

**Unit 1: Introduction to STEM Lab**

## Rotations 1-3

## Rotation 1:

K-5 Introduction to STEM Lab

## Rotation 2:

K What is a Scientist?

1 What does a Scientist Do?

2 What is Science?

3 Introduction to the Scientific Method

4 Pre-test Scientific Method Open Response

5 Pre-test Scientific Method Open Response

## Rotation 3:

K I am a Scientist When I...

1 I am a Scientist When I...

2 I am a Scientist When I study...

3 Scientific Method

4 Scientific Method

5 Scientific Method

## Unit 2: Physical Science

Rotations 4-7 for primary, Rotations 4-8 for intermediate

Topics:

Kindergarten	Matter and Stability: Forces and Interactions; Energy
1 <sup>st</sup> Grade	Waves and Their Applications in Technologies for Information Transfer
2 <sup>nd</sup> Grade	Matter and its Interactions
3 <sup>rd</sup> Grade	Motion and Stability: Forces and Interactions
4 <sup>th</sup> Grade	Energy; Waves and Their Applications in Technologies for Information Transfer
5 <sup>th</sup> Grade	Matter and its Interactions; Motion and Stability: Forces and Interactions; Energy

Rotation 4:

K	Pushes and Pulls
1	Sound
2	States of Matter Exploration
3	Balanced and Unbalanced Forces
4	Pop Bottle Cars
5	Matter: Dancing Raisins

Rotation 5:

K	Speed and Direction
1	Illuminating the Dark
2	Designing a Construction
3	Paper Helicopters
4	Collision
5	Water Cycle Measurement

Rotation 6:

K	Sunlight
1	The Path of Light
2	Reconstructing and Rebuilding
3	Magnet and Static Exploration
4	Electric Circuits - Motors and Buzzers
5	Mixtures and Solutions

Rotation 7:

- K Heat
- 1 Using Sound or Light to Solve a Problem
- 2 Making Crayons
- 3 Marta's Magnets
- 4 Light and Sight
- 5 Gravitational Pulls

Rotation 8:

- 4 Transferring Information
- 5 Food Chain Diagrams

Standards:

**Kindergarten**

Next Generation Science Standards

- K-PS2-1 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. (Pushes and Pulls)
- K-PS2-2 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. (Speed and Direction)
- K-PS3-1 Make observations to determine the effect of sunlight on Earth's surface. (Sunlight)
- K-PS3-2 Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area. (Heat)

**1<sup>st</sup> Grade**

Next Generation Science Standards

- 1-PS4-1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (Sound)
- 1-PS4-2 Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. (Illuminating the Dark)

- 1-PS4-3 Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light. (The Path of Light)
- 1-PS4-4 Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (Using Light and Sound to Solve a Problem)

## **2<sup>nd</sup> Grade**

### Next Generation Science Standards

- 2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. (States of Matter Exploration)
- 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. (Designing a Construction)
- 2-PS1-3 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. (Reconstructing and Rebuilding)
- 2-PS1-4 Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. (Making Crayons)

## **3<sup>rd</sup> Grade**

### Next Generation Science Standards

- 3-PS2-1 Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. (Balanced and Unbalanced Forces)
- 3-PS2-2 Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. (Paper Helicopters)
- 3-PS2-3 Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. (Magnet and Static Exploration)
- 3-PS2-4 Define a simple design problem that can be solved by applying scientific ideas about magnets. (Marta's Magnets)

## 4<sup>th</sup> Grade

### Next Generation Science Standards

- 4-PS3-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object. (Pop Bottle Cars)
- 4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. (Transferring Information)
- 4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide. (Collision)
- 4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. (Electric Circuits: Motors and Buzzers)
- 4-PS4-1 Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. (Transferring Information)
- 4-PS4-2 Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. (Light and Sight)
- 4-PS4-3 Generate and compare multiple solutions that use patterns to transfer information. (Electric Circuits: Motors and Buzzers)

## 5<sup>th</sup> Grade

### Next Generation Science Standards

- 5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen. (Water Cycle Measurement)
- 5-PS1-2 Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. (Water Cycle Measurement)
- 5-PS1-3 Make observations and measurements to identify materials based on their properties. (Dancing Raisins)
- 5-PS1-4 Conduct an investigation to determine whether the mixing of two or more substances results in new substances. (Mixtures and Solutions)
- 5-PS2-1 Support an argument that the gravitational force exerted by Earth on objects is directed down. (Gravitational Pull)
- 5-PS3-1 Use models to describe that that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. (Food Chain Diagrams)

