

GRADE 4 STANDARDS AND BENCHMARKS

September 2005

MATHEMATICS

Number & Operations

Standard 1: Understand and apply concepts of number and operations

Power Benchmark 1: Understand the properties of numbers and number systems

- a. Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.
- b. Recognize equivalent representations for the same number and generate them by composing and decomposing numbers.
- c. Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.
- d. Use models, benchmarks and equivalent forms to judge the size of fractions.
- e. Recognize and generate equivalent forms of commonly used fractions, decimals, and percents.
- f. Explore numbers less than 0 by extending the number line and through familiar application.
- g. Describe classes of numbers according to characteristics such as the nature of their factors.

Power Benchmark 2: Understand the properties of operations

- a. Understand various meanings of multiplication and division.
- b. Understand the effects of multiplying and dividing whole numbers.
- c. Identify and use relationships between operations to solve problems.
- d. Understand and use properties of operations, such as the distributivity of multiplication over addition.

Power Benchmark 3: Compute fluently and make reasonable estimates

- a. Develop fluency with basic number combinations for multiplication and division and use these combinations to mentally compute related problems.
- b. Develop fluency in adding, subtracting, multiplying and dividing whole numbers.
- c. Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results.
- d. Develop and use strategies to estimate computations involving fractions and decimals.
- e. Use visual models, benchmarks and equivalent forms to add and subtract commonly used fractions and decimals.
- f. Select appropriate strategies and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected strategy or tool to solve problems.

Algebra

Standard 2: Understand and apply concepts of algebra and functions

Power Benchmark 1: Understand patterns, relations and functions

- a. Describe, extend, and make generalizations about geometric and numeric patterns.
- b. Represent and analyze patterns and functions, using words, tables and graphs.

Power Benchmark 2: Use symbols to represent and analyze mathematical situations and structures

- a. Identify the commutative, associative, and distributive properties and use them to compute with whole numbers.
- b. Represent the idea of a variable as an unknown quantity using a letter or symbol.
- c. Express mathematical relationships using equations.

Power Benchmark 3: Use mathematical models to represent and understand quantitative relationships

- a. Model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions.

Power Benchmark 4: Analyze change in a variety of situations

- a. Investigate how a change in one variable relates to a change in a second variable
- b. Identify and describe situations with constant or varying rates of change and compare them

Geometry

Standard 3: Understand and apply concepts of geometry

Power Benchmark 1: Analyze characteristics and properties of two- and three-dimensional geometric shapes

- a. Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.
- b. Classify two- and three-dimensional shapes according to their attributes and develop definitions of classes of shapes such as triangles and pyramids.
- c. Investigate, describe, and reason about the results of subdividing, combining and transforming shapes.
- d. Explore congruence and similarity.
- e. Make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions.

Power Benchmark 2: Use coordinate geometry & other representational systems to describe spatial relationships

- a. Describe location and movement using common language and geometric vocabulary.
- b. Make and use coordinate systems to specify locations and to describe paths.
- c. Find the distance between points along horizontal and vertical lines of a coordinate system.

Power Benchmark 3: Use transformations and symmetry to analyze mathematical situations

- a. Predict and describe the results of sliding, flipping and turning two-dimensional shapes.
- b. Describe a motion or a series of motions that will show that two shapes are congruent.
- c. Identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs.

Power Benchmark 4: Use visualization, spatial reasoning and geometric modeling to solve problems

- a. Build and draw geometric objects.
- b. Create and describe mental images of objects, patterns, and paths.
- c. Identify and build a three-dimensional object from two-dimensional representations of that object.
- d. Identify and draw a two-dimensional representation of a three-dimensional object.
- e. Use geometric models to solve problems in other areas of mathematics such as number and measurement.
- f. Recognize geometric ideas and relationships and apply them to other disciplines and to problems that arise in the classroom or in everyday life.

Measurement

Standard 4: Understand and apply concepts of measurement

Power Benchmark 1: Understand measurable attributes and processes of measurement

- a. Understand such attributes as length, area, weight, volume and size of angle and select the appropriate unit of measure.
- b. Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.
- c. Carry out simple unit conversions within a system of measurement.
- d. Understand that measurements are approximations and understand how differences in units affect precision.
- e. Explore what happens to measurements of a two-dimensional shape such as its perimeter or area when the shape is changed in some way.

Power Benchmark 2: Apply appropriate techniques, tools and formulas to determine measurements

- a. Develop strategies for estimating the perimeters, areas, and volumes of irregular shapes.
- b. Select and apply appropriate standard units and tools to measure length, area, volume, weight, elapsed time, temperature and the size of angles.
- c. Select and use benchmarks to estimate measurements.
- d. Develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms.
- e. Develop strategies to determine the surface areas and volumes of rectangular solids.

