emotional well-being and vice versa.	Diet and exercise are studied in *DASH* K–6. Students are prompted through aphorisms, studies of their own physiology, and dietary intake records to be fully conscious of their eating and exercise patterns. Students may generate explanations in their various investigations. See *DASH* 4 and 5, Clusters 1 LEARNING; 3 ANIMALS; 5 FOOD AND NUTRITION; and 6 HEALTH AND SAFETY. Learning about germs, their transmission, and ways to fight and prevent disease and infection begins in *DASH* K and continues through *DASH* 6. Aphorisms are used in all levels of *DASH* to carry the message of the need for sanitation and dangers of disease transmission. Appropriate sanitation practices are used in all activities. See *DASH* 4 and 5, Cluster 1 LEARNING. In *DASH* 5 the emphasis is on sexually transmitted diseases (STD). See *DASH* 5, Cluster 6 HEALTH AND SAFETY. Mental health, like physical health, is emphasized throughout *DASH* K–6 This is studied in simulations of interpersonal interactions, reflections on the learning process, learning to learn, and aphorisms. Appropriate behavior is stressed in all *DASH* activities. The effect of physical health on emotional health is also studied. See *DASH* 4 and 5, Clusters 1 LEARNING and 6 HEALTH AND SAFETY.	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.	Organ systems and their interdependencies are studied starting in *DASH* 3 and major body systems, including digestive, circulatory, sensory, and respiratory, are covered by *DASH* 5. Digestion, nutrients, the kilocalorie, and the transfer of energy are studied along with respiration. See *DASH* 6, Cluster 5 FOOD AND NUTRITION. Nutrition, exercise, and disease prevention (including alcohol and drug addiction), eating disorders, and nutrient cautions in vegetarian diets are studied in *DASH* 6, Cluster 6 HEALTH AND SAFETY. This is done in the context of wellness and longevity. Body defenses against disease including white cells and vaccination are studied in *DASH* 6, Cluster 6 HEALTH AND SAFETY. Mental health is a major theme in *DASH* K–6. Emotions, values, and coping are studied in *DASH* 6, Cluster 1 LEARNING.

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

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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 Hawaii a visitor is asked to remove his/her footwear. On the next visit, the visitor automatically removes his/her footwear before entering the home.	LEARNING • Identify factors that affect learning such as different interests, motivation, skills, and talents. • Explain how people can learn from each other by telling and listening, showing and watching, and imitating what others do. BEHAVIOR • Explain how people are grouped by common behavior such as culture and learning style. • Explain how different families, classrooms, and societies have different roles and patterns of behavior for their members.	The organization of *DASH* favors its use in a heterogeneous classroom, which brings together a range of intellectual, motivational, and emotional talents and learning styles. Because of the integration of the physical science, biology, earth science, health, and other technologies, it offers a full range of experiences appealing to interests in all natural and human made phenomena. See all *DASH* K–3 Clusters and the *DASH* Instructional guide. Students are regularly required to reflect on the nature of their learning. In discussion they become critical of group and individual learning through observing, describing, listening, and actively investigating. See *DASH* K–3, Cluster1 LEARNING. As part of the Learning Calendar, students keep a record of the ongoing events in the classroom and school and become aware of cultural events that typify activities of different groups in a class. Through the facts of different preferred contributions in class activities, students get immediate experience in personal and group learning styles. See *DASH* K–3, Cluster LEARNING.	LEARNING • Express that learning means using what one already knows to make sense out of new experiences or information, not just storing new information in one's head. • Explain and demonstrate how repetition and practice can make a skill automatic, such as riding a bike. BEHAVIOR • Identify situations where members of a group and even people in a crowd sometimes do and say things that they would not do or say on their own. • Compare human behavior in the various cultural groups during different time periods and give examples of some behaviors that are unacceptable in almost all cultures, past and present.	*DASH* makes explicit the importance of building on knowledge already gained through its sequential building of concepts and skills. Students are made aware of this in their reflections and debriefing in all activities. In particular see *DASH* 4 and 5, Cluster 1 LEARNING. In *DASH* learning a skill is immediately followed by use of that skill. All skills once used are repeatedly applied. This process is reinforced in *DASH* 4 and 5, Cluster 1 LEARNING, where students reflect on things they have learned, how they have learned, and what they yet want to learn. Comparison of group and individual responses to situations is studied in simulations and reflections in *DASH* 4 and 5, Cluster 1 LEARNING and 6 HEALTH AND SAFETY. This is particularly studied in *Chris's Story*, a choice book about party behavior. See *DASH* 5, Cluster 6 HEALTH AND SAFETY. Behaviors and their acceptability are studied in *DASH* 4 and 5, Clusters 1 LEARNING and 6 HEALTH AND SAFETY.	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.	Learning as part of mental health is studied in *DASH* K–6. Students are regularly made aware of how they are learning through reflection and group discussion. Personal differences in relation to multiple intelligences are noted. This is particularly brought out in studies of the work world. See *DASH* 6, Cluster 1 LEARNING. Experience, practice, and time on task are identified as factors in achievement. Students are regularly made aware of how they are learning through reflection and group discussion. This is part of the studies of the work world and the Concept and Skill Inventory, which is organized to assess the contribution of multiple intelligences. See *DASH* 6, Cluster 1 LEARNING. Reflection on group organizations is part of ongoing study of how a group of researchers prepare for the travel to Mars. The need for group cooperation, sharing, and harmonious interaction becomes apparent. See *DASH* 6, Cluster 1 LEARNING. The bearing of culture on interpersonal interaction is incorporated into *DASH* 4 where the technologies of Polynesian or Native American societies are studied.

