Green Infrastructure Toolkit For Schools

Engagement and Resources for Integrating Green Infrastructure into the Classroom

Nebraska Science and Mathematics
Curriculum Standard Overview

The Nebraska science and mathematics curriculum standards are designed to test student performance on a variety of topics. Each school district in Nebraska is responsible for students to become science and math literate by creating a K-12 science curriculum that meets the state standards. The standards are laid out by grade level, Kindergarten through Grade 12. Both Science and Mathematics standards are categorized into four science inquiries. There is the Nature of Science and Technology, Physical Science, Life Science, and Earth and Space Science for the Science standards, and Number, Algebra, Geometry, and Data for the Mathematics standards.

The Nebraska State Board of Education adopted the current version of the Nebraska Science Standards on October 6th, 2010. The standards are to be reviewed and updated every seven years and are currently going through the revision process. These standards set the stage for what is taught in classrooms across the state.

Green infrastructure is an excellent way to teach many specific science and math topics inside and outside of the classroom. In addition to science, green infrastructure applies to other subject areas including technology, engineering, arts, and math. These subjects together are often known as STEM or STEAM. This packet of information is the start of creating a better awareness with those in the education system of what is possible with green infrastructure and using it as a means to become more aware of our community's environment.

The standards that have been selected and listed in this package are taken from the 2011 Nebraska Science Standards and 2015 Nebraska Mathematics Standards from the Nebraska Department of Education and can be met through the use of green infrastructure principles and practices. Green infrastructure can be used to explore many areas of science including the water cycle, botany, horticulture, insects and animals, soil science, weather, climate change, environmental pollution, chemistry, and more. It can also involve many areas of math such as calculation, measuring, and chart reading. Utilization of green infrastructure principles and practices provides a dynamic opportunity for students to meet and exceed these science standards. For example, the Science standard 2.4.2.b for K2 states, "Recognize ways in which individuals and families can conserve Earth's resources by reducing, reusing, and recycling." Runoff from a school roof can be directed into a rain garden where plants will use the water rather than letting it go down the storm drain, carrying pollution with it. The Math standard MA 2.3.3.d for second graders states, "Measure the length of an object using two different length units and describe how the measurements relate to the size of the specific unit." A rain garden can provide students a hands-on opportunity to measure its length and width, while also learning about unit conversion.

Standards selected and listed here can be taught using green infrastructure principles and practices. Depending on a teacher's lesson plan, there may be other standards that could be applied to incorporate green infrastructure; so view this document not as a definitive list but as a resource to build upon. One final note: this package is only good if it is used, so we want feedback on how to improve it into the future. Please send questions, comments, or inquiries to omahastormwater@ci.omaha.ne.us, thank you!

Inquiry - the Nature of Science, and Technology

Inquiry – Students will ask questions and conduct investigations that lead to observations and communication of findings. 2.1.1

1. Scientific Questioning: Explore teacher generated questions that relate to a science topic 2.1.1.a

2. Scientific Investigation: Participate in simple, teacher-facilitated investigations 2.1.1.b

3. Scientific Tools: Explore the guided use of tools (e.g., hand lens, balance, nonstandard measurement tools) 2.1.1.c

4. Scientific Observations: Using the five senses, describe objects, organisms, or events through pictures, words, and numbers 2.1.1.d

5. Scientific Data Collection: Collect and record observations using pictures, words, and symbols (e.g., weather charts, birthdays, lost teeth) 2.1.1.e

6. Scientific Communication: Use drawings and words to describe and share observations with others 2.1.1.f

7. Mathematics: Use appropriate mathematics in all aspects of scientific inquiry 2.1.1.g

Physical Science

Matter – Students will observe and describe properties of objects and their behavior. 2.2.1

1. Properties and Structure of Matter: Observe physical properties of objects (freezing and melting, sinking and floating, color, size, texture, shape, weight) 2.2.1.a

2. Properties and Structure of Matter: Separate and sort objects by physical attributes (texture, weight) 2.2.1.b

3. Properties and Structure of Matter: Measure objects using non-standard (e.g., paperclip length, pencil length) and standard (e.g., inches, centimeters) units 2.2.1.c

4. States of Matter: Identify solids and liquids and recognize that liquids and recognize that liquids take the shape of their container 2.2.1.d

