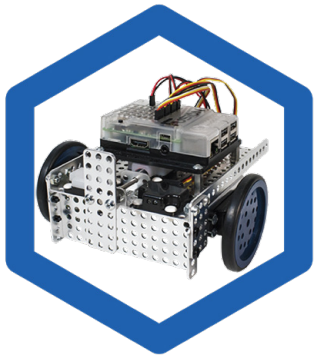
US STEM CLUB

Use these pathways as a guide for planning your units.



MyBot Robotics

Labdisc Sensors

Virtual STEM Kits

3D Printing

**Virtual STEM Kits and 3D Printed Kits can be exchanged for each other where both are listed. Variations in ranking indicate our preferred method.*

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Pathways: *Integrated STEM | Kindergarten*

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1	*How Many Letters?* | 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.	N	N	N	E
2	*Counting Pins* | It's all about counting in this fun bowling activity! Students will roll a ball to knock over 3D-printed bowling pins and count how many were knocked over. They'll get a second attempt and count on from roll one.	N	N	N	R
3	*Active Addition* | Students randomly draw an addition problem from a bag at stations numbered 0-20. They then move to the station that has the correct answer for their addition problem and repeat.	N	N	N	H
4	*Exploring Measurable Attributes* | Explore the measureable attributes of objects. Attributes include continuous variables such as weight, length, and volume, as well as discrete variables.	N	N	N	H
5	*Comparing Measurable Attributes* | Directly compare two objects with a measurable attribute in common to decide which has more or less of the attribute. Use comparison terms to describe their conclusions.	N	N	N	H
6	*Counting and Classifying* | Classify objects based on a discretely measured attribute (e.g., the number of arms of a starfish). They sort categories by count, and count the number of objects in each category.	N	N	N	H
7	*Catapults & Counting* | Launch projectiles into a grid marked out in zones 1-10. Then, students will place the projectile onto a graph template corresponding to the zone it landed in. Count and compare zones.	N	N	N	R
8	*Race to the Finish Line* | 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.	H	N	N	E
9	*Tiny Towns* | Students design, build, and name their own towns. Then, students map and count how many of each type of city feature is in their town. Compare their numbers to their classmates' using more of/less of.	N	N	E	R
10	*Planting Trees* | Discover the importance of trees on both local and global temperatures and investigate other reasons trees are important. Then, program a robot to follow a course as if it were planting trees.	H	E	N	E

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11	*Wildlife Comparison* | Students randomly select an animal. With adult help, they must then research its diet and habitat to determine what it needs to survive. Students identify shared needs between species.	N	N	N	E
12	*Welcoming Urban Wildlife* | Build and name their own towns and then count how many of each type of city feature in their town. Adapt their existing towns to be more wildlife-friendly using creative solutions.	N	N	R	R
13	*Project Nest Box (PBL)* | Learn about birds, weather, and the interactions between humans and the world in this PBL inspiration guide. Build and monitor your own bird nesting box and present on your findings.	N	R	N	N
14	*Shade Structures* | 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.	N	H	N	H
15	*Day and Night* | 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.	N	R	N	H
16	*What's the Weather Like Today?* | Explore weather over a couple of days in this interdisciplinary activity. Students will then use the data they collect to practice comparing values.	N	H	N	H
17	*Variations of Equality* | Draw a tile with dots on it, identify the quantity of dots, and decompose that number. Finally, test their results using an interactive balance to see if they correctly identified a solution.	N	N	R	E
18	*Diving for Deca-Dots* | Pull a coin out of a bag containing between zero and ten dots and identify the quantity on it. Students must identify the paired number required to equal ten.	N	N	N	E
19	*Balancing Tens* | 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. Test their results on a virtual or 3D-printed balance.	N	N	R	E
20	*Circles and Position* | Identify circles both in the environment and on paper. They distinguish between circles and shapes that are similar to circles. They begin the development of vocabulary related to relative position.	N	N	N	E