### Unit 3: Earth and Space Science

Rotations 8- for primary, Rotations 9- for intermediate

Topics:

Kindergarten	Earth's Systems; Earth and Human Activity
1 <sup>st</sup> Grade	Earth's Place in the Universe
2 <sup>nd</sup> Grade	Earth's Place in the Universe; Earth's Systems
3 <sup>rd</sup> Grade	Earth's Systems; Earth and Human Activity
4 <sup>th</sup> Grade	Earth's Place in the Universe; Earth's Systems
5 <sup>th</sup> Grade	Earth's Place in the Universe; Earth's Systems

Standards:

#### Kindergarten

##### Next Generation Science Standards

- K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time. (Patterns in Weather)
- K-ESS2-2 Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. (Changing the Environment to Meet our Needs)
- K-ESS3-1 Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. (Model an Ecosystem)
- K-ESS3-2 Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. (Preparing for Weather)
- K-ESS3-3 Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment. (Leave no Trace)

## **1<sup>st</sup> Grade**

### Next Generation Science Standards

- 1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted. (What is Space?, Sunrise and Sunset, Stars, Moon)
- 1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year. (Daylight Hours)

## **2<sup>nd</sup> Grade**

### Next Generation Science Standards

- 2-ESS1-1 Use information from several sources to provide evidence that Earth events can occur quickly or slowly. (Natural Disasters Parts 1 & 2)
- 2-ESS2-1 Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. (Designing Barriers)
- 2-ESS2-2 Develop a model to represent the shapes and kinds of land and bodies of water in an area. (Sculpting the Land)
- 2-ESS2-3 Obtain information to identify where water is found on Earth and that it can be solid or liquid. (Where is the Water?)

## **3<sup>rd</sup> Grade**

### Next Generation Science Standards

- 3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. (Graphing the Weather parts 1 & 2)
- 3-ESS2-2 Obtain and combine information to describe climates in different regions of the world. (Climates Around the World)
- 3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. (Building Dams, Wind-Resistant Structures)

## **4<sup>th</sup> Grade**

### Next Generation Science Standards

- 4-ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers for changes in a landscape over time to support an explanation for changes in a landscape over time. (Fossils, Rocks Rock)

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| 4-ESS2-1 | Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. (Weathering and Erosion) |
| 4-ESS2-2 | Analyze and interpret data from maps to describe patterns of Earth's features. (Topographical Maps)  |
| 4-ESS3-1 | Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. (Natural Resources for Fuel)    |
| 4-ESS3-2 | Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.  |

### **5<sup>th</sup> Grade**

#### Next Generation Science Standards

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| 5-ESS1-1 | Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.                                   |
| 5-ESS1-2 | Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. |
| 5-ESS2-1 | Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.  |
| 5-ESS2-2 | Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.                             |
| 5-ESS3-1 | Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.  |

## Unit 4: Life Science

Rotations 7-12, 2nd Quarter

Topics:

Kindergarten From Molecules to Organisms: Structures and Processes

1<sup>st</sup> Grade From Molecules to Organisms: Structures and Processes

2<sup>nd</sup> Grade Ecosystems: Interactions, Energy and Dynamics; Biological Evolution: Unity and Diversity

3<sup>rd</sup> Grade From Molecules to Organisms: Structures and Processes; Ecosystems: Interactions, Energy and Dynamics, Heredity: Inheritance and Variation or Traits; Biological Evolution: Unity and Diversity

4<sup>th</sup> Grade From Molecules to Organisms: Structures and Processes

5<sup>th</sup> Grade From Molecules to Organisms: Structures and Processes; Ecosystems: Interactions, Energy and Dynamics

Kindergarten – 5<sup>th</sup> Practical Living: Health

Standards:

### Kindergarten

#### Next Generation Science Standards

K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.

#### Practical Living – Health Standards

PL-P-PW-S-DP-1 Identify and practice personal health habits (e.g., hand washing, care of teeth and eyes, covering coughs and sneezes, sun protection) which affect self and others in the prevention and spread of disease.

PL-P-PW-S-DP-2 Describe the reasons for regular visits to health care providers.

PL-P-PW-S-ATOD-1 Identify the differences between the use/misuse of alcohol, tobacco and other drugs and the effects they have on the body.

PL-P-N-U-1 Proper nutrition is essential to growth and development.

PL-P-N-U-2 Nutrients provide energy for daily living.

PL-P-N-U-3 Resources are available to assist in making nutritional choices.