Force and Motion-Students will compare relative position and motion of objects. 2.2.2

1. Motion: State location and/or motion relative to another object or its surroundings (in front of, behind, between, over, under, up, and down) 2.2.2.a

2. Motion: Describe how objects move in many different ways (straight, zigzag, round and round, back and forth, and fast and slow) 2.2.2.b

Life Science

Structure and Function of Living Systems – Students will investigate the characteristics of living things. 2.3.1

1. Characteristics of Life: Differentiate between living and nonliving things 2.3.1.a

2. Characteristics of Living Organisms: Identify the basic needs of living things (food, water, air, space, shelter) 2.3.1.b

3. Characteristics of Living Organisms: Identify external parts of plants and animals 2.3.1.c

4. Characteristics of Living Organisms: Observe and match plants and animals to their distinct habitats 2.3.1.d

Heredity – Students will recognize changes in living things. 2.3.2

1. Inherited Traits: Describe how offspring resemble their parents 2.3.2.a

2. Reproduction: Describe how living things change as they grow 2.3.2.b

Biodiversity– Students will recognize changes in organisms. 2.3.4

1. Biological Adaptations: Recognize seasonal changes in animals and plants 2.3.4.a

Earth and Space Science

Earth Structures and Processes – Students will observe, identify, and describe characteristics of Earth's materials. 2.4.2

1. Properties of Earth Materials: Describe Earth materials (sand, soil, rocks, water) 2.4.2.a

2. Use of Earth Materials: Recognize ways in which individuals and families can conserve Earth's resources by reducing, reusing, and recycling 2.4.2.b

Energy in Earth's Systems – Students will observe simple patterns of change on Earth 2.4.3

1. Energy Sources: Observe that the Sun provides heat and light 2.4.3.a

2. Weather and Climate: Observe and describe simple daily changes in weather 2.4.3.a

Reference:
SAMPLE K-12 SCIENCE CURRICULUM 2011 [PDF].(n.d.). Lincoln: Nebraska Department of Education.
NEBRASKA SCIENCE STANDARD GRADE K12 2010 [PDF].(n.d.). Lincoln: Nebraska Department of Education.

Inquiry - the Nature of Science, and Technology

Inquiry – Students will plan and conduct investigations that lead to the development of explanations. 5.1.1

1. Scientific Questioning: Ask testable scientific questions 5.1.1.a

2. Scientific Investigations: Plan and conduct investigations and identify factors that have the potential to impact an investigation 5.1.1.b

3. Scientific Tools: Select and use equipment correctly and accurately 5.1.1.c

4. Scientific Observations: Make relevant observations and measurements 5.1.1.d

5. Scientific Data Collection: Collect and organize data 5.1.1.e

6. Scientific Interpretations, Reflections, and Applications: Develop a reasonable explanation based on collected data (teacher guided) 5.1.1.f

7. Scientific Communication: Share information, procedures, and results with peers and/or adults 5.1.1.g

8. Scientific Communication: Provide feedback on previously conducted scientific investigations such as class experiments or appropriate science publications 5.1.1.h

9. Mathematics: Use appropriate mathematics in all aspects of scientific inquiry 5.1.1.i

Nature of Science – Students will describe how scientists go about their work. 5.1.2

1. Scientific Knowledge: Recognize that scientific explanations are based on evidence and scientific knowledge 5.1.2.a

2. Science and Society: Recognize that new discoveries are always being made which impact scientific knowledge 5.1.2.b

3. Science as a Human Endeavor: Recognize many different people study science 5.1.2.c

Technology – Students will solve a simple design problem. 5.1.3

1. Abilities to do Technical Design: Identify a simple problem 5.1.3.a

2. Abilities to do Technical Design: Propose a solution to a simple problem 5.1.3.b

3. Abilities to do Technical Design: Implement the proposed solution 5.1.3.c

4. Abilities to do Technical Design: Evaluate the implementation 5.1.3.d

5. Abilities to do Technical Design: Communicate the problem, design, and solution 5.1.3.e

Physical Science

Matter – Students will explore and describe the physical properties of matter and its changes. 5.2.1

1. Properties and Structure of Matter: Identify mixtures and pure substances 5.2.1.a

2. Properties and Structure of Matter: Identify physical properties of matter (color, odor, elasticity, weight, volume) 5.2.1.b