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21	*Push, Pull, Hover* | Explore pushes and pulls in a frictionless environment as they investigate the different ways to move the Hoverpuck in specific directions.	N	N	N	R
22	*Hovercraft Parking* | 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.	N	N	N	R
23	*Introducing Triangles* | Develop a definition of a triangle that can be used to discriminate between 2D shapes that are triangles and those that are not. Emphasis is placed on the defining attributes such as sides & vertices.	N	N	N	E
24	*Identifying Right Angles* | 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 (sides & vertices).	N	N	N	H
25	*Introducing Rectangles* | Discriminate between 2D shapes that are rectangles and those that are not. Justify decisions about whether a shape is a rectangle or not based on the defining attributes.	N	N	N	E
26	*Introducing Length Measure* | Students are introduced to the concept of length measure by using multiple copies of an unspecified length unit to measure the lengths of items. Describe and record the length of each.	N	N	N	H
27	*Rectangle Routes* | Travel along a route coded using paper and then translate that to a picture-based code using 2D or 3D tiles. Finally, students must program their MyBot robot to travel along a rectangular route.	H	N	N	E
28	*Measuring and Comparing* | Continue to measure lengths using an unspecified unit describing lengths numerically. Compare lengths of objects by both physical side-by-side comparisons & numerical comparisons.	N	N	N	H
29	*Measuring and Classifying* | Classify objects based on a continuously measured attribute (e.g., the length of a caterpillar). Measure each object using an unspecified unit and sort the objects into categories.	N	N	N	H
30	*Introducing Hexagons* | Discriminate between 2D shapes that are hexagons and those that are not. Justify decisions about whether a shape is a hexagon or not based on the defining attributes.	N	N	N	E

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31	*Comparing Flat Shapes* | Analyze and compare properties of two-dimensional shapes. They develop and deepen their understanding of defining attributes of two-dimensional shapes by analyzing and comparing them.	N	N	N	E
32	*An Introduction to Composing Shapes* | 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.	N	N	N	E
33	*Composing Shapes with a Template* | Students further explore shape composition by selecting shapes that complete template puzzles.	N	N	N	E
34	*Decomposing Shapes* | 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.	N	N	N	E
35	*Flat and Solid Shapes* | Distinguish between two- and three-dimensional shapes. Terms describing attributes of three-dimensional shapes are also introduced.	N	N	N	E
36	*Naming Solid Shapes* | 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.	N	N	N	H
37	*Modeling Shapes in the Real World* | Students model shapes in the real world by composing solid shapes.	N	N	N	H
STEAM **Design Challenge** 38	*(optional) Open-Ended Design Challenge* | Challenge your students with an exploration into Tinkercad. Keep it simple but have them model something like a car or an animal using simple shapes.	N	N	N	E

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Pathways: *Integrated STEM | Grade 1*

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1	*Race to the Finish Line* | 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.	H	N	N	E
2	*Direct Length Comparison* | 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.	N	N	N	R
3	*Bird Bretheren* | 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 & use comparison terms.	N	N	N	R
4	*Project Nest Box (PBL)* | Learn about birds, weather, and the interactions between humans and the world in this PBL inspiration guide. Build and monitor your own bird nesting box and present on your findings.	N	R	N	N
5	*Indirect Length Comparison* | 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.	N	N	N	R
6	*Reviewing Length Measure* | Review the concept of length measure and measure the lengths of a number of items. Compare the lengths of three objects numerically and order the objects according to their lengths.	N	N	N	R
7	*Rectangle Routes* | Travel along a route coded using paper and then translate that to a picture-based code using 2D or 3D tiles. Finally, students must program their MyBot robot to travel along a rectangular route.	H	N	N	E
8	*Introducing Rulers and Inches* | Transition from measuring length using an unspecified unit to measuring in inches using a specially designed ruler. Measure the lengths of objects and express the lengths numerically.	N	N	N	R
9	*Measuring with a Conventional Ruler* | Transition from using the no scale/one-inch ruler to using a conventional ruler. Practice using the conventional ruler to measure the lengths of objects.	N	N	N	R
10	*Working with Discrete Data* | Classify objects based on a discretely measured attribute. Organize their classifications and represent them in a graph. Ask and answer questions about the data.	N	N	N	H

