Alignment of the Developmental Approaches in Science, Health, and Technology Program (DASH)

with the

AAAS Benchmarks for Science Literacy

Grades K-5

Curriculum Research & Development Group
DASH Project
1776 University Avenue
Honolulu HI 96822
Ph: 800-799-8111
Fax: 808-956-6730
e-mail: crdg@hawaii.edu

FOREWORD

Alignment of the Developmental Approaches in Science, Health, and Technology (*DASH*) Program with the AAAS Benchmarks for Science Literacy

Developmental Approaches in Science, Health, and Technology (*DASH*), an engaging K–6 inquiry-based program in science, health, and technology, has already been validated by the U.S. Department of Education's Program Effectiveness Panel, awarded a dissemination grant through the National Diffusion Network, and included in the U.S. Department of Education's recently published *Promising Practices in Mathematics and Science.* Primary developmental funding was from the National Science Foundation, the Hawaii State Department of Business, Economic Development, and Tourism, and the University of Hawai'i.

DASH meets the American Association for the Advancement of Science (AAAS) *Benchmarks for Science Literacy* through ten learning clusters of activities specifically integrating science, health and technology. *DASH* is designed to articulate with language arts, mathematics, arts, history, and geography. Students with various backgrounds and learning styles master concepts and skills in contexts of authentic technological and scientific exploration, invention, and explanation providing models for thinking and problem solving.

Benchmarks for Science Literacy is a product of the AAAS *Project 2061 Science For All Americans* effort to reform science education in the United States. The Benchmarks specify how students should progress toward science literacy, recommending what they should know and be able to do by the time they reach certain grade levels, K-2 and 3-5, for elementary schools.

The following analysis describes how *DASH* addresses the recommended Benchmarks for science education.

Analysis of DASH Match to the AAAS Benchmarks for Science Literacy

The AAAS Benchmarks for Grades K–2	Developmental Approaches in Science, Health, and Technology (DASH)
1. The Nature of Science **1.A. Scientific View of the World** • When a science investigation is done the way it was done before, we expect to get a very similar result.	DASH students at each grade level frequently repeat experimental investigations individually and among groups with the subsequent finding of similar results. Such repetition takes several forms. • Repeated observation and enumeration of external body parts of different insects mammals, and plants (Examples: K.3.9 Parts Of Bugs, K.3.10 Parts Of Mammals, K.3.11 People, K.4.1 Plant Parts, 1.3.4 Animal Key, 1.4.4 Plant Key, 2.3.2 External Anatomy Of A Fish) • Shared investigations by different groups in a class. (Examples: 1.8.1 Temperature Of Things. 1.10.3 Testing For Water, 2.4.1 Soil, 2.4.2 Making Soil) • Multiple-year longitudinal studies. Examples: Weather K.2.1 Weather Watch, 1.2.1 Sky And Weather Watch, 1.2.3 Snow And Streams, 2.2.1 Temperature, 2.2.2 Wind, 2.2.5 Rain, 2.2.6 Snow Seasons K.2.8 Seasons, 1.2.8 Night And Day, 1.2.10 The Seasons, 2.2.3 Sunrise, Sunset, And Seasons Astronomy K.2.6 Moon Watch, K.2.7 Moon Phases, K.7.2 Sunrise, K.7.3 Sun Set, K.7.5 Rising Moon, K.7.6 Setting Moon, 1.2.7 Sunrise And Sunset, 1.2.9 The Sun, 2.2.3 Sunrise, Sunset, And Seasons, 2.2.4 Moonrise And Moonset Plants And Agriculture K.4.4 Growing Bean Sprouts, K.4.6 Gardening, 1.4.2 Plant Survey, 2.4.9 Vegetable Garden In A Bucket, 2.4.10 Flower Garden In A Bucket, 2.4.16 Tree Planting

AAAS Benchmarks	DASH Grades K–2
• When a science investigation is done the way it was done before, we expect to get a very similar result.	Animals K.3.2 Classroom Animals, K.3.2 Caring For Classroom Animals, 1.3.9 Classroom Pets, 2.3.1 The Classroom Aquarium, 2.3.14 Classroom Pets, 1.3.3 Animal Survey, 1.3.8 Metamorphosis, 2.3.6 Hatching Insect Eggs, 2.3.7 Early Metamorphosis, 2.3.8 Late Metamorphosis Decomposition K.9.1 Decomposition, 1.9.4 Decomposition And Unearthing, 1.9.5 Decomposition And Reburial, 2.9.1 Fall Unearthing, 2.9.2 Fall Burying, 2.9.3 Spring Unearthing, 2.9.4 Spring Burying Personal Growth And Development K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 2.6.2 Tooth Chart Transportation K.7.8 Sidewalks And Walkways, K.7.9 Roads, K.7.10 Traffic Simulations, K.7.11 Traffic Rules, 1.7.5 Making A Boat, 1.7.7 The Great Regatta, 2.7.1 Transportation Systems, 2.7.2 Making Race Cars, 2.7.3 Racing And Modifying Cars, 2.7.4 Roads, 2.7.5 Building A Village, 2.7.6 Pedestrians In The Village, 2.7.7 Bikes In The Village, 2.7.8 Cars In The Village Safety K.6.21 Getting Lost, K.7.1 Right And Left, K.7.4 North South, K.7.7 Home Location, K.7.11 Traffic Rules, 1.6.8 Safety Rules, 2.6.7 Classroom And Playground Safety, 2.6.8 Fire Safety, 2.6.9 Using 911.
• Science investigations generally work the same in different places.	Replication of experimental investigations in different places with the consequent finding of similar results is common at each grade level. All of the multi-year, longitudinal investigations involve both a validation of previous work and exploration in new areas. All involve multiple sites since classrooms change from year to year.

AAAS Benchmarks	DASH Grades K–2
1.B. Scientific Inquiry • People can often learn about things around them by just observing those things carefully, but sometimes they can learn more by doing something to the things and observing what happens.	Observing natural phenomena is a daily occurrence as students as students collect and report weather, astronomical, animal, and other data on the DASH Learning Calendar. Students commonly manipulate variables in experiments with plants and insects. (Examples: K.4.5 Plants And Water, 1.4.5 Plant Needs, 2.3.10 Spider Food, 2.3.10 Spider Care, 2.4.3 Soil And Plants, 2.4.11 Plants And Sunlight, 2.4.12-15 (Root Studies). Inventing, designing, making, testing, modifying, creating solutions, developing or making products, seeing how products react under different conditions, etc. are common, daily experiences in DASH. (Examples: K.6.15 Raincoats, K.6.16 Testing Raincoats, K.7.10 Traffic Simulation, K.7.11 Traffic Rules, K.8.2 Making Things Move, K.8.3 Making Things, K.8.6 Repairing Thing, K.10.1 Cubby Organization, K.10.7 Packing And Storing, K.10.8 Linear Measurement, 1.3.4 Animal Key, 1.3.7 Building Cages, 1.4.4 Plant Key, 1.5.2 Cooking, 1.6.8 Safety Rules, 1.7.5 Making A Boat, 1.7.8 Floating And Sinking, 1.10.1 Meter String Can, 1.10.5 Water Systems, 1.10.9 Building With Air, 1.10.12 Cardboard House Plan, 1.10.13 Making A Cardboard House, 1.10.15-19 (Furnishing The House), 2.4.2 Making Soil, 2.4.3 Soil And Plants, 2.4.6 Pipes And Water, 2.4.7 Moving Water With Gravity, 2.4.8 Moving Water With Pumps, 2.6.7 Classroom And Playground Safety, 2.6.8 Fire Safety, 2.6.9 Using 911, 2.7.2 Making Race Cars, 2.7.3 Racing And Modifying Cars, 2.7.4 Roads, 2.7.5-2.7.8 (Building A Traffic Simulation Village), 2.7.9-2.7.12 (Investigation Of Wheels, Pulleys, Belts, Chains, And Gears Using Bikes And Trikes, 2.8.1 Camera Obscura ,2.8.2 Mirrors And Sunlight, 2.10.1 Desk Organizer, 2.10.2 Notebook Organizer, 2.10.3 The Balance, 2.10.4 Meter-String Can, 2.10.5 Measuring Volume.)

AAAS Benchmarks	DASH Grades K–2
• Tools such as thermometers, magnifiers, rulers or balances often give us more information about things than can be obtained by just observing things without their help.	Thermometers, magnifiers, rulers are all used in grades K–6. Students begin making linear measurements in grade K. Weighing and measuring volume are introduced in grade 1. (Examples: K.10.8 Linear Measurement, 1.10.1 Meter-String Can, 2.10.4 Meter-String Can) • Students use volumetric tools starting in kindergarten (Examples: K.10.6 Volume Of Boxes And Bags, 1.5.3 Measuring Volume) • Students make their own balances and volumetric measuring tools starting in grade 2. (Examples: 2.10.3 The Balance) • Students make their own volumetric measurement tools starting in grade 2. (Examples: 2.10.5 Measuring Volume)
• Describing things accurately as possible is important in science because it enables people to compare their results with others.	DASH emphasizes accurate description. The following special tools and techniques are used to provide practice and facilitate mastery of the art of description. • The DASH LEARNING CALENDAR which is a continuous record of data recorded daily by groups of students to ensure accuracy. • The SCIENCE RECORD BOOK which is the student's personal record of the results of activities. In kindergarten students rely heavily on drawings. As they advance writing is encouraged with continuing use of diagrams. Quantitative data are used from the beginning . • The WORKING DICTIONARY which is a repository of evolving definition.
• When people give different descriptions of the same thing, it is usually a good idea to make some fresh observations instead of just arguing about who is right.	DASH students resolve discrepant observations and diverse interpretations by further observations and experimentation.

1.C. The Scientific Enterprise • Everyone can do science and invent things and ideas.	In keeping with the goal science for all students, DASH activities are designed for full class participation. To achieve this, activities are designed to address differences in learning styles and modalities. They include opportunities to engage students with strengths in kinesthetic, spatial, logical-mathematical, linguistic, interpersonal, and intrapersonal modes of learning. Cooperative learning and grouping techniques allow teachers to organize the classroom for maximum use of peer teaching. These techniques cause greater focus on the work under study by all students.

AAAS Benchmarks	DASH Grades K–2
• In doing science, it is often helpful to work with a team and to share findings with others. All team members should reach their own individual conclusions, however, about what findings mean.	DASH activities are designed for group involvement. The students keep individual interpretations with those of the group. Differences in conclusions are common. They are encouraged and become a driving force for personal and often class explorations.
• A lot can be learned about plants and animals by observing them closely, but care must be taken to know the needs of living things and how to provide for them in the classroom.	Careful observation of plants and animals is a K–6 experience for students. Each year additional organisms are added to the repertoire and kinds of inquiry become more sophisticated. Central to these studies is finding out how to care for these organisms. (Examples: Plants K.4.4 Growing Bean Sprouts, K.4.6 Gardening, 1.4.2 Plant Survey, 2.4.9 Vegetable Garden In A Bucket, 2.4.10 Flower Garden In A Bucket, K.4.5 Plants And Water, 1.4.5 Plant Needs, 2.4.3 Soil And Plants, 2.4.11 Plants And Sunlight, 2.4.12-15 (Root Studies) Animals K.3.2 Classroom Animals, K.3.2 Caring For Classroom Animals, 1.3.9 Classroom Pets, 2.3.1 The Classroom Aquarium, 2.3.14 Classroom Pets, K.3.12 Animals And Food, K.3.13 Animals And Water, K.3.14 Animals And Air, K.3.15 Animals And Waste, K.3.16 How Animals Keep Warm, K.3.17 How Animals Keep Cool, 1.3.5 Animal Needs, 2.3.3 Biological Needs Of Fish, 2.3.10 Spider Food, 2.3.10 Spider Care.)
2. Nature of Mathematics **2.A. Patterns and Relationships** • Circles, squares, triangles, and other shapes can be found in nature and in things that people build.	Intuitive geometry and geometric shapes are used throughout DASH in making tools and structures and in measuring and describing objects. (Examples: Focus Book Friendly Shape, K.10.2 Patterns In Puzzles, K.10.3. Making Puzzles, K.10.4 Making Envelopes, K.10.5 Making Boxes, K.7.10 Traffic Simulation 1.10.13 Making A Cardboard House, 2.7.6 Building A Village, 2.7.11 Fast And Slow Pulleys, 2.7.12 Gears And Wheels, 2.10.5 Measuring Volume)
• Patterns can be made by putting different shapes together or taking them apart.	DASH students have many experiences in using geometric shapes in building structures and inventions. (Examples: The Focus Book, The Friendly Shape, for kindergarten involves the additive power of geometric shapes in making different objects. K.7.10 Traffic Simulation, K.10.4 Making Envelopes, K.10.5 Making Boxes And Bags, 1.10.3 Making A Cardboard House, 2.7.3 Making Race Cars, 2.7.5 Building A Village (all involve the combining of geometric shapes))

AAAS Benchmarks	DASH Grades K–2
• Things move, or can be made to move, along straight, curved, circular, back-and-forth, and jagged paths.	• DASH students study the paths of objects in several activities. (Examples: Students' travel paths—K.7.7 Home Location, 1.7.1 Pacing, 1.7.3 Home, 2.7.4 Roads Paths Of Moving Objects—K.8.3 Making Things Stop, 2.7.3 Racing And Modifying Cars)
2.B. Mathematics, Science, and Technology • Counting and measuring with numbers are useful for doing, describing, and designing things.	Counting and measuring to get a quantitative sense of natural events and provide accuracy in technological construction are an integral part of the daily DASH experience. Counting is basic to all DASH activities. Measuring with metric and other tools is found throughout DASH. (Examples: Temperature K.2.1 Weather Watch, K.2.1 Sky And Weather Watch, 1.8.1 Temperature Of Things, 1.8.2 The Master Thermometer, 2.2.1 Temperature, Comparing Temperature Linear Measure K.6.1 Growth Charts, K.7.12 Mapping, K.10.8 Linear Measure, 1.6.1 Growth Charts, 1.7.4 Map Distance, 1.10.1 Meter-String Can, 1.10.2 Outdoor Study Area Mapping, 1.10.10 Floor Plan Model, 1.10.13 Cardboard House Model, 1.10.13 Making A Cardboard House, 2.6.1 Growth Charts, 2.7.3 Making Race Cars, 2.7.5 Building A Village, 2.10.4 Meter-String Can Area K.6.1 Growth Chart, 1.6.1 Growth Chart, And 2.6.1 Growth Chart, 1.10.2 Outdoor Survey Area Mapping Volume K.10.6 Volume Of Boxes And Bags, 1.5.3 Measuring Volume, 2.10.5 Measuring Volume Weight K.6.1 Growth Chart, 1.6.1 Growth Chart, And 2.6.1 Growth Chart Mass 2.10.3 The Balance Time K.2.9 Clocks And Calendars, 1.2.4 Digital Time, 1.2.5 Hours And Minutes, 1.2.11 Making A Clock, 2.2.7 Digital Time, 2.2.8 Analog Time)

AAAS Benchmarks	DASH Grades K–2
2.C. Mathematical Inquiry • Numbers and shapes can be used to tell about things.	Numbers and shapes are routinely used to represent objects from kindergarten through grade 6. Time, temperature, mass, and space are regularly measured and described numerically. Students are regularly asked to give graphic and pictorial representation of things they are observing. In their discussions students use diagrams and models as tools for description.
3. The Nature of Technology **3.A. Technology and Science** • Tools are used to do things better or more easily and to do some things that could not otherwise be done at all. In technology, tools are used to observe, measure and make things.	A wide variety of technological tools are used in DASH. Measuring tools include are clocks, watches, calendars, thermometers, rulers, metric marked strings, area grid paper, volumetric measuring cups, graduated cylinders, scales, balances and compasses. (Examples Clocks and Calendars K.2.9 Clocks And Calendars, 1.2.4 Digital Time, 1.2.5 Hours And Minutes, 1.2.11 Making A Clock, 2.2.7 Digital Time, 2.2.8 Analog Time Thermometers K.2.1 Weather Watch, 1.8.1 Temperature Of Things, 1.8.2 The Master Thermometer, 2.2.1 Temperature, 2.8.4 Comparing Temperature Linear Measuring Tools K.10.8 Linear Measure, 1.6.1 Growth Charts, 1.7.4 Map Distance, 1.10.1 Meter-String Can Area Measuring Grid Paper 1.10.2 Outdoor Study Area Mapping, 1.10.10 Floor Plan Model Volume Measuring Tools K.10.6 Volume Of Boxes And Bags, 1.5.3 Measuring Volume, 2.10.5 Measuring Volume Scales And Mass K.6.1 Growth Chart, 1.6.1 Growth Chart, And 2.6.1 Growth Chart, 2.10.3 The Balance, 2.2.2 Wind Construction tools include scissors, saws, clamps, miter boxes, hammers, pliers, wrenches cutting implements, glue guns, paint brushes, shovels.

AAAS Benchmarks	DASH Grades K–2
• When trying to build something or to get something to work better, it usually helps to follow directions if there are any or to ask someone who has done it before for suggestions.	Students are encouraged to use all resources possible to solve problems including books, authorities, and other students. (Examples: K.6.15 Raincoats, K.6.16 Testing Raincoats, K.7.10 Traffic Simulation, K.8.2 Making Things Move, K.8.3 Making Things Stop, K.8.6 Repairing Things, K.10.1 Cubby Organization, K.10.7 Packing And Storing, K.10.8 Linear Measurement, 1.3.7 Building Cages, 1.5.2 Cooking, 1.7.5 Making A Boat, 1.7.8 Floating And Sinking, 1.10.1 Meter String Can, 1.10.5 Water Systems, 1.10.9 Building With Air, 1.10.12 Cardboard House Plan, 1.10.13 Making A Cardboard House, 1.10.15-19 (Furnishing The House), 2.4.2 Making Soil, 2.4.6 Pipes And Water, 2.4.7 Moving Water With Gravity, 2.4.8 Moving Water With Pumps, 2.6.7 Classroom And Playground Safety, 2.7.2 Making Race Cars, 2.7.3 Racing And Modifying Cars, 2.7.4 Roads, 2.7.5-2.7.8 (Building A Traffic Simulation Village), 2.8.1 Camera Obscura, 2.8.2 Mirrors And Sunlight, 2.10.1 Desk Organizer, 2.10.2 Notebook Organizer, 2.10.3 The Balance, 2.10.4 Meter-String Can, 2.10.5 Measuring Volume)
3.B. Design and Systems • People can use objects and ways of doing things to solve problems.	DASH presents students with an array of problems to be solved. K–2 problems are practical ones, often involving technology and rooted in the local environment. Tools are listed under 3A. Techniques emphasized include: • Thinking. All activities involve some thinking skills from cataloging and generalizing to conceptualizing a final product. • Organizing work teams. Cooperative group organization of the class is the normal pattern of operation and students are giving growing responsibility for class organization. • Allocating time. Projects have a time allocation component which the students participate in. • Establishing rules and procedures. As part of the cooperative enterprise students are regularly called upon to establish procedures and rules for the care of organism, discharging jobs, behavior in groups, etc. • Presenting ideas and other products. In each activity attention is given to the representation of ideas and products in oral, pictorial, demonstration to other form. Special attention is given to the need for refinement and modification of ideas and continual repair and maintenance of equipment and the classroom environments.

AAAS Benchmarks	DASH Grades K–2
• People may not be able to actually make or do everything that they can design.	During their activities, students readily become aware of physical limitations in making their own devices. They are allowed to encounter the limitations of skill, materials, time, knowledge, the designs themselves, and the community including peers, teacher, administrators, and parents.
3.C. Issues in Technology • People, alone or in groups, are always inventing new ways to solve problems and to get work done. The tools and the ways of doing things that people have invented affect all aspects of life.	The DASH CONNECTIONS BOOK is used to relate what students are doing in the classroom with the wider world outside of school. As tools and techniques are used in class, students are asked to report on similar usage elsewhere. What they do in the microcosm of the school is seen on a continuum with the wider world of humans in general.
• When a group of people wants to build something or try something new, they should try to figure out ahead of time how it might affect other people and their work.	In their construction and other technology activities students are asked to consider how they are going to organize for harmonious use of space, maintain their projects, and clean up. They also consider how they are going to work harmoniously with others. Biological projects involve planning for the care and ultimate disposition of animals and agricultural products and growing sites. (Examples: K.3.3 Caring For Classroom Animals, K.4.6 Gardening, 1.3.6 Planning To Raise Small Animals, 2.3.14 Classroom Pets, 2.4.16 Tree Planting K.7.10 Traffic Simulation, K.9.2 Waste Disposal, 1.7.7 The Great Regatta, 1.10.12 Cardboard House Plan, 2.7.5 Building A Village)
4. The Physical Setting **4.A. The Universe** • There are more stars in the sky than anyone can easily count, but they are not scattered evenly and they are not all the same in brightness or color.	DASH stresses study of the sun and moon in grades K–2. Stars are the focus from grade 3 on. Students who are out viewing the early morning and evening skies are well aware of the starry background. Inquiries are recorded in the WONDER AND DISCOVER BOOK, a repository of questions raised and being explored by students. DASH encourages pursuit of individual an group interests that flow from students' curiosity.
• The sun can be seen only in the daytime, but the moon can be seen sometimes at night and sometimes during the day. The sun, moon and stars all appear to move slowly across the sky.	DASH astronomy activities focus on the movement of the sun and moon. The anomaly of the moon as a daylight companion of the sun is a point of constant surprise. (Examples: K.2.6 Moon Watch, K.2.7 Moon Phases, K.2.4 Day And Night, 1.2.1 Sky And Weather Watch, 2.2.4 Moonrise And Moonset, K.2.8 Seasons, 1.27 Sunrise And Sunset, 1.2.8 Night And Day, 1.2.9 The Sun, 1.2.10 The Seasons, 2.2.3 Sunrise, Sunset, And Seasons)

AAAS Benchmarks	DASH Grades K–2
• The moon looks a little different every day, but looks the same again about every four weeks.	The phases of the moon are a point of continuing study through grade 4. (Examples: K.2.6 Moon Watch, K.2.7 Moon Phases, 1.2.1 Sky And Weather Watch, 2.2.4 Moonrise And Moonset)
• Some events in nature have a repeating pattern. The weather changes some from day to day, but things such as temperature and rain (or snow) tend to be high, low, or medium in the same months of every year.	Weather is a major seven-year theme of DASH. Weather is directly tied into the study of seasons, climate, and gases in grades 3–6. (Examples: K.2.1 Weather Watch, 1.2.1 Sky And Weather Watch, 1.2.3 Rain And Streams, 1.2.3 Snow And Streams, 2.3 Snow And Streams, 1.2.1 Sky And Weather Watch, 2.2.1 Temperature, 2.2.2 Wind, 2.2.5 Rain, 2.2.6 Snow, K.2.8 Seasons, 1.2.8 Night And Day, 1.2.10 The Seasons, 2.2.3 Sunrise, Sunset, And Seasons)
• Water can be a liquid or a solid and can go back and forth from one form to another. If water is turned into ice and the ice is allowed to melt, the amount of water is the same as it was before freezing.	Change of state is studied in the context of rain and snow. Conservation of volume is studied in grade 3. (Examples: 1.2.3 Rain And Streams, 2.2.5 Rain, 2.2.6 Snow)
• Water left in an open container disappears, but water in a closed container does not disappear.	Evaporation is introduced in grade 2 with students inventing rain and snow gauges. Students observe evaporation of both rainwater and snow. (Examples: 2.2.5 Rain, 2.2.6 Snow)
4.C. Processes that Shape the Earth • Chunks of rocks come in many sizes and shapes, from boulders to grains of sand and even smaller.	DASH introduces the study of soils in grade 2. They observe the nature of rocks and compare it with soil. They also make synthetic soil by pulverizing rock. (Examples: 2.4.1 Soil, 2.4.2 Making Soil, 2.4.3 Soil And Plants, 2.4.4 Soil Uses, 2.4.5 Finding Soil)

AAAS Benchmarks	DASH Grades K–2
• Change is something that happens to many things.	Study of change is a multi-year activity in DASH. (Examples: K.2.6 Moon Watch, K.2.7 Moon Phases, 1.3.3 Animal Survey, 1.4.2 Plant Survey, 2.3.5–2.3.13 (A Year Long Study Of Insects And Spiders), K.2.1 Weather Watch, 1.2.1 Sky And Weather Watch, 1.2.3 Snow And Streams, 1.2.1 Sky And Weather Watch, 2.2.1 Temperature, 2.2.2 Wind, 2.2.5 Rain, 2.2.6 Snow, K.2.8 Seasons, 1.2.8 Night And Day, 1.2.10 The Seasons, 2.2.3 Sunrise, Sunset, And Seasons, K.4.4 Growing Bean Sprouts, K.4.6 Gardening, 1.4.2 Plant Survey, 2.4.9 Vegetable Garden In A Bucket, 2.4.10 Flower Garden In A Bucket, K.3.2 Classroom Animals, K.3.2 Caring For Classroom Animals, 1.3.9 Classroom Pets, 2.3.1 The Classroom Aquarium, 2.3.14 Classroom Pets, K.9.1 Decomposition, 1.9.4 Decomposition And Unearthing, 1.9.5 Decomposition And Reburial, 2.9.1 Fall Unearthing, 2.9.2 Fall Burying, 2.9.3 Spring Unearthing, 2.9.4 Spring Burying, 1.3.8 Metamorphosis, 2.3.6 Hatching Insect Eggs, 2.3.7 Early Metamorphosis, K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 2.6.2 Tooth Chart, 2.4.16 Tree Planting)
• Animals and plants sometimes cause changes in their environment.	Study of ecological interactions of plants and animals is a seven-year investigation in DASH. They continually focus on interactions of plants, animals, and humans and their impact on the physical surroundings. (Examples: K.3.6 Animal Environments, K.4.2 Plant Environments, 1.3.3 Animal Survey, 1.4.2 Plant Survey, 2.4.3 Soil And Plants)
4.D. Structure of Matter • Objects can be described in terms of materials they are made of (clay, cloth, paper, etc.) and their physical properties (color, size, shape, weight, texture, flexibility).	Properties of matter are identified as components of good descriptions. DASH carefully introduces and uses descriptive and explanatory language. Students record definitions in the WORKING DICTIONARY as they evolve. (Examples: K.1.7 Same And Different, K.1.8 Physical Characteristics Of Things, K.1.10 The Working Dictionary And Working Definitions)
• Things can be done to materials to change some of their properties, but not all materials respond the same way to what is done to them.	DASH includes study of the response of materials to various treatments in different contexts. • Biological vs non-biological response to water as a growth agent is tested in K.4.5 Plants And Water. • Decomposition of different biological and non-biological materials is studied in K.9.1 Decomposition, 1.9.4 Decomposition And Unearthing, 1.9.5 Decomposition And Reburial, 2.9.1 Fall Unearthing, 2.9.2 Fall Burying, 2.9.3 Spring Unearthing, 2.9.4 Spring Burying.

AAAS Benchmarks	DASH Grades K–2
4.E. Energy Transformation • The sun warms the land, air, and water.	Study of the sun as a warming agent, is the basis of many studies in DASH. (Examples: 1.8.1 Temperature Of Things, 2.2.1 Temperature, .K.2.8 Seasons, 1.2.8 Night And Day, 1.2.9 The Sun, 1.2.10 The Seasons, 2.2.3 Sunrise, Sunset, And Seasons)
4.F. Motion • Things move in many different ways, such as straight, zigzag, round and round, back and forth, and fast and slow.	Types of movement are investigated in several kinds of activities. (Examples: K.7.7 Home Location, 1.7.1 Pacing, 2.7.4 Roads, K.8.3 Making Things Stop, 2.7.3 Racing And Modifying Cars)
• The way to change how something is moving is to give a push or a pull.	Ways of moving things are introduced in kindergarten. (Examples: K.8.2 Making Things Move, K.8.2 Making Things Stop, 1.7.7 The Great Regatta, 2.7.3 Racing And Modifying Cars)
• Things that make sound vibrate.	Sound is studied thoroughly in grades 5 and 6. It is included in 1.8.4 Energy Sources.
4.G. Forces of Nature • Things near the earth fall to the ground unless something holds them up.	Effects of gravity are investigated beginning in kindergarten. (Examples: K.8.1 Energy, K.8.2 Making Things Move, 1.8.4 Energy Sources, 2.4.7 Moving Water With Gravity)
• Magnets can be used to make some things move without being touched.	Magnetism is introduced with the compass in grade 1 and making magnet by induction in grade 2. It is extensively studied in grades 5 and 6. (Examples: 1.2.1 Sky And Weather Watch, 2.2.2 Wind)
5. The Living Environment **5.A. Diversity of Life** • Some animals are alike in the way they look and in the things they do, and others are very different from one another.	DASH activities on physical characteristics and behaviors of animals emphasize the diversity of nature. They provide models for human anatomy and physiology. (Examples: K.3.2 Classroom Animals, K.3.3 Caring For Classroom Animals, K.3.8 How Bugs Walk, K.3.9 Parts Of Bugs, K.3.10 Parts Of Mammals, K.3.11 People, 1.3.4 Animal Keys, 1.3.5 Animal Needs, 1.3.9 Class Pets, 2.3.2 External Anatomy Of Fish, 2.3.3 Biological Need Of Fish, 2.3.14 Classroom Pets)
• Plants and animals have features that help them live in different environments.	Environmental adaptability of plants and animals is part of all ecological field work. (Examples: K.3.6 Animal Environments, K.4.2 Plant Environments, 1.3.3 Animal Survey, 1.4.2 Plant Survey, 2.3.5 Finding Insect Eggs, 2.3.9 Collecting Spiders, 2.4.3 Soil And Plants.