## 1<sup>st</sup> Grade

### Next Generation Science Standards

- 1-LS1-1 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.
- 1-LS1-2 Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
- 1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

### Practical Living – Health Standards

- PL-P-PW-S-DP-1 Identify and practice personal health habits (e.g., hand washing, care of teeth and eyes, covering coughs and sneezes, sun protection) which affect self and others in the prevention and spread of disease.
- PL-P-PW-S-DP-2 Describe the reasons for regular visits to health care providers.
- PL-P-PW-S-ATOD-1 Identify the differences between the use/misuse of alcohol, tobacco and other drugs and the effects they have on the body.
- PL-P-N-U-1 Proper nutrition is essential to growth and development.
- PL-P-N-U-2 Nutrients provide energy for daily living.
- PL-P-N-U-3 Resources are available to assist in making nutritional choices.
- PL-P-N-S-1 Explain why foods are needed by the body (growth, energy).
- PL-P-N-S-2 Identify the six nutrients.
- PL-P-N-S-3 Investigate the role of the digestive system in nutrition.
- PL-P-N-S-4 Describe the reasons why an individual needs to eat breakfast.
- PL-P-N-S-5 Identify the food groups and the recommended number of daily servings to be eaten from each group.

PL-P-N-S-6 Apply the decision-making process in making healthful food choices.

## 2<sup>nd</sup> Grade

### Next Generation Science Standards

2-LS2-1 Plan and conduct an investigation to determine if plants need sunlight and water to grow.

2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

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

### Practical Living – Health Standards

PL-P-PW-S-DP-1 Identify and practice personal health habits (e.g., hand washing, care of teeth and eyes, covering coughs and sneezes, sun protection) which affect self and others in the prevention and spread of disease.

PL-P-PW-S-DP-2 Describe the reasons for regular visits to health care providers.

PL-P-PW-S-ATOD-1 Identify the differences between the use/misuse of alcohol, tobacco and other drugs and the effects they have on the body.

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PL-P-N-S-5 Identify the food groups and the recommended number of daily servings to be eaten from each group.

PL-P-N-S-6 Apply the decision-making process in making healthful food choices.

### 3<sup>rd</sup> Grade

#### Next Generation Science Standards

- 3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- 3-LS2-1 Construct an argument that some animals form groups that help members survive.
- 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.
- 3-LS4-1 Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
- 3-LS4-2 Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.
- 3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
- 3-LS4-4 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

#### Practical Living – Health Standards

PL-P-PW-S-DP-1 Identify and practice personal health habits (e.g., hand washing, care of teeth and eyes, covering coughs and sneezes, sun protection) which affect self and others in the prevention and spread of disease.

PL-P-PW-S-DP-2 Describe the reasons for regular visits to health care providers.

PL-P-PW-S-ATOD-1 Identify the differences between the use/misuse of alcohol, tobacco and other drugs and the effects they have on the body.

PL-P-N-U-1 Proper nutrition is essential to growth and development.

- PL-P-N-U-2 Nutrients provide energy for daily living.
- PL-P-N-U-3 Resources are available to assist in making nutritional choices.
- PL-P-N-S-1 Explain why foods are needed by the body (growth, energy).
- PL-P-N-S-2 Identify the six nutrients.
- PL-P-N-S-3 Investigate the role of the digestive system in nutrition.
- PL-P-N-S-4 Describe the reasons why an individual needs to eat breakfast.
- PL-P-N-S-5 Identify the food groups and the recommended number of daily servings to be eaten from each group.
- PL-P-N-S-6 Apply the decision-making process in making healthful food choices.

#### **4<sup>th</sup> Grade**

##### Next Generation Science Standards

- 4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- 4-LS1-2 Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

##### Practical Living – Health Standards

- PL-4-PW-S-PPH4 Describe how individual behaviors and choices of diet, exercise and rest affect the body.
- PL-4-PW-S-GD1 Explain why growth and development are unique to each individual.
- PL-4-PW-S-GD2 Develop an awareness of the interrelatedness of body functions and the impact lifestyle choices has on body systems.
- PL-4-PW-S-GD3 Describe physical, social and emotional changes that occur during preadolescence.

PL-4-PW-S-DP1 Describe symptoms and treatments of:

PL-4-PW-S-DP1.a communicable diseases (cold, strep throat and chicken pox).

PL-4-PW-S-DP1.b non-communicable diseases (asthma, heart disease, diabetes, skin cancer).