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11	*Catapults & Counting* | Launch projectiles into a grid marked out in zones 1-10. Then, students will place the projectile onto a graph template corresponding to the zone it landed in. Count and compare zones.	N	N	N	R
12	*Counting Pins* | Students will roll a ball to knock over 3D-printed bowling pins and count how many were knocked over. They'll get a second attempt and count on from roll one. Optionally graph results.	N	N	N	R
13	*Bird Beaks at Brunch* | Compare an assortment of 3D printed bird beaks to determine how specific beak shapes are optimized for different food sources. Test each beak in each environment and tally results.	N	N	N	R
14	*Day and Night* | 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.	N	R	N	H
15	*Light Absorbance: Sunglasses Shades* | In this whole-class activity, students will check and compare the absorbance of light from a variety of different sunglasses to see which ones are the most effective glasses!	N	R	N	N
16	*Working with Measurement Data* | Classify objects based on a continuously measured attribute. Organize their classifications and represent them in a graph. Ask and answer questions about the data.	N	N	N	R
17	*How Loud is Sound?* | Investigate sound waves and how they travel in this activity. Run tests to see how the distance from the sound source is related to the volume of the sound at that distance.	N	R	N	N
18	*Morse Light Machines* | Do some unplugged programming, discuss the history of communication devices, send messages using light, and work together to program your robot to create Morse light signals.	R	N	N	N
19	*Skip Counting Multiples* | Using randomly assigned numbers, students must practice skip counting from that number using a Hundreds Chart. They'll use the Multiplication Tables Kit to check their answers.	N	N	N	E
20	*Skip Counting* | Using randomly drawn numbers, students will select a starting number and the number by which they are counting. Then, they'll match the skip-counted numbers to the Hundreds Chart.	N	N	N	E

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21	N	N	N	H
22	N	N	N	E
23	N	N	R	E
24	N	N	N	R
25	N	N	N	E
26	N	N	N	R
27	N	N	E	E
28	N	N	N	R
29	N	N	N	R
30	N	N	N	R

21 *Active Addition* | Students randomly draw an addition problem from a bag at stations numbered 0-20. They then move to the station that has the correct answer for their addition problem and repeat.

22 *Detecting Tens* | Explore the associative property of addition while adding three single-digit numbers. Students will randomly draw three numbers from a bag, determine if any pair of them makes a ten, and add them together.

23 *Balancing Equations: Addition* | 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!

24 *Matching Two-Digit Numbers* | Match the written numeral to the quantity requested. Both 3D-printed kits used reinforce place value for ones and tens to increase students' fluency and automaticity with two-digit numbers.

25 *What's a Polygon with Three Sides?* | Learn the term polygon as it relates to all closed, flat shapes with three or more straight sides. Identify the defining attributes of triangles.

26 *What's a Four-Sided Polygon? A Square is a Rectangle Too?* | Students deepen their understanding that a square is a special kind of rectangle. They compare and contrast the defining attributes of squares and rectangles.

27 *Hexagons: A Shape with Six Sides* | Identify the defining attributes of hexagons. They will sort hexagons and non-hexagons, as well as creating hexagons of various sizes, orientations, and side lengths.

28 *Introducing Parallel Lines & Trapezoids* | Identify parallel lines in two-dimensional shapes using the Parallel Lines Tester Kit. Students are then introduced to the defining attributes of trapezoids.

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

30 *Shapes with Right Angles* | Define a right angle and identify right angles in two-dimensional shapes. Students recognize that some shapes always have right angles, sometimes have right angles, or never have right angles.