3. Properties and Structure of Matter: Use appropriate metric measurements to describe physical properties 5.2.1.c

4. States of Matter: Identify state changes caused by heating and cooling solids, liquids, and gases 5.2.1.d

Force and Motion – Students will identify the influence of forces on motion. 5.2.2

1. Motion: Describe motion by tracing and measuring an object's position over a period of time (speed) 5.2.2.a

2. Forces/Newton's 2nd law: Describe changes in motion due to outside forces (push, pull, gravity) 5.2.2.b

Energy – Students will observe and identify signs of energy transfer. 5.2.3

1. Light: Recognize that light travels in a straight line and can be reflected by an objects (mirror) 5.2.3.b

2. Light: Recognize that light can travel through certain materials and not others (transparent, translucent, opaque) 5.2.3.c

3. Heat: Identify materials that act as thermal conductors or insulators 5.2.3.e

Life Science

Structure and Function of Living Systems – Students will investigate and compare the characteristics of living things. 5.3.1

1. Characteristics of Life: Compare and contrast characteristics of living and nonliving things 5.3.1.a

2. Characteristics of Living Organisms: Identify how parts of plants and animals function to meet basic needs (e.g., leg of an insect helps an insect to move, root of plant helps the plant to obtain water) 5.3.1.b

Heredity – Students will identify variations of inherited characteristics and life cycles. 5.3.2

1. Inherited Traits: Identify inherited characteristics of plants and animals 5.3.2.a

2. Reproduction: Identify the life cycle of an organism (plants and animals) 5.3.2.b

Flow of Matter and Energy in Ecosystems – Students will describe relationships within an ecosystem. 5.3.3

1. Flow of Energy: Diagram and explain a simple food chain beginning with the Sun 5.3.3.a

2. Flow of Energy: Identify the role of producers, consumers, and decomposers in an ecosystem 5.3.3.b

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3. Ecosystems: Recognize the living and nonliving factors that impact the survival of organisms in an ecosystem 5.3.3.c

4. Impacts on Ecosystems: Recognize all organisms cause changes, some beneficial and some detrimental, in the environment where they live 5.3.3.d

Biodiversity – Students will describe changes in organisms over time. 5.3.4

1. Biological Adaptations: Describe adaptations made by plants or animals to survive environmental changes 5.3.4.a

Earth and Space Science

Earth Structures and Processes – Students will observe and describe Earth's materials, structure, and processes. 5.4.2

1. Properties of Earth Materials: Describe the characteristics of rocks, minerals, soil, water, and the atmosphere 5.4.2.a

2. Earth's Processes: Identify weathering, erosion, and deposition as processes that build up or break down Earth's surface 5.4.2.b

3. Use of Earth Materials: Identify how Earth materials are used (fuels, building materials, sustaining plant life) 5.4.2.c

Energy in Earth's Systems – Students will observe and describe the effects of energy changes on Earth. 5.4.3

1. Energy Sources: Describe the Sun's warming effect on the land and water 5.4.3.a

2. Weather and Climate: Observe, measure, and record changes in weather (temperature, wind direction and speed, precipitation) 5.4.3.b

3. Weather and Climate: Recognize the difference between weather, climate, and seasons 5.4.3.c

Earth's History – Students will describe changes in Earth. 5.4.4.

1. Past/Present Earth: Describe how slow processes (erosion, weathering, deposition) and rapid process (landslides, volcanic eruptions, earthquakes) change Earth's surface 5.4.4.a

Reference:
SAMPLE K-12 SCIENCE CURRICULUM 2011 [PDF].(n.d.). Lincoln: Nebraska Department of Education.
NEBRASKA SCIENCE STANDARD GRADE K12 2010 [PDF].(n.d.). Lincoln: Nebraska Department of Education.

