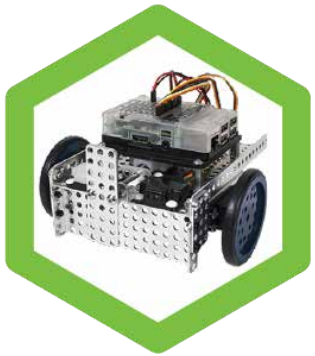
mimioSTEM Lesson Plan Library

Explore the collection of STEM lesson plans available at www.MyStemKits.com for all mimioSTEM products!



MyBot Robotics

3D Printing

Labdisc Sensors

Below you will find the library of lesson plans available at www.MyStemKits.com as it stands at the time of creation. This collection is constantly expanding, so additional kits, lesson plans, and STEAM Design Challenges may have been added since it was last updated. To see the current collection, please visit www.MyStemKits.com.

Product Key

Look for the icon for your product to find out how to use your:

MyBot Robotics

3D Printers

MyStemKits Virtual Labs

Labdisc Sensors

Document Cameras & Panels

ShareSpace Lunar and Mars Maps

MimioSTEM Activity Mats

Color Key

All lesson plans have been color-coded so you can more-easily find those relevant to you.

Mathematics

Interdisciplinary

Science

Curriculum Units Key

If you see one of these symbols, it means that kit is used as part of a comprehensive curriculum unit.

Measurement and Data Unit
Grades K-1

Moon Phases Unit
Grades 4-5

Statistics Unit
Grades 6-8

DNA and Genetics Unit
Grades 9-12

Geometry Unit
Grades K-5

Binary Unit
Grades 4-8

Water Filtration (Coding) Unit
Grades 6-8

Macromolecules Unit
Grades 9-12

Active Addition

Grades: K

Strands: Operations and Algebraic Thinking

Get the wiggles out with this active way to practice addition! Set up stations 0 – 20 around your room and have students randomly draw an addition problem from a bag at that station. They then move to the station that has the correct answer for their addition problem and repeat.

Standards Addressed

CCSS.MATH.CONTENT.K.OA.A.2

3D Kits Utilized

Addition Facts Kit

Balancing Tens

Grades: K

Strands: Counting and Cardinality, Operations and Algebraic Thinking

Find out what number you need to create balance in this interactive exploration of addition! Students will draw a random coin, count the number of dots and then identify what quantity needs to be added to it to equal 10. Then, they get to test this out by placing the values on a 3D-printed or virtual balance.
This activity pairs well with the *Diving for Deca-Dots* and *Variations of Equality* lesson plans.

Standards Addressed

CCSS.MATH.CONTENT.K.CC.A.3
CCSS.MATH.CONTENT.K.CC.B.4
CCSS.MATH.CONTENT.K.CC.B.5
CCSS.MATH.CONTENT.K.OA.A.4

Product Integrations

New York Balance Kit (Virtual or 3D)
Number Dot Coins Kit (2D or 3D)
MimioView Document Camera (optional)

Diving for Deca-Dots

Grades: K

Strands: Counting and Cardinality, Operations and Algebraic Thinking

Students randomly pull a coin out of a bag containing between zero and ten dots and have to identify the quantity on it. Then they must identify the paired number required to equal ten. Do this activity in conjunction with *Balancing Tens*, in which students literally balance their equations on a virtual or 3D-printed New York Balance.

Standards Addressed

CCSS.MATH.CONTENT.K.CC.A.3
CCSS.MATH.CONTENT.K.CC.B.4
CCSS.MATH.CONTENT.K.CC.B.5
CCSS.MATH.CONTENT.K.OA.A.4

Product Integrations

Number Dot Coins Kit (2D or 3D)

Flyswatter Arithmetic: Elementary

Grades: K, 1, 2, 3, 4, 5

Strands: Counting and Cardinality, Geometry, Operations and Algebraic Thinking, Number and Operations

Use your MimioSTEM Activity Mat paired with flyswatters to pinpoint the correct answers to arithmetic questions to increase fluency and automaticity. This fast-paced activity includes sample prompts for each relevant standard and grade in elementary school. Perfect as a breakout station or as a group transition activity.

Standards Addressed

CCSS.MATH.CONTENT.K.CC.A.2
CCSS.MATH.CONTENT.K.CC.A.3
CCSS.MATH.CONTENT.K.CC.B.4
CCSS.MATH.CONTENT.K.CC.B.5
CCSS.MATH.CONTENT.K.G.B.4
CCSS.MATH.CONTENT.K.OA.A.2
CCSS.MATH.CONTENT.K.OA.A.4
CCSS.MATH.CONTENT.K.OA.A.5
(For additional standards, see each relevant grade.)

Product Integrations

MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)
MimioView Document Camera (optional)

Tiny Towns

Grades: K **Strands: Counting and Cardinality, Measurement and Data**

Students design, build, and name their own tiny towns. Then, students map and count how many of each type of city feature (housing, greenery, shopping, parking, and water) is in their town. They compare their numbers to their classmates' towns using more of/less of terminology.

Standards Addressed

CCSS.MATH.CONTENT.K.CC.B.5
CCSS.MATH.CONTENT.K.CC.C.7
CCSS.MATH.CONTENT.K.MD.A.2

3D Kits Utilized

Urban Ecology Kit

Variations of Equality

Grades: K **Strands: Counting and Cardinality, Operations and Algebraic Thinking**

Counting pairs up with decomposing numbers in this hands-on activity! Students will draw a tile with a random number of dots on it, identify the quantity of dots, and then figure out ways to decompose that number. Finally, they'll test their results using an interactive New York Balance to see if they correctly identified a solution. Do this activity in conjunction with *Balancing Tens* in which students always balance a 10.

Standards Addressed

CCSS.MATH.CONTENT.K.CC.A.3
CCSS.MATH.CONTENT.K.CC.B.4
CCSS.MATH.CONTENT.K.CC.B.5
CCSS.MATH.CONTENT.K.OA.A.3

Product Integrations

New York Balance Kit (Virtual or 3D)
Number Dot Coins Kit (2D or 3D)
Ones, Tens, and Hundreds Kit (optional)
MimioView Document Camera (optional)

Circles and Position

Grades: K **Strands: Geometry**

Students identify circles both in the environment and on paper. They distinguish between circles and shapes that are similar to circles (i.e., distractors). They begin the development of vocabulary related to relative position (i.e., terms such as above, below, beside, in front of, behind, and next to).

Standards Addressed

CCSS.MATH.CONTENT.K.G.A.1
CCSS.MATH.CONTENT.K.G.A.2
CCSS.MATH.PRACTICES: 4

3D Kits Utilized

Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit

Introducing Triangles

Grades: K **Strands: Geometry**

Students develop a working definition of a triangle that can be used to discriminate between two-dimensional shapes that are triangles and those that are not triangles. They are introduced to vocabulary related to polygons (e.g., sides and vertices). Emphasis is placed on the defining attributes of triangles and using the defining attributes to justify decisions about whether a shape is a triangle or not.

Standards Addressed

CCSS.MATH.CONTENT.K.G.A.1
CCSS.MATH.CONTENT.K.G.A.2
CCSS.MATH.CONTENT.K.G.B.5
CCSS.MATH.PRACTICES: 3, 4

3D Kits Utilized

Basic Shapes: Triangles Kit

Identifying Right Angles

Grades: K **Strands: Geometry**

Students are introduced to the concept of a right angle. They identify examples of right angles in the real world and in geometric shapes and are introduced to vocabulary related to angles (i.e., sides and vertices). This lesson prepares students for understanding and identifying rectangles.

Standards Addressed

CCSS.MATH.CONTENT.K.G.A.1
CCSS.MATH.CONTENT.K.G.A.2
CCSS.MATH.PRACTICES: 3, 4

3D Kits Utilized

Angle Tester Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit

Introducing Rectangles

Grades: K **Strands: Geometry**

Students develop a working definition of a rectangle that can be used to discriminate between two-dimensional shapes that are rectangles and those that are not rectangles. They continue to use vocabulary related to polygons (e.g., sides and vertices). Emphasis is placed on the defining attributes of rectangles and using the defining attributes to justify decisions about whether a shape is a rectangle or not.

Standards Addressed

CCSS.MATH.CONTENT.K.G.A.1
CCSS.MATH.CONTENT.K.G.A.2
CCSS.MATH.CONTENT.K.G.B.5
CCSS.MATH.PRACTICES: 3, 4

3D Kits Utilized

Basic Shapes: Quadrilaterals Kit
Composing Polygons Kit

Introducing Hexagons

Grades: K **Strands: Geometry**

Students develop a working definition of a hexagon that can be used to discriminate between two-dimensional shapes that are hexagons and those that are not hexagons. They continue to use vocabulary related to polygons (e.g., sides and vertices). Emphasis is placed on the defining attributes of hexagons and using the defining attributes to justify decisions about whether a shape is a hexagon or not.

Standards Addressed

CCSS.MATH.CONTENT.K.G.A.1
CCSS.MATH.CONTENT.K.G.A.2
CCSS.MATH.CONTENT.K.G.B.5
CCSS.MATH.PRACTICES: 3, 4

3D Kits Utilized

Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Composing Polygons Kit (optional)

Comparing Flat Shapes

Grades: K **Strands: Geometry**

Students analyze and compare properties of two-dimensional (flat) shapes to which they have been introduced. They develop and deepen their understanding of defining attributes of two-dimensional shapes by analyzing and comparing them. Students analyze circles, triangles, rectangles, and hexagons. They compare shapes based on the numbers of sides, vertices, presence of right angles, and congruence of sides.

Standards Addressed

CCSS.MATH.CONTENT.K.G.B.4
CCSS.MATH.PRACTICES: 2

3D Kits Utilized

Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Composing Polygons Kit (optional)

An Introduction to Composing Shapes

Grades: K **Strands: Geometry**

Students recognize that shapes can be joined along sides of equal length to compose new shapes. They compose rectangles, squares, and hexagons using other two-dimensional shapes.

Standards Addressed

CCSS.MATH.CONTENT.K.G.B.6
CCSS.MATH.PRACTICES: 4, 7

3D Kits Utilized

Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Decomposing Shapes Kit (optional)

Composing Shapes with Templates

Grades: K **Strands: Geometry**

Students further explore shape composition by selecting shapes that complete template puzzles.

Standards Addressed

CCSS.MATH.CONTENT.K.G.B.6
CCSS.MATH.PRACTICES: 4, 7

3D Kits Utilized

Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Tangram Kit

Decomposing Shapes

Grades: K **Strands: Geometry**

Students will work to decompose known shapes into their component parts. They will explore and discuss the shapes and their attributes that compose hexagons, pentagons, and other complex shapes.

Standards Addressed

CCSS.MATH.CONTENT.K.G.B.6
CCSS.MATH.PRACTICES: 4, 7

3D Kits Utilized

Decomposing Shapes Kit

Flat and Solid Shapes

Grades: K **Strands: Geometry**

Students learn to distinguish between two- and three-dimensional shapes. Terms describing attributes of three-dimensional shapes are also introduced.

Standards Addressed

CCSS.MATH.CONTENT.K.G.B.6
CCSS.MATH.PRACTICES: 2

3D Kits Utilized

Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Right Solids Kit
Basic Shapes: Triangles Kit

Naming Solid Shapes

Grades: K **Strands: Geometry**

Students are introduced to cubes, cylinders, cones, and spheres. Emphasis is placed on identifying and naming these solids using manipulatives and finding examples in the environment.

Standards Addressed

CCSS.MATH.CONTENT.K.G.B.4
CCSS.MATH.PRACTICES: 2, 4

3D Kits Utilized

Basic Shapes: Right Solids Kit

Modeling Shapes in the Real World

Grades: K **Strands: Geometry**

Students model shapes in the real world by composing solid shapes.

Standards Addressed

CCSS.MATH.CONTENT.K.G.B.5
CCSS.MATH.PRACTICES: 4, 7

3D Kits Utilized

Basic Shapes: Right Solids Kit
Composing Polyhedrons Kit (optional)

Exploring Measurable Attributes

Grades: K **Strands: Measurement and Data**

Students explore the measureable attributes of a variety of objects. Attributes include continuous variables such as weight, length, and volume, as well as discrete variables such as the number of arms on a starfish or rungs on a ladder.

Standards Addressed

CCSS.MATH.CONTENT.K.MD.A.1
CCSS.MATH.CONTENT.K.MD.A.2
CCSS.MATH.PRACTICES: 2

3D Kits Utilized

Exploring Measurable Attributes Kit

Comparing Measurable Attributes

Grades: K **Strands: Measurement and Data**

Students directly compare two objects with a measurable attribute in common to decide which has more or less of the attribute. They are introduced to comparison terms (e.g., longer and more) and use these terms to describe their conclusions.

Standards Addressed

CCSS.MATH.CONTENT.K.MD.A.2
CCSS.MATH.PRACTICES: 2

3D Kits Utilized

Exploring Measurable Attributes Kit

Introducing Length Measure

Grades: K **Strands: Measurement and Data**

Students are introduced to the concept of length measure by using multiple copies of an unspecified length unit to measure the lengths of a number of items. They describe and record the length of each item numerically.

Standards Addressed

CCSS.MATH.CONTENT.K.MD.A.2
CCSS.MATH.PRACTICES: 2, 5, 6

3D Kits Utilized

Exploring Measurable Attributes Kit
Measuring with Length Units Kit

Measuring and Comparing

Grades: K **Strands: Counting and Cardinality, Measurement and Data**

Students continue to measure lengths using an unspecified unit describing lengths numerically. In addition, they compare lengths of objects by both physical side-by-side comparisons and numerical comparisons.

Standards Addressed

CCSS.MATH.CONTENT.K.MD.A.2
CCSS.MATH.CONTENT.CC.C.6
CCSS.MATH.PRACTICES: 2, 5, 6

3D Kits Utilized

Measuring with Length Units Kit

Counting and Classifying


Grades: K **Strands: Measurement and Data**

Students classify objects based on a discretely measure attribute (e.g., the number of arms of a starfish). They sort categories by count, and count the number of objects in each category.

Standards Addressed

CCSS.MATH.CONTENT.K.MD.B.3
CCSS.MATH.PRACTICES: 2, 6

Product Integrations

Exploring Measurable Attributes Kit

Measuring and Classifying


Grades: K **Strands: Measurement and Data**

Students classify objects based on a continuously measured attribute (e.g., the length of a caterpillar). They measure each object using a previously introduced unspecified unit and sort the objects into categories according to length. They sort categories by count, and count the number of objects in each category.

Standards Addressed

CCSS.MATH.CONTENT.K.MD.B.3
CCSS.MATH.PRACTICES: 2, 6

Product Integrations

Exploring Measurable Attributes Kit
Measuring with Length Units Kit

How Many Letters?

Grades: K **Strands: Counting and Cardinality, Operations & Algebraic Thinking, Reading: Foundational Skills**

Students will use the Alphabet Coins Kit to spell out their names and then compare to their classmates' names to see how many more or how many fewer letters are in their name. Great as a way to practice spelling and vocabulary with other words as well!

Standards Addressed

CCSS.MATH.CONTENT.K.CC.A.1
CCSS.MATH.CONTENT.K.OA.A.1
CCSS.ELA-LITERACY.RF.K.1.B

Product Integrations

Alphabet Coins Kit

Race to the Finish Line

Grades: K, 1

Strands: Computer Science, Operations & Algebraic Thinking, Numbers & Operations: Base Ten

It's a race to the finish line in this roundabout robot revel! Students must use addition and subtraction to code their robot to reach the finish line. They'll draw either forwards or backwards symbols at random and must use those to code their robot until they reach 10. (Any "backwards" arrows don't count if they're at 0.)
Next, students get to act out their program and finally will program their robot to follow the steps. When the programs are ready, students line up their MyBot robots and watch the silly race begin to see which MyBot makes it to the finish line first!

Standards Addressed

CCSS.MATH.CONTENT.K.OA.A.1
CCSS.MATH.CONTENT.K.OA.A.2
CCSS.MATH.CONTENT.1.NBT.C.4
CCSS.MATH.CONTENT.OA.A.1
CCSS.MATH.CONTENT.OA.C.5
CCSS.MATH.CONTENT.OA.C.6
SC.K2.CS-CS.2.4
SC.K2.CS-CS.2.5
SC.K2.CS-CS.2.7
SC.K2.CS-CS.4.3
SC.K2.CS-CP.2.1
SC.K2.CS-CP.2.3
SC.K2.CS-CP.2.4
SC.K2.CS-PC.1.1
SC.K2.CS-PC.2.2

Product Integrations

MyBot by Mimio Fusion
MyStemKits' Coding Kit (2D or 3D)

Shade Structures

Grades: K

Strands: Physical Science: Energy, Engineering Design

Students must engineer a structure which will reduce the impact of sunlight on a temperature probe by using the pieces of the Composing Polyhedrons Kit to create a shade shelter to house the temperature sensor.

Standards Addressed

NGSS.K-PS3-2

3D Kits Utilized

Composing Polyhedrons Kit
Composing Polyhedrons Kit: Kites Expansion (optional)

Product Integrations

Labdisc Portable STEM Lab
or
HipScience Temperature Probe or SAMLabs Sensors

Welcoming Urban Wildlife

Grades: K

Strands: Earth and Human Activity, Counting and Cardinality

Students build and name their own towns and then count how many of each type of city feature (housing, greenery, shopping, parking, and water) is in their town. Students then must adapt their existing towns to be more wildlife-friendly using creative solutions.

Standards Addressed

NGSS.K-ESS3-3
MATH.CONTENT.K.CC.A.2
MATH.CONTENT.K.CC.B.5

Product Integrations

MyStemKits' Urban Ecology Kit

Day and Night

Grades: K, 1, 3, 5

Strands: Earth's Systems, Earth's Place in the Universe, Energy, Computer Science

This flexible activity is great foundation for a discussion of light, temperature, seasons, and weather! Using your Labdisc Portable STEM Lab, collect data on temperature and light changes over the course of a day. Repeat this experiment throughout the year for a more-complete understanding of seasons. Then, discuss how the weather you're experiencing is related to your location and that weather in other parts of the world varies based on season and positional relationship to the sun. For younger rades, guide them through the questions and engage in open discussion, while for high grades dig into the data by analysing and interpreting graphs.

Standards Addressed

NGSS.K-ESS2-1
NGSS.K-PS3-1
NGSS.1-ESS1-1
NGSS.1-ESS1-2
NGSS.3-ESS2-1
NGSS.3-ESS2-2
NGSS.5-ESS1-2
Florida Computer Science Standards
SC.K2.CS-CC.1.3
SC.K2.CS-CS.4.1
SC.K2.CS-CS.4.2
SC.K2.CS-CS.4.3
SC.K2.CS-CS.6.1
SC.K2.CS-PC.1.1
SC.K2.CS-PC.2.3
SC.35.CS-CC.1.1
SC.35.CS-CP.1.3
SC.35.CS-CP.1.4

Product Integrations

Labdisc Portable STEM Labs: Gensci, Biochem, Mini, Physio, Primo

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Hovercraft Parking

Grades: K

Strands: Physical Science: Forces

Students investigate the impact on pushes of different strengths as they try to successfully park a balloon-powered Hovercraft in a variety of different parking spots.

Standards Addressed

NGSS.K-PS2-1

3D Kits Utilized

Hoverpuck Kit

Push, Pull, Hover

Grades: K

Strands: Physical Science: Forces

Students explore pushes and pulls in a frictionless environment as they investigate the different ways to move the Hoverpuck in specific directions.

Standards Addressed

NGSS.K-PS2-1

3D Kits Utilized

Hoverpuck Kit

Wildlife Comparison

Grades: K

Strands: Earth and Human Activity, Life Science: Structures & Processes

In groups, students randomly select an animal. They must then research its diet and habitat to determine what it needs to survive. Students compare to see if any of the other animals could live in the same habitat. They identify shared needs between species.

Standards Addressed

NGSS.K-ESS3-1
NGSS.K-LS1-1

3D Kits Utilized

Species Interaction Kit

Balancing Equations: Addition

Grades: 1

Strands: Operations and Algebraic Thinking

Balance equations to understand the equals sign - literally! Use our New York Balance to explore addition by placing values on each side. If it balances, so does the equation!

Standards Addressed

CCSS.MATH.CONTENT.1.OA.D.7
CCSS.MATH.CONTENT.1.OA.D.8

Product Integrations

New York Balance Kit (Virtual or 3D)

Detecting Tens

Grades: 1

Strands: Operations and Algebraic Thinking

Explore the associative property of addition while adding three single-digit numbers together. Students will randomly draw three numbers from a bag, determine if any pair of them makes a ten, and add them together to find the sum. Designed to increase fluency and automaticity, this activity is a great way to reinforce how grouping the numbers in addition does not affect the final sum.

Standards Addressed

CCSS.MATH.CONTENT.1.OA.B.3

3D Kits Utilized

Number Dot Coins Kit

Flyswatter Arithmetic: Elementary

Grades: K, 1, 2, 3, 4, 5

Strands: Counting and Cardinality, Geometry, Operations and Algebraic Thinking, Number and Operations

Use your MimioSTEM Activity Mat paired with flyswatters to pinpoint the correct answers to arithmetic questions to increase fluency and automaticity. This fast-paced activity includes sample prompts for each relevant standard and grade in elementary school. Perfect as a breakout station or as a group transition activity.

Standards Addressed

CCSS.MATH.CONTENT.1.NBT.B.2
CCSS.MATH.CONTENT.1.NBT.C.4
CCSS.MATH.CONTENT.1.NBT.C.5
CCSS.MATH.CONTENT.1.NBT.C.6
CCSS.MATH.CONTENT.1.OA.A.1
CCSS.MATH.CONTENT.1.OA.A.2
CCSS.MATH.CONTENT.1.OA.C.6
CCSS.MATH.CONTENT.1.OA.D.8
(For additional standards, see each relevant grade.)

Product Integrations

MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)
MimioView Document Camera (optional)

Matching Two-Digit Numbers

Grades: 1

Strands: Number & Operations in Base Ten

Using two 3D printed kits, students must match the written numeral to the quantity requested. Both utilized kits reinforce place value for ones and tens to increase students' fluency and automaticity with two-digit numbers.

Standards Addressed

CCSS.MATH.CONTENT.1.NBT.B.2.A
CCSS.MATH.CONTENT.1.NBT.B.2.B
CCSS.MATH.CONTENT.1.NBT.B.2.C

3D Kits Utilized

Expanding Place Value: Whole Numbers Ones, Tens, and Hundreds Kit *or*
Ones, Tens, and Hundreds Kit Large

Product Integrations

MimioView Document Camera

Skip Counting

Grades: 1 **Strands: Operations and Algebraic Thinking**

Students will use a Hundreds Chart to develop their skip counting fluency. Using randomly drawn numbers, students will select a starting number and the number by which they are counting. Then, using the One Hundred Kit, they'll match the skip-counted numbers to the Hundreds Chart.

Standards Addressed

CCSS.MATH.CONTENT.1.OA.C.5

3D Kits Utilized

One Hundred Kit
Number and Operator Coins Kit (optional)
Number Dot Coins Kit (optional)

Skip Counting Multiples

Grades: 1 **Strands: Operations and Algebraic Thinking**

Using randomly assigned numbers, students must practice skip counting from that number. Students will use a Hundreds Chart to practice skip counting and then use the strips from the Multiplication Tables Kit to check their answers.

Standards Addressed

CCSS.MATH.CONTENT.1.OA.C.5

3D Kits Utilized

Multiplication Tables Kit
Number and Operator Coins Kit (optional)
Number Dot Coins Kit (optional)

What's a Polygon with Three Sides?

Grades: 1 **Strands: Geometry**

Students will learn the term polygon as it relates to all closed, flat shapes with three or more straight sides. Next, students identify the defining attributes of triangles. They reason about the defining attributes of triangles as well as non-defining attributes such as color, size, and orientation.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.1
CCSS.MATH.PRACTICES: 3, 4

3D Kits Utilized

Basic Shapes: Triangles Kit
Basic Shapes: Polygons Kit

What's a Four-Sided Polygon? A Square is a Rectangle, Too?

Grades: 1 **Strands: Geometry**

Students deepen their understanding that a square is a special kind of rectangle. They compare and contrast the defining attributes of squares and rectangles to uncover the similarities and differences.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.1
CCSS.MATH.PRACTICES: 3, 7

3D Kits Utilized

Angle Tester Kit
Basic Shapes: Quadrilaterals Kit
Composing Polygons Kit
Parallel Line Tester Kit

Hexagons: A Shape with Six Straight Sides

Grades: 1 **Strands: Geometry**

Students identify the defining attributes of hexagons. They apply their understanding by sorting hexagons and non-hexagons, as well as creating and drawing hexagons of various sizes, orientations, and side lengths.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.1
CCSS.MATH.PRACTICES: 3, 7

3D Kits Utilized

Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Composing Polygons Kit

Introducing Parallel Lines & Trapezoids

Grades: 1 **Strands: Geometry**

Students are formally introduced to parallel lines. They identify parallel lines in two-dimensional shapes using parallel lines testers. Students are then introduced to the defining attributes of trapezoids. They have the opportunity to reason about the defining attributes of trapezoids and non-defining attributes such as color, size, and orientation.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.1
CCSS.MATH.PRACTICES: 3, 7

3D Kits Utilized

Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Parallel Line Tester Kit

Introducing Parallelograms

Grades: 1 **Strands: Geometry**

Students are introduced to the defining attributes of a parallelogram. They apply their understanding by distinguishing between parallelograms and non-parallelograms.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.1
CCSS.MATH.PRACTICES: 3, 4

3D Kits Utilized

Basic Shapes: Quadrilaterals Kit
Composing Polygons Kit (optional)
Geometry Sticks: Metric Kit (optional)
Geometry Sticks: Customary Kit (optional)
Parallel Line Tester Kit

Shapes with Right Angles

Grades: 1 **Strands: Geometry**

Students review the definition of a right angle and then identify right angles in two-dimensional shapes using the right angle tester. Students recognize that some shapes always have right angles, sometimes have right angles, and never have right angles.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.1
CCSS.MATH.PRACTICES: 3, 7

3D Kits Utilized

Angle Tester Kit
Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Composing Polygons Kit

Circles, Half Circles, & Quarter Circles

Grades: 1 **Strands: Geometry**

Students are introduced to half-circles and quarter-circles using a foundational understanding of the defining attributes of circles. Students identify and sort half-circles, quarter-circles, and circles.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.2
CCSS.MATH.CONTENT.1.G.A.3
CCSS.MATH.PRACTICES: 3, 4

3D Kits Utilized

Adjustable Angle Kit (optional)
Basic Shapes: Circles Kit
Partitioning Circles Kit

Sorting Two-Dimensional Shapes

Grades: 1 **Strands: Geometry**

Students sort two-dimensional shapes based on their defining attributes.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.1
CCSS.MATH.PRACTICES: 3, 4

3D Kits Utilized

Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit

Composing Two-Dimensional Shapes

Grades: 1 **Strands: Geometry**

Students combine two-dimensional shapes to compose new shapes. Students are challenged to create composite shapes from smaller shapes.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.2
CCSS.MATH.PRACTICES: 3, 4

3D Kits Utilized

Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit

Decomposing Shapes

Grades: 1 **Strands: Geometry**

Students will work to decompose known shapes into their component parts. Students will explore and discuss the shapes and their attributes that compose, hexagons, pentagons, and other complex shapes.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.2
CCSS.MATH.PRACTICES: 3, 4

3D Kits Utilized

Decomposing Shapes Kit
Tangram Kit

Sorting Three-Dimensional Shapes

Grades: 1 **Strands: Geometry**

Students engage in sorting activities to uncover similarities and differences of three-dimensional shapes. They use the terms faces, bases, and vertices to identify defining attributes.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.1
CCSS.MATH.PRACTICES: 3, 7

3D Kits Utilized

Basic Shapes: Circles Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Right Solids Kit

Composing Three-Dimensional Shapes

Grades: 1 **Strands: Geometry**

Students combine three-dimensional shapes to compose new shapes. Students are challenged to create composite shapes from smaller shapes.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.2
CCSS.MATH.PRACTICES: 3, 4

3D Kits Utilized

Basic Shapes: Polygons Kit
Basic Shapes: Right Solids Kit
Composing Polyhedrons Kit (optional)

Partitioning Circles into Halves and Quarters

Grades: 1 **Strands: Geometry**

Students engage in partitioning circles into equal shares called halves and fourths (quarters). They create and identify circles correctly partitioned into equal shares and use the terms half, fourth, and quarter to name each share.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.3
CCSS.MATH.PRACTICES: 2

3D Kits Utilized

Partitioning Circles Kit

Partitioning Rectangles into Halves and Quarters

Grades: 1 **Strands: Geometry**

Students partition rectangles into equal shares called halves and fourths (quarters). They create and identify rectangles correctly partitioned into equal shares and use the terms half, fourth, and quarter to name each share.

Standards Addressed

CCSS.MATH.CONTENT.1.G.A.3
CCSS.MATH.PRACTICES: 2

3D Kits Utilized

Partitioning Rectangles Kit

Direct Length Comparison

Grades: 1 **Strands: Measurement and Data**

Students review direct length comparisons as they directly compare the lengths of two objects and use the terms longer, shorter, and equal to describe their conclusions.

Standards Addressed

CCSS.MATH.CONTENT.1.MD.A.1
CCSS.MATH.PRACTICES: 6

3D Kits Utilized

Exploring Measurable Attributes Kit

Indirect Length Comparison

Grades: 1 **Strands: Measurement and Data**

Students directly compare the lengths of three objects and order them by length. Then they indirectly compare the lengths of two objects using a third object.

Standards Addressed

CCSS.MATH.CONTENT.1.MD.A.1
CCSS.MATH.PRACTICES: 2

3D Kits Utilized

Exploring Measurable Attributes Kit

Reviewing Length Measure

Grades: 1 **Strands: Measurement and Data**

Students review the concept of length measure by using multiple copies of an unspecified length unit to measure the lengths of a number of items. They compare the lengths of three objects numerically and order the objects according to their lengths.

Standards Addressed

CCSS.MATH.CONTENT.1.MD.A.1
CCSS.MATH.CONTENT.1.MD.A.2
CCSS.MATH.PRACTICES: 2, 5, 6

3D Kits Utilized

Exploring Measurable Attributes Kit
Measuring with Length Units Kit

Introducing Rulers and Inches

Grades: 1 **Strands: Measurement and Data**

Students transition from measuring length using an unspecified unit to measuring length in inches using a specially designed ruler marked off in one-inch intervals with no scale given (the no scale/one-inch ruler from the MyStemKits.com Measuring with Length Units Kit). They use this ruler to measure the lengths of a variety of objects and express the lengths numerically in inches.

Standards Addressed

CCSS.MATH.CONTENT.1.MD.A.1
CCSS.MATH.PRACTICES: 2, 5, 6

3D Kits Utilized

Exploring Measurable Attributes Kit
Measuring with Length Units Kit

Measuring with a Conventional Ruler

Grades: 1 **Strands: Measurement and Data**

Students transition from using the no scale/one-inch ruler from the MyStemKits.com Measuring with Length Units kit to using a conventional ruler. They practice using the conventional ruler to measure the lengths of objects both in the real-world and on paper.

Standards Addressed

CCSS.MATH.CONTENT.1.MD.A.1
CCSS.MATH.PRACTICES: 2, 5, 6

3D Kits Utilized

Exploring Measurable Attributes Kit
Measuring with Length Units Kit

Working with Discrete Data

Grades: 1 **Strands: Measurement and Data**

Students classify objects based on a discretely measured attribute. They organize their classifications and represent them in a graph. They ask and answer questions about the total number of data points, the number of data points in each category, and the differences in the number of data points across categories.

Standards Addressed

CCSS.MATH.CONTENT.1.MD.C.4
CCSS.MATH.PRACTICES: 2, 6

3D Kits Utilized

Animal Attributes Kit

Working with Measurement Data

Grades: 1 **Strands: Measurement and Data**

Students classify objects based on a continuously measured attribute (e.g., the length of a caterpillar). They organize their classifications and represent them in a graph. They 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.

Standards Addressed

CCSS.MATH.CONTENT.1.MD.C.4
CCSS.MATH.PRACTICES: 2, 6

3D Kits Utilized

Exploring Measurable Attributes Kit
Measuring with Length Units Kit

How Loud is Sound?

Grades: 1, 4

Strands: Waves and Eloctromagnetic Radiation, Computer Science

Investigate how far sound travels in this sensor-based activity. Students will be provided with an introduction on how sound waves travel and then run tests to see how the distance from the sound source is related to the volume of the sound at that distance using the Labdisc Portable STEM Lab Sound sensor. Students will be encouraged to look for patterns in the data and extrapolate upon what they learned to apply it to different situations.

Standards Addressed

NGSS.1-PS4-1
NGSS.4-PS4-1
Florida Computer Science Standards:
SC.K2.CS-CC.1.3
SC.K2.CS-CS.4.1
SC.K2.CS-CS.4.2
SC.K2.CS-CS.6.1
SC.K2.CS-PC.1.1
SC.K2.CS-PC.2.3
SC.35.CS-CC.1.1
SC.35.CS-CP.1.3
SC.35.CS-CP.1.4

Product Integrations

Labdisc Portable STEM Labs:
Gensci, Enviro

Morse Light Machines

Grades: 1

Strands: Computer Science, Waves and Eloctromagnetic Radiation, Social Studies

Do some unplugged programming and then convert your MyBot into a Morse-code machine! Discuss the history of communication devices, send messages using light, and work together to program your robot to create Morse light signals.

Standards Addressed

NGSS.1-PS4-4

Florida Social Studies Standards:
SS.1.A.2.2

Florida Computer Science Standards:
SC.K2.CS-CC.1.1
SC.K2.CS-CS.2.2
SC.K2.CS-CS.2.3
SC.K2.CS-CS.2.5
SC.K2.CS-CP.2.1
SC.K2.CS.CP.2.4
SC.K2.CS-PC.2.1
SC.K2.CS-PC.2.2
SC.K2.CS-PC.2.3

Product Integrations

MyBot by Mimio Fusion
Boxlight Interactive Flat Panel or Projector (optional)
MimioView Document Camera (optional)

Race to the Finish Line

Grades: K, 1

Strands: Computer Science, Operations & Algebraic Thinking, Numbers & Operations: Base Ten

It's a race to the finish line in this roundabout robot revel! Students must use addition and subtraction to code their robot to reach the finish line. They'll draw either forwards or backwards symbols at random and must use those to code their robot until they reach 10. (Any "backwards" arrows don't count if they're at 0.)
Next, students get to act out their program and finally will program their robot to follow the steps. When the programs are ready, students line up their MyBot robots and watch the silly race begin to see which MyBot makes it to the finish line first!

Standards Addressed

CCSS.MATH.CONTENT.K.OA.A.1
CCSS.MATH.CONTENT.K.OA.A.2
CCSS.MATH.CONTENT.1.NBT.C.4
CCSS.MATH.CONTENT.OA.A.1
CCSS.MATH.CONTENT.OA.C.5
CCSS.MATH.CONTENT.OA.C.6
SC.K2.CS-CS.2.4
SC.K2.CS-CS.2.5
SC.K2.CS-CS.2.7
SC.K2.CS-CS.4.3
SC.K2.CS-CP.2.1
SC.K2.CS-CP.2.3
SC.K2.CS-CP.2.4
SC.K2.CS-PC.1.1
SC.K2.CS-PC.2.2

Product Integrations

MyBot by Mimio Fusion
MyStemKits' Coding Kit (2D or 3D)

Bird Beaks at Brunch

Grades: 1

Strands: Life Science: Structures and Processes

Students will analyze and compare an assortment of 3D printed bird beaks to determine how specific beak shapes are optimized for different food sources. Students get a chance to test each beak in each environment to determine which beak is best for which type of food.

Standards Addressed

NGSS.1-LS1-1

3D Kits Utilized

Bird Beaks Kit

Bird Brethren

Grades: 1

Strands: Life Science: Heredity

Students will randomly select a bird from one of two families. They will compare their bird to the other birds within their family and look for similarities and differences. Students will practice using comparison terms such as smaller and larger.

Standards Addressed

NGSS.1-LS3-1

3D Kits Utilized

Camarhynchus Finch Kit

Day and Night

Grades: K, 1, 3, 5

Strands: Earth's Systems, Earth's Place in the Universe, Energy, Computer Science

This flexible activity is great foundation for a discussion of light, temperature, seasons, and weather! Using your Labdisc Portable STEM Lab, collect data on temperature and light changes over the course of a day. Repeat this experiment throughout the year for a more-complete understanding of seasons. Then, discuss how the weather you're experiencing is related to your location and that weather in other parts of the world varies based on season and positional relationship to the sun. For younger rades, guide them through the questions and engage in open discussion, while for high grades dig into the data by analysing and interpreting graphs.

Standards Addressed

NGSS.K-ESS2-1
NGSS.K-PS3-1
NGSS.1-ESS1-1
NGSS.1-ESS1-2
NGSS.3-ESS2-1
NGSS.3-ESS2-2
NGSS.5-ESS1-2
Florida Computer Science Standards
SC.K2.CS-CC.1.3
SC.K2.CS-CS.4.1
SC.K2.CS-CS.4.2
SC.K2.CS-CS.4.3
SC.K2.CS-CS.6.1
SC.K2.CS-PC.1.1
SC.K2.CS-PC.2.3
SC.35.CS-CC.1.1
SC.35.CS-CP.1.3
SC.35.CS-CP.1.4

Product Integrations

Labdisc Portable STEM Labs: Gensci, Biochem, Mini, Physio, Primo

Caterpillars and Ladders

Grades: 2 **Strands: Measurement and Data**

Practice measuring and create line plots using the caterpillars and ladders in the MyStemKits Exploring Measurable Attributes Kit. Students will use a ruler to measure the length of each item in inches and then record it on a line plot.

Standards Addressed

CCSS.MATH.CONTENT.2.MD.D.9

3D Kits Utilized

Exploring Measurable Attributes Kit

Comparing Cities

Grades: 2 **Strands: Measurement and Data**

Students design, build, and name their own miniature cities. Then, students collect data on their city and compare it to their classmates' creations. Students graph their findings to find out which cities have the most and least of each type of city feature: housing, greenery, commerce, parking, and water.

Standards Addressed

CCSS.MATH.CONTENT.2.MD.D.10

3D Kits Utilized

Urban Ecology Kit

Counting Commerce

Grades: 2 **Strands: Number & Operations in Base Ten**

Students become entrepreneurs in this lesson plan, deciding in which city they want to open up their new business. Students will compare the number of businesses in three competing markets and then decide which city is best for business! Students must practice skip counting by 5s, 10s, and 100s and then add their totals together to compare.

Standards Addressed

CCSS.MATH.CONTENT.2.NBT.A.2
CCSS.MATH.CONTENT.2.NBT.A.3
CCSS.MATH.CONTENT.2.NBT.A.4
CCSS.MATH.CONTENT.2.NBT.B.7

Product Integrations

Urban Ecology Kit
Ones, Tens, and Hundreds Kit (optional) *or*
Ones, Tens, and Hundreds Kit Large (optional)

Flyswatter Arithmetic: Elementary

Grades: K, 1, 2, 3, 4, 5

Strands: Counting and Cardinality, Geometry, Operations and Algebraic Thinking, Number and Operations

Use your MimioSTEM Activity Mat paired with flyswatters to pinpoint the correct answers to arithmetic questions to increase fluency and automaticity. This fast-paced activity includes sample prompts for each relevant standard and grade in elementary school. Perfect as a breakout station or as a group transition activity.

Standards Addressed

CCSS.MATH.CONTENT.2.G.A.1
CCSS.MATH.CONTENT.2.NBT.B.5
CCSS.MATH.CONTENT.2.OA.A.1
CCSS.MATH.CONTENT.2.OA.B.2
CCSS.MATH.CONTENT.2.OA.C.3
(For additional standards, see each relevant grade.)

Product Integrations

MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)
MimioView Document Camera (optional)

Matching Three-Digit Numbers

Grades: 2

Strands: Number & Operations in Base Ten

Using two 3D printed kits, students must match the written numeral to the quantity requested. Both utilized kits reinforce place value for ones, tens, and hundreds to increase students' fluency and automaticity with three-digit numbers.

Standards Addressed

CCSS.MATH.CONTENT.2.NBT.A.1.A
CCSS.MATH.CONTENT.2.NBT.A.1.B

3D Kits Utilized

Expanding Place Value: Whole Numbers Ones, Tens, and Hundreds Kit *or*
Ones, Tens, and Hundreds Kit Large

Product Integrations

MimioView Document Camera

Salamander Specimens

Grades: 2

Strands: Measurement & Data Number & Operations in Base Ten

Students must measure and compare a series of salamander specimens. Since each specimen is curved, students get to practice measuring using a measuring tape on non-linear surfaces.

Standards Addressed

CCSS.MATH.CONTENT.2.MD.A.1
CCSS.MATH.CONTENT.2.MD.A.4
CCSS.MATH.CONTENT.2.NBT.B.7

3D Kits Utilized

Allometry: Salamanders Kit

Tracking Even and Odd Numbers

Grades: 2 **Strands: Operations and Algebraic Thinking**

Students will practice identifying the number of toes on individual animal prints, as well as those on pairs of tracks to develop an intuitive understanding of even and odd numbers.

Standards Addressed

CCSS.MATH.CONTENT.2.OA.C.3

3D Kits Utilized

Animal Tracks Kit *or*
Animal Tracks Kit: Imprint Expansion

Introducing Pentagons

Grades: 2 **Strands: Geometry**

This lesson begins with a review of polygons introduced in Kindergarten (triangle, rectangle, square, and hexagon) and first grade (trapezoid) in light of their defining attributes. Students then develop a working definition of a pentagon that can be used to discriminate between two-dimensional shapes that are pentagons and those that are not pentagons. Emphasis is placed on the defining attributes of pentagons.

