STEM Lessons and Next Generation Standards with Math Standards
4/2022

Kindergarten

NGS: K-2-ETS1-1
Engineering Design
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps its function as needed to solve a given problem.

NGS: K-2-ETS1-2
Engineering Design
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.

STEM Lesson 1: Students will create a design like an engineer to either enhance a skate to make it more to their liking or help design a skate mate to help them skate with assistance. They will also discuss how surfaces in the rink are made of different materials and how that affects a roller skate in motion. Students will also engineer taking a part a roller skate and do their best to put it back together in order for it to work at its peak performance.

NGS: K-PS2-1
Motion and Stability: Forces and Interactions
Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

STEM Lesson 2: The students will investigate and understand that moving objects exhibit different kinds of motion incorporating physical dimensions (left, right, forward, back, up and down. They will also gain an understanding of what motion is and how to put an object into motion

NGS: K-PS2-2

Motion and Stability: Forces and Interactions

Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

Math Concepts Learned: The student will: K.G.1 Describe positions of objects by appropriately using terms, including below, above, beside, between, inside, outside, in front of, or behind. K.G.2 Identify and describe a given shape and shapes of objects in everyday situations to include two-dimensional shapes (i.e., triangle, square, rectangle, hexagon, and circle) and three-dimensional shapes (i.e., cone, cube, cylinder, and sphere). K.G.3 Classify shapes as two-dimensional/flat or three-dimensional/solid and explain the reasoning used. K.G.4 Analyze and compare two- and three-dimensional shapes of different sizes and orientations using informal language. K.G.5 Draw two-dimensional shapes (i.e., square, rectangle, triangle, hexagon, and circle) and create models of three-dimensional shapes (i.e., cone, cube, cylinder, and

STEM Lesson 8: The students will gain and understanding of Newton's Laws and determine how a change in mass of an object (a roller skate) effects a push or pull on the objects speed and or direction.

Math Concepts Learned: Numbers & Operations, Counting, Measurement, Geometry, Measurement In Kindergarten, students begin to build the understanding that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Real-life experiences should be used to support students' ability to connect mathematics to the world.

STEM Lesson 1: Numbers and Operations, Counting, Geometry
STEM Lesson 2: Numbers and Operations, Counting, Geometry
STEM Lesson 3: Numbers and Operations, Counting
STEM Lesson 5: Numbers and Operations
STEM Lesson 6: Counting
STEM Lesson 8: Measurement

First Grade

NGS: K-2-ETS1-1

Engineering Design

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.

NGS: K-2-ETS1-2
Engineering Design
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps its function as needed to solve a given problem.

STEM Lesson 1: Students will create a design like an engineer to either enhance a skate to make it more to their liking or help design a skate mate to help them skate with assistance. They will also discuss how surfaces in the rink are made of different materials and how that affects a roller skate in motion. Students will also engineer taking a part a roller skate and do their best to put it back together in order for it to work at its peak performance

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NGS: 1-PS4-1
Waves and Their Applications in Technologies for Information Transfer
Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

STEM Lesson 4: The students will learn that sound is made of vibrations or sounds waves that we can hear. They will also understand that sound must travel through a medium as vibrations.

NGS: 1-PS4-1
Waves and Their Applications in Technologies for Information Transfer
Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. Objects can be seen if light is available to illuminate them or if they give off their own light (electromagnetic radiation).

STEM Lesson 5: The students will investigate and understand that different frequencies and wavelengths in the electromagnetic spectrum range from radio waves through visible light to gamma radiation. They will gain an understanding of what light truly is and how it travels

Math Concepts learned: Operations and Algebraic Thinking, Numbers and Operations, Measurement and Data, Geometry

In first grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. They begin developing understanding of linear measurement and measuring lengths as iterating length units; and reasoning about attributes of and composing and decomposing geometric shapes.

STEM Lesson 1: Numbers and Operations, Counting, Geometry
STEM Lesson 2: Numbers and Operations, Counting, Geometry
STEM Lesson 3: Numbers and Operations, Counting
STEM Lesson 5: Numbers and Operations
STEM Lesson 6: Counting
STEM Lesson 8: Measurement

Second Grade

NGS: 2-PS1-1
Matter and Its Interactions
Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

NGS: 2-PS1-3
Matter and Its Interactions
Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.

NGS: K-2-ETS1-1
Engineering Design
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.

NGS: K-2-ETS1-2
Engineering Design

Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps its function as needed to solve a given problem.

STEM Lesson 1: The students will discuss how surfaces in the rink are made of different materials and how that affects a roller skate in motion. Students will also engineer taking a part a roller skate and do their best to put it back together in order for it to work at its peak performance.

Math Concepts Learned: **Operations and Algebraic Thinking, Number and Operations, Measurement and Data, Geometry** In second grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. They may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They make conjectures about the solution and plan out a problem-solving approach.

STEM Lesson 1: Numbers and Operations, Counting, Geometry
STEM Lesson 2: Numbers and Operations, Counting, Geometry
STEM Lesson 3: Numbers and Operations, Counting
STEM Lesson 5: Numbers and Operations
STEM Lesson 6: Counting
STEM Lesson 8: Measurement

Third Grade

NGS: 3-PS2-1
Motion and Stability: Forces and Interactions
Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

NGS: 3-PS2-2
Motion and Stability: Forces and Interactions
Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

STEM Lesson 8: The students will be guided towards an understanding in regard to balanced and unbalanced forces through the study of Newton's Laws. They will also gain a more thorough understanding of Newton's Laws and determine how a change in mass of an object (a roller skate) effects a push or pull on the objects speed and or direction.
Math Concepts Learned: Operations and Algebraic Thinking, Number and Operations, Factions, Measurement and Data, Geometry In third grade, mathematically proficient students know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Students may use concrete objects, pictures, or drawings to help them conceptualize and solve problems.