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The Physical Environment Grade Cluster Benchmarks

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
NATURE OF MATTER 13. Students examine the nature of 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.	• Identify the properties of matter from which objects are made.	The study of the properties of matter begins in *DASH* K and continues through *DASH* 6. Studies of change in state are found in DASH K–3, Cluster 2 TIME WEATHER AND SKY. Soils and water investigations are found with *DASH* K–3, Cluster 3 PLANTS. Matter is further studied in *DASH* K–3, Cluster 10 MATTER, SPACE, AND CONSTRUCTION	• Describe how materials can change from one state to another by heating or cooling (e.g., water cycle, burning candle). • Give examples of how the properties of a material can be used to predict how that material will behave under different conditions.	Changes in state and the water cycle are studied in *DASH* 4 and 5, Cluster 2 TIME, WEATHER, AND SKY. Burning is studied in *DASH* 4, Clusters 6 HEALTH AND SAFETY and 10 MATTER SPACE, AND CONSTRUCTION.	• 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).	Chemical properties are introduced in *DASH* 3. In *DASH* 6 the emphasis is on elements found in rocks and minerals, the electrolytic recovery of metals, and the formation of crystals—salt, sugar, and minerals. See *DASH* 6, Cluster 8 ENERGY AND COMMUNICATION. Acids, bases, and crystallization of sugar are studied in *DASH* 3. In *DASH* 4 students study oxidation using the gases hydrogen, oxygen, and carbon dioxide. In *DASH* 5 study focuses on nutrients—water, vitamins, minerals, carbohydrates, fats, and proteins. In *DASH* 6 metals are recovered from solution by electrolysis and acid-metal batteries are constructed. See *DASH* 6, Cluster 8 ENERGY AND COMMUNICATION.

Science Content Standards
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The Physical Environment Grade Cluster Benchmarks