Data Analysis & Probability

Standard 5: Understand and apply concepts of data analysis and probability

Power Benchmark 1: Collect, organize, and display data to answer questions

- a. Design investigations to address a question and consider how data-collection methods affect the data set.

- b. Collect data using observations, surveys, and experiments.
- c. Represent data using a variety of tables and graphs.
- d. Recognize the differences in representing categorical and numerical data.

Power Benchmark 2: Use statistical methods to analyze data

- a. Describe the shape and important features of a set of data and compare related data sets.
- b. Use measures of center, focusing on the median, and understand what each does and does not indicate about a data set.
- c. Compare and evaluate different representations of the same data.

Power Benchmark 3: Read and interpret data

- a. Propose and justify conclusions and predictions that are based on data.

Power Benchmark 4: Use basic probability concepts

- a. Describe events as likely or unlikely and discuss the degree of likelihood using such words as certain, equally likely, and impossible.
- b. Predict the probability of outcomes of simple experiments and test the predictions.
- c. Understand that the measure of the likelihood of an event can be rectangular solids.

SCIENCE

Power Standard 1: Understands and applies principles of scientific inquiry

Concepts: Scientific reasoning

- a. Understands how scientific knowledge changes with new evidence.
- b. Uses the scientific method to gather, analyze, and interpret data.
- c. Uses appropriate tools for scientific investigations.
- d. Demonstrates safe handling procedures.

Concepts: Structure, function

- a. Bones have several functions: support, protection, and movement.
- b. The human skeleton has three types of joints: hinge, ball-and-socket, and gliding joints.
- c. Muscles provide movement, coordination, and structure for the body.
- d. Bones, muscles, and the central nervous system work together to respond to stimuli.

Power Standard 3: Understands and applies the basic concepts of earth science

Concepts: Structure, change, properties.

- a. Earth materials have a variety of characteristics that can be identified.
- b. The properties of hardness, streak, luster, and color differentiate minerals.
- c. Earth materials can combine to form new substances.

Power Standard 4: Understands and applies the basic concepts of physical science

Concepts: Structure, change, properties

- a. Magnets attract and repel each other and certain other materials.
- b. A circuit is a pathway through which electric current flows.
- c. Series and parallel circuits.
- d. Electro-magnetism is magnetism created by current flowing through a conductor.

LANGUAGE ARTS

Standard: Students will be able to apply reading, writing, speaking and listening skills to communicate effectively.

Reading

Power Standard: Students will be able to read, analyze, and understand a variety of literary and informational texts for varied purposes

Power Benchmark 1: Demonstrates accuracy and fluency when reading grade appropriate text

- a. Reads grade level materials accurately.
- b. Reads with fluency.

Power Benchmark 2: Uses a variety of comprehension processes

- a. Uses the elements of reciprocal teaching (clarifying, questioning, summarizing and predicting).
- b. Retells stories or parts of stories or books through oral or written tasks.

- c. Responds to text in a variety of ways (oral, written, artistic, movement) to show comprehension.
- d. Identifies the author's purpose.
- e. Analyzes the style or structure of a text.

Power Benchmark 3: Demonstrates the ability to learn new vocabulary to increase comprehension of texts.

- a. Uses a variety of strategies to gain and apply meaning of unfamiliar words.

Writing

Power Standard: Students will be able to use the writing process and apply a working knowledge of the English language to write for a variety of purposes.

Power Benchmark 1: Uses the writing process

- a. Uses the 5 step writing process (pre-write, draft, revise, edit, publish)

Power Benchmark 2: Varies writing according to purpose

- a. Uses a variety of forms to write for different purposes

Power Benchmark 3: Applies language conventions in writing

- a. Uses sentence and grammatical structure in written work
- b. Spells grade appropriate words correctly
- c. Uses capitalization and punctuation

Communication

Power Standard: Students will be able to use speaking, writing and listening strategies and technological tools to support self-directed learning, and to share/receive information to work with diverse groups in a variety of situations.

Power Benchmark 1: Communicates effectively using speaking, listening and technology skills

- a. Uses speaking skills to communicate effectively
- b. Uses listening skills to communicate effectively
- c. Uses technology skills to communicate effectively

SOCIAL STUDIES

Standard: Students will be able to understand the development of civic responsibility and the influence of economics, geography, history, political science, and behavioral science on individuals and societies.