NUMBER

Numeric Relationships: Students will demonstrate, represent, and show relationship among while numbers within the base-ten number system. 0.1.1

1. Demonstrate cardinality (i.e. the last number name said indicates the number of objects counted), regardless of the arrangement or order in which the objects were counted. 0.1.1.b

2. Use one-to-one correspondence (pairing each object with one and only one spoken number name, and each spoken number name with one and only one object) when counting objects to show the relationship between numbers and quantities of 0 to 20. 0.1.1.c

3. Demonstrate the relationship between whole numbers, knowing each sequential number name refers to a quantity that is one larger. 0.1.1.d

4. Count up to 20 objects arranged in a line, a rectangular array, or a circle. Count up to 10 objects in a scattered configuration. Count out the number of objects, given a number from 1 to 20. 0.1.1.e

5. Write numbers 0 to 20 and represent a number of objects with a written numeral 0 to 20. 0.1.1.f

6. Compose and decompose numbers from 11 to 19 into ten ones and some more ones by a drawing, model, or equation (e.g., 14 = 10 + 4) to record each composition and decomposition. 0.1.1.g

7. Compare the number of objects in two groups by identifying the comparison as greater than, less than, or equal to by using strategies of matching and counting. 0.1.1.h

8. Compare the value of two written numerals between 1 and 10. 0.1.1.i

Operations: Students will demonstrate the meaning of addition and subtraction with whole numbers and compute accurately. 0.1.2

1. Fluently (i.e. automatic recall based on understanding) add and subtract within 5. 0.1.2.a

ALGEBRA

Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions and equations. 0.2.1

1. Decompose numbers less than or equal to 10 into pairs in more than one way, showing each decomposition with a model, drawing, or equation (e.g., 7 = 4 + 3 and 7 = 1 + 6). 0.2.1.a

2. For any number from 1 to 9, find the number that makes 10 when added to the given number, showing the answer with a model, drawing, or equation. 0.2.1.b

Applications: Students will solve real-world problems involving addition and subtraction. 0.2.3

1. Solve real-world problems that involve addition and subtraction within 10 (e.g., by using objects, drawings or equations to represent the problem). 0.2.3.a

GEOMETRY

Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes. 0.3.1

1. Describe real-world objects using names of shapes, regardless of their orientation or size (e.g., squares, circles, triangles, rectangles, hexagons, cubes, cones, spheres, and cylinders). 0.3.1.a

2. Identify shapes as two-dimensional ("flat") or three-dimensional ("solid"). 0.3.1.b

3. Compare and analyze two- and three-dimensional shapes, with different sizes and orientations to describe their similarities, differences, parts (e.g., number "corners"/vertices), and other attributes (e.g., sides of equal length). 0.3.1.c

4. Model shapes found in the real world by building shapes from materials (e.g., clay and pipe cleaners) and drawing shapes. 0.3.1.d

Coordinate Geometry: Students will determine location, orientation, and relationships on the coordinate plane. 0.3.2

1. Describe the relative positions of objects (e.g., above, below, beside, in front of, behind, next to, between). 0.3.2.a

Measurement: Students will perform and compare measurements and apply formulas. 0.3.3

1. Describe measurable attributes of real-world objects (e.g., length or weight). 0.3.3.a

2. Compare length and weight of two objects (e.g., longer/shorter, heavier/lighter). 0.3.3.b

DATA

Analysis & Applications: Students will analyze data to address the situation. 0.4.2

1. Identify, sort, and classify objects by size, shape, color, and other attributes. Identify objects that do not belong to a particular group and explain the reasoning used. 0.4.2.a

Reference:
NEBRASKA MATHEMATICS STANDARDS (Rep.). (n.d.). Retrieved
https://www.education.ne.gov/math/Math_Standards/Adopted_2015_Math_Standards/
2015_Nebraska_College_and_Career_Standards_for_Mathematics_Vertical.pdf

NUMBER

Numeric Relationships: Students will demonstrate, represent, and show relationships among whole numbers within the base-ten number system. 1.1.1

1. Write numerals to match a representation of a given set of objects for numbers up to 120. 1.1.1.c

2. Compare two two-digit numbers by using symbols <, =, and > and justify the comparison based on the number of tens and ones. 1.1.1.f

Operations: Students will demonstrate the meaning of addition and subtraction with whole numbers and compute accurately. 1.1.2

1. Fluently (i.e., automatic recall based on understanding) add and subtract within 10. 1.1.2.a

2. Add and subtract within 20, using a variety of strategies (e.g., count on to make a ten). 1.1.2.b

3. Add within 100, which may include adding a two-digit number and a one-digit number, and adding a two digit number and a multiple of ten using concrete models, drawings, and strategies which reflect understanding of place value. MA 1.1.2.e