Standards Addressed

CCSS.MATH.CONTENT.2.G.A.1
CCSS.MATH.PRACTICES: 3

3D Kits Utilized

Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit

Solid Shapes

Grades: 2 **Strands: Geometry**

This lesson begins with a review of the names and attributes of solid shapes introduced in Kindergarten (cube, cone, cylinder, and sphere) and first grade (prism). Then students analyze attributes of solid shapes by describing the number and type of the faces and the number of vertices and edges.

Standards Addressed

CCSS.MATH.CONTENT.2.G.A.1
CCSS.MATH.PRACTICES: 2

3D Kits Utilized

Basic Shapes: Right Solids Kit

Quadrilaterals

Grades: 2 **Strands: Geometry**

Students develop a working definition of a quadrilateral that can be used to discriminate between two-dimensional shapes that are quadrilaterals and those that are not. Emphasis is placed on the defining attributes of quadrilaterals. Students reexamine parallelograms, trapezoids, rectangles, and squares as special cases of quadrilaterals.

Standards Addressed

CCSS.MATH.CONTENT.2.G.A.1
CCSS.MATH.PRACTICES: 2, 5, 6

3D Kits Utilized

Angle Tester Kit
Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Parallel Line Tester Kit

Partitions & Equal Shares - Circles

Grades: 2 **Strands: Geometry**

Students partition circles into two, three, or four equal shares and use the words halves, thirds, and fourths to describe the parts. They understand that two halves, three thirds, and four fourths comprise a whole and recognize that equal shares of two circles are the same only when they come from identical circles.

Standards Addressed

CCSS.MATH.CONTENT.2.G.A.3
CCSS.MATH.PRACTICES: 2

3D Kits Utilized

Partitioning Circles Kit

Partitions & Equal Shares-Rectangles

Grades: 2 **Strands: Geometry**

Students partition rectangles into two, three, or four equal shares and use the words halves, thirds, and fourths to describe the parts. They understand that two halves, three thirds, and four fourths comprise a whole and recognize that equal shares of identical wholes need not have the same shape.

Standards Addressed

CCSS.MATH.CONTENT.2.G.A.3
CCSS.MATH.PRACTICES: 2

3D Kits Utilized

Partitioning Circles Kit
Partitioning Rectangles Kit

Partitioning Rectangles and Arrays

Grades: 2 **Strands: Geometry, Operations and Algebraic Thinking**

Students partition rectangles into rows and columns of same-size squares. They begin the development of the concept of area by counting the number of squares into which a rectangle has been partitioned. They discover that the size of the rectangle affects the number of squares in the partition as they write repeated addition sentences to describe the arrays they created.

Standards Addressed

CCSS.MATH.CONTENT.2.G.A.2
CCSS.MATH.CONTENT.2.OA.C.4
CCSS.MATH.PRACTICES: 2, 5

3D Kits Utilized

Partitioning Rectangles Kit

Scale of Species


Grades: 2

Strands: Biological Evolution, Measurement & Data

Investigate the scale of animals from different habitats and times and consider the diversity of species. Students will use a variety of measuring tools to examine teeth and overall size of an assortment of animals from land, water, and prehistory.

Standards Addressed

MATH.CONTENT.2.MD.A.1
NGSS.2-LS4-1

3D Kits Utilized

Animal Teeth Kit
Animal Teeth Kit: Aquatic Expansion
Animal Teeth Kit: Prehistoric Expansion

Product Integrations

MimioView Document Camera

Seed Stations

Grades: 2

Strands: Life Science: Ecology

Students analyze a collection of seeds, using physical characteristics to hypothesize how each plant disperses its seeds. Students will examine and draw each seed specimen and then look for similarities within seeds dispersed by animals, water, and wind.

Standards Addressed

NGSS.2-LS2-2

3D Kits Utilized

Seed Dispersal Kit

Seeds: Air Dispersal Varieties Kit (optional)

Rocket Bodies

Grades: 2

Strands: Physical Science: Matter Engineering Design

Students become materials engineers as they compare a variety of rocket bodies. Using the 3D printed nose cones and fins from the MyStemKits' Rockets Kit, students will test how changing the body of the rocket affects flight distance and durability. By assembling rockets made of printer paper, cardstock, tissue paper, cardboard, fabric, and aluminum foil, they'll determine which material is best suited to this specific purpose.

Standards Addressed

NGSS.2.PS1-2
NGSS K-2-ETS1-3

3D Kits Utilized

Rockets Kit

Historic Habitats

Grades: 2

Strands: Biological Evolution

Students design an animal using the Creature Features Kits. The students will then learn that their creature's fossils have been recently discovered and they must help identify more about its lifestyle. Based on their animal's physical characteristics, students must hypothesize the habitat of this newly-discovered species.

Standards Addressed

NGSS.2.LS4-1

3D Kits Utilized

Creature Features Kit *and*
Creature Features Kit: Alternate

Flyswatter Arithmetic: Elementary

Grades: K, 1, 2, 3, 4, 5

Strands: Counting and Cardinality, Geometry, Operations and Algebraic Thinking, Number and Operations

Use your MimioSTEM Activity Mat paired with flyswatters to pinpoint the correct answers to arithmetic questions to increase fluency and automaticity. This fast-paced activity includes sample prompts for each relevant standard and grade in elementary school. Perfect as a breakout station or as a group transition activity.

Standards Addressed

CCSS.MATH.CONTENT.3.NBT.A.1
CCSS.MATH.CONTENT.3.NBT.A.3
CCSS.MATH.CONTENT.3.OA.A.1
CCSS.MATH.CONTENT.3.OA.A.2
CCSS.MATH.CONTENT.3.OA.A.3
CCSS.MATH.CONTENT.3.OA.A.4
CCSS.MATH.CONTENT.3.OA.C.7

(For additional standards, see each relevant grade.)

Product Integrations

MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)
MimioView Document Camera (optional)

Graphing Urban Geography

Grades: 3

Strands: Measurement and Data

Create comparison graphs of different cities based on their land use. Practice creating scaled bar and picture graphs to represent each. Then answer questions to compare how much more or less each city has of various land types. Follow this activity up with the two-part *Land Use Fractions* activity in which students take their collected data and translate it into fractions and then compare fractional values.

Standards Addressed

CCSS.MATH.CONTENT.3.MD.B.3

Product Integrations

MyStemKits' Urban Ecology Kit

Land Use Fractions: Part 1

Grades: 3

Strands: Number & Operations: Fractions

A follow-up to *Graphing Urban Geography*, use this two-part activity to introduce fractions. In part 1, students will collect data on different cities and then write fractions to represent the land use for each. Then, in part 2, students must plot their fractions on a number line and compare their values.

Standards Addressed

CCSS.MATH.CONTENT.3.NF.A.1

Product Integrations

MyStemKits' Urban Ecology Kit

Land Use Fractions: Part 2

Grades: 3

Strands: Number & Operations: Fractions

Part 2 of the *Land Use Fractions* activity, students will get a chance to dive deeper into understanding fraction values. Using the fractions they identified in part 1, they will plot them on a number line and compare them using greater than, less than, and equal to.

Standards Addressed

CCSS.MATH.CONTENT.3.NF.A.2
CCSS.MATH.CONTENT.3.NF.A.3

Product Integrations

MyStemKits' Urban Ecology Kit
Boxlight Interactive Flat Panel (optional)

Population Density

Grades: 3 | **Strands: Measurement & Data, Number & Operations: Base Ten**

Compare the population density of various cities. Students must count types of residences and multiply by the average number of people living in each. Then, students will compile their results into scaled bar graphs.

Standards Addressed

CCSS.MATH.CONTENT.3.MD.B.3
CCSS.MATH.CONTENT.3.NBT.A.3

Product Integrations

MyStemKits' Urban Ecology Kit

Review of 2D Shapes

Grades: 3 | **Strands: Geometry**

Students review circles, half circles, and quarter circles as well as the defining attributes of triangles, quadrilaterals, pentagons, and hexagons. They also review the concepts of right angles and parallel sides using manipulatives and sort shapes based on these attributes.

Standards Addressed

CCSS.MATH.CONTENT.3.G.A.1
CCSS.MATH.PRACTICES: 2, 7

3D Kits Utilized

Angle Tester Kit
Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Composing Polygons (optional) Kit
Parallel Line Tester Kit
Partitioning Circles Kit

Properties of the Special Quadrilaterals

Grades: 3 | **Strands: Geometry**

Students review the defining attributes of the special quadrilaterals studied at previous grade levels (trapezoids, parallelograms, rectangles, and squares). They also explore other important mathematical properties of each shape.

Standards Addressed

CCSS.MATH.CONTENT.3.G.A.1
CCSS.MATH.PRACTICES: 2, 7

3D Kits Utilized

Angle Tester Kit
Basic Shapes: Quadrilaterals Kit
Parallel Line Tester Kit

Introducing Rhombuses

Grades: 3 | **Strands: Geometry**

Students are introduced to rhombuses. They engage in sorting activities that focus attention on the defining attributes of rhombuses and then explore other important properties of rhombuses.

Standards Addressed

CCSS.MATH.CONTENT.3.G.A.1
CCSS.MATH.PRACTICES: 2, 7

3D Kits Utilized

Basic Shapes: Quadrilaterals Kit
Parallel Line Tester Kit

Introducing Kites

Grades: 3 **Strands: Geometry**

Students are introduced to the defining attributes of kites. They engage in sorting activities that focus attention on important attributes of quadrilaterals and the differences among them.

Standards Addressed

CCSS.MATH.CONTENT.3.G.A.1
CCSS.MATH.PRACTICES: 2, 7

3D Kits Utilized

Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit

Categorizing Special Quadrilaterals

Grades: 3 **Strands: Geometry**

Students explore shared attributes of sets of quadrilaterals that place them in the same larger category and identify larger categories into which the quadrilaterals can be placed. They draw examples of quadrilaterals which do not belong to a given set of categories.

Standards Addressed

CCSS.MATH.CONTENT.3.G.A.1
CCSS.MATH.PRACTICES: 2, 7

3D Kits Utilized

Basic Shapes: Quadrilaterals Kit

Partitioning Rectangles into Equal-Area Parts

Grades: 3 **Strands: Geometry, Measurement and Data**

Students are introduced to partitioning rectangles into equal-area parts. Over the course of this two-day lesson, they partition rectangles presented on square grids into two, three, four, six, and eight equal-area parts using a variety of methods. They describe each part as a unit fraction of the whole.

Standards Addressed

CCSS.MATH.CONTENT.3.G.A.2
CCSS.MATH.CONTENT.3.MD.C.5.A
CCSS.MATH.CONTENT.3.MD.C.5.B
CCSS.MATH.CONTENT.3.MD.C.6
CCSS.MATH.PRACTICES: 2, 8

3D Kits Utilized

Partitioning Rectangles Kit

Partitioning Shapes into Equal-Area Parts

Grades: 3 **Strands: Geometry**

Students partition a variety of shapes into equal-area parts without the benefit of a square grid. They reason about equal area using both an intuitive understanding of congruence and the recognition that equal-area parts of the same whole can vary in shape. They continue to describe each part as a unit fraction of the whole.

Standards Addressed

CCSS.MATH.CONTENT.3.G.A.2
CCSS.MATH.PRACTICES: 2, 7

3D Kits Utilized

Decomposing Shapes Kit
Basic Shapes: Quadrilaterals Kit (optional)
Basic Shapes: Polygons Kit (optional)
Basic Shapes: Triangles Kit (optional)
Partitioning Rectangles Kit (optional)

Beachfront Property

Grades: 3

Strands: Earth and Human Activity, Engineering Design, Measurement & Data

Building on a beach is no easy feat. Students must tackle this real-world challenge by designing structures within constraints and then testing their designs against strong winds and storm surge flood waters.

Standards Addressed

NGSS.3-ESS3-1
NGSS 3-5-ETS1-3

3D Kits Utilized

Stacking Blocks Kit
Stacking Blocks Kit: Engineering Expansion

Best of the Birds

Grades: 3

Strands: Biological Evolution, Reading: Foundational Skills

Take to the skies as students become birds. Using dice to randomly generate features of their particular birds, students' birds then must then face a variety of environmental and social scenarios where particular traits are more favorable than others. Students tally their results at the end to see who is the best of the birds.

Standards Addressed

NGSS.3.LS4-2
CCSS.ELA-LITERACY.RF.3.4

3D Kits Utilized

Genome Generator Dice Kit

Bicycle Delivery Routes

Grades: 3, 4

Strands: Computer Science, Geometry, Measurement & Data, Operations & Algebraic Thinking

Ride into robotics with this interactive exploration of perimeter and area. Become a bicycle delivery entrepreneur and determine the optimal routes for delivering your packages as efficiently as possible. Calculate the perimeter and covered area for each route and then test it using the MyBot Robot in an over-size city.

Standards Addressed

MATH.CONTENT.3.MD.A.1
MATH.CONTENT.3.MD.C.5
MATH.CONTENT.3.MD.C.6
MATH.CONTENT.3.MD.C.7
MATH.CONTENT.3.MD.D.8
MATH.CONTENT.3.OA.A.3
MATH.CONTENT.4.G.A.1
MATH.CONTENT.4.MD.A.2
MATH.CONTENT.4.MD.A.3

Florida Computer Science Standards:
SC.35.CS-CC.1.3
SC.35.CS-CC.1.4
SC.35.CS-CS.1.2
SC.35.CS-CS.2.6
SC.35.CS-CP.2.1
SC.35.CS-CP.2.2
SC.35.CS-PC.2.6
SC.35.CS-PC.2.7

3D Kits Utilized

City Engineering Kit

Product Integrations

MyBot by Mimio Fusion
MimioSTEM Activity Mat (optional)
MimioView Document Camera or
Boxlight Interactive Flat Panel

Magnetic Mixtures Binary

Grades: 3, 5

Strands: Measurement and Data, Physical Science

In this lesson, students will explore mixtures and how to separate them based on each material's properties. This is lesson 1 in the Fifth-Grade Binary Unit.

Standards Addressed

CCSS.MATH.CONTENT.5.MD.A.1
NGSS.3-PS2-3
NGSS.3-PS2-4
NGSS.5.PS1-3

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

Magnetic Field Tray Kit

Sifting Magnetic Mixtures

Grades: 3, 5

Strands: Measurement and Data, Physical Science

In this lesson, students will explore mixtures and different ways to separate them. This is lesson 2 in the Fifth-Grade Binary Unit.

Standards Addressed

CCSS.MATH.CONTENT.5.MD.A.1
NGSS.3-PS2-3
NGSS.3-PS2-4
NGSS.5.PS1-3

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

Magnetic Field Tray Kit
Sieve Kit

Using Binary Magnets

Grades: 3, 4

Strands: Measurement and Data, Physical Science

In this lesson, students will explore the workings of magnets and how the polarity and distance can affect the attraction or repulsion of other magnets to perform actions. This is lesson 2 in the Fourth-Grade Binary Unit.

Standards Addressed

CCSS.MATH.CONTENT.4.MD.A.1
NGSS.3-PS2-3
NGSS.3-PS2-4

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

Magnetic Field Tray Kit

Magnetic Binary

Grades: 3, 4

Strands: Physical Science

In this lesson, students will explore the workings of magnets and how the polarity can affect the attraction or repulsion of other magnets. This is lesson 1 in a fourth-grade unit on binary.

Standards Addressed

NGSS.3-PS2-3
NGSS.3-PS2-4

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

Magnetic Field Tray Kit

Day and Night

Grades: K, 1, 3, 5

Strands: Earth's Systems, Earth's Place in the Universe, Energy, Computer Science

This flexible activity is great foundation for a discussion of light, temperature, seasons, and weather! Using your Labdisc Portable STEM Lab, collect data on temperature and light changes over the course of a day. Repeat this experiment throughout the year for a more-complete understanding of seasons. Then, discuss how the weather you're experiencing is related to your location and that weather in other parts of the world varies based on season and positional relationship to the sun. For younger rades, guide them through the questions and engage in open discussion, while for high grades dig into the data by analysing and interpreting graphs.

Standards Addressed

NGSS.K-ESS2-1
NGSS.K-PS3-1
NGSS.1-ESS1-1
NGSS.1-ESS1-2
NGSS.3-ESS2-1
NGSS.3-ESS2-2
NGSS.5-ESS1-2
Florida Computer Science Standards
SC.K2.CS-CC.1.3
SC.K2.CS-CS.4.1
SC.K2.CS-CS.4.2
SC.K2.CS-CS.4.3
SC.K2.CS-CS.6.1
SC.K2.CS-PC.1.1
SC.K2.CS-PC.2.3
SC.35.CS-CC.1.1
SC.35.CS-CP.1.3
SC.35.CS-CP.1.4

Product Integrations

Labdisc Portable STEM Labs: Gensci, Biochem, Mini, Physio, Primo

Column Comparisons

Grades: 4

Strands: Number and Operations - Fractions

Students randomly select two fractions and compare their values using greater than, less than, and equal to signs. Students will use the Portions of a Whole Kit to justify their conclusions by building the two fractional columns and comparing their results. Finally, students must find common denominators to prove their findings.

Standards Addressed

CCSS.MATH.CONTENT.4.NF.A.2

Product Integrations

Number Line: Fractions Kit
Portions of a Whole Kit

Flyswatter Arithmetic: Elementary

Grades: K, 1, 2, 3, 4, 5

Strands: Counting and Cardinality, Geometry, Operations and Algebraic Thinking, Number and Operations

Use your MimioSTEM Activity Mat paired with flyswatters to pinpoint the correct answers to arithmetic questions to increase fluency and automaticity. This fast-paced activity includes sample prompts for each relevant standard and grade in elementary school. Perfect as a breakout station or as a group transition activity.

Standards Addressed

CCSS.MATH.CONTENT.4.G.A.2
CCSS.MATH.CONTENT.4.NF.B.4
CCSS.MATH.CONTENT.4.OA.B.4

(For additional standards, see each relevant grade.)

Product Integrations

MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)
MimioView Document Camera (optional)

Polygons and Shape Review

Grades: 4 **Strands: Geometry**

This lesson begins with a review of the defining attributes of the two-dimensional shapes addressed in kindergarten through grade 3. Then students develop a working definition of the term polygon that can be used to discriminate between two-dimensional shapes that are polygons and those that are not. Students engage in sorting exercises as they explore the relationships among categories of two-dimensional shapes.

Standards Addressed

CCSS.MATH.CONTENT.4.G.A.1
CCSS.MATH.PRACTICES: 2, 7

Product Integrations

Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Parallel Line Tester Kit

Points, Lines, Rays, and Segments

Grades: 4 **Strands: Geometry, Operations and Algebraic Thinking**

In this two-day lesson, students begin a formal introduction to points, lines, rays, and segments. They learn to model these entities with drawings. They learn how to name points and describe lines, rays, and segments using named points. They identify points, lines, rays, and segments in two-dimensional figures.

Standards Addressed

CCSS.MATH.CONTENT.4.G.A.1
CCSS.MATH.CONTENT.4.OA.C.5
CCSS.MATH.PRACTICES: 2, 4

Product Integrations

N/A

Angles and Angle Types

Grades: 4 **Strands: Geometry, Measurement and Data**

This lesson will introduce the definition of angle and angle measure. Students then learn to categorize angles as either right, acute, or obtuse. Students will begin using a protractor to measure and draw angles.

Standards Addressed

CCSS.MATH.CONTENT.4.G.A.1
CCSS.MATH.CONTENT.4.MD.C.5.A
CCSS.MATH.CONTENT.4.MD.C.5.B
CCSS.MATH.CONTENT.4.MD.C.6
CCSS.MATH.PRACTICES: 5, 7

Product Integrations

Adjustable Angle Kit
Angle Tester Kit

Shapes and Angles

Grades: 4 | **Strands: Geometry, Measurement and Data**

This lesson begins with reviewing how to categorize angles as either right, acute, or obtuse and reinforces how to use a protractor. Students then analyze shapes by measuring and categorizing their angles.

Standards Addressed

CCSS.MATH.CONTENT.4.G.A.1
CCSS.MATH.CONTENT.4.MD.C.6
CCSS.MATH.PRACTICES: 5, 7

Product Integrations

Angle Tester Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit

Shapes and Symmetry

Grades: 4 | **Strands: Geometry, Measurement and Data**

Students are introduced to the concept of a line of symmetry of a two-dimensional figure. They identify line-symmetric figures and draw lines of symmetry. They also draw figures with specified numbers of lines of symmetry. The lesson includes a bridge into bisecting angles using symmetry to then introduce the additive property of angles.

Standards Addressed

CCSS.MATH.CONTENT.4.G.A.3
CCSS.MATH.CONTENT.4.MD.C.6
CCSS.MATH.CONTENT.4.MD.C.7
CCSS.MATH.PRACTICES: 7

Product Integrations

Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit

Adding Angles

Grades: 4 | **Strands: Geometry, Operations and Algebraic Thinking**

Students will further their understanding of how angle measure is additive by decomposing and composing angles. Students will use the angle kits to build angles to add together and transition to writing equations using variables to represent an unknown angle in a diagram.

Standards Addressed

CCSS.MATH.CONTENT.4.G.A.3
CCSS.MATH.CONTENT.4.MD.C.6
CCSS.MATH.CONTENT.4.MD.C.7
CCSS.MATH.PRACTICES: 7

Product Integrations

Adjustable Angle Kit
Angle Tester Kit
(Virtual Composing Polygons Kit Compatible)

Symmetry and Design

Grades: 4 | **Strands: Geometry**

Students use lines of symmetry to create designs while reinforcing identification of polygons and the variety of ways to decompose and compose polygons.

Standards Addressed

CCSS.MATH.CONTENT.4.G.A.3
CCSS.MATH.PRACTICES: 7

Product Integrations

Decomposing Shapes Kit

Perpendicular Lines, Segments, & Rays

Grades: 4 **Strands: Geometry**

Students are introduced to the term perpendicular and draw examples of perpendicular lines, segments, and rays. They identify and label perpendicular sides in two-dimensional shapes.

Standards Addressed

CCSS.MATH.CONTENT.4.G.A.1
CCSS.MATH.PRACTICES: 7

Product Integrations

Angle Tester Kit
Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Composing Polygons Kit

Parallel Lines, Segments, and Rays

Grades: 4 **Strands: Geometry**

Students are introduced to the term parallel and draw examples of parallel lines, segments, and rays. They identify and label parallel sides in two-dimensional shapes.

Standards Addressed

CCSS.MATH.CONTENT.4.G.A.1
CCSS.MATH.PRACTICES: 7

Product Integrations

Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Parallel Line Tester Kit

Classifying Shapes: Triangles

Grades: 4 **Strands: Geometry**

Students are introduced to terminology used to classify triangles based on the lengths of their sides and on the measures of their angles. Students analyze, classify, and cross-classify a variety of triangle types.

Standards Addressed

CCSS.MATH.CONTENT.4.G.A.2
CCSS.MATH.PRACTICES: 7

Product Integrations

Basic Shapes: Triangles Kit
Composing Polygons Kit (optional)
Geometry Sticks: Customary Kit (optional)
Geometry Sticks: Metric Kit (optional)

Classifying Shapes: Quadrilaterals

Grades: 4 **Strands: Geometry**

Students further explore perpendicular and parallel lines by classifying quadrilaterals based on the presence or absence of parallel or perpendicular lines and on the lengths of sides. They analyze quadrilaterals through a variety of sorting activities.

Standards Addressed

CCSS.MATH.CONTENT.4.G.A.2
CCSS.MATH.PRACTICES: 7

Product Integrations

Angle Tester Kit
Basic Shapes: Quadrilaterals Kit
Composing Polygons Kit (optional)
Geometry Sticks: Customary Kit (optional)
Geometry Sticks: Metric Kit (optional)
Parallel Line Tester Kit

All Charged Up

Grades: 4

Strands: Energy, Engineering Design, Computer Science, Writing

Explore battery voltage in this hands-on activity. Students will learn about the history of batteries and unified specifications thereof as well as exploring the parts and functions of batteries to learn how they work. FInally, they will use their Labdisc Portable STEM Lab to compare the voltage of an assortment of common batteries and graph their results.

Standards Addressed

CCSS.LITERACY.W.4.7
CCSS.LITERACY.W.4.8
NGSS.4-PS3-2
NGSS.4-PS3-4
NGSS Science and Engineering Practices: 1, 4, 6
NGSS.35-ETS1-1
Florida Computer Science Standards:
SC.35.CS-CC.1.1
SC.35.CS-CP.1.3
SC.35.CS-CP.1.4

Product Integrations

Labdisc Portable STEM Labs:
Gensci, Physio, Mini

Bicycle Delivery Routes

Grades: 3, 4

Strands: Computer Science, Geometry, Measurement & Data, Operations & Algebraic Thinking

Ride into robotics with this interactive exploration of perimeter and area. Become a bicycle delivery entrepreneur and determine the optimal routes for delivering your packages as efficiently as possible. Calculate the perimeter and covered area for each route and then test it using the MyBot Robot in an over-size city.

Standards Addressed

MATH.CONTENT.3.MD.A.1
MATH.CONTENT.3.MD.C.5
MATH.CONTENT.3.MD.C.6
MATH.CONTENT.3.MD.C.7
MATH.CONTENT.3.MD.D.8
MATH.CONTENT.3.OA.A.3
MATH.CONTENT.4.G.A.1
MATH.CONTENT.4.MD.A.2
MATH.CONTENT.4.MD.A.3
Florida Computer Science Standards:
SC.35.CS-CC.1.3
SC.35.CS-CC.1.4
SC.35.CS-CS.1.2
SC.35.CS-CS.2.6
SC.35.CS-CP.2.1
SC.35.CS-CP.2.2
SC.35.CS-PC.2.6
SC.35.CS-PC.2.7

Product Integrations

City Engineering Kit

MyBot by Mimio Fusion
MimioSTEM Activity Mat (optional)
MimioView Document Camera or
Boxlight Interactive Flat Panel

How Loud is Sound?

Grades: 1, 4

Strands: Waves and Eloctromagnetic Radiation, Computer Science

Investigate how far sound travels in this sensor-based activity. Students will be provided with an introduction on how sound waves travel and then run tests to see how the distance from the sound source is related to the volume of the sound at that distance using the Labdisc Portable STEM Lab Sound sensor. Students will be encouraged to look for patterns in the data and extrapolate upon what they learned to apply it to different situations.

Standards Addressed

NGSS.1-PS4-1
NGSS.4-PS4-1
Florida Computer Science Standards:
SC.K2.CS-CC.1.3
SC.K2.CS-CS.4.1
SC.K2.CS-CS.4.2
SC.K2.CS-CS.6.1
SC.K2.CS-PC.1.1
SC.K2.CS-PC.2.3
SC.35.CS-CC.1.1
SC.35.CS-CP.1.3
SC.35.CS-CP.1.4

Product Integrations

Labdisc Portable STEM Labs:
Gensci, Enviro

Our Heart Rate

Grades: 4

Strands: Life Science: Structures and Processes, Computer Science

Introduce students to the function of the heart and see how it adapts to our behavior. Begin by reviewing the location and function of the human heart. Integrate the MyStemKits Human Body Kit to help students visualize their internal structures or simply model a pumping heart using a fist. Then, utilize the Labdisc heart rate sensor to measure each students' heart rate at rest before comparing it to their heart rate just after exercising. Evaluate the change in heart rate to hypothesize changes based on activity.

Standards Addressed

NGSS.4-LS1-1
Florida Computer Science Standards:
SC.35.CS-CC.1.1
SC.35.CS-CP.1.3
SC.35.CS-CP.1.4

Product Integrations

Human Body Kit (optional)
Labdisc Portable STEM Lab: Biochem

Measuring Lionfish

Grades: 4, 5

Strands: Earth & Human Activity, Numbers & Operations: Base Ten, Numbers & Operations: Fractions

Students become marine biologists by comparing invasive lionfish populations in two habitats. Students will randomly select multiple lionfish specimens within a certain habitat and compare their length values in feet using hundredths. Then, they'll expand their exploration by comparing the first habitat to a second to hypothesize as to which population is older and discuss ways that this data could be used to help protect the existing ecosystems from this invasive predator.

Standards Addressed

MATH.CONTENT.4.NF.C.7
MATH.CONTENT.5.NBT.A.3
NGSS 5-ESS3-1

Product Integrations

Lionfish Sampling Kit

Topography Mapping

Grades: 4

Strands: Earth's Systems, Computer Science

Explore topography and robotics in this hands-on activity. In small groups, students analyze a feature from our Landform Topography Kit and create a color-coded topographic map. After building their maps, students must program a robot to read and decode another group's map without looking at it. Once they've completed their analyses and identified the other group's landform, students get a chance to view both the original landform and topographic map.
This activity is the perfect follow-up to *Ocean Mapping*, in which students are introduced to creating topographic maps the way oceanographers would.

Standards Addressed

NGSS.4-ESS2-2
Florida Computer Science Standards:
SC.35.CS-CC.1.3
SC.35.CS-CC.1.4
SC.35.CS-CC.1.5
SC.35.CS-CS.2.6
SC.35.CS-CS.2.7
SC.35.CS-CS.4.2
SC.35.CS-CS.4.3
SC.35.CS-CP.2.1
SC.35.CS-CP.2.2
SC.35.CS-CP.2.5
SC.35.CS-PC.2.4
SC.35.CS-PC.2.6
SC.35.CS-PC.2.7

Product Integrations

Landform Topography Kit
MyBot by Mimio Fusion & Color Sensor
MimioSTEM Activity Mat (optional)

Magnetic Binary

Grades: 3, 4 **Strands: Physical Science**

In this lesson, students will explore the workings of magnets and how the polarity can affect the attraction or repulsion of other magnets. This is lesson 1 in a fourth-grade unit on binary.

Standards Addressed

NGSS.3-PS2-3
NGSS.3-PS2-4

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

Magnetic Field Tray Kit

Using Binary Magnets

Grades: 3, 4 **Strands: Measurement and Data, Physical Science**

In this lesson, students will explore the workings of magnets and how the polarity and distance can affect the attraction or repulsion of other magnets to perform actions. This is lesson 2 in the Fourth-Grade Binary Unit.

Standards Addressed

CCSS.MATH.CONTENT.4.MD.A.1
NGSS.3-PS2-3
NGSS.3-PS2-4

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

Magnetic Field Tray Kit

Discovering Binary

Grades: 4 **Strands: Computer Science**

In this interdisciplinary lesson, students will explore how decimal numbers can be represented in binary. Students will explore the idea of binary and how it uses only 0 and 1 as its digits, which represent switches that either use or don't use certain values in an 8-bit string. Students will convert between base ten and base two using their math knowledge. This is lesson 3 in the Fourth-Grade Binary Unit.

Standards Addressed

CCSS.MATH.PRACTICES: 1, 2, 4, 6, 7, 8
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Florida Computer Science Standards:
SC.35.CS-CS.2.7
SC.35.CS-CS.2.8
SC.35.CS-CS.2.9

Product Integrations

Binary Conversion Kit

How Does My Computer Use Binary?

Grades: 4

Strands: Computer Science. Reading Informational Text, Writing

In this interdisciplinary lesson, students will explore how computers use binary digits to communicate. Students will explore how data is stored in different devices using binary logic. Students will also explore the history of using magnetism in hard drives and the current use of electric charges in solid state disks making the connection between math, science and computer science. This is lesson 4 of 6 in the Fourth-Grade Binary Unit.

Standards Addressed

CCSS.ELA-LITERACY.R1.4.1
CCSS.ELA-LITERACY.R1.4.2
CCSS.ELA-LITERACY.R1.4.3
CCSS.ELA-LITERACY.W.4.2
CCSS.MATH.PRACTICES: 1, 2, 4, 7
NGSS Science & Engineering Practices:
2, 5, 8

Florida Computer Science Standards:
SC.35.CS-CS.4.2
SC.35.CS-CS.4.3
SC.35.CS-PC.2.1
SC.35.CS-PC.3.1

Product Integrations

N/A

Converting Binary

Grades: 4

Strands: Computer Science, Number and Operations in Base Ten

In this interdisciplinary lesson, students will explore how they can use their subtraction or division computational skills to convert from the base-ten system to base two. While students convert between decimal and binary students will enhance their number sense and reasoning, helping to solidify basic conceptual foundations of numeracy and increase computational fluency. This is lesson 5 of 6 in the Fourth-Grade Binary Unit.

Standards Addressed

CCSS.MATH.CONTENT.4.NBT.B.4
CCSS.MATH.CONTENT.4.NBT.B.6
CCSS.MATH.PRACTICES: 1, 2, 4, 6, 7, 8
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Florida Computer Science Standards:
SC.35.CS-CS.2.7
SC.35.CS-CS.2.8
SC.35.CS-CS.2.9

Product Integrations

Binary Conversion Kit (optional)
Flowchart Stencil Kit (optional)

Programming Challenge: Binary and Magnetism

Grades: 4

Strands: Computer Science. Reading Informational Text, Writing

In this interdisciplinary challenge, students will use the Binary Conversion Kit to create a model that works with magnets to convert a base-ten number to a binary number. Student will be given a set of criteria that their model must adhere to. This is the culminating lesson in the Fourth-Grade Binary Unit and merges magnetism, binary code, and math computational fluency concepts with an engineering challenge.

Standards Addressed

CCSS.MATH.CONTENT.4.MD.A.2
CCSS.MATH.PRACTICES: 1, 2, 4, 6, 7, 8
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Florida Computer Science Standards:
SC.35.CS-CS.2.2
SC.35.CS-CS.2.7
SC.35.CS-CS.2.8
SC.35.CS-CS.2.9

Product Integrations

Binary Conversion Kit

Earth-Moon System Phase Cards

Grades: 4, 5

Strands: Computer Science, Earth and Space Science

In this lesson, the first of four in an Earth-Moon system unit, students will use Moon Phase Cards to analyze the eight major divisions of the Moon's cycle and use a Moon model to analyze features found on the Moon.

Standards Addressed

NGSS.5-ESS1-2
NGSS Science & Engineering Practices:
1, 2, 6, 7, 8

Florida Computer Science Standards:
SC.35.CS-CS.1.2

Products Integrated

Moon Topography Kit
ShareSpace Moon Map (optional)

Earth-Moon Systems in 3D

Grades: 4, 5

Strands: Earth and Space Science

In this lesson, the second of four in an Earth-Moon system unit, students will use the Moon Stages Kit to model and explore the Moon's location relative to Earth and the Sun.

Standards Addressed

NGSS.5-ESS1-2

NGSS Science & Engineering Practices:
1, 2, 6, 7, 8

Product Integrations

Moon Stages Kit

Earth-Moon System Animation

Grades: 4, 5

Strands: Computer Science, Geometry

In this lesson, the second of four in an Earth-Moon system unit, students will use the Moon Stages Kit to model and explore the Moon's location relative to Earth and the Sun.

Standards Addressed

CCSS.MATH.CONTENT.5.G.A.1
CCSS.MATH.CONTENT.5.G.1.2
CCSS.MATH.PRACTICES: 4
NGSS.5-ESS1-2
NGSS Science & Engineering Practices:
1, 2, 6, 7, 8

Florida Computer Science Standards:
SC.35.CS-CP.2.2
SC.35.CS-CP.2.5
SC.35.CS-CP.3.2
SC.35.CS-CS.1.1
SC.35.CS-CS.1.2
SC.35.CS-CS.1.4

Product Integrations

Moon Topography Kit

Earth-Moon System Writing

Grades: 4, 5

Strands: Earth and Space Science

In this lesson, fourth of four in a unit on the Earth-Moon system, students will use their knowledge of the Moon, Earth and Sun system to develop a writing piece about the interactions that occur within the system and the ways that people have built models to help in the learning process of science.

Standards Addressed

NGSS.5-ESS1-2

NGSS Science & Engineering Practices: 1, 6, 7, 8

Product Integrations

Moon Topography Kit

Ocean Mapping

Grades: 4

Strands: Earth's Systems

Explore oceanography and cartography in this hands-on activity. In small groups, students utilize our Ocean Topography Mapping Kit to create a color-coded topographic map of an unknown ocean landform. After analyzing their maps, groups switch locations and try to describe the landforms of the other groups based solely on their maps. Once they've completed their analyses, remove the ocean surface to see the landform within! Follow this activity with *Topography Mapping*, in which students get to explore the shapes made by land and water. Students will use their MyBot by Mimoi robots to read and decode other groups' maps!

Standards Addressed

NGSS 4-ESS2-2

Product Integrations

Ocean Topography Mapping Kit

Why Whiskers?

Grades: 4

Strands: Life Science: Structures & Processes

Become a cat and navigate an obstacle course blindfolded! Use the pieces from this kit and straws to replicate a cat's whiskers. Then, experience how whiskers help cats gain awareness of their surroundings. Afterwards, discuss how various animals use their senses and abilities to navigate their environments safely.

Standards Addressed

NGSS 4-LS1-2

Product Integrations

Composing Polyhedrons Kit: Kite Expansion

Flyswatter Arithmetic: Elementary

Grades: K, 1, 2, 3, 4, 5

Strands: Counting and Cardinality, Geometry, Operations and Algebraic Thinking, Number and Operations

Use your MimioSTEM Activity Mat paired with flyswatters to pinpoint the correct answers to arithmetic questions to increase fluency and automaticity. This fast-paced activity includes sample prompts for each relevant standard and grade in elementary school. Perfect as a breakout station or as a group transition activity.

Standards Addressed

CCSS.MATH.CONTENT.5.G.A.1
CCSS.MATH.CONTENT.5.NF.B.4

(For additional standards, see each relevant grade.)

Product Integrations

MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)
MimioView Document Camera (optional)

Introducing the Coordinate System

Grades: 5

Strands: Geometry

Students are introduced to the basic structure of the coordinate plane and how it can be used to describe the location of points. They apply their understanding by graphing points given their coordinates and by describing the coordinates of graphed points.

Standards Addressed

CCSS.MATH.CONTENT.5.G.A.1
CCSS.MATH.PRACTICES: 2, 6

Product Integrations

Graphing Kit (optional)
MimioSTEM Activity Mat (optional)

Graphing Shapes on the Coordinate Plane

Grades: 5

Strands: Geometry

Students apply their understanding of graphing on the coordinate plane. They will practice graphing points given the coordinates and describe the polygons created by connecting the points.

Standards Addressed

CCSS.MATH.CONTENT.5.G.A.1
CCSS.MATH.CONTENT.5.G.B.3
CCSS.MATH.PRACTICES: 2, 6

Product Integrations

Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Loaded Dice (optional) Kit

Graphing Data in the Coordinate Plane

Grades: 5 **Strands: Geometry, Operations and Algebraic Thinking**

Students are introduced to two-variable data that can be graphed in the first quadrant of the coordinate plane. They collect, graph, and interpret data in context.

Standards Addressed

CCSS.MATH.CONTENT.5.G.A.2
CCSS.MATH.CONTENT.5.OA.B.3
CCSS.MATH.PRACTICES: 2, 4

Product Integrations

Bowling Kit (optional)
Loaded Dice Kit (optional)
MimioView Document Camera (optional)
Boxlight Interactive Flat Panel (optional)

An Introduction to Venn & Euler Diagrams

Grades: 5 **Strands: Geometry**

Students are introduced to Venn and Euler diagrams as a means of displaying the relationships among sets of objects. They both construct and interpret Venn diagrams to show the relationships among real-world sets, sets of numbers, and sets of shapes.

Standards Addressed

CCSS.MATH.CONTENT.5.G.B.3
CCSS.MATH.CONTENT.5.G.B.4
CCSS.MATH.PRACTICES: 2, 7

Product Integrations

Basic Shapes: Circles Kit
Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Basic Shapes: Right Solids Kit

Classifying Triangles Using Venn and Euler Diagrams

Grades: 5 **Strands: Geometry**

Students review the angle types and triangle classifications. Then they use Venn diagrams to show the relationships among the sets of scalene, isosceles, equilateral, acute, right, obtuse, and equiangular triangles.

Standards Addressed

CCSS.MATH.CONTENT.5.G.B.3
CCSS.MATH.CONTENT.5.G.B.4
CCSS.MATH.PRACTICES: 2, 6

Product Integrations

Angle Tester Kit
Basic Shapes: Triangles Kit
Composing Polygons Kit (optional)
Geometry Sticks: Customary Kit (optional)
Geometry Sticks: Metric Kit (optional)

Classifying Quadrilaterals Using Venn and Euler Diagrams

Grades: 5 **Strands: Geometry**

Students review the defining attributes of the special quadrilaterals (parallelograms, trapezoids, kites, rectangles, rhombuses, and squares). Then they use Venn diagrams to show the relationships among these sets.

Standards Addressed

CCSS.MATH.CONTENT.5.G.B.3
CCSS.MATH.CONTENT.5.G.B.4
CCSS.MATH.PRACTICES: 2, 6

Product Integrations

Basic Shapes: Quadrilaterals Kit

Coordinate Design

Grades: 5 **Strands: Geometry**

Students use the coordinate plane and polygons to create designs to reinforce graphing on the coordinate plane.

Standards Addressed

CCSS.MATH.CONTENT.5.G.A.1
CCSS.MATH.CONTENT.5.G.B.3
CCSS.MATH.PRACTICES: 2, 6

Product Integrations

Basic Shapes: Polygons Kit
Basic Shapes: Quadrilaterals Kit
Basic Shapes: Triangles Kit
Decomposing Shapes Kit
Tangram Kit

Engineering a City

Grades: 5 **Strands: Geometry**

Students use the coordinate plane and their knowledge of polygon attributes to engineer a map of a city that adheres to certain criteria.