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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.	• Illustrate that the sun warms the land, air, and water.	Study of the sun and its warming capacity is threaded throughout *DASH* starting in *DASH* K. Temperature is recorded daily on the Learning Calendar. See *DASH* K–3, Cluster 1 LEARNING. The sun is found to be the source of temperature change on land in the air and in bodies of water. See *DASH* K-3, Cluster 2 TIME WEATHER AND SKY. Study of forms of energy is begun in *DASH* K and continues through *DASH* 6. Students initiate study by finding situations where things "go, grow, and glow." This rudimentary definitional base is expanded as students become more sophisticated in observation and investigation. See *DASH* K–3, Cluster 3 ENERGY AND COMMUNICATION.	• Explain how heat is produced and how it differs from light. • Explain how energy goes from more useful to less useful forms.	Heat as a phenomenon separate from light is studied starting in *DASH* K and continues through *DASH* 6 along with its many different ways of being produced. See *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 8 ENERGY AND COMMUNICATION; 10 MATTER, SPACE, AND CONSTRUCTION. Energy transformation is studied starting in *DASH* K. In *DASH* 5 the emphasis is on the transformation of mechanical, chemical, and solar energy to heat. Along with this there is the study of loss of energy through friction and dissipation of low energy heat. See *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 8 ENERGY AND COMMUNICATION; and 10 MATTER, SPACE, AND CONSTRUCTION.	• Describe and explain an example of energy transfer and transformation. • Demonstrate how vibration in materials set up wave like 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.	The idea of energy transfer is introduced in *DASH* K and is a continuing concept through *DASH* 6. Energy transformation is studied concurrently with transfer—light energy to food and fuel; chemical to electrical; electrical to light, mechanical, and sound. See *DASH* 6, Cluster 8 ENERGY AND COMMUNICATION and 10 MATTER, SPACE, AND CONSTRUCTION. Sound is introduced in *DASH* 5 and the concept is used in *DASH* 6 to demonstrate the limits of use in air and airless environments and to make sound based communication systems. See *DASH* 6 Cluster 10 MATTER, SPACE, AND CONSTRUCTION. Forms of energy are introduced in *DASH* K with continuing addition of types through *DASH* 6. Comparison occurs in the study of transformations of energy. See *DASH* 6, Cluster 8 ENERGY AND COMMUNICATION and 10 MATTER, SPACE, AND CONSTRUCTION. The "Mission to Mars" theme includes intensive study of conservation of all the ingredients of survival needed in such a project, including fabricated materials, matter, and energy. See *DASH* 6 Cluster 9 CONSERVATION, RECYCLING, AND DECOMPOSITION.

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CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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 • Describe the various ways or paths in which things can move such as back and forth, zigzag, and circular. • Describe a method to change how something is moving such as applying more or less force (e.g., push-pull). SOUND • Describe how things make sound.	Motion is studied in may situations. It is studied as a component of energy *DASH* K–3, Cluster 8 ENERGY AND COMMUNICATION. It is studied in the technology of vehicle building and testing in *DASH* K–3, Cluster 7 WAYFINDING AND TRANSPORTATION. As mobility, it is studied as a characteristic separating plants and animals. See *DASH* K–3, Cluster 3 Animals. Different paths, Zigzag, random, straight and circular, are identified as part of ongoing observation. Mechanisms for changing direction are investigated in *DASH* K–3, Cluster 8 ENERGY AND COMMUNICATION and in *DASH* K–3, Cluster 7 WAYFINDING AND TRANSPORTATION. Sound is investigated in *DASH* 3 Cluster 8 ENERGY AND COMMUNICATION. Students make different sound producing devices.	MOTION AND FORCES • Explain how force and mass can change the speed or direction of an object. • Use time to describe motion. ELECTROMAGNETIC RADIATION • Explain that light travels in a straight line until it strikes an object (e.g., reflected by a mirror, refracted by a lens or absorbed by an object).	Time and speed of objects is first introduced in *DASH* 1 and is continued through *DASH* 6. Wind speed, boat speed, and long-term rate changes are studied in *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 6 HEALTH AND SAFETY; 7 WAYFINDING AND TRANSPORTATION; 8 ENERGY AND COMMUNICATION; 9 CONSERVATION, RECYCLING, DECOMPOSITION; and 10 MATTER, SPACE, AND CONSTRUCTION. Light, its straight-line travel, and its reflection by mirrors is first studied in *DASH* 2. It is studied extensively in *DASH* 5, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 7 WAYFINDING AND TRANSPORTATION; 8 ENERGY AND COMMUNICATION; and 10 MATTER, SPACE, AND CONSTRUCTION.	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.	The concept of mass is introduced in *DASH* 2 and force and motion in *DASH* 4. Study continues of all three entities through *DASH* 6 See *DASH* 6, Clusters7 WAYFINDING AND TRANSPORTATION; 8 ENERGY AND COMMUNICATION; and 10 MATTER, SPACE, AND CONSTRUCTION. Light and the spectrum are studied in *DASH* 5. Light as an energy source for organisms is studied in *DASH* 6. See *DASH* 6, Cluster 1 LEARNING, 4 PLANTS, and 8 ENERGY AND COMMUNICATION. The eye and light detection are studied in *DASH* 5.

