School District 51
Fifth Grade Standards

5th Grade Standards-MATH-

STANDARD 1: NUMBER SENSE -Students develop number sense and common sense about numbers and use numbers and number relationships in problem-solving situations and communicate the reasoning used in solving these problems

STANDARD 2: ALGEBRA - Students use algebraic methods to explore, model, and describe patterns and functions involving numbers, shapes, data, and graphs in problem-solving situations and communicate the reasoning used in solving these problems

STANDARD 3: DATA ANALYSIS - Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning and processes used in solving these problems

STANDARD 4: GEOMETRY - Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems

STANDARD 5: MEASUREMENT - Students use a variety of tools and techniques to measure, apply the results in problem-solving situations, and communicate the reasoning involved in solving these problems

STANDARD 6: COMPUTATION - Students link concepts and procedures as they develop and use computational techniques, including estimation, mental arithmetic, paper-and-pencil, calculators, and computers, in problem-solving situations and communicate the reasoning involved in solving these problems

- Adding and subtracting like denominator fractions
- Estimate techniques to problem solve
- Addition, subtraction, multiplication and division
- Square numbers
- Even, odd and prime number characteristics
- Order positive rational numbers characteristics
- Estimation, determination and justify solutions to problems
- Locate commonly used positive rational numbers
- Recognize equivalent representations for the same number
- Use concrete materials or pictures, determine commonly-used percentages in problem solving
- Estimate sums and differences of fractions and decimals
- Demonstrate addition, subtraction, multiplication and division
- Explain strategies to addition and subtraction of common fractions with the denominator
- Determine from real world problems
- Given a real world problem, use an appropriate method

- Given a math sentence, create a real world problem
- Compare commonly-used proper fractions and terminating decimals
- Develop, test, and explain conjectures about properties of whole numbers and commonly-used fractions and decimals
- Use number properties (commutative, associative, identify) to evaluate numeric expressions and solve equations
- Using concrete materials, demonstrate the equivalence of commonly used fractions, terminating decimals, and percents
- Use and explain strategies to add, subtract, multiply and divide whole numbers in problem-solving situations.
- Determine whether information given in a problem-solving situation is sufficient, insufficient, or extraneous
- In a problem-solving situation determine whether the results are reasonable
- Identify, compare and contrast 2 and 3 dimensional shapes and develop vocabulary for attributes
- Make and test conjectures about geometric relationships, and develop logical arguments to justify arguments
- Read coordinate pairs
- Solve problems of area of triangles and squares
- Predict and describe translate, rotate and reflect 2 dimensional shapes
- Show lines of symmetry
- Determine unit of measurement when estimating
- Demonstrate change of one dimension of a rectangle effects its perimeter
- Read and interpret scales on number lines, graphs and maps
- Find the perimeter and area of rectangles and squares using appropriate units
- Demonstrate how changing one of the dimensions of a rectangle effects it's area
- Select the appropriate scale for a given problem
- Represent a 3-D shape in 2-D
- Choose the coordinate graph which represents a given data set
- Use maps and grids to locate points, create paths and measure distances within a coordinate system
- Solve problems involving the perimeter of polygons
- Estimate the length of common objects
- Estimate the perimeter of polygons
- Estimate the measures of angles
- Describe angles as acute, obtuse, and right
- Select and use the appropriate unit and tool to measure to the degree of accuracy required in a particular problem.
- Measure the sides of rectangles, squares, and triangles to the nearest ¼ inch and nearest centimeters
- Analyze data and draw conclusions based on data displays such as tables, charts, line graphs, pictographs and line plots
- Describe how data collection methods affect the nature of the data set
- Describe events such as likely or unlikely and explain the degree of likelihood using works, such as certain, equally likely, and impossible
- Use zero to represent the probability of an impossible event and one to represent the probability of a certain event
- Using a chance device, such as a number cube or a spinner, design a fair game and an unfair game, and explain why they are fair and unfair
- Make predictions based on data obtained from simple probability experiments
- Solve problems using strategies for finding all possible combinations and or arrangements