ALGEBRA

Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions and equations. 1.2.1

1. Use the meaning of the equal sign to determine if equations are true and give examples of equations that are true (e.g., $4 = 4$, $6 = 7 – 1$, $6 + 3 = 3 + 6$, and $7 + 2 = 5 + 4$). 1.2.1.a

2. Use the relationship of addition and subtraction to solve subtraction problems (e.g., find $12 – 9 =$ ___, using the addition fact $9 + 3 = 12$). 1.2.1.b

3. Find numerical patterns to make connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). 1.2.1.c

4. Determine the unknown whole number in an addition or subtraction equation (e.g. $7 + ? = 13$). 1.2.1.d

Algebraic Processes: Students will apply the operational properties when adding & subtracting. 1.2.2

1. Decompose numbers and use the commutative and associative properties of addition to develop addition and subtraction strategies including (making 10's and counting on from the larger number) to add and subtract basic facts within 20. 1.2.2.a

Applications: Students will solve real-world problems involving addition and subtraction. 1.2.3

1. Solve real-world problems involving addition and subtraction within 20 in situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all parts of the addition or subtraction problem (e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem). 1.2.3.a

2. Solve real-world problems that include addition of three whole numbers whose sum is less than or equal to 20 by using objects, drawings, and equations with a symbol to represent the unknown number in the problem. 1.2.3.b

3. Create a real-world problem to represent a given equation involving addition and subtraction within 20. 1.2.3.c

GEOMETRY

Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes. 1.3.1

1. Determine defining and non-defining attributes of two-dimensional shapes; build and draw shapes that match the given definition. 1.3.1.a

2. Decompose circles and rectangles into two and four equal parts, using the terms "halves", "fourths" and "quarters", and use the phrases "half of", "fourths of", and "quarter of". 1.3.1.b

3. Use two-dimensional shapes (e.g., rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) and three-dimensional shapes (e.g., cubes, rectangular prisms, cones, and cylinders) to compose and describe new shapes. 1.3.1.c

Measurement: Students will perform and compare measurements and apply formulas. 1.3.3

1. Measure objects by using a shorter object end-to-end and know that the length of the object is the amount of same-size objects that span it lined up end-to-end. 1.3.3.c

2. Order three objects by directly comparing their lengths, or indirectly by using a third object. 1.3.3.d

DATA

Representations: Students will create displays that represent data. 1.4.1

1. Organize and represent a data set with up to three categories using a picture graph. 1.4.1.a

Analysis & Applications: Students will analyze data to address the situation. 1.4.2

1. Ask and answer questions about the total number of data points, how many in each category, and compare categories by identifying how many more or less are in a particular category using a picture graph. 1.4.2.a

Reference:
NEBRASKA MATHEMATICS STANDARDS (Rep.). (n.d.). Retrieved
https://www.education.ne.gov/math/Math_Standards/Adopted_2015_Math_Standards/
2015_Nebraska_College_and_Career_Standards_for_Mathematics_Vertical.pdf

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NUMBER

Numeric Relationships: Students will demonstrate, represent, and show relationships among whole numbers within the base-ten number system. 2.1.2

1. Compare two three-digit numbers by using symbols <, =, and > and justify the comparison based on the meanings of the hundreds, tens, and ones. 2.1.1.e

Operations: Students will demonstrate the meaning of addition and subtraction with whole numbers and compute accurately. 2.1.2

1. Fluently (i.e. automatic recall based on understanding) add and subtract within 20. 2.1.2.a

ALGEBRA

Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions and equations. 2.2.1

1. Identify a group of objects from 0-20 as even or odd by counting by 2's or by showing even numbers as a sum of two equal parts. 2.2.1.a

Applications: Students will solve real-world problems involving addition and subtraction. 2.2.3

1. Solve real-world problems involving addition and subtraction within 100 in situations of addition and subtraction, including adding to, subtracting from, joining and separating, and comparing situations with unknowns in all positions using objects, models, drawings, verbal explanations, expressions and equations. 2.2.3.a

2. Create real-world problems to represent one- and two-step addition and subtraction within 100, with unknowns in all positions. 2.2.3.b

GEOMETRY

Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes. 2.3.1

1. Recognize and draw shapes having a specific number of angles, faces, or other attributes, including triangles, quadrilaterals, pentagons, and hexagons. 2.3.1.a