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

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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.	• Observe and describe the properties, locations, and movements of celestial objects in the sky.	From *DASH* K through *DASH* 6 student keep records of the movement of celestial objects. See *DASH* K–3, Clusters 1 LEARNING and 2 TIME WEATHER AND SKY. In the beginning the focus is on the sun and moon, then starting in *DASH* 3 the planets are added to the objects watched. Out of this comes a clear description of daily movement and locations.	• Identify the source of light and heat necessary to maintain the Earth's temperature and to support life. • Describe what constitutes the solar system of which Earth is a part. • Describe the tools used to gather information about the solar system.	The sun as a source of energy is extensively studied in *DASH* 4 and 5. Temperature, seasons, and their correlation with the cycles of life of plants and animals are observed, logged, and modeled See *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 3 ANIMALS; 4 PLANTS; 7 WAYFINDING AND TRANSPORTATION; and 8 ENERGY AND COMMUNICATION. The study of the sun and moon begin in *DASH* K, stars and planets are added in *DASH* 3, and full development of the solar system is undertaken in *DASH* 4 and 5, Clusters 2 TIME, WEATHER, AND SKY; 7 WAYFINDING AND TRANSPORTATION; and 8 ENERGY AND COMMUNICATION. *DASH* students make sundials, gnomons, planetariums, and camera obscura to study eclipses in *DASH* 4. See Cluster 2 TIME, WEATHER, AND SKY. In *DASH* 5 they continue to make gnomons, planetariums, camera obscura, telescopes, and models of the solar system. Students describe these tools in their Student Record Books.	• 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.	Study of the solar system is begun in *DASH* K with studies of the sun and moon. Each year this theme is expanded through continuing observations. The regularity and predictability of celestial objects is used to develop a Copernican model of the solar system in *DASH* 5. In *DASH* 6 this model is used to map a path to Mars. See *DASH* 6, Cluster 7 WAYFINDING AND TRANSPORTATION. Description of the universe emerges in *DASH* 5 and is further developed in *DASH* 6, Clusters 1 LEARNING and 7 WAYFINDING AND TRANSPORTATION. Telescopes are studied, constructed, and used in *DASH* 5 for both terrestrial and celestial observations.

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CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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.	• Describe how things near the Earth fall to the ground unless something holds them up. • Describe how magnets can make some things move without being touched.	Gravity as a downward force is investigated starting in *DASH* K. It is continued in *DASH* K–3, Cluster 8 ENERGY AND COMMUNICATION. Need for support is studied concurrently and is an inherent part of a range of engineering projects. See *DASH* K–3, Cluster 10 MATTER SPACE AND CONSTRUCTION. Magnets are introduced with the construction of a compass in *DASH* 2 and their attractive and north-seeking properties are used thereafter. See *DASH* 2-3, Cluster 2 TIME WEATHER AND SKY.	• Describe how the Earth's gravity pulls any object toward it without touching it. • Describe how a magnet pulls on all things made of iron and either pushes or pulls on other magnets. • Explain that electrically charged materials pulls on other materials and may either push or pull other charged materials.	Gravity is studied in both *DASH* 4 and 5. See Clusters 2 TIME, WEATHER, AND SKY; 7 WAYFINDING AND TRANSPORTATION; and 8 ENERGY AND COMMUNICATION. Magnets are studied in conjunction with studies of the compass starting in *DASH* 2. Magnetism is studied as an electromagnetic, geomagnetic, and ferromagnetic phenomenon in detail in *DASH* 6. See *DASH* 4 and 5, Cluster 2 TIME, WEATHER, AND SKY. Electric charge is studied in lightning in *DASH* 4, Cluster 2 TIME WEATHER AND SKY. Static electricity and current electricity are studied in detail in *DASH* 6.	• 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.	A model of the solar system and the universe, which uses gravity as the tethering agent of the universe, is developed in *DASH* 5. This concept is used to study traveling to Mars. The *DASH* 5 model of the solar system and the universe illustrates the role of gravity in holding the Earth, Moon, and planets in their orbits. Electromagnetism is studied in *DASH* 6. Comparisons are made with geomagnetism and ferromagnetism. Forces are identified and their interaction is observed and analyzed. Electrostatic forces are also extensively studied. See *DASH* 6, Clusters 6 ENERGY AND COMMUNICATION and 10 MATTER, SPACE, AND CONSTRUCTION.