AAAS Benchmarks	DASH Grades K–2
• Stories sometimes give plants and animals attributes they really do not have.	Anthropomorphism is confronted in kindergarten. Example: K.3.18 Real And Imaginary
5.B. Heredity • There are variations among individuals of one kind within a population.	Variation in populations is investigated in several short-term and long-term studies. (Examples: K.4.4 Growing Bean Sprouts, K.4.6 Gardening, 1.3.3 Animal Survey, 1.4.2 Plant Survey, 2.4.9 Vegetable Garden In A Bucket, 2.4.10 Flower Garden In A Bucket. K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 2.6.2 Tooth Chart).
• Offspring are very much, but not exactly, like their parents and like one another.	DASH students compare sibling and parental characteristics in grades 3 and 4. In grade K–2 they observe similarities and differences in fish and insects. (Examples: 2.3.4 Reproduction And Development Of Fish, 2.3.6 Hatching Insect Eggs).
5.C. Cells • Magnifiers help people see things they could not see without them.	Magnifiers are available at all times to DASH students to enhance investigations of small things.
• Most living things need water, food, and air.	DASH K–3 extensively studies the basic biological needs of plants and animals. (Examples: K.3.12 Animals And Food, K.3.13 Animals And Water, K.3.14 Animals And Air, K.3.15 Animals And Waste, K.3.16 How Animals Keep Warm, K.3.17 How Animals Keep Cool, 1.3.5 Animal Needs, 2.3.3 Biological Needs Of Fish, 2.3.10 Spider Food, 2.3.10 Spider Care)
5.D. Interdependence of Life • Animals eat plants or other animals for food and may also use plants (or even other animals) for shelter and nesting.	Interdependence of plants and animals is addressed in many DASH activities. (Examples: K.3.12 Animals And Food, K.3.16 How Animals Keep Warm, K.3.17 How Animals Keep Cool, 1.3.5 Animal Needs, 1.4.7 Edible Plant Parts, 1.4.8 Plant Parts Animals Eat, 2.3.3 Biological Needs Of Fish 2.3.10 Spider Food, 2.3.11 Spider Care.)
• Living things are found almost everywhere in the world. There are somewhat different kinds in different places.	The world wide presence of plants and animals is addressed in the extensions of activities throughout DASH. (Examples: K.3.6 Animal Environments, K.4.2 Plant Environments, 1.41. Plant Identification, 2.4.3 Plants And Soils.)
5.E. Flow of Matter and Energy • Plants and animals both need to take in water, and animals need to take in food. In addition, plants need light.	Basic biological needs are studied with progressive sophistication in grades K–6. (Examples: K.3.12 Animals And Food, K.3.13 Animals And Water, 1.3.5 Animal Needs, 2.3.3 Biological Needs Of Fish, 2.3.10 Spider Food, K.4.5 Plants And Water, 1.4.5 Plant Needs, 2.4.11 Plants And Sunlight)

AAAS Benchmarks	DASH Grades K–2
• Many materials can be recycled and used again, sometimes in different forms.	Recycling is a major theme beginning in grade K. If the DASH design is followed the lower three grades and the upper three grades pair up to recycle paper (K and 6), glass or plastic (1 and 4), and aluminum (2 and 5). The third grade is responsible for recycling biological waste in a school compost pile. (Examples: K.9.2 Recycling Project, 1.9.6 Recycling, 2.9.6 Aluminum Recycling) Materials are recycled through reuse. All equipment in DASH is made from recyclable materials and the students make almost all the experimental equipment that they use. (Examples: K.9.4 Paper Making, 1.10.1 Meter-String Can, 2.10.3 The Balance, 2.10.4 Meter-String Can, 2.10.5 Measuring Volume) Building materials are recycled materials. (Examples: K.7.10 Traffic Simulation, 1.3.7 Building Cages, 1.7.5 Making A Boat, 1.10.9 Building With Air, 1.10.3-1.10.8, 2.7.2 Making Race Cars, 2.7.10 Belts And Pulleys, 2.10.1 Desk Organizers)
5.F. Evolution of Life • Different plants and animals have external features that help them thrive in different kinds of places.	DASH includes studies of external anatomy and its affect on the adaptability of organisms in grades K–6. (Examples: K.3.5 Animal Environments, K.3.8 How Bugs Walk, K.3.9 Parts Of Bugs, 1.3.3 Animal Survey, 2.3.7-2.3.13).
• Some kinds of organisms that once lived on earth have completely disappeared, although they were something like others that are alive today.	Activities in K–2 introduce the concept of once living. Extensions deal with extinct organisms. (Examples: K.3.18 Real and Imaginary).
6. The Human Organism **6.A. Human Identity** • People have external features such as size, shape, and color of hair, skin, and eyes, but they are more like one another than like other animals.	DASH students continuously compare similarities and differences among themselves, other humans, and other animals. (Examples: K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 2.6.2 Tooth Chart, K.3.9 Parts Of Bugs, K.3.10 Parts Of Mammals, K.3.11 People, 1.3.4 Animal Keys, 2.3.2 External Anatomy Of Fish).
• People need water, food, air, waste removal, and a particular range of temperature in their environment, just as other animals do.	DASH uses animal models to open discussions on biological needs that humans share with other animals. (Examples: K.3.12 Animals And Food, K.3.13 Animals And Water, K.3.14 Animals And Air, K.3.15 Animals And Waste, K.3.16 How Animals Keep Warm, K.3.17 How Animals Keep Cool, K.6.4 Exercise, 1.3.5 Animal Needs) Human needs are dramatized in the building or the cardboard house. (Examples: 1.10.12 Cardboard House Plan, 1.10.13 Making A Cardboard House, 1.10.15 Furnishing The House, 1.10.18 Warming The House, 1.10.19 Lighting The House)

AAAS Benchmarks	DASH Grades K–2
• People tend to live in families and communities in which individuals have different roles.	As part of the mental health component of DASH, family and community structure and behaviors are a primary focus in K–6. (Examples: K.1.13 Families, K.1.14 Families And Helping, 1.1.6 Working Together, 2.1.8 School, Teacher, Friends, And Family) As part of the vocational development theme in each activity the students are given roles to play. These are the professional and family roles of persons who work at the tasks carried out in the activity. To more completely engage the family there is a home news bulletin *DASH ON HOME* for parents. This incorporates parallel activities to those found in the DASH sequences and gives the teacher a way of contacting parents and extending the school program in science and technology inquiry to the family.
6.B. Human Development • All animals have offspring, usually with two parents involved. People may prevent some animals from producing offspring.	DASH begins study of animal reproduction in kindergarten with the introduction of pets some of which may bear young during the year. Pairing of pets is controlled by the teacher and students. Reproduction is a focus of study in grades 3–6. (Examples: K.3.2 Classroom Animals, K.3.2 Caring For Classroom Animals, 1.3.9 Classroom Pets, 2.3.1 The Classroom Aquarium, 2.3.14 Classroom Pets, K.3.9 Parts Of Bugs, 1.3.8 Metamorphosis, 2.3.4 Reproduction And Development Of Fish, 2.3.8 Hatching Insect Eggs)
• A human baby grows inside its mother until its birth. Even after its birth, a human baby is unable to care for itself, and its survival depends on the care it receives from adults.	Human reproduction is a major focus in grade 5. Comparative study of human care and other animal care of their young is part of grade 3 and 4 investigations. In grades K–2, pets are used as models for human reproduction. (Examples: K.3.2 Classroom Animals, K.3.2 Caring For Classroom Animals, 1.3.9 Classroom Pets, 2.3.1 The Classroom Aquarium, 2.3.14 Classroom Pets)
6.C. Basic Functions • The human body has parts that help it seek, find, and take in food when it feels hunger; eyes and nose for detecting food; legs to get it; arms to carry it away; and a mouth to eat it.	Basic biological functions of humans are considered along with those of other animals. (Examples: K.1.6 Using Our Senses, K.1.11 People, K.3.12 Animals And Food, K.3.13 Animals And Water, K.3.14 Animals And Air, K.3.15 Animals And Waste, K.3.16 How Animals Keep Warm, K.3.17 How Animals Keep Cool, K.6.4 Exercise, K.6.7 Bathrooms And Basins, K.6.18 Keeping Warm Indoors, K.6.19 Keeping Cool Indoors, 1.3.5 Animal Needs, 1.6.5 Air And Breathing
• Senses can warn individuals about danger; muscles help them get fight, hide, or get out of danger.	Use of senses both implies an explicitly studied in K–2. Classroom pets respond with attraction and repulsion to alluring and threatening situations. Animals response is compared to those of students. (Examples: K.3.2 Classroom Animals, K.3.2 Caring For Classroom Animals, K.6.4 Exercise, 1.3.9 Classroom Pets, 2.3.1 The Classroom Aquarium, 2.3.14 Classroom Pets)

AAAS Benchmarks	DASH Grades K–2
• The brain enables human beings to think and send messages to other body parts to help them work properly.	The brain is studied extensively in grades 5 and 6. These activities are supported by K.1.6. Using our Senses and 2.1.11. Thinking.
6.D. Learning • People use their senses to find out about their surroundings and themselves. Different senses give different information. Sometimes a person can get different information about the same thing by moving closer to it or further away from it.	• DASH involves the student's full sensory capacities in dealing with phenomena. There is continual looking closely and reflection.
• Some of the things people do, like playing soccer, reading, and writing, must be deliberately learned. Practicing helps people to improve. How well one learns sometimes depends on how one does it and how often and how hard one tries to learn. • People learn from each other by telling and listening, showing and watching, and imitating what others do.	The goal of being able to teach a concept or skill is held as the highest level of achievement in DASH. There is constant opportunity to modify and refine, both understanding and skills through practice and interaction with those who have already achieved some level of mastery. As part of their development of self esteem, students are continually encouraged to work toward understanding to a level where they can help and teach others. (Examples: K.1.18 Concept And Skill Inventory, 1.1.5 Helping, 1.1.8 Concept And Skill Inventory, 2.1.4 Helping Myself And Others, 2.1.13 Concept And Skill Inventory)
6.E. Physical Health • Eating a variety of healthful foods and getting enough exercise and rest help people stay healthy.	Two major DASH themes are food and nutrition. (Examples: K.5.4 Familiar Foods, Favorite Foods, New Foods, 1.5.1 Basic Three Food Groups, 1.5.2 Cooking, 2.5.2 Food Preferences, 2.5.3 Basic Food Groups, K.6.4 Exercise, 1.6.7 Staying Healthy, 2.6.6 Staying Well)
• Some things people take into their bodies from the environment can hurt them.	Hygiene and the dangers of ingesting, inhaling, entry through wounds and injection of foreign organisms and detrimental chemicals is pursued with increasing sophistication in grades K–6. In grades K–2 emphasis is on hygiene. (Examples: K.6.5 Germs, K.6.6 Washing Hands, K.6.7 Bathrooms And Basins, K.6.10 Getting Sick, K.6.11 Feeling Sick, K.6.12 Going To The Doctor, K.6.13 What Doctors Do, K.6.14 Going To The Hospital, 1.6.7 Staying Healthy, 2.1.3 Aphorisms, 2.6.5 Getting Sick, 2.6.5 Staying Well)
• Some diseases are caused by germs, some are not. Diseases caused by germs may be spread by people who have them. Washing one's hands with soap and water reduces the number of germs that can get into the body or that can be passed on to other people.	Study of germ transmission is included throughout K–6 activities. (Examples: K.6.5. Germs, K.6.6. Washing Hands. K.6.7. Bathrooms and Basins, K.6.10. Getting Sick, K.6.11. Feeling Sick, 1.6.7. Staying Healthy. 2.6.5. Getting Sick.)

AAAS Benchmarks	DASH Grades K–2
6.F. Mental Health • People have many different feelings—sadness, joy, anger, fear, etc.—about events, themselves, and other people.	Emotions of joy, anger, and fear are dealt with through commentary to the teacher in the DASH Teacher Guide and through a series of activities on group dynamics and friendship. (Examples: K.1.13 Families, K.1.14 Families And Helping, K.1.15 Making Friends, K.1.16 Being Friends, K.1.17 School And Home, 1.1.5 Helping, 1.1.6 Working Together, 1.1.7 Taking Turns And Sharing, 2.1.5 Getting Help, 2.1.6 Making And Keeping Friends, 2.1.7 Turns, 2.1.8 School, Teacher, Friends, And Family)
• People react to personal problems in different ways. Some ways are more likely to be helpful than others.	DASH uses simulations, puppets, problems in drama as techniques for conflict resolution. These give outlet to ways of solving problems and allow group assessment of effectiveness. (Examples: K.1.16 Being Friends, 1.1.6 Working Together, 1.1.7 Taking Turns And Sharing, 2.1.6 Making And Keeping Friends, 2.1.7 Turns)
• Talking to someone (a friend, relative, teacher, or counselor) may help people to understand their feelings and problems and what to do about them.	The friendship, school, parent series of activities open up opportunities to carry the notions of caring, helping, and talking out problems. (Examples: K.1.13 Families, K.1.14 Families And Helping, K.1.17 School And Home, 1.1.5 Helping, 2.1.5 Getting Help, 2.1.6 Making And Keeping Friends, 2.1.8 School, Teacher, Friends, And Family)
7. Human Society **7.A. Cultural Effects on Behavior** • People are alike in many ways and different in many ways.	The idea of differences among people is carried out in the study of difference in general. (Example: K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 2.6.2 Tooth Chart.)
• Different families or classrooms have different rules and patterns of behavior. Some behaviors are not accepted in most families or schools.	Acceptable behavior in the classroom, playground, and community is established and practiced in DASH. (Examples: K.1.13 Families, K.1.14 Families And Helping, K.1.17 School And Home, 1.1.5 Helping, School, Teacher, Friends, And Family, K.1.4 Responsibility, 1.1.2 The Responsibility Chart, K.7.11 Traffic Rules, 1.6.8 Safety Rules, 2.6.7 Classroom And Playground Safety, 2.6.8 Fire Safety)
• People often choose to dress, talk, and act like their friends, do the same things they do, and have the same kinds of things they have. They also often choose to do certain things their own way.	Friendships, conformity, and non-conformity are components of the friendship series and other activities in DASH. (Examples: K.1.7. Same and Different, K.1.16. Being Friends, 2.1.6. Making and Keeping Friends.)

AAAS Benchmarks	DASH Grades K–2
7.B. Group Behavior • People belong to some groups by birth and belong to some groups because they join them.	Inclusion in a family of one's birth and voluntary inclusion in other groups is inherent in the discussions surrounding activities 2.1.8. School, Teacher, Friends, and Family.
• The way people act is often influenced by the groups to which they belong.	How and why people conform with group norms is inherent in discussions flowing out of a set of activities addressed in 2.1.8. School, Teacher, Friends, and Family, K.1.16. Being Friends, 2.1.6. Making and Keeping Friends.
7.C. Social Change • Changes happen in everyone's life, sometimes suddenly, more often slowly. People cannot control some changes, but they can usually learn to cope with them.	DASH uses several devices for recording and reviewing changes that take place during the school year. In debriefing these records with students there is a natural opportunity to discuss rapid and long-term change, the uncontrollability of some events, and ways people cope with changes in their lives. Scientific observations and events in the students' collective and individual lives are recorded on the DASH LEARNING CALENDAR. This calendar is periodically reviewed with the students. (Examples: K.1.1 The Learning Calendar, 1.1.1 The Learning Calendar, 2.1.1 The Learning Calendar Students also keep longitudinal data on their slow personal growth. (Examples: K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 2.6.2 Tooth Chart) The students keep a record of what they have learned each year in their SCIENCE RECORD BOOK which is ideally kept in the library over the summer. This includes past CONCEPT AND SKILL INVENTORIES. These are reviewed at the beginning of each year to get a sense of what has been studied and learned over the several years the students have been in the program. From this they get a sense of the slow methodical change in their skills and knowledge. (Examples: K.1.5 Science Record Book, 1.1.4 Things Learned Last Year, 2.1.12 Library)
7.D. Social Trade-offs • Getting something one wants may mean giving up something in return.	Taking turns and sharing are central to the cooperative dynamics of the DASH classroom. (Examples: K.1.16 Being Friends, 1.1.6 Taking Turns And Sharing, 2.17 Turns)

AAAS Benchmarks	DASH Grades K–2
• Different people may make different choices for different reasons.	DASH students are constantly engaged in planning and decision making. They quickly find that planning can produce very diverse products and that plans are often motivated by different views of end products. (Examples: K.7.8 Sidewalks And Walkways, K.7.9 Roads, K.7.10 Traffic Simulation, 1.1.3 The Planning Calendar, 1.3.6 Planning To Raise A Small Animal, 1.10.11 Floor Plan, 1.10.13 Cardboard House Plan, 2.1.10 Planning For Tomorrow, 2.7.5 Building A Village)
• Choices have consequences, some of which are more serious than others.	DASH generally empowers students to make choices in invention, design, construction, and behavior. Because they work cooperatively, they feel the consequences of their choices through peer and teacher responses.
7.E. Political and Economic System • There are not enough resources to satisfy all the desires of all people, so there has to be some way of deciding who gets what.	Decisions on the distribution of resources in the classroom are made in different ways. In some cases, they are made by the authority of the teacher. In others, students democratically make the decisions. DASH urges teachers to progressively divest themselves of decision making as students appear ready for self regulation.
• Some jobs require more (or more expensive) training than others, some involve more risk, and some pay better.	Each DASH activity identifies the professionals who would do or are involved in the kinds of things students are doing. Teachers invite professionals to class to tell what they do, what their training is, what they receive in salary, and to answer other student questions.
7.F. Social Conflict • Disagreements are common, even between family members or friends. Some ways of dealing with them work better than others. People who are not involved in an argument may be helpful in solving it.	Disagreement is encouraged in DASH to test student's generalizations and conclusions. The class as a whole acts to jury argumentation as a scientific community acts to adjudicate arguments among professionals. Other disagreements are resolved through light reasoning, bodies of evidence, and fairness. Authoritarian judgments of teachers is used very sparingly. Direct talking out between parties is advocated. (Examples: K.1.16 Being Friends, 1.1.6 Working Together, 1.1.7 Taking Turns And Sharing, 2.1.6 Making And Keeping Friends, 2.1.7 Turns)

• Rules at home, at school, and in the community let individuals know what to expect and so can reduce the number of disputes.	As part of the mental health component of DASH, students are aware of the need for rules to govern their interactions. Students have numerous opportunities to make rules for the working classroom, the playground, going to and from home, etc. (Examples: K.1.4 Responsibility, K.3.3 Caring For Classroom Animals, K.6.6 Washing Hands, K.7.11 Traffic Rules, K.9.2 Waste Disposal, 1.1.7 Taking Turns And Sharing, 1.3.9 Classroom Pets, 1.6.8 Safety Rules, 1.9.2 Conserving Classrooms Resources, 2.1.3 Aphorisms, 2.6.7 Classroom And Playground Safety)

AAAS Benchmarks	DASH Grades K–2
7.G. Global Interdependence • For many things they need, people rely on others who are not part of the family and maybe not even part of their local community.	Global interdependence is extensively studied in grades 3–6. It is reflected in 2.5.1 Supermarket Survey.
8. The Designed World **8.A. Agriculture** • Most food comes from farms either directly as crops or as the animals that eat the crops. To grow well, plants need enough warmth, light, and water. Crops also must be protected from weeds and pests that can harm them.	Agriculture is a major theme in DASH. Food is followed from field to processor, to supermarket, to stove, and finally to the table. (Examples: K.3.7 Animal Uses, 1.5.1 Basic Three Food Groups, 2.5.1 Supermarket Survey, 2.5.3 Basic Three Food Groups, K.4.4 Growing Bean Sprouts, K.4.6 Gardening, K.5.1 Bean Sprout Salad, K.5.2 Drinks, K.5.3 Flour And Bread, K.5.4 Familiar Food, K.5.5 Favorite Foods, K.5.6 New Foods, 1.5.2 Cooking, 2.4.9 Vegetable Garden In A Bucket, 2.4.15 Growing Root Vegetables, 2.5.1 Supermarket Survey, 2.5.2 Food Preferences, 2.5.4 New Foods, 2.5.6 Changing Flavors, 2.5.7 Milk, 2.5.8 Butter, 2.5.9 Cheese, 2.5.10 Energy From Food)
• Part of a crop may be lost to pests or spoilage.	Crop loss to insects is part of the immediate experience of DASH. (Examples: K.4.6 Gardening, 1.4.2 Plant Survey, 2.4.9 Vegetable Garden In A Bucket, 2.4.10 Flower Garden In A Bucket)
• A crop that is fine when harvested may spoil before it gets to consumers.	Food and crop spoilage are directly addressed in DASH. Decomposition of organic materials is part of a multi-year study. (Examples: K.9.1 Decomposition, 1.9.4 Decomposition And Unearthing, 1.9.5 Decomposition And Reburial, 2.9.1 Fall Unearthing, 2.9.2 Fall Burying, 2.9.3 Spring Unearthing, 2.9.4 Spring Burying. K.4.6 Gardening, 2.4.9 Vegetable Garden In A Bucket.)
• Machines improve what people get from crops by helping in planting and harvesting, in keeping food fresh by packaging and cooling, and in moving it long distances from where it is grown to where people live.	The industrial nature of agriculture is extensively studied in grade 3. In preparation for these investigations, kindergarten students have their garden area tilled by machinery. First graders in studies of seasons watch the planting and harvesting in fields locally or on TV. Transportation and food storage are part of the supermarket survey. (Examples: K.4.6 Gardening, 1.2.10 Seasons, 2.5.1 Supermarket Survey)

AAAS Benchmarks	DASH Grades K–2
8.B. Materials and Manufacturing • Some kinds of materials are better than others for making any particular thing. Materials that are better in some ways (such as stronger or cheaper) may be worse in other ways (heavier or harder to cut).	Judging the appropriate qualities of building materials is a necessary part of DASH construction and fabrication projects. DASH uses the INVENTORS BOX to hold a range of materials from which students can select those most appropriate to their needs. (Examples: K.6.15 Raincoats, K.6.16 Testing Raincoats, K.7.10 Traffic Simulation, K.8.3 Making Things Stop, K.8.6 Repairing Thing, K.10.8 Linear Measurement, 1.3.7 Building Cages, 1.7.5 Making A Boat, 1.10.1 Meter String Can, 1.10.5 Water Systems, 1.10.9 Building With Air, 1.10.13 Making A Cardboard House, 1.10.15-19 (Furnishing The House), 2.4.6 Pipes And Water, 2.4.7 Moving Water With Gravity, 2.4.8 Moving Water With Pumps, 2.7.2 Making Race Cars, 2.7.5-2.7.8 (Building A Traffic Simulation Village), 2.8.1 Camera Obscura, 2.10.1 Desk Organizer, 2.10.3 The Balance, 2.10.4 Meter-String Can, 2.10.5 Measuring Volume)
• Several steps are usually involved in making things.	DASH students gain insight into the multiple steps of inventing, designing, making, testing, refining, and retesting inventions and products. (Examples: K.6.15 Rain Coats, K.6.16 Testing Raincoats, K.6.20 Hand And Foot Protection, K.7.10 Traffic Simulation, K.8.3 Making Things Stop, 1.7.5 Making A Boat, 1.7.7 The Great Regatta, 2.7.2 Making Race Cars, 2.7.3 Racing And Modifying Cars, 1.7.5 Making A Boat, 1.10.1 Meter String Can, 1.10.5 Water Systems, 1.10.9 Building With Air, 1.10.13 Making A Cardboard House, 1.10.15-19 (Furnishing The House), 2.4.6 Pipes And Water, 2.4.7 Moving Water With Gravity, 2.4.8 Moving Water With Pumps, 2.7.2 Making Race Cars, 2.7.5 Building A Village)
• Tools are used to help make things, and some things cannot be made at all without tools. Each kind of tool has a special purpose.	DASH students use a wide variety of tools. In K–2 they use common classroom tools (pencils, scissors, rulers, protractors); agricultural tools (tillers, hoses, watering cans, shovels, rakes, and hoes); carpenter tools (hammer, saw, screwdriver, square, plumb line, level, and miter box); general tools (wire cutters, pliers, wrenches); kitchen tools (hot plates, measuring cups and spoons, containers, and refrigerators); laboratory and field tools (measuring strings, graduated cylinders, balances, hand lens, and compass).

AAAS Benchmarks	DASH Grades K–2
• Some materials can be used over again.	Recycling is both a message and a study in DASH. Equipment and products are designed to be constructed from recyclable materials. (Examples: K.9.3 Recycling Project, 1.9.6 Recycling, 2.9.6 Aluminum Recycling, K.6.15 Raincoats, K.7.10 Traffic Simulation, K.8.6 Repairing Thing, K.10.1 Cubby Organization, K.10.8 Linear Measurement, 1.3.7 Building Cages, 1.7.5 Making A Boat, 1.10.1 Meter String Can, 1.10.5 Water Systems, 1.10.9 Building With Air, 1.10.13 Making A Cardboard House, 1.10.15-19 (Furnishing The House), 2.4.2 Making Soil, 2.7.2 Making Race Cars, 2.7.3 Racing And Modifying Cars, 2.7.4 Roads, 2.7.5 Building A Village, 2.8.1 Camera Obscura, 2.10.1 Desk Organizer, 2.10.3 The Balance, 2.10.4 Meter-String Can, 2.10.5 Measuring Volume)
8.C. Energy Sources and Uses • People can save money by turning off machines when they are not using them.	Conservation of energy is another theme of DASH. Beginning in kindergarten, students are aware of the need to conserve energy as well as other resources. (Examples: K.8.4 Turning Things Off, K.8.5 Turning Things On, 1.9.2 Conservation Of Energy)
• People burn fuels such as wood, oil, coal, or natural gas, or use electricity to cook their food and warm their houses.	Throughout DASH a growing list of energy sources are identified and associated with household uses including cooling and house warming. (Examples: K.8.1 Energy, 1.8.4 Sources Of Energy, 1.10.18 Warming And Cooling The House, 1.10.19 Lighting The House, 2.5.10 Energy From Food)
8.D. Communication • Information can be sent and received in many different ways. Some allow answering back and some do not. Each way has advantages and disadvantages.	In DASH getting students to communicate is a basic concern. K–2 students are provided a range of experiences as they are available in schools. One way communication includes DASH written material, trade book and reference works, the LEARNING CALENDAR, the SCIENCE RECORD BOOK, the WONDER AND DISCOVER BOOK, the CONNECTIONS BOOK, and the WORKING DICTIONARY. TV, video materials, and CDs are suggested sources, if accessible. Two way communication includes interpersonal communication, telephone, and where available computers.
• Devices can be used to send and receive messages quickly and clearly.	Where available DASH uses quick communication devices including video, TV, and telephone.
8.E. Information Processing • There are different ways to store things so they can be easily found later.	Storage and organization of stored materials begins in kindergarten. DASH students are continuously involved with storage, labeling, and retrieving materials. (Examples: K.10.1 Cubby Organization, K.10.7 Packing And Storing, 1.9.1 Conserving Classroom Resources, 2.10.1 Desk Organization, 2.10.2 Notebook Organization)

AAAS Benchmarks	DASH Grades K–2
• Letters and numbers can be used to put things in a useful order.	Alphabetic and numeric codes are used whenever appropriate. (Examples: K1.1 The Learning Calendar, K.1.5 The Science Record Book, K.10.7 Packing And Storing, 1.1.1 The Learning Calendar, 1.1.4 Things Learned Last Year, 1.9.1 Conserving Classroom Resources, 2.1.1 The Learning Calendar, 2.1.1 Last Year, 2.10.1 Desk Organization, 2.10.2 Notebook Organization)
8.F. Health Technology • Vaccinations and other scientific treatments protect people from getting certain diseases, and different kinds of medicines may help those who become sick to recover.	Medicine and various treatment modes are a K–6 theme. In K–2, the idea of medicines is introduced. (Examples: K.6.10 Getting Sick, K.6.11 Feeling Sick, K.6.12 Going To The Doctor, K.6.13 What Do Doctors Do, K.6.14 Going To The Hospital, 1.6.6 Getting Hurt, 1.6.7 Staying Healthy, 2.6.4 Getting Hurt, 2.6.5 Getting Sick, 2.6.6 Staying Well)
9. The Mathematical World **9.A. Numbers** • Numbers can be used to count things, place them in order, or name them.	Numbers are continuously used in counting, quantifying, ordering, and naming things. Starting in kindergarten, numbers become a primary communication tool for DASH students. On the DASH LEARNING CALENDAR the morning begins with naming the day, ordering responsibilities, quantifying temperature, and counting students for lunch. Most DASH activities require numbers.
• Sometimes in sharing or measuring, there is a need to use numbers between whole numbers.	Fractions, minutes between hours, and decimal units are introduced through practice. (Examples: K.1.8 Linear Measurement, 1.2.4 Digital Time, 1.2.5 Hours And Minutes, 1.2.6 Time Line, 2.2.7 Digital Time, 2.2.8 Analog Time, 1.10.4 Meter-String Can)
• It is possible (and often useful) to estimate quantities without knowing them exactly.	Estimation and quantitative prediction are regularly used. (Examples: K.7.12 Mapping, 1.7.1 Pacing, 1.8.1 Temperature Of Things, 1.10.10 Floor Plan, 2.2.7 Digital Time, K.6.15 Raincoats, K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 2.6.2 Tooth Chart)
• Simple graphs can help tell about observations.	Graphing is a major tool of quantitative representation and communication in DASH grades K–6. (Examples: K.5.1 Bean Sprouts, K.5.2 Drinks, K.6.1 Growth Chart, K. 6.2 Tooth Chart, 1.2.6 Time Line, 1.2.9 Sunrise And Sunset, 1.3.3 Animal Survey, 1.4.2 Plant Survey, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, I.8.3 The Master Thermometer, 2.2.5 Rain, 2.2.6 Snow, 2.6.1 Growth Chart, 2.6.2 Tooth Chart, 2.8.4 Comparing Temperatures)