2. Partition a rectangle into rows and columns of equal sized squares. Count to find the total. 2.3.1.b

3. Divide circles and rectangles into two, three, or four equal parts. Describe the parts using the language of halves, thirds, fourths, half of, a third of, a fourth of. 2.3.1.c

4. Recognize that equal shares of identical wholes need not have the same shape. 2.3.1.d

Measurement: Students will perform and compare measurements and apply formulas. 2.3.3

1. Identify and use appropriate tools for measuring length (e.g., ruler, yardstick, meter stick, and measuring tape). 2.3.3.c

2. Measure the length of an object using two different length units and describe how the measurements relate to the size of the specific unit. 2.3.3.d

3. Measure and estimate lengths using inches, feet, centimeters, and meters. 2.3.3.e

4. Compare the difference in length of objects using inches and feet or centimeters and meters. 2.3.3.f
5. Use measurement lengths and addition and subtraction within 100 to solve real-world problems. 2.3.3.h

DATA

Representations: Students will create displays that represent data. 2.4.1
1. Create and represent a data set using pictographs and bar graphs to represent a data set with up to four categories. 2.4.1.a
2. Create and represent a data set by making a line plot. 2.4.1.b
Analysis & Applications: Students will analyze data to address the situation. 2.4.2
1. Interpret data using bar graphs with up to four categories. Solve simple comparison problems using information from the graphs. 2.4.2.a

Reference:
NEBRASKA MATHEMATICS STANDARDS (Rep.). (n.d.). Retrieved
https://www.education.ne.gov/math/Math_Standards/Adopted_2015_Math_Standards/
2015_Nebraska_College_and_Career_Standards_for_Mathematics_Vertical.pdf

Nebraska 3 Mathematics Curriculum 2011 - Summary for Green Infrastructure

NUMBER

Numeric Relationships: Students will demonstrate, represent, and show relationships among whole numbers and simple fractions within the base-ten number system. 3.1.1

1. Compare whole numbers through the hundred thousands and represent the comparisons using the symbols >, < or =. 3.1.1.b

2. Round a whole number to the tens or hundreds place, using place value understanding or a visual representation. 3.1.1.c

3. Show and identify equivalent fractions using visual representations including pictures, manipulatives, and number lines. 3.1.1.f

Operations: Students will demonstrate the meaning of multiplication and division with whole numbers and compute accurately. 3.1.2

1. Add and subtract within 1,000 with or without regrouping. 3.1.2.a

2. Select and apply the appropriate methods of computation when solving one- and two- step addition and subtraction problems with four-digit whole numbers through the thousands (e.g., visual representations, mental computation, paper-pencil). 3.1.2.b

3. Use drawings, words, arrays, symbols, repeated addition, equal groups, and number lines to explain the meaning of multiplication. 3.1.2.c

4. Multiply one digit whole numbers by multiples of 10 in the range of 10 to 90. 3.1.2.e

5. Use objects, drawings, arrays, words and symbols to explain the relationship between multiplication and division (e.g., if 3 x 4 = 12 then 12 ÷ 3 = 4). 3.1.2.f

6. Determine the reasonableness of whole number sums and differences in real-world problems using estimation, compatible numbers, mental computations, or other strategies. 3.1.2.h

ALGEBRA

Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions and equations. 3.2.1

1. Identify arithmetic patterns (including patterns in the addition or multiplication tables) using properties of operations. 3.2.1.a

2. Interpret a multiplication equation as equal groups (e.g., interpret 4 × 6 as the total number of objects in four groups of six objects each). Represent verbal statements of equal groups as multiplication equations. 3.2.1.b

Algebraic Processes: Student will apply the operational properties when multiplying & dividing. 3.2.2

1. Solve real-world problems involving addition and subtraction within 100 in situations of addition and subtraction, including adding to, subtracting from, joining and separating, and comparing situations with unknowns in all positions using objects, models, drawings, verbal explanations, expressions and equations. 2.2.3.a

2. Create real-world problems to represent one- and two-step addition and subtraction within 100, with unknowns in all positions. 2.2.3.b

Applications: Students will solve real-world problems involving equations with whole numbers. 3.2.3

1. Solve real-world problems involving two-step equations (involving two operations) involving whole numbers using addition and subtraction. 3.2.3.a

2. Write an equation (e.g., one operation, one variable) to represent real-world problems involving whole numbers. 3.2.3.b