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CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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 the movements of the sun, moon, and stars throughout the day. • Describe how weather changes from day to day and over the seasons.	From *DASH* K through *DASH* 6 student keep records of the movement of celestial objects in the sky. See *DASH* K–3, Clusters 1 LEARNING and 2 TIME WEATHER AND SKY. In the beginning focus is on the sun and moon. Students use a mnemonic to follow the Daily path of the sun, moon, planets and stars across the day and night skies. Daily records are kept of weather changes starting in *DASH* K and continued through *DASH* 6. Weather phenomena, as evidenced in these records, are related directly to seasons. See *DASH* K–3, Clusters 1 LEARNING and 2 TIME WEATHER AND SKY.	• Illustrate the water cycle and its relationship to weather and climatic patterns. • Explain the phases of the moon and eclipses. • Describe the Earth's daily rotation and annual revolution.	Study of the water cycle is begun in *DASH* K and continues through *DASH* 6. It is associated with weather throughout *DASH*. Climate is studied in detail in *DASH* 6. See *DASH* 4 and 5 Cluster 2 TIME, WEATHER, AND SKY. Study of the moon is begun in *DASH* K and continues through *DASH* 5. Explanations of eclipses and phases are worked out in *DASH* 4. See *DASH* 4 and 5, Cluster 2 TIME, WEATHER, AND SKY. Rotation and revolution of the earth and moon are studied in *DASH* 5, Clusters 2 TIME, WEATHER, AND SKY and 7 WAYFINDING AND TRANSPORTATION.	• 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.	Earth's axial tilt in the plane of the ecliptic is studied in *DASH* 5. This is correlated with the change in seasons. The parallel axial tilt of Mars is studied in *DASH* 6. Comparisons are made between resulting seasons on Earth and Mars. See *DASH* 6, Clusters 1 LEARNING and 2 TIME, WEATHER, AND SKY. Studies begin in *DASH* K and continue in *DASH* 5 on the role of the sun in producing weather systems, currents, the water cycle, and plant growth. In *DASH* 6 applications of this knowledge are made to predict the evolution and change in the Martian environment as humans attempt to make the planet habitable by terraforming. See *DASH* 6, Clusters 1 LEARNING and 2 TIME, WEATHER, AND SKY.

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Earth Systems and The Universe Grade Cluster Benchmarks

CONTENT STANDARDS	Grades K–3	*DASH* Alignment	Grades 4–5	*DASH* Alignment	Grades 6–8	*DASH* Alignment
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.	• Give examples of different Earth materials and how they are used. • Classify chunks of rocks by size and shape.	Building using Earth materials is particularly studied in *DASH* 2. Here soil and rock and their many uses are surveyed. See *DASH* 2, Cluster 4 PLANTS. In this series of activities the students make soils, use them to grow plants, and undertake an inventory of the use of soil and rock in construction. As part of the soils activities in *DASH* 2 components are separated by size and inspected for shape.	• Conclude that rock is composed of different combinations of minerals and/or living things. • Give examples of how waves, wind, water, and ice shape and reshape the Earth's land surface. • Explain the causes and effects of earthquakes and volcanoes.	Rocks and their properties are studied in *DASH* 4, Cluster 10 MATTER, SPACE, AND CONSTRUCTION. They are further studied in *DASH* 6. Erosion is studied in *DASH* 5, Cluster 5 PLANTS and in *DASH* 6. Volcanism is introduced in *DASH* 4 in the study of rocks. See Cluster 10 MATTER, SPACE, AND CONSTRUCTION. Earthquakes and volcanism are studied extensively in *DASH* 6.	• Describe how different kinds of rocks are formed. • Compare different kinds of soil and their formation.	Rock formation is extensively studied in *DASH* 6. Formation of rock on Earth is the beginning point. This knowledge is extrapolated to Mars. See *DASH* 6, Cluster 8 ENERGY AND COMMUNICATION. Soils are studied starting in *DASH* 2. In *DASH* 6 the study is extended to the Martian environment. See *DASH* 6, Cluster 8 ENERGY AND COMMUNICATION.