AAAS Benchmarks	DASH Grades K–2
9.B. Symbolic Relationships • Similar patterns may show up in many places in nature and in the things people make.	Patterns are sought in many things in DASH activities including shape, size, graphic representations, laboratory experimentation, sequences of environmental events, astronomical events, biological events, social events, etc. (Examples: Focus Book Friendly Shape, K.10.2 Patterns In Puzzles, K.10.3. Making Puzzles, K.10.4 Making Envelopes, K.10.5 Making Boxes, K.7.10 Traffic Simulation, 1.10.13 Making A Cardboard House, 2.7.6 Building A Village, 2.7.11 Fast And Slow Pulleys, 2.7.12 Gears And Wheels, 2.10.5 Measuring Volume. Patterns In Graphing—K.5.1 Bean Sprouts, K.5.2 Drinks, K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.2.6 Time Line, 1.2.9 Sunrise And Sunset, 1.3.3 Animal Survey, 1.4.2 Plant Survey, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 1.8.3 The Master Thermometer, 2.2.5 Rain, 2.2.6 Snow, 2.6.1 Growth Chart, 2.6.2 Tooth Chart, 2.8.4 Comparing Temperatures. Pattern Laboratory Work—K.3.9 Parts Of Bugs, K.3.10 Parts Of Mammals, K.3.11 People K.4.1 Plant Parts, K.4.4 Growing Bean Sprouts, 1.4.1 Plant Identification, 1.8.1 Temperature Of Things, 1.10.3 Testing For Water, 2.4.2 Making Soil, 2.4.3 Soil And Plants. Pattern In Environmental Events—K.2.1 Weather Watch, K.2.8 Seasons, 1.2.1 Sky And Weather Watch, 1.2.2 Rain And Streams, 1.2.3 Snow And Streams, 2.1.1 Temperature, 2.1.2 Wind, 2.2.5 Rain, 2.2.6 Snow, K.3.6 Animals And Environments, K.4.2 Plants And Environments, 2.4.1 Soil, 2.4.4 Soil Use, 2.4.5 Finding Soil, 2.9.5 Pollution Survey And Clean Up. Patterns Of Astronomical Events—K.2.4 Day And Night, K.2.6 Moon Watch, K.2.7 Moon Watch, K.2.7 Moon Phase, K.2.8 Seasons, K.7.2 Sunrise, K.7.3 Sunset, K.7.5 Rising Moon, K.7.6 Setting Moon, 1.2.7 Sunrise And Sunset, 1.2.8 Night And Day, 1.2.9 The Sun, 2.2.3 Sunrise, Sunset, And Seasons, 2.3.4 Moonrise And Moonset Patterns In Biological Events—K.3.3 Classroom Animals, K.3.4 Caring For Classroom Animals, K.3.4 Living, Once-Living, And Non-Living, K.3.8 How Bugs Walk, K.3.12-K.3.17 (Basic Biological Needs Of Animals.), K.4.4 Growing Bean Sprouts, K.4.5 Plants And Water, K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.3.1 Living And Non-Living Things, 1.3.3 Animals Survey, 1.3.4 Animal Key, 1.3.5 Animals Needs, 1.3.8 Metamorphosis, 1.4.2 Plant Survey, 1.4.4 Plant Key, 1.4.5 Plant Needs, 1.4.6 Plant Life Cycle, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 1.6.4 Chewing, 1.6.5 Air And Breathing, 2.3.5 Finding Insect Eggs, 2.3.7 Early Metamorphosis, 2.3.8 Late Metamorphosis, .3.9 Collecting Spiders, 2.6.1 Growth Chart, 2.6.2 Tooth Chart

AAAS Benchmarks	DASH Grades K–2
• Sometimes changing one thing causes changes in something else. In some situations, changing the same thing in the same way usually has the same result.	Many DASH activities deal with change. Multi-year longitudinal studies show changes in seasons and weather. (Examples: K.2.8 Seasons, 2.10 The Seasons, 2.2.3 Sunrise, Sunset, And Seasons K.2.1 Weather Watch, 1.2.1 Sky And Weather Watch, 1.2.3 Snow And Streams, 1.2.1 Sky And Weather Watch, 2.2.1 Temperature, 2.2.2 Wind, 2.2.5 Rain, 2.2.6 Snow) Multi-year studies of plants show that when tended with watering and cultivation crop plants undergo the same general changes. (Examples: K.4.6 Gardening, 1.4.2 Plant Survey, 2.4.9 Vegetable Garden In A Bucket, 2.4.10 Flower Garden In A Bucket) Multi-year studies show that the same kinds of materials undergo similar decompositional changes when buried. (Examples: K.9.1 Decomposition, 1.9.4 Decomposition And Unearthing, 1.9.5 Decomposition And Reburial, 2.9.1 Fall Unearthing, 2.9.2 Fall Burying, 2.9.3 Spring Unearthing, 2.9.4 Spring Burying) Multi-year studies of insects show that their body changes correlate with changes in seasons. (Examples: 1.3.8 Metamorphosis, 2.3.6 Hatching Insect Eggs, 2.3.7 Early Metamorphosis, 2.3.8 Late Metamorphosis) Studies of personal class growth reveal that the students' own care and feeding results in a common pattern of change in size. (Examples: K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 2.6.2 Tooth Chart) Multi-year study of astronomical events and their correlation with regular changes in time. (Examples: K.2.4 Day And Night, K.2.6 Moon Watch, K.2.7 Moon Watch, K.2.7 Moon Phase, K.2.8 Seasons, K.7.2 Sunrise, K.7.3 Sunset, K.7.5 Rising Moon, K.7.6 Setting Moon, 1.2.7 Sunrise And Sunset, 1.2.8 Night And Day, 1.2.9 The Sun, 2.2.3 Sunrise, Sunset, And Seasons, 2.3.4 Moonrise And Moonset) Repeated experiments by different groups involving changing the same variables in the same way produces similar results. (Examples: K.4.4 Growing Bean Sprouts, K. 6.17 Wet And Cold, K.6.6 Washing Hands, 1.6.5 Air And Breathing, 1.8.1 Temperature Of Things, 1.10.3 Testing For Water, 1.10.7 Bubbles In Water, 1.10.8 Bubbles In Air, 2.3.13 Spider Webs, 2.4.1 Soil, 2.4.2 Making Soil, 2.4.6 Moving Water With Gravity, 2.4.7 Moving Water With Pumps, 2.7.10 Belts And Pulleys, 2.7.11 Fast And Slow Pulleys, 2.7.12 Gears And Wheels.)

AAAS Benchmarks	DASH Grades K–2
9.C. Shapes • Shapes such as circles, squares, and triangles can be used to describe many things that can be seen.	DASH activities make constant reference to geometric shapes. (Examples: Focus Book Friendly Shape, K.10.2 Patterns In Puzzles, K.10.3. Making Puzzles, K.10.4 Making Envelopes, K.10.5 Making Boxes, K.7.10 Traffic Simulation, 1.10.13 Making A Cardboard House, 2.7.6 Building A Village, 2.7.11 Fast And Slow Pulleys, 2.7.12 Gears And Wheels, 2.10.5 Measuring Volume)
9.C. Uncertainty • Some things are more likely to happen than others. Some events can be predicted well and some cannot. Sometimes people are sure that things will happen because they don't know everything that might be having an effect.	Prediction and assessment of predictions is continuous in DASH. From this emerges the conditions under which good predictions can be made or are highly questionable. Example activities include those listed under 9B and 9C.
• Often a person can find out about a group of things by studying just a few of them.	Plant and animal activities in particular are used to develop the idea of sampling. Though the idea is informal, students gain insight that they are making generalizations about the larger world around them. (Examples: K.4.6 Gardening, 1.3.3 Animal Survey, 1.3.4 Animal Key, 1.4.2 Plant Survey, 1.4.4 Plant Key, 2.4.9 Vegetable Garden In A Bucket, 2.4.10 Flower Garden In A Bucket, K.9.1 Decomposition, 1.9.4 Decomposition And Unearthing, 1.9.5 Decomposition And Reburial, 2.9.1 Fall Unearthing, 2.9.2 Fall Burying, 2.9.3 Spring Unearthing, 2.9.4 Spring Burying, 1.3.8 Metamorphosis, 2.3.6 Hatching Insect Eggs, 2.3.7 Early Metamorphosis, 2.3.8 Late Metamorphosis, K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 2.6.2 Tooth Chart)
9.E. Reasoning • People are more likely to believe your ideas if you can give them reasons for them.	Valuing good, convincing, reasoning is a constant objective in DASH. By organizing the classroom into a scientific-technological community where ideas and products are the coin of the realm, students very early learn than accidental ideas without reasoned support will not stand. Those backed by convincing evidence have far greater likelihood of lasting import.

AAAS Benchmarks	DASH Grades K–2
11. Common Themes **11.A. Systems** • Most things are made of parts.	This is exemplified in numerous activities. The mental health component deals with the institutional parts of the home, school and society. (Examples: K.1.13 Families, K.1.2.7 School And Home, K.6.14 Going To The Hospital, 2.1.8 School, Teacher, Friends, And Family) Biological activities explore the parts of animals and plants. (Examples: K.3.9 Parts Of Animals, K.3.10 Parts Of Mammals, K.3.12 People, K.4.1 Plant Parts, K.4.4 Bean Sprouts, 1.3.8 Metamorphosis, 1.4.1 Plant Identification, 1.4.2 Plant Pressing, 2.3.2 External Anatomy Of Fish, 2.4.12 Root And Stems) Environmental parts are developed as the surrounding world is described. (Examples: K.2.1 Weather Watch, K.3.6 Animal Environments, K.4.2 Plant Environments, 1.2.1 Sky And Weather Watch, 1.2.2 Rain And Streams, 1.2.3 Snow And Streams, 2.2.2 Wind, 2.2.5 Rain, 2.2.6 Snow, 2.4.1 Soil, 2.4.4 Uses Of Soil, 2.4.5 Finding Soil) Astronomical parts are progressively identified through the seven years of DASH. (Examples: K.2.7 Moon Phases, K.7.2 Sunrise, K.7.3 Sunset, K.7.5 Rising Moon, K.7.6 Setting Moon, 1.2.7 Sunrise And Sun Set, 1.2.9 Sun, 2.2.3 Sunrise , Sunset, And Seasons, 2.2.4 Moonrise And Moonset) Identification of the parts of technological devices is ongoing in all technology activities. (Examples: K.6.15 Rain Coats, K.6.16 Testing Raincoats, K.6.20 Hand And Foot Protection, K.7.10 Traffic Simulation, K.8.3 Making Things Stop, 1.7.5 Making A Boat, 1.7.7 The Great Regatta, 1.10.1 Meter String Can, 1.10.5 Water Systems, 1.10.9 Building With Air, 1.10.13 Making A Cardboard House, 1.10.15-19 (Furnishing The House), 2.4.6 Pipes And Water, 2.4.7 Moving Water With Gravity, 2.4.8 Moving Water With Pumps, 2.7.2 Making Race Cars, 2.7.5 Building A Village)
• Something may not work if some of its parts are missing.	Disfunctionalities of all kinds are identified as students work with devices of their own making. This is an outcome of their constant construction and reconstruction of devices.

AAAS Benchmarks	DASH Grades K–2
• When the parts are put together, they can do things that they couldn't do by themselves.	This idea is developed in both social and physical contexts. Students work together in many projects that could not be accomplished by single persons (Examples: K.7.10 Traffic Simulation, 1.10.13 Making A Cardboard House, 1.10.15-19 (Furnishing The House), 2.4.6 Pipes And Water, 2.4.7 Moving Water With Gravity, 2.4.8 Moving Water With Pumps, 2.7.5 Building A Village, K.4.6 Gardening, 1.3.3 Animal Survey, 1.3.4 Animal Key, 1.4.2 Plant Survey, 1.4.4 Plant Key) The students use and make many devices with multiple parts which could not work without all components being present. (Examples: K.7.10 Traffic Simulation, 1.10.13 Making A Cardboard House, 1.10.15-19 (Furnishing The House), 2.4.6 Pipes And Water, 2.4.7 Moving Water With Gravity, 2.4.8 Moving Water With Pumps, 2.7.5 Building A Village)
• Many of the toys children play with are like real things only in some ways. They are not the same size, are missing many details, or are not able to do all of the same things.	Students make their own model boats, cars, villages, houses, and devices. There is a CONNECTIONS BOOK to provide a place to list things that are like the things observed, created, and used in class.
• A model of something is different from the real thing but can be used to learn something about the real thing.	Physical and diagrammatic models are used throughout grades K–2 to give a sense of the capabilities of things represented. (Examples: K.7.10 Traffic Simulation, 1.10.13 Making A Cardboard House, 1.10.15-19 (Furnishing The House), 2.7.5 Building A Village, 1.7.5 Making A Boat, 1.7.7 The Great Regatta, 2.7.2 Making Race Cars, 2.7.3 Racing And Modifying Cars. 1.7.5 Making A Boat, 1.1.7.4 Map Distance, 1.10.2 Outdoor Study Area Mapping, 2.7.4 Roads)
• One way to describe something is to say how it is like something else.	Throughout DASH students use the WORKING DICTIONARY to refine their definitions of things and processes. Use of simile is encouraged.
11.C. Constancy and Change • Things change in some ways and stay the same in some ways.	This is seen dramatically in studies of decomposition, human growth, and environmental surveys. (Examples: K.9.1 Decomposition, 1.9.4 Decomposition And Unearthing, 1.9.5 Decomposition And Reburial, 2.9.1 Fall Unearthing, 2.9.2 Fall Burying, 2.9.3 Spring Unearthing, 2.9.4 Spring Burying, K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 26.2 Tooth Chart, 1.3.3 Animal Survey, 1.3.4 Animal Key, 1.4.2 Plant Survey, 1.4.4 Plant Key)

AAAS Benchmarks	DASH Grades K–2
• People can keep track of some things, seeing where they come from and where they go.	Tracking coming and going is seen dramatically in K–2 astronomy studies. (Examples: K.2.7 Moon Phases, K.2.8 Seasons, K.7.2 Sunrise, K.7.3 Sunset, K.7.5 Rising Moon, K.7.6 Setting Moon, 1.2.7 Sunrise And Sun Set, 1.2.8 Day And Night, 1.2.9 Sun, 1.2.10 The Seasons, 2.2.3 Sunrise, Sunset, And Seasons, 2.2.4 Moonrise And Moonset)
• Things can change in different ways, such as in size, weight, color, and movement. Some small changes can be detected by taking measurements.	Changes in color, size, weight, and movement are found in many activities. (Examples: 1.4.2 Plant Survey, 1.4.3 Plant Press, 3.4.10 Plants And Sunlight, K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 2.6.2 Tooth Chart)
• Some changes are so slow, or so fast that they are hard to see.	Slow change is readily seen in human growth and plant studies. (Examples: 1.4.2 Plant Survey, K.6.1 Growth Chart, 1.6.1 Growth Chart, 2.6.1 Growth Chart, 2.4.1 Soil) Rapid change is seen in the movement of animals and objects. (Examples: K 3.8 How Bugs Walk, K.8.2 Making Things Move, K.8.3 Making Things Stop, 1.3.9 Classroom Pets, 1.7.7 The Great Regatta, 2.7.3 Racing Cars)
11.D. Scale • Things in nature and things people make have very different sizes, weights, ages, and speeds.	DASH students constantly confront differences in size, weight, speed, and age of things. (Examples: K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 2.6.2 Tooth Chart, K.4.6 Gardening, 1.4.2 Plant Survey, 2.4.9 Vegetable Garden In A Bucket, 2.4.10 Flower Garden In A Bucket)
12. Habits of Mind **12.A. Values and Attitudes** • Raise questions about the world around them and be willing to seek answers to some of them by making careful observations and trying things out.	One of the DASH goals is to get students to be self-actuated learners willing to pursue their natural curiosity to answer their own questions. Throughout they are asked to frame their own questions and seek answers. To aid in the process techniques such as the WONDER AND DISCOVER BOOK are used.
12.B. Computation and Estimation • Use whole numbers and simple everyday fractions in ordering, counting, identifying, measuring, and describing things and experiences.	Numbers are continuously used in counting, quantifying, ordering, and naming things. Starting in kindergarten, numbers become a primary communication tool for DASH students. On the DASH LEARNING CALENDAR the morning begins with naming the day, ordering responsibilities, quantifying temperature, and counting students for lunch. Most DASH activities require numbers.

AAAS Benchmarks	DASH Grades K–2
• Readily give the sums and differences of single-digit numbers in familiar contexts where the operation makes sense to them and they can judge the reasonableness of the answer.	Addition and subtraction are essential to DASH activities. (Examples: K.4.4 Growing Bean Sprouts, K.5.2 Drinks, K.5.2 Flower And Bread, K.6.1 Growth Chart, K.7.12 Mapping, K.10.8 Linear Measurement, 1.5.2 Cooking, 1.6.1 Growth Chart, 1.6.5 Air And Breathing, 1.7.4 Mapping Distance, 1.8.2 The Master Thermometer, 1.10.1 Meter-String Can , 1.10.2 Outdoor Study Area Mapping, 1.10.11 Floor Plan Model, 1.10.12 Cardboard House Plan, 1.10.13 Making A Cardboard House, 2.2.5 Rain, 2.2.6 Snow, 2.6.1 Growth Chart, 2.7.4 Roads, 2.7.5 Building A Village, 2.10.4 Meter-String Can, 2.10.5 Measuring Volume)
• Explain to other students how they go about solving problems.	DASH assumes every child is a teacher. In the CONCEPT AND SKILL INVENTORY “can teach” is the highest level of achievement. Throughout students are given the opportunity and encouraged to share their knowledge and skills with others. (Examples: K.1.1 The Learning Calendar, K.1.4 Responsibility, K.1.18 Concept And Skill Inventory, 1.1.1 The Learning Calendar, 1.1.2 The Responsibility Chart, 1.1.5 Helping, 1.1.8 Concept And Skill Inventory, 2.1.1 The Learning Calendar, 2.1.4 Helping Myself And Others, 2.1.5 Getting Help, 2.1.13 Concept And Skill Inventory)
• Give rough estimates of numerical answers to problems before doing them formally.	Estimating and predicting familiar lengths, weights, etc. are regularly required of students. (Examples: K.7.12 Mapping, 1.7.1 Pacing, 1.8.1 Temperature Of Things, 1.10.10 Floor Plan, 2.2.7 Digital Time, K.6.15 Raincoats, K.6.1 Growth Chart, K.6.2 Tooth Chart, 1.6.1 Growth Chart, 1.6.2 Tooth Chart, 2.6.1 Growth Chart, 2.6.2 Tooth Chart)
• Make quantitative estimates of time intervals and check them by measurements.	Time and its measure begins in kindergarten with the daily recording on the LEARNING CALENDAR. By grade 1 they are using the digital clock and estimating shorter periods of time.

AAAS Benchmarks	DASH Grades K–2
12.C. Manipulation and Observation • Use hammers, screwdrivers, clamps, rulers, scissors, and hand lenses, and operate ordinary audio equipment.	A wide variety of technological tools are used in DASH. Measuring tools include are clocks, watches, calendars, thermometers, rulers, metric marked strings, area grid paper, volumetric measuring cups, graduated cylinders, scales, balances and compasses. (Examples Clocks and Calendars K.2.9 Clocks And Calendars, 1.2.4 Digital Time, 1.2.5 Hours And Minutes, 1.2.11 Making A Clock, 2.2.7 Digital Time, 2.2.8 Analog Time Thermometers K.2.1 Weather Watch, 1.8.1 Temperature Of Things, 1.8.2 The Master Thermometer, 2.2.1 Temperature, 2.8.4 Comparing Temperature Linear Measuring Tools K.10.8 Linear Measure, 1.6.1 Growth Charts, 1.7.4 Map Distance, 1.10.1 Meter-String Can Area Measuring Grid Paper 1.10.2 Outdoor Study Area Mapping, 1.10.10 Floor Plan Model Volume Measuring Tools K.10.6 Volume Of Boxes And Bags, 1.5.3 Measuring Volume, 2.10.5 Measuring Volume Scales And Mass K.6.1 Growth Chart, 1.6.1 Growth Chart, And 2.6.1 Growth Chart, 2.10.3 The Balance, 2.2.2 Wind Construction tools include scissors, saws, clamps, miter boxes, hammers, pliers, wrenches cutting implements, glue guns, paint brushes, shovels.
• Assemble, describe, take apart, and reassemble constructions using interlocking blocks, erector sets and the like.	All manner of construction materials are used including interlocking blocks and toy construction systems. Assembling and disassembling products is common. (Examples: K.8.3 Stopping Things, K.8.6 Repairing Things, 1.3.7 Building Cages, 1.7.5 Making A Boat, 1.10.5 Water Systems, 1.10.13 Making A Cardboard House, 1.10.15-19 (Furnishing The House), 2.4.2 Making Soil, 2.4.6 Pipes And Water, 2.4.7 Moving Water With Gravity, 2.4.8 Moving Water With Pumps, 2.7.2 Making Race Cars, 2.7.3 Racing And Modifying Cars, 2.7.4 Roads, 2.7.5 Building A Village, 2.8.1 Camera Obscura)
• Make something out of paper, cardboard, wood, plastic, metal or existing objects that can actually be used to perform a task.	All manner of recycled materials are used including paper, cardboard, tin and aluminum cans, plastic bottles, cloth, leather, wood, iron, brass, and ceramics. These are the materials of the INVENTORS BOX. Selection of materials often gives clues for invention of devices.

AAAS Benchmarks	DASH Grades K–2
• Measure the length in whole units of objects having straight edges.	DASH uses a range of tools for measuring length including rulers, meter sticks, edges of sheets of paper, meter-string can, pacing, etc. Examples are included under 12C.
12.D. Communication Skills • Describe and compare things in terms of number, shape, texture, size, weight, color, and motion.	Students keep a SCIENCE RECORD BOOK in which they record critical descriptions of the things they observe. In kindergarten this is mainly pictorial and numerical. As students gain language skills their records are written. Throughout DASH each activity is debriefed at critical times in its development and it is summarized. This is done orally so that students gain facility with hearing and speaking the language of description. The activity K.1.8 Physical Characteristics Of Things is used over and over to get the students to describe in terms of number, shape, texture, size, weight, color, motion and function what they saw on the way to school.
• Draw pictures that correctly portray at least some features of the thing being described.	Developing capacity to draw is part of the observation process which causes students to look more closely at things in order to represent them. Students are asked at all levels of DASH to make their own drawings of what they see.
12.E. Critical Response Skills • Ask “How do you know?” in appropriate situations and attempt reasonable answers when others ask them the same question.	Probing the reasoning behind statements is a basic procedure in DASH. When students make an observation or give an explanation teachers are encouraged to ask “What is your reason for saying that?”, or “How do you know that?”

Analysis of DASH Match to the AAAS Benchmarks for Science Literacy

The AAAS Benchmarks for Grades 3–5	Developmental Approaches in Science, Health, and Technology (DASH)
1. The Nature of Science **1.A Scientific World View** • Results of similar scientific investigations seldom turn out exactly the same. Sometimes this is because of unexpected differences in the things being investigated, sometimes because of unrealized differences in the methods used or in the circumstances in which the investigation is carried out, and sometimes just because of uncertainties in observations. It is not always easy to tell which.	DASH students in grades 3–5 do many investigations that emphasize quantification and they become very much aware that few experiments when redone by themselves or others produce data that are exactly the same. Since every activity is carefully debriefed the students find that there are many sources of error including instrument error, error from variations in method, and error on the part of observers. (Examples: 3.3.11 Chick Growth, 4.8.1 Push-Pull Measuring Tool, 4.8.2 Friction, 4.10.6 Specific Gravity, 5.4.1 Annual, Biennial, And Perennial Plant Project, 5.4.4 Tree Observation, 5.4.5 Measuring Trees, 5.4.7 Trees, Shrubs, And Grasses, 5.4.8 Grasses: Why Do They Grow There?, 5.8.2 Teeter-Totters, 5.8.3 The Balance, 5.8.4 Wheels And Axles, 5.8.7 Inclined Planes And Screws)
1.B Scientific Inquiry • Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments. Investigations can focus on physical, biological, and social questions.	DASH activities in grades 3–5 involve a range of methods including observing, collecting and analyzing numerical data, and experimenting. This is done in biological, social, earth, and physical science contexts. Examples: Observation 3.3.5 Natural Habitats Of Frogs And Toads, 3.3.7 Frog Metamorphosis, 3.3.10 Hatching Chicks, 3.4.3 Watching Garden Soil, 3.9.2 Watching Compost, 3.9.3 Animals In Compost, 3.9.4 Using Compost, 3.9.5 Fall Unearthing And Burial, 3.9.6 Spring Unearthing And Burial, 4.2.7 Clouds And Weather, 4.3.1 Pet Care, 4.3.2 The Unincubated Egg, 4.3.4 Raising Small Mammals, 4.3.7 Pairing Pet Mammals, 4.3.8 Reproduction Of Pet Mammals, 4.3.10 Our Early Years, 4.3.11 The First Grade Child, 4.3.12 Growth, Development, And Behavior Of Young Pets, 4.3.13 Human Growth And Development, 4.3.14 Changing Dimensions, 4.3.15 External Anatomy Of Fish, 4.3.16 Cleaning Fish: Internal Anatomy, 4.3.17 Fish Reproduction, 4.3.18 Modeling Our Digestive System, 4.3.19 Our Digestive System In Two Dimensions, 4.3.20 Digestive, Circulatory, And Respiratory System, 4.3.21 Length Of The Digestive Tract, 4.3.22 Migration And Hibernation, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 4.4.1 Annual, Biennial, And Perennial Garden Plants, 4.4.3 Fungus Collection, 4.5.2 Mechanical Digestion, 5.3.1 Pet Care, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.3.6 Male Urogenital System, 5.3.7 Female Urogenital System,

AAAS Benchmarks	DASH Grades 3–5
• Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments. Investigations can focus on physical, biological, and social questions.	5.3.8 Ovulation Cycle, 5.3.9 Ovulation And Pregnancy, 5.3.10 Embryology, 5.4.2 Tree Harvesting, 5.4.3 Tree Planting, 5.4.4 Tree Observation, 5.4.7 Trees, Shrubs, And Grasses, 5.6.4 Alcohol, Tobacco, And Drugs, 5.6.5 Sexually Transmitted Diseases Collection And Analysis Of Data 3.3.11 Chick Growth, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.5 Height Of Clouds, 4.2.6 Humidity, 4.2.7 Clouds And Weather, 4.2.8 Storm Clouds, 4.2.9 Lightning, 4.2.10 Weather Maps, 4.2.11 Weather Fronts, 4.2.18 Using The Planetarium, 4.2.19 Planets, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 4.9.1 Unearthing, 5.2.1 Weather Station, 5.2.2 The Heat Index And The Hygrometer, 5.2.3 Weather And Its Prediction, 5.2.4 Fronts, 5.2.5 Clouds, 5.4.5 Measuring Trees, 5.4.6 Age Of Trees, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.9.3 Decomposition And Archeology Experimentation 3.4.4 Making Artificial Soil, 3.4.5 Testing Artificial Soil, 3.4.15 Pollination, 3.6.3 Breathing Air, 3.6.4 Anatomy Of Breathing 3.6.5 Lung Model, 3.6.6 Lungs And Smoking, 3.6.7 Breathing And Pulse Rates, 3.6.8 Heart, Veins, And Arteries, 3.6.9 Heart, Lungs, And Exercise, 3.8.1 Shadow, Light, And Bubbles, 3.8.2 Wind And Heat, 3.10.2 Acids And Bases, 3.10.3 Acid And Base Reactions, 3.10.4 Diluting Acids And Bases, 3.10.5 Acid And Base Interaction, 3.10.6 Dissolving Things, 3.10.7 Things In Liquids, 3.10.8 Crystals, 3.10.9 Rain In A Jar, 4.2.12 Predicting Weather, 4.2.13 Wind Chill, 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.20 When Is It Noon?, 4.2.22 Using A Sundial, 4.2.23 Seasons And The Sun, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 4.5.3 Chemical Digestion, 4.6.5 Making A Fire, 4.6.6 Things That Burn, 4.6.7 Smoking And The Lungs, 4.8.1 Push-Pull Measuring Tool, 4.8.2 Friction, 4.8.3 Streamlining, 4.8.4 Pressure, Sharp Edges, And Points, 4.8.5 Energy Of Falling Objects, 4.8.6 Circles And Speed, 4.10.4 Collecting Rocks, 4.10.5 Hardness Of Rocks, 4.10.6 Specific Gravity, 4.10.7 Rocks And Sharp Edges, 4.10.10 Clowns, 4.10.11 Clay, 4.10.12 Fire And Pottery, 4.10.13 Air And Fire, 4.10.14 Fire And Oxygen, 4.10.15 Properties Of Gases, 5.2.6 Gnomon, 5.2.7 Size Of The Earth, 5.2.8 Moon Through A Telescope, 5.2.9 How Big And Far Away Is The Moon?, 5.2.10 Planets Through A Telescope, 5.2.11 Models Of The Solar System, 5.3.4 Cells, 5.3.11 Body Changes, 5.3.12 Bones, 5.3.13 Skeletal System, 5.3.14 Muscles, 5.3.15 Muscular System, 5.3.16 Chemistry And Bones, 5.3.17 The Senses, 5.3.18 The Eye, 5.3.19 Sound, 5.3.20 The Ear, 5.4.1 Annual, Biennial, And Perennial Plant Project, 5.4.7 Trees, Shrubs, And Grasses, 5.4.8 Grasses: Why Do They Grow There?