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31	*Circles, Half Circles, and Quarter Circles* | Students are introduced to half-circles and quarter-circles using an understanding of the defining attributes of circles. Identify and sort half-circles, quarter-circles, and circles.	N	N	N	R
32	*Sorting Two-Dimensional Shapes* | Sort two-dimensional shapes based on their defining attributes.	N	N	N	E
33	*Composing Two-Dimensional Shapes* | Combine two-dimensional shapes to compose new shapes. Students are challenged to create composite shapes from smaller shapes.	N	N	N	E
34	*Decomposing Shapes* | 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.	N	N	N	R
35	*Sorting Three-Dimensional Shapes* | Uncover similarities and differences of three-dimensional shapes. They use the terms faces, bases, and vertices to identify defining attributes.	N	N	N	R
36	*Composing Three-Dimensional Shapes* | Combine three-dimensional shapes to compose new shapes. Students are challenged to create composite shapes from smaller shapes.	N	N	N	R
STEAM Design Challenge 37	*(optional) Pattern Block Building* | Create stacking pattern blocks. Students will utilize measuring, tolerances, and calculations to ensure the blocks stack well. Personalize their blocks using shapes.	N	N	N	E
38	*Partitioning Circles into Halves and Quarters* | Partition circles into equal shares. Create and identify circles correctly partitioned into equal shares and use the terms half, fourth, and quarter to name each share.	N	N	N	H
39	*Partitioning Rectangles into Halves and Quarters* | Partition rectangles into equal shares. Create and identify rectangles correctly partitioned into equal shares and use the terms half, fourth, and quarter.	N	N	N	H

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Pathways: *Integrated STEM | Grade 2*

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1	*Matching Three-Digit Numbers* | Match the written numeral to the quantity requested. Both 3D-printed kits reinforce place value for ones, tens, & hundreds to increase students' fluency & automaticity.	N	N	N	R
2	*Distance Data: Centimeters & Inches* | Students are introduced to centimeters and then asked to create a table based on the distance their MyBot robot travels in both inches and centimeters at various power levels in one second.	R	N	N	E
3	*Approximating Distance: Catapults* | Refine approximation skills for inch measurement. Launch projectiles with a catapult, guess how far they flew, then measure to compare. Find the difference to guage accuracy.	N	N	N	H
4	*Approximating Distance: Robots* | Refine approximation skills for centimeter measurement. Program their MyBot to travel a random distance, guess how far it goes, then measure to compare. Find the difference to guage accuracy.	R	N	N	N
5	*Salamander Specimens* | 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.	N	N	N	R
6	*Scale of Species* | Investigate the scale of animals and consider the diversity of species. Use a variety of measuring tools to examine teeth and overall size of an assortment of animals from land, water, and prehistory.	N	N	N	R
7	*Project Nest Box (PBL)* | Learn about birds, weather, and the interactions between humans and the world in this PBL inspiration guide. Build and monitor your own bird nesting box and present on your findings.	N	R	N	N
8	*Historic Habitats* | Design an animal using the Creature Features Kits. Based on their animal's physical characteristics, students must hypothesize the habitat of this newly-discovered species.	N	N	N	R
9	*Tracking Even and Odd Numbers* | 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.	N	N	N	R
10	*Seed Stations* | Analyze a collection of seeds, using physical characteristics to hypothesize how each plant disperses its seeds. Students will look for similarities within seeds dispersed by animals, water, and wind.	N	N	N	R