Power Benchmark - History: Understand the formation, development, and change of societies through time

- a. Understand the origins and significance of customs, holidays, celebrations, and landmarks in the family, community, state, nation, and world.
- b. Understand that the past influences the present.
- c. Explore regional folklore and cultural contributions that help form our heritage.
- d. Understand human influence in shaping communities:
 - contributions of ordinary people
 - historic figures and their lives
- e. Understand the concepts of time and chronology.
- f. Understand the history of their community.
- g. Understand the history of indigenous peoples who lived in Iowa.
- h. Understand the interaction and influence of the immigrants who came to Iowa.
- i. Understand how human needs, ideas, issues, and events influence the past and present:
 - exploration and settlement immigration
 - growth and westward expansion
- j. Understand the significance and change brought about by scientific discoveries and technological inventions.

Power Benchmark - Political Science: Identify and analyze various governments, emphasizing the role of the citizen in a participatory government

- a. Describe rules and procedures that contribute to an effective family and community.
- b. Identify and practice rules and procedures that contribute to an effective classroom, school and community.
- c. Understand and practice good citizenship.

- d. Understand school, city, state, and national identities:
 - flags, symbols, anthems, pledges
 - customs, commemorations, and celebrations
 - mottoes
- e. Understand the purpose of rules and laws.
- f. Understand the levels of government (local, state, and national).

Power Benchmark - Economics: Understand the nature of world economies and their impact on the human condition

- a. Give examples of the various institutions that make up economic systems such as families, workers, banks, labor unions, government agencies, small businesses, and large corporations.
- b. b. Examine the distribution and use of natural resources in home, school, community, the nation, and the world
- c. Distinguish between goods and services.
- d. Identify examples of supply and demand.

Power Benchmark - Geography: Analyze the impact of location, place, human environmental interaction, movement, and region on the world's people

- a. Recognize the five themes of geography location, place, human interaction with the environment, movement, and regions.
- b. Construct and use mental maps of communities, regions, and the world that demonstrate understanding of relative location, direction, size, and shape.
- c. Interpret, use, and distinguish various representations of the earth, such as maps, globes, and photographs.
- d. Use appropriate resources, data sources, and geographic tools, such as atlases, data bases, grid systems, charts, graphs, and maps to generate, manipulate, and interpret information.
- e. Describe how people create places that reflect ideas, personality, culture, and wants and needs as they design structures such as homes, playgrounds, and classrooms.
- f. Understand directions.
- g. Understand the purpose of a globe.
- h. Apply knowledge of a globe to locate information.
- i. Locate and describe varying landforms and geographic features, such as mountains, plateaus, islands, rain forests, rivers, deserts, and oceans.
- j. Explain the relationship of landforms within the ecosystem.
- k. Estimate distance, calculate scale, and distinguish other geographic relationships such as population density and spatial distribution patterns.
- l. Describe the geographic regions of the United States.

Power Benchmark - Behavioral Science: Understand the interactions of the individual and society and analyze human behavior and the range of its influences on human development to promote lifelong wellness

- a. Demonstrate and practice the Skills for Life to be able to work independently and cooperatively to accomplish goals.
- b. Demonstrate behavior appropriate to activity or location (school assemblies and functions, study trips, museums, memorials, parades, etc.).
- c. Describe the ways family, gender, ethnicity, nationality, and institutional affiliations contribute to personal identity.
- d. Identify and describe ways family, groups, and community change over time.
- e. Explore factors that contribute to one's personal identity such as interests, capabilities, and perceptions.
- f. Analyze a particular event to identify reasons individuals might respond to it in different ways.
- g. Understand how the arts express cultural heritage and our humanity:
 - literature,
 - music, drama, dance
 - role of writers and artists
 - art architecture

PHYSICAL EDUCATION

Standard: Students will display the skills and practices of a physically active lifestyle.

Power Benchmark 1: Identify and model a health-enhancing level of physical fitness

- a. Identifies mental and emotional benefits that result from participation in physical activities.
- b. Applies the knowledge of heart rate to participation in physical activity.

Power Benchmark 2: Demonstrate competency in performance and apply knowledge of many movement concepts and forms.

- a. Refines manipulative skills.
- b. Refines balancing activities with partners and small groups.
- c. Performs a variety of tumbling movements in sequence.
- d. Refines the skills of travel and changing directions while manipulating equipment.

Power Benchmark 3: Demonstrate responsible, personal and social behavior in a physical activity setting

- a. Knows and applies rules and procedures in the gymnasium and outdoor physical education areas.
- b. Interacts positively with students in class regardless of personal difference.
- c. Demonstrates cooperation with others in group tasks.

VISUAL ARTS

Standard: Students will understand, produce, and value visual art.

Power Benchmark 1: Process, analyze, and respond to sensory information through the language and skills unique to the visual arts

- a. Describe, analyze, and use the elements of art as they are used in works of art.
- b. Describe, analyze, and use of the principles of design, emphasizing contrast and proportion.