Standards Addressed

CCSS.MATH.CONTENT.5.G.A.1
CCSS.MATH.CONTENT.5.G.B.3
CCSS.MATH.PRACTICES: 2, 6

Product Integrations

City Engineering Kit
MimioSTEM Activity Mat (optional)

Graphing with Gravity

Grades: 5 **Strands: Physical Science: Forces, Geometry**

It's ready for takeoff in this interdisciplinary activity. Students get a chance to decorate and build a paper rocket. Then, launch the rockets into a coordinate plane to discuss gravity and practice graphing on the coordinate plane.

Standards Addressed

MATH.CONTENT.5.G.A.2
NGSS 5-PS2-1

Product Integrations

Rockets Kit

Measuring Lionfish

Grades: 4, 5 **Strands: Earth & Human Activity, Numbers & Operations: Base Ten, Numbers & Operations: Fractions**

Students become marine biologists by comparing invasive lionfish populations in two habitats. Students will randomly select multiple lionfish specimens within a certain habitat and compare their length values in feet using hundredths. Then, they'll expand their exploration by comparing the first habitat to a second to hypothesize as to which population is older and discuss ways that this data could be used to help protect the existing ecosystems from this invasive predator.

Standards Addressed

MATH.CONTENT.4.NF.C.7
MATH.CONTENT.5.NBT.A.3
NGSS 5-ESS3-1

Product Integrations

Lionfish Sampling Kit

Magnetic Mixtures Binary

Grades: 3, 5

Strands: Measurement and Data, Physical Science

In this lesson, students will explore mixtures and how to separate them based on each material's properties. This is lesson 1 in the Fifth-Grade Binary Unit.

Standards Addressed

CCSS.MATH.CONTENT.5.MD.A.1
NGSS.3-PS2-3
NGSS.3-PS2-4
NGSS.5.PS1-3

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

Magnetic Field Tray Kit

Sifting Magnetic Mixtures

Grades: 3, 5

Strands: Measurement and Data, Physical Science

In this lesson, students will explore mixtures and different ways to separate them. This is lesson 2 in the Fifth-Grade Binary Unit.

Standards Addressed

CCSS.MATH.CONTENT.5.MD.A.1
NGSS.3-PS2-3
NGSS.3-PS2-4

NGSS.5.PS1-3
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

Magnetic Field Tray Kit
Sieve Kit

Discovering Binary

Grades: 5

Strands: Computer Science, Operations and Algebraic Thinking

In this interdisciplinary lesson, students will explore how decimal numbers can be represented in binary. Students will explore the idea of binary and how it uses only 0 and 1 as its digits, representing switches that either use or don't use certain values in an 8-bit string. Students will convert between base 10 and base 2 using their math knowledge. This is lesson 3 in the Fifth-Grade Binary Unit.

Standards Addressed

CCSS.MATH.CONTENT.5.OA.A.2
CCSS.MATH.CONTENT.5.OA.B.3
CCSS.MATH.PRACTICES:
1, 2, 4, 6, 7, 8

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8
Florida Computer Science Standards:
SC.35.CS-CS.2.8
SC.35.CS-CS.2.9

Product Integrations

Binary Conversion Kit

How Does My Computer Use Binary?

Grades: 5

Strands: Computer Science. Reading Informational Text, Writing

In this interdisciplinary lesson, students will explore how computers use binary digits to communicate. Students will explore how data is stored in different devices using binary logic. Students will also explore the history of using magnetism in hard drives and the current use of electric charges in solid state disks, making the connection between math, science, and computer science. This is lesson 4 of 6 in the Fifth-Grade Binary Unit.

Standards Addressed

CCSS.ELA-LITERACY.R1.5.3
CCSS.ELA-LITERACY.R1.5.4
CCSS.ELA-LITERACY.R1.5.7
CCSS.ELA-LITERACY.R1.5.9
CCSS.ELA-LITERACY.W.5.2
CCSS.MATH.PRACTICES: 1, 2, 4, 7

NGSS Science & Engineering Practices: 2, 5, 8

Florida Computer Science Standards:
SC.35.CS-CS.4.2
SC.35.CS-CS.4.3
SC.35.CS-PC.2.1
SC.35.CS-PC.3.1

Product Integrations

N/A

Converting Binary

Grades: 5

Strands: Computer Science, Number and Operations in Base Ten

In this interdisciplinary lesson, students will explore how they can use their subtraction or division computational skills to convert from the base-ten system to base two. While students convert between decimal and binary students will enhance their number sense and reasoning, helping to solidify basic conceptual foundations of numeracy and increase computational fluency. This is lesson 5 of 6 in the Fifth-Grade Binary Unit.

Standards Addressed

CCSS.MATH.CONTENT.5.NBT.B.6
CCSS.MATH.CONTENT.5.NBT.B.7
CCSS.MATH.PRACTICES: 1, 2, 4, 6, 7, 8
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Florida Computer Science Standards:
SC.35.CS-CS.2.7
SC.35.CS-CS.2.8
SC.35.CS-CS.2.9

Product Integrations

Binary Conversion Kit (optional)
Flowchart Stencil Kit (optional)

Programming Challenge: Binary and Magnetism

Grades: 5

Strands: Computer Science, Measurement and Data, Operations and Algebraic Thinking

In this interdisciplinary challenge, students will program the Binary Conversion Kit to create a model that works with magnets to convert a base-ten number to a binary number. Students will be given a set of criteria that their model must adhere to. This lesson is the culminating project in the Fifth-Grade Binary Unit and merges magnetism, binary code, and math computational fluency concepts with an engineering challenge.

Standards Addressed

CCSS.MATH-CONTENT.5.OA.A.1
CCSS.MATH.CONTENT.5.MD.A.1
CCSS.MATH.PRACTICES: 1, 2, 4, 6, 7, 8
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Florida Computer Science Standards:
SC.35.CS-CS.2.8
SC.35.CS-CS.2.9

Product Integrations

Binary Conversion Kit

Earth-Moon System Phase Cards

Grades: 4, 5

Strands: Computer Science, Earth and Space Science

In this lesson, the first of four in an Earth-Moon system unit, students will use Moon Phase Cards to analyze the eight major divisions of the Moon's cycle and use a Moon model to analyze features found on the Moon.

Standards Addressed

NGSS.5-ESS1-2
NGSS Science & Engineering Practices: 1, 2, 6, 7, 8
Florida Computer Science Standards: SC.35.CS-CS.1.2

Product Integrations

Moon Topography Kit
ShareSpace Moon Map (optional)

Earth-Moon Systems in 3D

Grades: 4, 5

Strands: Earth and Space Science

In this lesson, the second of four in an Earth-Moon system unit, students will use the Moon Stages Kit to model and explore the Moon's location relative to Earth and the Sun.

Standards Addressed

NGSS.5-ESS1-2
NGSS Science & Engineering Practices: 1, 2, 6, 7, 8

Product Integrations

Moon Stages Kit

Earth-Moon System Animation

Grades: 4, 5

Strands: Computer Science, Geometry

In this lesson, the second of four in an Earth-Moon system unit, students will use the Moon Stages Kit to model and explore the Moon's location relative to Earth and the Sun.

Standards Addressed

CCSS.MATH.CONTENT.5.G.A.1
CCSS.MATH.CONTENT.5.G.1.2
CCSS.MATH.PRACTICES: 4
NGSS.5-ESS1-2
NGSS Science & Engineering Practices: 1, 2, 6, 7, 8
Florida Computer Science Standards:
SC.35.CS-CP.2.2
SC.35.CS-CP.2.5
SC.35.CS-CP.3.2
SC.35.CS-CS.1.1
SC.35.CS-CS.1.2
SC.35.CS-CS.1.4

Product Integrations

Moon Topography Kit

Earth-Moon System Writing

Grades: 4, 5

Strands: Earth and Space Science

In this lesson, fourth of four in a unit on the Earth-Moon system, students will use their knowledge of the Moon, Earth and Sun system to develop a writing piece about the interactions that occur within the system and the ways that people have built models to help in the learning process of science.

Standards Addressed

NGSS.5-ESS1-2
NGSS Science & Engineering Practices: 1, 6, 7, 8

Product Integrations

Moon Topography Kit

Day and Night

Grades: K, 1, 3, 5

Strands: Earth's Systems, Earth's Place in the Universe, Energy, Computer Science

This flexible activity is great foundation for a discussion of light, temperature, seasons, and weather! Using your Labdisc Portable STEM Lab, collect data on temperature and light changes over the course of a day. Repeat this experiment throughout the year for a more-complete understanding of seasons. Then, discuss how the weather you're experiencing is related to your location and that weather in other parts of the world varies based on season and positional relationship to the sun. For younger rades, guide them through the questions and engage in open discussion, while for high grades dig into the data by analysing and interpreting graphs.

Standards Addressed

NGSS.K-ESS2-1
NGSS.K-PS3-1
NGSS.1-ESS1-1
NGSS.1-ESS1-2
NGSS.3-ESS2-1
NGSS.3-ESS2-2
NGSS.5-ESS1-2
Florida Computer Science Standards
SC.K2.CS-CC.1.3
SC.K2.CS-CS.4.1
SC.K2.CS-CS.4.2
SC.K2.CS-CS.4.3
SC.K2.CS-CS.6.1
SC.K2.CS-PC.1.1
SC.K2.CS-PC.2.3
SC.35.CS-CC.1.1
SC.35.CS-CP.1.3
SC.35.CS-CP.1.4

Product Integrations

Labdisc Portable STEM Labs: Gensci, Biochem, Mini, Physio, Primo

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Sunshine Smorgasbord

Grades: 5

Strands: Life Science: Ecosystems, Physical Science: Energy, (Art)

This informal activity is the perfect introduction to food chains, filled with hands-on demonstrations of energy transfer and questions designed to drive deeper understanding. Let the students lead the way while guiding them to an understanding that the smorgasbord of food and the energy gained from it all starts with the sun!

Standards Addressed

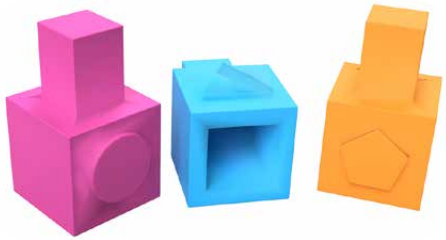
NGSS 5-LS2-1
NGSS 5-PS3-1

Product Integrations

Food Energy Transfer Kit
Food Web: Forest Kit

Pattern Block Building

Basic | **Grades: 2-3** | **Subjects: Technology, Engineering, Art, Mathematics**



In this activity, students will create their own stacking pattern blocks. Students will utilize measuring, tolerances, and calculations to ensure the blocks stack well. Each student will get a chance to personalize their blocks using shapes, which can then be used to explore pattern recognition in math classrooms.

Product Integrations: Stacking Blocks Kit

Guiding Standards

MATH.CONTENT.2.G.A.1	SC.K2.CS-CS.4.3	SC.K2.CS-PC.4.1	NGSS 5-PS2-1	SC.35.CS-PC.2.7
NGSS K-2-ETS1-1	SC.K2.CS-CS.6.1	NGSS 3-5-ETS1-1	SC.35.CS-CP.3.1	
NGSS K-2-ETS1-2	SC.K2.CS-CP.1.1	NGSS 3-5-ETS1-2	SC.35.CS-CP.3.2	
SC.K2.CS-CS.4.2	SC.K2.CS-PC.1.1	NGSS 3-5-ETS1-3	SC.35.CS-PC.2.4	

Derby Wheels

Basic | **Grades: 2-5** | **Subjects: Science, Technology, Engineering, Art, Mathematics**

Students get to design customized 3D-printed wheels to use in conjunction with a wooden derby car. Students must take accurate measurements and plan a design that will integrate with an existing car and print well. Then, students can compare and analyze different wheel designs for speed and distance travelled over a variety of courses. This activity can be done with derby tracks or either of the MyStemKits.com Meter Stick Ramp Kits.

Product Integrations: Thin Meter Stick Ramp Kit or Wide Meter Stick Ramp Kit

Guiding Standards

MATH.CONTENT.2.MD.A.1	SC.K2.CS-CS.4.2	SC.K2.CS-PC.1.1	NGSS 3-5-ETS1-2	SC.35.CS-CP.3.2
NGSS K-2-ETS1-1	SC.K2.CS-CS.4.3	SC.K2.CS-PC.4.1	NGSS 3-5-ETS1-3	SC.35.CS-PC.2.4
NGSS K-2-ETS1-2	SC.K2.CS-CS.6.1	MATH.CONTENT.5.MD.C.3	NGSS 5-PS2-1	SC.35.CS-PC.2.7
NGSS K-2-ETS1-3	SC.K2.CS-CP.1.1	NGSS 3-5-ETS1-1	SC.35.CS-CP.3.1	

Engineering 3D Vertices: Cubes

Basic | **Grades: 3-5** | **Subjects: Science, Technology, Engineering, Art, Mathematics**

Students will build a cube vertex which attaches to straws so it can be used to construct cubes and rectangular prisms. Students will be challenged to make it fit a real-world object and design for variation in print quality and straw size. Utilization of angles, measurement, and an understanding of 3D space will be instrumental in the construction of this simple vertex.

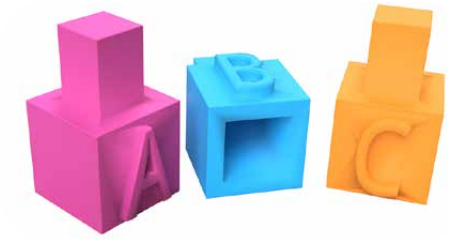
Product Integrations: Thin Meter Stick Ramp Kit or Wide Meter Stick Ramp Kit

Guiding Standards

MATH.CONTENT.4.G.A.1	MATH.CONTENT.4.C.6	NGSS 3-5-ETS1-1	SC.35.CS-CP.3.1	SC.35.CS-PC.2.4
MATH.CONTENT.4.G.A.2	MATH.CONTENT.5.MD.C.3	NGSS 3-5-ETS1-3	SC.35.CS-CP.3.2	SC.35.CS-PC.2.7
MATH.CONTENT.4.MD.C.5				

Number Block Building

Basic | **Grades: 4-5** | **Subjects: Technology, Engineering, Art, Mathematics**



In this activity, students will create their own stacking number blocks. Students will utilize measuring, tolerances, and calculations to ensure the blocks stack well. Each student will get a chance to personalize their blocks using numbers or letters, which can then be used to explore pattern recognition in math classrooms or create words in language arts lessons.

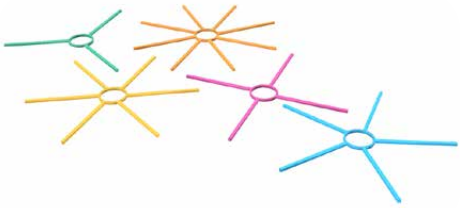
Product Integrations: Stacking Blocks Kit

Guiding Standards

MATH.CONTENT.5.MD.C.3
NGSS 3-5-ETS1-1
NGSS 3-5-ETS1-3
SC.35.CS-CP.3.1
SC.35.CS-CP.3.2
SC.35.CS-PC.2.4
SC.35.CS-PC.2.7

Spinner Partitions

Basic | **Grades: 4-5** | **Subjects: Technology, Engineering, Art, Mathematics**



Students will design a useful classroom tool to quickly partition the CD Spinner Kit into equal shares. Students will be challenged to take measurements and design around the existing kit before creating a partitioning disk according to specific instructions.

Product Integrations: CD Spinner Kit or Probability Kit

Guiding Standards

MATH.CONTENT.3.G.A.2
MATH.CONTENT.3.NF.A.1
MATH.CONTENT.5.MD.C.3
NGSS 3-5-ETS1-1
NGSS 3-5-ETS1-3
SC.35.CS-CP.3.1
SC.35.CS-CP.3.2
SC.35.CS-PC.2.4
SC.35.CS-PC.2.7

Tessellation Tails: *An Introduction to Codeblocks*

Basic | **Grades: 3-12** | **Subjects: Technology, Engineering, Art, Mathematics**

In this activity, students will analyze and decompose a complex feline tile into its component parts. They will then use that information to create the tile two times, first using traditional modeling techniques and then using Tinkercad Codeblocks. This introduction to code-based 3D modeling serves as a foundation for understanding block-based coding and parametric modeling. It will emphasize the differences between and benefits of each modeling technique.

Product Integrations: Tessellation Tiles Kit

Guiding Standards

MATH.CONTENT.3.MD.C.5
MATH.CONTENT.3.MD.C.6
MATH.CONTENT.3.MD.C.7
MATH.CONTENT.3.OA.A.3
MATH.CONTENT.4.MD.A.1
MATH.CONTENT.4.MD.A.2
MATH.CONTENT.4.MD.A.3
MATH.CONTENT.5.G.A.1
MATH.CONTENT.5.G.A.2
MATH.CONTENT.5.MD.A.1
NGSS 3-5-ETS1-1
SC.35.CS-CS.2.6
SC.35.CS-CP.2.1
SC.35.CS-CP.2.2
SC.35.CS-CP.3.1
SC.35.CS-CP.3.2
SC.35.CS-PC.2.4
SC.35.CS-PC.2.7
MATH.CONTENT.6.G.A.1
MATH.CONTENT.7.G.B.6
MATH.CONTENT.8.G.A.1
MATH.CONTENT.8.G.A.2
SC.68.CS-CS.2.10
SC.68.CS-CS.2.13
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.3.1
SC.68.CS-CS.3.2
SC.68.CS-CS.6.1
SC.68.CS-CS.6.6
SC.68.CS-PC.2.3
SC.68.CS-PC.2.6
SC.68.CS-PC.2.8
MATH.CONTENT.HSG.CO.A.5
MATH.CONTENT.HSG.CO.B.6
MATH.CONTENT.HSG.MG.A.1
SC.912.CS-CS.2.7
SC.912.CS-CS.2.9
SC.912.CS-CS.3.1
SC.912.CS-CS.3.2

Time to Design

Intermediate | Grades: 2-3 | Subjects: Technology, Engineering, Art, Mathematics

In this activity, students are guided through setting up the hour and minute markers for an analog clock. Then, they get to customize the numbering and design of the clock to create a one-of-a-kind timepiece. Students must come up with a variety of custom design options for the clock within provided constraints before choosing which one to build.

Product Integrations: Time: Analog Clock Kit

Guiding Standards

MATH.CONTENT.2.G.A.1	NGSS K-2-ETS1-2	SC.K2.CS-CS.6.1	MATH.CONTENT.3.MD.A.1	SC.35.CS-CP.3.1
MATH.CONTENT.2.MD.A.1	NGSS K-2-ETS1-3	SC.K2.CS-CP.1.1	NGSS 3-5-ETS1-1	SC.35.CS-CP.3.2
MATH.CONTENT.2.MD.C.7	SC.K2.CS-CS.4.2	SC.K2.CS-PC.1.1	NGSS 3-5-ETS1-2	SC.35.CS-PC.2.4
NGSS K-2-ETS1-1	SC.K2.CS-CS.4.3	SC.K2.CS-PC.4.1	NGSS 3-5-ETS1-3	SC.35.CS-PC.2.7

Home Sweet 3D Home

Intermediate | Grades: 4-5 | Subjects: Technology, Engineering, Art, Mathematics

Students will design the house from our City Engineering Kit. Students will utilize their understanding of basic shapes, decimals, and scale to recreate the existing model, including adding text to the bottom of the model. Students will be allowed to customize the locations and shapes of the windows and doors.

Product Integrations: City Engineering Kit

Guiding Standards

MATH.CONTENT.5.MD.C.3	NGSS 3-5-ETS1-1	SC.35.CS-CP.3.1	SC.35.CS-PC.2.4
MATH.CONTENT.5.NBT.B.7	NGSS 3-5-ETS1-3	SC.35.CS-CP.3.2	SC.35.CS-PC.2.7

Coding Custom Clocks - A Codeblocks Activity *(4th Grade)*

Intermediate | Grades: 4 | Subjects: Technology, Engineering, Art, Mathematics

In this Tinkercad Codeblocks Design Challenge, students must rise to the challenge of a client-driven project. They will be provided with a sample of code as they work to design a code-driven clock. They must decode the sample, identify the function of each of the parts, and reverse-engineer the code to use it for other pieces of the clock. Throughout they'll be challenged with understanding and utilizing code-based logic systems, fractions, and concepts of angle measurement as well as meeting the demands of the client (a local 2nd or 3rd grader).

Product Integrations: Time: Analog Clock Kit and Adjustable Angles Kit

Guiding Standards

MATH.CONTENT.4.MD.C.5.A	MATH.CONTENT.4.NF.B.4	SC.35.CS-CS.2.6	SC.35.CS-CP.2.3	SC.35.CS-PC.2.4
MATH.CONTENT.4.MD.C.5.B	NGSS 3-5-ETS1-1	SC.35.CS-CS.2.7	SC.35.CS-CP.2.5	SC.35.CS-PC.2.7
MATH.CONTENT.4.MD.C.7	NGSS 3-5-ETS1-2	SC.35.CS-CP.2.1	SC.35.CS-CP.3.1	
MATH.CONTENT.4.NF.B.3	NGSS 3-5-ETS1-3	SC.35.CS-CP.2.2	SC.35.CS-CP.3.2	

Rover Wheels

Intermediate | Grades: 4-12 | Subjects: Science, Technology, Engineering, Art, Mathematics

Students get to design customized 3D-printed wheels to use in conjunction with a mars rover. Students must take accurate measurements and plan a design that will integrate with an axle and print well. Then, students can compare and analyze different wheel designs for speed and ability to traverse a variety of courses.

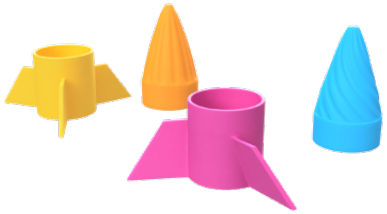
Product Integrations: Mars Rover Kit and MyBot by Mimio Fusion (optional)

Guiding Standards

MATH.CONTENT.5.MD.C.3	SC.35.CS-CP.3.2	NGSS MS-ETS1-1	SC.68.CS-CS.3.2	SC.68.CS-PC.2.8
NGSS 3-5-ETS1-1	SC.35.CS-PC.2.4	NGSS MS-ETS1-2	SC.68.CS-CS.6.1	MATH.CONTENT.HSG.MG.A.1
NGSS 3-5-ETS1-2	SC.35.CS-PC.2.7	NGSS MS-ETS1-3	SC.68.CS-CS.6.6	MATH.CONTENT.HSG.MG.A.3
NGSS 3-5-ETS1-3	MATH.CONTENT.7.G.B.6	NGSS MS-ETS1-4	SC.68.CS-PC.2.3	SC.912.CS-CS.3.1
SC.35.CS-CP.3.1	MATH.CONTENT.8.G.A.1	SC.68.CS-CS.3.1	SC.68.CS-PC.2.6	SC.912.CS-CS.3.2

Lift Off!

Advanced | Grades: 2-5 | Subjects: Science, Technology, Engineering, Art, Mathematics



Become aerospace engineers in this interdisciplinary activity! Students will get a chance to analyze a couple of rocket parts and then customize their own creations. Throughout students will utilize and enhance their measuring, geometry, and design skills as they put them to use in a real-world scenario.

Product Integrations: Rockets Kit

Guiding Standards

MATH.CONTENT.2.G.A.1	NGSS K-2-ETS1-2	SC.K2.CS-CS.4.3	SC.K2.CS-PC.1.1	SC.35.CS-CP.3.2
MATH.CONTENT.2.MD.A.1	NGSS 3-5-ETS1-1	SC.K2.CS-CS.6.1	SC.K2.CS-PC.4.1	SC.35.CS-PC.2.4
MATH.CONTENT.MD.C.3	NGSS E-T-ETS1-2	SC.K2.CS-CP.1.1	SC.35.CS-CP.3.1	SC.35.CS-PC.2.7

3D Dream Home

Advanced | Grades: 3-5 | Subjects: Technology, Engineering, Art, Mathematics

Students will get to design and model a dream house in the same scale as the rest of the parts in the City Engineering Kit. Students first must plan and draw their building and then utilize their understanding of basic shapes and 3D printing to create a house model which prints well.

Product Integrations: City Engineering Kit

Guiding Standards

MATH.CONTENT.5.MD.C.3	NGSS 3-5-ETS1-2	SC.35.CS-CP.3.1	SC.35.CS-PC.2.4
NGSS 3-5-ETS1-1	NGSS 3-5-ETS1-3	SC.35.CS-CP.3.2	SC.35.CS-PC.2.7

Sailing Regatta

Advanced | **Grades: 3-5** | **Subjects: Science, Technology, Engineering, Art, Mathematics**

Students engineer a sailboat given specific requirements and constraints. Students will be guided through creating an adjustable mast and yards (the horizontal beams which hold the sails) but must come up with the rest of the design on their own. Students first must plan and draw their sailboat and then utilize their understanding of basic shapes and 3D printing to create a boat model which prints and performs well.

Product Integrations: Sailboats Kit

Guiding Standards

MATH.CONTENT.3.MD.C.5	MATH.CONTENT.4.MD.A.3	NGSS 3-5-ETS1-1	SC.35.CS-CP.3.1	SC.35.CS-PC.2.4
MATH.CONTENT.3.MD.C.6	MATH.CONTENT.5.MD.C.3	NGSS 3-5-ETS1-2	SC.35.CS-CP.3.2	SC.35.CS-PC.2.7
MATH.CONTENT.3.MD.C.7	NGSS 3-PS2-1	NGSS 3-5-ETS1-3		

3D Derby

Advanced | **Grades: 4-7** | **Subjects: Science, Technology, Engineering, Art, Mathematics**

Students design customized 3D-printed derby racers. Students must take accurate measurements and plan a design that will integrate with an existing set of wheels and ramp, all while ensuring their design will successfully 3D print. This activity can be done with derby tracks or either of the MyStemKits.com Meter Stick Ramp Kits.

Product Integrations: Thin Meter Stick Ramp Kit or Wide Meter Stick Ramp Kit

Guiding Standards

NGSS 3-5-ETS1-1	SC.35.CS-CP.3.1	MATH.CONTENT.7.G.B.6	NGSS MS-ETS1-4	SC.68.CS-CS.6.6
NGSS 3-5-ETS1-2	SC.35.CS-CP.3.2	NGSS MS-ETS1-1	SC.68.CS-CS.3.1	SC.68.CS-PC.2.3
NGSS 3-5-ETS1-3	SC.35.CS-PC.2.4	NGSS MS-ETS1-2	SC.68.CS-CS.3.2	SC.68.CS-PC.2.6
NGSS 5-PS2-1	SC.35.CS-PC.2.7	NGSS MS-ETS1-3	SC.68.CS-CS.6.1	SC.68.CS-PC.2.8

Catapults and Data Collection

Grades: 6, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore data collection using a catapult and perform statistical analysis of the data. Students will calculate the mean, median, mode and range, discuss outliers, and graph the data. Students will determine the best statistical number and graph to use for the data.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.HSS.ID.A.3 CCSS.
MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Product Integrations

Ball Bearing Catapult Kit

Flyswatter Arithmetic: Middle School

Grades: 6, 7, 8

Strands: Expressions and Equations, Geometry, The Number System, Ratios and Proportions

Use your MimioSTEM Activity Mat paired with flyswatters to pinpoint the correct answers to arithmetic questions to increase fluency and automaticity. This fast-paced activity includes sample prompts for grades 6-8. Perfect as a warm up or end-of-class activity. Adapt to suit whatever topics you're currently covering or use to refresh previously-covered skills.

Standards Addressed

CCSS.MATH.CONTENT.6.EE.A.1
CCSS.MATH.CONTENT.6.EE.B.8
CCSS.MATH.CONTENT.6.NS.B.2
CCSS.MATH.CONTENT.6.NS.B.4
CCSS.MATH.CONTENT.6.NS.C.8
CCSS.MATH.CONTENT.6.RP.A.1
(For additional standards, see each relevant grade.)

Product Integrations

MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)
MimioView Document Camera (optional)

The Importance of Being Accurate

Grades: 6

Strands: The Number System, Statistics and Probability

Discover the importance of being accurate in this exploratory activity. Students become aerospace engineers testing shuttle launches to see how even a few degrees from vertical can significantly impact the flight of the shuttle. This real-world scenario provides the perfect backdrop for measuring, utilizing absolute value, calculating averages, and creating plots of their results.
Designed in conjunction with the MyBot by Mimio activity, *Missed it by that Much*, enjoy this standalone activity or progress from this lesson onto that one.

Standards Addressed

CCSS.MATH.CONTENT.6.NS.B.2
CCSS.MATH.CONTENT.6.NS.C.5
CCSS.MATH.CONTENT.6.NS.C.6
CCSS.MATH.CONTENT.6.NS.C.7
CCSS.MATH.CONTENT.6.NS.C.8
CCSS.MATH.CONTENT.6.SP.B.4

Product Integrations

Space Shuttles Kit
(Virtual Rockets Kit Compatible)
MyBot by Mimio Fusion (in follow-up lessons)
Mimio Document Camera
Boxlight Interactive Flat Panel

Statistical Questions

Grades: 6

Strands: Engineering Design, Statistics and Probability

In this lesson, students will explore how scientists and mathematicians develop and plan investigations with statistical questions, taking into account a variety of attributes as part of the inquiry.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.1
CCSS.MATH.CONTENT.6.SP.B.5.A
CCSS.MATH.CONTENT.6.SP.B.5.B
CCSS.MATH.PRACTICES: 2, 3, 4, 5

NGSS.MS-ETS1-1
NGSS.MS-ETS1-4
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

Hominid Species and Tools Kit

Statistical Questions and Surveys

Grades: 6, 7

Strands: Statistics and Probability

In this lesson, students will explore how mathematicians develop and plan investigations with statistical surveys while taking into account a variety of attributes, including wording bias.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.1
CCSS.MATH.CONTENT.6.SP.B.5.A
CCSS.MATH.CONTENT.6.SP.B.5.B
CCSS.MATH.CONTENT.7.SP.A.1

CCSS.MATH.PRACTICES: 3, 4
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

N/A

Height Histograms

Grades: 6, 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will discover the usefulness of the histogram when trying to represent heights of students in their class. The lesson will start with gathering data and then progresses through the steps needed to create histograms. Further investigation will show how the distribution of data may or may not change based on the chosen intervals. There is also an opportunity to use stacked histograms to identify any relationships between male and female student height.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.3

CCSS.MATH.PRACTICES:
1, 2, 3, 4, 5, 6, 7, 8

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

Stacking Blocks Kit

Lionfish and Histograms

Grades: 6, 7, 9, 10, 11, 12

Strands: Earth and Space Science, Life Science, Statistics and Probability

In this lesson, students will explore longitudinal data on a population of invasive lionfish and the usefulness of histograms to help visualize the changes in lionfish age groups over time. Students will base their information from random samples conducted each year for 5 years.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS.MS-LS2-1
NGSS.MS-LS2-2
NGSS.MS-LS2-4
NGSS.MS-LS2-5
NGSS.MS-ESS3-3
NGSS.HS-LS2-1
NGSS.HS-LS2-2
NGSS.HS-LS2-6
NGSS.HS-LS2-7
NGSS.HS-ESS3-3
NGSS.HS-ESS3-4

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

Lionfish Sampling Kit

It Can Be a Zoo of Data!

Grades: 6, 7

Strands: Statistics and Probability

In this lesson, students will explore how the mean and median are affected by different data distributions. Students will enhance their knowledge of mean and median as they are challenged to create a variety of distributions with specific criteria. They will also begin to develop an understanding of how these measures can be affected and therefore which measure may be a better statistic to describe the data.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.3
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.PRACTICES: 2, 3, 4, 5

Product Integrations

N/A

Mean and Median Modification

Grades: 6, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore how the mean and median are affected by different data distributions. Students will enhance their knowledge of mean and median as they are challenged to create a variety of distributions with specific criteria. They will also begin to develop an understanding of how these measures can be affected and therefore which measure may be a better statistic to describe the data.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.PRACTICES: 1, 2, 3, 4, 5, 7, 8

Product Integrations

Stacking Blocks Kit

Greenhouse Atmosphere

Grades: 6

Strands: Earth and Space Science, Statistics and Probability

In this lesson, students will:

- Explore the effect of a greenhouse atmosphere on a planet's temperature.
- Use dot plots to help determine which measures of center may be appropriate to describe the data.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
NGSS.MS-ESS1-3
NGSS.MS-ESS2-4
NGSS Science & Engineering Practices: 1, 2, 5, 6, 8

Product Integrations

Planetary Temperatures Kit

Labdisc Portable STEM Lab
or
SAMLabs Sensors

Marshmallow Catapults



Grades: 6, 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will be presented with situations that require them to synthesize the knowledge they have gained over the entire statistics unit. Students will calculate the mean, median, mode, range, mean absolute deviation (MAD), and inter quartile range (IQR) for the data sets with and without outliers and represent the data in graphical displays. Students will determine the best statistical measure and graph to use for the data based on the distributions and situations they have been given.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.2
CCSS.MATH.CONTENT.6.SP.A.3
CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Product Integrations

Ball Bearing Catapult Kit

It's Raining Cats and Dogs

Grades: 6, 7

Strands: Statistics and Probability

In this lesson, students will discover how to create and interpret box plots. Students will also be introduced to the interquartile range as a measure of variability. This lesson uses an original student tutorial found at FloridaStudents.org. Content is delivered through text and narration, and students are presented with practice questions. Feedback will be provided to the students as they progress through the tutorial and answer the questions.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.PRACTICES: 2, 4, 5

Product Integrations

N/A

Human Box Plot


Grades: 6, 7

Strands: Statistics and Probability

In this lesson, students will create and interpret box plots based on their own birthdates. Students will experience the cluster or spread of data firsthand by creating a "human box plot" based on their birthdates. This activity is meant to allow students to explore data both visually and kinesthetically, since they will form the box plot and experience the clustering and spread of the data. They will see how some people are more squished together or spread apart, but every quartile has the same number of people in it.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.PRACTICES: 2, 4, 5

Product Integrations

Box and Whisker Plot Kit

Measurement and Data Collection

Grades: 6, 7

Strands: Statistics and Probability

In this interdisciplinary lesson, students will practice the skill of data collection with a variety of tools. They will then statistically analyze the class data sets and begin to understand that error is inherent in all data.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.2
CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.A
CCSS.MATH.CONTENT.6.SP.B.5.B
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.PRACTICES: 2, 4, 5, 6
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Product Integrations

Labdisc Portable STEM Lab (no 3D Kit Used)
or
HipScience Sensor Wand
HipScience Temperature Probe

Catapulting Data

Grades: 6

Strands: Physical Science, Statistics and Probability

In this interdisciplinary lesson, students will explore data collection using a catapult and perform statistical analysis of the data. Students will create boxplots for analysis that will help demonstrate the scientific concepts of forces and motion.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.2
CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.MS-PS3-1
NGSS.MS-PS2-2
NGSS.MS-PS3-5
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Product Integrations

Ball Bearing Catapult Kit

MAD Bickering Boys

Grades: 6

Strands: Statistics and Probability

In this lesson, students will explore the various statistical measures that can describe a data set and discover the usefulness of the mean absolute deviation (MAD) as a measure of variation.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.PRACTICES: 1, 2, 3, 4, 7, 8
NGSS Science & Engineering Practices: 2, 4, 5, 8

Product Integrations

N/A

Lionfish and Dot Plots

Grades: 6, 7

Strands: Statistics and Probability

In this lesson, students will explore data on the invasive lionfish and the usefulness of dot plots to help visualize the frequency of lionfish age groups at five different locations. Students will base their information on random samples conducted at five different reefs in the Atlantic Ocean. For each location, students will also calculate the Mean Absolute Deviation value and then compare it to the locations' dot plots. This comparison will help further the conceptual understanding by analyzing the relationship between quantitative measures of dispersion and graphical distributions.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.A.3

CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Product Integrations

Lionfish Sampling Kit

Sea Ice Analysis (Sixth Grade)

Grades: 6

Strands: Earth and Space Science, Statistics and Probability

The changing climate is an important topic for both scientific analysis and worldly knowledge. This lesson uses data collected by the National Snow and Ice Data Center to create and use statistical analysis as a tool to evaluate the mean and variation from the mean of sea ice loss.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.3
CCSS.MATH.CONTENT.6.SP.B.5
NGSS.MS-ESS2-2
NGSS.MS-ESS3-1
NGSS.MS-ESS3-2
NGSS.MS-ESS3-3
NGSS.MS-ESS3-4
NGSS.MS-ESS3-5
NGSS Science & Engineering Practices: 3, 4, 5, 8

Product Integrations

N/A

Let's Go to the Mall

Grades: 6, 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will be presented with situations that require them to synthesize the knowledge they have gained over the entire statistics unit. Students will calculate the mean, median, mode, range, MAD, and IQR for the data sets with and without outliers and represent the data in graphical displays. Students will determine the best statistical measure and graph to use for the data based on the distributions and situations they have been given.

Standards Addressed

CCSS.MATH.PRACTICES: 1, 2, 3, 4, 5
NGSS Science & Engineering Practices: 2, 4, 5, 8

Product Integrations

N/A

Sensoring Data

Grades: 6, 7, 8, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore data collection using the Climate Sensor and perform statistical analysis of the data. Students will use a scientific method of inquiry to plan an investigation of their own. This activity is meant to allow students to use a variety of skills they have acquired throughout a statistics unit in a personally meaningful way. The specific standards addressed will vary based on the students' approach to the challenge.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.1
CCSS.MATH.CONTENT.6.SP.B.5.A
CCSS.MATH.CONTENT.6.SP.B.5.B
CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.CONTENT.HSS.ID.B.5
CCSS.MATH.CONTENT.HSS.ID.B.6.A
CCSS.MATH.CONTENT.HSS.ID.B.6.B
CCSS.MATH.CONTENT.HSS.ID.B.6.C
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Product Integrations

Labdisc Portable STEM Lab
or
HipScience Climate Sensor
or
SAMLabs Sensors

Calculator Energy

Grades: 6

Strands: Computer Science, Physical Science

In this lesson, students will explore the inner workings of a calculator and identify the areas where potential and kinetic energy are at work. This lesson serves as an introduction to a computer science unit looking that the ways that computers use binary to communicate, specifically in the function of a simple calculator.

Standards Addressed

NGSS.MS-PS3-5
NGSS Science & Engineering Practices: 1, 2, 5, 6, 8
Florida Computer Science Standards: SC.68.CS-CS.6.1

Product Integrations

N/A

Discovering Binary

Grades: 6

Strands: Computer Science, Earth and Space Science, Expressions and Equations

In this interdisciplinary lesson, students will explore how decimal numbers can be represented in binary. Students will explore the idea of binary notation and how it uses only 0 and 1 as its digits, representing switches that either use or don't use certain values in an 8-bit string. Students will convert between base ten and base two using their math knowledge. This is lesson 2 in a binary unit.

Standards Addressed

CCSS.MATH.CONTENT.6.EE.A.3
CCSS.MATH.CONTENT.6.EE.A.4
CCSS.MATH.PRACTICES: 1, 2, 4, 6, 7, 8
NGSS-MS-ETS1-1
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-CS.1.1
SC.68.CS-CS.2.11

Product Integrations

Binary Conversion Kit

History of Binary Storage

Grades: 6

Strands: Computer Science, Physical Science, Reading in Science and Technical Subjects, Writing

In this interdisciplinary lesson, students will explore how computers use binary digits to communicate and different devices store data using binary logic. Students will also explore the history of using magnetism in hard drives and the current use of electric charges in solid state disks, making the connection between math, science, and computer science. This is the third lesson in a binary unit.

Standards Addressed

CCSS.ELA-LITERACY.RST.6-8.2
CCSS.ELA-LITERACY.RST.6-8.4
CCSS.ELA-LITERACY.WHST.6-8.2
CCSS.ELA-LITERACY.WHST.6-8.8
CCSS.MATH.PRACTICES: 1, 2, 4, 7
NGSS-MS-PS3-5

NGSS Science & Engineering Practices:
2, 5, 8
Florida Computer Science Standards:
SC.68.CS-CS.4.1
SC.68.CS-CS.4.2
SC.68.CS-CS-4.3
SC.68.CS-CS.5.1

Product Integrations

Binary Conversion Kit

Converting to Binary

Grades: 6

Strands: Computer Science, Engineering Design, Expressions and Equations, Nature of Science, Reading in Science and Technical Subjects

In this interdisciplinary lesson, students will explore how they can use their subtraction or division computational skills to convert from the base-ten system to base two. While converting between decimal and binary, students will enhance their number sense and reasoning, helping to solidify basic conceptual foundations of numeracy and increase computational fluency. This is lesson 4 in the binary unit.

Standards Addressed

CCSS.ELA-LITERACY.R1.5.3
CCSS.ELA-LITERACY.R1.5.4
CCSS.ELA-LITERACY.R1.5.7
CCSS.ELA-LITERACY.R1.5.9
CCSS.ELA-LITERACY.W.5.2
CCSS.MATH.PRACTICES: 1, 2, 4, 7

NGSS Science & Engineering Practices:
2, 5, 8
Florida Computer Science Standards:
SC.35.CS-CS.4.2
SC.35.CS-CS.4.3
SC.35.CS-PC.2.1
SC.35.CS-PC.3.1

Product Integrations

Binary Conversion Kit (optional)

What is ASCII?

Grades: 6

Strands: Computer Science, Reading in Science and Technical Subjects, Writing

In this lesson, students will explore how computers use binary digits to communicate text. They will use binary to write letters and characters while learning about the history of this coding language. Students will then practice writing about themselves in binary. This is the fifth lesson in the binary unit.

