KEY CONCEPTS

- Creativity is the production of original ideas that are appropriate to a particular problem or challenge
- Innovation is developing and applying new ideas that have value to people
- Design engineering is developing practical solutions to real-world problems, using insights from all of the fields of engineering
- Design thinking is a discipline that uses a designers' methods to match people's needs with what is technologically possible and what has market value
- Biometrics utilizes nature to inspire solutions to design challenges
- Games have objectives and strategies players use to accomplish the objectives
- Prototyping is the process of testing and retesting and idea or model until a satisfactory solution is reached
- Inventions are often created to help people by making tasks easier or more enjoyable, and to extend people's abilities to explore and perform activities
- Innovation is developing and applying new ideas that have value to people

OBJECTIVES

- Spin a wheel to select an invention challenge and build a prototype invention to solve it.
- Play a carnival-style game to win a bonus material for building
- Use creativity, innovation, design engineering, and design thinking to engage in a variety of activities
- Answer pop questions about inventions, the invention process, and the roles inventions have in people's lives to win prizes and fun animal trivia.

COMMON CORE STATE STANDARDS FOR MATHEMATICS ALIGNED TO WHEEL OF INVENTION (TM) K-5

COUNTING AND CARDINALITY
- K.CC1 Count to 100 by ones and by tens.
- K.CC2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1).
- K.CC6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.

OPERATIONS AND ALGEBRAIC THINKING
- 1.OA1 Use addition and subtraction within 20 to solve word problems involving situation of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, eg., by using objects, drawings, and equations with symbol for the unknown number to represent the problem.
- 1.OA6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on: making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 + 14$): decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$): using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$): and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 13$).

- 2.OA1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- 2.OA2 Fluently add and subtract within 20 using mental strategies.

NUMBER & OPERATIONS IN BASE TEN

- K.NBT1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by drawing or equation (e.g., 18 + 10 + 8): understand that these numbers are composed of ten ones and one two, three, four, five, six, seven, eight, ore nine ones.
- 1.NBT4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones: and sometimes it is necessary to compose a ten.
- 2.NBT5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

NUMBER & OPERATIONS-FRACTIONS

- 3.NF1 Understand a fraction 1/b as the quantity formed by 1 part when a whole number is partitioned into b equal parts: understand a fraction a/b as the quantity formed by a parts of size 1/b.

MEASUREMENT & DATA

- K.MD3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.
- 1.MD4 Organize, represent, and interpret data with up to three categories: ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
- 4.MD5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:

  a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one -degree angle," and can be used to measure angles.

GEOMETRY

- K.G1 Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.
- K.G2 Correctly name shapes regardless of their orientations or overall size.
- 3.G2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY IN HISTORY/SOCIAL STUDIES, SCIENCE, AND TECHNICAL SUBJECTS ALIGNED TO WHEEL OF INVENTION (TM) K-5

WRITING STANDARDS

- Range of Writing

1. Write routinely over extended time frames (time for research, reflections, and revision) and shorter time frames (a

single sitting or a day or two) for a range of tasks, purposes, and audiences.

SPEAKING AND LISTENING

- Comprehension and Collaboration

1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building

on others' ideas and expressing their own clearly and persuasively.

2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.

- Presentation of Knowledge and Ideas

4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

LANGUAGE

- Conventions of Standard English

1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

- Knowledge of Language

3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

NEXT GENERATION SCIENCE STANDARDS ALIGNED TO WHEEL OF INVENTION(TM) K-5

LIFE SCIENCES

- From Molecules to Organisms: Structures and Processes

K.LS.1 Use observations to describe patterns of what plants and animals (including humans) need to survive).

1.LS.1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

- Heredity: Inheritance and Variation of Traits

3.LS3.2 Use evidence to support the explanation that traits can be influenced by the environment

- Biological Evolution: Unity and Diversity

2.LS4.1 Make observations of plants and animals to compare the diversity of life in different habitats

- Heredity: Inheritance and Variation of Traits

3.LS3.1 Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3.LS3.2 Use evidence to support the explanation that traits can be influenced by the environment

- Molecules to Organisms: Structures and Processes

4.LS1.1 Construct an argument that plants and animals have internal and external structures to support survival, growth, behavior, and reproduction.

- Ecosystems: Interactions, Energy, and Dynamics

5.LS2.1 Develop a model to describe the movement of matter among plants, animals, decomposes, and the environment.

EARTH & SPACE SCIENCES

- Earth's Systems

K.ESS2.2 Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

- Earth and Human Activity

K.ESS3.1 Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

PHYSICAL SCIENCE

- Matter and its Interactions

2.PS1.2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

- Motion and Stability: Forces and Interactions

3.PS2.2 Make observations and/or measurements of object's motion to provide evidence that a pattern can be used to predict future motion.

- Energy

4.PS3.1 Use evidence to construct an explanation relating to the speed of an object to the energy of that object.

- Waves and their Applications in Technologies for Information Transfer

4.PS4.3 Generate and compare multiple solutions that use patterns to transfer information.

- Matter and its Interactions

5.PS1.3 Make observations and measurements to identify materials based on their properties.

- Engineering Design

K-2.ETS1.1 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2.ETS1.2 Generate and compare multiple possible solutions to a problem based on how likely to meet the criteria and constraints of the problem

3-5.ETS1.1 Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost.

3-5.ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet t he criteria and constraints of the problem