AAAS Benchmarks	DASH Grades 3–5
• Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments. Investigations can focus on physical, biological, and social questions.	5.4.9 Roots, 5.4.10 Soil Conservation, 5.6.8 Smokers' Survey, 5.6.9 Non-Smokers' Survey, 5.7.2 Planetarium, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Sun?, 5.8.2 Teeter-Totters, 5.8.3 The Balance, 5.8.4 Wheels And Axles, 5.8.7 Inclined Planes And Screws, 5.8.8 Block And Tackle, 5.8.12 Forces Projects
• Results of scientific investigations are seldom exactly the same, but if the differences are large, it is important to try to figure out why. One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused the differences.	DASH students have a personal SCIENCE RECORD BOOK in which they keep accounts of their investigations. The record book is supported by a series of STUDENT PAGES which suggest critical data to be kept and analytical questions to be answered. All activities are debriefed at various stages in their evolution and large and small differences in outcomes are identified. Unexplained differences are recorded in the WONDER AND DISCOVER BOOK which are kept from year to year in the library and becomes the impetus to new investigations. (Examples: 3.1.2 Last Year, 4.1.3 Last Year, 4.1.4 The Library, 5.1.3 Library Check-Out)
• Scientists' explanations about what happens in the world come partly from what they observe, partly from what they think. Sometimes scientists have different explanations for the same set of observations. That usually leads to their making more observations to resolve the differences.	The DASH classroom models the dynamics of the scientific and technological communities. As the students gain insight into the natural and technological worlds around them they are increasingly able to use their organized experience to think about and create explanations. There are 40 multi-grade level thematic sequences of activities including studies of weather, astronomy, agriculture, nutrition, disease, reproduction, decomposition, human growth and development, and mental health found within DASH. Many activities are designed to serve multiple functions and encourage multiple interpretations on the part of students which are then used to derive further inquiry. Examples: Weather 3.2.1 Weather, 3.2.2 Temperature, 3.2.3 Wind, 3.2.4 Rain And Snow, 3.2.5 Humidity, 3.10.9 Rain In A Jar, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.5 Height Of Clouds, 4.2.6 Humidity, 4.2.7 Clouds And Weather, 4.2.8 Storm Clouds, 4.2.9 Lightning, 4.2.10 Weather Maps, 4.2.11 Weather Fronts, 4.2.12 Predicting Weather, 4.2.13 Wind Chill, 5.2.1 Weather Station, 5.2.2 The Heat Index And The Hygrometer, 5.2.3 Weather And Its Prediction, 5.2.4 Fronts, 5.2.5 Clouds

AAAS Benchmarks	DASH Grades 3–5
• Scientists' explanations about what happens in the world come partly from what they observe, partly from what they think. Sometimes scientists have different explanations for the same set of observations. That usually leads to their making more observations to resolve the differences.	Animals 3.3.3 Raising Insects, 3.3.4 Importance Of Insects, 3.3.5 Natural Habitats Of Frogs And Toads, 3.3.6 Making Habitats For Frogs And Toads, 3.3.7 Frog Metamorphosis, 3.3.8 Importance Of Frogs And Toads, 3.3.9 Toads And Insects, 3.3.10 Hatching Chicks, 3.3.11 Chick Growth, 3.3.12 Importance Of Birds, 4.3.1 Pet Care, 4.3.2 The Unincubated Egg, 4.3.3 Chick Embryology, 4.3.4 Raising Small Mammals, 4.3.5 Housing Pet Mammals, 4.3.6 Weekend Care Of Pet Mammals, 4.3.7 Pairing Pet Mammals, 4.3.8 Reproduction Of Pet Mammals, 4.3.9 Pet Baby Care, 4.3.15 External Anatomy Of Fish, 4.3.16 Cleaning Fish: Internal Anatomy, 4.3.17 Fish Reproduction, 4.3.22 Migration And Hibernation, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 5.3.1 Pet Care, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.3.4 Cells, 5.3.5 Cell Quiz Astronomy 3.2.7 Moon Phases, 3.2.8 Polar Sky Model, 3.2.9 Polar Constellations, 3.2.10 Venus, 3.2.11 Eclipses, 4.2.14 Flat Or Round Earth, 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.17 Planetarium, 4.2.18 Using The Planetarium, 4.2.19 Planets, 4.2.20 When Is It Noon?, 4.2.21 Making A Sundial, 4.2.22 Using A Sundial, 4.2.23 Seasons And The Sun, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 5.2.7 Size Of The Earth, 5.2.8 Moon Through A Telescope, 5.2.9 How Big And Far Away Is The Moon?, 5.2.10 Planets Through A Telescope, 5.2.11 Models Of The Solar System, 5.2.12 Eclipses, 5.7.1 Where In The World Are We?, 5.7.2 Planetarium, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Earth? Agriculture 3.1.12 Carey's Garden, 3.4.1 Garden Planning, 3.4.2 Garden Preparation, 3.4.3 Watching Garden Soil, 3.4.4 Making Artificial Soil, 3.4.5 Testing Artificial Soil, 3.4.6 Soil And Water, 3.4.7 Garden Planting, 3.4.8 Garden Care, 3.4.9 Garden Watering Systems, 3.4.10 Garden Invaders, 3.4.11 Controlling Insects, 3.4.12 Garden Harvesting, 3.4.13 Flowers, 3.4.14 Seeds, 3.4.15 Pollination, 3.5.2 Selecting Plants For The Garden 4.4.1 Annual, Biennial, And Perennial Garden Plants, 4.4.2 The Fungus Among Us, 4.4.3 Fungus Collection, 5.4.1 Annual, Biennials, And Perennial Plant Project, 5.4.2 Tree Harvesting, 5.4.3 Tree Planting, 5.4.4 Tree Observation, 5.4.5 Measuring Trees, 5.4.6 Age Of Trees, 5.4.7 Trees, Shrubs, And Grasses, 5.4.8 Grasses: Why Do They Grow There?, 5.4.9 Roots, 5.4.10 Soil Conservation

AAAS Benchmarks	DASH Grades 3–5
• Scientists' explanations about what happens in the world come partly from what they observe, partly from what they think. Sometimes scientists have different explanations for the same set of observations. That usually leads to their making more observations to resolve the differences.	Nutrition 3.5.1 Food Selection, 3.5.2 Selecting Plants For The Garden, 3.5.3 Planning The Class Feast, 3.5.6. Drying Foods, 3.5.7 Pickling Foods, 3.5.8 Preserving And Rotting, 3.5.9 Supermarket Game Preparation, 3.5.10 Pricing Foods, 3.5.11 Newspaper Ads And Banking, 3.5.12 Farmers And Processors, 3.5.13 Supermarket Game, 3.10.10 Supermarket Planning, 3.10.11 Supermarket Construction, 4.5.1 Nutrition Messages, 4.5.2 Mechanical Digestion, 4.5.3 Chemical Digestion, 4.5.4 Food Groups, 4.5.5 Digestion Game, 4.5.6 Preserving Foods, 5.5.1 Nutrients, 5.5.2 Nutrients And Cells, 5.5.3 The Kilocalorie, 5.5.4 RDAs And Food Labeling Disease 3.6.10 Disease Transmission, 3.6.11 Trash And Sanitation, 4.4.2 The Fungus Among Us, 5.3.4 Cells, 5.6.5 Sexually Transmitted Diseases, 5.6.6 Sexually Transmitted Disease Quiz Drugs, Tobacco, And Alcohol 3.6.12 Helpful Drugs, 3.6.13 Proper Drug Use, 4.6.7 Smoking And The Lungs, 4.6.8 Alcohol, Tobacco And Drugs, 5.6.4 Alcohol, Tobacco, And Drugs, 5.6.7 Tobacco Quiz, 5.6.8 Smokers' Survey, 5.6.9 Ex-Smokers' Survey, 5.6.10 Smoking Laws, 5.6.11 Alcohol Quiz, 5.6.12 Alcohol Laws, 5.6.13 Chris's Story, 5.6.14 The Parents' Story, 5.6.15 Intoxication Meter, 5.6.16 Drug Laws Reproduction 3.3.3 Raising Insects, 3.3.7 Frog Metamorphosis, 3.3.10 Hatching Chicks, 3.3.11 Chick Growth, 3.4.13 Flowers, 3.4.14 Seeds, 3.4.15 Pollination, 4.3.2 The Unincubated Egg, 4.3.3 Chick Embryology, 4.3.8 Reproduction Of Pet Mammals 4.3.9 Pet Baby Care, 4.3.17 Fish Reproduction, 5.3.6 Male Urogenital System, 5.3.7 Female Urogenital System, 5.3.8 Ovulation Cycle, 5.3.9 Ovulation And Pregnancy, 5.3.10 Embryology Machines 3.7.1 Garden Mover, 3.7.2 Propeller-Driven Message Center, 3.7.3 Propeller-Driven Boat, 3.7.4 Delivery Systems, 4.7.1 Boat Design, 4.7.2 Wind And Sails, 5.8.1 Pushes, Pulls, And Forces, 5.8.2 Teeter-Totters, 5.8.3 The Balance, 5.8.4 Wheels And Axles, Cranks And Gears, 5.8.5 Levers: Where Are They?, 5.8.6 Arms And Jaws, 5.8.7 Inclined Planes And Screws, 5.8.8 Block And Tackle, 5.10.5 Making A Telescope, 5.10. 6 Stabilizing The Telescope, 5.10.7 Making A Microscope, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer

AAAS Benchmarks	DASH Grades 3–5
• Scientists' explanations about what happens in the world come partly from what they observe, partly from what they think. Sometimes scientists have different explanations for the same set of observations. That usually leads to their making more observations to resolve the differences.	Chemistry 3.10.1 Acidic And Basic Soil, 3.10.2 Acids And Bases, 3.10.3 Acid And Base Reactions, 3.10.4 Diluting Acids And Bases, 3.10.5 Acid And Base Interaction, 3.10.6 Dissolving Things, 3.10.7 Things In Liquids, 3.10.8 Crystals, 4.6.5 Making A Fire, 4.6.6 Things That Burn, 4.10.11 Clay, 4.10.12 Fire And Pottery, 4.10.13 Air And Fire, 4.10.14 Fire And Oxygen Decomposition 3.9.1 Making Compost, 3.9.2 Watching Compost, 3.9.3 Animals In Compost, 3.9.4 Using Compost, 3.9.5 Fall Unearthing And Burial, 3.9.6 Spring Unearthing And Burial, 4.9.1 Unearthing And Burial, 5.9.3 Decomposition And Archeology Human Growth And Development 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 4.3.10 Our Early Years, 4.3.11 The First Grade Child, 4.3.12 Growth, Development, And Behavior Of Young Pets, 4.3.13 Human Growth And Development, 4.3.14 Changing Dimensions, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart Human Physiology 3.6.3 Breathing Air, 3.6.4 Anatomy Of Breathing, 3.6.5 Lung Model, 3.6.6 Lungs And Smoking, 3.6.7 Breathing And Pulse Rates, 3.6.8 Heart, Veins, And Arteries, 3.6.9 Heart, Lungs, And Exercise, 4.3.18 Modeling Our Digestive System, 4.3.19 Our Digestive System In Two Dimensions, 4.3.20 Digestive, Circulatory, And Respiratory Systems, 4.3.21 Length Of The Digestive Tract, 5.3.5 Cell Quiz, 5.3.6 Male Urogenital System, 5.3.7 Female Urogenital System, 5.3.8 Ovulation Cycle, 5.3.9 Ovulation And Pregnancy, 5.3.10 Embryology, 5.3.11 Body Changes, 5.3.12 Bones, 5.3.13 Skeletal System, 5.3.14 Muscles, 5.3.15 Muscular System, 5.3.16 Chemistry And Bones, 5.3.17 The Senses, 5.3.18 The Eye, 5.3.19 Sound Mental Health 3.1.3 Responsibility, 3.1.4 Planning, 3.1.5 Organizing Our Environment, 3.1.6 Friends, 3.1.7 Giving And Receiving, 3.1.8 Working Together, 3.1.9 Helping Myself And Others 3.1.10 Aphorisms, 3.1.11 Next Year, 3.1.13 Concept And Skill Inventory, 4.1.2 Responsibility, 4.1.3 Last Year, 4.1.4 The Library, 4.1.5 Working Together, 4.1.6 Things I Can Do For Myself And Others, 4.1.7 Aphorisms, 4.1.8 Planning, 4.1.9 Survival Game, 4.1.10 Concept And Skill Inventory, 5.1.2 Responsibility, 5.1.5 Working Together, 5.1.6 Things I Can Do For Myself And Others, 5.1.7 Aphorisms, 5.1.8 Friendship, 5.1.9 Ways To Day No, 5.1.10 Making Time To Decide, 5.1.11 Concept And Skill Inventory, 5.1.12 Learning To Learn

AAAS Benchmarks	DASH Grades 3–5
• Scientists do not pay much attention to claims about how something they know about works unless the claims are backed up with evidence that can be confirmed and with a logical argument.	From kindergarten on, the students in DASH operate as communities of technologists and scientists. Their investigations and inventions are continually open to reflective discussion. Inventions that do not meet the criterion of functionality are immediately identified and turned back to the inventor/designers to modify or redesign. Investigations that do not support the claims of researchers are sent back for reassessment or further investigation in the lab and field.
1.C. The Scientific Enterprise • Science is an adventure that people everywhere can take part in, as they have for many centuries.	Concurring with the goal of science for all, DASH activities are designed for full class participation. Activities attend to different modalities of learning. They provide opportunities to engage students with strengths in kinesthetic, spatial, logical-mathematical, linguistic, interpersonal, and intrapersonal modes of learning. Cooperative learning techniques allow teachers to organize the classroom for maximum use of peer teaching.
• Clear communication is an essential part of doing science. It enables scientists to inform others about their work, expose their ideas to criticism by other scientists, and stay informed about scientific discoveries around the world.	The DASH classroom is designed to model the larger communities of the biological, earth, physical and social sciences; technologies; and health care services. Communication is essential since investigations are interconnected, often long term, and often the product of small groups of students. Records kept in the SCIENCE RECORD BOOK, on the DASH LEARNING CALENDAR, in the WORKING DICTIONARY, in the WONDER AND DISCOVER BOOK, and in the CONNECTIONS BOOK all have functional import in ongoing work. DASH strongly recommends that classrooms supplement the research with trade books, reference works particularly almanacs and newspapers, and science and natural history magazines so the students can get a sense of the vital character of today's science and technology that is being pursued by professionals. (Examples: 3.1.1 The Learning Calendar, 3.1.2 Last Year, 4.1.1 The Learning Calendar, 4.1.3 Last Year, 4.1.4 The Library, 5.1.1 The Learning Calendar, 5.1.2 Responsibility, 5.1.3 Library Check-Out, 5.1.4 Library Check-In)
• Doing science involves many different kinds of work and engages men and women of all ages and backgrounds.	DASH involves all students in doing science. Investigations call for different roles, skills, and knowledge. Each DASH activity identifies the kinds of professionals who would engage in such work. Teachers are encouraged to have guest speakers talk with students about their jobs, training, salary, and professional obligations.

AAAS Benchmarks	DASH Grades 3–5
2. Nature of Mathematics **2.A. Patterns and Relationships** • Mathematics is the study of many kinds of patterns, including numbers and shapes and operations on them. Sometimes patterns are studied because they help to explain how the world works or how to solve practical problems, sometimes because they are interesting in themselves.	In DASH activities mathematical patterns are sought in many things—in graphs and numerical data from laboratory experimentation and from the field, as well as astronomical, biological, and social investigations. Intuitive geometry uses triangles to measure distance, and provide degrees of angularity. Since astronomical bodies are spheres and the heavens can be considered a spherical surrounding of Earth and the solar system, the DASH student regularly uses great circles—latitude, longitude, right ascension, declination, the ecliptic—to describe location. Examples: Arithmetic Patterns 3.2.1 Weather, 3.2.2 Temperature, 3.2.4 Wind, 3.2.5 Rain And Snow, 3.5.10 Pricing Foods, 3.5.11 Newspaper Ads And Banking, 3.5.12 Farmers And Processors, 3.5.13 Supermarket Game, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.8.5 Energy Of Falling Objects, 4.10.3 Mass Measurement, 4.10.4 Collecting Rocks, 4.10.5 Hardness Of Rock, 4.10.6 Specific Gravity, 5.2.1 Weather Station, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart Graphing Patterns 3.2.1 Weather, 3.2.2 Temperature, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 4.2.13 Wind Chill, 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.23 Seasons And The Sun, 4.3.8 Reproduction Of Pet Mammals, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 5.2.2 The Heat Index And The Hygrometer, 5.4.2 Tree Harvesting, 5.4.4 Tree Observation, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.6.8 Smokers' Survey, 5.6.9 Ex-Smokers' Survey, 5.6.15 Intoxication Geometry Patterns 4.2.14 Flat Or Round Earth, 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.17 Planetarium, 4.2.18 Using The Planetarium, 4.2.19 Planets, 4.2.20 When Is It Noon?, 4.2.21 Making A Sundial, 4.2.22 Using A Sundial, 4.2.23 Seasons And The Sun, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 4.8.6 Circles And Speed, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement 5.2.6 Gnomon, 5.2.7 Size Of The Earth, 5.2.9 How Big And Far Away Is The Moon?, 5.2.10 Planets Through A Telescope, 5.2.11 Models Of The Solar System, 5.7.1 Where In The World Are We?, 5.7.2 Planetarium, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Sun?, 5.10.1 Linear Measurement, 5.10.4 Controlling Light With Lenses

AAAS Benchmarks	DASH Grades 3–5
• Mathematical ideas can be represented concretely, graphically, and symbolically.	DASH recognizes that in any class students are working at different levels of abstraction. As a result concrete, graphing, and symbolic representations are all used to convey quantitative and geometric relationships. Graphing is used extensively to visualize relationships. Geometric ideas are presented in concrete examples before being generalized symbolically. Examples: Concrete Representations 3.2.1 Weather, 3.2.2 Temperature, 3.5.10 Pricing Foods, 3.5.13 Supermarket Game, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 4.2.20 When Is It Noon?, 4.2.21 Making A Sundial, 4.2.22 Using A Sundial, 4.2.23 Seasons And The Sun, 4.2.24 Using A Sundial, 4.2.23 Seasons And The Sun, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart Graphing Patterns 3.2.1 Weather, 3.2.2 Temperature, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 4.2.13 Wind Chill, 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.23 Seasons And The Sun, 4.3.8 Reproduction Of Pet Mammals, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 5.2.2 The Heat Index And The Hygrometer, 5.4.2 Tree Harvesting, 5.4.4 Tree Observation, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.6.8 Smokers' Survey, 5.6.9 Ex-Smokers' Survey, 5.6.15 Intoxication Concrete/Symbolic 4.2.14 Flat Or Round Earth, 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.17 Planetarium, 4.2.18 Using The Planetarium, 4.2.19 Planets, 4.8.6 Circles And Speed, 5.2.6 How Big And Far Away Is The Moon?, 5.2.11 Models Of The Solar System, 5.7.1 Where In The World Are We?, 5.7.2 Planetarium, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Sun?, 5.10.1 Linear Measurement, 5.10.4 Controlling Light With Lenses Symbolic 5.8.2 Teeter-Totters, 5.8.3 The Balance, 5.8.4 Wheels And Axles, 5.8.5 Levers: Where Are They?, 5.8.6 Arms And Jaws, 5.8.7 Inclined Planes And Screws, 5.8.8 Block And Tackle
2.B. Mathematics, Science and Technology • Knowing how to work with numbers and shapes (and operations on them) is useful in studying and describing things and events. With the help of mathematics, patterns can be found in data that otherwise might be missed.	The constant use of graphing as an analytical tool and numerical data analysis along with intuitive geometry gives DASH students ways of teasing meaning out of data that might otherwise remain meaningless.

AAAS Benchmarks	DASH Grades 3–5
• Knowing how to work with numbers and shapes (and operations on them) is useful in studying and describing things and events. With the help of mathematics, patterns can be found in data that otherwise might be missed.	Graphing Patterns 3.2.1 Weather, 3.2.2 Temperature, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 4.2.13 Wind Chill, 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.23 Seasons And The Sun, 4.3.8 Reproduction Of Pet Mammals, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 5.2.2 The Heat Index And The Hygrometer, 5.4.2 Tree Harvesting, 5.4.4 Tree Observation, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.6.8 Smokers' Survey, 5.6.9 Ex-Smokers' Survey, 5.6.15 Intoxication Geometric Patterns 4.2.14 Flat Or Round Earth, 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.17 Planetarium, 4.2.18 Using The Planetarium, 4.2.19 Planets, 4.8.6 Circles And Speed, 5.2.6 Gnomon, 5.2.7 Size Of The Earth, 5.2.9 How Big And Far Away Is The Moon?, 5.2.11 Models Of The Solar System, 5.7.1 Where In The World Are We?, 5.7.2 Planetarium, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Sun?, 5.10.1 Linear Measurement, 5.10.4 Controlling Light With Lenses Numerical Patterns 3.2.1 Weather, 3.2.2 Temperature, 3.2.4 Wind, 3.2.5 Rain And Snow, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 3.5.10 Pricing Foods, 3.5.11 Newspaper Ads And Banking, 3.5.12 Farmers And Processors, 3.5.13 Supermarket Game, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.8.5 Energy Of Falling Object, 4.10.3 Mass Measurement, 4.10.5 Hardness Of Rock, 4.10.6 Specific Gravity, 5.2.1 Weather Station, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.8.2 Teeter-Totters, 5.8.3 The Balance, 5.8.4 Wheels And Axles, 5.8.5 Levers: Where Are They?, 5.8.6 Arms And Jaws, 5.8.7 Inclined Planes And Screws, 5.8.8 Block And Tackle
2.C. Mathematical Inquiry • Numbers and shapes—and operations on them—help to describe and predict things about the world around us.	Aggregates of numbers and shapes are used both for descriptive purposes and for prediction. Examples: Numbers Used In Description And Prediction 3.2.1 Weather, 3.2.2 Temperature, 3.2.4 Wind, 3.2.5 Rain And Snow, 3.5.10 Pricing Foods, 3.5.13 Supermarket Game, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.8.5 Energy Of Falling Objects, 4.10.3 Mass Measurement, 4.10.5 Hardness Of Rock, 4.10.6 Specific Gravity, 5.2.1 Weather Station, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.8.2 Teeter-Totters, 5.8.3 The Balance,

AAAS Benchmarks	DASH Grades 3–5
• Numbers and shapes—and operations on them—help to describe and predict things about the world around us.	5.8.4 Wheels And Axles, 5.8.5 Levers: Where Are They?, 5.8.6 Arms And Jaws, 5.8.7 Inclined Planes And Screws, 5.8.8 Block And Tackle Shapes Used In Description And Prediction 3.2.7 Moon Phases, 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.18 Using The Planetarium, 4.2.20 When Is It Noon?, 4.2.21 Making A Sundial, 4.2.22 Using A Sundial, 4.2.23 Seasons And The Sun 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 5.2.6 Gnomon, 5.7.1 Where In The World Are We?, 5.7.2 Planetarium, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic
• In using mathematics, choices have to be made about what operations will give the best results. Results should always be judged by whether they make sense and are useful.	Because DASH follows the early history of quantification in science, the students are regularly in search of mathematical interpretation of data. They find that those interpretations that follow a logical pattern are much more likely to support prediction than those which do not. By grade 3 success of prediction is a criterion for judgment of adequacy of interpretation. Examples: 3.2.7 Moon Phases, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 3.6.7 Breathing And Pulse Rates, 4.2.16 The Sun's Shadow Path, 4.2.24 Moon Phases And The Sun, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 5.2.6 Gnomon, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.8.2 Teeter-Totters, 5.8.4 Wheels And Axle, 5.8.7 Inclined Planes And Screws
3. The Nature of Technology **3.A. Technology and Science** • Throughout all of history, people everywhere have invented and used tools. Most tools of today are different from those of the past but many are modifications of very ancient tools.	Throughout DASH students invent, design, make, and test laboratory tools and tools used in crafting products. In grade 4 where the technological study focuses on the crafts of stone implement cultures, the students chip rocks and makes the tools needed for survival in a simple environment. This gives the student a sense of how natural materials allowed people in the past to achieve many of the same ends that modern materials and tools achieve for us today.

AAAS Benchmarks	DASH Grades 3–5
	Examples: Modern Tools 3.10.12 Measuring Devices, 3.10.13 Safety Equipment, 4.6.3 Safety Gear, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.2.6 Gnomon, 5.6.3 Safety Devices, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement, 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses, 5.10.5 Making A Telescope 5.10.6 Stabilizing The Telescope, 5.10.7 Making A Microscope, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer Ancient Tools 4.10.4 Collecting Rocks, 4.10.5 Hardness Of Rocks, 4.10.7 Rocks And Sharp Edge, 4.10.8 Making Tools From Rock, 4.10.9 Making Fishing Tools, 4.10.11 Clay, 4.10.12 Fire And Pottery
• Technology enables scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving at all.	DASH employs a broad range of tools, many of which the students make, including enlargers such as the camera obscura, pin hole cameras, telescopes, and microscopes; impact measuring devices to measure the energy of moving objects; and the tools of photography and record keeping to preserve observations and measurements of slow progressing events. Examples: Enlarging Devices 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses, 5.10.5 Making A Telescope, 5.10.6 Stabilizing The Telescope, 5.10.7 Making A Microscope Fast Moving Object Measuring Devices 4.8.5 Energy Of Falling Objects, 4.8.6 Circles And Speed Measuring Slow Progressing Events 3.9.2 Watching Compost, 3.9.5 Fall Unearthing And Burial, 3.9.6 Spring Unearthing And Burial, 3.2.7 Moon Phases, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 4.4.1 Annual, Biennial, And Perennial Garden Plants, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.4.1 Annual, Biennial, And Perennial Plant Project, 5.4.2 Tree Harvesting, 5.4.3 Tree Planting, 5.4.4 Tree Observation
• Measuring instruments can be used to gather accurate information for making scientific comparisons of objects and events and for designing and constructing things that will work properly.	DASH students make almost all of the measuring equipment they use in the classroom. Instrument making has two functions. First, it provides measurements of data for science inquiries and technological construction and services activities. Second, it causes the student to think about the nature of measurement, its functions, limitations, and advantages.

AAAS Benchmarks	DASH Grades 3–5
	Examples: 3.2.1 Weather, 3.2.2 Temperature, 3.2.4 Wind, 3.10.12 Measuring Devices, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.21 Making A Sundial, 4.2.17 Planetarium, 4.2.19 Planets, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.2.1 Weather Station, 5.2.6 Gnomon, 5.3.12 Bones, 5.10.1 Linear Measurement, 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses, 5.10.5 Making A Telescope, 5.10.6 Stabilizing The Telescope, 5.10.7 Making A Microscope, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer
• Technology extends the ability of people to change the world: to cut, shape, or put together materials; to move things from one place to another; and to reach farther with their hands, voices, senses, and minds. The changes may be for survival needs such as food, shelter, and defense, for communication and transportation, or to gain knowledge and express ideas.	Basic biological needs and the technologies developed to satisfy them are major organizing ideas throughout DASH K–6. In these studies the students are "changers" of the world. In each activity they are given a role of a technologist, scientist, health provider or other who professionally works at the same tasks of ancient technologists—chippers of stone, potters, makers of fish traps, and weapons, preservers and preparers of food. They are inventors and work at the tasks of modern farmers, food processors, distributors, and cooks; they are carpenters, plumbers, electricians, and instrument makers: they are makers of sleds, wheeled carriers, rockets, and airplanes; they are communicators with speaking tubes, light, telephone, radio and codes; they are sanitary engineers, health service providers, builders of shelters, and safety experts. In all these experiences they get a deep insight into how we humans have put together the things of nature through manufacturing to enhance our capacity to survive as organisms. Examples: Ancient Technologists 4.1.9 Survival Game, 4.5.6 Preserving Foods, 4.7.1 Boat Design, 4.7.2 Wind And Sails, 4.10.4 Collecting Rocks, 4.10.5 Hardness Of Rocks, 4.10.7 Rocks And Sharp Edges, 4.10.8 Making Tools From Rock, 4.10.9 Making Fishing Tools, 4.10.11 Clay, 4.10.12 Fire And Pottery Food Technologists 3.4.1 Garden Planning, 3.4.2 Garden Preparation, 3.4.3 Watching Garden Soil, 3.4.4 Making Artificial Soil, 3.4.5 Testing Artificial Soil, 3.4.6 Soil And Water, 3.4.7 Garden Planting, 3.4.8 Garden Care, 3.4.9 Garden Watering Systems, 3.4.1 Garden Invaders, 3.4.11 Controlling Insects, 3.4.12 Garden Harvesting, 3.4.13 Flowers, 3.4.14 Seeds, 3.4.15 Pollination, 3.5.1 Food Selection, 3.5.2 Selecting Plants For The Garden, 3.5.3 Planning The Class Feast, 3.5.4 Preparing The Class Feast, 3.5.5 The Class Feast, 3.5.6 Drying Foods, 3.5.7 Pickling Foods, 3.5.8 Preserving And Rotting, 3.5.9 Supermarket Game Preparation, 3.5.10 Pricing,

AAAS Benchmarks	DASH Grades 3–5
	3.5.11 Newspaper Ads And Banking, 3.5.12 Farmers And Processors, 3.5.13 Supermarket Game, 4.5.6 Preserving Foods, 5.4.1 Annual, Biennial, And Perennial Plant Project, 5.5.1 Nutrients, 5.5.2 Nutrients And Cells, 5.5.5 RDAs And Food Labeling Forestry 5.4.2 Tree Harvesting, 5.4.3 Tree Planting, 5.4.4 Tree Observation, 5.4.5 Measuring Trees, 5.4.6 Age Of Trees, 5.4.7 Trees, Shrubs, And Grasses, 5.4.8 Grasses: Why Do They Grow There?, 5.4.9 Roots, 5.4.10 Soil Conservation Health And Sanitation 3.6.10 Disease Transmission, 3.6.11 Trash And Sanitation, 3.6.12 Helpful Drugs, 3.6.13 Proper Drug Use, 4.6.7 Smoking And The Lungs, 4.6.8 Alcohol, Tobacco, And Drugs, 5.6.4 Alcohol, Tobacco And Drugs, 5.6.5 Sexually Transmitted Diseases, 5.6.6 Sexually Transmitted Disease Quiz, 5.6.7 Tobacco Quiz, 5.6.8 Smokers' Survey, 5.6.9 Ex-Smokers' Survey, 5.6.10 Smoking Laws, 5.6.11 Alcohol Quiz, 5.6.12 Alcohol Laws, 5.6.13 Chris's Story, 5.6.14 The Parents' Story, 5.6.15 Intoxication, 5.6.16 Drug Laws Builders And Communicators 3.3.6 Making Habitats For Frogs And Toads, 3.7.1 Garden Mover, 3.7.2 Propeller-Driven Message Center, 3.7.3 Propeller-Driven Boat, 3.7.4 Delivery Systems, 3.8.4 Propellers Driving Propellers, 3.8.5 Waterwheels, 3.8.6 Propellers In Water, 3.8.7 Heliograph, 3.8.8 Speaking Tube, 3.8.9 String Telephone, 3.10.10 Supermarket Planning, 3.10.11 Supermarket Construction, 4.7.1 Boat Design, 4.7.2 Wind And Sail, 5.8.9 Forces Projects Instrument Makers 3.2.1 Weather, 3.2.2 Temperature, 3.2.4 Wind, 3.10.12 Measuring Devices, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.21 Making A Sundial, 4.2.17 Planetarium, 4.2.19 Planets, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.2.1 Weather Station, 5.2.6 Gnomon, 5.3.12 Bones, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement, 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses, 5.10.5 Making A Telescope, 5.10.6 Stabilizing The Telescope, 5.10.7 Making A Microscope, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer

AAAS Benchmarks	DASH Grades 3–5
	Project Developers 3.3.6 Making Habitats For Frogs And Toads, 3.7.1 Garden Mover, 3.7.2 Propeller-Driven Message Center, 3.7.3 Propeller-Driven Boat, 3.7.4 Delivery Systems, 3.8.4 Propellers Driving Propellers, 3.8.5 Waterwheels, 3.8.6 Propellers In Water, 3.8.7 Heliograph, 3.8.8 Speaking Tube, 3.8.9 String Telephone, 3.10.10 Supermarket Planning, 3.10.11 Supermarket Construction, 4.7.1 Boat Design, 4.7.2 Wind And Sail, 5.8.9 Forces Projects
3.B. Design and Systems • There is no perfect design. Designs that are best in one respect (safety or ease of use, for example) may be inferior in other ways (cost or appearance). Usually some features must be sacrificed to get others. How such trade-offs are received depends upon which features are emphasized and which are down-played.	Because DASH students are constantly inventing, designing, making, testing and modifying devices to satisfy various needs, they learn early that there are innumerable ways of technologically achieving such satisfaction. They constantly confront trade offs—quality vs. time expended, aesthetics vs. functionality, cost vs. quality. Examples: Instruments 3.2.1 Weather, 3.2.2 Temperature, 3.2.4 Wind, 3.10.12 Measuring Devices, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.17 Planetarium, 4.2.19 Planets, 4.2.21 Making A Sundial, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.2.1 Weather Station, 5.2.6 Gnomon, 5.3.12 Bones, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement, 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses, 5.10.5 Making A Telescope 5.10.6 Stabilizing The Telescope, 5.10.7 Making A Microscope, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer Projects 3.3.6 Making Habitats For Frogs And Toads, 3.7.1 Garden Mover, 3.7.2 Propeller-Driven Message Center, 3.7.3 Propeller-Driven Boat, 3.7.4 Delivery Systems, 3.8.4 Propellers Driving Propellers, 3.8.5 Waterwheels, 3.8.6 Propellers In Water, 3.8.7 Heliograph, 3.8.8 Speaking Tube, 3.8.9 String Telephone, 3.10.10 Supermarket Planning, 3.10.11 Supermarket Construction, 4.7.1 Boat Design, 4.7.2 Wind And Sail, 5.8.9 Forces Projects
• Even a good design may fail. Sometimes steps can be taken ahead of time to reduce the likelihood of failure, but it cannot be entirely eliminated.	Design failure is not uncommon in DASH where students confront real construction problems. It becomes clear that technology requires time and patience in tinkering to make even the best of prototypes work. This is best exemplified in instrument making and in other DASH projects.