Standards Addressed

CCSS.ELA-LITERACY.RST.6-8.2
CCSS.ELA-LITERACY.RST.6-8.4
CCSS.ELA-LITERACY.WHST.6-8.8
CCSS.MATH.PRACTICES: 1, 2, 4, 7
NGSS Science & Engineering Practices: 2, 5, 8
Florida Computer Science Standards:
SC.68.CS-CS.4.3
CS.68.CS-CS.5.1

Product Integrations

Binary Conversion Kit

Logic Gates

Grades: 6

Strands: Computer Science, Engineering Design, Reading in Science and Technical Subjects

In this lesson, students will explore how binary code is read using logic gates and transistors. Students will follow truth tables for AND, OR, and NOT gates used in a series to add two single-digit numbers on a "paper calculator." Students will then simulate a "human calculator" by serving as the logic gates to add numbers using binary. This is lesson 6 in the binary unit.

Standards Addressed

CCSS.ELA-LITERACY.RST.6-8.3
CCSS.MATH.PRACTICES: 1, 2, 4, 6 7, 8
NGSS-MS-ETS1-1
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-CP.1.1
SC.68.CS-CS.1.1
SC.68.CS-CS.2.11

Product Integrations

Logic Gate Stencil Kit

Warning System Water Filter

Grades: 6

Strands: Computer Science, Engineering Design, Statistics and Probability

In this mathematics and science lesson, the first of four in a unit on water quality warning systems, students use different filtering materials to design, build, and test different water filters. Water filtration is an important aspect of maintaining good health during and after an extreme weather event, such as a destructive hurricane. The development of experimental skills through the use of different filters and the mathematical analysis of data is pivotal to student success in this activity.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5
CCSS.MATH.PRACTICES: 2, 5, 6
NGSS.MS-ESS3-2
NGSS.MS-ETS1-1
NGSS.MS-ETS1-2
NGSS.MS-ETS1-3
NGSS.MS-ETS1-4
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-CS.1.3

Product Integrations

Water Filtration Kit

Labdisc Portable STEM Lab: Enviro
or
HipScience Turbidity Probe

Warning System Water Filtration

Grades: 6

Strands: Computer Science, Earth and Space Science, Reading Informational Text

Modern emergency warning systems have come a long way, and they continue to improve as new technologies emerge and scientists gain a better understanding of warning signs that a crisis is looming. In this science and ELA-based lesson, students will analyze the systems and statistics associated with early warning systems.

Standards Addressed

CCSS.ELA-LITERACY.RI.6.1
CCSS.ELA-LITERACY.RI.6.3
CCSS.MATH.PRACTICES: 2
NGSS.MS-ESS3-2
NGSS Science & Engineering Practices: 2, 4, 5

Florida Computer Science Standards:
SC.68.CS-PC.2.1
SC.68.CS-PC.2.3
SC.68.CS-CS.6.1
SC.68.CS-CS.6.2

Product Integrations

N/A

Warning System Flowchart

Grades: 6

Strands: Computer Science, Earth and Space Science, Engineering Design, Expressions and Equations

In this math and science lesson, the third of four in a water quality warning system unit, students will create a flowchart to outline the steps required in the development of a water quality warning system. This warning system will be based on specific parameters to help communities assess drinking water safety after a severe weather event or natural disaster, and will be the basis for a warning system that students will code in the final lesson.

Standards Addressed

CCSS.MATH.CONTENT.6.EE.B.8
CCSS.MATH.PRACTICES: 2, 4
NGSS.MS-ESS3-2
NGSS.MS-ETS1-1
NGSS.MS-ETS1-4

NGSS Science & Engineering Practices: 2, 5, 8
Florida Computer Science Standards:
SC.68.CS-CP.2.2
SC.68.CS-CS.1.3

Product Integrations

Flow Chart Stencil Kit

Warning System Programming

Grades: 6

Strands: Computer Science, Earth and Space Science, Engineering Design, Expressions and Equations

In this mathematics and science lesson, students will code a computerized warning system. This warning system will be based on specific parameters to help communities assess drinking water safety after a severe weather event. This is the final lesson in a unit on water quality warning systems.

Standards Addressed

CCSS.MATH.CONTENT.6.EE.B.8
CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.MS-ESS3-2
NGSS.MS-ETS1-1
NGSS.MS-ETS1-4

NGSS Science & Engineering Practices: 2, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-CP.1.2
SC.68.CS-CP.2.3
SC.68.CS-CS.1.3

Product Integrations

N/A

Animal Cell Scale Model

Grades: 6

Strands: Life Science, Ratios and Proportions

In this lesson, students will explore the components of a cell and their functions, determine the scale used to build a cell model, and use their proportional reasoning skills to create a model of a cell.

Standards Addressed

CCSS.MATH.CONTENT.6.RP.A.2
CCSS.MATH.CONTENT.6.RP.A.3.B
CCSS.MATH.CONTENT.6.RP.A.3.D
NGSS.MS-LS1-2
NGSS Science & Engineering Practices:
1, 2, 5, 6, 8

Product Integrations

Cells: Animal Kit

A Walk Through the City

Grades: 6, 7, 8

Strands: Earth and Human Activity, Ecosystems, Computer Science

The purpose of this activity is to study the relationship between temperature and humidity in several locations inside and outside school, creating a hypothesis and proceeding to test it using the Labdisc external temperature, relative humidity and GPS sensors. The goal is to obtain the values of these variables in urban spaces and in green areas. Use as a standalone acitvity, or extend this understanding with the MyStemKits Urban Ecology Kit where students can investigate ways to improve the ecosystems, temperatures, and energy efficiency of cities.

Standards Addressed

NGSS.MS-ESS3-3
NGSS.MS-ESS3-5
NGSS.MS-LS2-4
NGSS.MS-LS2-5
Florida Computer Science Standards
SC.68.CS-CS.2.1
SC.68.CS-CS.4.4
SC.68.CS-CS.6.1
SC.68.CS-CS.6.2
SC.68.CS-CS.6.3
SC.68.CS-CP.1.2
SC.68.CS-CP.3.1
SC.68.CS-PC.2.8
SC.68.CS-PC.3.1

Product Integrations

Urban Ecology Kit (optional)
Labdisc Portable STEM Labs:
Gensci, Biochem, Enviro

Candy Chromatography

Grades: 6

Strands: Life Science, Physical Science, Ratios and Proportions

In this lesson, students will explore the components of a cell and their functions, determine the scale used to build a cell model, and use their proportional reasoning skills to create a model of a cell.

Standards Addressed

CCSS.MATH.CONTENT.6.RP.A.2
CCSS.MATH.CONTENT.6.RP.A.3.A-C
NGSS.MS-PS1-2
NGSS.MS-PS3-1
NGSS.MS-LS4-2
NGSS Science & Engineering Practices:
1, 5, 6, 8

Product Integrations

Chromatography Paper Holder Kit

Comparing Sensors: *The Distance of Light*

Grades: 6, 7, 8

Strands: Computer Science, Waves and Electromagnetic Radiation

Students get to know their technology tools better in this integrated activity. They will explore assorted sensors: the Labdisc Light & Distance Sensors and the MyBot Optical Distance Sensor, to better understand how the optical distance sensor relies on light readings to sense changes in distance and color. They will evaluate how changing the surface the robot is on can impact the accuracy of the readings and how to use this to their advantage for future activities

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This activity is the perfect follow-up to Albedo (6th Grade) or Time to Reflect (7th Grade), (or both in order) which introduce light reflection and simulate albedo on a small scale. Follow this up with Morse Codebots or Roving Roombot which use the skills learned herein to create smart programs based on the readings of the MyBot optical distance sensor.

Standards Addressed

NGSS.MS-PS4-2
Florida Computer Science Standards
SC.68.CS-CS.2.10
SC.68.CS-CS.2.11
SC.68.CS-CS.2.13
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.2.8
SC.68.CS-CS.4.4
SC.68.CS-CS.6.3
SC.68.CS-CS.6.6
SC.68.CS-CP.1.2
SC.68.CS-CP.2.3
SC.68.CS-CP.3.1

Product Integrations

MyBot by Mimio Fusion
Labdisc Portable STEM Labs: Gensci, Biochem
MimioSTEM Activity Mat

The Coriolis Effect

Grades: 6

Strands: Earth and Space Science, Expressions and Equations

In this activity, students will explore an underlying principal associated with the Coriolis Effect. This lesson provides students the opportunity to use math to begin to understand the behavior of a rotating object. The far-reaching impacts of the Coriolis Effect (e.g. global winds, the jet stream, ocean surface currents) are not directly taught in this lesson. However, it is recommended that this lesson be used to prepare students leading up to those topics.

Standards Addressed

CCSS.MATH.CONTENT.6.EE.A.2
CCSS.MATH.PRACTICES: 1, 2, 4, 6
NGSS.MS-ESS2-6
NGSS Science & Engineering Practices: 5

Product Integrations

Coriolis Effect Kit

Dropsonde Challenge

Grades: 6

Strands: Engineering Design, Geometry, Physical Science

In this interdisciplinary lesson, students will research forces that affect flight in regards to hurricanes and instrumentation for hurricane data collection. Student will then use their knowledge and the engineering design process to design parachutes for dropsondes that adhere to specific criteria, including surface area.

Standards Addressed

CCSS.MATH.CONTENT.6.G.A.1
CCSS.MATH.CONTENT.6.G.A.4
CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.MS-PS2-2
NGSS.MS.ETS1-1
NGSS.MS.ETS1-2
NGSS.MS.ETS1-3
NGSS.MS.ETS1-4
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Product Integrations

Dropsonde Kit

The Golden Ratio

Grades: 6, 7

Strands: Engineering Design, Life Science, Ratios and Proportions

In this lesson, students will discover how the golden ratio can be found in many places throughout the world, in nature and on the human body. Students will use golden ratio calipers as well as direct measurements of a variety items looking for the ratio that is equivalent to the number Phi ≈ 1.618.

Standards Addressed

CCSS.MATH.CONTENT.6.RP.A.1
CCSS.MATH.CONTENT.7.RP.A.2.A-B
CCSS.MATH.PRACTICES: 2, 4, 5, 7, 8
NGSS-MS-ETS1-1
NGSS-MS-ETS1-4
NGSS-MS-LS4-6
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Product Integrations

MyStemKits' Golden Ratio Kit

Layers of Detail: Part 1 *Landforms*

Grades: 6

Strands: Computer Science, Statistics and Probability

Visualize the impact of sample size through mapping! Create and compare topography maps with different levels of detail to see how the clarity of the landforms is improved as the number and precision of samples is increased. Then, integrate your MyBot by Mimio robots as students learn how to use sensors to read another group's map and then analyze the data to determine the charted landform.
Follow this activity with Layers of Detail: Part 2 – Martian Landscape, in which students get to analyze a topography map of Mars based on the readings of their robots and compare their findings to Earth landforms.

Standards Addressed

MATH.CONTENT.6.SP.B.5.A
Florida Computer Science Standards
SC.68.CS-CS.2.10
SC.68.CS-CS.2.13
SC.68.CS-CS.2.2
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.4.4
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8

Product Integrations

Landform Topography Kit
MyBot by Mimio Fusion with Color Sensor
MimioSTEM Activity Mat (optional)

Layers of Detail: Part 2 *Martian Landscape*

Grades: 6

Strands: Computer Science, Earth's Place in the Universe, Statistics and Probability

Continue exploring topography as students use a giant Mars map to plot out and identify Martian landforms. Students must program their MyBot to collect topographic data from a color-coded map and then use that data to evaluate the landform(s) mapped. Students will compare Martian landforms with iconic landforms on Earth to gain a deeper understanding of the scale of the Martian topography.

Standards Addressed

MATH.CONTENT.6.NS.C.5
NGSS MS-ESS1-3
Florida Computer Science Standards
SC.68.CS-CS.2.10
SC.68.CS-CS.2.13
SC.68.CS-CS.2.2
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.4.4
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8

Product Integrations

MyBot by Mimio Fusion with Color Sensor
ShareSpace Giant Mars Map
Meter Stick Quadrat Kit (optional)

Mars Colony (PBL)

Grades: 6, 7, 8

Strands: Computer Science, Engineering Design, Expressions & Equations, Geometry, The Number System, Ratios & Proportions

Engineer the perfect city by placing buildings and determining speed limits, and then test to see how it holds up to a variety of scenarios. From fires to commute times, and running errands to medical emergencies, calculate the efficiency of your design. Once you've figured out your design on paper, scale it up to a floor-sized test space. Then, integrate robotics by running real tests to see how long it takes to travel places by programming your MyBot to traverse your streets. Calculate and graph speed, compare solutions, implement scaling, and engineer within complex scenarios both individually and collaboratively.

Standards Addressed

MATH.CONTENT.6.EE.A.2
MATH.CONTENT.6.EE.B.6
MATH.CONTENT.6.G.A.3
MATH.CONTENT.6.NS.B.2
MATH.CONTENT.6.NS.B.3
MATH.CONTENT.6.NS.C.7
MATH.CONTENT.6.NS.C.8
MATH.CONTENT.6.RP.A.2
MATH.CONTENT.7.G.A.1
MATH.CONTENT.7.NS.A.3
MATH.CONTENT.8.EE.B.5
MATH.CONTENT.8.G.B.7
MATH.CONTENT.8.G.B.8
NGSS MS-ETS1-1
NGSS MS-ETS1-2
Florida Computer Science Standards:
SC.68.CS-CS.1.2
SC.68.CS-CS.1.3
SC.68.CS-CS.2.10
SC.68.CS-CS.2.13
SC.68.CS-CS.2.2
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.6.2
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.6
SC.68.CS-PC.2.8

Product Integrations

MyStemKits City Engineering Kit
MyBot by Mimio Fusion
MimioSTEM Activity Mat (optional)
MimioView Document Camera (optional)
Boxlight Interactive Flat Panel (optional)

Meter Stick Cart

Grades: 6, 8, 9, 10, 11, 12

Strands: Algebra, Physical Science

In this lesson, students will qualitatively and quantitatively analyze the motion of a cart undergoing uniform acceleration. Graphs of position and velocity versus time will be created and a function for the velocity graph will be generated suing the data.

Standards Addressed

CCSS.MATH.CONTENT.HSA.CED.A.1
CCSS.MATH.PRACTICES: 2, 4, 6
NGSS.HS-PS2-1
NGSS Science & Engineering Practices:
4, 8

Product Integrations

Thin Meter Stick Ramp Kit or
Wide Meter Stick Ramp Kit

Missed It By That Much: Part 1

Grades: 6

Strands: Earth's Place in the Universe, Number Systems, Ratios and Proportions

Explore the importance of accuracy and discover how an error is compounded over time at a constant rate of change by investigating the historical Apollo 11 rocket launch. Nowadays, global positioning satellites (GPS) help adjust the paths of everything from small boats to airliners to shuttles carrying supplies and astronauts to the International Space Station but the Apollo missions depended on exact calculations and measurements. Students will determine the rate of change and use ratios to calculate how far off course a traveler would be after going a given distance if the launch angle was even slightly off.

This activity was developed in conjunction with MyStemKits' *The Importance of Being Accurate* lesson plan. That lesson provides a good introduction to the topics covered herein. It requires a 3D printer and utilizes the MyStemKits' Space Shuttles Kit. This is Part 1 of a 2-Part lesson plan. The MyBot is not used until part 2.

Standards Addressed

CCSS.MATH.CONTENT.6.NS.B.2
CCSS.MATH.CONTENT.6.NS.B.4
CCSS.MATH.CONTENT.6.RP.A.1
CCSS.MATH.CONTENT.6.RP.A.2
CCSS.MATH.CONTENT.6.RP.A.3
NGSS.MS-ESS1-3

Product Integrations

Solar System Kit (optional)
MyBot by Mimio Fusion (in part 2)

Missed It By That Much: Part 2

Grades: 6

Strands: Computer Science, Ratios and Proportions

Fast forward to the future and recreate living in a command module on Mars. Use your MyBot by Mimio Fusion to simulate a supply transport that has wavered from its course and instead of delivering a life-saving medical package for a sick colleague, it has vanished into a Martian dust storm. Students must rely on calculations to rendezvous with the robot and save their colleague. This is Part 2 of a 2-Part lesson plan. It is suggested you lead into this activity with the MyStemKits' *The Importance of Being Accurate* & MyBot *Missed it by that Much: Part 1* activities.

Standards Addressed

CCSS.MATH.CONTENT.6.RP.A.1
CCSS.MATH.CONTENT.6.RP.A.2
CCSS.MATH.CONTENT.6.RP.A.3

Florida Computer Science Standards:
SC.68.CS-CS-2.13
SC.68.CS-CS.2.2
SC.68.CS-CS.2.6

SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8

Product Integrations

MyBot by Mimio Fusion
ShareSpace Giant Mars Map (optional)

Morse Codebots

Grades: 6, 7, 8
9, 10, 11, 12

Strands: Computer Science, Waves and Electromagnetic Radiation, American/World History

Learn about digital and analog signals as well as the Optical Distance Sensor on your MyBot by building and reading coded messages. Students will learn the history of Morse code and the importance of coded messages in wars and must deliver messages to their peers using their robots. Students will explore reading sensors, utilizing code loops, and evaluate whether digital or analog signals are easier to decode. Then, they'll focus on generating easy-to-understand outputs based on logic by creating a binary output.

This activity is the perfect follow-up to Comparing Sensors: The Distance of Light, which investigates how material properties impact sensor readings on the MyBot Optical Distance Sensor and Labdisc Light Sensor.

Standards Addressed

NGSS.MS-PS4-2
NGSS.MS-PS4-3
NGSS.HS.PS4-2

Florida Social Studies Standards
SS.6.W.1.3
SS.8.A.1.5
SS.912.A.1.2
SS.912.A.4.5
SS.912.A.6.1
SS.912.W.1.3
SS.912.W.7.9
SS.912.W.9.1

Florida Computer Science Standards
SC.68.CS-CS.1.1
SC.68.CS-CS.2.10
SC.68.CS-CS.2.11
SC.68.CS-CS.2.12
SC.68.CS-CS.2.13
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.4.3
SC.68.CS-CS.4.4
SC.68.CS-CS.6.3
SC.68.CS-CS.6.6

SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8
SC.68.CS-PC.3.1

SC.912.CS-CC.1.1
SC.912.CS-CS.2.11
SC.912.CS-CS.2.7
SC.912.CS-CS.2.9
SC.912.CS-CS.4.4
SC.912.CS-CP.3.1
SC.912.CS-PC.3.1
SC.912.CS-PC.3.2

Product Integrations

MyBot by Mimio Fusion
MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)

Moving Mars Rocks

Grades: 6,7, 8

Strands: Forces, Computer Science, Expressions & Equations, The Number System, Ratios & Proportions, Statistics & Probability, Reading in Science & Technical Fields, Writing

Investigate Newton's Laws of Motion in this interactive activity! Using a student-engineered attachment to the MyBot, students will program their robot to push rocks of varying masses across a finish line. Using the data they generate, students will then analyze it mathematically and scientifically, constructing graphs, solving equations, and evaluating scientific concepts such as inertia, acceleration, and force. This lesson plan was written in conjunction with the MyStemKits.com design challenge Bulldozer Blade, which challenges students with engineering the optimal blade attachment.

Standards Addressed

CCSS.ELA.LITERACY.RST.6-8.2
CCSS.ELA.LITERACY.WHST.6-8.7
CCSS.MATH.PRACTICES.MP.2
CCSS.MATH.CONTENT.6.EE.A.2
CCSS.MATH.CONTENT.6.EE.B.6
CCSS.MATH.CONTENT.6.EE.B.7
CCSS.MATH.CONTENT.6.EE.C.9
CCSS.MATH.CONTENT.6.NS.B.2
CCSS.MATH.CONTENT.6.NS.B.3
CCSS.MATH.CONTENT.6.RP.A.2
CCSS.MATH.CONTENT.6.RP.A.3
CCSS.MATH.CONTENT.7.EE.B.4
CCSS.MATH.CONTENT.7.NS.A.3
CCSS.MATH.CONTENT.7.RP.A.2
CCSS.MATH.CONTENT.8.EE.B.5
CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
NGSS.MS-PS2-1
NGSS.MS.PS2-2

Florida State Computer Science Standards
SC.68.CS-CS.2.6
SC.68.CS-CS.6.6

Product Integrations

Mars Rover Kit (optional)
MyBot by Mimio Fusion

New York Balance

Grades: 6, 8, 9, 10, 11, 12

Strands: Expressions and Equations, Nature of Science, Ratios and Proportions

In this lesson, students will create a mathematical model that quantitatively explains the relationship between varying mass and distance from the pivot point on a balanced lever. Students will make modifications to their models as they use it to predict the results of various scenarios. This activity is an excellent springboard into many subjects and is appropriate for use in grades 6 to 12.

Standards Addressed

CCSS.MATH.CONTENT.6.EE.A.1
CCSS.MATH.CONTENT.6.RP.A.1
CCSS.MATH.CONTENT.HSS.IC.A.1
CCSS.MATH.PRACTICES: 4
NBSS Science & Engineering Practices: 4

Product Integrations

New York Balance Kit

Plant Cell Scale Model

Grades: 6

Strands: Life Science, Ratios and Proportions

In this lesson, students will explore the components of a cell and their functions, determine the scale used to build a cell model, and use their proportional reasoning skills to create a model of a cell.

Standards Addressed

CCSS.MATH.CONTENT.6.RP.A.2
CCSS.MATH.CONTENT.6.RP.A.3.B
CCSS.MATH.CONTENT.6.RP.A.3.D
NGSS.MS-LS1-2
NGSS Science & Engineering Practices: 1, 2, 5, 6, 8

Product Integrations

Cells: Plant Kit

Ready, Aim Fire!

Grades: 6, 7, 9, 10, 11, 12

Strands: Algebra, Physical Science

In this lesson, students will build a catapult out of pencils and apply the law of conservation of energy to determine the total mechanical energy of the projectile. Students will generate histogram plots of the various forms of energy to emphasize energy conservation.

Standards Addressed

CCSS.MATH.CONTENT.HSA.CED.A.1
CCSS.MATH.PRACTICES: 2, 4, 6
NGSS.MS-PS3.5
NGSS Science & Engineering Practices:
4

Product Integrations

Pencil Catapult Kit
(Virtual Ball Bearing Catapult Module Compatible)

Stabilized Direction Control

Grades: 6, 7

Strands: Computer Science, Expressions & Equations, The Number System, Ratios & Proportions

Explore the use of gyroscopes as you build an auto-pilot program for your MyBot robot to keep it on course the same way airplanes, spacecraft, rovers, and shipsdo. This lesson is a perfect follow-up to the two-part *Missed it by that Much* activity in which students explore the importance of accuracy in shuttle launches and rover routes. It can also be used in conjunction with any other MyBot lesson plans to help your robot travel more-consistently in a straight line.

Standards Addressed

CCSS.MATH.CONTENT.6.EE.A.2
CCSS.MATH.CONTENT.6.EE.B.5
CCSS.MATH.CONTENT.6.EE.B.6
CCSS.MATH.CONTENT.6.EE.B.8
CCSS.MATH.CONTENT.6.NS.B.2
CCSS.MATH.CONTENT.6.NS.B.3
CCSS.MATH.CONTENT.6.NS.C.5
CCSS.MATH.CONTENT.6.RP.A.2
CCSS.MATH.CONTENT.6.RP.A.3
CCSS.MATH.CONTENT.7.EE.B.3
CCSS.MATH.CONTENT.7.NS.A.3
CCSS.MATH.CONTENT.7.RP.A.2
Florida Computer Science Standards:
SC.68.CS-CS.1.1
SC.68.CS-CS.2.10
SC.68.CS-CS.2.13
SC.68.CS-CS.2.14
SC.68.CS-CS.2.2
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.4.4
SC.68.CS-CS.6.4
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8

Product Integrations

MyBot by Mimio Robot

Temperature Variation between Day and Night

Grades: 6, 7, 8

Strands: Earth's Place in the Universe, Earth's Systems, Computer Science

This activity investigates measuring thermal oscillation and luminosity during a full day. Students will study the temperature and luminosity changes produced during the day and night in a given area by formulating a hypothesis and proceeding to check it using the Globisens Labdisc light and temperature sensors. They must then extrapolate what they know about light and heat to make informed hypotheses about how thermal oscillation varies from location to location around the globe.

Standards Addressed

NGSS.MS-ESS1-3
NGSS.MS-ESS2-1
NGSS Science & Engineering Practices:
1, 2, 3, 4, 7, 8
Florida Computer Science Standards:
SC.68.CS-CS.4.4
SC.68.CS-CS.6.3
SC.68.CS-CP.1.2

Product Integrations

Labdisc Portable STEM Labs:
Biochem, Gensci, or Physio

Tour of Mars

Grades: 6, 7, 8

Strands: Computer Science, Earth's Place in the Universe

Explore the Red Planet with your very own Mars Rover. Students must divvy up unique roles and work together to plan and implement a tour of Mars. As a group, they must analyze surface features and justify both tour locations and a safe landing zone based on Martian topography. Evaluate the features of possible tour sites using an AR Mars model or online research. Finally, program your rover to traverse from your chosen landing zone to a series of locations of interest while avoiding hazardous terrains.

Standards Addressed

NGSS.MS-ESS1-3
Florida Computer Science Standards:
SC.68.CS-CC.1.3 (optional)
SC.68.CS-CS-2.13
SC.68.CS-CS.2.2
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.4.4
SC.68.CS-CS.6.4
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-CP.3.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8
SC.68.CS-PC.3.1
SC.68.CS-PC.4.1 (optional)
SC.68.CS-PC.4.5 (optional)
SC.68.CS-PC.4.6 (optional)

Product Integrations

MyBot by Mimio Fusion
ShareSpace Giant Mars Map
Buzz Aldrin's "Welcome to Mars" book (optional)
AstroReality AR Mars Globe (optional)

Water Filtration Challenge: Sixth Grade

Grades: 6

Strands: Earth and Space Science, Engineering Design, Ratios and Proportions

In this interdisciplinary Problem Based Learning lesson, students will need to research a variety of concepts to prepare themselves for a water filtration engineering design challenge. Students will design, test, and present a water filtration system that meets specific parameters to help communities access safe drinking water after a hurricane.

Standards Addressed

CCSS.MATH.CONTENT.6.RP.A.2
CCSS.MATH.CONTENT.6.RP.A.3.B-D
CCSS.MATH.PRACTICES: 2, 4, 5, 6
NGSS.MS-ESS3-3
NGSS.MS-ETS1-1
NGSS.MS-ETS1-2
NGSS.MS-ETS1-3
NGSS.MS-ETS1-4
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Water Filtration Kit

Product Integrations

Labdisc Portable STEM Lab: Enviro
or
HipScience Turbidity Probe

Albedo

Grades: 6 **Strands: Physical Science**

In this lesson, students examine the extent to which surface color and texture affect light reflection. Students will record incoming light and reflected light to calculate the albedo of multiple surfaces.

Standards Addressed

NGSS.MS-PS4-2B

NGSS Science & Engineering Practices:
3, 4

3D Kits Utilized

Albedo Effect Kit

Product Integrations

Labdisc Portable STEM Lab
or
HipScience Climate Sensor or
SAMLabs Sensors

Bioengineering

Grades: 6, 7, 8 **Strands: Life Science, Reading in Science and Technical Subjects, Writing**

In this lesson, students will learn:

1. How bioengineering techniques use recombinant DNA to augment the genetic material in one organism with the genetic material from one or more other organisms with the intent of expressing novel gene products in the host organism.
2. General principles behind the technique of bacterial cell transformation with plasmids to augment host cells.
3. About a real-world context for bioengineering: microbe-driven biofuel production from algae.
4. How humans can manipulate living organisms to influence inheritable traits.

Standards Addressed

CCSS.ELA-LITERACY.WHST.6-8.1
CCSS.ELA-LITERACY.WHST.6-8.2
CCSS.ELA-LITERACY.RST.6-8.7

NGSS.MS-LS4-5

NGSS Science & Engineering Practices:
1, 2, 6

3D Kits Utilized

Cell Transformation Kit

Coriolis Effect and Weather

Grades: 6 **Strands: Earth and Space Science**

In this lesson, students will explore the driving forces behind the bending of wind and ocean currents and the patterns they follow. They will use the data to determine the impact the Coriolis force has on weather systems.

Standards Addressed

NGSS.MS-ESS2-6

NGSS Science & Engineering Practices:
1, 2, 5, 6, 8

3D Kits Utilized

CD Spinner: Coriolis Effect Kit

DNA Mutation Types

Grades: 6, 7, 8, 9, 10, 11, 12

Strands: Life Science

In this lesson, students will explore types of mutations that can occur in DNA. They will relate each type of mutation to potential consequences in gene expression. The teacher will use a DNA model to demonstrate the variety of sequence mutations. Students should be provided an opportunity to work with the model to create the mutations alongside the activity at the discretion of the teacher.

Standards Addressed

NGSS.MS-LS3-1

NGSS Science & Engineering Practices: 4, 6, 7

3D Kits Utilized

DNA Kit

Greenhouse Planet

Grades: 6

Strands: Earth and Space Science

In this lesson, students will explore the effect of a greenhouse atmosphere on a planet's temperature.

Standards Addressed

NGSS-MS-ESS2-6

NGSS Science & Engineering Practices: 1, 2, 5, 6, 8

3D Kits Utilized

Planetary Temperatures Kit

Product Integrations

Labdisc Portable STEM Lab or SAMLabs Sensors

Mendel's Mighty Model

Grades: 6, 7, 8, 9, 10, 11, 12

Strands: Life Science

In this lesson, students demonstrate the law of segregation during meiosis, which states that a pair of alleles for a particular trait separate during cell division. They will then use Mendel's model of inheritance, which can be represented by a Punnett square, to predict the genotype and phenotype of offspring from a particular cross. They will test these predictions by simulating the results of particular crosses.

Standards Addressed

CCSS.MATH.PRACTICES: 1, 2, 4
NGSS.MS-LS3-2
NGSS.HS-LS3-3

NGSS Science & Engineering Practices: 2, 4, 5, 6

3D Kits Utilized

Chromosomes Kit
Punnett Square Dice (Gg) Kit

Ocean Currents

Grades: 6 **Strands: Earth and Space Science**

In this lesson, students will explore the driving forces behind ocean currents and the patterns they follow and will use the data to determine the impact that ocean currents have on regional climate.

Standards Addressed

NGSS.MS-ESS2-6

NGSS Science & Engineering Practices:
1, 2, 5, 6, 8

3D Kits Utilized

Ocean Current Beads Kit

Phospholipids

Grades: 6, 8, 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students will explore the structure of the fluid mosaic model of the cell membrane. Specifically, students will examine phospholipids and proteins found within the membrane. The phospholipid models used with this lesson are capable of automatically arranging into a bilayer structure when submerged in water. While this is due to buoyancy and not biochemistry, as with real phospholipids, the overall appearance of the display is relevant. Additional found objects, such as ping pong balls, may be used to represent integral membrane proteins and/or transmembrane proteins. This lesson is primarily an opportunity for observation and discussion of a model.

Standards Addressed

CCSS.MATH.CONTENT.HSA.CED.A.1

CCSS.MATH.PRACTICES:
2, 4, 6

NGSS.HS-PS2-1

NGSS Science & Engineering Practices:
4, 8

3D Kits Utilized

Cell Membrane Kit

Sea Floor Topography

Grades: 6, 7, 8, 9, 10, 11, 12 **Strands: Earth and Space Science**

In this lesson, students collect data, model the process of echo sounding, and create models to determine the shapes of several sea floor models.

Standards Addressed

NGSS.MS-ESS2-3

NGSS Science & Engineering Practices:
2, 4

3D Kits Utilized

Ocean Topography Mapping Kit

Surface Ocean Currents

Grades: 6 **Strands: Earth and Space Science**

In this lesson, students will model the driving forces behind ocean surface currents and the patterns they follow and use observations to determine the impact that ocean currents have on regional climates.

Standards Addressed

NGSS.MS-ESS2-6

NGSS Science & Engineering Practices:
1, 2, 5, 6, 8

3D Kits Utilized

Continents Kit

Weather Mapping

Grades: 6 **Strands: Earth and Space Science**

In this lesson, students interpret weather data to construct weather maps identifying air masses and types of weather fronts.

Standards Addressed

NGSS.MS-ESS2-6

NGSS Science & Engineering Practices: 2, 4

3D Kits Utilized

Weather Front Beads Kit

Catapults and Standard Deviation

Grades: 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore data collection using a catapult and perform statistical analysis of the data. Students will compare two sets of data using graphical and numerical representations including standard deviation.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Ball Bearing Catapult Kit

Cruising for Circumference

Grades: 7

Strands: Geometry, Ratios & Proportions

What impact does wheel diameter have on distance travelled? Students investigate circumference as they compare different wheel designs. Integrate coding or go low-tech, testing each design either by number of seconds running or number of rotations. Then, calculate the speeds of the vehicle and convert to a variety of unit rates such mph & rpm.

Standards Addressed

MATH.CONTENT.7.G.B.4
MATH.CONTENT.7.RP.A.1

3D Kits Utilized

Mars Rover Kit

Product Integrations

MyBot by Mimio Fusion

Find Your Exit Buddy!

Grades: 7

Strands: Geometry

Oh no! A colony of angles are trapped by a mad mathematician. The only way out is to find the correct exit buddy! Some are trapped in the Complementary Chamber while others are trapped in the Supplementary Suite. Students will randomly select an angle and must determine its correct partner – only then can the angles escape!

Standards Addressed

MATH.CONTENT.7.G.B.5

Product Integrations

Composing Polygons Kit

Flyswatter Arithmetic: Middle School

Grades: 6, 7, 8

Strands: Expressions and Equations, Geometry, The Number System, Ratios and Proportions

Use your MimioSTEM Activity Mat paired with flyswatters to pinpoint the correct answers to arithmetic questions to increase fluency and automaticity. This fast-paced activity includes sample prompts for grades 6-8. Perfect as a warm up or end-of-class activity. Adapt to suit whatever topics you're currently covering or use to refresh previously-covered skills.

Standards Addressed

CCSS.MATH.CONTENT.7.G.B.5
(For additional standards, see each relevant grade.)

Product Integrations

MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)
MimioView Document Camera (optional)

Fractions and Decimals

Grades: 7

Strands: The Number System

In this lesson, students will discover that the decimal form of a rational number will be either a terminating or repeating decimal. Through the use of categorization, critical observations, and Mathematical Practices 3, 7, and 8, students will develop conjectures that help them determine if a fraction's decimal form will be terminating or repeating by just looking at the fraction. The idea of validating or invalidating conjectures with counterexamples and checking the conjectures is one of the overarching goals of this lesson. This type of mathematical conversation is the base for many upper-level mathematical thought processes.

Standards Addressed

CCSS.MATH.CONTENT.7.NS.A.2D
CCSS.MATH.PRACTICES: 2, 3, 4, 5, 7, 8

NGSS Science & Engineering Practices:
2, 3, 4, 5, 6

3D Kits Utilized

Portions of a Whole Kit

Fractions, Decimals, and Percents

Grades: 7

Strands: The Number System

In this lesson, students will discover efficient ways to convert a fraction to a decimal and to a percent by knowing the decimal value of the base unit fraction. This lesson assists students in discovering easy mental algorithms to remember equivalent forms of fractions, decimals, and percents. The questions at the beginning of the lesson are designed to remind students of the basic math knowledge they acquired in elementary school. By building on prior knowledge, conceptualizing the ideas through explanations, and using 3D manipulatives, the students will bridge basic ideas into an algorithm they can use to determine equivalencies. Later in the lesson, the students are asked to check their algorithm with the 3D kit and to practice their algorithm on other unit fractions. Finally, at the end of the lesson, students are challenged to think of quicker strategies to use with their algorithm to make it even more useful. This lesson helps improve mental math abilities and improve quick computation.

Standards Addressed

CCSS.MATH.CONTENT.7.NS.A.2D
CCSS.MATH.PRACTICES: 2, 4, 5, 7, 8

NGSS Science & Engineering Practices:
2, 3, 4, 5, 6

3D Kits Utilized

Portions of a Whole Kit

Height Histograms

Grades: 6, 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will discover the usefulness of the histogram when trying to represent heights of students in their class. The lesson will start with gathering data and then progresses through the steps needed to create histograms. Further investigation will show how the distribution of data may or may not change based on the chosen intervals. There is also an opportunity to use stacked histograms to identify any relationships between male and female student height. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.3

CCSS.MATH.PRACTICES:
1, 2, 3, 4, 5, 6, 7, 8

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

Stacking Blocks Kit

Human Box Plot

Grades: 6, 7 **Strands: Statistics and Probability**

In this lesson, students will create and interpret box plots based on their own birthdates. Students will experience the cluster or spread of data firsthand by creating a "human box plot" based on their birthdates. This activity is meant to allow students to explore data both visually and kinesthetically, since they will form the box plot and experience the clustering and spread of the data. They will see how some people are more squished together or spread apart, but every quartile has the same number of people in it. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.PRACTICES: 2, 4, 5

3D Kits Utilized

Box and Whisker Plot Kit

It Can Be a Zoo of Data!

Grades: 6, 7 **Strands: Statistics and Probability**

In this lesson, students will explore how the mean and median are affected by different data distributions. Students will enhance their knowledge of mean and median as they are challenged to create a variety of distributions with specific criteria. They will also begin to develop an understanding of how these measures can be affected and therefore which measure may be a better statistic to describe the data. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.3
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.PRACTICES: 2, 3, 4, 5

3D Kits Utilized

N/A

It's Raining Cats and Dogs

Grades: 6, 7 **Strands: Statistics and Probability**

In this lesson, students will discover how to create and interpret box plots. Students will also be introduced to the interquartile range as a measure of variability. This lesson uses an original student tutorial found at FloridaStudents.org. Content is delivered through text and narration, and students are presented with practice questions. Feedback will be provided to the students as they progress through the tutorial and answer the questions. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.PRACTICES: 2, 4, 5

3D Kits Utilized

N/A

Let's Go to the Mall

Grades: 6, 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will be presented with situations that require them to synthesize the knowledge they have gained over the entire statistics unit. Students will calculate the mean, median, mode, range, MAD, and IQR for the data sets with and without outliers and represent the data in graphical displays. Students will determine the best statistical measure and graph to use for the data based on the distributions and situations they have been given. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.PRACTICES: 1, 2, 3, 4, 5

NGSS Science & Engineering Practices: 2, 4, 5, 8

3D Kits Utilized

N/A

Lionfish and Dot Plots

Grades: 6, 7

Strands: Statistics and Probability

In this lesson, students will explore data on the invasive lionfish and the usefulness of dot plots to help visualize the frequency of lionfish age groups at five different locations. Students will base their information on random samples conducted at five different reefs in the Atlantic Ocean. For each location, students will also calculate the Mean Absolute Deviation value and then compare it to the locations' dot plots. This comparison will help further the conceptual understanding by analyzing the relationship between quantitative measures of dispersion and graphical distributions. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.A.3

CCSS.MATH.PRACTICES: 2, 4, 5, 7

NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Lionfish Sampling Kit

Lionfish Invasion Model-Eliciting Activity (PBL)

Grades: 7

Strands: Statistics and Probability, Writing

Students will explore how to make inferences about a population through random sampling, estimate population density, and explore the impacts that an invasive species can have on the local ecosystem. Students will use 3D-printed lionfish to simulate collecting samples in various habitats. Students will consider multiple factors when responding to a request from the Florida Department for Protecting the Environment to develop a method for selecting the location most in need of protection from the invasive lionfish.

Standards Addressed

CCSS.MATH.CONTENT.7.NS.A.2D
CCSS.MATH.PRACTICES: 2, 3, 4, 5, 7, 8

NGSS Science & Engineering Practices: 2, 3, 4, 5, 6

3D Kits Utilized

Lionfish Sampling Kit

Marshmallow Catapults

Grades: 6, 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will be presented with situations that require them to synthesize the knowledge they have gained over the entire statistics unit. Students will calculate the mean, median, mode, range, mean absolute deviation (MAD), and inter quartile range (IQR) for the data sets with and without outliers and represent the data in graphical displays. Students will determine the best statistical measure and graph to use for the data based on the distributions and situations they have been given. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.2
CCSS.MATH.CONTENT.6.SP.A.3
CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Ball Bearing Catapult Kit

Probability Models

Grades: 7

Strands: Statistics and Probability

In this lesson, students will explore the use of probability models to compare and contrast theoretical probability and experimental probability. Student will use repeated trials to help conceptualize the law of large numbers and its relationship to theoretical and experimental probability.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.C.5
CCSS.MATH.CONTENT.7.SP.C.6
CCSS.MATH.CONTENT.7.SP.C.7
NGSS Science & Engineering Practices: 1, 2, 4, 5, 6, 8

3D Kits Utilized

Probability Kit

Roll Dice

Grades: 7

Strands: Statistics and Probability

In this lesson, students will explore theoretical probability and sampling methods to make inferences and conclusions about basic claims. This simulation will allow students to decipher which dice are loaded and which are fair to help them understand that basic knowledge of what “should” happen is essential when analyzing results from experiments and statistical manipulations.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.C.5
CCSS.MATH.CONTENT.7.SP.C.6
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Loaded Dice Kit

Roving Roombot

Grades: 7

Strands: Computer Science, Expressions & Equations, Geometry, The Number System, Ratios & Proportions

Program your MyBot Fusion to behave like a cleaning robot! Practice using scale and area calculations to translate a scale drawing into an arena for your robot at 1/12th scale of the final room. Then, program the MyBot Fusion using the Optical Distance Sensor to stay within the bounds. Test your program and time it to see how long it takes to cover the full room, identifying the rate of cleaning. Investigate and compare how changes to the code impact efficiency and effect the unit rate of the cleaning roombot.