PL-4-PW-S-DP2 Demonstrate an understanding of how to maintain a healthy body by:

PL-4-PW-S-DP2.a explaining how body systems work together (e.g., digestive, circulatory and respiratory systems).

PL-4-PW-S-DP2.b listing body defenses that fight pathogens.

PL-4-PW-S-DP2.c describing ways pathogens from the environment enter the body.

PL-4-PW-S-DP2.d identifying and explaining behaviors that promote personal hygiene (e.g., the use of grooming products) or can affect self and others in the prevention and spread of disease (e.g., hand washing, care of teeth and eyes, covering coughs and sneezes, sun protection).

PL-4-PW-S-DP2.e describing reasons for regular visits to health care providers.

PL-4-N-U-1 Proper nutrition is essential to growth and development.

PL-4-N-U-2 Nutrients provide energy for daily living.

PL-4-N-U-3 Resources are available to assist in making nutritional choices.

PL-4-N-S-1 Explain the role of the digestive system in nutrition.

PL-4-N-S-2 Describe the relationship between food choices in staying healthy.

PL-4-N-S-3 Explain how to use resources (e.g., Food Guide Pyramid (FGP), Dietary Guidelines for Americans) in making healthful food choices.

PL-4-N-S-4 Identify nutrients which are important to growth and development of healthy bodies.

PL-4-N-S-5 Identify and explain the nutritional information provided on food labels.

### **5<sup>th</sup> Grade**

#### Next Generation Science Standards

5-LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.

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

#### Practical Living – Health Standards

PL-5-PW-S-PPH1 Explain the importance of assuming responsibility for personal health behaviors.

PL-5-PW-S-PPH2 Determine health goals by identifying personal strengths and weakness.

PL-5-PW-S-PPH3 Describe how individual behaviors and choices of diet, exercise and rest affect the body.

PL-5-PW-S-GD1 Explain the concept of maturity as it relates to physical, social and emotional development.

PL-5-PW-S-GD2 Describe physical, social and emotional changes that occur during preadolescence.

PL-5-PW-S-DP1 Demonstrate an understanding of diseases by:

PL-5-PW-S-DP1.a describing symptoms and treatments of communicable diseases (cold, strep throat, chicken pox).

PL-5-PW-S-DP1.b describing symptoms and treatments of non-communicable diseases (asthma, heart disease, diabetes, skin cancer).

PL-5-PW-S-DP2 Investigate family history, environment, lifestyle and other risk factors related to the cause or prevention of disease and other health problems.

PL-5-PW-S-DP3 Demonstrate an understanding of how to maintain a healthy body by:

PL-5-PW-S-DP3.a explaining how body systems work together (e.g., digestive, circulatory and respiratory systems).

PL-5-PW-S-DP3.b describing ways pathogens from the environment enter the body and body defenses that fight pathogens.

PL-5-PW-S-DP3.c identifying and explaining behaviors that promote personal hygiene (e.g., the use of grooming products) or can affect self and others in the prevention and spread of disease (e.g., hand washing, care of teeth and eyes, covering coughs and sneezes, sun protection).

PL-5-PW-S-DP3.d describing reasons for regular visits to health care providers.

PL-5-N-U-1 Proper nutrition is essential to growth and development.

PL-5-N-U-2 Nutrients provide energy for daily living.

PL-5-N-U-3 Resources are available to assist in making nutritional choices.

PL-5-N-S-1 Provide examples of foods that are sources of the six nutrients (protein, carbohydrates, fats, minerals, vitamins, water).

PL-5-N-S-2 Identify the role of nutrients and food sources which are important in the growth and development of healthy bodies.

PL-5-N-S-3 Interpret and explain the recommendations of national resources (e.g., Food Guide Pyramid (FGP), Dietary Guidelines for Americans) in making healthful food choices.

PL-5-N-S-4 Explain the role of the digestive system in nutrition.

PL-5-N-S-5 Explain how the nutritional information provided on food labels impacts dietary choices.

## Unit 4: Engineering Design

Rotations 19-24, 4<sup>th</sup> Quarter

Topics:

Kindergarten – 5<sup>th</sup> Grade Engineering Design

Standards:

### Kindergarten – 2<sup>nd</sup> Grade

#### Next Generation Science Standards

- 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 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-2-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

### 3<sup>rd</sup> Grade – 5<sup>th</sup> Grade

#### Next Generation Science Standards

- 3-5-ETS1-1 Define a simple design problem reflecting a need or a 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 the criteria and constraints of the problem.
- 3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.