AAAS Benchmarks	DASH Grades 3–5
• The solution to one problem may create other problems.	DASH students frequently find that the solution to one problem leads to another—the new subdivision that becomes eroded in a heavy rain, the bird feeder that becomes a point for bird droppings, the break in the city water main that floods a city block. Examples: Dash Connections Books, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 5.3.2 Bird Feeder
3.C. Issues in Technology • Technology has been part of life on the earth since the advent of the human species. Like language, ritual, commerce, and the arts, technology is an intrinsic part of human culture, and it both shapes society and is shaped by it. The technology available to people greatly influences what their lives are like.	The deep involvement of students with technology and the regular connecting of the work of the classroom with the technologies pursued in the world around them provide living examples of the place of technology in the culture they know. Exploration of stone cultures gives them a comparative reflection on the import and the enormity of the technology of today. Examples: DASH Connections Books, 4.1.9 Survival Game, 4.5.6 Preserving Foods, 4.7.1 Boat Design, 4.7.2 Wind And Sails, 4.10.4 Collecting Rocks, 4.10.5 Hardness Of Rocks, 4.10.7 Rocks And Sharp Edges, 4.10.8 Making Tools From Rock, 4.10.9 Making Fishing Tools, 4.10.11 Clay, 4.10.12 Fire And Pottery
• Any invention is likely to lead to other inventions. Once an invention exists, people are likely to think up ways of using it that were never imagined at first.	The dynamics of a DASH class provide numerous opportunities for students to be involved in linking one invention with another. As students invent solutions to problems they are encouraged to share their ideas. As a result one idea is quickly embedded in many more. Examples: 3.2.1 Weather, 3.2.4 Wind, 3.10.12 Measuring Devices, 3.3.6 Making Habitats For Frogs And Toads, 3.7.1 Garden Mover, 3.7.2 Propeller-Driven Message Center, 3.7.3 Propeller-Driven Boat, 3.7.4 Delivery Systems, 3.8.4 Propellers Driving Propellers, 3.8.5 Waterwheels, 3.8.6 Propellers In Water, 3.8.7 Heliograph, 3.8.8 Speaking Tube, 3.8.9 String Telephone, 3.10.10 Supermarket Planning, 3.10.11 Supermarket Construction, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.7.1 Boat Design, 4.7.2 Wind And Sails, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 4.10.4 Collecting Rocks, 4.10.8 Making Tools From Rock, 4.10.9 Making Fishing Tools, 5.2.1 Weather Station, 5.2.6 Gnomon, 5.3.12 Bones, 5.8.9 Forces Projects, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement, 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses, 5.10.5 Making A Telescope, 5.10.6 Stabilizing The Telescope, 5.10.7 Making A Microscope, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer

AAAS Benchmarks	DASH Grades 3–5
• Transportation, communications, nutrition, sanitation, health care, entertainment, and other technologies give large numbers of people today the goods and services that once were luxuries enjoyed only by the wealthy. These benefits are not equally available to everyone.	By looking at the history of technology DASH students gain a sense of the immense difference between our modern technological wealth and the paucity of the available technological products of the past. Through science and technology news articles recorded on the DASH LEARNING CALENDAR and accounts in the CONNECTIONS BOOK they see that much of the world does not yet have access to many of the material products of our culture. Examples: 3.1.1 The Learning Calendar, 3,1,2 Last Year, 4.1.1 The Learning Calendar, 4.1.3 Last Year, 4.1.4 The Library, 5.1.1 The Learning Calendar, 5.1.3 Library Check-Out, 5.1.4 Library Check-In
• Scientific laws, engineering principles, properties of materials, and construction techniques must be taken into account in designing engineering solutions to problems. Other factors, such as cost, safety, appearance, environmental impact, and at will happen if the solution fails also must be considered.	In DASH technology is a vehicle to learning concepts that undergrid science. DASH students simultaneously confront engineering principles, scientific laws, and properties of materials. Safety, appearance, space occupied, time necessary for construction, cost, and the impact of failure are all considered in the design phase of projects. Similar concerns in the working world of technology and science are found in interviews with professionals as guest presenters at numerous points in the program. Examples: 3.10.12 Measuring Devices, 3.10.13 Safety Equipment, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 4.10.4 Collecting Rocks, 4.10.5 Hardness Of Rocks, 4.10.7 Rocks And Sharp Edges, 4.10.11 Clay, 4.10.12 Fire And Pottery, 5.2.6 Gnomon, 5.6.3 Safety Devices, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement, 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses, 5.10.5 Making A Telescope, 5.10.6 Stabilizing The Telescope, 5.10.7 Making A Microscope, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer
• Technologies often have drawbacks as well as benefits. A technology that helps some people or organisms may hurt others--either deliberately (as weapons can) or inadvertently (as pesticides can). When harm occurs or seems likely, choices have to be made or new solutions found.	Advantages and disadvantages are a common topic of newspaper articles posted on the LEARNING CALENDAR and observations made in the CONNECTIONS BOOK. The relative environmental costs and benefits of chemical pesticides and biological controls are studied in agricultural activities. Other costs and benefits such as diseases associated with trash and pollution and the values of clean up; the waste of energy and material resources and their conservation or recycling are ongoing studies. Examples: 3.4.1 Garden Invaders, 3.4.11 Controlling Insects, 3.6.10 Disease Transmission, 3.6.11 Trash And Sanitation, 3.6.12 Helpful Drugs, 3.6.13 Proper Drug Use, 4.1.1 The Learning Calendar, 4.6.7 Smoking And The Lungs, 4.6.8 Alcohol, Tobacco, And Drugs, 4.9.2 Recycling Project, 5.1.1 The Learning Calendar,

AAAS Benchmarks	DASH Grades 3–5
	5.4.2 Tree Harvesting, 5.4.3 Tree Planting, 5.6.4 Alcohol, Tobacco, And Drugs, 5.6.7 Tobacco Quiz, 5.6.8 Smokers' Survey, 56.9 Ex-Smokers' Survey, 5.6.10 Smoking Laws, 5.6.11 Alcohol Quiz, 5.6.12 Alcohol Laws, 5.6.13 Chris's Story, 5.6.14 The Parents' Story, 5.6.15 Intoxication, 5.6.16 Drug Laws, 5.9.1 Class Recycling Project, 5.9.2 Class Conservation Project, 5.9.3 Decomposition And Archeology, 5.9.4 Pollution Project
• Because of their ability to invent tools and processes, people have an enormous effect on the lives of other living things.	As keepers of class pets, tenders of gardens, researchers into the impact of technological practices on forests, shrub, and grasslands DASH students are deeply aware of the effects of our technology on other organisms. Examples: 3.3.1 Classroom Pets, 3.3.2 Preparing To Raise Insects, 3.3.3 Raising Insects, 3.3.6 Making Habitats For Frogs And Toads, 3.3.7 Frog Metamorphosis, 3.3.10 Hatching Checks, 3.3.11 Chick Growth, 3.4.1 Garden Invaders, 3.4.7 Garden Planting, 3.4.8 Garden Care, 3.4.11 Controlling Insects, 4.3.1 Pet Care, 4.3.4 Raising Small Mammals, 4.3.5 Housing Pet Mammals, 4.3.6 Weekend Care Of Pet Mammals, 4.3.7 Pairing Pet Mammals, 4.3.8 Reproduction Of Pet Mammals, 4.3.9 Pet Baby Care, 5.3.1 Pet Care, 5.4.1 Annual, Biennial, And Perennial Plant Project, 5.4.2 Tree Harvesting, 5.4.3 Tree Planting, 5.4.4 Tree Observation, 5.4.5 Measuring Trees, 5.4.6 Age Of Trees, 5.4.7 Trees, Shrubs, And Grasses, 5.4.8 Grasses: Why Do They Grow There?, 5.4.9 Roots, 5.4.10 Soil Conservation
4. The Physical Setting **4.A. The Universe** • The patterns of stars in the sky stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons.	Astronomy is a major area of study in DASH. From Kindergarten the students follow the phases of the moon and the movement of other celestial bodies across the day and night sky. In grade 3 they are introduced to a simple planetarium housing the north circumpolar stars. In grade 4 the planetarium is expanded to include the stars of the zodiac. In grade 5 declinations and right ascensions are included. Seasonal movement of the stars and sum are followed as well as the wanderings of the planets. Examples: 3.2.9 Polar Constellations, 3.2.10 Venus, 4.2.17 Planetarium, 4.2.18 Using The Planetarium, 4.2.19 Planets, 5.7.2 Planetarium, 5.7.3 Mapping The Sky
• Telescopes magnify the appearance of some distant objects in the sky, including the moon and the planets. The number of stars that can be seen through telescopes is dramatically greater than can be seen by the unaided eye.	DASH students make their own telescopes in grade 5 and use them to study the moon, planets, and stars. With their scopes the moon is seen in greater detail and the Milky Way becomes a river of stars. Examples: 5.2.8 Moon Through A Telescope, 5.10.5 Making A Telescope, 5.10.6 Stabilizing The Telescope
• Planets change their positions against the background of stars.	Venus is studied beginning in grade 3 . Mars in added in grade 4. The other visible planets are added to their study in grade 5. Examples: 3.2.10 Venus, 4.2.19 Planets, 5.2.10 Path Of Celestial Bodies

AAAS Benchmarks	DASH Grades 3–5
• The earth is one of several planets that orbit the sun, and the moon orbits around the earth.	The orbit of the moon around the earth is deduced from data on moon phases and eclipses in grade 4. The logic for a sun-centered solar system is worked out in grade 5 with the deduction that the earth and other planets are orbiting the sun contrary to commonsense observation of the apparent diurnal movements of the sun. Examples: 4.2.17 Planetarium, 4.2.18 Using The Planetarium, 4.2.19 Planets, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 5.2.10 Path Of Celestial Bodies, 5.2.11 Models Of The Solar System, 5.7.2 Planetarium, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Earth?
• Stars are like the sun, some being smaller and some larger, but so far away that they look like points of light.	Distance of heavenly bodies is investigated in grade 5. This includes study of relative brightness and size. Examples: 5.7.3 Mapping The Sky, 5.2.9 How Big And Far Away Is The Moon?, 5.2.10 Path Of Celestial Bodies
4.B. The Earth • Things on or near the earth are pulled toward it by the earth's gravity.	Gravity as a down-pulling force is introduced in grade 2. Students make force measuring instruments in grade 4 and continue the study of gravity through grades 5 and 6. Examples: 4.8.1 Push-Pull Measuring Tool, 4.8.2 Friction, 4.8.5 Energy Of Falling Objects, 5.8.1 Pushes, Pulls, And Forces
• Like all planets and stars, the earth is approximately spherical in shape. The rotation of the earth on its axis every 24 hours produces the night-and-day cycle. To people on earth, this turning of the planet makes it seem as though the sun, moon, planets, and stars are orbiting the earth once a day.	The logic for a spherical earth is investigated in grade 4. The 24 hour period of day and night cycle is recorded and progressively analyzed starting in grade 1. The apparent diurnal revolution of the heavens about the earth is a focus from Kindergarten through grade 5. Examples: Earth shape 3.2.11 Eclipses, 4.2.14 Flat Or Round Earth, 4.2.25 Eclipses Apparent Diurnal Movement 3.2.7 Moon Phases, 3.2.9 Polar Constellations, 3.2.10 Venus, 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.17 Planetarium, 4.2.18 Using The Planetarium, 4.2.19 Planets, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 5.2.6 Gnomon, 5.2.10 Path Of Celestial Bodies
• When liquid water disappears, it turns into a gas (vapor) in the air and can reappear as a liquid when cooled, or as a solid if cooled below the freezing point of water. Clouds and fog are made of tiny droplets of water.	Changes of state as part of the water cycle is introduced in grade 3. Water vapor and its condensation as fog and ice melting and crystallization are studied in grades 3–6. Examples: 3.10.9 Rain In A Jar, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.6 Humidity, 4.2.7 Clouds And Weather, 4.2.8 Storm Clouds, 5.2.1 Weather Station, 5.2.2 The Heat Index And The Hygrometer, 5.2.3 Weather And Its Prediction, 5.2.4 Fronts, 5.2.5 Clouds

AAAS Benchmarks	DASH Grades 3–5
• Air is a substance that surrounds us, takes up space, and whose movement we feel as wind.	Air and wind are studied in grades K–6. DASH students keep regular records of wind speed and direction as part of their weather studies. They engage in an intensive study of air and its properties and components in grades 4 and 6. Examples: 3.2.4 Wind, 3.8.1 Shadow, Light, And Bubbles, 3.8.2 Wind And Heat, 3.8.3 Wind Pulls And Pushes, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.10.13 Air And Fire, 4.10.14 Fire And Oxygen, 4.10.15 Properties Of Gases, 5.2.1 Weather Station
4.C. Processes That Shape The Earth • Waves, wind, water, and ice shape and reshape the earth's land surface by eroding rock and soil in some areas and depositing them in other areas, sometimes in seasonal layers.	The study of the erosion process of nature begins in grade 2 and continues through grade 6. Examples: 3.4.6 Soil And Water, 4.10.14 Collecting Rocks, 5.4.9 Roots, 5.4.10 Soil Conservation
• Rock is composed of different combinations of minerals. Smaller rocks come from the breakage and weathering of bedrock and larger rocks. Soil is made partly from weathered rock, partly from plant remains--and also contains many living organisms.	Rocks and their properties are characterized in grades 4–6. Study of the nature of soil and its formation begins in grade 2 and continues through grade 6. Emphasized are both the inorganic and organic components of soil. Examples: 3.4.3 Watching Garden Soil, 3.4.4 Making Artificial Soil, 3.4.5 Testing Artificial Soil, 3.4.6 Soil And Water, 3.9.1 Making Compost, 3.9.2 Watching Compost, 3.9.3 Animals In Compost, 3.9.4 Using Compost, 4.10.4 Collecting Rocks, 4.10.5 Harness Of Rocks, 4.10.6 Specific Gravity, 4.10.7 Rocks And Sharp Edges, 4.10.11 Clay, 5.4.9 Roots, 5.4.10 Soil Conservation
4.D. The Structure of Matter • Heating and cooling cause changes in the properties of materials. Many kinds of changes occur faster under better conditions.	Heating and cooling and their effect on matter are covered in a range of studies including those of cooking, changes in state, weather, curing of pottery, flammability of substances, etc. Examples: 3.2.2 Temperature, 3.2.4 Wind, 3.2.5 Rain And Snow, 3.2.6 Humidity, 3.5.4 Preparing The Class Feast, 3.5.7 Pickling Foods, 3.10.6 Dissolving Things, 3.10.7 Things In Liquids, 3.10.8 Crystals, 3.10.9 Rain In A Jar, 4.5.6 Preserving Foods, 4.10.12 Fire And Pottery, 4.10.13 Air And Fire, 4.10.14 Fire And Oxygen, 5.2.1 Weather Station, 5.10.8 Making A Hygrometer
• No matter how parts of an object are assembled, the weight of the whole object made is always the same as the sum of the parts; and when a thing is broken into parts, the parts have the same total weight as the original thing.	Conservation of mass is investigated under several contexts including cooking, soils making, specific gravity, and changes in state. Examples: 3.10.9 Rain In A Jar, 3.10.6 Dissolving Things, 3.10.7 Things In Liquids, 4.10.6 Specific Gravity, 5.5.4 Making Pancakes, 5.8.2 Teeter-Totters, 5.8.3 The Balance

AAAS Benchmarks	DASH Grades 3–5
• Materials may be composed of parts that are too small to be seen without magnification.	Magnifiers are used starting in kindergarten to give students a way of seeing very small things that make up insects, rocks, wood, soil, and other items. Microscopes are used in grade 5 to view the world of the water drop and the cellular make-up of tissues. Examples: 3.4.3 Watching Garden Soil, 3.4.4 Making Artificial Soil, 3.4.5 Testing Artificial Soil, 3.9.1 Making Compost, 3.9.2 Watching Compost, 3.9.3 Animals In Compost, 4.10.11 Clay, 5.3.4 Cells, 5.3.5 Cell Quiz, 5.4.4 Tree Observation, 5.4.6 Age Of Trees, 5.4.9 Roots, 5.10.7 Making A Microscope
• When a new material is made by combining two or more materials, it has properties that are different from the original materials. For that reason, a lot of different materials can be made from a small number of basic kinds of materials.	DASH students make products of their own design from common materials. It becomes obvious that the possible products that could be made from these materials are nearly infinite. Examples: 3.5.4 Preparing The Class Feast, 3.9.5 Fall Unearthing And Burial, 3.9.6 Spring Unearthing And Burial, 3.10.12 Acids And Bases, 3.10.3 Acid And Base Reactions, 3.10.4 Diluting Acids And Bases, 3.10.5 Acid And Base Interaction, 3.10.6 Dissolving Things, 3.10.7 Things In Liquids, 3.10.8 Crystals, 4.5.5 Digestion Games, 4.5.6 Preserving Foods, 4.6.6 Things That Burn, 4.10.13 Air And Fire, 4.10.14 Fire And Oxygen, 4.10.15 Properties Of Gases, 5.3.16 Chemistry And Bones, 5.5.4 Making Pancakes
4.E. Energy Transformations • Things that give off light often also give off heat. Heat is produced by mechanical and electrical machines, and any time one thing rubs against something else.	Energy transformation is extensively investigated. Light, electricity, chemicals, friction, and mechanical energy are all investigated as ways of producing heat. Examples: 3.8.2 Wind And Heat, 3.8.10 Energy Definitions, 3.10.3 Acid And Base Reactions, 3.10.4 Diluting Acids And Bases, 3.10.5 Acid And Base Interaction, 3.10.6 Dissolving Things, 4.2.9 Lightning, 4.6.5 Making A Fire, 4.6.6 Things That Burn, 4.8.2 Friction, 4.10.12 Fire And Pottery, 4.10.13 Air And Fire, 4.10.14 Fire And Oxygen, 5.5.1 Nutrients, 5.5.2 Nutrients And Cells, 5.10.4 Controlling Light With Lenses, 5.10.8 Making A Hygrometer
• When warmer things are put with cooler ones, the warm ones lose heat and the cool ones gain it until they are all at the same temperature. A warmer object can warm a cooler one by contact or at a distance.	Heat transfer and temperature equilibrium are studied in the measurement of the caloric values of foods. Radiant energy and warming of objects at a distance are investigated in the water cycle studies and the study of fire. Examples: 3.8.2 Wind And Heat, 3.10.3 Acid And Base Reactions, 3.10.4 Diluting Acids And Bases, 3.105 Acid And Base Interaction, 3.106 Dissolving Things, 3.8.10 Energy Definitions, 4.2.9 Lightning, 4.8.2 Friction, 4.6.5 Making A Fire, 4.6.6 Things That Burn, 4.10.12 Fire And Pottery, 4.10.13 Air And Fire, 4.10.14 Fire And Oxygen, 5.5.1 Nutrients, 5.5.2 Nutrients And Cells, 5.10.4 Controlling Light With Lenses, 5.10.8 Making A Hygrometer

AAAS Benchmarks	DASH Grades 3–5
• Some materials conduct heat much better than others. Poor conductors can reduce heat loss.	Heat insulators and conductors are investigated in the study of fire and heat. Insulators are used as safety devices in handling hot materials, and to retain low 0°C water in the standardizing of thermometers. Examples: 3.5.4 Preparing The Class Feast, 3.10.13 Safety Equipment, 4.6.3 Safety Gear, 4.6.4 Safety And Putting Out Fires, 4.6.5 Making A Fire, 4.6.6 Things That Burn, 4.10.12 Fire And Pottery, 4.10.13 Air And Fire, 4.10.14 Fire And Oxygen, 5.6.3 Safety Devices, 5.5.4 Making Pancakes, 5.10.8 Making A Hygrometer
4.F. Motion • Changes in speed or direction of motion are caused by forces. The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.	Force and its effect on objects is introduced in Kindergarten and formally studied from grade 4 through grade 6, including studies of the effect of the same force on different masses. Examples: 3.7.2 Propeller-Driven Message Center, 3.7.3 Propeller Driven Boat, 3.8.3 Wind Pulls And Pushes, 3.8.4 Propellers Driving Propellers, 3.8.5 Waterwheels, 3.8.6 Propellers In Water, 4.8.1 Push-Pull Measuring Tool, 4.8.2 Friction, 4.8.3 Streamlining, 4.8.5 Energy Of Falling Objects, 4.8.6 Circles And Speed, 4.103 Mass Measurement, 5.8.1 Pushes, Pulls, And Forces, 5.8.2 Teeter-Totters, 5.8.3 The Balance, 5.8.4 Wheels And Axles, 5.8.5 Lever: Where Are They?
• How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.	DASH students work with speeds as fast as lightning and light and as slow as erosion of mountains into soil. As part of their study of the solar system they make a relative speed line on which they attach the speeds of different things. Examples: 3.2.4 Wind, 3.2.11 Eclipses, 3.3.10 Hatching Chicks, 3.3.11 Chick Growth, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 3.6.3 Breathing Air, 3.6.7 Breathing And Pulse Rates, 3.7.3 Propeller-Driven Boat, 3.9.2 Watching Compost, 3.9.5 Fall Unearthing And Burial, 3.9.6 Spring Unearthing And Burial, 4.2.4 Wind Speed, 4.2.21 Making A Sundial, 4.2.22 Using A Sundial, 4.2.23 Seasons And The Sun, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 4.7.2 Wind And Sails, 4.8.6 Circles And Speed, 5.2.1 Weather Station, 5.2.11 Models Of The Solar System, 5.4.6 Age Of Trees
4.G. Forces of Nature • The earth's gravity pulls any object toward it without touching it.	Gravity as a down pulling force is introduced in grade 2. Gravity is seen as a force acting at a distance. Examples: 4.8.1 Push-Pull Measuring Tool, 4.8.5 Energy Of Falling Objects, 4.8.6 Circles And Speed, 4.10.3 Mass Measurement, 5.8.1 Pushes, Pulls, And Forces, 5.8.2 Teeter-Totters, 5.8.3 The Balance, 5.8.4 Wheels And Axles, 5.8.5 Levers: Where Are They?

AAAS Benchmarks	DASH Grades 3–5
• Without touching them, a magnet pulls on all things made of iron and either pushes or pulls on other magnets.	Magnetic induction is used to make magnetic compasses. The magnetic compass is studied from grade 1 on. A Gilbert-like study of magnets is undertaken in grade 6 along with the study of electromagnetism. Examples: 3.2.4 Wind, 4.2.3 Wind Direction, 4.2.20 When Is It Noon?, 4.2.21 Making A Sundial, 4.2.22 Using A Sundial, 5.2.1 Weather Station, 5.7.1 Where In The World Are We?
• Without touching them, material that has been electrically charged pulls on all other materials and may either push or pull other charged materials.	Lightning and lightning safety are introduced in grade 4. A Franklin-like study of static electricity is introduced in grade 6 along with study of current electricity. Electromagnetism, electric motors, the telegraph, and radio are also studied in grade 6. Example: 4.2.9 Lightning
5. The Living Environment **5.A. Diversity of Life** • A great variety of kinds of living things can be sorted into groups in many ways using various features to decide which things belong to which group.	DASH students spend considerable time out of doors investigating the organisms about the school, neighborhood, home and other environments. From grade 1 they begin to make and use keys to identify organisms as well as making herbaria documenting the plants they find. They focus on the common and uncommon features that distinguish different groups of organisms. In grade 4 the students focus on identification of fungi, birds, and trees using standard field guides. Examples: 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 4.4.2 The Fungus Among Us, 4.4.3 Fungus Collection, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.4.4 Tree Observation
• Features used for grouping depend on the purpose of the grouping.	In distinguishing living from non-living things the students identify characteristic requirements of life such as water, air, and nutrients. They find that these characteristics are not useful to separate plants from animals, or pines from birches. Examples: 1.3.1 Living And Non-Living Things, 1.3.2 Defining Living And Non-Living Things, 1.3.3 Animals Survey, 1.3.4 Animals Key, 1.4.1 Plant Identification, 1.4.2 Plant Survey, 1.4.3 Plant Pressing, 1.4.4 Plant Key, 3.5.2 Selecting Plants For The Garden, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 4.4.2 The Fungus Among Us, 4.4.3 Fungus Collection, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.4.4 Tree Observation

5.B. Heredity • Some likenesses between children and parents, such as eye color in human beings, or fruit or flower color in plants, are inherited. Other likenesses, such as people's table manners or carpentry skills, are learned.	Likeness between parent organisms and offspring are studied in both animals and plants. In animals inherited behaviors are noted and distinguished from learned behaviors. These studies are extended to the students own parent-sibling group. Examples: 3.3.3 Raising Insects, 3.3.5 Natural Habitats Of Frogs And Toads, 3.3.6 Making Habitats For Frogs And Toads, 3.3.7 Frog Metamorphosis, 3.3.10 Hatching Chicks, 3.3.11 Chick Growth, 4.3.1 Pet Care, 4.3.2 The Unincubated Egg, 4.3.3 Chick Embryology, 4.3.8 Reproduction Of Pet Mammals, 4.3.9 Pet Baby Care, 4.3.10 Our Early Years, 4.3.11 The First Grade Child, 4.3.12 Growth, Development, And Behavior Of Young Pets, 4.3.13 Human Growth And Development, 4.3.15 External Anatomy Of Fish, 4.3.16 Cleaning Fish: Internal Anatomy, 4.3.17 Fish Reproduction, 4.4.1 Annual, Biennial, And Perennial Garden Plants, 4.4.2 The Fungus Among Us, 4.4.3 Fungus Collection, 5.3.1 Pet Care, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.3.10 Embryology, 5.3.11 Body Change, 5.4.1 Annual, Biennial, And Perennial Plant Project, 5.4.4 Tree Observation, 5.4.5 Measuring Trees, 5.4.6 Age Of Trees
• For offspring to resemble their parents, there must be a reliable way to transfer information from one generation to the next.	DASH students study reproduction of both plants and animals including humans and identify the sperm and egg as carrying the information to insure reproductive continuity between parent and offspring. Examples: 5.3.4 Cells, 5.3.5 Cell Quiz, 5.3.6 Male Urogenital System, 5.3.7 Female Urogenital System, 5.3.8 Ovulation Cycle, 5.3.9 Ovulation And Pregnancy, 5.3.10 Embryology
5.C. Cells • Some living things consist of a single cell. Like familiar organisms, they need food, water, and air; a way to dispose of waste; and an environment they can live in.	Germs are introduced in Kindergarten. other microorganisms are introduced in grade 5. Their biological needs are identified as being the same as other living things. Examples: 5.3.4 Cells, 5.3.5 Cell Quiz, 5.5.2 Nutrients And Cells
• Microscopes make it possible to see that living things are made mostly of cells. Some organisms are made of a collection of similar cells that benefit from cooperating. Some organisms' cells vary greatly in appearance and perform very different roles in the organism.	In grade 5 DASH students make microscopes to help in their investigations of single-cell organisms and the cellular structure of tissues. In their explorations they find that there is a wide difference in structure and function of cells. Examples: 5.3.4 Cells, 5.3.5 Cell Quiz, 5.5.2 Nutrients And Cells, 5.10.7 Making A Microscope