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11	*Caterpillars and Ladders* | Measure and create line plots using the caterpillars and ladders in the Exploring Measurable Attributes Kit. Use a ruler to measure the length of each item in inches and then record it on a line plot.	N	N	N	R
12	*Comparing Cities* | Design, build, and name their own cities. Collect data on their city and compare it to their classmates'. Graph their findings to find out which cities have the most and least of each type of city feature.	N	N	E	R
13	*Counting Commerce* | Compare the number of businesses in 3 competing markets and then decide which city is best for business! Practice skip counting by 5s, 10s, and 100s and then add their totals together to compare.	N	N	R	E
14	*Introducing Pentagons* | Review polygons in light of their defining attributes. Students then develop a definition of a pentagon that can be used to discriminate between pentagons and non-pentagons.	N	N	N	E
15	*Solid Shapes* | Review of the names and attributes of solid shapes. Then, students analyze attributes of solid shapes by describing the number and type of the faces and the number of vertices and edges.	N	N	N	R
16	*Quadrilaterals* | Develop a working definition of a quadrilateral. Students reexamine parallelograms, trapezoids, rectangles, and squares as special cases of quadrilaterals.	N	N	N	R
17	*Partitions & Equal Shares - Circles* | Partition circles into 2, 3, or 4 equal shares and use the words halves, thirds, & fourths to describe the parts. Equal shares of two circles are the same only when from identical circles.	N	N	N	H
STEAM Design Challenge 18	*Spinner Partitions* | Design a classroom tool to partition the CD Spinner Kit into equal shares. Design around the existing kit before creating a partitioning disk according to specific instructions.	N	N	N	H
STEAM Design Challenge 19	*Time to Design* | 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 custom timepiece.	N	N	N	H
20	*Partitions & Equal Shares - Rectangles* | Partition rectangles into 2, 3, or 4 equal shares & use the words halves, thirds, & fourths to describe the parts. Understand that 2 halves, 3 thirds, & 4 fourths comprise a whole.	N	N	N	H

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21 *Partitioning Rectangles and Arrays* | Partition rectangles into same-size squares. Begin the development of the concept of area by counting the squares. Discover that the size of the rectangle affects the number of squares.	N	N	N	H
STEAM Design Challenge 22 *Lift Off!* | Analyze rocket parts and 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.	N	N	N	R
23 *Rocket Bodies* | Become materials engineers as they compare a variety of rocket bodies. Using 3D printed nose cones and fins, students will test how changing the body of the rocket affects flight distance and durability.	N	N	N	R

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Pathways: *Integrated STEM* | *Grade 3*

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1 *Review of 2D Shapes* | Review circles, half circles, & quarter circles as well as the defining attributes of triangles, quadrilaterals, pentagons, & hexagons. Review the concepts of right angles and parallel sides.	N	N	N	R
STEAM **Design Challenge** 2 *Pattern Block Building* | Create stacking pattern blocks. Students will utilize measuring, tolerances, and calculations to ensure the blocks stack well. Personalize their blocks using shapes.	N	N	N	H
3 *Properties of the Special Quadrilaterals* | Review the defining attributes of the special quadrilaterals studied at previous grade levels. Explore other important mathematical properties of each shape.	N	N	N	R
4 *Introducing Rhombuses* | Students are introduced to rhombuses. Engage in sorting activities that focus attention on the defining attributes of rhombuses and then explore other important properties of rhombuses.	N	N	N	R
5 *Introducing Kites* | 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.	N	N	N	E
6 *Categorizing Special Quadrilaterals* | 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.	N	N	N	E
7 *Partitioning Rectangles into Equal-Area Parts* | Partition rectangles presented on square grids into 2, 3, 4, 6, and 8 equal-area parts using a variety of methods. They describe each part as a unit fraction of the whole.	N	N	N	H
8 *Partitioning Shapes into Equal Area Parts* | Partition a variety of shapes into equal-area parts without the benefit of a square grid. Reason about equal area using both an intuitive understanding of congruence.	N	N	N	H
STEAM **Design Challenge** 9 *Spinner Partitions* | Design a classroom tool to partition the CD Spinner Kit into equal shares. Design around the existing kit before creating a partitioning disk according to specific instructions.	N	N	N	H
10 *Bowling for Tenths* | Introduce fractions through bowling! Students must evaluate their bowling scores as a fraction of the total number of pins available. They'll also be asked to identify their fractions on a number line.	N	N	N	R

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Pathways: *Integrated STEM | Grade 3*