Power Benchmark 2: Use media, techniques, and processes to communicate ideas, experiences, feelings, and stories

- a. Develop skills in a variety of media, techniques, and processes to express ideas, thoughts, and feelings.
- b. Understand how choice of subject matter, symbols, and ideas affect meaning of works of art.
- c. Use materials and tools in a safe and responsible manner.

Power Benchmark 3: Understand the historical contributions and cultural dimensions of the visual arts

- a. Identify artists as historical and cultural recorders.
- b. Identify specific works of art as belonging to particular cultures, times, and places.

Power Benchmark 4: Respond to, analyze, and make judgments about works in the visual arts

- a. Know how using the language of the visual arts helps to clarify personal responses to works of art.
- b. Understand the influences on the development of an artist's work.

MUSIC

Standard: Student will be able to understand, perform, and value music.

Power Benchmark 1: Singing alone and with others, a varied repertoire of music

- a. Sings a variety of increasing complex melodic and harmonic songs in various keys, meters, styles, and genres. alone and with a group, becoming more accurate in pitch and rhythm.
- b. Sings expressively with appropriate timbre, diction, dynamics, phrasing, interpretation, and posture.
- c. Performs by responding accurately to conductor/teacher cues.

Power Benchmark 2: Perform on instruments alone and with others, a varied repertoire of music

- a. Maintains a steady tempo independently and in a group.
- b. Performs simple rhythmic and melodic patterns accurately.
- c. Performs instrumental parts independently while others sing or play contrasting parts.

Power Benchmark 3: Improvising melodies, variations, and accompaniments

- a. Improvises short songs and instrumental pieces using a variety of sound sources (traditional, body sounds, nontraditional).
- b. Improvises within a tonal framework.

Power Benchmark 4: Composes and arranges within specific guidelines

- a. Creates a melody to a pre-selected text (i.e., short chant or rhyme).
- b. Creates an accompaniment for a pre-selected melody or poem.

Power Benchmark 5: Reading and notating music

- a. Reads whole, dotted half, half, quarter, eighth notes, and rests in duple and triple meters.
- b. Reads absolute note names on treble clef staff.
- c. Begins to identify musical symbols & traditional terms referring to dynamics, tempo and articulation.

Power Benchmark 6: Listening to, analyzing, and describing music

- a. Identifies music forms.
- b. Uses appropriate terminology in explaining music.
- c. Experiences music of various styles representing various cultures.

Power Benchmark 7: Evaluating music and music performances

- a. Devises criteria for evaluating performances and compositions.

Power Benchmark 8: Understands relationships between music, the other arts and disciplines outside the arts

- a. Identifies similarities and differences between music and other disciplines.
- b. Identifies ways in which music and other disciplines are interrelated.
- c. Experiences affective qualities of various arts.

Power Benchmark 9: Understanding music in relation to history and culture

- a. Experiences aural examples of music from various cultures and historical periods.
- b. Demonstrates appropriate audience behavior for the context and style of music performed.

ORCHESTRA

Standard: Students will be able to understand, perform, and value music.

Power Benchmark 1: Singing, alone and with others, a varied repertoire of music

- a. Begin introductory ear training.

Power Benchmark 2: Performing on instruments, alone and with others, a varied repertoire of music

- a. Establish left hand skills.
- b. Establish right hand skills.
- c. Solo/Ensemble Skills.

Power Benchmark 3: Improvising melodies, variations, and accompaniments

- a. Improvise rhythmic and melodic patterns.

Power Benchmark 4: Composing and arranging music within specified guidelines

- a. Create a melody following specified patterns or guidelines.
- b. Create rhythm patterns following specified patterns or guidelines.
- c. **Power Benchmark 5: Reading and notating music**
- d. Read and perform simple rhythm patterns.
- e. Read and perform basic note patterns.
- f. Read and perform basic dynamics, bowings, and articulation.

Power Benchmark 6: Listening to, analyzing, and describing music

- a. Analyze various elements in music.
- b. Identify/experience different musical instruments and timbres.
- c. Identify musical elements.

Power Benchmark 7: Evaluating music and music performances

- a. Evaluate musical performances and compositions.
- b. Assess large group and/or individual performance.

Power Benchmark 8: Understanding relationships between music, the other arts, and disciplines outside the arts

- a. Teachers will discuss similarities and differences between music and other disciplines.
- b. Teachers will identify ways in which music and other disciplines are interrelated and discuss how students participate in interrelated events.

Power Benchmark 9: Understanding music in relation to history and culture

- a. Teachers will provide musical examples from various historical periods and cultures.
- b. Teachers will introduce the composers, genre, cultural background, and performance practices.