AAAS Benchmarks	DASH Grades 3–5
5.D. Interdependence of Life • For any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.	Field studies throughout DASH show that different plants have different environmental needs. This is systematically explored in the study of trees, shrubs, broad-leafed plants, and grasses in grade 5. Starting in kindergarten the students find that animals have three very different environments in which they can live—water, land, and sky; that to live in each of these environments requires special adaptations. Examples: 3.3.2 Preparing To Raise Insects, 3.3.3 Raising Insects, 3.3.4 Importance Of Insects, 3.3.5 Natural Habitats Of Frogs And Toads, 3.3.6 Making Habitats For Frogs And Toads, 3.3.7 Frog Metamorphosis, 3.3.8 Importance Of Frogs And Toad, 3.3.9 Toads And Insects, 3.3.10 Hatching Chicks, 3.3.11 Chick Growth, 3.3.12 Importance Of Birds, 3.3.12 Importance Of Birds, 4.3.22 Migration And Hibernation, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 4.4.1 Annual, Biennial, And Perennial Plant Project, 4.4.2 The Fungus Among Us. 4.4.3 Fungus Collection, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.4.1 Annual, Biennial, And Perennial Plant Project, 5.4.2 Tree Harvesting , 5.4.3 Tree Planting, 5.4.4 Tree Observation, 5.4.5 Measuring Trees, 5.4.6 Age Of Trees, 5.4.7 Tree, Shrubs, And Grasses, 5.4.8 Grasses: Why Do They Grow There?
• Insects and various other organisms depend on dead plant and animal material for food.	The role of some insects as decomposers is extensively studied in the third grade composting unit and carries on through the sixth grade unit on worms. Examples: 3.9.2 Watching Compost, 3.9.3 Animals In Compost, 3.9.4 Using Compost, 3.9.5 Fall Unearthing And Burial, 3.9.6 Spring Unearthing And Burial, 4.9.1 Unearthing, 5.9.3 Decomposition And Archeology
• Organisms interact with one another in various ways besides providing food. Many plants depend on animals for carrying their pollen to other plants or for dispersing their seeds.	The interactions of plants and animals are investigated in the third grade biological control, pollination, and seed dispersal activities. The import of microorganisms in the digestion of animals is studied in grades 4 and 5. The interaction of plants in providing sun, shelter, and water conservation is studied in grade 5. Examples: 3.3.8 Importance Of Frogs And Toads, 3.3.9 Toads And Insects, 3.4.1 Garden Invaders, 3.4.11 Controlling Insects, 3.4.12 Garden Harvesting, 3.4.13 Flowers, 3.4.14 Seeds, 3.4.15 Pollination, 3.9.3 Animals In Compost, 4.3.22 Migration And Hibernation, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 4.4.2 The Fungus Among Us, 4.5.3 Chemical Digestion, 5.3.2 Bird Feeder, 5.3.3 Birds I Know

AAAS Benchmarks	DASH Grades 3–5
• Changes in an organism's habitat are sometimes beneficial to it and sometimes harmful.	Observation of the wide dispersion of seeds and subsequent successful growth in only particular areas is found in investigation of trees, shrubs, broad-leafed plants, and grasses in grade 5. Studies of animal hibernation and migration, and bird migrating and non-migrating populations in grades 4 and 5 lead to the same conclusion about animals' limited adaptability to changing environments—some changes enhance, some reduce viability. Examples: 4.3.22 Migration And Hibernation, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.4.4 Tree Observation, 5.4.5 Measuring Trees, 5.4.6 Age Of Trees, 5.4.7 Trees, Shrubs, And Grasses, 5.4.8 Grasses: Why Do They Grow There?, 5.4.9 Roots, 5.4.10 Soil Conservation
• Most microorganisms do not cause disease, and many are beneficial.	The non-beneficial as well as predominantly beneficial role of microorganisms is a recurring theme from grades 3–6. This is dramatically brought out in studies of compost in grade 3, molds in grade 4, and disease and non-disease organisms in grades 5 and 6. Examples: 3.9.1 Making Compost, 3.9.2 Watching Compost, 3.9.3 Animals In Compost, 3.9.4 Using Compost, 3.9.5 Fall Unearthing And Burial, 3.9.6 Spring Unearthing And Burial, 4.4.2 The Fungus Among Us, 4.4.3 Fungus Collection, 4.9.1 Unearthing, 5.3.4 Cells, 5.3.5 Cell Quiz, 5.9.3 Decomposition And Archeology
5.E. Flow of Matter and Energy • Almost all kinds of animals' food can be traced back to plants.	The inability of animals to manufacture their own food from the raw materials of nature is stressed from grades 1–6. Plants are observed to be producers of the food which some animals eat and those that do not eat plants are eaters of animals that do eat plants. Examples: 3.3.1 Classroom Pets, 3.3.2 Preparing To Raise Insects, 3.3.3 Raising Insects, 3.3.4 Importance Of Insects, 3.3.5 Natural Habitats Of Frogs And Toads, 3.3.6 Making Habitats For Frogs And Toads, 3.3.7 Frog Metamorphosis, 3.3.8 Importance Of Frogs And Toads, 3.3.9 Toads And Insects, 3.5.1 Food Selection, 3.5.2 Selecting Plants For The Garden, 3.5.3 Planning The Class Feast, 3.5.4 Preparing The Class Feast, 3.5.5 The Class Feast, 3.9.2 Watching Compost, 3.9.3 Animals In Compost, 4.3.1 Pet Care, 4.3.22 Migration And Hibernation, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 4.5.1 Nutrition Messages, 4.5.4 Food Groups, 4.5.5 Digestion Game, 5.3.1 Pet Care, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.5.1 Nutrients, 5.5.2 Nutrients And Cells, 5.5.3 RDA And Food Labeling

• Some sources of “energy” is needed for all organisms to stay alive and grow.	Food and sunlight as a biological energy sources is amplified in activities starting in kindergarten. To emphasize our human need for energy students are introduced to the three functions of food: activation, regulation and fabrication. Foods are sorted into the principal or mixed contribution to those three functions. Other animals are found to use food to satisfy these same three functions. Human needs for secondary sources of warmth and how these have extended our capacity to live in inhospitable habitats are extensively studied. The essential character of light as a source of energy for plants is investigated from grade 2–6. Examples: Energy And Animals 3.5.1 Food Selection, 3.5.2 Selecting Plants For The Garden, 3.5.3 Planning A Class Feast, 3.5.4 Preparing The Class Feast, 3.5.5 The Class Feast, 4.3.1 Pet Care, 4.3.22 Migration And Hibernation, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 4.5.1 Nutrition Messages, 4.5.4 Food Groups, 4.5.5 Digestion Game, 5.3.1 Pet Care, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.5.1 Nutrients, 5.5.2 Nutrients And Cells, 5.5.3 RDA And Food Labeling Energy And Plants 3.4.1 Garden Planning, 4.2.23 Seasons And The Sun, 4.4.1 Annual, Biennial, And Perennial Garden Plant, 5.4.1 Annual, Biennial, And Perennial Plant Project, 5.4.4 Tree Observation, 5.4.5 Measuring Trees, 5.4.6 Age Of Trees, 5.4.7 Trees, Shrubs, And Grasses, 5.4.8 Grasses: Why Do They Grow There?
• Over the whole earth, organisms are growing, dying, and decaying, and new organisms are being produced by the old ones.	The life cycles of numerous animals and plants are studied in detail in grade K–6. Birth, growth, and development, and death are not uncommon among the animals that are kept in the classroom. Plants are studied over several seasons, so that the natural cycle of planting growth and death in annuals and biennials is seen. Examples: Animals 3.3.1 Classroom Pets, 3.3.2 Preparing To Raise Insects, 3.3.3 Raising Insects, 3.3.4 Importance Of Insects, 3.3.5 Natural Habitats Of Frogs And Toads, 3.3.6 Making Habitats For Frogs And Toads, 3.3.7 Frog Metamorphosis, 3.3.8 Importance Of Frogs And Toads, 3.3.9 Toads And Insects, 3.3.10 Hatching Chicks, 3.3.11 Chick Growth, 3.3.12 Importance Of Birds, 4.3.1 Pet Care, 4.3.2 The Unincubated Egg, 4.3.3 Chick Embryology, 4.3.4 Raising Small Mammals, 4.3.5 Housing Small Mammals, 4.3.6 Weekend Care Of Pet Mammals, 4.3.7 Pairing Of Pet Mammals, 4.3.8 Reproduction Of Pet Mammals, 4.3.9 Pet Baby Care, 4.3.10 Our Early Years, 4.3.11 The First Grade Child, 4.3.12 Growth, Development, And Behavior Of Young Pets, 4.3.13 Human Growth And Development, 4.3.14 Changing Dimensions, 4.3.17 Fish Reproduction, 4.3.22 Migration And Hibernation, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 5.3.1 Pet Care, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.3.4 Cells, 5.3.5 Cell Quiz, 5.3.10 Embryology

AAAS Benchmarks	DASH Grades 3–5
	Plants 4.2.23 Seasons And The Sun, 4.4.1 Annual, Biennial, And Perennial Garden Plant, 5.4.1 Annual, Biennial, And Perennial Plant Project, 5.4.4 Tree Observation, 5.4.5 Measuring Trees, 5.5.6 Age Of Trees, 5.4.7 Trees, Shrubs, And Grasses, 5.4.8 Grasses: Why Do They Grow There?
5.F. Evolution of Life • Individuals of the same kind differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing.	Animals, particularly birds in the wild are studied through a two year period. Individuals are identified. Their ability to survive over the winter is observed and the characteristics of temperament, eating habits, plumage, and other features that more or less enhance their survival are noted.
• Fossils can be compared to one another and to living organisms according to their similarities and differences. Some organisms that lived long ago are similar to existing organisms, but some are quite different.	DASH anatomy activities include study of bones and skeletons. This involves comparison of skeletons of different animals and the possible ways that skeletons could be used to identify like organisms; that skeletons could be used to identify the changes of one kind of organism over time; and that skeletons could be used to identify different organisms that lived long ago. Examples: 5.3.13 Skeletal System, 5.9.3 Decomposition And Archeology
6. The Human Organism **6.A. Human Identity** • Unlike in human beings, behavior in insects and many other species is determined almost entirely by biological inheritance.	Instinctual behavior of animals is compared to the intentional learned responses of humans. Ground work is started in grade 1 studies of insects and progresses through grade 6. Included in the study of instinct is that set of instincts that we humans share with other animals. Examples: 3.3.1 Classroom Pets, 3.3.3 Raising Insects, 3.3.4 Importance Of Insects, 3.3.5 Natural Habitats Of Frogs Ant Toads, 3.3.6 Making Habitats For Frogs And Toads, 3.3.8 Importance Of Frogs And Toads, 3.3.9 Toads And Insects, 4.3.1 Pet Care, 4.3.2 The Unincubated Egg, 4.3.3 Chick Embryology, 4.3.4 Raising Small Mammals, 4.3.8 Reproduction Of Pet Mammals, 4.3.9 Pet Baby Care, 4.3.10 Our Early Years, 4.3.11 The First Grade Child, 4.3.12 Growth, Development, And Behavior Of Young Pets, 4.3.13 Human Growth And Development, 4.3.22 Migration And Hibernation, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 5.3.1 Pet Care, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.1.8 Friendship

AAAS Benchmarks	DASH Grades 3–5
• Human beings have made tools and machines to sense and do things that they could not otherwise sense or do at all, or as quickly, or as well.	Throughout DASH students make and use tools to enhance their senses including weather instruments, microscopes, telescopes, and a wide variety of measuring devices. Examples: 3.2.4 Wind, 3.10.12 Measuring Devices, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.21 Making A Sundial, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.2.1 Weather Station, 5.2.6 Gnomon, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement, 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses, 5.10.5 Making A Telescope, 5.10.6 Stabilizing The Telescope, 5.10.7 Making A Microscope, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer
• Artifacts and preserved remains provide some evidence of the physical characteristics and possible behavior of human beings who lived a very long time ago.	In the study of stone tool technologies in grade 4 the students research ancient artifacts to discover how early peoples used stone, bone, wood, leather, clay, and other materials. Examples: 4.1.9 Survival Game, 4.6.5 Making A Fire, 4.7.1 Boat Design, 4.7.2 Wind And Sails, 4.8.6 Circles And Speed, 4.10.4 Collecting Rocks, 4.10.5 Hardness Of Rocks, 4.10.6 Specific Gravity, 4.10.7 Rocks And Sharp Edges, 4.10.8 Making Tools From Rock, 4.10.9 Making Fishing Tools, 4.10.11 Clay, 4.10.12 Fire And Pottery, 5.9.3 Decomposition And Archeology
6.B. Human Development • It takes about 9 months for a human embryo to develop. Embryos are nourished by the mother, so substances she takes in will affect how well or poorly the baby develops.	Study of human development from fertilized egg to birth of a fully mature baby is undertaken in grade 5. At the beginning of the school year pregnancy begins and day by day the development of the embryo is followed to parturition 40 weeks later. During this experience diet, use of drugs, and sexually transmitted diseases are studied as possible problems in the pregnancy. Examples: 5.3.9 Ovulation And Pregnancy, 5.3.10 Embryology
• Human beings live longer than most other animals, but all living things die.	Through the experiences DASH students have with animals there is almost always some time when a pet dies. Using some of the excellent trade books that deal with death and dying teachers are encouraged to reverently treat such events as part of a natural consequence of life for all creatures including we humans.
• There is a usual sequence of physical and mental development among human beings, although individuals differ in exactly when they learn things.	As part of the human development theme students in grade 4 do a retrospective analysis of their early years and check its correctness with parents or others. They also interview younger students to recapture and generalize about the nature of the years they have just lived through. Out of this comes a sense of the kinds of things one learns at different times in one's life.

AAAS Benchmarks	DASH Grades 3–5
	Each year the students set goals for greater self sufficiency and commitment to help others. These goals are monitored to explicitly show progress in gained capacity. They keep the CONCEPT AND SKILL INVENTORIES for grade K–6. These give a picture of the kinds of things and the times that the students are able to succeed at difference learning tasks. Examples: Generalized Development 3.1.9 Helping Myself And Others, 4.3.10 Our Early Years, 4.3.11 The First Grade Child, 4.3.12 Growth, Development, And Behavior Of Young Pets, 4.3.13 Human Growth And Development, 4.3.14 Changing Dimensions Personal Intellectual/Skill Development 3.1.13 Concept And Skill Inventory, 4.1.6 Things I Can Do For Myself And Others, 4.1.10 Concept And Skill Inventory, 5.1.6 Things I Can Do For Myself And Others, 5.1.11 Concept And Skill Inventory
• People are usually able to have children before they are able to care for them properly.	In the study of pregnancy and sexual development in grade 5 and 6 the students find that the capacity for becoming pregnant and impregnating develops at different times in different people; that babies born to very young mothers often times have low birth weights and health problems; that caring for a baby is a difficult, complex, and time consuming task; and that many very young mothers have a difficult time in obtaining the resources to care for a baby. Examples: 5.3.9 Ovulation And Pregnancy, 5.3.10 Embryology, 5.5.3 RDA And Food Labeling
6.C. Basic Functions • From food, people obtain energy and materials for body repair and growth. The indigestible parts of food are eliminated.	DASH nutrition studies investigate the three primary functions of foods in the body-energy production, building and repair, and body regulation. In studies of the digestive tract the bodies processing of foods is studied from its entry into the mouth to the discharge of fecal waste. Examples: 3.5.1 Food Selection, 4.3.18 Modeling Our Digestive System, 4.3.19 Our Digestive System In Two Dimensions, 4.3.20 Digestive, Circulatory, And Respiratory Systems, 4.3.21 Length Of The Digestive Tract, 4.5.1 Nutrition Messages, 4.5.2 Mechanical Digestion, 4.5.3 Chemical Digestion, 4.5.4 Food Groups, 4.5.5 Digestion Game, 5.5.1 Nutrients, 5.5.2 Nutrients And Cells, 5.5.3 RDA And Food Labeling, 5.5.4 Making Pancakes

AAAS Benchmarks	DASH Grades 3–5
• By breathing, people take in the oxygen they need to live.	The process of breathing is first studied in grade 1 and continued through grade 6. Oxygen is identified by the students as the gas in air involved in breathing in grade 4. Examples: 3.6.3 Breathing Air, 3.6.4 Anatomy Of Breathing, 3.6.5 Lung Model, 3.6.6 Lungs And Smoking, 3.6.7 Breathing And Pulse Rates, 4.3.20 Digestive, Circulatory, And Respiratory Systems, 4.10.13 Air And Fire, 4.10.14 Fire And Oxygen
• Skin protects the body from harmful substances and other organisms and from drying out.	The skin as a barrier against infection is first introduced in grade 2. As a barrier against disease it is further studied in investigations of sexually transmitted diseases in grade 5 and 6. Examples: 3.6.10 Disease Transmission, 4.6.4 Safety And Putting Out Fires, 5.6.6 Sexually Transmitted Disease Quiz
• The brain gets signals from all parts of the body telling what is going on there. The brain also sends signals to parts of the body to influence what they do.	The brain as a central information processor is introduced in grade 4. Its association with the senses is a focus in grades 5 and 6. Examples: 4.3.13 Human Growth And Development, 4.3.3 Chick Embryology, 4.3.16 Cleaning Fish: Internal Anatomy, 5.3.17 The Senses, 5.3.18 The Eye, 5.3.19 Sound, 5.3.20 The Ear, 5.6.11 Alcohol Quiz, 5.6.12 Alcohol Laws, 5.6.15 Intoxication, 5.6.16 Drug Laws
6.D. Learning • Human beings have different interests, motivations, skills, and talents.	DASH appeals to a range of learning modalities—the linguistic, logical-mathematical, spatial, musical, kinesthetic, interpersonal, and intrapersonal. DASH encourages the development of personal interests, gives opportunities for personal invention, and provides situations to develop and hone a range of personal skills. For this reason all DASH activities can be done in the context of groups where there is a reservoir of needed deciphering and quantification skills.
• Human beings can use the memory of their past experiences to make judgments about new situations.	Recognizing the importance of memory in constructivist processes of knowledge and skill building, DASH students use numerous devices to enhance memory. These devices include aphorisms, songs and raps, doggerel, concept maps, systems diagrams, keys, the DASH LEARNING CALENDAR, the WORKING DICTIONARY, the CONNECTION BOOK, the STUDENT RECORD BOOK, pictorial displays, and technological products, aphorisms, doggerel, rap, etc. Examples: 3.1.1 The Learning Calendar, 3.1.2 Last Year, 3.1.10 Aphorisms, 3.1.13 Concept And Skill Inventory, 4.1.1 The Learning Calendar, 4.1.7 Aphorisms, 4.1.10 Concept And Skill Inventory, 4.2.18 Using The Planetarium, 5.1.1 The Learning Calendar, 5.1.3 Library Check-Out, 5.1.7 Aphorisms, 5.1.9 Concept And Skill Inventory, 5.7.2 Planetarium 5.7.3 Mapping The Sky

AAAS Benchmarks	DASH Grades 3–5
• Many skills can be practiced until they become automatic. If the right skills are practiced, performance may improve.	Skill development, refinement, and maintenance is central to the evolution of the DASH student. Where skills are commonly used effort is made to make their operation automatic. Skills once introduced are regularly used in different contexts. Skills include use of technological, laboratory, and field tools; making pictorial representation and physical models; using language, math, and higher order thinking skills; and group interaction skills. Examples: Dash Instructional Guide, Dash Trainer Manual, 3.1.13 Concept And Skill Inventory, 4.1.10 Concept And Skill Inventory, 5.1.9 Concept And Skill Inventory
• Human beings tend to repeat behaviors that feel good or have pleasant consequences and avoid behaviors that feel bad or have unpleasant consequences.	DASH recognizes that a sense of incapacity can arrest interest and the willingness to learn any school subject; that in the past many students have become science phobic because of an early unsatisfactory experience with science in school; that success, pleasure, and a sense of accomplishment are strong motivators for learning; and that an ambiance of success and satisfaction can be produced by an interested and accepting teacher and a meaningful curriculum. To increase the probability of success and pleasure in the science experience DASH includes training for its teachers in the concepts, skills, and motivational techniques of the program.
• Learning means using what one already knows to make sense out of new experiences or information, not just storing the new information in one's head.	In keeping with its constructivist philosophy DASH students make use of experiences, information, and skills already internalized through a spiral-type of curriculum construction. Activities within grade levels are clustered to allow a progressive building of the content of selected themes. Underlying themes in turn are further developed at successive grade levels so that students must use their ever growing knowledge and skill base as they seek solutions to new more complicated problems. Examples: Astronomy 3.2.7 Moon Phases, 3.2.8 Polar Sky Model, 3.2.9 Polar Constellations, 3.2.10 Venus, 3.2.11 Eclipses, 4.2.14 Flat Or Round Earth, 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.17 Planetarium, 4.2.18 Using The Planetarium, 4.2.19 Planets, 4.2.20 When Is It Noon?, 4.2.21 Making A Sundial, 4.2.22 Using A Sundial, 4.2.23 Seasons And The Sun, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 5.2.6 Gnomon, 5.2.7 Size Of The Earth, 5.2.8 Moon Through A Telescope, 5.2.9 How Big And Far Away Is The Moon?, 5.2.10 Planets Through A Telescope, 5.2.11 Models Of The Solar System, 5.2.12 Eclipses, 5.10.5 Making A Telescope, 5.10.6 Stabilizing The Telescope

AAAS Benchmarks	DASH Grades 3–5
	Weather 3.2.1 Weather, 3.2.2 Temperature, 3.2.4 Wind, 3.2.5 Rain And Snow, 3.2.6 Humidity, 3.8.1 Shadow, Light, And Bubbles, 3.8.2 Wind And Heat, 3.8.3 Wind Pulls And Pushes, 4.2.1 Rainfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.5 Height Of Clouds, 4.2.6 Humidity, 4.2.7 Clouds And Weather, 4.2.8 Storm Clouds, 4.2.9 Lightning, 4.2.10 Weather Maps, 4.2.11 Weather Fronts, 4.2.12 Predicting Weather, 4.2.13 Wind Chill, 5.2.1 Weather Station, 5.2.2 The Heat Index And The Hygrometer, 5.2.3 Weather And Its Prediction, 5.2.4 Fronts, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer Measurements 3.2.4 Wind, 3.2.8 Polar Sky Model, 3.10.12 Measuring Devices, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.17 Planetarium, 4.2.21 Making A Sundial, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.2.1 Weather Station, 5.2.6 Gnomon, 5.3.12 Bones, 5.7.2 Planetarium, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement, 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses, 5.10.5 Making A Telescope, 5.10.6 Stabilizing The Telescope, 5.10.7 Making A Microscope, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer Reproduction 3.3.3 Raising Insects, 3.3.7 Frog Metamorphosis, 3.3.8 Importance Of Frogs And Toads, 3.3.9 Toads And Insects, 3.3.10 Hatching Chicks, 3.4.13 Flowers, 3.4.14 Seeds, 3.4.15 Pollination, 4.3.2 The Unincubated Egg, 4.3.3 Chick Embryology, 4.3.17 Fish Reproduction, 5.3.5 Cell Quiz, 5.3.6 Male Urogenital System, 5.3.7 Female Urogenital System, 5.3.8 Ovulation Cycle, 5.3.9 Ovulation And Pregnancy, 5.3.10 Embryology Tobacco, Alcohol, And Drugs 3.6.5 Lung Model, 3.6.6 Lungs And Smoking, 3.6.12 Helpful Drugs, 3.6.13 Proper Drug Use, 4.6.7 Smoking And The Lungs, 4.6.8 Alcohol, Tobacco, And Drugs, 5.6.4 Alcohol, Tobacco, And Drugs, 5.6.5 Sexually Transmitted Diseases, 5.6.7 Tobacco Quiz, 5.6.8 Smokers' Survey, 5.6.9 Ex-Smokers' Survey, 5.6.10 Smoking Laws, 5.6.11 Alcohol Quiz, 5.6.12 Alcohol Laws, 5.6.13 Chris's Story, 5.6.14 The Parents' Story, 5.6.15 Intoxication, 5.6.16 Drug Laws

AAAS Benchmarks	DASH Grades 3–5
6.E. Physical Health • Food provides energy and materials for growth and repair of body parts. Vitamins and minerals, present in small amounts in foods, are essential to keep everything working well. As people grow up, needed by the body may change.	Understanding the body's nutrient requirements is introduced in kindergarten and is progressively studied through grade 6. DASH students first classify foods as they are used for activation, regulation, or fabrication. In grade 4 they use the US Department of Agriculture's Nutritional Pyramid. Examples: 3.5.1 Food Selection, 3.5.2 Selecting Plants For The Garden, 3.5.3 Planning The Class Feast, 3.5.5 The Class Feast, 4.5.1 Nutrition Messages, 4.5.4 Food Groups, 4.5.5 Digestion Game, 4.5.6 Preserving Foods, 5.5.1 Nutrients, 5.5.2 Nutrients And Cells, 5.5.3 RDA And Food Labeling
• Tobacco, alcohol, other drugs, and certain poisons in the environment (pesticides, lead) can harm human beings and other living things.	Environmental poisons, alcohol, tobacco and recreationally used drugs are topics of extensive study beginning in grade 2. Both the physiological and social implications of their use are studied. Students keep separate class room SCRAP BOOKS of newspaper accounts of drugs, tobacco, and alcohol use and treatment. Examples: 3.4.1 Garden Invaders, 3.4.11 Controlling Insects, 3.6.5 Lung Model, 3.6.6 Lungs And Smoking, 3.6.12 Helpful Drugs, 3.6.13 Proper Drug Use, 4.6.7 Smoking And The Lungs, 4.6.8 Alcohol, Tobacco, And Drugs, 5.6.4 Alcohol, Tobacco, And Drugs, 5.6.5 Sexually Transmitted Diseases, 5.6.6 Sexually Transmitted Diseases, 5.6.7 Tobacco Quiz, 5.6.8 Smokers' Survey, 5.6.9 Ex-Smokers' Survey, 5.6.10 Smoking Laws, 5.6.11 Alcohol Quiz, 5.6.12 Alcohol Laws, 5.6.13 Chris's Story, 5.6.14 The Parents' Story, 5.6.15 Intoxication, 5.6.16 Drug Laws
• If germs are able to get inside one's body, they may keep it from working properly. For defense against germs, the human body has tears, saliva, skin, some blood cells, and stomach secretions. A healthy body can fight most germs that do get inside. However, there are some germs that interfere with the body's defenses.	Disease and the need for sanitation is stressed from K–6. Each year some aspect of the problem of disease transmission is studied. Virus, bacteria, protozoa, and disease producing microscopic insects are studied in grade 5 and 6 when sexually transmitted diseases become a focal point of investigation. Throughout there is an emphasis on the body's natural defenses and ways of enhancing those defenses. Examples: 3.6.10 Disease Transmission, 4.4.2 The Fungus Among Us. 5.6.5 Sexually Transmitted Diseases, 5.6.6 Sexually Transmitted Disease Quiz
• There are some diseases that human beings can catch only once. After they've recovered they don't get sick from them again. There are many diseases that can be prevented by vaccination, so that people don't catch them even once.	Natural and acquired immunity as well as diseases that can be controlled by vaccines are studied in grade 5 and 6.

AAAS Benchmarks	DASH Grades 3–5
6.F. Mental Health • Different individuals handle their feelings differently, and sometimes they have different feelings in the same situation.	Human emotions are studied through several vehicles. These include role playing, vignette analysis, and interpreting the content of a DASH STORIES series. In role playing the students are involved in the creation and analysis of the problems. Multiple perceptions of feelings are evident and become the basis for insight in this emotional variable in their relationships with peers and family. Vignettes and novels create much the same experience through vicarious involvement. Examples: 3.1.6 Friends, 3.1.7 Giving And Receiving, 3.1.8 Working Together, 4.1.5 Working Together, 4.1.9 Survival Game, 5.1.5 Working Together, 5.1.8 Friendship, 5.6.13 Chris's Story, 5.6.14 The Parents' Story
• Often human beings don't understand why others act the way they do, and sometimes they don't understand their own behavior and feelings.	The problem of understanding why others act the way they do is worked through in the same contexts as understanding how different people have different feelings toward the same situation. Examples: 3.1.6 Friends, 3.1.7 Giving And Receiving, 3.1.8 Working Together, 4.1.5 Working Together, 4.1.9 Survival Game, 5.1.5 Working Together, 5.1.8 Friendship, 5.6.13 Chris's Story, 5.3.14 The Parents' Story
• Physical health can affect people's emotional well-being and vice versa.	Physical and mental health are seen as intertwined in DASH lessons on human behavior. People's feelings are affected by their health and health is affected by feelings.
• One way to respond to a strong feeling, either pleasant or unpleasant, is to think about what it and then consider whether to seek out or avoid similar situations.	DASH students are given many opportunities to respond analytically to simulation and stories as well as ongoing class situations. In their analysis they can weigh the pros and cons of adopting modeled behaviors. Examples: 3.1.6 Friends, 3.1.7 Giving And Receiving, 3.1.8 Working Together, 4.1.5 Working Together, 4.1.9 Survival Game, 5.1.5 Working Together, 5.1.8 Friendship, 5.6.13 Chris's Story, 5.6.14 The Parents' Story
7. Human Society **7.A. Cultural Effects on Behavior** • People can learn about others from direct experience, from the mass communications media, and from listening to other people talk about their work and their lives. People also sometimes imitate people—or characters—in the media.	The DASH student is encouraged to make contacts with professionals to find out what their life is like. Teachers are encouraged to bring experts into the classroom to help students in understanding the complexities of weather, gardening, nutrition, health, and safety. Newspapers, radio, and TV are necessary sources of information in numerous activities. Mail, telephone, Internet, and other means of communication are suggested for sharing information with other DASH schools nationally and internationally. Students are encouraged to use the media to broaden their understanding of the world around them. Identification with media personalities is not unexpected and when personalities are compelling their character can be a focus in debriefing.