GEOMETRY

Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes. MA 3.3.1

1. Identify the number of sides, angles, and vertices of two-dimensional shapes. 3.3.1.a

2. Sort quadrilaterals into categories (e.g., rhombuses, squares, and rectangles). 3.3.1.b

3. Draw lines to separate two-dimensional figures into equal areas, and express the area of each part as a unit fraction of the whole. 3.3.1.c

Measurement: Students will perform and compare measurements and apply formulas. 3.3.3

1. Find the perimeter of polygons given the side lengths, and find an unknown side length. 3.3.3.a

2. Identify and use the appropriate tools and units of measurement, both customary and metric, to solve real-world problems involving length, weight, mass, liquid volume, and capacity (within the same system and unit). 3.3.3.d

3. Estimate and measure length to the nearest half inch, quarter inch, and centimeter. 3.3.3.e

4. Use concrete and pictorial models to measure areas in square units by counting square units. 3.3.3.f

5. Find the area of a rectangle with whole-number side lengths by modeling with unit squares, and show that the area is the same as would be found by multiplying the side lengths. 3.3.3.g

6. Identify and draw rectangles with the same perimeter and different areas or with the same area and different perimeters. 3.3.3.h

DATA

Representations: Students will create displays that represent data. 3.4.1

1. Create scaled pictographs and scaled bar graphs to represent a data set—including data collected through observations, surveys, and experiments—with several categories. 3.4.1.a

2. Represent data using line plots where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters. 3.4.1.b

Analysis & Applications: Students will analyze data to address the situation. 3.4.2

1. Solve problems and make simple statements about quantity differences (e.g., how many more and how many less) using information represented in pictographs and bar graphs. 3.4.2.a

Reference:
NEBRASKA MATHEMATICS STANDARDS (Rep.). (n.d.). Retrieved
https://www.education.ne.gov/math/Math_Standards/Adopted_2015_Math_Standards/
2015_Nebraska_College_and_Career_Standards_for_Mathematics_Vertical.pdf

NUMBER

Numeric Relationships: Students will demonstrate, represent, and show relationships among fractions and decimals within the base-ten number system. 4.1.1

1. Compare whole numbers up to one million and decimals through the hundredths place using >, <, and = symbols, and visual representations. 4.1.1.f

2. Round a multi-digit whole number to any given place. 4.1.1.g

Operations: Students will demonstrate the meaning of addition and subtraction of whole numbers and fractions and compute accurately. 4.1.2

1. Add and subtract multi-digit numbers using the standard algorithm. 4.1.2.a

2. Multiply a four-digit whole number by a one-digit whole number. 4.1.2.b

3. Multiply a two-digit whole number by a two-digit whole number using the standard algorithm. 4.1.2.c

4. Divide up to a four-digit whole number by a one-digit divisor with and without a remainder. 4.1.2.d

5. Use drawings, words, and symbols to explain the meaning of addition and subtraction of fractions with like denominators. 4.1.2.e

6. Add and subtract fractions and mixed numbers with like denominators. 4.1.2.f

7. Multiply a fraction by a whole number. 4.1.2.g

8. Determine the reasonableness of whole number products and quotients in real-world problems using estimation, compatible numbers, mental computations, or other strategies. 4.1.2.h

ALGEBRA

Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions and equations. 4.2.1

1. Create a simple algebraic expression or equation using a variable for an unknown number to represent a math process (e.g., $3 + n = 15$, $81 \div n = 9$). 4.2.1.a

2. Generate and analyze a number or shape pattern to follow a given rule, such as $y = 3x + 5$ is a rule to describe a relationship between two variables and can be used to find a second number when a first number is given. 4.2.1.b

Applications: Students will solve real-world problems involving equations with fractions. 4.2.3

1. Solve real-world problems involving multi-step equations comprised of whole numbers using the four operations, including interpreting remainders. 4.2.3.a

2. Solve real-world problems involving addition and subtraction of fractions and mixed numbers with like denominators. 4.2.3.b

GEOMETRY

Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes. MA 4.3.1

1. Recognize angles as geometric shapes that are formed where two rays share a common endpoint. 4.3.1.a

2. Classify an angle as acute, obtuse, or right. 4.3.1.b

3. Identify and draw points, lines, line segments, rays, angles, parallel lines, perpendicular lines, and intersecting lines, and recognize them in two-dimensional figures. 4.3.1.c