Standards Addressed

CCSS.MATH.CONTENT.7.EE.B.3
CCSS.MATH.CONTENT.7.G.A.1
CCSS.MATH.CONTENT.7.G.B.6
CCSS.MATH.CONTENT.7.NS.A.2
CCSS.MATH.CONTENT.7.NS.A.3
CCSS.MATH.CONTENT.7.RP.A.1

Florida Computer Science Standards:
SC.68.CS-CS.2.10
SC.68.CS-CS.2.13
SC.68.CS-CS.2.2
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.4.4
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8

3D Kits Utilized

Basic Shapes: Quadrilaterals Kit (optional)
Logic Gate Stencil Kit (optional)

Product Integrations

MyBot by Mimio Fusion

Statistical Quadrat Sampling

Grades: 7

Strands: Statistics and Probability

In this lesson, students will explore statistical sampling methods, specifically the quadrat method, and how well it produces samples similar to the population. Students will compare their sampling results to the entire population to scrutinize the validity of this sampling method. A quadrat is a small, square frame used to create a sampling area and is often used by ecologists and environmental scientists.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.PRACTICES: 2, 4, 5, 7

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

Pencil Quadrat Kit

Statistical Questions and Surveys

Grades: 6, 7 **Strands: Statistics and Probability**

In this lesson, students will explore how mathematicians develop and plan investigations with statistical surveys while taking into account a variety of attributes, including wording bias. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.1
CCSS.MATH.CONTENT.6.SP.B.5.A
CCSS.MATH.CONTENT.6.SP.B.5.B
CCSS.MATH.CONTENT.7.SP.A.1

CCSS.MATH.PRACTICES: 3, 4
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

N/A

MAD Statapults

Grades: 7, 9, 10, 11, 12 **Strands: Statistics and Probability**

In this lesson, students will explore data collection using a catapult and perform statistical analysis of the data. Students will compare two sets of data using graphical and numerical representations, including standard deviation.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.2

CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

Ball Bearing Catapult Kit

Analyzing MAD Lionfish

Grades: 7 **Strands: Statistics and Probability**

In this lesson, students will practice calculating mean absolute deviations and increase their conceptual understanding of how the MAD is related to data distribution by comparing dot plots of multiple samples. This lesson uses the problem of invasive species as an engaging situation for statistical analysis.
This lesson can be used after students have experienced an original student tutorial found at floridastudents.org that would help review the concepts.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.2

CCSS.MATH.PRACTICES: 2, 4, 5, 6, 7, 8

3D Kits Utilized

N/A

Soap Bubbles

Grades: 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore data collection by blowing soap bubbles and performing statistical analysis of the data. Students will compare two sets of data using graphical and numerical representations, including mean absolute deviation. Student will answer the question, "Do different soap brands produce different-sized bubbles?"

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

N/A

Catapulting Data

Grades: 7

Strands: Physical Science, Statistics and Probability

In this interdisciplinary lesson, students will explore data collection using a catapult and perform statistical analysis of the data. Students will create boxplots for data analysis that will help to demonstrate the scientific concepts of transfer of energy.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.MS-PS3-1
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

Ball Bearing Catapult Kit

Baseball Statistics

Grades: 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students are presented with a problem-based learning challenge to showcase their previously-learned statistical skills. Students will use basic measures of center and variability to take opposing positions. This challenge has a baseball theme, but could be adapted for any sport that commonly collects multiple types of data.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 1, 2, 3, 4, 5, 6, 7
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

N/A

Adjusting Data

Grades: 7 **Strands: Statistics and Probability**

In this lesson, students will explore how the mean and median are affected by adjusting values in a data set. Students will enhance their knowledge of mean and median as they are challenged to create a variety of data sets with specific criteria. They will also begin to develop an understanding of how these measures can be affected and therefore which measure may be a better statistic to describe the data.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

N/A

Reaction Time

Grades: 7, 9, 10, 11, 12 **Strands: Statistics and Probability**

In this lesson, students gather reaction data using two different procedures to help illustrate the bias that can occur due to human perception. This activity will further help to develop the idea that error is inherent in data collection. Understanding the concept of error in data is fundamental in being able to interpret and begin to understand confidence intervals and reliability in data analysis.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 1, 2, 3, 4, 5, 6, 7
NGSS Science & Engineering Practices:
1, 3, 4, 5, 8

3D Kits Utilized

N/A

Measurement and Data Collection

Grades: 6, 7 **Strands: Statistics and Probability**

In this interdisciplinary lesson, students will practice the skill of data collection with a variety of tools. They will then statistically analyze the class data sets and begin to understand that error is inherent in all data.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.2
CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.A
CCSS.MATH.CONTENT.6.SP.B.5.B
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.PRACTICES: 2, 4, 5, 6
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

Product Integrations

Labdisc Portable STEM Lab
or
HipScience Sensor Wand
HipScience Temperature Probe

(No 3D Kit Used)

Energy Efficiency

Grades: 7

Strands: Earth and Space Science, Ratios and Proportions, Statistics and Probability

In this lesson, students will gather information about different types of light bulbs and their efficiency at producing light. Based on their findings, they will identify cost-saving measures that people can take to reduce energy consumption.

Standards Addressed

CCSS.MATH.CONTENT.7.RP.A.3
CCSS.MATH.CONTENT.7.SP.B.4
NGSS.MS-ESS3-3
NGSS.MS-ESS3-4
NGSS Science & Engineering Practices:
1, 2, 5, 6, 8

3D Kits Utilized

Planetary Temperatures Kit

Product Integrations

Labdisc Portable STEM Lab
or
SAMLabs Sensors

Sea Ice Analysis (Seventh Grade)

Grades: 7

Strands: Earth and Space Science, Statistics and Probability

The changing climate is an important topic for both scientific analysis and worldly knowledge. This lesson uses data collected by the National Snow and Ice Data Center to create and use statistical analysis as a tool to evaluate the sea ice loss. Students will use technology to quickly generate graphs for each month, looking for trends, patterns, or deviations over time.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
NGSS.MS-ESS2-2
NGSS.MS-ESS3-1
NGSS.MS-ESS3-2
NGSS.MS-ESS3-3
NGSS.MS-ESS3-4
NGSS.MS-ESS3-5
NGSS Science & Engineering Practices:
3, 4, 5, 8

3D Kits Utilized

N/A

Ocean Floor Sampling: Part 1

Grades: 7

Strands: Statistics and Probability

Not all measurements are easily or directly determinable. In this lesson, students will use 3D-printed ocean models to gather measurements, estimate the average depth of two different regions of the ocean, and then determine which portion has a different average depth. These activities facilitate understanding of how repeated random sampling techniques allow students to compare different populations.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.B.4
NGSS Science & Engineering Practices:
2, 4, 7

3D Kits Utilized

Ocean Topography Mapping Kit

Ocean Floor Sampling: Part 2

Grades: 7 **Strands: Statistics and Probability**

Not all measurements are easily or directly determinable. In this lesson, students will use 3D-printed ocean models to gather measurements, estimate the average depth of two different regions of the ocean, and then determine which portion has a deeper average depth. These activities facilitate understanding of how repeated random sampling techniques allow students to compare different populations.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.4

3D Kits Utilized

Ocean Topography Mapping Kit

Statistical Quadrats

Grades: 7 **Strands: Statistics and Probability**

In this lesson, students will explore statistical sampling methods, specifically the quadrat method, and evaluate how well it produces samples similar to the population. Students will compare their sampling results to the entire population to scrutinize the validity of this sampling method.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Pencil Quadrat Kit

Lionfish Sampling Methods

Grades: 7, 9, 10, 11, 12 **Strands: Reading in Science and Technical Subjects, Statistics and Probability**

In this lesson, students will develop a sampling method to make inferences about the invasive lionfish in the Atlantic Ocean. Students will carry out their investigation, create histograms, and calculate quantitative data like mean absolute deviation to help make conjectures about the lionfish population. Students will then analyze their sampling methodology by repeating the procedure with the population data. This investigation not only allows students the opportunity to simulate and improve their own methodologies, but also provides a current and real-life scientific issue to be examined.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.IC.A.2
CCSS.MATH.CONTENT.HSS.IC.B.3
CCSS.MATH.PRACTICES: 2, 3, 4, 5
CCSS.ELA-LITERACY.RST.6-8.3
CCSS.ELA-LITERACY.RST.11-12.3
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Lionfish Sampling Kit

Bean Bag Toss

Grades: 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students are presented with a problem-based learning challenge to showcase their previously-learned statistical skills. Students will use basic measures of center and variability to create a bean bag toss game board that adheres to specific parameters by testing and analyzing the frequencies within samples.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.7.SP.C.7.A
CCSS.MATH.CONTENT.7.SP.C.7.B
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 1, 2, 3, 4, 5, 6, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

N/A

Introduction to Probability

Grades: 7

Strands: Statistics and Probability

Not all measurements are easily or directly determinable. In this lesson, students will use 3D-printed ocean models to gather measurements, estimate the average depth of two different regions of the ocean, and then determine which portion has a deeper average depth. These activities facilitate understanding of how repeated random sampling techniques allow students to compare different populations.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.C.5
CCSS.MATH.PRACTICES: 2, 4, 5, 6, 7, 8

3D Kits Utilized

Ocean Topography Mapping Kit

Predicting Outcomes

Grades: 7

Strands: Statistics and Probability

In this lesson, students will be introduced to the concept of using probability to determine the relative frequency that a specific event is expected to occur. Students will also see how recording data from experiments and/or trials can help them determine the long-run relative frequency of an event.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.C.6
CCSS.MATH.PRACTICES: 2, 4, 5, 6, 7, 8

3D Kits Utilized

N/A

Which Bag Is It?

Grades: 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore the idea of probability in terms of confidence levels with repeated trials. The use repeated trials will help conceptualize the law of large numbers and its relationship to theoretical and experimental probability. The lesson also uses technology to simulate multiple trials. Students will also interpret the distribution of the trials in dot plots to help make inferential decisions.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.C.6
CCSS.MATH.CONTENT.7.SP.C.7.B
CCSS.MATH.CONTENT.HSS.IC.A.2
CCSS.MATH.CONTENT.HSS.IC.B.5
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 3, 4, 5
NGSS Science & Engineering Practices: 1, 2, 4, 5, 6, 8

3D Kits Utilized

N/A

Theoretical & Experimental Probability

Grades: 7

Strands: Statistics and Probability

In this lesson, students will explore the use of probability models to compare and contrast theoretical probability and experimental probability. Student will use repeated trials to help conceptualize the law of large numbers and its relationship to theoretical and experimental probability.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.C.5
CCSS.MATH.CONTENT.7.SP.C.6
CCSS.MATH.CONTENT.7.SP.C.7
NGSS Science & Engineering Practices: 1, 2, 4, 5, 6, 8

3D Kits Utilized

Probability Kit

Probability Dice

Grades: 7

Strands: Statistics and Probability

In this lesson, students will explore theoretical probability and sampling methods to make inferences and conclusions about basic claims. This simulation will allow students to decipher which dice are loaded and which are fair, which will help them understand that basic knowledge of what “should” happen is essential when analyzing results from experiments and statistical manipulations.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.C.5
CCSS.MATH.CONTENT.7.SP.C.6
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Loaded Dice Kit

Modeling Genetics with Probability

Grades: 7

Strands: Life Science, Statistics and Probability

In this lesson, students will create their own probability models to simulate determining the experimental probability of certain genetic combinations through exploring genotypes and phenotypes. Students will then compare experimental probability to the theoretical probabilities based on the Punnett square.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.C.7.A
CCSS.MATH.CONTENT.7.SP.C.7.B
NGSS.MS-LS3-2

NGSS Science & Engineering Practices:
1, 2, 4, 5, 6, 8

3D Kits Utilized

Probability Kit

Natural Selection with Probability Models

Grades: 7

Strands: Life Science, Statistics and Probability

In this lesson, students will explore the use of probability models to simulate natural selection of a type of organism. Using both theoretical and experimental probability concepts will demonstrate that simulations do not always behave as expected.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.C.7.A
CCSS.MATH.CONTENT.7.SP.C.7.B
NGSS.MS-LS4-6

NGSS Science & Engineering Practices:
1, 2, 4, 5, 6, 8

3D Kits Utilized

Bunnies Kit

How Many Outfits?

Grades: 7

Strands: Computer Science, Statistics and Probability

In this lesson, students will be introduced to the concept of compound events. Students will build a conceptual understanding of the function of tree diagrams by creating all the possible combinations of a scenario. Students will then create their own simulation to generate frequencies of the scenario.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.C.8.A
CCSS.MATH.CONTENT.7.SP.C.8.B
CCSS.MATH.CONTENT.7.SP.C.8.C
CCSS.MATH.PRACTICES: 2, 4, 5, 6, 7, 8

Florida Computer Science Standards:
SC.68.CS-CS.1.1
SC.68.CS-CS.1.2
SC.68.CS-CS.1.3
SC.68.CS-CS.1.4

3D Kits Utilized

Clothing Combinations Kit

Compound Events

Grades: 7

Strands: Statistics and Probability

In this lesson, students will be introduced to the concept of compound events. Students will build a conceptual understanding by relating the use of organized lists and/or tree diagrams to the multiplication rule of probability. Students will be exposed to basic independent and dependent events.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.C.8.A
CCSS.MATH.CONTENT.7.SP.C.8.B

3D Kits Utilized

N/A

Consumer Product Analysis

Grades: 7

Strands: Reading in Science and Technical Subjects, Statistics and Probability

In this lesson, students will explore a statistical consumer analysis investigation on two different types of microwave popcorn. Students will use a scientific method of inquiry to plan an investigation of their own. This activity is meant to allow students to use a variety of skills they have acquired throughout a statistics unit in a personally meaningful way. Due to the multiple avenues the students can choose, the standards will vary.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.PRACTICES: 2, 4, 5, 7
CCSS.ELA-LITERACY.RST.6-8.3
CCSS.ELA-LITERACY.RST.11-12.3
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

N/A

Cold Soda Cups

Grades: 7, 9, 10, 11, 12

Strands: Reading in Science and Technical Subjects, Statistics and Probability

In this lesson, students will collect data with a temperature probe and perform statistical analysis of the data. Students will use a scientific method of inquiry to plan an investigation to determine which soda cup is the best. This activity is meant to allow students to use a variety of skills they have acquired throughout a statistics unit in a problem-based STEM challenge. There are many standards covered in this lesson due to the multiple skills that students will use.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
CCSS.ELA-LITERACY.RST.6-8.3
CCSS.ELA-LITERACY.RST.11-12.3
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Product Integrations

Labdisc Portable STEM Lab
or
HipScience Sensor Wand
HipScience Temperature Probe
or
SAMLabs Sensors

(No 3D Kit Used)

A Walk Through the City

Grades: 6, 7, 8

Strands: Earth and Human Activity, Ecosystems, Computer Science

The purpose of this activity is to study the relationship between temperature and humidity in several locations inside and outside school, creating a hypothesis and proceeding to test it using the Labdisc external temperature, relative humidity and GPS sensors. The goal is to obtain the values of these variables in urban spaces and in green areas. Use as a standalone acitvity, or extend this understanding with the MyStemKits Urban Ecology Kit where students can investigate ways to improve the ecosystems, temperatures, and energy efficiency of cities.

Standards Addressed

NGSS.MS-ESS3-3
NGSS.MS-ESS3-5
NGSS.MS-LS2-4
NGSS.MS-LS2-5

Florida Computer Science Standards
SC.68.CS-CS.2.1
SC.68.CS-CS.4.4
SC.68.CS-CS.6.1
SC.68.CS-CS.6.2
SC.68.CS-CS.6.3
SC.68.CS-CP.1.2
SC.68.CS-CP.3.1
SC.68.CS-PC.2.8
SC.68.CS-PC.3.1

Product Integrations

Urban Ecology Kit (optional)
Labdisc Portable STEM Labs:
Gensci, Biochem, Enviro

Comparing Sensors: *The Distance of Light*

Grades: 6, 7, 8

Strands: Computer Science, Waves and Electromagnetic Radiation

Students get to know their technology tools better in this integrated activity. They will explore assorted sensors: the Labdisc Light & Distance Sensors and the MyBot Optical Distance Sensor, to better understand how the optical distance sensor relies on light readings to sense changes in distance and color. They will evaluate how changing the surface the robot is on can impact the accuracy of the readings and how to use this to their advantage for future activities

.

This activity is the perfect follow-up to Albedo (6th Grade) or Time to Reflect (7th Grade), (or both in order) which introduce light reflection and simulate albedo on a small scale. Follow this up with Morse Codebots or Roving Roombot which use the skills learned herein to create smart programs based on the readings of the MyBot optical distance sensor.

Standards Addressed

NGSS.MS-PS4-2
Florida Computer Science Standards
SC.68.CS-CS.2.10
SC.68.CS-CS.2.11
SC.68.CS-CS.2.13
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.2.8
SC.68.CS-CS.4.4
SC.68.CS-CS.6.3
SC.68.CS-CS.6.6
SC.68.CS-CP.1.2
SC.68.CS-CP.2.3
SC.68.CS-CP.3.1

Product Integrations

MyBot by Mimio Fusion
Labdisc Portable STEM Labs:
Gensci, Biochem
MimioSTEM Activity Mat

DNA Scale

Grades: 7

Strands: Nature of Science, Ratios and Proportions

In this lesson, students will explore the structure of DNA through the construction of a DNA molecule model. Students will calculate scale factors of the DNA model as compared to an actual DNA molecule. This lesson does not address realistic DNA structure or configurations, such as coiled DNA or chromosomes, which are capable of fitting large amounts of DNA into a cell.

Standards Addressed

CCSS.MATH.CONTENT.7.RP.A.2
SC.7.N.3.2
NGSS Science & Engineering Practices:
1, 2, 4, 5, 6, 8

3D Kits Utilized

DNA Kit

The Golden Ratio

Grades: 6, 7

Strands: Engineering Design, Life Science, Ratios and Proportions

In this lesson, students will discover how the golden ratio can be found in many places throughout the world, in nature and on the human body. Students will use golden ratio calipers as well as direct measurements of a variety items looking for the ratio that is equivalent to the number Phi ≈ 1.618.

Standards Addressed

CCSS.MATH.CONTENT.6.RP.A.1
CCSS.MATH.CONTENT.7.RP.A.2.A-B
CCSS.MATH.PRACTICES: 2, 4, 5, 7, 8
NGSS-MS-ETS1-1
NGSS-MS-ETS1-4
NGSS-MS-LS4-6
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Product Integrations

MyStemKits' Golden Ratio Kit

Hoverpuck

Grades: 7

Strands: Engineering Design, Life Science, Statistics and Probability, Writing

In this lesson, students will measure distance and time data of a balloon-powered hoverpuck. The hoverpuck sits on a small cushion of air that is provided by an inflated balloon. The hoverpuck moves in the near absence of friction, which allows students to observe non-accelerated motion. Students will generate graphs of distance vs. time, speed vs. time, and will generate a function for the distance traveled by the hoverpuck. By measuring slope and calculating speed, students learn that slope of a distance vs. time graph represents the speed of the hoverpuck.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
SC.7.L.15.2
SC.7.L.15.3
LAFS.68.WHST.2.4
NGSS Science & Engineering Practices: 1, 2, 4, 5, 6, 8

3D Kits Utilized

Hoverpuck Kit

Lionfish and Histograms

Grades: 6, 7, 9, 10, 11, 12

Strands: Earth and Space Science, Life Science, Statistics and Probability

In this lesson, students will explore longitudinal data on a population of invasive lionfish and the usefulness of histograms to help visualize the changes in lionfish age groups over time. Students will base their information from random samples conducted each year for 5 years. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS.MS-LS2-1
NGSS.MS-LS2-2
NGSS.MS-LS2-4
NGSS.MS-LS2-5
NGSS.MS-ESS3-3
NGSS.HS-LS2-1
NGSS.HS-LS2-2
NGSS.HS-LS2-6
NGSS.HS-LS2-7
NGSS.HS-ESS3-3
NGSS.HS-ESS3-4
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Lionfish Sampling Kit

Marker Chromatography

Grades: 7

Strands: Life Science, Physical Science, Statistics and Probability

In this lesson, students will separate components of a compound using paper chromatography and measure and analyze the movement of the components on the paper.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
NGSS.MS-PS1-2
NGSS.MS-LS4-2

NGSS Science & Engineering Practices:
1, 5, 6, 8

3D Kits Utilized

Chromatography Paper Holder Kit

Mars Colony (PBL)

Grades: 6, 7, 8

Strands: Computer Science, Engineering Design, Expressions & Equations, Geometry, The Number System, Ratios & Proportions

Engineer the perfect city by placing buildings and determining speed limits, and then test to see how it holds up to a variety of scenarios. From fires to commute times, and running errands to medical emergencies, calculate the efficiency of your design. Once you've figured out your design on paper, scale it up to a floor-sized test space. Then, integrate robotics by running real tests to see how long it takes to travel places by programming your MyBot to traverse your streets. Calculate and graph speed, compare solutions, implement scaling, and engineer within complex scenarios both individually and collaboratively.

Standards Addressed

MATH.CONTENT.6.EE.A.2
MATH.CONTENT.6.EE.B.6
MATH.CONTENT.6.G.A.3
MATH.CONTENT.6.NS.B.2
MATH.CONTENT.6.NS.B.3
MATH.CONTENT.6.NS.C.7
MATH.CONTENT.6.NS.C.8
MATH.CONTENT.6.RP.A.2
MATH.CONTENT.7.G.A.1
MATH.CONTENT.7.NS.A.3
MATH.CONTENT.8.EE.B.5
MATH.CONTENT.8.G.B.7
MATH.CONTENT.8.G.B.8
NGSS MS-ETS1-1
NGSS MS-ETS1-2
Florida Computer Science Standards:
SC.68.CS-CS.1.2
SC.68.CS-CS.1.3
SC.68.CS-CS.2.10
SC.68.CS-CS.2.13
SC.68.CS-CS.2.2
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.6.2
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.6
SC.68.CS-PC.2.8

3D Kits Utilized

City Engineering Kit

Product Integrations

MyBot by Mimio Fusion
MimioView Document Camera
MimioSTEM Activity Mat (optional)

Mirror Maze

Grades: 7

Strands: Geometry, Physical Science

In this interdisciplinary lesson, students will discover the relationship between a beam of light and the reflection of that beam as it applies to angle relationships. Students will then use their knowledge to create mirror mazes that use a combination of different angles to hit a specific target.

Standards Addressed

CCSS.MATH.CONTENT.7.G.B.5
CCSS.MATH.PRACTICES: 1, 2, 4, 5, 8
NGSS.MS-PS4-2

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

Mirror Maze Kit

Morse Codebots

Grades: 6, 7, 8 9, 10, 11, 12

Strands: Computer Science, Waves and Electromagnetic Radiation, American/World History

Learn about digital and analog signals as well as the Optical Distance Sensor on your MyBot by building and reading coded messages. Students will learn the history of Morse code and the importance of coded messages in wars and must deliver messages to their peers using their robots. Students will explore reading sensors, utilizing code loops, and evaluate whether digital or analog signals are easier to decode. Then, they'll focus on generating easy-to-understand outputs based on logic by creating a binary output.

This activity is the perfect follow-up to Comparing Sensors: The Distance of Light, which investigates how material properties impact sensor readings on the MyBot Optical Distance Sensor and Labdisc Light Sensor.

Standards Addressed

NGSS.MS-PS4-2
NGSS.MS-PS4-3
NGSS.HS.PS4-2

Florida Social Studies Standards
SS.6.W.1.3
SS.8.A.1.5
SS.912.A.1.2
SS.912.A.4.5
SS.912.A.6.1
SS.912.W.1.3
SS.912.W.7.9
SS.912.W.9.1

Florida Computer Science Standards
SC.68.CS-CS.1.1
SC.68.CS-CS.2.10
SC.68.CS-CS.2.11
SC.68.CS-CS.2.12
SC.68.CS-CS.2.13
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.4.3
SC.68.CS-CS.4.4
SC.68.CS-CS.6.3
SC.68.CS-CS.6.6

SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8
SC.68.CS-PC.3.1

SC.912.CS-CC.1.1
SC.912.CS-CS.2.11
SC.912.CS-CS.2.7
SC.912.CS-CS.2.9
SC.912.CS-CS.4.4
SC.912.CS-CP.3.1
SC.912.CS-PC.3.1
SC.912.CS-PC.3.2

Product Integrations

MyBot by Mimio Fusion
MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)

Moth Survival

Grades: 7

Strands: Life Science, Statistics and Probability, Writing

In this lesson, students will use dice to simulate environmental pressures on a moth population. The comparison and analysis of theoretical and experimental data will be the main focus of the activity.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.C.7
CCSS.ELA-LITERACY.WHST.6-8.4
NGSS.MS-LS4-6

NGSS Science & Engineering Practices:
1, 2, 4, 5, 6, 8

3D Kits Utilized

Moths Kit
Loaded Dice Kit

Ready, Aim Fire!

Grades: 6, 7, 9, 10, 11, 12

Strands: Algebra, Physical Science

In this lesson, students will build a catapult out of pencils and apply the law of conservation of energy to determine the total mechanical energy of the projectile. Students will generate histogram plots of the various forms of energy to emphasize energy conservation.

Standards Addressed

CCSS.MATH.CONTENT.HSA.CED.A.1
CCSS.MATH.PRACTICES: 2, 4, 6
NGSS.MS-PS3.5

NGSS Science & Engineering Practices:
4

3D Kits Utilized

Pencil Catapult Kit
(Virtual Ball Bearing Catapult Module Compatible)

Stabilized Direction Control

Grades: 6, 7

Strands: Computer Science, Expressions & Equations, The Number System, Ratios & Proportions

Explore the use of gyroscopes as you build an auto-pilot program for your MyBot robot to keep it on course the same way airplanes, spacecraft, rovers, and shipsdo. This lesson is a perfect follow-up to the two-part *Missed it by that Much* activity in which students explore the importance of accuracy in shuttle launches and rover routes. It can also be used in conjunction with any other MyBot lesson plans to help your robot travel more-consistently in a straight line.

Standards Addressed

CCSS.MATH.CONTENT.6.EE.A.2
CCSS.MATH.CONTENT.6.EE.B.5
CCSS.MATH.CONTENT.6.EE.B.6
CCSS.MATH.CONTENT.6.EE.B.8
CCSS.MATH.CONTENT.6.NS.B.2
CCSS.MATH.CONTENT.6.NS.B.3
CCSS.MATH.CONTENT.6.NS.C.5
CCSS.MATH.CONTENT.6.RP.A.2
CCSS.MATH.CONTENT.6.RP.A.3
CCSS.MATH.CONTENT.7.EE.B.3
CCSS.MATH.CONTENT.7.NS.A.3
CCSS.MATH.CONTENT.7.RP.A.2
Florida Computer Science Standards:
SC.68.CS-CS.1.1
SC.68.CS-CS.2.10
SC.68.CS-CS.2.13
SC.68.CS-CS.2.14
SC.68.CS-CS.2.2
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.4.4
SC.68.CS-CS.6.4
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8

Product Integrations

MyBot by Mimio Robot

Temperature Variation between Day and Night

Grades: 6, 7, 8

Strands: Earth's Place in the Universe, Earth's Systems, Computer Science

This activity investigates measuring thermal oscillation and luminosity during a full day. Students will study the temperature and luminosity changes produced during the day and night in a given area by formulating a hypothesis and proceeding to check it using the Globisens Labdisc light and temperature sensors. They must then extrapolate what they know about light and heat to make informed hypotheses about how thermal oscillation varies from location to location around the globe.

Standards Addressed

NGSS.MS-ESS1-3
NGSS.MS-ESS2-1
NGSS Science & Engineering Practices: 1, 2, 3, 4, 7, 8

Florida Computer Science Standards:
SC.68.CS-CS.4.4
SC.68.CS-CS.6.3
SC.68.CS-CP.1.2

3D Kits Utilized

New York Balance Kit

Tour of Mars

Grades: 6, 7, 8

Strands: Computer Science, Earth's Place in the Universe

Explore the Red Planet with your very own Mars Rover. Students must divvy up unique roles and work together to plan and implement a tour of Mars. As a group, they must analyze surface features and justify both tour locations and a safe landing zone based on Martian topography. Evaluate the features of possible tour sites using an AR Mars model or online research. Finally, program your rover to traverse from your chosen landing zone to a series of locations of interest while avoiding hazardous terrains.

Standards Addressed

NGSS.MS-ESS1-3
Florida Computer Science Standards:
SC.68.CS-CC.1.3 (optional)
SC.68.CS-CS-2.13
SC.68.CS-CS.2.2
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.4.4
SC.68.CS-CS.6.4
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-CP.3.3

Product Integrations

SC.68.CS-PC.2.3
SC.68.CS-PC.2.8
SC.68.CS-PC.3.1
SC.68.CS-PC.4.1 (optional)
SC.68.CS-PC.4.5 (optional)
SC.68.CS-PC.4.6 (optional)

MyBot by Mimio Fusion
ShareSpace Giant Mars Map
Buzz Aldrin's "Welcome to Mars" book (optional)
AstroReality AR Mars Globe (optional)

Water Filtration Challenge: Seventh Grade

Grades: 7

Strands: Earth and Space Science, Engineering Design, Ratios and Proportions

In this interdisciplinary Problem Based Learning lesson, students will need to research a variety of concepts to prepare themselves for a water filtration engineering design challenge. Students will design, test, and present a water filtration system that meets specific parameters to help communities access safe drinking water during a drought.

Standards Addressed

CCSS.MATH.CONTENT.7.RP.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 6
NGSS.MS-ESS3-3
NGSS.MS-ETS1-1
NGSS.MS-ETS1-2
NGSS.MS-ETS1-3
NGSS.MS-ETS1-4
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Water Filtration Kit

Product Integrations

Labdisc Portable STEM Lab: Enviro
or
HipScience Turbidity Probe

Calculator Energy

Grades: 7

Strands: Computer Science, Physical Science

In this lesson, students will explore the inner workings of a calculator and identify the areas where different types of energy are transformed form one form into another. This lesson serves as an introduction to a computer science binary unit looking that the ways that computers use binary to communicate, specifically in the function of a simple calculator.

Standards Addressed

NGSS.MS-PS3-5
NGSS Science & Engineering Practices:
1, 2, 5, 6, 8

Florida Computer Science Standards:
SC.68.CS-CS.6.1

3D Kits Utilized

N/A

Discovering Binary

Grades: 7

Strands: Computer Science, Engineering Design, Expressions and Equations, Nature of Science

In this interdisciplinary lesson, students will explore how decimal numbers can be represented in binary. Students will explore the idea of binary notation and how it uses only 0 and 1 as its digits, representing switches that either use or don't use certain values in an 8-bit string. Students will convert between base ten and base two using their math knowledge. This is lesson 2 in a binary unit.

Standards Addressed

CCSS.MATH.CONTENT.7.EE.A.1
CCSS.MATH.CONTENT.7.EE.A.2
CCSS.MATH.CONTENT.7.NS.A.3
CCSS.MATH.PRACTICES: 1, 2, 4, 6, 7, 8
NGSS-MS-ETS1-1

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-CS.1.1
SC.68.CS-CS.2.11

3D Kits Utilized

Binary Conversion Kit

History of Binary Storage

Grades: 7

Strands: Computer Science, Physical Science, Reading in Science and Technical Subjects, Writing

In this interdisciplinary lesson, students will explore how computers use binary digits to communicate and different devices store data using binary logic. Students will also explore the history of using magnetism in hard drives and the current use of electric charges in solid state disks, making the connection between math, science, and computer science. This is the third lesson in a binary unit.

Standards Addressed

CCSS.ELA-LITERACY.RST.6-8.2
CCSS.ELA-LITERACY.RST.6-8.4
CCSS.ELA-LITERACY.WHST.6-8.2
CCSS.ELA-LITERACY.WHST.6-8.8
CCSS.MATH.PRACTICES: 1, 2, 4, 7
NGSS-MS-PS3-5

NGSS Science & Engineering Practices:
2, 5, 8
Florida Computer Science Standards:
SC.68.CS-CS.4.1
SC.68.CS-CS.4.2
SC.68.CS-CS-4.3
SC.68.CS-CS.5.1

3D Kits Utilized

Binary Conversion Kit

Converting to Binary

Grades: 7

Strands: Computer Science, Engineering Design, Nature of Science, Reading in Science and Technical Subjects

In this interdisciplinary lesson, students will explore how they can use their subtraction or division computational skills to convert from the base-ten system to base two. While converting between decimal and binary, students will enhance their number sense and reasoning, helping to solidify basic conceptual foundations of numeracy and increase computational fluency. This is lesson 4 in the binary unit.

Standards Addressed

CCSS.ELA-LITERACY.RST.6-8.3
CCSS.MATH.CONTENT.7.NS.A.2.B
CCSS.MATH.CONTENT.7.NS.A.2.C
CCSS.MATH.CONTENT.7.NS.A.2.D
CCSS.MATH.PRACTICES: 1, 2, 4, 6, 7, 8
NGSS-MS-ETS1-1

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-CP.2.2
SC.68.CS-CS.1.1
SC.68.CS-CS.2.10
SC.68.CS-CS.5.1

3D Kits Utilized

Binary Conversion Kit (optional)

What is ASCII?

Grades: 7

Strands: Computer Science, Physical Science, Reading in Science and Technical Subjects, Writing

In this lesson, students will explore how computers use binary digits to communicate text. They will use binary to write letters and characters while learning about the history of this coding language. Students will then practice writing about themselves in binary. This is the fifth lesson in the binary unit.

Standards Addressed

CCSS.ELA-LITERACY.RST.6-8.2
CCSS.ELA-LITERACY.RST.6-8.4
CCSS.ELA-LITERACY.WHST.6-8.8
CCSS.MATH.PRACTICES: 1, 2, 4, 7

NGSS Science & Engineering Practices:
2, 5, 8
Florida Computer Science Standards:
SC.68.CS-CS.4.3
CS.68.CS-CS.5.1

3D Kits Utilized

Binary Conversion Kit

Logic Gates

Grades: 7

Strands: Computer Science, Engineering Design, Expressions and Equations, Nature of Science, Reading in Science and Technical Subjects

In this lesson, students will explore how binary code is read using logic gates and transistors. Students will follow truth tables for AND, OR, and NOT gates used in a series to add two single-digit numbers on a "paper calculator." Students will then simulate a "human calculator" by serving as the logic gates to add numbers using binary. This is lesson 6 in the binary unit.

Standards Addressed

CCSS.ELA-LITERACY.RST.6-8.3
CCSS.MATH.CONTENT.7.EE.A.1
CCSS.MATH.CONTENT.7.EE.A.2
CCSS.MATH.CONTENT.7.NS.A.3
CCSS.MATH.PRACTICES: 1, 2, 4, 6 7, 8
NGSS-MS-ETS1-1

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-CP.1.1
SC.68.CS-CS.1.1
SC.68.CS-CS.2.11
SC.68.CS-CS.5.1

3D Kits Utilized

Logic Gate Stencil Kit

Water Filter Materials

Grades: 7

Strands: Computer Science, Earth and Space Science, Engineering Design, Statistics and Probability

In this mathematics and science lesson, the first of four in a unit on water quality, students use different materials to design, build, and test water filters. Human impacts on the world has resulted in the contamination of many drinking water supplies. The use of water filters has become common in extracting both pollutants and microbes that could otherwise cause illness. The development of experimental skills and mathematical data analysis is pivotal to the success of students during this activity.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.PRACTICES: 2, 5, 6
NGSS.MS-ESS3-3
NGSS.MS-ETS1-1
NGSS.MS-ETS1-2

NGSS.MS-ETS1-3
NGSS.MS-ETS1-4
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-CP.1.2
SC.68.CS-CS.1.3

3D Kits Utilized

Water Filtration Kit

Product Integrations

Labdisc Portable STEM Lab: Enviro
or
HipScience Turbidity Probe

Water Filter

Grades: 7

Strands: Computer Science, Earth & Space Science, Ratios & Proportions, Reading Informational Text

Water quality in the modern world has been impacted by human activities and requires everyone's attention to ensure that safe drinking water is available long into the future. In this science, computer science, and ELA-based lesson, the second of four in a unit on water quality and filtering, students will analyze the impact water insecurity has on areas in Asia and how this might impact water management all over the world.

Standards Addressed

CCSS.ELA-LITERACY.RI.7.1
CCSS.ELA-LITERACY.RI.7.3
CCSS.MATH.CONTENT.7.RP.A.3
CCSS.MATH.PRACTICE.MP2
NGSS.MS-ESS3-3
NGSS Science & Engineering Practices: 2, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-PC.2.1
SC.68.CS-PC.2.3
SC.68.CS-CS.6.1
SC.68.CS-CS.6.2

3D Kits Utilized

N/A

Warning System Flowchart

Grades: 7

Strands: Computer Science, Earth and Space Science, Engineering Design, Expressions and Equations

In this lesson, students will create a flowchart to outline the steps in a water quality and quantity warning system. This warning system will be based on specific parameters to help communities assess drinking water safety. This is lesson 3 of 4 in a unit on water quality and filtering and will set the stage for coding a warning system in lesson 4.

Standards Addressed

CCSS.MATH.CONTENT.7.EE.B.4
CCSS.MATH.PRACTICES:2, 4
NGSS.MS-ESS3-3
NGSS.MS-ETS1-1
NGSS.MS-ETS1-4
NGSS Science & Engineering Practices: 2, 5, 8
Florida Computer Science Standards:
SC.68.CS-CP.2.2
SC.68.CS-CS.1.3

3D Kits Utilized

Flow Chart Stencil Kit

Warning System Programming

Grades: 7

Strands: Computer Science, Earth & Space Science, Engineering Design, Expressions and Equations

In this mathematics and science lesson, students will code a computerized warning system. This warning system will be based on specific parameters to help communities assess drinking water quality and quantity. This is the final lesson in a unit on water quality and filtering.

Standards Addressed

CCSS.MATH.CONTENT.7.EE.B.4
CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.MS-ESS3-3
NGSS.MS-ETS1-1
NGSS.MS-ETS1-4
NGSS Science & Engineering Practices: 2, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-CP.1.2
SC.68.CS-CP.2.3
SC.68.CS-CS.1.3

3D Kits Utilized

N/A

Bioengineering

Grades: 6, 7, 8

Strands: Life Science, Reading in Science and Technical Subjects, Writing

In this lesson, students will learn:

1. How bioengineering techniques use recombinant DNA to augment the genetic material in one organism with the genetic material from one or more other organisms with the intent of expressing novel gene products in the host organism.
2. General principles behind the technique of bacterial cell transformation with plasmids to augment host cells.
3. About a real-world context for bioengineering: microbe-driven biofuel production from algae.
4. How humans can manipulate living organisms to influence inheritable traits.

Standards Addressed

CCSS.ELA-LITERACY.WHST.6-8.1
CCSS.ELA-LITERACY.WHST.6-8.2
CCSS.ELA-LITERACY.RST.6-8.7
NGSS.MS-LS4-5
NGSS Science & Engineering Practices: 1, 2, 6

3D Kits Utilized

Cell Transformation Kit

DNA Molecule

Grades: 7

Strands: Life Science

In this lesson, students will explore the structure of DNA through the construction of a DNA molecule model.

Standards Addressed

NGSS.MS-LS3-1
NGSS Science & Engineering Practices: 1, 2, 6, 8

3D Kits Utilized

DNA Kit

DNA Mutation Types

Grades: 6, 7, 8, 9, 10, 11, 12

Strands: Life Science

In this lesson, students will explore types of mutations that can occur in DNA. They will relate each type of mutation to potential consequences in gene expression. The teacher will use a DNA model to demonstrate the variety of sequence mutations. Students should be provided an opportunity to work with the model to create the mutations alongside the activity at the discretion of the teacher.

Standards Addressed

NGSS.MS-LS3-1
NGSS Science & Engineering Practices: 4, 6, 7

3D Kits Utilized

DNA Kit

Mendel's Mighty Model

Grades: 6, 7, 8, 9, 10, 11, 12

Strands: Life Science

In this lesson, students demonstrate the law of segregation during meiosis, which states that a pair of alleles for a particular trait separate during cell division. They will then use Mendel's model of inheritance, which can be represented by a Punnett square, to predict the genotype and phenotype of offspring from a particular cross. They will test these predictions by simulating the results of particular crosses.

Standards Addressed

CCSS.MATH.PRACTICES: 1, 2, 4
NGSS.MS-LS3-2
NGSS.HS-LS3-3

NGSS Science & Engineering Practices: 2, 4, 5, 6

3D Kits Utilized

Chromosomes Kit
Punnett Square Dice (Gg) Kit

Monohybrid Cross Simulation

Grades: 7

Strands: Life Science

In this lesson, students will explore mathematical models used to describe genetic inheritance patterns resulting from monohybrid crosses. Students will complete Punnett squares to determine ideal expected ratios and genetic combination frequencies. Students also will complete dice-roll simulations for monohybrid crosses to generate data for comparison to the ideal determined through the use of Punnett squares. Students will practice basic data analysis and will examine individual and pooled class data versus the Punnett square results to better understand how large data sets yield more accurate ratios versus expectations.

Standards Addressed

CCSS.MATH.PRACTICES: 4
NGSS.MS-LS3-2

3D Kits Utilized

Punnett Square Dice (Gg) Kit

Moth Selection

Grades: 7, 9, 10, 11, 12

Strands: Life Science

In this lesson, students will explore sampling techniques and will collect data to examine adaptive characteristics of the moths.

Standards Addressed

CCSS.MATH.PRACTICES: 1, 2, 4
NGSS.MS-LS3-2
NGSS.HS-LS3-3

NGSS Science & Engineering Practices: 2, 4, 5, 6

3D Kits Utilized

Moths Kit
Pencil Quadrat Kit

Sea Floor Topography

Grades: 6, 7, 8, 9, 10, 11, 12

Strands: Earth and Space Science

In this lesson, students collect data, model the process of echo sounding, and create models to determine the shapes of several sea floor models.