AAAS Benchmarks	DASH Grades 3–5
	Examples: 3.2.1 Weather, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.7 Clouds And Weather, 4.2.10 Weather Maps, 4.2.11 Weather Fronts, 4.2.12 Predicting Weather, 5.2.1 Weather Station, 5.2.3 Weather And Its Prediction, 3.4.1 Garden Planning, 3.4.2 Garden Preparation, 4.3.16 Cleaning Fish: Internal Anatomy, 4.3.22 Migration And Hibernation, 4.3.23 Fall Birds, 4.6.4 Safety And Putting Out Fires, 5.3.6 Male Urogenital System, 5.3.7 Female Urogenital System, 5.3.8 Ovulation Cycle, 5.3.9 Ovulation And Pregnancy, 5.3.10 Embryology, 5.4.2 Tree Harvesting, 5.4.3 Tree Planting, 5.4.4 Tree Observation, 5.4.5 Measuring Trees, 5.4.6 Age Of Trees, 5.5.3 And Food Labeling, 5.6.4 Alcohol, Tobacco, And Drugs, 5.6.5 Sexually Transmitted Diseases
• People tend to feel uncomfortable with other people who dress, talk or act very differently from themselves. What is considered to be acceptable human behavior varies from culture to culture and from one time period to another, but there are some behaviors that are unacceptable in almost all cultures, past and present.	Differences in behavior due to culture are studied. The students reflect upon why it is difficult to accept such differences. Totally unacceptable behaviors are also reflected upon. Examples: 3.1.6 Friends, 5.1.8 Friendships
7.B. Group Behavior • People often like or dislike other people because of membership in or exclusion from a particular social group. Individuals tend to support members of their own group and perceive them as being like themselves.	Group exclusion is studied and students reflect on simulation to create ways of allowing inclusion. Examples: 3.1.6 Friends, 5.1.8 Friendships
• Different groups have different expectations for how their members should act. Sometimes the rules are written down and strictly enforced, sometimes they are just understood from example.	DASH students have opportunities to write out codes of behavior from grade 2 on. They also reflect on behavior that is expected but not codified. Examples: 3.1.3 Responsibility, 3.1.4 Planning, 3.1.5 Organizing Our Environment, 3.1.7 Giving And Receiving, 3.1.8 Working Together, 4.1.2 Responsibility, 4.1.5 Working Together, 4.1.7 Aphorisms, 4.1.9 Survival Game, 5.1.5 Working Together, 5.1.7 Aphorisms
• When acting together, members of a group and even people in a crowd sometimes do and say things, good or bad, that they would not do or say on their own.	Mob mentality is simulated and analyzed. At all times the objective is to find alternatives to negative behavior before one must face situations where such behavior occurs. The activities are equally useful in vicariously analyzing situations that have existed on the campus or elsewhere.

AAAS Benchmarks	DASH Grades 3–5
7.C. Social Change • Although rules at home, school, church, and in the community stay mostly the same, sometimes they change. Changes in social arrangements happen because some rules do not work or new people are involved or outside circumstances change.	In a DASH classroom students are responsible for making many of the rules that govern responsibility, classroom safety, care of class pets, and the operations of teams. These are regularly reviewed and adjusted as needed. When changes occur the reasons for change are analyzed. Students quickly find that most of the rules they develop are the same as the ones found at home and in the community. Examples: 3.1.3 Responsibility, 3.1.4 Planning, 3.1.5 Organizing Our Environment, 3.1.7 Giving And Receiving, 3.1.8 Working Together, 4.1.2 Responsibility, 4.1.5 Working Together, 4.1.7 Aphorisms, 4.1.9 Survival Game, 5.1.5 Working Together, 5.1.7 Aphorisms
• Rules and laws can sometimes be changed by getting most of the people they affect to agree to change them.	The DASH classroom is a democratic community of peers. As such, students must agree in their rule making. As the students connect their classroom operations with the wider world they find that change of rules in our society is done through elected or appointed officials who must agree among themselves and who normally use some form of democratic decision making process. Examples: 3.1.3 Responsibility, 3.1.4 Planning, 3.1.5 Organizing Our Environment, 3.1.7 Giving And Receiving, 3.1.8 Working Together, 4.1.2 Responsibility, 4.1.5 Working Together, 4.1.7 Aphorisms, 4.1.9 Survival Game, 5.1.5 Working Together, 5.1.7 Aphorisms
7.D. Social Trade-Offs • In making decisions, it helps to take time to consider the benefits and drawbacks of alternatives.	In DASH there are numerous large projects which have a major bearing on time, space, and resource utilization. As students progress from year to year they learn how to more effectively anticipate problems and think through alternative solutions. As they make connections with the wider world of technological, scientific and social organization they find much time is usually expended by professionals in mulling over alternatives before projects are launched. Examples: 3.4.1 Garden Planning, 3.4.2 Garden Preparation, 3.4.7 Garden Planting, 3.4.8 Garden Care, 3.4.9 Garden Watering Systems, 3.4.10 Garden Invaders, 3.4.11 Controlling Insects, 3.4.12 Garden Harvesting, 3.5.1 Food Selection, 3.5.2 Selecting Plants For The Garden, 3.5.3 Planning The Class Feast, 3.5.4 Preparing The Class Feast, 3.5.5 The Class Feast, 3.5.9 Supermarket Game Preparation, 3.5.10 Pricing Foods, 3.5.11 Newspaper Ads And Banking, 3.5.12 Farmers And Processors, 3.5.13 Supermarket Game, 3.10.10 Supermarket Planning, 3.10.11 Supermarket Construction, 4.7.1 Boat Design, 4.7.2 Wind And Sail, 4.10.8 Making Tools From Rock, 4.10.9 Making Fishing Tools, 4.10.11 Clay, 4.10.12 Fire And Pottery, 5.8.9 Forces Projects, 5.4.2 Tree Harvesting, 5.4.3 Tree Planting

AAAS Benchmarks	DASH Grades 3–5
• In making decisions, benefits and drawbacks of alternatives can be taken into account more effectively if the people who will be affected are involved.	As a community of technologists, scientists, and social scientists DASH students are responsible for much of the decision making that governs class operations. Thus the DASH student early on experiences group and the effectiveness of group decisions involving cost, benefits, and alternative actions. Examples: 3.4.1 Garden Planning, 3.4.2. Garden Preparation, 3.4.7 Garden Planting, 3.4.8 Garden Care, 3.4.9 Garden Watering Systems, 3.4.11 Controlling Insects, 3.4.12 Garden Harvesting, 3.5.1 Food Selection, 3.5.2 Selecting Plants For The Garden, 3.5.3 Planning The Class Feast, 3.5.4 Preparing The Class Feast, 3.5.5 The Class Feast, 3.5.9 Supermarket Game Preparation, 3.5.10 Pricing Foods, 3.5.11 Newspaper Ads And Banking, 3.5.12 Farmers And Processors, 3.5.13 Supermarket Game, 3.10.10 Supermarket Planning, 3.10.11 Supermarket Construction, 4.7.1 Boat Design, 4.7.2 Wind And Sail, 4.10.8 Making Tools From Rock, 4.10.9 Making Fishing Tools, 4.10.11 Clay, 4.10.12 Fire And Pottery, 5.4.2 Tree Harvesting, 5.4.3 Tree Planting, 5.8.9 Forces Projects
• Sometimes social decisions have unexpected consequences, no matter how carefully the decisions are made.	Because DASH students work in social context of a community they make numerous decisions. Though rationalized, these on occasion result in unanticipated consequences, some positive, some negative. Such consequences are reflected upon in regular debriefings. Examples: 3.4.1 Garden Planning, 3.4.2. Garden Preparation, 3.4.7 Garden Planting, 3.4.8 Garden Care, 3.4.9 Garden Watering Systems, 3.4.10 Garden Invaders, 3.4.11 Controlling Insects, 3.4.12 Garden Harvesting, 3.5.1 Food Selection, 3.5.2 Selecting Plants For The Garden, 3.5.3 Planning The Class Feast, 3.5.4 Preparing The Class Feast, 3.5.5 The Class Feast, 3.5.9 Supermarket Game Preparation, 3.5.10 Pricing Foods, 3.5.11 Newspaper Ads And Banking, 3.5.12 Farmers And Processors, 3.5.13 Supermarket Game, 3.10.10 Supermarket Planning, 3.10.11 Supermarket Construction, 4.7.1 Boat Design, 4.7.2 Wind And Sail, 4.10.8 Making Tools From Rock, 4.10.9 Making Fishing Tools, 4.10.11 Clay, 4.10.12 Fire And Pottery, 5.4.2 Tree Harvesting, 5.4.3 Tree Planting, 5.8.9 Forces Projects
7.E. Political and Economic Systems • People tend to live together in groups and therefore have to have ways of deciding who will do what.	Governance of the classroom is a part of continuous study and the students are constantly encouraged to make connections with the ways decisions are made in the wider outside community. Examples: 3.1.3 Responsibility, 3.1.4 Planning, 3.1.5 Organizing Our Environment, 3.1.7 Giving And Receiving, 3.1.8 Working Together, 4.1.2 Responsibility, 4.1.5 Working Together, 4.1.7 Aphorisms, 4.1.9 Survival Game, 5.1.5 Working Together, 5.1.7 Aphorisms

AAAS Benchmarks	DASH Grades 3–5
• Services that everyone gets, such as schools, libraries, parks, mail service, and police and fire protection, are usually provided by government.	Organization of the classroom community is studied against several backdrops. Governmental response to issues of safety including police and fire service, medical services, control of pollution, and communication are studied. Examples: 2.6.8 Fire Safety, 2.6.9 Using 911, 3.6.11 Trash And Sanitation, 3.6.12 Helpful Drugs, 3.6.13 Proper Drug Use, 4.1.4 The Library, 4.6.4 Safety And Putting Out Fires, 4.6.8 Alcohol, Tobacco, And Drugs, 5.6.4 Alcohol, Tobacco, And Drugs, 5.6.5 Sexually Transmitted Diseases, 5.6.10 Smoking Laws, 5.6.11 Alcohol Quiz, 5.6.12 Alcohol Laws, 5.6.13 Chris's Story, 5.6.14 The Parent's Story, 5.6.15 Intoxication, 5.6.16 Drug Laws, 5.9.4 Pollution Project
• There are not enough resources to satisfy all the desires of all people, and so there has to be so way of deciding who gets what.	Distribution of resources is a common issue in the classroom and students develop allocation techniques including sharing or providing for the most important aspects of projects. Cost of goods as a means of allocation is studied from grade 3. Examples: 3.1.4 Planning, 3.1.5 Organizing Our Environment, 3.1.8 Working Together, 4.1.5 Working Together, 5.1.5 Working Together
• Some jobs require more (or more expensive) training than others, some involve more risk, and some pay better.	In each DASH activity students play the role of a professional who would be concerned with the task they undertake. As part of this role adoption teachers are encouraged to invite in guest professionals to tell the story of their job preparation, their work life as a professional, risks involved, and to speak of the financial reward that can be expected.
7.F. Social Conflict • Communicating the different points of view in a dispute can often help people to find a satisfactory compromise.	DASH uses cooperative grouping techniques embracing conflict resolution through compromise. However, this does not negate the emphasis in finding explanations based on observational data and reason.
• Resolving a conflict by force rather than compromise can lead to more problems.	The effects of force and fighting are incidental to most any year's teaching, and each incident gives students a chance to analyze the initiating situation and identify future preventive steps. Examples: 3.1.6 Friends, 3.1.7 Giving And Receiving, 3.1.8 Working Together, 4.1.5 Working Together, 5.1.5 Working Together, 5.1.8 Friendship

AAAS Benchmarks	DASH Grades 3–5
• One person's exercise of freedom may conflict with the freedom of others. Rules can help to resolve conflicting freedoms.	DASH students are yearly engaged in the process of making classroom rules dealing with situations where the freedom of one individual may conflict with the freedom of another. A fairness criterion quickly evolves. Such rules cover distribution of limited resources, turn taking, and time allocation at desirable and undesirable tasks. Examples: 3.1.3 Responsibility, 3.1.4 Planning, 3.1.5 Organizing Our Environment, 3.1.7 Giving And Receiving, 3.1.8 Working Together, 3.1.10 Aphorisms, 4.1.2 Responsibility, 4.1.5 Working Together, 4.1.7 Aphorisms, 4.1.8 Planning, 5.1.2 Responsibility, 5.1.5 Working Together, 5.1.7 Aphorisms
• If a conflict cannot be settled by compromise, it may be decided by a vote--if everyone agree to accept the results.	The nature of the scientific technical community in the DASH classroom requires that some decision tool be available to resolve continuing conflict and here democratic processes are called into play.
7.G. Global Interdependence • Many of the things people eat and wear come from other countries, and people in those countries use things from this country. Trade occurs between nations, between different people, and between regions in the same nation. Decisions made in one country about what is produced there may have an effect on other countries.	The reality of intra- and international movement of goods and services is particularly studied in distribution of food stuff. DASH students get a sense of how world and regional movement of food directly affects what they have on their table. Examples: 2.5.1 Supermarket Survey, 3.5.10 Pricing Foods
8. The Designed World **8.A. Agriculture** • Some plant varieties and animal breeds have more desirable characteristics than others, but some may be more difficult or costly to grow. The kinds of crops that ca grow in an area depend on the climate and soil. Irrigation and fertilizers can help crops grow in places where there is too little water the soil is poor.	Agriculture is an ongoing study in DASH involving both plants and animals. Students are engaged in small-scale farming, including gardening, horticulture, and aquaculture in grades K–6. They deal with cost considerations in deciding what to grow, soil conditions, fertilization, and ways of irrigating their gardens. Simultaneously, they are alert to the practices of large scale farms visited or seen around them and reports on farms in the media as collected on the DASH LEARNING CALENDAR in conjunction with studies of seasons. Examples: 3.3.8 Importance Of Frogs And Toads, 3.3.12 Importance Of Birds, 3.4.1 Garden Planning, 3.4.2 Garden Preparation, 3.4.3 Watching Garden Soil, 3.4.4 Making Artificial Soil, 3.4.6 Soil And Water, 3.4.7 Garden Planting, 3.4.8 Garden Care, 3.4.9 Garden Watering Systems, 3.4.10 Garden Invaders, 3.4.11 Controlling Insects, 3.4.12 Garden Harvesting, 3.4.13 Flowers, 3.4.14 Seeds, 3.4.15 Pollination, 3.5.1. Food Selection, 3.5.2 Selecting Plants For The Garden, 3.5.3 Planning The Class Feast, 3.9.1 Making Compost, 3.9.2 Watching Compost, 3.9.3 Animals In Compost, 3.9.4 Using Compost, 3.10.1 Acidic And Basic Soil, 4.1.4 The Learning Calendar, 4.2.23 Seasons And The Sun, 4.4.1 Annual, Biennial, And Perennial Garden Plants, 4.4.2 The Fungus Among Us, 5.4.1 Annual, Biennial, And Perennial Plant Project

AAAS Benchmarks	DASH Grades 3–5
• The damage to crops caused by rodents, weeds, and insects can be reduced by using poisons, but their use may harm other plants or animals as well, and pests tend to develop resistance to poisons.	In tending their gardens students learn that weeds, insects, rodents, even humans can destroy crops. Based on studies of potential for environmental damage, the availability of biological controls, and costs they make decisions on whether to use pesticides or handle the problem of crop destruction in other ways including mechanical and biological controls. Examples: 3.4.1 Garden Invaders, 3.4.11 Controlling Insects
• Heating, salting, smoking, drying, cooling, and airtight packaging are ways to slow down the spoiling of food by microscopic organisms. These methods make it possible for food to be stored for long intervals before being used.	Food preservation is studied from grade 3 on. Students use smoking, drying, freezing, canning, and other techniques for long term preservation of foods Examples: 3.5.6 Drying Foods, 3.5.7 Pickling Foods, 3.5.8 Preserving And Rotting, 4.5.6 Preserving Foods
• Modern technology has increased the efficiency of agriculture so that fewer people are needed to work on farms than ever before.	In each activity students play the role of a person who carries out the task they are working at. The teacher is encouraged to bring in parents and community people who represent these work groups. Through the study of professions students become aware of the changing nature of agriculture, including its increasing use of machinery, increasing efficiency and reduction of job opportunities.
• Places too cold or dry to grow certain crops can obtain food from places with more suitable climates. Much of the food eaten by Americans comes from other parts of the country and other places in the world.	Global interdependence is extensively studied in grades 3–6 including analysis of where foods are produced, how they are transported and stored.
8.B. Material and Manufacturing • Naturally occurring materials such as wood, clay, cotton, and animal skins may be processed or combined with other materials to change their properties.	DASH students extensively study the properties of naturally occurring materials starting in kindergarten where wood and cloth are introduced as common building materials. In grade 4 stone, clay, natural fibers, wood, and leather are used to construct products using ancient technological processes. Examples: 4.10.4 Collecting Rocks, 4.10.5 Hardness Of Rocks, 4.10.6 Specific Gravity, 4.10.7 Rocks And Sharp Edges, 4.10.8 Making Tools From Rock, 4.10.9 Making Fishing Tools, 4.10.10 Clowns, 4.10.11 Clay, 4.10.12 Fire And Pottery

AAAS Benchmarks	DASH Grades 3–5
• Through science and technology, a wide variety of materials that do not appear in nature all have become available, ranging from steel to nylon to liquid crystals.	DASH students work with and are involved in the production of fabricated materials from kindergarten where they make paper. Probably the most spectacular fabrication occurs in the production of certain foods. The students constantly use plastics, metals, and synthetic fibers in their crafting of tools. As part of their search for making connections, production processes are an ongoing point of inquiry. Examples: Activity Materials Lists, 3.5.3 Planning The Class Feast, 3.5.4 Preparing The Class Feast, 3.5.5 The Class Feast, 3.5.6 Drying Foods, 3.5.7 Pickling Foods, 4.5.6 Preserving Foods, 4.10.11 Clay, 4.10.12 Fire And Pottery, 5.5.4 Making Pancakes
• Discarded products contribute to the problem of waste disposal. Sometimes it is possible to use the materials in them to make new products, but materials differ widely in the ease with which they can be recycled.	Recycling is an ongoing project in DASH schools. Organic material is composted. Paper, aluminum, plastic, and glass are collected for normal recycling. Other materials are disposed of recognizing that at some future point these to may be recycled. All student projects are produced from recycled materials. Examples: 3.9.1 Making Compost, 3.9.2 Watching Compost, 3.9.3 Animals In Compost, 3.9.4 Using Compost, 4.9.2 Recycling Project, 5.1.7 Aphorisms, 5.9.1 Class Recycling Project
• Through mass production, the time required to make a product and its cost can be greatly reduced. Although many things are still made by hand in some parts of the world, almost everything in the most technologically developed countries is now produced using automatic machines. Even automatic machines require human supervision.	Much of the technological experience in DASH is centered on handmade objects. However, in the supermarket simulation in grade 3, students get a sense of production line technologies. Teachers are encouraged to use trade books to describe mass production processes and to take students on field trips to sites where they can see these processes in operation. Examples: Dash Instructional Guide, 3.5.12 Framers And Processors, 3.5.13 Supermarket Game
8.C. Energy Sources and Use • Moving air and water can be used to run machines.	Moving air and water are extensively studied in grade 3. Here students make wind mills, water wheels, paddle wheels, and propellers. This equipment is used to propel boats. The study of wind and water driven machines is returned to in grade 5. Examples: 3.7.2 Propeller-Driven Message Center, 3.7.3 Propeller-Driven Boat, 3.8.1 Shadow, Light, And Bubbles, 3.8.3 Wind Pulls And Pushes, 3.8.4 Propellers Driving Propellers, 3.8.5 Waterwheels, 3.8.6 Propellers In Water
• The sun is the main source of energy for people and they use it in various ways. The energy in fossil fuels such as oil and coal comes from the sun indirectly, because the fuels come from plants that grew long ago.	Energy is a major theme of DASH from grades K–6 and is a topic of special consideration in Cluster 8, Energy and Communication. Students also study the storage of energy as part of Conservation, Recycling, and Decomposition activities.
• Some energy sources cost less than others and some cause less pollution than others.	Energy resources are evaluated in terms of their cost and polluting qualities in grade 5. Examples: 5.9.2 Conservation Project, 5.9.4 Pollution Project

AAAS Benchmarks	DASH Grades 3–5
• People try to conserve energy in order to slow down the depletion of energy resources and/or to save money.	Energy depletion, its costs, and means of conservation are studied in grades 2–6. Examples: 5.4.1 Aphorisms, 5.9.2 Class Conservation Project
8.D. Communications • People have always tried to communicate with one another. Signed and spoken language was one of the first inventions. Early forms of recording messages used markings on materials such as wood or stone.	Different forms of communication are investigated and used in DASH. Study includes making communication devices that require special languages, heliographs (grade 3), telegraphs (grade 6) for which they make and use codes. Daily there is a rich experience in using standard communication, written, spoken and the language of math and pictures. Examples: 3.8.7 Heliograph, 3.8.8 Speaking Tube, 3.8.9 String Telephone
• Communication involves coding and decoding information. In any language, both the sender and the receiver to know the same code, which means that secret codes can be used to keep communication private.	Writing-reading and speaking-listening are characterized as reciprocal coding and decoding operations. In DASH secret codes are used to convey information. Students make codes to communicate with heliographs and telegraphs, thereby, reinforcing the role of coding-decoding in communication. Examples: 3.8.7 Heliograph, 3.8.8 Speaking Tubes, 3.8.9 String Telephone, 4.5.1 Nutrition Messages
8.E. Information Processing • Computers are controlled partly by how they are wired and partly by special instructions called programs that are entered into a computer's memory. Some programs stay permanently in the machine but most are coded on disks and transferred into and out of the computer to suit the user.	DASH recommends the use of the computer as a worked processing and data storage device. It provides opportunities for the use of data sharing through the Internet. The operations of the computer, software, and peripherals are suggested to be taught and reflected upon as the devices are used.
• Computers can be programmed to store, retrieve, and perform operations on information. These operations include mathematical calculations, word processing, diagram drawing, and the modeling of complex events.	DASH uses the computer as a tool. It assumes that instruction in the operation of the computer is done at the time a given procedure is needed. The computer is recommended for word processing, data collection, drawing, mathematical operations (particularly graphing), information receiving on the Internet system, and for modeling with weather programs. Examples: Dash Instructional Guide, 4.2.10 Weather Maps, 4.2.11 Weather Fronts, 5.2.1 Weather Station
• Mistakes can occur when people enter programs or data into a computer. Computers themselves can make errors in information processing because of defects in their hardware or software.	DASH students are charged to seek out errors in technological and scientific operations. Students from kindergarten are aware of the fact that they, their peers, and the teachers make errors. Errors even exist in reference materials. This knowledge is extended to use of computers where human error as well as errors in hardware and software are not uncommon. Examples: 3.10.12 Measuring Devices, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.1.7 Aphorisms, 5.3.12 Bones, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement

AAAS Benchmarks	DASH Grades 3–5
8.F. Health Technology • There are normal ranges for body measurements—including temperature, heart rate, and what is in the blood and urine—that help to tell when people are well. Tools, such as thermometers and X-ray machines, provide us clues about what is happening inside the body.	DASH students make measurements of all the body indicators that are within the practical instrument capability of the classroom including temperature, heart rate, and breathing rate. From this they find that there are normal ranges of data for these functions that apply to most people. They are made of more complex tests using X-ray machines, otoscopes, ophthalmoscopes, sphygmomanometers, and body fluid chemical tests. Most important they are made aware of what specific kind of information each kind of body probe produces and what constitutes a normal response. Examples: Focus Books: Going To The Doctor; What Doctors Do; Going To The Hospital , 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 3.6.3 Breathing Air, 3.6.4 Anatomy Of Breathing, 3.6.5 Lung Model, 3.6.7 Breathing And Pulse Rate, 3.6.8 Heart, Veins, And Arteries, 3.6.9 Heart, Lungs, And Exercise, 4.3.18 Modeling Our Digestive System, 4.3.19 Our Digestive System In Two Dimensions, 4.3.20 Digestive, Circulatory, And Respiratory Systems, 4.3.21 Length Of The Digestive Tract, 4.5.1 Nutrition Messages, 4.5.2 Mechanical Digestion, 4.5.3 Chemical Digestion, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 5.3.6 Male Urogenital System, 5.3.7 Female Urogenital System, 5.3.8 Ovulation Cycle, 5.3.9 Ovulation And Pregnancy, 5.3.10 Embryology, 5.3.11 Body Changes, 5.3.12 Bones, 5.3.13 Skeletal System, 5.3.14 Muscles, 5.3.15 Muscular System, 5.3.16 Chemistry, 5.3.17 The Senses, 5.3.18 The Eye, 5.3.19 Sound, 5.3.20 The Ear, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart
• Technology has made it possible to repair and sometimes replace some body parts.	The topic of repair and replacement of organs is a topic of individual research. These personal investigations are suggested along with the study of specific organs. Examples: 5.3.12 Bones, 5.3.14 Muscles, 5.3.18 The Eye, 5.3.20 The Ear
9. The Mathematical World **9.A. Numbers** • The meaning of numerals in many-digit numbers depends on their positions.	Because DASH students use metric units and measuring devices from kindergarten they are well aware of the decimal nature of metric measurements. They deal with a range of magnitudes from 1/100 to millions and are well aware of the role of place in numerical expressions. Examples: 3.10.12 Measuring Devices, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.6.1 Growth Chart And Area Measurement, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement, 5.10.3 Mass Measurement

AAAS Benchmarks	DASH Grades 3–5
• In some situations, "0" means none of something but in others it may be just the label some point on a scale.	The meaning of zero as an expression of nothing and as a numerical place holder is part of the student's constant employment of metric units. The zero's position is found on almost all scales that the students use as well as on graphs. Examples: 3.10.12 Measuring Devices, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.6.1 Growth Chart And Area Measurement, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement, 5.10.3 Mass Measurement
• When people care about what is being counted or measured, it is important for them to say what the units are (three degrees Fahrenheit is different from three centimeters, three miles from three miles per hour).	Because the DASH students must communicate data to their peers as well as teacher, they are regularly reminded of the necessity of labeling all data with appropriate units. All graphs of course are labeled. Examples: Graphs 3.2.2 Temperature, 3.2.5 Rain And Snow, 3.2.6 Humidity, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.15 Length Of Day And Night, 4.2.23 Seasons And The Sun, 4.2.24 Moon Phases And The Sun, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 5.2.1 Weather Station, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.8.2 Teeter-Totters, 5.8.3 The Balance, 5.8.4 Wheels And Axles, Cranks, And Gears, 5.8.5 Levers: Where Are They?, 5.8.6 Arms And Jaws, 5.8.7 Inclined Planes And Screws, 5.8.8 Block And Tackle
• Measurements are always likely to give slightly different numbers, even if what is being measured stays the same.	Human error, instrument, and observational error are considered in all measurement problems. DASH students quickly find that actual measurements are quite often slightly different, and the same measurement is seen slightly differently by different observers. Examples: 3.10.12 Measuring Devices, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.1.7 Aphorisms, 5.3.12 Bones, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement
9.B. Symbolic Relationships • Mathematical statements using symbols may be true only when the symbols are replaced by certain numbers.	Starting in grade 4 DASH students use symbolic equations. They quickly find that there is but one value for pi and that things like the speed of sound and the distances of the planets from the sun have relatively fixed values. When the correct values are not used the equations give incorrect answers. Examples: 4.2.9 Lightning, 4.8.5 Energy Of Falling Objects, 4.10.6 Specific Gravity, 5.2.7 Size Of The Earth, 5.2.9 How Big And Far Away Is The Moon?, 5.8.2 Teeter-Totters, 5.8.3 The Balance, 5.8.4 Wheels And Axles, 5.8.5 Levers: Where Are They?, 5.8.6 Arms And Jaws, 5.8.7 Inclined Planes And Screws, 5.8.8 Block And Tackle

AAAS Benchmarks	DASH Grades 3–5
• Tables and graphs can show how values of one quantity are related to values of another.	DASH students use both tabular and graphic forms to record and interpret data. In searching for patterns students discover that some quantities are equivalent to multiples of others, come ratios, some additive totals, some differences. Examples: 4.2.9 Lightning, 4.8.5 Energy Of Falling Objects, 4.10.6 Specific Gravity, 5.2.7 Size Of The Earth, 5.2.9 How Big And Far Away Is The Moon?, 5.8.2 Teeter-Totters, 5.8.3 The Balance, 5.8.4 Wheels And Axles, Cranks And Gear, 5.8.5 Levers: Where Are They?, 5.8.6 Arms And Jaws, 5.8.7 Inclined Planes And Screws, 5.8.8 Block And Tackle
9.C. Shapes • Length can be thought of as unit lengths joined together, area as a collection of unit squares, and volume as a set of unit cubes.	DASH students use physical roads, squares on grid paper, and collections of cubes to gain a conceptual understanding of linear, area, and volumetric units in the metric system. Examples: 3.10.12 Measuring Devices, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.6.1 Growth Chart And Area Measurement, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement, 5.10.3 Mass Measurement
• If 0 and 1 are located on a line, any other number can be depicted as a position on the line.	DASH employs numerous measuring scales which cause the students to construct equivalents that are multiples and fractions of some distance from 0 to 1. The Pythagorean method of dividing lines into equal distances is used as a construction tool. Rulers, scales, time lines are all used showing the incremental position of numbers that represent different quantities. Examples: 3.10.12 Measuring Devices, 4.2.13 Wind Chill, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.2.2 Heat Index, 5.2.3 Weather And Its Prediction, 5.6.1 Growth Chart And Area Measurement, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement, 5.10.3 Mass Measurement, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer
• Graphical display of numbers may make it possible to spot patterns that are not otherwise obvious, such as comparative size and trends.	From kindergarten DASH students are engaged in analysis of patterns of numbers in tables and graphic displays including pie, line, and bar graphs, linear time lines and other linear displays. Examples: 3.2.5 Rain And Snow, 3.3.11 Chick Growth, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 3.6.3 Breathing Air, 3.6.7 Breathing And Pulse Rates, 3.6.9 Heart, Lungs, And Exercise, 4.2.11 Rainfall, 4.2.2 Snowfall, 4.2.13 Wind Chill, 4.2.15 Length Of Day And Night, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 4.8.5 Energy Of Falling Objects, 4.8.6 Circles And Speed, 4.10.5 Hardness Of Rocks, 5.2.2 Heat Index, 5.2.6 Gnomon, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.8.2 Teeter-Totters, 5.8.4 Wheels And Axles, 5.8.7 Inclined Planes And Screws, 5.8.8 Block And Tackle

AAAS Benchmarks	DASH Grades 3–5
• Many objects can be described in terms of simple plane figures and solids. Shapes can be compared in terms of concepts such as parallel and perpendicular, congruence and similarity, and symmetry. Symmetry can be found by reflection, turns, or slides.	Throughout DASH shape language is used and figures are made and drawn—square, triangle, circle, cylinder, sphere, globe, etc. Since there is a heavy emphasis on intuitive geometry, the terms perpendicular, internal, external, equal, parallel, congruent, and similar are used as well as comparative language such as symmetrical and asymmetrical introduced in the study of the skeletal system. Examples: 4.2.5 Height Of Clouds, 4.2.16 The Sun's Shadow Path, 4.2.20 When Is It Noon?, 4.2.21 Making A Sundial, 4.2.22 Using A Sundial, 4.8.5 Energy Of Falling Objects, 4.8.6 Circles And Speed, 5.2.7 Size Of The Earth, 5.2.8 Moon Through A Telescope, 5.2.9 How Big And Far Away Is The Moon?, 5.2.10 Models Of The Solar System, 5.4.5 Measuring Trees, 5.7.1 Where In The World Are We?, 5.7.2 Planetarium, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Sun?, 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses, 5.2.13 Skeletal System
• Areas of irregular shapes can be found by dividing them into squares and triangles.	Areas of irregular shapes are found by several techniques—counting squares and overlapping geometrical figures; tracing, cutting, and weighing cut outs; estimation. Examples: 3.6.1 Growth Chart, 4.6.1 Growth Chart And Area Measurement, 5.6.1 Growth Chart And Area Measurement
• Scale drawings show shapes and compare locations of things very different in size.	Scaling is introduced in kindergarten and continued through grade 6. Scaled drawings are used to allocate classroom, and garden space, to provide graphic models of things to be constructed, and mapping. Examples: 3.2.8 Polar Sky Model, 3.3.6 Making Habitats For Frogs And Toads, 3.4.1 Garden Planning, 3.7.1 Garden Mover, 3.7.2 Propeller-Driven Message Center, 3.7.3 Propeller-Driven Boat, 3.7.4 Delivery Systems, 3.10.10 Supermarket Planning, 4.2.17 Planetarium, 4.3.5 Housing Pet Mammals, 4.3.6 Weekend Care Of Pet Mammals, 4.7.1 Boat Design, 5.2.9 How Big And Far Away Is The Moon?, 5.2.10 Models Of The Solar System, 5.4.10 Soil Conservation, 5.7.1 Where In The World Are We?, 5.7.2 Planetarium, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Sun?, 5.8.9 Forces Projects
9.D. Uncertainty • Some predictions can be based on what is known about the past, assuming that conditions are pretty much the same now.	The constructivist model suggests that present knowledge is built out of past experience. To make experience useful the students are regularly engaged in actively conceptualizing what they have done, on the assumption that this provides a basis on which to make predictions about the future. To aid in this process DASH students make concept maps, working definitions, and statements of physical rules and generalizations. Prediction based on long term conceptual growth is common in Weather, Astronomy, Decomposition, Seasons, Growth and Development, Animal, and Plant activities.