STEM Lesson 1: Numbers and Operations, Counting, Geometry
STEM Lesson 2: Numbers and Operations, Counting, Geometry
STEM Lesson 3: Numbers and Operations, Counting
STEM Lesson 5: Numbers and Operations, Algebraic Thinking
STEM Lesson 6: Counting, Numbers and Operations
STEM Lesson 7: Numbers and Operations, Fractions
STEM Lesson 8: Measurement

Fourth Grade

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

NGS: 4-PS3-2
Energy:

Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat and electric currents. (energy can be transferred in various ways and between objects)

STEM Lesson 5: The students will investigate and understand that different frequencies and wavelengths in the electromagnetic spectrum range from radio waves through visible light to gamma radiation. They will gain an understanding of what light truly is and how it travels.

STEM Lesson 9: The students will gain an understanding of velocity, several types of motion, and how they relate to the speed of a hockey puck and a roller hockey ball.

STEM in Sports: Basketball, Volleyball, Roller Skating and Roller Derby
The students will get an introduction into the physics of sports, The Law of Conservation, how energy converts while the ball is moving, while calculating averages and velocity.

Math Concepts Learned: **Operations and Algebraic Thinking, Numbers and Operations, Fractions, Measurement and Data, Geometry** In fourth grade, students know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Fourth graders may use concrete objects or pictures to help them conceptualize and solve problems.

STEM Lesson 1: Numbers and Operations, Counting, Geometry
STEM Lesson 2: Numbers and Operations, Counting, Geometry
STEM Lesson 3: Numbers and Operations, Counting
STEM Lesson 5: Numbers and Operations, Algebraic Thinking
STEM Lesson 6: Counting, Numbers and Operations
STEM Lesson 7: Numbers and Operations, Fractions
STEM Lesson 8: Measurement and Data

Fifth Grade

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

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

STEM Lesson 7
The students will engage in a math heavy lesson solving problems through statistics and logic. They will figure out a solution as to how many skates a roller rink may need to purchase through population and samples as scientists and engineers do to solve certain situations.

NGS: 5-PS2-1
Motion and Stability: Forces and Interactions
Support an argument that the gravitational force exerted by Earth on objects is directed down.

STEM Lesson 8
The students will gain and understanding of Newton's Laws and determine how a change in mass of an object (a roller skate) effects a push or pull on the objects speed and or direction. They will also gain information on different forces including the role gravity plays.

Math Concepts Learned: **Operations and Algebraic Thinking, Numbers and Operations, Fractions, Measurement and Data, Geometry** Fifth graders should recognize that a number represents a specific quantity. They connect quantities to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions and decimals.

STEM Lesson 1: Numbers and Operations, Counting, Geometry
STEM Lesson 2: Numbers and Operations, Counting, Geometry
STEM Lesson 3: Numbers and Operations, Counting
STEM Lesson 5: Numbers and Operations, Algebraic Thinking

STEM Lesson 6: Counting, Numbers and Operations
STEM Lesson 7: Numbers and Operations, Fractions
STEM Lesson 8: Measurement and Data

Middle School

NGS: MS-PS4-1
Waves and their Applications:
Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

STEM Lesson 4

The students will learn that sound is made of vibrations or sounds waves that we can hear. They will also understand that sound must travel through a medium as vibrations. The students will then gain an understanding of the different parts of a wave and discuss the differences between transverse and longitudinal waves.

NGS: MS-PS2-1
Motion and Stability: Forces and Interactions
Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

NGS: MS-PS2-2
Motion and Stability: Forces and Interactions
Plan and investigate to provide evidence that the change in an objects motion depends on the sum of the forces on the object and the mass of the object.

STEM Lesson 8

The students will gain and understanding of Newton's Laws and determine how a change in mass of an object (a roller skate) effects a push or pull on the objects speed and or direction. They will also gain information on different forces including the role gravity plays. They will conduct an experiment pertaining to the amount of force needed when mass changes.

NGS: MS-PS3-1
Energy
Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

STEM in Sports: Basketball, Volleyball, Roller Skating and Roller Derby

The students will get an introduction into the physics of sports, The Law of Conservation, how energy converts while the ball is moving, while calculating averages and velocity. They will also gain an understanding of how kinetic, potential and thermal energy work in sports.

Math Concepts Learned: **Ratios and Proportional, Relationships, Number System, Expressions and Equations, Geometry, Statistics and Probability**

In Middle School, students solve problems involving ratios and rates and discuss how they solved them. Students solve real-world problems through the application of algebraic and geometric concepts. Students seek the meaning of a problem and look for efficient ways to represent and solve it. They may check their thinking by asking themselves.

STEM Lesson 1: Numbers and Operations, Counting, Geometry
STEM Lesson 2: Numbers and Operations, Counting, Geometry
STEM Lesson 3: Numbers and Operations, Counting
STEM Lesson 5: Numbers and Operations, Algebraic Thinking
STEM Lesson 6: Counting, Numbers and Operations
STEM Lesson 7: Numbers and Operations, Fractions ,Ratios and Statistics
STEM Lesson 8: Measurement and Data
STEM Lesson 9: Statistics and Probability
STEM Lesson 10: Statistics