Standards Addressed

NGSS.MS-ESS2-3

NGSS Science & Engineering Practices: 2, 4

3D Kits Utilized

Ocean Topography Mapping Kit

Time to Reflect

Grades: 7

Strands: Physical Science

In this lesson, students will apply their understanding of albedo to investigate and measure the albedo values of multiple surfaces around their school campus.

Standards Addressed

SC.7.P.10.2

NGSS Science & Engineering Practices:
3, 4

3D Kits Utilized

Albedo Effect Kit

Product Integrations

Labdisc Portable STEM Lab
or
HipScience Climate Sensor or
SAMLabs Sensors

Ballista Bivariate Data

Grades: 8, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore classroom-generated bivariate data and scatter plots for analyzing ballista projectile flight results. Trend lines will be established for the scatter plots to determine whether linear relationships were present between two variables (force and distance).

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.HSS.ID.B.6

NGSS Science & Engineering Practices:
1, 2, 3, 4, 5, 6, 7, 8

3D Kits Utilized

Ballista/Force Generator Kit
(Virtual Ball Bearing Catapult Module Compatible)

Bivariate Data: Distance

Grades: 8

Strands: Statistics and Probability

In this lesson, students will:

1. Create bivariate data using a catapult to launch projectiles with a variety of masses
2. Analyze results of a data set to discover trends and create regression lines
3. Graph data on a scatterplot
4. Determine an optimal launch angle and projectile mass for greatest distance

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2

NGSS Science & Engineering Practices:
1, 2, 3, 4, 5, 6, 8

3D Kits Utilized

Ball Bearing Catapult Kit

Flyswatter Arithmetic: Middle School

Grades: 6, 7, 8

Strands: Expressions and Equations, Geometry, The Number System, Ratios and Proportions

Use your MimioSTEM Activity Mat paired with flyswatters to pinpoint the correct answers to arithmetic questions to increase fluency and automaticity. This fast-paced activity includes sample prompts for grades 6-8. Perfect as a warm up or end-of-class activity. Adapt to suit whatever topics you're currently covering or use to refresh previously-covered skills.

Standards Addressed

CCSS.MATH.CONTENT.8.EE.A.2

(For additional standards, see each relevant grade.)

Product Integrations

MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)
MimioView Document Camera (optional)

Historical Housing Model-Eliciting Activity (PBL)

Grades: 8 **Strands: Geometry**

This hands-on problem-solving activity will strengthen students' understanding of calculating surface area and volume. Students will use nets for various shapes and composite shapes, including cones, cylinders, triangular prisms, and rectangular prisms. Students will work in teams to respond to a request from the Fieldwork Research Lab asking students to write instructions for how to select temporary shelters for teams of researchers at a remote site. Each shelter and selected nets are 3D printed for observation and testing. The shapes of the buildings are based on historic housing of indigenous groups of people. Students will also have the opportunity to construct their own shelter based on the new information provided. Finally, students can select the building cover materials by testing prototypes of different materials (e.g., aluminum foil, fabric) in simulated heat and rain.

Standards Addressed

CCSS.MATH.CONTENT.8.G.C.9
CCSS.MATH.PRACTICES: 1, 2, 5

NGSS Science & Engineering Practices: 3, 4, 5, 7, 8

3D Kits Utilized

Housing Shapes Kit
Housing Shapes Kit: Nets Expansion (optional)

Product Integrations

SAM Labs Sensors

Pythagorean Proof: Conservation of Area

Grades: 8 **Strands: Geometry**

The Pythagorean Theorem is a very important statement regarding the relationship of right triangle side lengths. An understanding of this relationship is vital to many applications of geometry in the real world and for additional mathematical proofs. In this lesson, students will work with a tangible model to further explore a proof of the Pythagorean Theorem and will incorporate the area of a square formed by right triangle sides into their understanding.

Standards Addressed

CCSS.MATH.CONTENT.8.G.B.6
CCSS.MATH.PRACTICES: 5

NGSS Science & Engineering Practices: 2, 3, 4, 5, 6, 7

3D Kits Utilized

Pythagorean Proof Kit

Sensoring Data

Grades: 6, 7, 8, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore data collection using the Climate Sensor and perform statistical analysis of the data. Students will use a scientific method of inquiry to plan an investigation of their own. This activity is meant to allow students to use a variety of skills they have acquired throughout a statistics unit in a personally meaningful way. The specific standards addressed will vary based on the students' approach to the challenge. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.1
CCSS.MATH.CONTENT.6.SP.B.5.A
CCSS.MATH.CONTENT.6.SP.B.5.B
CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.CONTENT.HSS.ID.B.5
CCSS.MATH.CONTENT.HSS.ID.B.6.A
CCSS.MATH.CONTENT.HSS.ID.B.6.B
CCSS.MATH.CONTENT.HSS.ID.B.6.C
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Sensors Utilized

Labdisc Portable STEM Lab: Enviro
or
HipScience Climate Sensor

(No 3D Kit Used)

Space Station Model-Eliciting Activity (PBL)

Grades: 8

Strands: Geometry

Students will apply surface area and volume formulas for various shapes, including cones, spheres, and cylinders, in this open-ended problem. In response to a request from the director of the International Space Company, students will design a layout for a space station using four types of modules. In part 1 of the problem, teams of students will get one of three possible letters on behalf of space agencies from from three different countries. In part 2, students are called to collaborate with two other teams of students to combine ideas and design their own module for the space station while taking into account certain constraints.

Standards Addressed

CCSS.MATH.CONTENT.8.G.C.9
CCSS.MATH.PRACTICES: 1, 2, 4, 5, 6, 7
NGSS Science & Engineering Practices: 2, 4, 5, 7

3D Kits Utilized

Space Station Kit

Rocket Balloons

Grades: 8

Strands: Functions, Physical Science, Statistics and Probability

In this lesson, students will be exposed to how a scatterplot shows a relationship in bivariate data. Students will learn to graph bivariate data, look for a basic trend or association, as well as create the equation of the trend line. Students will explore the relationship between the number of breaths in a balloon and the distance the balloon travels.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.3
CCSS.MATH.CONTENT.8.F.A.3
CCSS.MATH.CONTENT.8.F.B.4
CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.MS-PS2-2
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Graphing Kit
Zone Marking Kit

Scattering Conkers

Grades: 8

Strands: Functions, Life Science, Statistics and Probability

In this interdisciplinary lesson, students will explore bivariate data collection by dropping conkers (horse chestnuts), tracking seed dispersion, and performing statistical analysis of the data. Students will create scatterplots of the data to look for trends and/or associations between the altitude of the seed drop and the distance they land away from a target.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.F.A.3
CCSS.MATH.CONTENT.8.F.B.4
CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.MS-LS2-1
NGSS.MS-LS2-4
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Conkers Kit

Let There Be Light

Grades: 8

Strands: Functions, Life Science, Physical Science, Statistics and Probability

In this lesson, students will explore and perform statistical analysis of bivariate data by collecting ambient light data with a sensor. Students will create scatterplots of the data to look for trends and/or associations between the distance from the window and the amount of ambient light.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.3
CCSS.MATH.CONTENT.8.F.A.3
CCSS.MATH.CONTENT.8.F.B.4
CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.MS-LS2-1
NGSS.MS-LS2-4
NGSS.MS.PS4-2
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Sensors Utilized

Labdisc Portable STEM Lab
or
HipScience Climate Sensor
or SAM Labs Sensors

(No 3D Kit Used)

Bowling for Stats

Grades: 8

Strands: Physical Science, Statistics and Probability

In this lesson, students will use a 3D-printed bowling set to explore the relationship between bowling distance and the number of pins a student can expect to knock down. These activities facilitate understanding of interpreting the correlation coefficient, slope, and y-intercept of a least squares regression model.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.3
CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.MS-PS2-2
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

Bowling Kit

Catapulting Data

Grades: 8

Strands: Geometry, Physical Science, Statistics and Probability

In this interdisciplinary lesson, students will explore data collection using a catapult and perform statistical analysis of the data. Students will create scatterplots for analysis that will help demonstrate the scientific concepts of density and its impact on the characteristics of objects.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.3
CCSS.MATH.CONTENT.8.G.C.9
CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.MS-PS3-1
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

Ball Bearing Catapult Kit

Adjusting Jumps

Grades: 8, 9, 10, 11, 12

Strands: Statistics and Probability

This activity brings awareness to the students on how to better improve their estimated lines of fit. Students will collect data with two numerical variables, create scatterplots, and estimate a line of fit. They will then discover how y-value residuals can be minimized to improve their line of fit. Day 1 provides students with the opportunity to visually understand residuals while enhancing their understanding of actual values and predicted values from a line of fit. Day 2 offers the opportunity for students to use their algebraic skills to calculate the residuals by collecting new data.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.3
CCSS.MATH.CONTENT.HSS.ID.8.6

3D Kits Utilized

N/A

Height Scatterplot

Grades: 8, 9, 10, 11, 12

Strands: Statistics and Probability

This activity focuses on collecting and analyzing data with two numerical variables. This kind of data analysis, known as bivariate analysis, explores the possible association between two variables. Students will create scatterplots and estimate a line of best fit. They will then use that linear regression line for interpolation. As an extension, they can work with a graphing calculator to determine the regression for the line of best fit and the correlation coefficient.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.3
CCSS.MATH.CONTENT.HSS.ID.8.6
CCSS.MATH.CONTENT.HSS.ID.C.8
NGSS Science & Engineering Practices:
1, 2, 3, 4, 5, 6, 8

3D Kits Utilized

N/A

Outlier Effect

Grades: 8, 9, 10, 11, 12

Strands: Statistics and Probability

This activity allows students to explore how outliers may or may not affect lines of best fit. Students will explore this concept on a scatterplot by hand and with technology.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.3
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.CONTENT.HSS.ID.B.6
NGSS Science & Engineering Practices:
1, 2, 3, 4, 5, 6, 7, 8

3D Kits Utilized

N/A

Blindfolded Target Practice

Grades: 8, 9, 10, 11, 12

Strands: Statistics and Probability

This activity focuses on planning, collecting, and analyzing data with two numerical variables. This kind of data analysis, known as bivariate analysis, explores the possible association between two variables. Students will create scatterplots and estimate a best fit line. They will then use that linear regression line for interpolation. Finally, they will work with technology to determine the regression for the line of best fit and the correlation coefficient.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.3
CCSS.MATH.CONTENT.HSS.ID.B.6
NGSS Science & Engineering Practices:
1, 2, 3, 4, 5, 6, 7, 8

3D Kits Utilized

N/A

Sea Ice Analysis (Eighth Grade)

Grades: 8

Strands: Earth and Space Science, Statistics and Probability

The changing climate is an important topic for both scientific analysis and worldly knowledge. This lesson uses data collected by the National Snow and Ice Data Center to create and use mathematical models as a predictive tool and do critical analysis of sea ice loss.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.3

CCSS.MATH.PRACTICES: 2, 4, 5, 6
NGSS Science & Engineering Practices:
2, 4, 5, 8

3D Kits Utilized

N/A

Planetary Thermometer

Grades: 8

Strands: Earth and Space Science, Expressions and Equations, Statistics and Probability

In this lesson, students will:

- Model the effect the Sun has on the temperature of the planets based on their distances from it.
- Use data to explore the effect of light and heat as the distance increases from the source.
- Use data to explore the impact that a model greenhouse atmosphere will have on the simulated inner three planets.
- Use data to explore linear and/or nonlinear models based on the temperatures of planets relative to their distance from the Sun and their atmospheric conditions.
- Relate the slope of lines in context to model the concept of temperature equilibrium.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.3
CCSS.MATH.CONTENT.8.EE.B.5

NGSS.MS-ESS1-3
NGSS Science & Engineering Practices:
1, 2, 5, 6, 8

3D Kits Utilized

Planetary Temperatures Kit

Product Integrations

Labdisc Portable STEM Lab
or
SAMLabs Sensors

Minute Minded!

Grades: 8

Strands: Statistics and Probability

Two-way tables provide a way to organize bivariate categorical data. In this lesson, students will gather data about gender differences in estimating the length of a minute, organize the data into a two-way table, and then analyze the data using relative frequencies.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.4

NGSS Science & Engineering Practices:
1, 2, 3, 4, 5, 6, 7, 8

3D Kits Utilized

N/A

Categorically Catapulting Cheery Cereal

Grades: 8

Strands: Statistics and Probability

Two-way tables provide a way to organize bivariate categorical data. In this lesson, students will gather data about distances a projectile travels from a catapult, organize the data into a two-way table, and then analyze the data using relative frequencies.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.4

NGSS Science & Engineering Practices:
1, 2, 3, 4, 5, 6, 7, 8

3D Kits Utilized

Ball Bearing Catapult Kit
Zone Marking Kit

Bivariate Rocket Launch

Grades: 8

Strands: Functions, Physical Science, Statistics and Probability

In this lesson, students will connect how the data in a scatterplot and a two-way frequency table can show a relationship in bivariate data. Students will graph bivariate data, perform a regression to develop the equation of the line of best fit, and use the mean of the x values and the mean of the y values to aggregate the data into four categories for a two-way table. Students will use both the scatterplot and two-way table to justify if there is a relationship between the bivariate data.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.3
CCSS.MATH.CONTENT.8.SP.A.4
CCSS.MATH.CONTENT.8.F.A.3
CCSS.MATH.CONTENT.8.F.B.4
CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.MS-PS2-2
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

Rockets Kit
Clinometer Kit

Water Filtration Challenge (Eighth Grade)

Grades: 8

Strands: Earth & Space Science, Engineering Design, Ratios & Proportions, Statistics & Probability

In this interdisciplinary Problem Based Learning lesson, students will need to research a variety of concepts to prepare themselves for a water filtration engineering design challenge. Students will design, test, and present a water filtration system that meets specific parameters to help communities access safe drinking water during the future colonization of Mars.

Standards Addressed

CCSS.MATH.CONTENT.7.RP.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 6
NGSS.MS-ESS3-3
NGSS.MS-ETS1-1
NGSS.MS-ETS1-2
NGSS.MS-ETS1-3
NGSS.MS-ETS1-4
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

Water Filtration Kit

Product Integrations

Labdisc Portable STEM Lab: Enviro
or
HipScience Turbidity Probe

Sand to Circuit

Grades: 8

Strands: Computer Science, Physical Science, Writing

In this lesson, students will explore the process of building an integrated circuit. This is the first lesson in the binary unit.

Standards Addressed

CCSS.ELA-LITERACY.WHST.6-8.2
CCSS.ELA-LITERACY.WHST.6-8.7
NGSS.MS-PS1-1

NGSS Science & Engineering Practices:
1, 2, 5, 6, 8
Florida Computer Science Standards:
SC.68.CS-CS.6.1

3D Kits Utilized

N/A

Discovering Binary

Grades: 8

Strands: Computer Science, Engineering Design, Expressions and Equations, Nature of Science

In this interdisciplinary lesson, students will explore how decimal numbers can be represented in binary. Students will explore the idea of binary notation and how it uses only 0 and 1 as its digits, representing switches that either use or don't use certain values in an 8-bit string. Students will convert between base ten and base two using their math knowledge. This is lesson 2 in a binary unit.

Standards Addressed

CCSS.MATH.CONTENT.8.EE.A.1
CCSS.MATH.CONTENT.8.NS.A.1
CCSS.MATH.PRACTICES: 1, 2, 4, 6, 7, 8
NGSS-MS-ETS1-1

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-CS.1.1
SC.68.CS-CS.2.11

3D Kits Utilized

Binary Conversion Kit

History of Binary Storage

Grades: 8

Strands: Computer Science, Physical Science, Reading in Science and Technical Subjects, Writing

In this interdisciplinary lesson, students will explore how computers use binary digits to communicate, how data is stored in different devices, and how binary logic is used so that hard drives and solid state disks with electrical charges can work together. This will make a connection between math, science, and computer science. This is the third lesson in a binary unit.

Standards Addressed

CCSS.ELA-LITERACY.RST.6-8.2
CCSS.ELA-LITERACY.RST.6-8.4
CCSS.ELA-LITERACY.WHST.6-8.2
CCSS.ELA-LITERACY.WHST.6-8.8
CCSS.MATH.PRACTICES: 1, 2, 4, 7
NGSS-MS-PS3-5

NGSS Science & Engineering Practices:
2, 5, 8
Florida Computer Science Standards:
SC.68.CS-CS.4.1
SC.68.CS-CS.4.2
SC.68.CS-CS-4.3
SC.68.CS-CS.5.1

3D Kits Utilized

Binary Conversion Kit

Converting to Binary

Grades: 8

Strands: Computer Science, Engineering Design, Expressions and Equations, Nature of Science, Reading in Science and Technical Subjects

In this interdisciplinary lesson, students will explore how they can use their subtraction or division computational skills to convert from the base-ten system to base two. While converting between decimal and binary, students will enhance their number sense and reasoning, helping to solidify basic conceptual foundations of numeracy and increase computational fluency. Students will also make connections between scientific notation and base ten while exploring binary conversion and base two. This is lesson 4 in the binary unit.

Standards Addressed

CCSS.ELA-LITERACY.RST.6-8.3
CCSS.MATH.CONTENT.8.EE.A.1
CCSS.MATH.CONTENT.8.EE.A.4
CCSS.MATH.CONTENT.8.NS.A.1
CCSS.MATH.PRACTICES: 1, 2, 4, 6, 7, 8
NGSS-MS-ETS1-1

NGSS Science & Engineering Practices:
2, 3, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-CP.2.2
SC.68.CS-CS.1.1
SC.68.CS-CS.2.10
SC.68.CS-CS.5.1

3D Kits Utilized

Binary Conversion Kit (optional)

What is ASCII?

Grades: 8

Strands: Computer Science, Reading in Science and Technical Subjects, Writing

In this lesson, students will explore how computers use binary digits to communicate text. They will use binary to write letters and characters while learning about the history of this coding language. Students will then practice writing about themselves in binary. This is the fifth lesson in the binary unit.

Standards Addressed

CCSS.ELA-LITERACY.RST.6-8.2
CCSS.ELA-LITERACY.RST.6-8.4
CCSS.ELA-LITERACY.WHST.6-8.8
CCSS.MATH.PRACTICES: 1, 2, 4, 7

NGSS Science & Engineering Practices:
2, 5, 8
Florida Computer Science Standards:
SC.68.CS-CS.4.3
CS.68.CS-CS.5.1

3D Kits Utilized

Binary Conversion Kit

Logic Gates

Grades: 8

Strands: Computer Science, Engineering Design, Functions, Reading in Science and Technical Subjects

In this lesson, students will explore how binary code is read using logic gates and transistors. Students will follow truth tables for AND, OR, and NOT gates used in a series to add two single-digit numbers on a "paper calculator." Students will then simulate a "human calculator" by serving as the logic gates to add numbers using binary. This is lesson 6 in the binary unit.

Standards Addressed

CCSS.ELA-LITERACY.RST.6-8.3
CCSS.MATH.CONTENT.8.F.A.1
CCSS.MATH.PRACTICES: 1, 2, 4, 6 7, 8
NGSS-MS-ETS1-1
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-CP.1.1
SC.68.CS-CP.2.2
SC.68.CS-CS.1.1
SC.68.CS-CS.2.11
SC.68.CS-CS.5.1

3D Kits Utilized

Logic Gate Stencil Kit

Water Filter Amounts

Grades: 8

Strands: Computer Science, Engineering Design, Statistics and Probability

In this mathematics and science lesson, the first of four in a unit on water quality and filtering, students design, build, and test water filters with different amounts of materials. Human exploration to distant worlds will test both those who make the voyage and the supplies needed to sustain life. One of the most important resources for life on distant worlds will be water, and water filters to create drinkable of water will be important for colonies. The development of experimental skills and mathematical data analysis is pivotal to student success in this activity.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.3
CCSS.MATH.CONTENT.8.SP.A.4
CCSS.MATH.PRACTICES: 2, 5, 6
NGSS.MS-ETS1-1
NGSS.MS-ETS1-2
NGSS.MS-ETS1-3
NGSS.MS-ETS1-4
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8
Florida Computer Science Standards:
Sc.68.CS-CP.1.2
SC.68.CS-CS.1.3

3D Kits Utilized

Water Filtration Kit

Product Integrations

Labdisc Portable STEM Lab: Enviro
or
HipScience Turbidity Probe

Water from Mars

Grades: 8

Strands: Computer Science, Earth and Space Science, Reading Informational Text

Water as a resource on other planets is primary concern for exploration and potential long-term colonialization. In this lesson, students will analyze the technologies that can be used to extract resources such as drinking water from the native soils and materials found on distant worlds.

Standards Addressed

CCSS.ELA-LITERACY.RI.8.1
CCSS.ELA-LITERACY.RI.8.3
CCSS.MATH.PRACTICES: 2
NGSS.MS-ESS3-2
NGSS.MS-ESS3-3
NGSS.MS-ESS3-4

NGSS Science & Engineering Practices:
2, 4, 5, 8
Florida Computer Science Standards:
SC.68.CS-PC.2.1
SC.68.CS-PC.2.3
SC.68.CS-CS.6.1
SC.68.CS-CS.6.2

3D Kits Utilized

N/A

Warning System Flowchart

Grades: 8

Strands: Computer Science, Earth and Space Science, Engineering Design, Functions

In this mathematics and science lesson, the third of four in a unit on water quality, students will create a flowchart to outline the steps required in the development of a regolith quantity, water quantity, and water quality warning system. This warning system will monitor specific parameters to help explorers assess drinking water quantity and safety. This will set the stage for coding a warning system in lesson 4.

Standards Addressed

CCSS.MATH.CONTENT.8.F.A.1
CCSS.MATH.PRACTICES: 2, 4
NGSS.MS-ESS3-3
NGSS.MS-ETS1-1
NGSS.MS-ETS1-4

NGSS Science & Engineering Practices:
2, 5, 8
Florida Computer Science Standards:
SC.68.CS-CP.2.2
SC.68.CS-CS.1.3

3D Kits Utilized

Flow Chart Stencil Kit

Warning System Programming

Grades: 8

Strands: Computer Science, Earth and Space Science, Engineering Design, Functions

In this mathematics and science lesson, students will code a computerized warning system for water collected on Mars. This warning system will be based on specific parameters to help determine the quantity of water in Martian regolith and quality of the water once filtered. This is the final lesson in a unit on water quality and filtering.

Standards Addressed

CCSS.MATH.CONTENT.8.F.A.1
CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.MS-ESS3-3
NGSS.MS-ETS1-1
NGSS.MS-ETS1-4

NGSS Science & Engineering Practices:
2, 5, 6, 8
Florida Computer Science Standards:
SC.68.CS-CP.1.2
SC.68.CS-CP.2.3
SC.68.CS-CS.1.3

3D Kits Utilized

N/A

A Walk Through the City

Grades: 6, 7, 8

Strands: Earth and Human Activity, Ecosystems, Computer Science

The purpose of this activity is to study the relationship between temperature and humidity in several locations inside and outside school, creating a hypothesis and proceeding to test it using the Labdisc external temperature, relative humidity and GPS sensors. The goal is to obtain the values of these variables in urban spaces and in green areas. Use as a standalone acitvity, or extend this understanding with the MyStemKits Urban Ecology Kit where students can investigate ways to improve the ecosystems, temperatures, and energy efficiency of cities.

Standards Addressed

NGSS.MS-ESS3-3
NGSS.MS-ESS3-5
NGSS.MS-LS2-4
NGSS.MS-LS2-5

Florida Computer Science Standards
SC.68.CS-CS.2.1
SC.68.CS-CS.4.4
SC.68.CS-CS.6.1
SC.68.CS-CS.6.2
SC.68.CS-CS.6.3
SC.68.CS-CP.1.2
SC.68.CS-CP.3.1
SC.68.CS-PC.2.8
SC.68.CS-PC.3.1

Product Integrations

Urban Ecology Kit (optional)
Labdisc Portable STEM Labs:
Gensci, Biochem, Enviro

Calculating Intercepts

Grades: 8, 9, 10, 11, 12

Strands: Computer Science, Expressions and Equations, Functions, Geometry,

Functions and teamwork are the key in this robotics-integrated activity. You are the pilots on a series of spacecraft travelling through the same quadrant of space. Write functions based on coordinate data to quantify your route and then use it to calculate an intercept point with a nearby spacecraft. Utilize the Pythagorean Theorem or Distance Formula to compare speeds and determine what changes are needed to ensure the two spacecraft intercept at the same moment in time so that you can deliver a vital sensor to their ship. Finally, program your MyBot robots to simulate this out-of-this-world scenario.

Standards Addressed

CCSS.MATH.CONTENT.8.EE.A.2
CCSS.MATH.CONTENT.8.EE.B.5
CCSS.MATH.CONTENT.8.EE.C.7
CCSS.MATH.CONTENT.8.EE.C.8
CCSS.MATH.CONTENT.8.F.A.1
CCSS.MATH.CONTENT.8.F.A.2
CCSS.MATH.CONTENT.8.F.A.3
CCSS.MATH.CONTENT.8.F.B.4
CCSS.MATH.CONTENT.8.G.B.7
CCSS.MATH.CONTENT.8.G.B.8

CCSS.MATH.CONTENT.HSA.CED.A.4
CCSS.MATH.CONTENT.HSA.REI.B.3
CCSS.MATH.CONTENT.HSA.REI.C.6

Florida Computer Science Standards
SC.68.CS-CS.2.13
SC.68.CS-CS.2.2
SC.68.CS-CS.2.6
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8

SC.912.CS-CS.3.1
SC.912.CS-PC.2.12
SC.912.CS-PC-2.7

Product Integrations

MyBot by Mimio Fusion
Mimio STEM Activity Mat (optional)
MyStemKits Graphing Kit (optional)

Comparing Sensors: *The Distance of Light*

Grades: 6, 7, 8

Strands: Computer Science, Waves and Electromagnetic Radiation

Students get to know their technology tools better in this integrated activity. They will explore assorted sensors: the Labdisc Light & Distance Sensors and the MyBot Optical Distance Sensor, to better understand how the optical distance sensor relies on light readings to sense changes in distance and color. They will evaluate how changing the surface the robot is on can impact the accuracy of the readings and how to use this to their advantage for future activities

.

This activity is the perfect follow-up to Albedo (6th Grade) or Time to Reflect (7th Grade), (or both in order) which introduce light reflection and simulate albedo on a small scale. Follow this up with Morse Codebots or Roving Roombot which use the skills learned herein to create smart programs based on the readings of the MyBot optical distance sensor.

Standards Addressed

NGSS.MS-PS4-2
Florida Computer Science Standards
SC.68.CS-CS.2.10
SC.68.CS-CS.2.11
SC.68.CS-CS.2.13
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.2.8
SC.68.CS-CS.4.4
SC.68.CS-CS.6.3
SC.68.CS-CS.6.6
SC.68.CS-CP.1.2
SC.68.CS-CP.2.3
SC.68.CS-CP.3.1

Product Integrations

MyBot by Mimio Fusion
Labdisc Portable STEM Labs: Gensci, Biochem
MimioSTEM Activity Mat

Geometry and Density

Grades: 8

Strands: Expressions and Equations, Functions, Geometry, Physical Science

In this interdisciplinary lesson, students will explore the relationships between density, mass, and volume both scientifically and mathematically. Students will focus on calculating the density of spheres, cylinders, and cones. Students will also use technology to see the relationship between density, mass, and volume, relating it to functions.

Standards Addressed

CCSS.MATH.CONTENT.8.G.C.9
CCSS.MATH.CONTENT.8.EE.B.5
CCSS.MATH.CONTENT.8.F.A.2
CCSS.MATH.CONTENT.8.F.A.3
CCSS.MATH.CONTENT.8.F.B.5
CCSS.MATH.PRACTICES: 2, 3, 4, 5, 8
NGSS-PS1-2
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Density Shapes Kit

Gliders & the Pythagorean Theorem

Grades: 8

Strands: Geometry, Engineering Design, Physical Science

In this lesson, students will conduct a series of flight distance trials using 3D-printed model gliders. Students will record the results of their flight trials as landing location coordinates. Following this, they will use their coordinate data to solve distance problems and answer questions using the Pythagorean Theorem.

Standards Addressed

CCSS.MATH.CONTENT.8.G.B.7
CCSS.MATH.CONTENT.8.G.B.8
NGSS-MS-ETS1-1
NGSS-MS-ETS1-2
NGSS-MS-ETS1-3
NGSS-MS-ETS1-4
NGSS-MS-PS2-5
NGSS Science & Engineering Practices: 4, 5, 8

3D Kits Utilized

Clinometer Kit
Gliders Kit
Gliders Kit: Alternate
(Virtual Ball Bearing Catapult Kit Compatible)

Mars Colony (PBL)

Grades: 6, 7, 8

Strands: Computer Science, Engineering Design, Expressions & Equations, Geometry, The Number System, Ratios & Proportions

Engineer the perfect city by placing buildings and determining speed limits, and then test to see how it holds up to a variety of scenarios. From fires to commute times, and running errands to medical emergencies, calculate the efficiency of your design. Once you've figured out your design on paper, scale it up to a floor-sized test space. Then, integrate robotics by running real tests to see how long it takes to travel places by programming your MyBot to traverse your streets. Calculate and graph speed, compare solutions, implement scaling, and engineer within complex scenarios both individually and collaboratively.

Standards Addressed

MATH.CONTENT.6.EE.A.2
MATH.CONTENT.6.EE.B.6
MATH.CONTENT.6.G.A.3
MATH.CONTENT.6.NS.B.2
MATH.CONTENT.6.NS.B.3
MATH.CONTENT.6.NS.C.7
MATH.CONTENT.6.NS.C.8
MATH.CONTENT.6.RP.A.2
MATH.CONTENT.7.G.A.1
MATH.CONTENT.7.NS.A.3
MATH.CONTENT.8.EE.B.5
MATH.CONTENT.8.G.B.7
MATH.CONTENT.8.G.B.8
NGSS MS-ETS1-1
NGSS MS-ETS1-2
Florida Computer Science Standards:
SC.68.CS-CS.1.2
SC.68.CS-CS.1.3
SC.68.CS-CS.2.10
SC.68.CS-CS.2.13
SC.68.CS-CS.2.2
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.6.2
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.6
SC.68.CS-PC.2.8

3D Kits Utilized

City Engineering Kit

Product Integrations

MyBot by Mimio Fusion
MimioView Document Camera
MimioSTEM Activity Mat (optional)

Meter Stick Cart

Grades: 6, 8, 9, 10, 11, 12

Strands: Algebra, Physical Science

In this lesson, students will qualitatively and quantitatively analyze the motion of a cart undergoing uniform acceleration. Graphs of position and velocity versus time will be created and a function for the velocity graph will be generated suing the data.

Standards Addressed

CCSS.MATH.CONTENT.HSA.CED.A.1
CCSS.MATH.PRACTICES: 2, 4, 6
NGSS.HS-PS2-1
NGSS Science & Engineering Practices:
4, 8

3D Kits Utilized

Thin Meter Stick Ramp Kit or
Wide Meter Stick Ramp Kit

Morse Codebots

Grades: 6, 7, 8 9, 10, 11, 12

Strands: Computer Science, Waves and Electromagnetic Radiation, American/World History

Learn about digital and analog signals as well as the Optical Distance Sensor on your MyBot by building and reading coded messages. Students will learn the history of Morse code and the importance of coded messages in wars and must deliver messages to their peers using their robots. Students will explore reading sensors, utilizing code loops, and evaluate whether digital or analog signals are easier to decode. Then, they'll focus on generating easy-to-understand outputs based on logic by creating a binary output.

This activity is the perfect follow-up to Comparing Sensors: The Distance of Light, which investigates how material properties impact sensor readings on the MyBot Optical Distance Sensor and Labdisc Light Sensor.

Standards Addressed

NGSS.MS-PS4-2
NGSS.MS-PS4-3
NGSS.HS.PS4-2

Florida Social Studies Standards
SS.6.W.1.3
SS.8.A.1.5
SS.912.A.1.2
SS.912.A.4.5
SS.912.A.6.1
SS.912.W.1.3
SS.912.W.7.9
SS.912.W.9.1

Florida Computer Science Standards
SC.68.CS-CS.1.1
SC.68.CS-CS.2.10
SC.68.CS-CS.2.11
SC.68.CS-CS.2.12
SC.68.CS-CS.2.13
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.4.3
SC.68.CS-CS.4.4
SC.68.CS-CS.6.3
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8
SC.68.CS-PC.3.1

SC.912.CS-CC.1.1
SC.912.CS-CS.2.11
SC.912.CS-CS.2.7
SC.912.CS-CS.2.9
SC.912.CS-CS.4.4
SC.912.CS-CP.3.1
SC.912.CS-PC.3.1
SC.912.CS-PC.3.2

Product Integrations

MyBot by Mimio Fusion
MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)

New York Balance

Grades: 6, 8, 9, 10, 11, 12

Strands: Expressions and Equations, Nature of Science, Ratios and Proportions

In this lesson, students will create a mathematical model that quantitatively explains the relationship between varying mass and distance from the pivot point on a balanced lever. Students will make modifications to their models as they use it to predict the results of various scenarios. This activity is an excellent springboard into many subjects and is appropriate for use in grades 6 to 12.

Standards Addressed

CCSS.MATH.CONTENT.6.EE.A.1
CCSS.MATH.CONTENT.6.RP.A.1
CCSS.MATH.CONTENT.HSS.IC.A.1
CCSS.MATH.PRACTICES: 4
NBSS Science & Engineering Practices: 4

3D Kits Utilized

New York Balance Kit

Plant Chromatography

Grades: 8

Strands: Life Science, Physical Science, Statistics and Probability

In this lesson, students will separate components of a compound using paper chromatography and measure and analyze the movement of the components on the paper. They will also identify the chemical components present in a plant sample.

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.4
NGSS.MS-PS1-2
NGSS.MS-LS1-6

NGSS Science & Engineering Practices:
1, 5, 6, 8

3D Kits Utilized

Chromatography Paper Holder Kit

Temperature Variation between Day and Night

Grades: 6, 7, 8

Strands: Earth's Place in the Universe, Earth's Systems, Computer Science

This activity investigates measuring thermal oscillation and luminosity during a full day. Students will study the temperature and luminosity changes produced during the day and night in a given area by formulating a hypothesis and proceeding to check it using the Globisens Labdisc light and temperature sensors. They must then extrapolate what they know about light and heat to make informed hypotheses about how thermal oscillation varies from location to location around the globe.

Standards Addressed

NGSS.MS-ESS1-3
NGSS.MS-ESS2-1
NGSS Science & Engineering Practices:
1, 2, 3, 4, 7, 8

Florida Computer Science Standards:
SC.68.CS-CS.4.4
SC.68.CS-CS.6.3
SC.68.CS-CP.1.2

3D Kits Utilized

New York Balance Kit

Scale, Speed, and Robots

Grades: 8, 9, 10, 11, 12

Strands: Computer Science, Algebra, Expressions & Equations, Functions, Geometry

Robotics, programming, and geometry come together in this exploration of code conventions, functions, and similar shapes. Create similar rectangles using coordinates on the MimioSTEM Activity Mat and then program your MyBot robot using distance-time calculations to follow the designated paths. Introduce common code conventions by exploring how programmatic variables and equations can create efficient programs. Then, reinforce the similarity of the shapes by noting that the robot's programming need only change its speed variable to adjust to the different scales of shapes. Finally, challenge students with following more-complex paths using the 3D-printed Pantograph Kit – Large to draw shapes in multiple scales simultaneously! (optional)

Standards Addressed

CCSS.MATH.CONTENT.8.EE.C.7
CCSS.MATH.CONTENT.8.F.A.1
CCSS.MATH.CONTENT.8.F.A.3
CCSS.MATH.CONTENT.8.G.A.3
CCSS.MATH.CONTENT.8.G.A.4
CCSS.MATH.CONTENT.HSA.CED.A.4
CCSS.MATH.CONTENT.HSA.REI.B.3
CCSS.MATH.CONTENT.HSG.SRT.A.1

Florida Computer Science Standards
SC.68.CS-CS.1.1
SC.68.CS-CS.2.13
SC.68.CS-CS.2.14
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.6.6

SC.68.CS-PC.2.3
SC.68.CS-PC.2.8

SC.912.CS-PC.2.12
SC.912.CS-PC.2.7

Products Integrated

MyBot by Mimio Fusion
MimioSTEM Activity Mat (optional)
MyStemKits' Pantograph Kit - Large (optional)
Boxlight Interactive Flat Panel (optional)

Tour of Mars

Grades: 6, 7, 8

Strands: Computer Science, Earth's Place in the Universe

Explore the Red Planet with your very own Mars Rover. Students must divvy up unique roles and work together to plan and implement a tour of Mars. As a group, they must analyze surface features and justify both tour locations and a safe landing zone based on Martian topography. Evaluate the features of possible tour sites using an AR Mars model or online research. Finally, program your rover to traverse from your chosen landing zone to a series of locations of interest while avoiding hazardous terrains.

Standards Addressed

NGSS.MS-ESS1-3
Florida Computer Science Standards:
SC.68.CS-CC.1.3 (optional)
SC.68.CS-CS-2.13
SC.68.CS-CS.2.2
SC.68.CS-CS.2.6

SC.68.CS-CS.2.7
SC.68.CS-CS.4.4
SC.68.CS-CS.6.4
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-CP.3.3

SC.68.CS-PC.2.3
SC.68.CS-PC.2.8
SC.68.CS-PC.3.1
SC.68.CS-PC.4.1 (optional)
SC.68.CS-PC.4.5 (optional)
SC.68.CS-PC.4.6 (optional)

Product Integrations

MyBot by Mimio Fusion
ShareSpace Giant Mars Map
Buzz Aldrin's "Welcome to Mars" book (optional)
AstroReality AR Mars Globe (optional)

Bioengineering

Grades: 6, 7, 8

Strands: Life Science, Reading in Science and Technical Subjects, Writing

In this lesson, students will learn:

1. How bioengineering techniques use recombinant DNA to augment the genetic material in one organism with the genetic material from one or more other organisms with the intent of expressing novel gene products in the host organism.
2. General principles behind the technique of bacterial cell transformation with plasmids to augment host cells.
3. About a real-world context for bioengineering: microbe-driven biofuel production from algae.
4. How humans can manipulate living organisms to influence inheritable traits.

Standards Addressed

CCSS.ELA-LITERACY.WHST.6-8.1
CCSS.ELA-LITERACY.WHST.6-8.2
CCSS.ELA-LITERACY.RST.6-8.7
NGSS.MS-LS4-5
NGSS Science & Engineering Practices: 1, 2, 6

3D Kits Utilized

Cell Transformation Kit

DNA Molecule

Grades: 8

Strands: Life Science

In this lesson, students will explore the structure of DNA through the construction of a DNA molecule model.

Standards Addressed

NGSS.MS-LS3-1
NGSS Science & Engineering Practices: 1, 2, 6, 8

3D Kits Utilized

DNA Kit

DNA Mutation Types

Grades: 6, 7, 8, 9, 10, 11, 12

Strands: Life Science

In this lesson, students will explore types of mutations that can occur in DNA. They will relate each type of mutation to potential consequences in gene expression. The teacher will use a DNA model to demonstrate the variety of sequence mutations. Students should be provided an opportunity to work with the model to create the mutations alongside the activity at the discretion of the teacher.

Standards Addressed

NGSS.MS-LS3-1
NGSS Science & Engineering Practices: 4, 6, 7

3D Kits Utilized

DNA Kit

Mendel's Mighty Model

Grades: 6, 7, 8, 9, 10, 11, 12

Strands: Life Science

In this lesson, students demonstrate the law of segregation during meiosis, which states that a pair of alleles for a particular trait separate during cell division. They will then use Mendel's model of inheritance, which can be represented by a Punnett square, to predict the genotype and phenotype of offspring from a particular cross. They will test these predictions by simulating the results of particular crosses.

Standards Addressed

CCSS.MATH.PRACTICES: 1, 2, 4
NGSS.MS-LS3-2
NGSS.HS-LS3-3

NGSS Science & Engineering Practices:
2, 4, 5, 6

3D Kits Utilized

Chromosomes Kit
Punnett Square Dice (Gg) Kit

Phospholipids

Grades: 6, 8, 9, 10, 11, 12

Strands: Life Science

In this lesson, students will explore the structure of the fluid mosaic model of the cell membrane. Specifically, students will examine phospholipids and proteins found within the membrane. The phospholipid models used with this lesson are capable of automatically arranging into a bilayer structure when submerged in water. While this is due to buoyancy and not biochemistry, as with real phospholipids, the overall appearance of the display is relevant. Additional found objects, such as ping pong balls, may be used to represent integral membrane proteins and/or transmembrane proteins. This lesson is primarily an opportunity for observation and discussion of a model.

Standards Addressed

CCSS.MATH.CONTENT.HSA.CED.A.1
CCSS.MATH.PRACTICES:
2, 4, 6

NGSS.HS-PS2-1
NGSS Science & Engineering Practices:
4, 8

3D Kits Utilized

Cell Membrane Kit

Planetary Temperatures

Grades: 8

Strands: Earth and Space Science

In this lesson, students will:

Explore the effect of light and heat on the temperature of an object as the distance from the light source increases.
Model the effect the Sun has on the temperature of the first three planets in our solar system based on their orbital distances.
Explore the impact that a model greenhouse atmosphere will have on the three simulated planets.

Standards Addressed

NGSS.MS-ESS1-3

NGSS Science & Engineering Practices:
1, 2, 5, 6, 8

3D Kits Utilized

Planetary Temperatures Kit

Product Integrations

Labdisc Portable STEM Lab or
SAMLabs Sensors

Sea Floor Topography

Grades: 6, 7, 8, 9, 10, 11, 12

Strands: Earth and Space Science

In this lesson, students collect data, model the process of echo sounding, and create models to determine the shapes of several sea floor models.