- Use and explain strategies to addition and subtraction of common fractions with the denominator
- Represent, describe, and analyze geometric and numeric patterns
- Identify such properties commutative, associative, distributive and use them to compute with whole numbers
- Match a description of a situation with its continuous graph
- Differentiate between categorical and numerical data
- From a given scenario, choose the correct graph from possible graph representations
- Organize, construct and interpret displays of data
- Describe how a change in one quantity results in a change in another quantity
- Solve problems by representing and analyzing patterns using words, tables and graphs
- To solve problems involving linear relationships with whole numbers
- Read, interpret and draw conclusions from various displays of data
- Make convincing arguments based on data analysis
- Recognize that variable is used to represent an unknown quantity
- Distinguish between the median and mode of a data set
- Determine the range of a set of data
- Use common fractions to represent the probability of events that are neither certain nor impossible
- Determine the appropriate unit of measure when estimating distance, capacity, and weight
- Demonstrate how changing one of the dimensions of a rectangle affects its perimeter
- Read and interpret scales on number lines, graphs and maps
- Demonstrate how changing one of the dimensions of a rectangle affects its area
- Make and test conjectures about geometric relationships, and develop logical arguments to justify arguments
- Use common fractions to represent the probability of events that are neither certain nor impossible
- Make convincing arguments based on data analysis
- Given a coordinate graph, read coordinate pairs in quadrant one
- Solve problems involving the area of rectangles and squares
- Predict and describe the results of flipping, sliding, turning a two dimensional shape
- Show lines of symmetry for geometrical shapes
- Identify factors, multiples, and prime/composite numbers
- Demonstrate the equivalent relationships among fractions, decimals and percents
- Use number sense to estimate sums and differences of fractions and decimals using bench marks
- Recognize that a variable is used to represent an unknown quantity
- Distinguish between the median and mode of data set
- Determine the range of a set of data

5th Grade Standards-SCIENCE-

Construct and use classification systems based on the structure of organisms.

- List physical characteristics of an animal that could be useful for identification.
- Select and use one characteristic to sort a group of plants or animals.
- Sort a group of organisms based on their function in an ecosystem (e.g., producers, consumers, or decomposers).
- Sort animals into two groups, vertebrates and invertebrates.

Explain the interaction and interdependence of nonliving and living components within ecosystems.

- Name examples of nonliving abiotic components of an ecosystem (e.g., climate, light, H_2O, nutrients, fire).
- Describe examples of nonliving characteristics of the local environment.
- Explain how the nonliving characteristic of an environment has affected the types of plants and animals that live there**.**

Create and interpret food chains and food webs.

- Draw a food web that includes the Sun.
- Explain that the arrows on a food web represent the flow of energy.
- Compare and contrast concepts of food chains and food webs; include producers, consumers, and decomposers.

Describe how people use science and technology in their professions.

- Describe specific scientific and/or technological uses in a profession.

Investigate and describe the extent of human uses of renewable and nonrenewable resources (*for example: forests, fossil fuels*).

- Distinguish between renewable (e.g., solar, wind, biomass, geothermal, water) and nonrenewable energy resources (e.g., coal, oil, natural gas). (Biomass encompasses fuels from biological sources such as wood, ethanol, and landfill gas).
- Identify positive and negative consequences of using renewable and nonrenewable energy resources, (e.g., solar → nonpolluting but expensive to manufacture; coal → plentiful but requires additional pollution controls; wind → nonpolluting but intermittent; oil → inexpensive but in limited supply).
- Describe sustainable uses of natural resources, (e.g., logging practices that preserve the health and biodiversity of forests; agricultural practices that ensure preservation of soil resources; water storage, conservation, and treatment practices that ensure the continued availability of clean fresh water) and describe the methods of maintaining the health of natural environments by managing human use and impacts.
- Recognize common uses of some of Earth's natural energy resources, (e.g., coal and nuclear used for electricity, solar radiation used for heating, hydroelectric used for electricity, natural gas used for heating, oil and biomass made into fuels).

Describe the advantages and disadvantages that might accompany the introduction of a new technology *(for example: mountain bikes, cellular telephones, pagers).*

- Given a new technology, identify its advantages and/or disadvantages (e.g., titanium used for stronger bikes but has high cost; the computer age uses less paper but requires more electricity and metal wiring).
- Recognize that technologies often have drawbacks as well as benefits. A technology that helps some people or organisms may hurt others.