4. Classify two-dimensional shapes based on the presence or absence of parallel and perpendicular lines, or the presence or absence of specific angles. 4.3.1.d

5. Identify right triangles. 4.3.1.e

6. Measure angles in whole number degrees using a protractor. 4.3.1.f

7. Sketch angles of a specified measure. 4.3.1.g

8. Recognize and draw lines of symmetry in two-dimensional shapes. 4.3.1.h

Measurement: Students will perform and compare measurements and apply formulas. 4.3.3

1. Apply perimeter and area formulas for rectangles. 4.3.3.a

2. Identify and use the appropriate tools, operations, and units of measurement, both customary and metric, to solve real-world problems involving time, length, weight, mass, capacity, and volume. 4.3.3.b

3. Generate simple conversions from a larger unit to a smaller unit within the customary and metric systems of measurement. 4.3.3.c

DATA

Representations: Students will create displays that represent data. 4.4.1

2. Represent data using line plots where the horizontal scale is marked off in appropriate units (e.g., whole numbers, halves, quarters, or eighths). 4.4.1.a

Analysis & Applications: Students will analyze data to address the situation. 4.4.2

1. Solve problems involving addition or subtraction of fractions using information presented in line plots. 4.4.2.a

Reference:
NEBRASKA MATHEMATICS STANDARDS (Rep.). (n.d.). Retrieved
https://www.education.ne.gov/math/Math_Standards/Adopted_2015_Math_Standards/
2015_Nebraska_College_and_Career_Standards_for_Mathematics_Vertical.pdf

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NUMBER

Numeric Relationships: Students will demonstrate, represent, and show relationships among whole numbers, fractions, and decimals within the base-ten number system. 5.1.1

1. Compare whole numbers, fractions, mixed numbers, and decimals through the thousandths place and represent comparisons using symbols <,>, or =. 5.1.1.b

2. Round whole numbers and decimals to any given place. 5.1.1.c

3. Round whole numbers and decimals to any given place. 5.1.1.c

Operations: Students will demonstrate the meaning of operations and compute accurately with whole numbers, fractions, and decimals. 5.1.2

1. Multiply multi-digit whole numbers using the standard algorithm. 5.1.2.a

2. Add, subtract, multiply, and divide decimals to the hundredths using concrete models or drawings and strategies based on place value, properties of operations (i.e. Commutative, Associative, Distributive, Identity, Zero), and/or relationships between operations. 5.1.2.g

ALGEBRA

Applications: Students will solve real-world problems involving equations with fractions and mixed numbers. 5.2.3

1. Solve real-world problems involving addition and subtraction of fractions and mixed numbers with like and unlike denominators. 5.2.3.a

GEOMETRY

Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes. 5.3.1

1. Identify three-dimensional figures including cubes, cones, pyramids, prisms, spheres, and cylinders. 5.3.1.a

2. Identify faces, edges, and vertices of rectangular prisms. 5.3.1.b

3. Justify the classification of two-dimensional figures based on their properties. 5.3.1.c

Coordinate Geometry: Students will determine location, orientation, and relationships on the coordinate plane. 5.3.2

1. Identify the origin, x axis, and y axis of the coordinate plane. 5.3.2.a

2. Graph and name points in the first quadrant of the coordinate plane using ordered pairs of whole numbers. 5.3.2.b

Measurement: Students will perform and compare measurements and apply formulas. 5.3.3

1. Recognize that solid figures have volume that is measured in cubic units. 5.3.3.a

2. Use concrete models to measure the volume of rectangular prisms in cubic units by counting cubic units. 5.3.3.b

3. Generate conversions within the customary and metric systems of measurement. 5.3.3.c

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DATA

Analysis & Applications: Students will analyze data to address the situation. 5.4.2

1. Use observations, surveys, and experiments to collect, represent, and interpret the data using tables (e.g., frequency charts) and bar graphs. 5.4.2.a

2. Formulate questions that can be addressed with data and make predictions about the data. 5.4.2.b

Reference:
NEBRASKA MATHEMATICS STANDARDS (Rep.). (n.d.). Retrieved
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2015_Nebraska_College_and_Career_Standards_for_Mathematics_Vertical.pdf