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
11	*Graphing Urban Geography* | Compare different cities based on their land use. Create scaled bar & picture graphs to represent each. Answer questions to compare how much more or less each city has of each type.	N	N	R	E
12	*Land Use Fractions: Part 1* | 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.	N	N	R	E
13	*Land Use Fractions: Part 2* | Using the fractions they identified in part 1, students will plot them on a number line and compare them using greater than, less than, and equal to.	N	N	R	E
STEAM **Design Challenge** 14	*3D Dream Home* | Design and model a dream house. Students must plan and draw their building and utilize their understanding of basic shapes and 3D printing to create a house model which prints well.	N	N	N	H
15	*Bicycle Delivery Routes* | Become a bicycle delivery entrepreneur and determine the optimal routes for delivering your packages. Calculate the perimeter and area for each route and test it using the MyBot robot.	H	N	N	E
16	*Population Density* | Compare the population density of cities. 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.	N	N	R	E
17	*Day and Night* | 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.	N	R	N	H
18	*Weather and Climate* | Investigate weather patterns over the course of a week and compare daily weather to overall seasonal climate.	N	H	N	E
19	*Beachfront Property* | Students must tackle the real-world challenge of engineering near a beach by designing structures within constraints and then testing their designs against strong winds and storm surge.	N	N	N	E
20	*Best of the 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.	N	N	N	R

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Pathways: *Integrated STEM | Grade 3*

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** STEM Kit*	**3D** Printer*
21	*Project Nest Box (PBL)* | Learn about birds, weather, and the interactions between humans and the world in this PBL inspiration guide. Build and monitor your own bird nesting box and present on your findings.	N	R	N	N
22	*Landing Zones* | Launch projectiles of varying mass into a series of zones and use their projectiles to create single-scale and scaled bar graphs. Analyze and anticipate behavior of a medium-mass projectile.	N	N	N	E
23	*Exploring Forces* | Students will progress through a series of stations, taking note of how objects move, identifying trends, and categorizing movements into both balanced and unbalanced forces.	H	N	N	H
24	*Changing Speeds* | Students must figure out how to program their MyBot robot to demonstrate both balanced and unbalanced forces. Students must utilize variables & loops to create their programs.	R	N	N	N
STEAM Design Challenge 25	*Sailing Regatta* | Engineer a sailboat given requirements. Students must plan their sailboat and utilize knowledge of basic shapes and 3D printing to create a boat model which prints and performs well.	N	N	N	H

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Pathways: *Integrated STEM | Grade 4*

Use these pathways as a guide for planning your units. For full standards and descriptions, see our complete lesson library or look up each lesson on MyStemKits.com.

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	MyBot **Robot**	Labdisc **Sensors**	**Virtual** STEM Kit*	**3D** Printer*
1 *STEAM* **Design Challenge** — *Number Block Building or Pattern Block Building* | Create stacking blocks. Students will utilize measuring and calculations to ensure the blocks stack well. Personalize using numbers or shapes.	N	N	N	E
2 — *Polygon and Shape Review* | Students develop a definition of polygon that can be used to discriminate between 2D shapes that are polygons and those that are not. Sort & explore the relationships of 2D shapes.	N	N	N	H
3 — *Points, Lines, Rays, and Segments* | Begin a formal introduction to points, lines, rays, & segments. Learn to model these entities with drawings & how to name points & describe lines, rays, & segments using named points.	N	N	N	N
4 — *Angles and Angle Types* | Define 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.	N	N	N	R
5 — *Shapes and Angles* | 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.	N	N	N	R
6 *STEAM* **Design Challenge** — *Engineering 3D Vertices: Cubes* | Build a cube vertex which attaches to straws so it can be used to construct cubes & prisms. Students must make it fit a real-world object & design for variations in straws.	N	N	N	H
7 — *Shapes and Symmetry* | Introduce the concept of a line of symmetry of a 2D figure. They identify line-symmetric figures and draw lines of symmetry. Then, draw figures with specified numbers of lines of symmetry.	N	N	N	E
8 — *Adding Angles* | Decompose and compose angles. Build angles to add together and transition to writing equations using variables to represent an unknown angle in a diagram.	N	N	R	R
9 — *Symmetry and Design* | Students use lines of symmetry to create designs while reinforcing identification of polygons and the variety of ways to decompose and compose polygons.	N	N	N	H
10 *STEAM* **Design Challenge** — *Tessellation Tails: An intro to Codeblocks* | Analyze & decompose a complex feline tile into its parts. Create the tile two times, first using traditional modeling techniques & then using Tinkercad Codeblocks.	N	N	N	H