Use metric units in measuring, calculating, and reporting results.

- Use an illustration of a graduated cylinder, gram scale or metric ruler to determine the volume in milliliters, mass in grams or dimensions in centimeters of an illustrated object.
- Describe data using appropriate metric units.
- Identify and classify factors causing change within a system (*for example: force, light, heat*).
- Identify cause and effect pairs involved in changes associated with a system (e.g., heating and cooling causes changes in some of the properties of materials; pushing and pulling an object affect the motion of the object; changes in pressure affect gases; changing the position of a mirror alters the path direction of light).
- Given a before and after picture, describe what might have caused the change.

Identify and predict what will change and what will remain unchanged when matter experiences an external force or energy change (*for example: boiling a liquid; compare the force, distance, and work involved in simple machines*).

- Predict the changes in motion of an object when a force is applied (e.g., moves faster or slower, changes direction).
- Given a particular system, predict what change will happen if the system undergoes a change in energy (e.g., a solid melts when heat is applied).
- Given a simple machine (lever, pulley, inclined plane) predict what will happen if there is a change in the system (e.g., changing the angle of an inclined plane, changes in placement of levers, fulcrum, adding a pulley).

Observe and gather data to support the concept of conservation of mass within a closed system (*for example: precipitation reaction, forming mixtures, gas production*).

- Given a physical change in a closed system, describe why the mass does not change.
- Predict resulting data based on the concept of “conservation of mass”.
- Identify and evaluate alternative explanations and procedures.
- Design a process/procedure including appropriate variables, constants, and controls to investigate a scientific question (in a chart, table, graph or qualitative observations).
- State two or more reasonable explanations for the data from an investigation.
- Use appropriate tools, technologies, and measurement units to gather and organize data.
- Determine the volume, mass, or dimensions of an object or substance.

Communicate results of their investigations in appropriate ways (*for example: written reports, graphic displays, oral presentations*).

- Given a question and a set of data, select a graph that best displays the data.

Explain that scientific investigations sometimes result in unexpected findings that lead to new questions and more investigations.

Describe qualitative and quantitative relationships, using data and observations and graphs, associated with energy transfer or energy transformation (*for example: speed of object vs. height of ramp; length of string vs. pitch of sound; electric current vs. volume of gas produced in electrolysis, with length of time kept constant*).

- Using graphs, observations, and data, compare the potential energy and kinetic energy within a system at various locations or times (e.g., roller coaster, waterfall).

Ask questions and state hypotheses that lead to different types of scientific investigations (*for example: experimentation, collecting specimens, constructing models, researching scientific literature*).

- Select appropriate methods (experimentation, collecting specimens, constructing models, researching scientific literature) to answer a scientific question.
- Given a situation/dilemma/issue, write a scientific question to frame an investigation.
- Identify a question that could have motivated the collection of the data.
- Select a question that can be answered by a scientific investigation.
- Write a hypothesis that matches a given question using an “If, Then” statement or other format.

Interpret and evaluate data in order to formulate conclusions.

- Given a question and a set of data, select a graph that best displays the data.
- Describe the relationships between two variables (e.g., time and temperature) in a given scientific investigation based on a given data table, chart, or graph.
- Given data in a table or graph, describe weather or not the data supports a given hypothesis. Use evidence from that data table, chart, or graph to back up conclusions or explain why the hypothesis should be rejected.
- Given a data table or graph and hypothesis, generate new questions to investigate based on results given.

Create a written plan for an investigation.

- Identify the evidence you need to collect in order to answer a certain scientific question.
- Given a question or hypothesis, write or critique an investigative process/procedure.
- Identify the data that you would collect and the conditions that remain constant in a scientific investigation.
- Explain why multiple trials or large sample sizes improve the confidence in or accuracy of results from an investigation.
- Identify multiple trials or large sample sizes as a means of improving the confidence in or accuracy of results from an investigation.
- Identify and classify factors causing change within a system (*for example: force, light, heat*).
- Identify cause and effect pairs involved in changes associated with a system (e.g., heating and cooling causes changes in some of the properties of materials; pushing and pulling an object affect the motion of the object; changes in pressure affect gases; changing the position of a mirror alters the path direction of light).