Standards Addressed		*3D Kits Utilized*
NGSS.MS-ESS2-3	NGSS Science & Engineering Practices: 2, 4	Ocean Topography Mapping Kit

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Sink or Swim

Grades: 8

Strands: Physical Science

In this lesson, students investigate the concept of density by measuring the mass and volume of Density Cube Models, predicting whether cubes will float or sink in water. The cubes have the same volume, but vary with regard to mass so that, while visually identical, they exhibit very different behavior when placed in water.

Standards Addressed		*3D Kits Utilized*
NGSS.MS-PS-1	NGSS Science & Engineering Practices: 1, 3, 5	Density Cubes Kit

Tessellation Tails: *An Introduction to Codeblocks*

Basic | **Grades: 3-12** | **Subjects: Technology, Engineering, Art, Mathematics**

In this activity, students will analyze and decompose a complex feline tile into its component parts. They will then use that information to create the tile two times, first using traditional modeling techniques and then using Tinkercad Codeblocks. This introduction to code-based 3D modeling serves as a foundation for understanding block-based coding and parametric modeling. It will emphasize the differences between and benefits of each modeling technique.

Product Integrations: Tessellation Tiles Kit

Guiding Standards

MATH.CONTENT.3.MD.C.5	MATH.CONTENT.5.G.A.2	SC.35.CS-PC.2.4	SC.68.CS-CS.2.5	SC.68.CS-PC.2.8
MATH.CONTENT.3.MD.C.6	MATH.CONTENT.5.MD.A.1	SC.35.CS-PC.2.7	SC.68.CS-CS.2.6	MATH.CONTENT.HSG.CO.A.5
MATH.CONTENT.3.MD.C.7	NGSS 3-5-ETS1-1	MATH.CONTENT.6.G.A.1	SC.68.CS-CS.3.1	MATH.CONTENT.HSG.CO.B.6
MATH.CONTENT.3.OA.A.3	SC.35.CS-CS.2.6	MATH.CONTENT.7.G.B.6	SC.68.CS-CS.3.2	MATH.CONTENT.HSG.MG.A.1
MATH.CONTENT.4.MD.A.1	SC.35.CS-CP.2.1	MATH.CONTENT.8.G.A.1	SC.68.CS-CS.6.1	SC.912.CS-CS.2.7
MATH.CONTENT.4.MD.A.2	SC.35.CS-CP.2.2	MATH.CONTENT.8.G.A.2	SC.68.CS-CS.6.6	SC.912.CS-CS.2.9
MATH.CONTENT.4.MD.A.3	SC.35.CS-CP.3.1	SC.68.CS-CS.2.10	SC.68.CS-PC.2.3	SC.912.CS-CS.3.1
MATH.CONTENT.5.G.A.1	SC.35.CS-CP.3.2	SC.68.CS-CS.2.13	SC.68.CS-PC.2.6	SC.912.CS-CS.3.2

Stacking Block Building

Basic | **Grades: 6-8** | **Subjects: Science, Technology, Engineering, Art, Mathematics**

In this activity, students will work from technical drawings to create their own stacking blocks given specific requirements. Students will utilize measuring, tolerances, and calculations to ensure the blocks stack well.

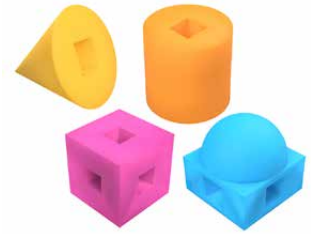
Product Integrations: Stacking Blocks Kit

Guiding Standards

MATH.CONTENT.7.G.A.1	SC.68.CS-CS.3.1	SC.68.CS-CS.6.1	SC.68.CS-PC.2.3	SC.68.CS-PC.2.8
NGSS MS-ETS1-1	SC.68.CS-CS.3.2	SC.68.CS-CS.6.6	SC.68.CS-PC.2.6	

Space Station Modules

Basic | **Grades: 6-8** | **Subjects: Technology, Engineering, Art, Mathematics**



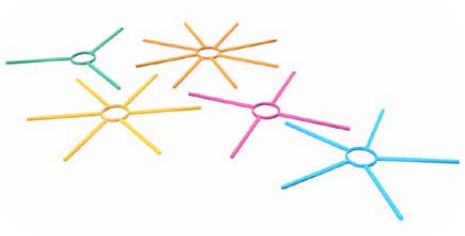
In this activity, students will work from technical explanations to create specific space station modules. Students will utilize their understanding of basic shapes, measuring, tolerances, and calculations to ensure the modules are built to the required specifications. Students will be given a chance to customize their modules once complete by adding exterior designs and patterns.

Product Integrations: Space Station Kit

Guiding Standards

MATH.CONTENT.7.G.A.1	NGSS MS-ETS1-1	SC.68.CS-CS.3.1	SC.68.CS-CS.6.1	SC.68.CS-PC.2.3
MATH.CONTENT.8.G.A.1	NGSS MS-ETS1-4	SC.68.CS-CS.3.2	SC.68.CS-CS.6.6	SC.68.CS-PC.2.6
				SC.68.CS-PC.2.8

Spinner Fractions



Basic | **Grades: 6-12** | **Subjects: Technology, Engineering, Art, Mathematics**

Students will design a useful tool to quickly partition the CD Spinner Kit into equal fractional amounts. Students will be challenged to take measurements and design around the existing kit before creating a fraction disk according to specific instructions. Moreover, students will be challenged to mathematically determine the proper divisions of the CD to simulate the requested fractions.

Product Integrations: CD Spinner Kit or Probability Kit

Guiding Standards

MATH.CONTENT.7.G.A.2
MATH.CONTENT.7.G.B.5
MATH.CONTENT.8.G.A.1
NGSS MS-ETS1-1
SC.68.CS-CS.3.1
SC.68.CS-CS.3.2
SC.68.CS-CS.6.1
SC.68.CS-CS.6.6
SC.68.CS-PC.2.3
SC.68.CS-PC.2.6
SC.68.CS-PC.2.8
MATH.CONTENT.HSG.CO.A.4
MATH.CONTENT.HSG.MG.A.1
MATH.CONTENT.HSG.MG.A.3
SC.912.CS-CS.3.1
SC.912.CS-CS.3.2

Catapult Basket

Basic | **Grades: 6-12** | **Subjects: Science, Technology, Engineering, Art, Mathematics**

Students will add a basket to the end of an existing lever arm to integrate with our Ball Bearing Catapult Kit. Students will utilize their understanding of basic shapes, measuring, and calculations to ensure the catapult basket works with the existing design and projectiles. Students will be given a chance to customize their catapult lever arm once complete by adding designs and patterns.

Product Integrations: Ball Bearing Catapult Kit

Guiding Standards

MATH.CONTENT.7.G.B.6
MATH.CONTENT.8.G.A.1
NGSS MS-ETS1-1
NGSS.MS-ETS1-4
SC.68.CS-CS.3.1
SC.68.CS-CS.3.2
SC.68.CS-CS.6.1
SC.68.CS-CS.6.6
SC.68.CS-PC.2.3
SC.68.CS-PC.2.6
SC.68.CS-PC.2.8
MATH.CONTENT.HSG.MG.A.1
MATH.CONTENT.HSG.MG.A.3
SC.912.CS-CS.3.1
SC.912.CS-CS.3.2

Turbine Design

Basic | **Grades: 6-12** | **Subjects: Science, Technology, Engineering, Art, Mathematics**

In this activity, students will compare a variety of pre-designed wind-turbine blades and then design their own while running a cost-benefit analysis of the different options. Integrating conversations on renewable energy, engineering design, and mathematics, this interdisciplinary activity tackles the challenges of the modern world.

Product Integrations: Wind Farm Kit

Guiding Standards

MATH.CONTENT.6.G.A.1
MATH.CONTENT.7.G.B.4
MATH.CONTENT.7.G.B.6
MATH.CONTENT.7.NS.A.3
MATH.CONTENT.8.G.B.7
NGSS MS-ESS3-3
NGSS MS-ETS1-1
NGSS MS-ETS1-2
NGSS MS-ETS1-3
NGSS.MS-ETS1-4
SC.68.CS-CS.3.1
SC.68.CS-CS.3.2
SC.68.CS-CS.6.1
SC.68.CS-CS.6.6
SC.68.CS-PC.2.3
SC.68.CS-PC.2.6
SC.68.CS-PC.2.8
MATH.CONTENT.HSG.MG.A.1
MATH.CONTENT.HSG.MG.A.3
MATH.CONTENT.HSG.GPE.B.7
NGSS HS-ESS3-2
NGSS HS-ESS3-4
NGSS HS-LS2-7
NGSS HS-ETS1-1
NGSS HS-ETS1-3
SC.912.CS-CS.3.1
SC.912.CS-CS.3.2

Rover Wheels

Intermediate | Grades: 4-12 | Subjects: Science, Technology, Engineering, Art, Mathematics

Students get to design customized 3D-printed wheels to use in conjunction with a mars rover. Students must take accurate measurements and plan a design that will integrate with an axle and print well. Then, students can compare and analyze different wheel designs for speed and ability to traverse a variety of courses.

Product Integrations: Mars Rover Kit and MyBot by Mimio Fusion (optional)

Guiding Standards

MATH.CONTENT.5.MD.C.3	SC.35.CS-CP.3.2	NGSS MS-ETS1-1	SC.68.CS-CS.3.2	SC.68.CS-PC.2.8
NGSS 3-5-ETS1-1	SC.35.CS-PC.2.4	NGSS MS-ETS1-2	SC.68.CS-CS.6.1	MATH.CONTENT.HSG.MG.A.1
NGSS 3-5-ETS1-2	SC.35.CS-PC.2.7	NGSS MS-ETS1-3	SC.68.CS-CS.6.6	MATH.CONTENT.HSG.MG.A.3
NGSS 3-5-ETS1-3	MATH.CONTENT.7.G.B.6	NGSS MS-ETS1-4	SC.68.CS-PC.2.3	SC.912.CS-CS.3.1
SC.35.CS-CP.3.1	MATH.CONTENT.8.G.A.1	SC.68.CS-CS.3.1	SC.68.CS-PC.2.6	SC.912.CS-CS.3.2

Engineering 3D Vertices: Prisms

Intermediate | Grades: 6-8 | Subjects: Science, Technology, Engineering, Art, Mathematics

Students will build an assigned vertex which attaches to straws so it can be used to construct a right regular triangular, pentagonal, hexagonal, or octagonal prism. Students will be challenged to make it fit a real-world object and design for variation in print quality and straw size. Utilization of angles, measurement, and an understanding of 3D space will be instrumental in the construction of the vertex.

Product Integrations: Composing Polyhedrons Kit

Guiding Standards

MATH.CONTENT.7.G.A.2	MATH.CONTENT.8.G.A.1	SC.68.CS-CS.3.1	SC.68.CS-CS.6.1	SC.68.CS-PC.2.3
MATH.CONTENT.7.G.B.5	NGSS MS-ETS1-1	SC.68.CS-CS.3.2	SC.68.CS-CS.6.6	SC.68.CS-PC.2.6
				SC.68.CS-PC.2.8

Driving Gears

Intermediate | Grades: 6-8 | Subjects: Science, Technology, Engineering, Art, Mathematics

Students will expand the Bicycle Gearing Kit by creating drive wheels in additional diameters than have been already provided. They will then have the option of customizing them. Students will be challenged to add some design appeal while reducing print time and plastic cost.

Product Integrations: Bicycle Gearing Kit

Guiding Standards

MATH.CONTENT.7.G.B.6	NGSS MS-ETS1-1	SC.68.CS-CS.3.1	SC.68.CS-CS.6.1	SC.68.CS-PC.2.3
MATH.CONTENT.8.G.A.1	NGSS MS-ETS1-2	SC.68.CS-CS.3.2	SC.68.CS-CS.6.6	SC.68.CS-PC.2.6
	NGSS MS-35S1-4			SC.68.CS-PC.2.8

Coding Custom Clocks - A Codeblocks Activity *(6th Grade)*

Intermediate | **Grades: 6** | **Subjects: Technology, Engineering, Art, Mathematics**

In this Tinkercad Codeblocks Design Challenge, students must rise to the challenge of a client-driven project. They will be provided with a sample of code as they work to design a code-driven clock. They must decode the sample, identify the function of the parts, and reverse-engineer the code to use it for other pieces of the clock. Throughout they'll be challenged with understanding and utilizing code-based logic systems and variables as well as expressing relationships through equations and unit rates as well as meeting the demands of the client (a local 2nd or 3rd grader).

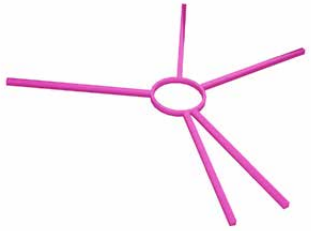
Product Integrations: Time: Analog Clock Kit

Guiding Standards

MATH.CONTENT.6.EE.A.2	NGSS MS-ETS1-2	SC.68.CS-CS.2.14	SC.68.CS-CS.3.2	SC.68.CS-PC.2.3
MATH.CONTENT.6.EE.B.6	SC.68.CS-CS.2.1.1	SC.68.CS-CS.2.5	SC.68.CS-CS.6.1	SC.68.CS-PC.2.6
MATH.CONTENT.6.EE.B.7	SC.68.CS-CS.2.10	SC.68.CS-CS.2.6	SC.68.CS-CS.6.6	SC.68.CS-PC.2.8
MATH.CONTENT.6.NS.C.5	SC.68.CS-CS-2.11	SC.68.CS-CS.2.7	SC.68.CS-CP.3.1	
	SC.68.CS-CS.2.13	SC.68.CS-CS.3.1	SC.68.CS-CP.3.2	

Spinner Probabilities

Intermediate | **Grades: 6-12** | **Subjects: Technology, Engineering, Art, Mathematics**



Students will design a tool to quickly partition the CD Spinner Kit into designated non-equal amounts for uneven probability exercises. Students will be challenged to take measurements and design around the existing kit before creating a probability disk according to specific instructions. Moreover, students will be challenged to mathematically determine the proper divisions of the CD to simulate the requested probability distribution.

Product Integrations: CD Spinner Kit or Probability Kit

Guiding Standards

MATH.CONTENT.7.G.A.2	SC.68.CS-CS.3.1	SC.68.CS-CS.6.6	SC.68.CS-PC.2.8	MATH.CONTENT.HSG.MG.A.3
MATH.CONTENT.8.G.A.1	SC.68.CS-CS.3.2	SC.68.CS-PC.2.3	MATH.CONTENT.HSG.CO.A.4	SC.912.CS-CS.3.1
NGSS MS-ETS1-1	SC.68.CS-CS.6.1	SC.68.CS-PC.2.6	MATH.CONTENT.HSG.MG.A.1	SC.912.CS-CS.3.2

Catapult Lever

Intermediate | **Grades: 6-12** | **Subjects: Science, Technology, Engineering, Art, Mathematics**

Students will design the lever arm to integrate with our Ball Bearing Catapult Kit. Students will utilize their understanding of basic shapes, measuring, tolerances, and calculations to ensure the catapult lever arm works with the existing design, ball bearings, and projectiles. Students will be given a chance to customize their catapult lever arm once complete by adding designs and patterns.

Product Integrations: Ball Bearing Catapult Kit

Guiding Standards

MATH.CONTENT.7.G.B.6	NGSS.MS-ETS1-4	SC.68.CS-CS.6.1	SC.68.CS-PC.2.6	MATH.CONTENT.HSG.MG.A.3
MATH.CONTENT.8.G.A.1	SC.68.CS-CS.3.1	SC.68.CS-CS.6.6	SC.68.CS-PC.2.8	SC.912.CS-CS.3.1
NGSS MS-ETS1-1	SC.68.CS-CS.3.2	SC.68.CS-PC.2.3	MATH.CONTENT.HSG.MG.A.1	SC.912.CS-CS.3.2

3D Derby

Advanced | **Grades: 4-7** | **Subjects: Science, Technology, Engineering, Art, Mathematics**

Students design customized 3D-printed derby racers. Students must take accurate measurements and plan a design that will integrate with an existing set of wheels and ramp, all while ensuring their design will successfully 3D print. This activity can be done with derby tracks or either of the MyStemKits.com Meter Stick Ramp Kits.

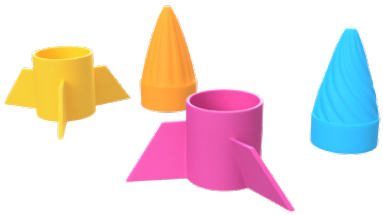
Product Integrations: Thin Meter Stick Ramp Kit or Wide Meter Stick Ramp Kit

Guiding Standards

NGSS 3-5-ETS1-1	SC.35.CS-CP.3.1	MATH.CONTENT.7.G.B.6	NGSS MS-ETS1-4	SC.68.CS-CS.6.6
NGSS 3-5-ETS1-2	SC.35.CS-CP.3.2	NGSS MS-ETS1-1	SC.68.CS-CS.3.1	SC.68.CS-PC.2.3
NGSS 3-5-ETS1-3	SC.35.CS-PC.2.4	NGSS MS-ETS1-2	SC.68.CS-CS.3.2	SC.68.CS-PC.2.6
NGSS 5-PS2-1	SC.35.CS-PC.2.7	NGSS MS-ETS1-3	SC.68.CS-CS.6.1	SC.68.CS-PC.2.8

Houston, We Have an Engineer

Advanced | **Grades: 6-12** | **Subjects: Science, Technology, Engineering, Art, Mathematics**



Become aerospace engineers in this interdisciplinary activity! Students will get a chance to compare various rocket parts and then customize their own creations. Throughout students will utilize and enhance their engineering, geometry, and problem-solving skills as they determine the best way to test and evaluate a series of competing designs.

Product Integrations: Rockets Kit and Clinometer Kit

Guiding Standards

MATH.CONTENT.6.SP.A.3	MATH.CONTENT.8.G.A.1	NGSS MS-ETS1-3	SC.68.CS-PC.2.3	MATH.CONTENT.HSS.ID.A.3
MATH.CONTENT.6.SP.B.4	MATH.CONTENT.8.SP.A.1	NGSS.MS-ETS1-4	SC.68.CS-PC.2.6	MATH.CONTENT.HSS.ID.B.6
MATH.CONTENT.6.SP.B.5	NGSS MS-PS2-2	SC.68.CS-CS.3.1	SC.68.CS-PC.2.8	NGSS HS-PS2-1
MATH.CONTENT.7.G.B.6	NGSS MS-PS3-1	SC.68.CS-CS.3.2	MATH.CONTENT.HSG.MG.A.1	SC.912.CS-CS.3.1
MATH.CONTENT.7.NS.A.3	NGSS MS-ETS1-1	SC.68.CS-CS.6.1	MATH.CONTENT.HSG.MG.A.3	SC.912.CS-CS.3.2
	NGSS MS-ETS1-2	SC.68.CS-CS.6.6	MATH.CONTENT.HSS.ID.A.2	

Ship Design

Advanced | **Grades: 6-12** | **Subjects: Science, Technology, Engineering, Art, Mathematics**

Students engineer a ship with the goal of optimizing the outcome given specific requirements and constraints. Students first must plan and draw their ship and then utilize their understanding of 3D modeling complex shapes and 3D printing to create a ship model which prints and performs well.

Product Integrations: Boats Kit

Guiding Standards

MATH.CONTENT.7.G.B.6	NGSS MS-ETS1-1	SC.68.CS-CS.3.1	SC.68.CS-PC.2.3	MATH.CONTENT.HSG.MG.A.1
MATH.CONTENT.8.G.A.1	NGSS MS-ETS1-2	SC.68.CS-CS.3.2	SC.68.CS-PC.2.6	MATH.CONTENT.HSG.MG.A.3
	NGSS MS-ETS1-3	SC.68.CS-CS.6.1	SC.68.CS-PC.2.8	SC.912.CS-CS.3.1
	NGSS.MS-ETS1-4	SC.68.CS-CS.6.6		SC.912.CS-CS.3.2

Bulldozer Blade

Advanced | **Grades: 6-12** | **Subjects: Science, Technology, Engineering, Art, Mathematics**

Investigate forces and Newton's laws of motion in this open-ended design challenge. Students are tasked with designing and testing an attachment to turn their MyBot by Mimio Fusion into a bulldozer so it can move rocks around with ease. From 3D design to determining how to quantitatively evaluate competing solutions, students will tackle the complexities of real-world engineering. Pair this design challenge with the MyBot activity "Moving Mars Rocks" for an even more in-depth exploration of forces and motion.

Product Integrations: MyBot by Mimio Fusion and Mars Rover Kit (optional)

Guiding Standards

MATH.CONTENT.6.EE.A.2
MATH.CONTENT.6.EE.B.6
MATH.CONTENT.6.EE.B.7
MATH.CONTENT.6.EE.C.9
MATH.CONTENT.6.NS.B.2
MATH.CONTENT.6.NS.B.3
MATH.CONTENT.6.RP.A.1
MATH.CONTENT.6.RP.A.2
MATH.CONTENT.7.EE.B.4
MATH.CONTENT.7.G.B.6
MATH.CONTENT.7.NS.A.3
MATH.CONTENT.7.RP.A.1
MATH.CONTENT.7.RP.A.2
MATH.CONTENT.8.EE.B.5
MATH.CONTENT.8.F.A.1
NGSS MS-PS2-1
NGSS MS-PS2-2
NGSS MS-PS3-1
NGSS MS-ETS1-1
NGSS MS-ETS1-2
NGSS MS-ETS1-3
NGSS.MS-ETS1-4
SC.68.CS-CS.3.1
SC.68.CS-CS.3.2
SC.68.CS-CS.6.1
SC.68.CS-CS.6.6
SC.68.CS-PC.2.3
SC.68.CS-PC.2.6
SC.68.CS-PC.2.8
MATH.CONTENT.HSF.BF.A.1
MATH.CONTENT.HSG.MG.A.1
MATH.CONTENT.HSG.MG.A.3
NGSS HS-PS2-1
NGSS-HS-PS2-2
SC.912.CS-CS.3.1
SC.912.CS-CS.3.2

Ballista Bivariate Data

Grades: 8, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore classroom-generated bivariate data and scatter plots for analyzing ballista projectile flight results. Trend lines will be established for the scatter plots to determine whether linear relationships were present between two variables (force and distance).

Standards Addressed

CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.HSS.ID.B.6

NGSS Science & Engineering Practices:
1, 2, 3, 4, 5, 6, 7, 8

3D Kits Utilized

Ballista/Force Generator Kit
(Virtual Ball Bearing Catapult Kit Compatible)

Ballista Data Set Comparison

Grades: 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will launch projectiles from a small model ballista to generate data. From launches at two or more angles, students will generate projectile distance data that will be analyzed. Students will calculate mean and standard deviation values for each data set in order to conduct a data set comparison within the context of the launch parameters.

Standards Addressed

CCSS.MATH.CONTENT.HSS.ID.A.2

NGSS Science & Engineering Practices:
1, 2, 3, 4, 5, 6, 7, 8

3D Kits Utilized

Ballista/Force Generator Kit
(Virtual Ball Bearing Catapult Kit Compatible)

Baseball Statistics

Grades: 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students are presented with a problem-based learning challenge to showcase their previously-learned statistical skills. Students will use basic measures of center and variability to take opposing positions. This challenge has a baseball theme, but could be adapted for any sport that commonly collects multiple types of data. This is part of the Seventh Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3

CCSS.MATH.PRACTICES: 1, 2, 3, 4, 5, 6, 7
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

N/A

Bean Bag Toss

Grades: 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students are presented with a problem-based learning challenge to showcase their previously-learned statistical skills. Students will use basic measures of center and variability to create a bean bag toss game board that adheres to specific parameters by testing and analyzing the frequencies within samples.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.7.SP.C.7.A
CCSS.MATH.CONTENT.7.SP.C.7.B
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 1, 2, 3, 4, 5, 6, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

N/A

Bivariate and Regression Catapult

Grades: 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will:

- Create bivariate data using a catapult to launch projectiles with a variety of masses
- Analyze results of a data set to discover trends and create regression lines
- Graph data on a scatterplot
- Determine an optimal launch angle and projectile mass for greatest distance

Standards Addressed

CCSS.MATH.CONTENT.HSS.ID.A.2
NGSS Science & Engineering Practices: 1, 2, 3, 4, 5, 6, 7, 8

3D Kits Utilized

Ball Bearing Catapult Kit

Catapults and Data Collection

Grades: 6, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore data collection using a catapult and perform statistical analysis of the data. Students will calculate the mean, median, mode and range, discuss outliers, and graph the data. Students will determine the best statistical number and graph to use for the data.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.HSS.ID.A.3 CCSS.
MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Ball Bearing Catapult Kit

Catapults and Standard Deviation

Grades: 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore data collection using a catapult and perform statistical analysis of the data. Students will compare two sets of data using graphical and numerical representations including standard deviation.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Ball Bearing Catapult Kit

Cold Soda Cups

Grades: 7, 9, 10, 11, 12

Strands: Reading in Science and Technical Subjects, Statistics and Probability

In this lesson, students will collect data with a temperature probe and perform statistical analysis of the data. Students will use a scientific method of inquiry to plan an investigation to determine which soda cup is the best. This activity is meant to allow students to use a variety of skills they have acquired throughout a statistics unit in a problem-based STEM challenge. There are many standards covered in this lesson due to the multiple skills that students will use. This is part of the Seventh Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
CCSS.ELA-LITERACY.RST.6-8.3
CCSS.ELA-LITERACY.RST.11-12.3
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Product Integraions

Labdisc Portable STEM Lab
or
HipScience Sensor Wand
HipScience Temperature Probe

(No 3D Kit Used)

Height Histograms

Grades: 6, 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will discover the usefulness of the histogram when trying to represent heights of students in their class. The lesson will start with gathering data and then progresses through the steps needed to create histograms. Further investigation will show how the distribution of data may or may not change based on the chosen intervals. There is also an opportunity to use stacked histograms to identify any relationships between male and female student height. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 1, 2, 3, 4, 5, 6, 7, 8
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Stacking Blocks Kit

Let's Go to the Mall

Grades: 6, 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will be presented with situations that require them to synthesize the knowledge they have gained over the entire statistics unit. Students will calculate the mean, median, mode, range, MAD, and IQR for the data sets with and without outliers and represent the data in graphical displays. Students will determine the best statistical measure and graph to use for the data based on the distributions and situations they have been given. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.PRACTICES: 1, 2, 3, 4, 5

NGSS Science & Engineering Practices: 2, 4, 5, 8

3D Kits Utilized

N/A

Linear Regression and Volume

Grades: 9, 10, 11, 12

Strands: Statistics and Probability

There is a relationship between linear and non-linear measures of a three-dimensional object. In this lesson, students will use linear regression models to examine the relationships between diagonal length, edge length, surface area, and volume. Students will use 3D-printed volume models to gather measurements and explore relationships. These activities demonstrate that not all relationships are linear, as well as how linear regression and residual plots can be used to show that a relationship is non-linear.

Standards Addressed

CCSS.MATH.CONTENT.HSS.ID.B.6.A-C
CCSS.MATH.PRACTICES: 4

NGSS Science & Engineering Practices: 4, 6

3D Kits Utilized

Density Cubes Kit

Lionfish Sampling Methods

Grades: 7, 9, 10, 11, 12

Strands: Reading in Science and Technical Subjects, Statistics and Probability

In this lesson, students will develop a sampling method to make inferences about the invasive lionfish in the Atlantic Ocean. Students will carry out their investigation, create histograms, and calculate quantitative data like mean absolute deviation to help make conjectures about the lionfish population. Students will then analyze their sampling methodology by repeating the procedure with the population data. This investigation not only allows students the opportunity to simulate and improve their own methodologies, but also provides a current and real-life scientific issue to be examined. This is part of the Seventh Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.IC.A.2
CCSS.MATH.CONTENT.HSS.IC.B.3

CCSS.MATH.PRACTICES: 2, 3, 4, 5
CCSS.ELA-LITERACY.RST.6-8.3
CCSS.ELA-LITERACY.RST.11-12.3
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Lionfish Sampling Kit

Lob the Lionfish!

Grades: 9, 10, 11, 12 **Strands: Statistics and Probability**

Players roll lionfish and earn points for each of the different possible roll positions. In this lesson, students will use data sets to determine whether the point allocation for the game is fair. Students will use 3D-printed lionfish to gather data. These activities facilitate understanding of statistical inference and the law of large numbers.

Standards Addressed

CCSS.MATH.CONTENT.HSS.IC.A.1
CCSS.MATH.CONTENT.HSS.IC.1.2
CCSS.MATH.PRACTICES: 4

NGSS Science & Engineering Practices:
7

3D Kits Utilized

Lionfish Sampling Kit

MAD Statapults

Grades: 7, 9, 10, 11, 12 **Strands: Statistics and Probability**

In this lesson, students will explore data collection using a catapult and perform statistical analysis of the data. Students will compare two sets of data using graphical and numerical representations, including standard deviation. This is part of the Seventh Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

Ball Bearing Catapult Kit

Marshmallow Catapults

Grades: 6, 7, 9, 10, 11, 12 **Strands: Statistics and Probability**

In this lesson, students will be presented with situations that require them to synthesize the knowledge they have gained over the entire statistics unit. Students will calculate the mean, median, mode, range, mean absolute deviation (MAD), and inter quartile range (IQR) for the data sets with and without outliers and represent the data in graphical displays. Students will determine the best statistical measure and graph to use for the data based on the distributions and situations they have been given. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.2
CCSS.MATH.CONTENT.6.SP.A.3
CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices:
2, 3, 4, 5, 8

3D Kits Utilized

Ball Bearing Catapult Kit

Mean and Median Modification

Grades: 6, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore how the mean and median are affected by different data distributions. Students will enhance their knowledge of mean and median as they are challenged to create a variety of distributions with specific criteria. They will also begin to develop an understanding of how these measures can be affected and therefore which measure may be a better statistic to describe the data. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.6.SP.B.5.C
CCSS.MATH.CONTENT.6.SP.B.5.D
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.PRACTICES: 1, 2, 3, 4, 5, 7, 8

3D Kits Utilized

Stacking Blocks Kit

Reaction Time

Grades: 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students gather reaction data using two different procedures to help illustrate the bias that can occur due to human perception. This activity will further help to develop the idea that error is inherent in data collection. Understanding the concept of error in data is fundamental in being able to interpret and begin to understand confidence intervals and reliability in data analysis. This is part of the Seventh Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 1, 2, 3, 4, 5, 6, 7
NGSS Science & Engineering Practices: 1, 3, 4, 5, 8

3D Kits Utilized

N/A

Ruler Rules

Grades: 9, 10, 11, 12

Strands: Number and Quantity

In this lesson, students will measure identical objects with three rulers that each have different levels of precision. Students will then make calculations using those measurements. The precision of the measurement is limited by the measuring instrument. The calculated values should not have greater precision than the original measurements.

Standards Addressed

CCSS.MATH.CONTENT.HSN.Q.A.3
CCSS.MATH.PRACTICES: 6
NGSS Science & Engineering Practices: 8

3D Kits Utilized

Measuring Precision Kit

Product Integrations

MimioView Document Camera

Sampling Lionfish

Grades: 9, 10, 11, 12

Strands: Reading in Science and Technical Subjects, Statistics and Probability

In this lesson, students will develop a sampling method to make inferences about the invasive lionfish in the Atlantic Ocean. Students will carry out their investigation, create histograms, and calculate quantitative data like standard deviation to help make conjectures about the lionfish. Students will then analyze their sampling methodology by repeating the procedure with the population data. This investigation not only allows students the opportunity to simulate and improve their own methodologies but also provides a current and real-life scientific issue to be examined.

Standards Addressed

CCSS.MATH.CONTENT.HSS.IC.A.1
CCSS.MATH.CONTENT.HSS.IC.A.2
CCSS.MATH.CONTENT.HSS.IC.B.3
CCSS.MATH.PRACTICES: 2, 3, 4, 5
CCSS.ELA-LITERACY.RST.11-12.3
NGSS Science & Engineering Practices: 2, 3, 4, 5, 6

3D Kits Utilized

Lionfish Sampling Kit

Sensoring Data

Grades: 6, 7, 8, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore data collection using the Climate Sensor and perform statistical analysis of the data. Students will use a scientific method of inquiry to plan an investigation of their own. This activity is meant to allow students to use a variety of skills they have acquired throughout a statistics unit in a personally meaningful way. The specific standards addressed will vary based on the students' approach to the challenge. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.A.1
CCSS.MATH.CONTENT.6.SP.B.5.A
CCSS.MATH.CONTENT.6.SP.B.5.B
CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.8.SP.A.1
CCSS.MATH.CONTENT.8.SP.A.2
CCSS.MATH.CONTENT.8.SP.A.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.CONTENT.HSS.ID.B.5
CCSS.MATH.CONTENT.HSS.ID.B.6.A
CCSS.MATH.CONTENT.HSS.ID.B.6.B
CCSS.MATH.CONTENT.HSS.ID.B.6.C
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

Product Integrations

Labdisc Portable STEM Lab
or
HipScience Climate Sensor
or
SAMLabs Sensors

(No 3D Kit Used)

Soap Bubbles

Grades: 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore data collection by blowing soap bubbles and performing statistical analysis of the data. Students will compare two sets of data using graphical and numerical representations, including mean absolute deviation. Student will answer the question, "Do different soap brands produce different-sized bubbles?" This is part of the Seventh Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.2
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.7.SP.B.4
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

N/A

Which Bag Is It?

Grades: 7, 9, 10, 11, 12

Strands: Statistics and Probability

In this lesson, students will explore the idea of probability in terms of confidence levels with repeated trials. The use repeated trials will help conceptualize the law of large numbers and its relationship to theoretical and experimental probability. The lesson also uses technology to simulate multiple trials. Students will also interpret the distribution of the trials in dot plots to help make inferential decisions. This is part of the Seventh Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.7.SP.A.1
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.7.SP.C.6
CCSS.MATH.CONTENT.7.SP.C.7.B
CCSS.MATH.CONTENT.HSS.IC.A.2
CCSS.MATH.CONTENT.HSS.IC.B.5
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 3, 4, 5
NGSS Science & Engineering Practices: 1, 2, 4, 5, 6, 8

3D Kits Utilized

N/A

Ballista T-Test

Grades: 9, 10, 11, 12

Strands: Nature of Science, Statistics and Probability

In this lesson, students will explore the relationship of launch force and projectile distance traveled through a series of ballista projectile launches. Data for two sets of launches will be collected. A statistical analysis will be conducted to evaluate the extent to which differences between the group means are statistically significant. Students will use an interactive spreadsheet for analysis.

Standards Addressed

CCSS.MATH.CONTENT.HSS.ID.A.2
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.CONTENT.HSS.ID.B.6
SC.912.N.1.1
NGSS Science & Engineering Practices: 1, 2, 3, 4, 5, 6, 7, 8

3D Kits Utilized

Ballista/Force Generator Kit (Virtual Ball Bearing Catapult Kit Compatible)

Calculating Intercepts

Grades: 8, 9, 10, 11, 12

Strands: Computer Science, Expressions and Equations, Functions, Geometry,

Functions and teamwork are the key in this robotics-integrated activity. You are the pilots on a series of spacecraft travelling through the same quadrant of space. Write functions based on coordinate data to quantify your route and then use it to calculate an intercept point with a nearby spacecraft. Utilize the Pythagorean Theorem or Distance Formula to compare speeds and determine what changes are needed to ensure the two spacecraft intercept at the same moment in time so that you can deliver a vital sensor to their ship. Finally, program your MyBot robots to simulate this out-of-this-world scenario.

Standards Addressed

CCSS.MATH.CONTENT.8.EE.A.2
CCSS.MATH.CONTENT.8.EE.B.5
CCSS.MATH.CONTENT.8.EE.C.7
CCSS.MATH.CONTENT.8.EE.C.8
CCSS.MATH.CONTENT.8.F.A.1
CCSS.MATH.CONTENT.8.F.A.2
CCSS.MATH.CONTENT.8.F.A.3
CCSS.MATH.CONTENT.8.F.B.4
CCSS.MATH.CONTENT.8.G.B.7
CCSS.MATH.CONTENT.8.G.B.8
CCSS.MATH.CONTENT.HSA.CED.A.4
CCSS.MATH.CONTENT.HSA.REI.B.3
CCSS.MATH.CONTENT.HSA.REI.C.6

Florida Computer Science Standards
SC.68.CS-CS.2.13
SC.68.CS-CS.2.2
SC.68.CS-CS.2.6
SC.68.CS-CS.6.6
SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8

SC.912.CS-CS.3.1
SC.912.CS-PC.2.12
SC.912.CS-PC-2.7

Product Integrations

MyBot by Mimio Fusion
Mimio STEM Activity Mat (optional)
MyStemKits Graphing Kit (optional)

Carrying Cargo Model-Eliciting Activity (PBL)

Grades: 9, 10

Strands: Geometry, Engineering Design, Writing

Students will be engaged in a hands-on activity to test the efficiency of various cargo boat designs. In testing, students will collect data using 3D-printed boat models and determine which design is superior in terms of total cargo mass. Students will explore scientific approaches, engineering design, and mathematical applications, namely developing a procedure to select a boat while meeting several constraints. In part 2 of the activity, students will have the opportunity to design their own boat prototype.

Standards Addressed

CCSS.MATH.CONTENT.HSG.MG.A.3
CCSS.ELA-LITERACY.WHST.9-10.4
NGSS.HS-ETS1-3

NGSS Science & Engineering Practices:
2, 4, 8

3D Kits Utilized

Boats Kit

Drone Delivery Distances

Grades: 9, 10, 11, 12

Strands: Computer Science, Geometry, Functions

Deliver with drones in this integrated lesson plan! Calculate optimal delivery routes based on coordinates using the distance formula. Given a list of necessary delivery locations, delivery times, and per-trip weight constraints, identify the series of routes with the shortest flight path overall and then graph your anticipated progress over time. Finally, program your MyBot to follow your complete delivery route on a to-scale map!

Standards Addressed

MATH.CONTENT.HSF.BF.A.1
MATH.CONTENT.HSG.GPE.B.7
Florida Computer Science Standards:
SC.912.CS-CS.3.1
SC.912.CS-CS.2.1
SC.912.CS-CS.2.7
SC.912.CS-CS.6.4
SC.912.CS-PC.2.12
SC.912.CS-PC.2.6
SC.912.CS-PC.2.7

3D Kits Utilized

City Engineering Kit

Product Integrations

MyBot by Mimio Fusion
MimioView Document Camera
MimioSTEM Activity Mat

Lionfish and Histograms

Grades: 6, 7, 9, 10, 11, 12

Strands: Earth and Space Science, Life Science, Statistics and Probability

In this lesson, students will explore longitudinal data on a population of invasive lionfish and the usefulness of histograms to help visualize the changes in lionfish age groups over time. Students will base their information from random samples conducted each year for 5 years. This is part of the Sixth Grade Statistics Unit.

Standards Addressed

CCSS.MATH.CONTENT.6.SP.B.4
CCSS.MATH.CONTENT.7.SP.B.3
CCSS.MATH.CONTENT.HSS.ID.A.1
CCSS.MATH.CONTENT.HSS.ID.A.3
CCSS.MATH.PRACTICES: 2, 4, 5, 7
NGSS.MS-LS2-1
NGSS.MS-LS2-2
NGSS.MS-LS2-4
NGSS.MS-LS2-5
NGSS.MS-ESS3-3
NGSS.HS-LS2-1
NGSS.HS-LS2-2
NGSS.HS-LS2-6
NGSS.HS-LS2-7
NGSS.HS-ESS3-3
NGSS.HS-ESS3-4
NGSS Science & Engineering Practices: 2, 3, 4, 5, 8

3D Kits Utilized

Lionfish Sampling Kit

Meter Stick Cart

Grades: 6, 8, 9, 10, 11, 12

Strands: Algebra, Physical Science

In this lesson, students will qualitatively and quantitatively analyze the motion of a cart undergoing uniform acceleration. Graphs of position and velocity versus time will be created and a function for the velocity graph will be generated suing the data.

Standards Addressed

CCSS.MATH.CONTENT.HSA.CED.A.1
CCSS.MATH.PRACTICES: 2, 4, 6
NGSS.HS-PS2-1
NGSS Science & Engineering Practices: 4, 8

3D Kits Utilized

Thin Meter Stick Ramp Kit or
Wide Meter Stick Ramp Kit

Morse Codebots

Grades: 6, 7, 8 9, 10, 11, 12

Strands: Computer Science, Waves and Electromagnetic Radiation, American/World History

Learn about digital and analog signals as well as the Optical Distance Sensor on your MyBot by building and reading coded messages. Students will learn the history of Morse code and the importance of coded messages in wars and must deliver messages to their peers using their robots. Students will explore reading sensors, utilizing code loops, and evaluate whether digital or analog signals are easier to decode. Then, they'll focus on generating easy-to-understand outputs based on logic by creating a binary output.

This activity is the perfect follow-up to Comparing Sensors: The Distance of Light, which investigates how material properties impact sensor readings on the MyBot Optical Distance Sensor and Labdisc Light Sensor.