AAAS Benchmarks	DASH Grades 3–5
	Examples: 3.2.7 Moon Phases, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 3.9.5 Fall Unearthing And Burial, 3.9.6 Spring Unearthing And Burial, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.5 Height Of Clouds, 4.2.6 Humidity, 4.2.12 Predicting Weather, 4.2.23 Seasons And The Sun, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 4.9.1 Unearthing, 4.9.2 Recycling Project, 5.2.3 Weather And Its Prediction, 5.2.6 Gnomon, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.9.3 Decomposition And Archeology
• Statistical predictions (as for rainy days, accidents) are typically better for *how many* of a group will experience something than for which members of the group will experience it—and better for *how often* something will happen than for *exactly when* .	The DASH student becomes aware that generalized data on weather and other environmental conditions, animal and plant, and animal and human behavior has only limited predictive power and that there are bound to be individual exceptions. These predictions are found to apply to "what" kind of events or "what" part of a group will be affected and how often but not to what or whom or when. Examples: 3.9.5 Fall Unearthing And Burial, 3.9.6 Spring Unearthing And Burial, 4.2.12 Predicting Weather, 4.9.1 Unearthing, 5.2.3 Weather And Its Prediction, 5.6.8 Smokers' Survey, 5.6.9 Ex-Smokers' Survey, 5.9.3 Decomposition And Archeology
• Summary predictions are usually more accurate for large collections of events than for just a few. Even very unlikely events may occur fairly often in very large populations.	DASH students by grade 5 have large bodies of data on weather, growth and development, and astronomy. They work with almanac data and find that there are varying degrees of predictability according to the subject. Astronomy is found to be highly predictable, weather and growth much less so. They also have made scrap books on tobacco, alcohol and drugs which are full of statistical data with regular comments on population size on conclusions. Examples: 3.2.7 Moon Phases, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 3.9.5 Fall Unearthing And Burial, 3.9.6 Spring Unearthing And Burial, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.5 Height Of Clouds, 4.2.6 Humidity, 4.2.12 Predicting Weather, 4.2.23 Seasons And The Sun, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 4.6.8 Alcohol, Tobacco, And Drugs, 4.9.1 Unearthing, 5.2.3 Weather And Its Prediction, 5.2.6 Gnomon, 5.3.2 Bird Feeder, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.6.4 Alcohol, Tobacco, And Drugs, 5.6.5 Sexually Transmitted Diseases, 5.6.8 Smokers' Survey, 5.6.9 Ex Smokers' Survey, 5.9.3 Decomposition And Archeology

AAAS Benchmarks	DASH Grades 3–5
• Spreading data out on a number line helps to see what the extremes are, where they pile up, and where the gaps are. A summary of data includes where the middle is and how much spread is around it.	Spreading data on number line is commonly used in analysis in DASH. This is done in graphing and pictorial formats. Both range and central tendencies are found. Examples: 3.6.1 Growth Chart, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.6 Humidity, 4.2.23 Seasons And The Sun, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.6.8 Smokers' Survey, 5.6.9 Ex-Smokers' Survey
• A small part of something may be special in some ways and not give an accurate picture of the whole. How much a portion of something can help to estimate what the whole is like depends on how the portion is chosen. There is a danger of choosing only the data that show what is expected by the person doing the choosing.	The individual nature of things is brought out in activities on Growth and Development, Weather, and the Seasons. Examples: 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.12 Predicting Weather, 4.2.23 Seasons And The Sun, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 5.2.3 Weather And Its Prediction, 5.3.2 Bird Feeder, 5.6.1 Growth Chart, 5.6.2 Tooth Chart, 5.6.8 Smokers' Survey, 5.6.9 Ex-Smokers' Survey
9.E. Reasoning • One way to make sense of something is to think how it is like something more familiar.	DASH students from kindergarten are producing working definitions. They are asked to use the things they already know about to describe new things. They also describe the operations of things seen for the first time in terms of more familiar operations that are similar.
• Reasoning can be distorted by strong feelings.	DASH students operating as communities of technologists and scientists must regularly submit their ideas for group validation. Very early they learn that ideas are precious personal products that are often defended with passion. In the normal course of a year there are many examples of situations where personal feelings or commitment to or ownership of an idea get in the way of logical appraisal. However, the commitment of DASH is to evidence and logical reasoning.
11. Common Themes **11.A. Systems** • In something that consists of many parts, the parts usually influence one another.	DASH students have wide-ranging experiences with systems and the interaction of parts. They deal with the human body as a system composed of organs, machines as systems composed of parts, the solar system composed of the sun, moon, planets, asteroids, ecosystems composed of living and non-living things, and classrooms as a social system composed of teachers and students. Examples: Body Systems 3.6.5 Lung Model, 3.6.7 Breathing And Pulse Rates, 3.6.8 Heart, Veins, And Arteries, 4.3.15 External Anatomy Of Fish, 4.3.16 Cleaning Fish: Internal Anatomy, 4.3.17 Fish Reproduction, 4.3.18 Modeling Our Digestive System, 4.3.19 Our Digestive System, In Two Dimensions, 4.3.20 Digestive, Circulatory, And Respiratory Systems, 5.3.4 Cells, 5.3.5 Cell Quiz,

AAAS Benchmarks	DASH Grades 3–5
	5.3.6 Male Urogenital System, 5.3.7 Female Urogenital System, 5.3.8 Ovulation Cycle, 5.3.9 Ovulation And Pregnancy, 5.3.13 Skeletal System, 5.3.14 Muscles, 5.3.15 Muscular System, 5.3.16 Chemistry And Bones, 5.3.17 The Senses, 5.3.18 The Eye, 5.3.19 Sound, 5.3.20 The Ear Machines As Systems 3.7.1 Garden Mover, 3.7.2 Propeller-Driven Message Center, 3.7.3 Propeller-Driven Boat, 3.7.4 Delivery Systems, 3.8.4 Propellers Driving Propellers, 3.8.5 Waterwheels, 3.8.6 Propellers In Water, 3.8.9 String Telephone, 3.10.12 Measuring Devices, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.21 Making A Sundial, 4.7.1 Boat Design, 4.7..2 Wind And Sail, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.2.1 Weather Station, 5.2.6 Gnomon, 5.3.12 Bones, 5.8.9 Forces Projects, 5.10.1 Linear Measurement, 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses, 5.10.5 Making A Telescope, 5.10.6 Stabilizing The Telescope, 5.10.7 Making A Microscope, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer Solar System 3.2.7 Moon Phases, 3.2.8 Polar Sky Model, 3.2.9 Polar Constellation, 3.2.10 Venus, 3.2.11 Eclipses, 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.17 Planetarium, 4.2.18 Using The Planetarium, 4.2.19 Planets, 4.2.20 When Is It Noon?, 4.2.21 Making A Sundial, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 5.2.8 Moon Through A Telescope, 5.2.9 How Big And Far Away Is The Moon?, 5.2.10 Models Of The Solar System, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Sun? Ecosystems 3.3.4 Importance Of Insects, 3.3.5 Natural Habitats Of Frogs And Toads, 3.3.6 Making Habitats For Frogs And Toads, 3.3.7 Frog Metamorphosis, 3.3.8 Importance Of Frogs And Toads, 3.3.9 Toads And Insects, 3.3.12 Importance Of Birds, 3.4.10 Garden Invaders, 4.3.22 Migration And Hibernation, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 4.4.1 Annual, Biennial, And Perennial Garden Plants, 4.4.2 The Fungus Among Us, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.4.2 Tree Harvesting, 5.4.3 Tree Planting, 5.4.4 Tree Observation, 5.4.5 Measuring Trees, 5.4.6 Age Of Trees, 5.4.7 Trees, Shrubs, And Grasses, 5.4.8 Grasses: Why Do They Grow There?, 5.4.9 Roots, 5.4.10 Soil Conservation Social Systems 3.1.3 Responsibility, 3.1.4 Planning, 3.1.5 Organizing Our Environment, 3.1.6 Friends, 3.1.7 Giving And Receiving, 3.1.8 Working Together, 3.1.9 Helping Myself And Others, 3.1.10 Aphorisms, 3.1.12 Carey's Garden, 4.1.2 Responsibility, 4.1.3 Last Year,

AAAS Benchmarks	DASH Grades 3–5
	4.1.4 The Library, 4.1.5 Working Together, 4.1.6 Things I Can Do For Myself And Others, 4.1.7 Aphorisms, 4.1.8 Planning, 4.1.9 Survival Game, 5.1.2 Responsibility, 5.1.5 Working Together, 5.1.6 Things I Can Do For Myself And Others, 5.1.7 Aphorisms, 5.1.8 Friendship
• Something may not work as well (or at all) if a part of it is missing, broken , worn out, mismatched, or misconnected.	Because of the intensive work with systems, DASH students learn early that social and mechanical systems have problems as their parts become dysfunctional (mismatched, tired, missing, worn out, etc.) Likewise, the body and ecosystems can be less effective or productive as changes occur in their parts. Examples: Body Systems—3.6.5 Lung Model, 3.6.7 Breathing And Pulse Rates, 3.6.8 Heart, Veins, And Arteries, 4.3.20 Digestive, Circulatory, And Respiratory Systems, 5.3.5 Cell Quiz, 5.3.13 Skeletal System, 5.3.14 Muscles, 5.3.15 Muscular System, 5.3.16 Chemistry And Bones, 5.3.17 The Senses, 5.3.18 The Eye, 5.3.19 Sound, 5.3.20 The Ear Machines As Systems—3.7.1 Garden Mover, 3.7.2 Propeller-Driven Message Center, 3.7.3 Propeller-Driven Boat, 3.7.4 Delivery Systems, 3.8.4 Propellers Driving Propellers, 3.8.5 Waterwheels, 3.8.6 Propellers In Water, 3.8.9 String Telephone, 3.10.10 Supermarket Planning, 3.10.12 Measuring Devices, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.21 Making A Sundial, 4.7.1 Boat Design, 4.7.2 Wind And Sail, 4.10.1 Linear Measurement, 4.10.2 Volume Measurement, 4.10.3 Mass Measurement, 5.2.1 Weather Station, 5.2.6 Gnomon, 5.3.12 Bones, 5.8.9 Forces Project, 5.10.1 Linear Measurement, 5.10.2 Volume Measurement, 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses, 5.10.5 Making A Telescope, 5.10.6 Stabilizing The Telescope, 5.10.7 Making A Microscope, 5.10.8 Making A Hygrometer, 5.10.9 Making A Barometer Ecosystems—3.3.4 Importance Of Insects, 3.3.5 Natural Habitats Of Frogs And Toads, 3.3.8 Importance Of Frogs And Toads, 3.3.9 Toads And Insects, 3.3.12 Importance Of Birds, 3.4.10 Garden Invaders, 4.3.22 Migration And Hibernation, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 4.4.2 The Fungus Among Us, 5.3.2 Bird Feeder, 5.4.2 Tree Harvesting, 5.4.3 Tree Planting, 5.4.4 Tree Observation, 5.4.7 Trees, Shrubs, And Grasses, 5.4.10 Soil Conservation Social Systems—3.1.3 Responsibility, 3.1.4 Planning, 3.1.5 Organizing Our Environment, 3.1.6 Friends, 3.1.7 Giving And Receiving, 3.1.8 Working Together, 3.1.9 Helping Myself And Others, 3.1.10 Aphorisms, 4.1.2 Responsibility, 4.1.5 Working Together, 4.1.6 Things I Can Do For Myself And Others, 4.1.7 Aphorisms, 4.1.8 Planning, 4.1.9 Survival Game, 5.1.2 Responsibility, 5.1.5 Working Together, 5.1.6 Things I Can For Myself And Others, 5.1.7 Aphorisms, 5.1.8 Friendship

AAAS Benchmarks	DASH Grades 3–5
11.B. Models • Seeing how a model works after changes are made to it may suggest how the real thing would work if the same were done to it.	Constructing devices and other products is common throughout DASH. In major projects, models are made of final products on the assumption that experimentation on a miniature version or a graphic representation is far more efficient than rebuilding the final product after deficiency is found. Students also make models of body parts, the solar system, and the universal sky. Examples: Mechanical Models—3.7.3 Propeller-Driven Boat, 3.7.4 Delivery Systems, 3.8.5 Water Wheels, 3.10.10 Supermarket Planning, 3.10.11 Supermarket Construction, 4.7.1 Boat Design, 5.8.9 Forces Projects Body Models—3.6.5 Lung Model, 4.3.18 Modeling Our Digestive System, 4.3.19 Our Digestive System In Two Dimensions, 4.3.20 Digestive, Circulatory, And Respiratory Systems, 5.3.6 Male Urogenital System, 5.3.7 Female Urogenital System, 5.3.10 Embryology, 5.3.13 Skeletal System, 5.3.15 Muscular System, 5.3.17 The Senses, 5.3.18 The Eye, 5.3.20 The Ear Astronomical Models—3.2.8 Polar Sky Model, 4.2.17 Planetarium, 4.2.18 Using The Planetarium 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 5.2.10 Models Of The Solar System, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Sun?
• Geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representations can never be exact in every detail.	DASH students are constantly communicating with each other, their teacher, and a wider audience of parents and interested outsiders. To do this they use a full range of modes of communication including geometric figures in geometric explanations of problems, number sequences in deciphering codes, graphs analysis and presentation of data, diagrams and sketches of things to be made and things observed, number lines in timelines and instrument scales, maps in planning projects, and projectional stories about what could have and might yet happen. Examples: Graphs/Number Lines—3.2.2 Temperature, 3.2.5 Rain And Snow, 3.2.6 Humidity, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.15 Length Of Day And Night, 4.2.23 Seasons And The Sun, 4.2.24 Moon Phases And The Sun, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 5.2.1 Weather Station, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.8.2 Teeter-Totters, 5.8.3 The Balance, 5.8.4 Wheels And Axles, Cranks And Gears, 5.8.5 Levers: Where Are They?, 5.8.6 Arms And Jaws, 5.8.7 Inclined Planes And Screws, 5.8.8 Block And Tackle

AAAS Benchmarks	DASH Grades 3–5
	Geometry—4.2.5 Height Of Clouds, 4.2.16 The Sun's Shadow Path, 4.2.20 When Is It Noon?, 4.2.21 Making A Sundial, 4.2.22 Using A Sundial, 4.8.5 Energy Of Falling Objects, 4.8.6 Circles And Speed, 5.2.7 Size Of The Earth, 5.2.8 Moon Through A Telescope, 5.2.9 How Big And Far Away Is The Moon?, 5.2.10 Models Of The Solar System, 5.2.13 Skeletal System, 5.4.5 Measuring Trees, 5.7.1 Where In The World Are We?, 5.7.2 Planetarium, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Sun?, 5.10.3 Camera Obscura, 5.10.4 Controlling Light With Lenses Scale Drawings—3.2.8 Polar Sky Model, 3.3.6 Making Habitats For Frogs And Toads, 3.4.1 Garden Planning, 3.7.1 Garden Mover, 3.7.2 Propeller-Driven Message Center, 3.7.3 Propeller-Driven Boat, 3.7.4 Delivery Systems, 3.10.10 Supermarket Planning, 4.3.5 Housing Pet Mammals, 4.7.1 Boat Design, 5.2.9 How Big And Far Away Is The Moon?, 5.2.10 Models Of The Solar System, 5.4.10 Soil Conservation, 5.7.1 Where In The World Are We?, 5.7.2 Planetarium, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Sun?, 5.8.9 Forces Projects Diagrams And Models—3.7.3 Propeller-Driven Boat, 3.7.4 Delivery Systems, 3.8.5 Water Wheels, 3.10.10 Supermarket Planning, 3.10.11 Supermarket Construction, 4.7.1 Boat Design, 5.8.9 Forces Projects—3.2.8 Polar Sky Model, 3.6.5 Lung Model, 4.2.17 Planetarium, 4.2.18 Using The Planetarium, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 4.3.18 Modeling Our Digestive System, 4.3.19 Our Digestive System In Two Dimensions, 4.3.20 Digestive, Circulatory, And Respiratory Systems, 5.2.10 Models Of The Solar System, 5.3.6 Male Urogenital System, 5.3.7 Female Urogenital System, 5.3.10 Embryology, 5.3.13 Skeletal System, 5.3.15 Muscular System, 5.3.17 The Senses, 5.3.18 The Eye, 5.3.20 The Ear, 5.7.3 Mapping The Sky, 5.7.4 The North Pole, Equator, And Ecliptic, 5.7.5 Where Is The Sun? Prediction—3.2.7 Moon Phases, 3.6.1 Growth Chart, 3.6.2 Tooth Chart, 3.9.5 Fall Unearthing And Burial, 3.9.6 Spring Unearthing And Burial, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.5 Height Of Clouds, 4.2.6 Humidity, 4.2.12 Predicting Weather, 4.2.23 Seasons And The Sun, 4.2.24 Moon Phases And The Sun, 4.2.25 Eclipses, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 4.9.1 Unearthing, 4.9.2 Recycling Project, 5.2.3 Weather And Its Prediction, 5.2.6 Gnomon, 5.3.2 Bird Feeder, 5.3.3 Birds I Know, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.9.3 Decomposition And Archeology

AAAS Benchmarks **DASH Grades 3–5**

11.C. Constancy and Change • Some features of things may stay the same even when other features change. Some patterns look the same when they are shifted over, or turned, or reflected, or seen from different directions.	DASH students are daily observers of change. They see change and constancy in common features of the events around them—in the growth of plants and animals and their own growth, in the decomposition and materials, in their constructing with materials, in their interpersonal relationships. They also see, handle, make, and use numerous things that have shapes that when viewed from different angles appear to be the same-spheres and circles, cubes and squares, and other geometric figures and organisms that mimic these geometries. Examples: Change—3.2.1 Weather, 3.2.2 Temperature, 3.2.4 Wind, 3.2.5 Rain And Snow, 3.2.6 Humidity, 3.2.7 Moon Phases, 3.2.8 Polar Sky Model, 3.2.9 Polar Constellations, 3.2.10 Venus, 3.2.11 Eclipses, 3.3.3 Raising Insects, 3.3.5 Natural Habitats Of Frogs And Toads, 3.3.7 Frog Metamorphosis, 3.3.9 Toads And Insects, 3.3.10 Hatching Chicks, 3.3.11 Chick Growth, 3.4.3 Watching Garden Soil, 3.4.5 Testing Artificial Soil, 3.4.6 Soil And Water, 3.4.7 Garden Planting, 3.4.8 Garden Care, 3.4.9 Garden Watering Systems, 3.4.10 Garden Invaders, 3.4.11 Controlling Insects, 3.4.12 Garden Harvesting, 3.4.13 Flower, 3.4.14 Seeds, 3.4.15 Pollination, 3.9.1 Making Compost, 3.9.2 Watching Compost, 3.9.3 Animals In Compost, 3.9.4 Using Compost, 3.9.5 Fall Unearthing And Burial, 3.9.6 Spring Unearthing, 4.2.1 Rainfall, 4.2.2 Snowfall, 4.2.3 Wind Direction, 4.2.4 Wind Speed, 4.2.5 Height Of Clouds, 4.2.6 Humidity, 4.2.7 Clouds And Weather, 4.2.8 Storm Clouds, 4.2.10 Weather Maps, 4.2.12 Predicting Weather, 4.2.13 Wind Chill, 4.2.14 Flat Or Round Earth. 4.2.15 Length Of Day And Night, 4.2.16 The Sun's Shadow Path, 4.2.17 Planetarium, 4.2.18 Using The Planetarium, 4.2.19 Planets, 4.2.20 When Is It Noon?, 4.2.22 Using A Sundial, 4.2.23 Seasons, 4.3.9 Pet Baby Care, 4.3.10 Our Early Years, 4.3.11 The First Grade Child, 4.3.12 Growth, Development, And Behavior Of Young Pets, 4.3.13 Human Growth And Development, 4.3.14 Changing Dimensions, 4.3.17 Fish Reproduction, 4.3.18 Modeling Our Digestive System, 4.3.22 Migration And Hibernation, 4.3.23 Fall Birds, 4.3.24 Winter Birds, 4.3.25 Spring Birds, 4.4.1 Annual, Biennial, And Perennial Garden Plants, 4.6.1 Growth Chart And Area Measurement, 4.6.2 Tooth Chart, 4.9.1 Unearthing, 5.2.1 Weather Station, 5.2.2 Heat Index, 5.2.3 Weather And Its Prediction, 5.2.4 Fronts, 5.2.5 Clouds, 5.2.6 Gnomon, 5.3.1 Pet Care, 5.3.3 Birds I Know, 5.3.10 Embryology, 5.3.11 Body Changes, 5.4.1 Annual, Biennial, And Perennial Plant Project, 5.4.2 Tree Harvesting, 5.4.3 Tree Planting, 5.4.4 Tree Observation, 5.4.5 Measuring Trees, 5.4.6 Age Of Trees, 5.4.7 Trees, Shrubs, And Grasses, 5.4.8 Grasses: Why Do They Grow There?, 5.4.9 Roots, 5.4.10 Soil Conservation, 5.6.1 Growth Chart And Area Measurement, 5.6.2 Tooth Chart, 5.9.3 Decomposition And Archeology, 5.9.4 Pollution Project

AAAS Benchmarks	DASH Grades 3–5
• Things change in steady, repetitive, or irregular ways—or sometimes in more than one way at the same time. Often the best way to tell which kinds of change are happening is to make a table or graph of measurements.	Rhythm of change and rate of change are both inherent in many DASH studies. To give analyzable accounts of these kinds of change, measurements are constantly made. Investigations involving measurements of rhythm are found in studies of the phase of the moon, the movement of the sun along the ecliptic, the growth, maturity, and death of plants and animals. Rate studies include growth rates, speeds of vehicle, decomposition rates, and rates of heating. Examples: Regular And Irregular Rates Of Change, 3.2.1 Weather, 3.2.6 Humidity, 3.2.7 Moon Phases, 3.2.8 Polar Sky Model, 3.2.9 Polar Constellation, 3.2.10 Venus, 3.2.11 Eclipses, 3.3.3 Raising Insects
11.D. Scale • Almost anything has limits on how big or small it can be.	DASH students are constantly making things and become abundantly aware of size limitation in their constructions. They learn that materials and tools limit both the gigantizing and miniaturizing of constructed things, that animals have natural size limits, as do social groups of different kinds of organization.
• Finding out what the biggest and the smallest possible values of something are is often as revealing as knowing what the usual value is.	DASH students explore the limits of data as well as their average states to get a full sense of proportions.
12. Habits of Mind **12.A. Values and Attitudes** • Keep records of their investigations and observations and not change the records later.	Intellectual honesty is held as a high virtue in the communities of technologists and science researchers in which DASH students participate. Error is expected, accepted, and overcome by alternative contributions by the community or redoing an investigation or remaking a product. Each student has a personal SCIENCE RECORD BOOK. Records are kept as they are generated and changes are recorded as additional data with corresponding explanation.
• Offer reasons for their findings and consider reasons suggested by others.	The DASH community of technologists and scientists is a community of reason. Ideas are presented based on interpreted experience and data and they are judged on the same basis.
12.B. Computation and Estimation • Add, subtract, multiply, and divide whole numbers mentally, on paper, and with a calculator.	Because of the extensive use of measurement in both the technology and science components of DASH, there is a constant use of mathematical operations—addition, subtraction, multiplication, and division. Teachers are encouraged in their DASH training to reinforce the math curriculum and engage the students in mental, paper, and pencil as well as calculator computations.

AAAS Benchmarks	DASH Grades 3–5
• Use fractions and decimals, translating when necessary between decimals and commonly encountered fractions—halves, thirds, fourths, fifths, tenths, and hundredths (but not sixths, sevenths, etc.).	DASH treats mathematics as an essential tool of understanding and analysis. As a result DASH employs the decimal and fractional forms that are most useful to its operations. Fractions and decimals are functionally introduced in grade 2.
• Judge whether measurements and computations of quantities such as length, area, volume, weight, or time are reasonable in a familiar context by comparing them to typical values.	The DASH community of researchers generates multiple examples of most experiments and comparison of measurements of temperature, length, area, volume, weight, and time for reasonableness are automatically made. Data is regularly inspected for compatibility with previously known values.
• State the purpose of each step in a calculation.	Students record the purpose of steps in laboratory mathematical operations in their SCIENCE RECORD BOOKS .
• Read and follow step-by-step instructions in a calculator or computer manual when learning new procedures.	Whenever step-by-step instructions are given for the operation of equipment it is expected that DASH students will decode and interpret those instructions in preparing to use the equipment. This is part of empowering the student to operate independently from adults. It is recognized that the teacher must stand by as a research colleague to help in the interpretive process when the class is unable to adequately interpret instructions.
12.C. Manipulation and Observation • Choose appropriate common materials for making simple mechanical constructions and repairing things.	DASH uses discarded materials as the basic stuff to construct products and repair things. It is up to the student to select those materials that are most appropriate to construction or experimental needs. The materials are delivered in an INVENTOR'S BOX which contains a variety of materials from which selection can be made.
• Measure and mix dry and liquid materials (in the kitchen, garage, or laboratory) in prescribed amounts, exercising reasonable safety.	DASH students measure and mix dry and liquid materials according to recipe in cooking and formula in laboratory investigations.
• Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.	DASH students keep their SCIENCE RECORD BOOKS from grades K–6. There is a premium placed on careful statement of observation and recording of quantitative data since past work is often used at a later time. The WONDER AND DISCOVER BOOK is used to record the student's group unanswered questions and the CONNECTIONS BOOK is used to record the way they tie their work into the larger world outside and inside of school.

AAAS Benchmarks	DASH Grades 3–5
• Use calculators to determine area and volume from linear dimensions, aggregate amounts of area, volume, weight, time, and cost, and find the difference between two quantities of anything.	Teachers are encouraged to have the students use calculators wherever they enhance the mathematical operations. This includes determining area and volume from linear dimensions, aggregate amounts of area, volume, weight, time, and cost, and find the difference between two quantities of anything.
• Make safe electrical connections with various plugs, sockets, and terminals.	Safety is a prime concern of the DASH community. both teacher and student are made responsible for keeping the room in a safe condition at all times. Safety teams work with the teacher each week. Electrical safety is one of the areas of vigilance.
12.D. Communication Skills • Write instructions that others can follow in carrying out a procedure.	DASH students regularly write instructions for their peers to use in carrying out procedures and to build devices.
• Make sketches to aid in explaining procedures or ideas.	DASH students regularly make sketches to explain devices, procedures and ideas.
• Use numerical data in describing and comparing objects and events.	DASH students regularly use numerical data in describing, comparing and explaining products, systems, and events.
12.E. Critical-Response Skills • Buttress their statements with facts found in books, articles, and databases, and identify the sources used and expect others to do the same.	DASH students use standard trade books, reference works, and databases in their investigations and research. As part of their reporting they cite the sources.
• Recognize when comparisons might not be fair because some conditions are not kept the same.	DASH students constantly compare data and as part of their methodology look for constancy in non-variables. They are alert to bias in statistical sampling.
• Seek better reasons for believing something than “Everybody knows that...” or “I just know” and discount such reasons when given by others.	DASH students are practiced at asking for data and authority in assessing claims. This is part of the appeal to reason in their technological and research community.