Examine, describe, compare, measure, and classify objects based on common physical and chemical properties (*for example: states of matter, mass, volume, electrical charge, temperature, density, boiling points, pH, magnetism, solubility*).

- Distinguish between physical (e.g., density, states of matter--solid, liquid, gas, and plasma, magnetism, hardness, melting point, boiling point, solubility) and chemical properties (e.g., flammability, pH, chemical reactivity).
- Describe and compare substances using physical properties.
- Describe and compare substances using chemical properties.
- Distinguish between physical and chemical changes.
- Use appropriate tools, and metric measurement units to gather data about an object’s characteristics (e.g., metric ruler [mm, cm], thermometer [Celsius],

graduated cylinder [mL], balance [g], stopwatch [s]). (*For example: given the volume, mass, and formula be able to calculate density*.)

Describe large scale and local weather systems (*for example: fronts, air masses, storms*).

- Use several pieces of evidence (cloud observations, weather maps) to show that weather systems generally move from west to east in the United States.
- Relate changes in local weather to the general motion of regional air masses.
- Identify a front as a boundary between air masses of different temperatures.
- Describe the distribution and circulation of the world's water through oceans, glaciers, rivers, groundwater, and the atmosphere.
- Interpret an illustration of the water cycle.
- Explain the processes and relationships that connect elements of the water cycle.

Investigate and compare the properties and behavior of water in its solid, liquid, and gaseous states.

Describe how the use of technology can help solve an individual or community problem (*for example: using catalytic converters on autos to help reduce air pollution*).

Identify and illustrate natural cycles within systems (*for example: water, planetary motion, geological changes, climate*).

Identify, compare, and predict variables and conditions related to change (*for example: climate, population, motion*).

Describe the growth and development of several organisms (*for example: embryonic development of a vertebrate*).

- Describe the life stages of vertebrates beginning with a sperm and egg (e.g., human, chick, frog), and invertebrates (e.g., complete metamorphosis and incomplete metamorphosis).
- Explain the tem life cycle and give examples.
- Compare and contrast how a human fetus and a bird embryo in an egg meet their needs for food, water, and oxygen.

Separate mixtures of substances based on their properties (*for example: solubility, boiling points, magnetic properties, densities*).

- Separate a mixture based on differences in physical properties (e.g., solubility, color, particle size, magnetic properties, and density).

Measure quantities associated with energy forms (*for example: temperature, mass, speed, distance, electrical charge, current, voltage*).

- Identify different types of energy forms (e.g., light, heat, sound, kinetic, electrical, chemical, mechanical-potential and kinetic).
- Quantify energy forms, (e.g., temperature change before and after heating a liquid; measure voltage through wires; temperature change caused by light shining on a surface; distance a rubber band travels when it is stretched; distance an object travels after acted on with different forces).

Describe the recycling of materials by determining a pathway of a substance that is important for life.

Explain how atmospheric circulation is driven by solar heating (*for example: the transfer of energy by radiation, convection, conduction*).

Observe, measure, and record changes in weather conditions (*for example: humidity, temperature, air pressure, cloud types, wind, precipitation*).

- Use data tables to compare weather conditions in various locations.
- Create and/or analyze a line graph to interpret weather changes over time.

Use appropriate tools, technologies, and measurement units to gather and organize data.

- Determine the volume, mass, or dimensions of an object or substance.
- Select appropriate tools and metric measurement units to gather data given an experimental procedure.
- Organize data appropriately into tables, charts, and/or graphs given the hypothesis and procedure/design process of a scientific investigation.
- Given a set of data, construct a graph.

Describe the basic composition, properties, and structure of the atmosphere (*for example: the range and distribution of temperature and pressure in the troposphere and stratosphere*).

- Identify the main components of air (nitrogen, oxygen, carbon dioxide, water, inert gases).
- Interpret evidence that air takes up space and has mass.
- Describe the relationship between altitude and temperature.

Classify and describe matter in terms of elements, compounds, mixtures, atoms, and molecules (*for example: copper is an element, water is a compound, air is a mixture*).
Use a model to predict change (*for example: computer simulation, video sequence, stream table*).
Describe the structures and functions of human body systems.