Standards Addressed

NGSS.MS-PS4-2
NGSS.MS-PS4-3
NGSS.HS.PS4-2

Florida Social Studies Standards
SS.6.W.1.3
SS.8.A.1.5
SS.912.A.1.2
SS.912.A.4.5
SS.912.A.6.1
SS.912.W.1.3
SS.912.W.7.9
SS.912.W.9.1

Florida Computer Science Standards
SC.68.CS-CS.1.1
SC.68.CS-CS.2.10
SC.68.CS-CS.2.11
SC.68.CS-CS.2.12
SC.68.CS-CS.2.13
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.2.7
SC.68.CS-CS.4.3
SC.68.CS-CS.4.4
SC.68.CS-CS.6.3
SC.68.CS-CS.6.6

SC.68.CS-CP.2.3
SC.68.CS-PC.2.3
SC.68.CS-PC.2.8
SC.68.CS-PC.3.1

SC.912.CS-CC.1.1
SC.912.CS-CS.2.11
SC.912.CS-CS.2.7
SC.912.CS-CS.2.9
SC.912.CS-CS.4.4
SC.912.CS-CP.3.1
SC.912.CS-PC.3.1
SC.912.CS-PC.3.2

Product Integrations

MyBot by Mimio Fusion
MimioSTEM Activity Mat
Boxlight Interactive Flat Panel or Projector (optional)

Moth Natural Selection

Grades: 9, 10, 11, 12

Strands: Life Science, Statistics and Probability

In this lesson, students will explore sampling techniques and how they relate to the whole population and use the data to determine adaptive characteristics of the moths.

Standards Addressed

CCSS.MATH.CONTENT.HSS.IC.A.1
NGSS.HS-4-LS-1
NGSS.HS-4-LS-4

NGSS Science & Engineering Practices:
1, 2, 4, 5, 6, 8

3D Kits Utilized

Moths Kit
Pencil Quadrat Kit

Moth Variation

Grades: 9, 10, 11, 12

Strands: Life Science, Statistics and Probability

In this lesson, students will use dice to simulate natural selection in a moth population, infer environmental conditions that impact natural selection of a given population, and compare and contrast empirical data in a 2-way frequency table.

Standards Addressed

CCSS.MATH.CONTENT.HSS.ID.B.5
NGSS.HS-4-LS-3

NGSS Science & Engineering Practices:
1, 2, 4, 5, 6, 8

3D Kits Utilized

Loaded Dice Kit
Moths Kit

New York Balance

Grades: 6, 8, 9, 10, 11, 12

Strands: Expressions and Equations, Nature of Science, Ratios and Proportions

In this lesson, students will create a mathematical model that quantitatively explains the relationship between varying mass and distance from the pivot point on a balanced lever. Students will make modifications to their models as they use it to predict the results of various scenarios. This activity is an excellent springboard into many subjects and is appropriate for use in grades 6 to 12.

Standards Addressed

CCSS.MATH.CONTENT.6.EE.A.1
CCSS.MATH.CONTENT.6.RP.A.1
CCSS.MATH.CONTENT.HSS.IC.A.1

CCSS.MATH.PRACTICES: 4
NBSS Science & Engineering Practices:
4

3D Kits Utilized

New York Balance Kit

Projectile Motion

Grades: 9, 10, 11, 12

Strands: Algebra, Physical Science

In this lesson, students will build a catapult out of pencils and use the kinematic equations to determine launch velocity, time of flight, and the maximum height attained by a projectile from only two data points. The activity is an excellent reinforcement to the accuracy of the kinematic equations taught in high school physics courses

Standards Addressed

CCSS.MATH.CONTENT.HSA.CED.A.4
CCSS.MATH.PRACTICES: 2, 6
NGSS.HS-PS2-1

NGSS Science & Engineering Practices:
4

3D Kits Utilized

Pencil Catapult Kit
(Virtual Ball Bearing Catapult Kit Compatible)

Ready, Aim Fire!

Grades: 6, 7, 9, 10, 11, 12

Strands: Algebra, Physical Science

In this lesson, students will build a catapult out of pencils and apply the law of conservation of energy to determine the total mechanical energy of the projectile. Students will generate histogram plots of the various forms of energy to emphasize energy conservation.

Standards Addressed

CCSS.MATH.CONTENT.HSA.CED.A.1
CCSS.MATH.PRACTICES: 2, 4, 6
NGSS.MS-PS3.5

NGSS Science & Engineering Practices:
4

3D Kits Utilized

Pencil Catapult Kit
(Virtual Ball Bearing Catapult Kit Compatible)

Scale, Speed, and Robots

Grades: 8, 9, 10, 11, 12

Strands: Computer Science, Algebra, Expressions & Equations, Functions, Geometry

Robotics, programming, and geometry come together in this exploration of code conventions, functions, and similar shapes. Create similar rectangles using coordinates on the MimioSTEM Activity Mat and then program your MyBot robot using distance-time calculations to follow the designated paths. Introduce common code conventions by exploring how programmatic variables and equations can create efficient programs. Then, reinforce the similarity of the shapes by noting that the robot's programming need only change its speed variable to adjust to the different scales of shapes. Finally, challenge students with following more-complex paths using the 3D-printed Pantograph Kit – Large to draw shapes in multiple scales simultaneously! (optional)

Standards Addressed

CCSS.MATH.CONTENT.8.EE.C.7
CCSS.MATH.CONTENT.8.F.A.1
CCSS.MATH.CONTENT.8.F.A.3
CCSS.MATH.CONTENT.8.G.A.3
CCSS.MATH.CONTENT.8.G.A.4
CCSS.MATH.CONTENT.HSA.CED.A.4
CCSS.MATH.CONTENT.HSA.REI.B.3
CCSS.MATH.CONTENT.HSG.SRT.A.1

Florida Computer Science Standards
SC.68.CS-CS.1.1
SC.68.CS-CS.2.13
SC.68.CS-CS.2.14
SC.68.CS-CS.2.5
SC.68.CS-CS.2.6
SC.68.CS-CS.6.6

SC.68.CS-PC.2.3
SC.68.CS-PC.2.8

SC.912.CS-PC.2.12
SC.912.CS-PC.2.7

Products Integrated

MyBot by Mimio Fusion
MimioSTEM Activity Mat (optional)
MyStemKits' Pantograph Kit - Large (optional)
Boxlight Interactive Flat Panel (optional)

Blood Type Compatibility

Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students will use models to refine their understanding of blood type compatibility. The models allow for investigation of a variety of donor-recipient scenarios. Physical characteristics of the models either allow for or prevent one model from fitting within another. By assessing each scenario, students can determine whether blood types are compatible.

Standards Addressed

NGSS.HS-LS1-2

NGSS Science & Engineering Practices: 1, 2, 6

3D Kits Utilized

Blood Type Compatibility Kit

Darwin's Finch Evolution

Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students use observational data and skull measurements for seven of Darwin's finch species to reconstruct the evolution of Darwin's finches from their common ancestor. Students will compare beak measurements to diet and habitat data to explain how these finches evolved to exploit different food types in different geographical locations. They will then examine data showing the effect of a drought on seed availability to explain how natural selection on beak shape can lead to evolution of a finch population.

Standards Addressed

NGSS.HS-LS4-1
NGSS.HS-LS4-2
NGSS.HS-LS4-4

NGSS Science & Engineering Practices: 2, 3, 4, 5, 6, 7

3D Kits Utilized

Darwin's Finches Kit

DNA Mutation Types

Grades: 6, 7, 8, 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students will explore types of mutations that can occur in DNA. They will relate each type of mutation to potential consequences in gene expression. The teacher will use a DNA model to demonstrate the variety of sequence mutations. Students should be provided an opportunity to work with the model to create the mutations alongside the activity at the discretion of the teacher.

Standards Addressed

NGSS.MS-LS3-1

NGSS Science & Engineering Practices: 4, 6, 7

3D Kits Utilized

DNA Kit

DNA Replication

Grades: 9, 10, 11, 12 | **Strands: Life Science**

In this lesson, students will explore the structure of DNA and how this structure plays a significant role in the replication of new DNA molecules. Students will build and replicate a model DNA molecule.

Standards Addressed		*3D Kits Utilized*
NGSS.HS-LS3-1	NGSS Science & Engineering Practices: 1, 2, 6, 8	DNA Kit

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Enzyme Structure and Function

Grades: 6, 7, 8, 9, 10, 11, 12 | **Strands: Life Science**

In this lesson, students will explore how enzymes interact with a variety of binding partners. An enzyme, potential substrates, and/or inhibitors will be manipulated to model how enzymes function through association with other molecules and allow students to speculate on how they can be regulated in vivo.

Standards Addressed		*3D Kits Utilized*
NGSS.HS-LS1-1 NGSS.HS-LS1-2	NGSS Science & Engineering Practices: 2, 6	Enzyme-Substrate Interaction Kit

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Food Web

Grades: 9, 10, 11, 12 | **Strands: Life Science**

In this lesson, students will explore food webs to investigate a central question: why do top predators often rely primarily on very small prey animals if they are capable of capturing much larger prey? Students will assemble or create three different food webs using 3D-printed plants and animals and will periodically revisit the central question as they proceed through the lesson. This lesson will introduce students to concepts surrounding food web relationships and energy transfer across trophic levels.

Standards Addressed	*3D Kits Utilized*
NGSS.HS-LS2-4	Food Web: Forest Kit

Genetic Mutations

Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students will first learn about DNA-level mutations and how such mutations can result in changes to a resulting protein by observing a change in an amino acid sequence. They will also explore how these changes in protein structure may result in consequences at the cellular level. Information about the protein, as well as its polypeptide and underlying DNA sequences, can be accessed through a public database for reference or further exploration by the teacher or students.

Standards Addressed

NGSS.HS-LS1-1
NGSS.HS-LS3-2

NGSS Science & Engineering Practices:
1, 6

3D Kits Utilized

DNA Kit
Sickle Cell Kit

Hominin Evolution

Grades: 6, 7, 8, 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students will explore trends in the evolutionary history of hominins, including the evolution of bipedalism, brain size, jaw size, and tool use. Acting as paleontologists, they will examine specimens (skull models and artifacts) and place human ancestors in the correct evolutionary sequence. They will then analyze data about the specimens to best explain the evolution of humans from the common ancestors we share with chimpanzees.

Standards Addressed

NGSS.MS-LS3-1

NGSS Science & Engineering Practices:
4, 6, 7

3D Kits Utilized

Hominid Species and Tools Kit

Human Brain in 3D

Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students will explore the major structural regions of the human brain and associate them with particular behaviors or functions.

Standards Addressed

CCSS.MATH.PRACTICES: 2, 4, 5
NGSS.HS-LS4-1
NGSS.HS-LS4-5

NGSS Science & Engineering Practices:
2, 3, 4, 6, 7

3D Kits Utilized

Brain Anatomy Kit

Product Integrations

MimioView Document Camera

Measuring Biodiversity

Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students use different metrics to quantify plant biodiversity at multiple locations on their school grounds. After calculating these metrics, which require using mathematical formulas and graphing data, students will hypothesize about their observed trends in biodiversity. Finally, students will apply these methods to an online data set to assess the diversity of plant communities around the world, compare the diversity measures of different locations, and create hypotheses that explain observed patterns of biodiversity.

Standards Addressed

NGSS.HS-LS2-2

NGSS Science & Engineering Practices:
1, 2, 3, 4, 5, 6, 7, 8

3D Kits Utilized

Meter Stick Quadrat Kit

Mendel's Mighty Model

Grades: 6, 7, 8, 9, 10, 11, 12

Strands: Life Science

In this lesson, students demonstrate the law of segregation during meiosis, which states that a pair of alleles for a particular trait separate during cell division. They will then use Mendel's model of inheritance, which can be represented by a Punnett square, to predict the genotype and phenotype of offspring from a particular cross. They will test these predictions by simulating the results of particular crosses.

Standards Addressed

CCSS.MATH.PRACTICES: 1, 2, 4
NGSS.MS-LS3-2
NGSS.HS-LS3-3

NGSS Science & Engineering Practices:
2, 4, 5, 6

3D Kits Utilized

Chromosomes Kit
Punnett Square Dice (Gg) Kit

Moth Selection

Grades: 7, 9, 10, 11, 12

Strands: Life Science

In this lesson, students will explore sampling techniques and will collect data to examine adaptive characteristics of the moths.

Standards Addressed

CCSS.MATH.PRACTICES: 1, 2, 4
NGSS.MS-LS3-2
NGSS.HS-LS3-3

NGSS Science & Engineering Practices:
2, 4, 5, 6

3D Kits Utilized

Moths Kit
Pencil Quadrat Kit

Phospholipids

Grades: 6, 8, 9, 10, 11, 12

Strands: Life Science

In this lesson, students will explore the structure of the fluid mosaic model of the cell membrane. Specifically, students will examine phospholipids and proteins found within the membrane. The phospholipid models used with this lesson are capable of automatically arranging into a bilayer structure when submerged in water. While this is due to buoyancy and not biochemistry, as with real phospholipids, the overall appearance of the display is relevant. Additional found objects, such as ping pong balls, may be used to represent integral membrane proteins and/or transmembrane proteins. This lesson is primarily an opportunity for observation and discussion of a model.

Standards Addressed

CCSS.MATH.CONTENT.HSA.CED.A.1
CCSS.MATH.PRACTICES:
2, 4, 6

NGSS.HS-PS2-1
NGSS Science & Engineering Practices:
4, 8

3D Kits Utilized

Cell Membrane Kit

Protein Folding

Grades: 9, 10, 11, 12

Strands: Life Science

Students use a 3D-printed model and then a classroom dramatic-play activity to visualize how polypeptides fold through interactions between the side chains of amino acids.

Standards Addressed

NGSS.HS-LS1-1
NGSS.HS-LS1-6

NGSS Science & Engineering Practices:
1, 2, 6

3D Kits Utilized

Macromolecules: Proteins Kit

Protein Synthesis (Cytochrome C Protein)

Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students will learn about the biochemical components and processes required to produce a protein, starting with the nucleotides in a DNA molecule. Both the DNA and protein produced in this lesson have a real-world counterpart: Human Cytochrome C. This mitochondrial protein, involved in the electron transport chain, has been found to be highly conserved across many different species. Understanding the sequence of this protein as it appears in different organisms has been found to be helpful in evolutionary studies.

Standards Addressed

NGSS.HS-LS1-1

NGSS Science & Engineering Practices: 1, 2, 6, 8

3D Kits Utilized

DNA Kit

Protein Synthesis (Sickle-Cell Protein)

Grades: 9, 10, 11, 12 **Strands: Life Science**

Proteins are amazing molecules! But where do proteins come from? In this activity, we will review the process of protein synthesis that includes transcription of DNA and translation into a peptide. Let's start with DNA, the genetic material in the cell's nucleus. Each gene contains a specific sequence of nucleotides. This sequence of nucleotides gives the instructions for the specific sequence of amino acids that will be joined together to form a protein. The sequence of amino acids in the protein determines the structure and function of the protein.

Standards Addressed

NGSS.HS-LS1-1
NGSS.HS-LS1-2

NGSS Science & Engineering Practices: 1, 2, 6

3D Kits Utilized

DNA Kit

Sea Floor Topography

Grades: 6, 7, 8, 9, 10, 11, 12 **Strands: Earth and Space Science**

In this lesson, students collect data, model the process of echo sounding, and create models to determine the shapes of several sea floor models.

Standards Addressed

NGSS.MS-ESS2-3

NGSS Science & Engineering Practices: 2, 4

3D Kits Utilized

Ocean Topography Mapping Kit

Sickle Cell Hemoglobin

Grades: 9, 10, 11, 12 **Strands: Life Science**

Different versions of the same gene are called alleles. Different alleles share the same general sequence of nucleotides, but they differ in at least one nucleotide in the sequence. Sickle cell disease results from a single nucleotide mutation in a hemoglobin gene, leading to an altered protein sequence and a different three-dimensional shape.

Standards Addressed

NGSS.HS-LS1-1
NGSS-HS-LS3-1

NGSS Science & Engineering Practices: 1, 2, 6

3D Kits Utilized

Sickle Cell Kit
DNA Kit (optional)

Patterns of Inheritance: Will My Child Inherit a Genetic Disorder?

Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students explore the transmission of genetic disease across generations and learn about Mendelian inheritance patterns. Students are introduced to the medical genetics unit storyline in this lesson: the student assumes the role of graduate student in a genetic counseling training program and interacts with an extended family in a clinical setting. In Lesson 1, the student meets the family's central character, Billy Jones, and completes a family pedigree and genetic counseling report to determine his risk of passing on a familial disease, Duchenne Muscular Dystrophy (DMD), to his future child. Students also complete a role play and model family pedigree using a 3D-printed kit as part of this lesson.

Standards Addressed

NGSS.HS-LS3-1
NGSS.HS-LS3-2
NGSS.HS-LS3-3

NGSS Science & Engineering Practices:
1, 2, 5, 6, 7, 8

3D Kits Utilized

Pedigree Tree Kit

Mendelian Genetics: Blood Type Inheritance

Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students connect the process of meiosis to Punnett squares and Mendelian inheritance patterns. In our storyline, the genetic counseling student helps alleviate the concerns of Billy Jones's pregnant wife regarding Rh-factor blood type compatibility with her infant. Rh-factor is one of the few traits in humans known to follow a simple, single gene, dominant versus recessive Mendelian inheritance pattern. As such, clinicians are able to make accurate predictions about Rh-factor inheritance using Mendel's simple models, making it an ideal clinical example to use to demonstrate Mendel's principles in the classroom. Students use Rh-factor blood type as an example to learn about Mendelian genetics in this medical case study lesson. Students also investigate concepts by modeling with 3D-printed chromosomes and Punnett square dice.

Standards Addressed

NGSS.HS-LS3-2

NGSS Science & Engineering Practices:
1, 2, 5, 6, 7, 8

3D Kits Utilized

Chromosomes Kit
Punnett Square Dice Kit

Genetic Variation in Related Individuals: Identical Cousins?

Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, we learn how genetic variation occurs through random assortment and independent segregation of chromosomes, both fundamental principles of meiosis. We are introduced to Billy Jones's sisters, a pair of identical twins who have recently married and are now expecting children with another set of identical twins! The genetic counseling graduate student protagonist must investigate how genetic variation occurs even in the children of identical twins and answer the question: could the children of two sets of identical twins be "identical cousins"? Students model chromosomes and karyotypes with 3D-printed kits and complete mathematical calculations of relatedness, among other activities.

Standards Addressed

NGSS.HS-LS3-1
NGSS.HS-LS3-2
NGSS.HS-LS3-3

NGSS Science & Engineering Practices:
1, 2, 3, 4, 5, 6, 7

3D Kits Utilized

Karyotypes Kit
Chromosomes Kit

Epigenetic Control of Identity: Are Identical Twins Always Identical?


Grades: 9, 10, 11, 12 **Strands: Life Science**

Gene expression is how our genetic information is transcribed and translated into who we are and what we do. We each have a combination of chromosomes contributed by our parents, each with allelic versions of their gene set. In order for all the DNA of these parent cells to fit into the nucleus of a zygote, there is highly ordered manner in which the DNA is packaged that includes a protein-DNA complex called chromatin. In this lesson, students will model chromatin formation with 3D-printed materials and visualize the scale of DNA compactions. Epigenetic factors such as diet, stresses, and pollutants can change how our DNA functions by controlling accessibility to genes. In this way, identical twins that are born with identical genomes often look and behave differently over their lifespan. Much of this can be accounted for in their epigenomes. In the unit storyline, the genetic counseling student is prompted to investigate these concepts after meeting Billy Jones's identical twin sisters.

Standards Addressed

NGSS.HS-LS3-2

NGSS Science & Engineering Practices: 1, 2, 5, 6, 7, 8

3D Kits Utilized

Chromatin Kit

A Case Study in Chromosomal Disorders


Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students investigate a case study during which they diagnose a case of aneuploidy in the newborn infant of one of Billy Jones' sisters. Students learn about specific types of chromosomal disorders and how they occur, and then diagnose healthy versus abnormal karyotypes using a 3D-printed karyotype model.

Standards Addressed

NGSS.HS-LS3-1
NGSS.HS-LS3-2

NGSS Science & Engineering Practices: 1, 2, 3, 6, 7, 8

3D Kits Utilized

Karyotypes Kit
Karyotypes Kit: Aneuploidy Expansion

DNA Structure and Replication: Cell Division in a Rapidly-Growing Fetus


Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, our genetic counseling graduate student helps a patient, one of Billy Jones' sisters, better understand DNA replication as related to her developing fetus. When an organism grows and develops, its cellular genetic material must be replicated as cells divide. Deoxyribonucleic acid, DNA, composes the genetic material and forms a stable double helix that contains the individual genes that make us all unique. The process of DNA replication is modeled in this lesson using a 3D-printed kit of the molecular components of DNA. Students will assemble nucleotides, the building blocks of DNA, and link them to form a strand of DNA. Following the rules of DNA replication, a complementary strand will be assembled from other nucleotides and associated with the original strand to demonstrate a DNA double helix.

Standards Addressed

NGSS.HS-LS3-1

NGSS Science & Engineering Practices: 1, 2, 4, 6, 8

3D Kits Utilized

DNA Kit

Protein Synthesis and DNA Mutation: Sickle Cell Hemoglobin


Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students explore the key concept of protein synthesis and the pathway from DNA to RNA to protein within the cell. Students use the example of sickle cell disease as a framework to investigate how protein is synthesized and the potential consequences of mutations in the genetic code. The storyline in this lesson focuses on Billy Jones seeking help from the protagonist in the unit, a genetic counseling student, for his brother, Amaud, who is suffering from sickle cell disease. Students complete a guided reading, model the structure of normal hemoglobin molecules and molecules carrying the sickle cell mutation, and model a hemoglobin B gene as it is transcribed into RNA and finally into a hemoglobin peptide. The lessons ends with the students evaluating a potential new cure for Amaud.

Standards Addressed

NGSS.HS-LS1-1
NGSS.HS-LS3-1
NGSS.HS-LS3-2

NGSS Science & Engineering Practices:
1, 2, 5, 6, 7, 8

3D Kits Utilized

DNA Kit
Sickle Cell Kit

The Role of the Ribosome: Antibiotic Defense against Infection


Grades: 9, 10, 11, 12 **Strands: Life Science**

In this lesson, students closely examine the ribosome complex. All living cells contain ribosomes and they are at the heart of a cell's ability to translate a DNA sequence to RNA and then to a protein molecule. The ribosome provides a workbench to hold the players in place (mRNA, tRNA, and a growing peptide) and the chemical environment to allow peptide synthesis to occur. While the ribosome was mentioned in discussion of protein synthesis covered in Lesson 7, students explore this topic in much greater depth in this lesson. The storyline continues with Billy Jones's great uncle visiting and subsequently receiving a diagnosis of tuberculosis, a serious respiratory disease typically treated with antibiotics. Students model a ribosome structure and investigate how antibiotics interact with the ribosome to cure bacterial infection.

Standards Addressed

NGSS.HS-LS3-1

NGSS Science & Engineering Practices:
1, 2, 6, 7, 8

3D Kits Utilized

Ribosome Kit

Biotechnology and Ethics: Editing Genes with CRISPR


Grades: 9, 10, 11, 12 **Strands: Engineering Design**

This lesson finds our genetic counseling graduate student preparing for a prestigious internship supporting patients in some of the first human clinical trials testing the gene editing technology CRISPR-Cas9. As the extended case study draws to a close, students learn about the remarkable potential of CRISPR technology and explore bioethical considerations through a close reading, 3D modeling, debate, and writing.

Standards Addressed

NGSS.HS-ETS1-3

NGSS Science & Engineering Practices:
1, 2, 6, 7, 8

3D Kits Utilized

DNA Kit

Biological Macromolecules

Grades: 9, 10, 11, 12 | **Strands: Life Science, Physical Science**

This is the first in a series of five connected lessons from MyStemKits. This initial lesson presents the concept of polymers, both biological and synthetic. The other four lessons address the four categories of biological macromolecules: carbohydrates, lipids, proteins, and nucleic acids. It is not necessary to present the series in any specific order. However, it is anticipated that this lesson proceeds any of the others.
Your students will explore the general concept of building blocks, monomers, and polymers as a way to understand the process of polymerization in this introductory lesson. Students will be able to relate the breakdown of food molecules into building blocks to be reassembled into biological macromolecules.

Standards Addressed

NGSS.HS-LS1-6 NGSS.HS-PS2-6

3D Kits Utilized

N/A

Macromolecules: Carbohydrates

Grades: 9, 10, 11, 12 | **Strands: Life Science, Physical Science**

In this lesson, students investigate a case study during which they diagnose a case of aneuploidy in the newborn infant of one of Billy Jones' sisters. Students learn about specific types of chromosomal disorders and how they occur, and then diagnose healthy versus abnormal karyotypes using a 3D-printed karyotype model.

Standards Addressed

NGSS.HS-LS1-6 NGSS.HS-PS2-6

3D Kits Utilized

Macromolecules: Carbohydrates Kit Glucose Isomer Kit

Macromolecules: Lipids

Grades: 9, 10, 11, 12 | **Strands: Life Science, Physical Science**

Lipids are one of four categories of biological macromolecules, essential polymers assembled from their respective monomeric building blocks. In this activity, students will assemble models of lipids using fatty acids, the building blocks of lipids, and understand their vital function in health and in biology.

Standards Addressed

NGSS.HS-LS1-6 NGSS.HS-PS2-6

3D Kits Utilized

Macromolecules: Lipids Kit

Macromolecules: Proteins

Grades: 9, 10, 11, 12 | **Strands: Life Science, Physical Science**

Proteins are the workhorses of the cell because of the number of cellular processes in which they are involved. The diversity of protein structures accounts for the diversity of protein functions. In this activity, students will assemble a three-dimensional model of a protein from amino acids, the building blocks of proteins. We will explore how proper folding and misfolding can influence the function of crucial proteins.

Standards Addressed

NGSS.HS-LS1-6 NGSS.HS-PS2-6

3D Kits Utilized

Macromolecules: Proteins Kit

Macromolecules: Nucleic Acids

Grades: 9, 10, 11, 12

Strands: Life Science, Physical Science

Nucleic acid metabolism is a complex process involving de novo synthesis and recycling of nucleotides to make DNA and RNA, the two nucleic acids we are concerned with here. This lesson provides students an opportunity to understand how nucleotides are assembled from the three components—a nitrogenous base, a phosphate group, and a five-carbon sugar—and ultimately form their final nucleic acid structure.

Standards Addressed

NGSS.HS-LS1-6

NGSS.HS-PS2-6

3D Kits Utilized

Macromolecules: Nucleotides Kit

Tessellation Tails:
An Introduction to Codeblocks

Basic | **Grades: 3-12** | **Subjects: Technology, Engineering, Art, Mathematics**

In this activity, students will analyze and decompose a complex feline tile into its component parts. They will then use that information to create the tile two times, first using traditional modeling techniques and then using Tinkercad Codeblocks. This introduction to code-based 3D modeling serves as a foundation for understanding block-based coding and parametric modeling. It will emphasize the differences between and benefits of each modeling technique.

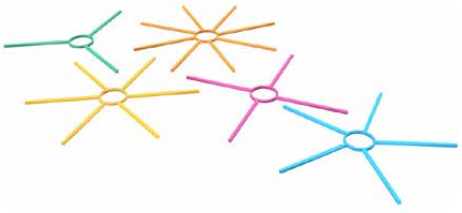
Product Integrations: Tessellation Tiles Kit

Guiding Standards

MATH.CONTENT.3.MD.C.5	MATH.CONTENT.5.G.A.2	SC.35.CS-PC.2.4	SC.68.CS-CS.2.5	SC.68.CS-PC.2.8
MATH.CONTENT.3.MD.C.6	MATH.CONTENT.5.MD.A.1	SC.35.CS-PC.2.7	SC.68.CS-CS.2.6	MATH.CONTENT.HSG.CO.A.5
MATH.CONTENT.3.MD.C.7	NGSS 3-5-ETS1-1	MATH.CONTENT.6.G.A.1	SC.68.CS-CS.3.1	MATH.CONTENT.HSG.CO.B.6
MATH.CONTENT.3.OA.A.3	SC.35.CS-CS.2.6	MATH.CONTENT.7.G.B.6	SC.68.CS-CS.3.2	MATH.CONTENT.HSG.MG.A.1
MATH.CONTENT.4.MD.A.1	SC.35.CS-CP.2.1	MATH.CONTENT.8.G.A.1	SC.68.CS-CS.6.1	SC.912.CS-CS.2.7
MATH.CONTENT.4.MD.A.2	SC.35.CS-CP.2.2	MATH.CONTENT.8.G.A.2	SC.68.CS-CS.6.6	SC.912.CS-CS.2.9
MATH.CONTENT.4.MD.A.3	SC.35.CS-CP.3.1	SC.68.CS-CS.2.10	SC.68.CS-PC.2.3	SC.912.CS-CS.3.1
MATH.CONTENT.5.G.A.1	SC.35.CS-CP.3.2	SC.68.CS-CS.2.13	SC.68.CS-PC.2.6	SC.912.CS-CS.3.2

Spinner Fractions

Basic | **Grades: 6-12** | **Subjects: Technology, Engineering, Art, Mathematics**



Students will design a useful tool to quickly partition the CD Spinner Kit into equal fractional amounts. Students will be challenged to take measurements and design around the existing kit before creating a fraction disk according to specific instructions. Moreover, students will be challenged to mathematically determine the proper divisions of the CD to simulate the requested fractions.

Product Integrations: CD Spinner Kit or Probability Kit

Guiding Standards

MATH.CONTENT.7.G.A.2	NGSS MS-ETS1-1	SC.68.CS-CS.6.6	MATH.CONTENT.HSG.CO.A.4	SC.912.CS-CS.3.1
MATH.CONTENT.7.G.B.5	SC.68.CS-CS.3.1	SC.68.CS-PC.2.3	MATH.CONTENT.HSG.MG.A.1	SC.912.CS-CS.3.2
MATH.CONTENT.8.G.A.1	SC.68.CS-CS.3.2	SC.68.CS-PC.2.6	MATH.CONTENT.HSG.MG.A.3	
	SC.68.CS-CS.6.1	SC.68.CS-PC.2.8		

Catapult Basket

Basic | Grades: 6-12 | Subjects: Science, Technology, Engineering, Art, Mathematics

Students will add a basket to the end of an existing lever arm to integrate with our Ball Bearing Catapult Kit. Students will utilize their understanding of basic shapes, measuring, and calculations to ensure the catapult basket works with the existing design and projectiles. Students will be given a chance to customize their catapult lever arm once complete by adding designs and patterns.

Product Integrations: Ball Bearing Catapult Kit

Guiding Standards

MATH.CONTENT.7.G.B.6	NGSS.MS-ETS1-4	SC.68.CS-CS.6.1	SC.68.CS-PC.2.6	MATH.CONTENT.HSG.MG.A.3
MATH.CONTENT.8.G.A.1	SC.68.CS-CS.3.1	SC.68.CS-CS.6.6	SC.68.CS-PC.2.8	SC.912.CS-CS.3.1
NGSS MS-ETS1-1	SC.68.CS-CS.3.2	SC.68.CS-PC.2.3	MATH.CONTENT.HSG.MG.A.1	SC.912.CS-CS.3.2

Turbine Design

Basic | Grades: 6-12 | Subjects: Science, Technology, Engineering, Art, Mathematics

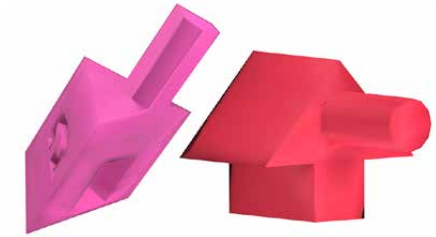
In this activity, students will compare a variety of pre-designed wind-turbine blades and then design their own while running a cost-benefit analysis of the different options. Integrating conversations on renewable energy, engineering design, and mathematics, this interdisciplinary activity tackles the challenges of the modern world.

Product Integrations: Wind Farm Kit

Guiding Standards

MATH.CONTENT.6.G.A.1	NGSS MS-ESS3-3	SC.68.CS-CS.3.2	MATH.CONTENT.HSG.MG.A.1	NGSS HS-ETS1-1
MATH.CONTENT.7.G.B.4	NGSS MS-ETS1-1	SC.68.CS-CS.6.1	MATH.CONTENT.HSG.MG.A.3	NGSS HS-ETS1-3
MATH.CONTENT.7.G.B.6	NGSS MS-ETS1-2	SC.68.CS-CS.6.6	MATH.CONTENT.HSG.GPE.B.7	SC.912.CS-CS.3.1
MATH.CONTENT.7.NS.A.3	NGSS MS-ETS1-3	SC.68.CS-PC.2.3	NGSS HS-ESS3-2	SC.912.CS-CS.3.2
MATH.CONTENT.8.G.B.7	NGSS.MS-ETS1-4	SC.68.CS-PC.2.6	NGSS HS-ESS3-4	
	SC.68.CS-CS.3.1	SC.68.CS-PC.2.8	NGSS HS-LS2-7	

Missing Molecules



Basic | Grades: 9-12 | Subjects: Science, Technology, Engineering, Art, Mathematics

Using only photographs and a portion of the Enzyme-Substrate Interaction Kit, students will be asked to recreate Molecules B and C. They will have to pay attention to detail, take precise measurements, and account for tolerances so that the pieces will work with the rest of the kit.

Product Integrations: Enzyme-Substrate Interaction Kit

Guiding Standards

MATH.CONTENT.HSG.MG.A.1	MATH.CONTENT.HSG.MG.A.3	SC.912.CS-CS.3.1	SC.912.CS-CS.3.2

Rover Wheels

Intermediate | Grades: 4-12 | Subjects: Science, Technology, Engineering, Art, Mathematics

Students get to design customized 3D-printed wheels to use in conjunction with a mars rover. Students must take accurate measurements and plan a design that will integrate with an axle and print well. Then, students can compare and analyze different wheel designs for speed and ability to traverse a variety of courses.

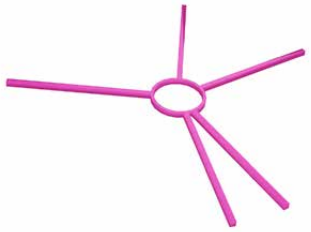
Product Integrations: Mars Rover Kit and MyBot by Mimio Fusion (optional)

Guiding Standards

MATH.CONTENT.5.MD.C.3	SC.35.CS-CP.3.2	NGSS MS-ETS1-1	SC.68.CS-CS.3.2	SC.68.CS-PC.2.8
NGSS 3-5-ETS1-1	SC.35.CS-PC.2.4	NGSS MS-ETS1-2	SC.68.CS-CS.6.1	MATH.CONTENT.HSG.MG.A.1
NGSS 3-5-ETS1-2	SC.35.CS-PC.2.7	NGSS MS-ETS1-3	SC.68.CS-CS.6.6	MATH.CONTENT.HSG.MG.A.3
NGSS 3-5-ETS1-3	MATH.CONTENT.7.G.B.6	NGSS MS-ETS1-4	SC.68.CS-PC.2.3	SC.912.CS-CS.3.1
SC.35.CS-CP.3.1	MATH.CONTENT.8.G.A.1	SC.68.CS-CS.3.1	SC.68.CS-PC.2.6	SC.912.CS-CS.3.2

Spinner Probabilities

Intermediate | Grades: 6-12 | Subjects: Technology, Engineering, Art, Mathematics



Students will design a tool to quickly partition the CD Spinner Kit into designated non-equal amounts for uneven probability exercises. Students will be challenged to take measurements and design around the existing kit before creating a probability disk according to specific instructions. Moreover, students will be challenged to mathematically determine the proper divisions of the CD to simulate the requested probability distribution.

Product Integrations: CD Spinner Kit or Probability Kit

Guiding Standards

MATH.CONTENT.7.G.A.2	SC.68.CS-CS.3.1	SC.68.CS-CS.6.6	SC.68.CS-PC.2.8	MATH.CONTENT.HSG.MG.A.3
MATH.CONTENT.8.G.A.1	SC.68.CS-CS.3.2	SC.68.CS-PC.2.3	MATH.CONTENT.HSG.CO.A.4	SC.912.CS-CS.3.1
NGSS MS-ETS1-1	SC.68.CS-CS.6.1	SC.68.CS-PC.2.6	MATH.CONTENT.HSG.MG.A.1	SC.912.CS-CS.3.2

Catapult Lever

Intermediate | Grades: 6-12 | Subjects: Science, Technology, Engineering, Art, Mathematics

Students will design the lever arm to integrate with our Ball Bearing Catapult Kit. Students will utilize their understanding of basic shapes, measuring, tolerances, and calculations to ensure the catapult lever arm works with the existing design, ball bearings, and projectiles. Students will be given a chance to customize their catapult lever arm once complete by adding designs and patterns.

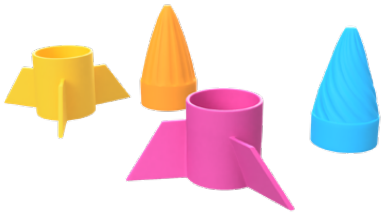
Product Integrations: Ball Bearing Catapult Kit

Guiding Standards

MATH.CONTENT.7.G.B.6	NGSS.MS-ETS1-4	SC.68.CS-CS.6.1	SC.68.CS-PC.2.6	MATH.CONTENT.HSG.MG.A.3
MATH.CONTENT.8.G.A.1	SC.68.CS-CS.3.1	SC.68.CS-CS.6.6	SC.68.CS-PC.2.8	SC.912.CS-CS.3.1
NGSS MS-ETS1-1	SC.68.CS-CS.3.2	SC.68.CS-PC.2.3	MATH.CONTENT.HSG.MG.A.1	SC.912.CS-CS.3.2

Houston, We Have an Engineer

Advanced | **Grades: 6-12** | **Subjects: Science, Technology, Engineering, Art, Mathematics**



Become aerospace engineers in this interdisciplinary activity! Students will get a chance to compare various rocket parts and then customize their own creations. Throughout students will utilize and enhance their engineering, geometry, and problem-solving skills as they determine the best way to test and evaluate a series of competing designs.

Product Integrations: Rockets Kit and Clinometer Kit

Guiding Standards

MATH.CONTENT.6.SP.A.3
MATH.CONTENT.6.SP.B.4
MATH.CONTENT.6.SP.B.5
MATH.CONTENT.7.G.B.6
MATH.CONTENT.7.NS.A.3
MATH.CONTENT.8.G.A.1
MATH.CONTENT.8.SP.A.1
NGSS MS-PS2-2
NGSS MS-PS3-1
NGSS MS-ETS1-1
NGSS MS-ETS1-2
NGSS MS-ETS1-3
NGSS.MS-ETS1-4
SC.68.CS-CS.3.1
SC.68.CS-CS.3.2
SC.68.CS-CS.6.1
SC.68.CS-CS.6.6
SC.68.CS-PC.2.3
SC.68.CS-PC.2.6
SC.68.CS-PC.2.8
MATH.CONTENT.HSG.MG.A.1
MATH.CONTENT.HSG.MG.A.3
MATH.CONTENT.HSS.ID.A.2
MATH.CONTENT.HSS.ID.A.3
MATH.CONTENT.HSS.ID.B.6
NGSS HS-PS2-1
SC.912.CS-CS.3.1
SC.912.CS-CS.3.2

Ship Design

Advanced | **Grades: 6-12** | **Subjects: Science, Technology, Engineering, Art, Mathematics**

Students engineer a ship with the goal of optimizing the outcome given specific requirements and constraints. Students first must plan and draw their ship and then utilize their understanding of 3D modeling complex shapes and 3D printing to create a ship model which prints and performs well.

Product Integrations: Boats Kit

Guiding Standards

MATH.CONTENT.7.G.B.6
MATH.CONTENT.8.G.A.1
NGSS MS-ETS1-1
NGSS MS-ETS1-2
NGSS MS-ETS1-3
NGSS.MS-ETS1-4
SC.68.CS-CS.3.1
SC.68.CS-CS.3.2
SC.68.CS-CS.6.1
SC.68.CS-CS.6.6
SC.68.CS-PC.2.3
SC.68.CS-PC.2.6
SC.68.CS-PC.2.8
MATH.CONTENT.HSG.MG.A.1
MATH.CONTENT.HSG.MG.A.3
SC.912.CS-CS.3.1
SC.912.CS-CS.3.2

Bulldozer Blade

Advanced | Grades: 6-12 | Subjects: Science, Technology, Engineering, Art, Mathematics

Investigate forces and Newton's laws of motion in this open-ended design challenge. Students are tasked with designing and testing an attachment to turn their MyBot by Mimio Fusion into a bulldozer so it can move rocks around with ease. From 3D design to determining how to quantitatively evaluate competing solutions, students will tackle the complexities of real-world engineering. Pair this design challenge with the MyBot activity "Moving Mars Rocks" for an even more in-depth exploration of forces and motion.

Product Integrations: MyBot by Mimio Fusion and Mars Rover Kit (optional)

Guiding Standards

MATH.CONTENT.6.EE.A.2
MATH.CONTENT.6.EE.B.6
MATH.CONTENT.6.EE.B.7
MATH.CONTENT.6.EE.C.9
MATH.CONTENT.6.NS.B.2
MATH.CONTENT.6.NS.B.3
MATH.CONTENT.6.RP.A.1
MATH.CONTENT.6.RP.A.2
MATH.CONTENT.7.EE.B.4
MATH.CONTENT.7.G.B.6
MATH.CONTENT.7.NS.A.3
MATH.CONTENT.7.RP.A.1
MATH.CONTENT.7.RP.A.2
MATH.CONTENT.8.EE.B.5
MATH.CONTENT.8.F.A.1
NGSS MS-PS2-1
NGSS MS-PS2-2
NGSS MS-PS3-1
NGSS MS-ETS1-1
NGSS MS-ETS1-2
NGSS MS-ETS1-3
NGSS.MS-ETS1-4
SC.68.CS-CS.3.1
SC.68.CS-CS.3.2
SC.68.CS-CS.6.1
SC.68.CS-CS.6.6
SC.68.CS-PC.2.3
SC.68.CS-PC.2.6
SC.68.CS-PC.2.8
MATH.CONTENT.HSF.BF.A.1
MATH.CONTENT.HSG.MG.A.1
MATH.CONTENT.HSG.MG.A.3
NGSS HS-PS2-1
NGSS-HS-PS2-2
SC.912.CS-CS.3.1
SC.912.CS-CS.3.2