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	MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
11	N	N	N	H
12	N	N	N	R
13	N	N	E	H
14	N	N	E	H
STEAM **Design Challenge** 15	N	N	N	E
16	H	N	N	E
STEAM **Design Challenge** 17	N	N	N	H
18	N	N	R	E
19	N	N	R	E
20	R	N	N	N

11 *Perpendicular Lines, Segments, and Rays* | Introduce the term perpendicular and draw examples of perpendicular lines, segments, and rays. They identify and label perpendicular sides in two-dimensional shapes.

12 *Parallel Lines, Segments, and Rays* | Introduce the term parallel and draw examples of parallel lines, segments, and rays. They identify and label parallel sides in two-dimensional shapes.

13 *Classifying Shapes: Triangles* | Introduce terminology used to classify triangles based on the lengths of their sides and measures of their angles. Students analyze, classify, and cross-classify a variety of triangle types.

14 *Classifying Shapes: Quadrilaterals* | Explore perpendicular and parallel lines by classifying quadrilaterals. Analyze quadrilaterals through sorting activities.

STEAM **Design Challenge** **15** *3D Dream Home* | Design and model a dream house. Students must plan and draw their building and utilize their understanding of basic shapes and 3D printing to create a house model which prints well.

16 *Bicycle Delivery Routes* | Become a bicycle delivery entrepreneur and determine the optimal routes for delivering your packages. Calculate the perimeter and area for each route and test it using the MyBot robot.

STEAM **Design Challenge** **17** *Spinner Partitions* | 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.

18 *Adding Like Fractions* | Practice adding equivalent fractions up to 1 by stacking 3D-printed or virtual fraction manipulatives to see how they add up. Develop an understanding that when a = b in fraction a/b, fraction = 1.

19 *Stacking Fractions* | Investigate multiplication of fractions by a whole number by stacking 3D-printed or virtual fraction manipulatives to see how they stack up. This activity will focus on proper fractions.

20 *Multiplying Movement with Fractional Measurements* | Multiply fractions by whole numbers through coding! Program your robot to move a fractional distance of a meter. Then, change how many times it repeats.

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
21	*Pin Percents* | Students bowl for 3D-printed bowling pins and then must identify the quantity of pins knocked over as a fraction, decimal, and percent of the total number of pins.	N	N	N	R
22	*Column Comparisons* | Randomly select two fractions and compare their values using greater than, less than, and equal to signs. Justify their conclusions by building the two fractional columns and comparing their results.	N	N	R	E
23	*Car Curling* | Design an experiment & use their MyBot robot to push a toy car to notice how changing the speed of the robot changes the distance travelled by the car. Practice measuring/data collection.	R	N	N	N
24	*What are Waves?* | Introduce waves through this student-led discussion and a collection of interactive stations where students get to see waves working.	N	R	N	H
25	*Graphing Waves* | Students will investigate properties of waves through simplified graphs. They will explore amplitude, frequency, and wavelength and relate energy and speed with amplitude.	N	N	N	R
26	*How Loud is Sound?* | Investigate sound waves and how they travel in this activity. Run tests to see how the distance from the sound source is related to the volume of the sound at that distance.	N	R	N	N
27	*Light Absorbance* | Students must design an experiment to compare the absorbance of light from a variety of different sunglasses to see which ones are the most effective glasses!	N	R	N	N
28	*(optional) Project Nest Box (PBL)* | Learn about birds, weather, and the interactions between humans and the world in this PBL inspiration guide. Build and monitor your own bird nesting box and present on your findings.	N	R	N	N
29	*Sunshine Smorgasbord* | Students lead the way in this informal activity. Develop an understanding that the smorgasbord of food and the energy gained from it all starts with the sun! Perfect intro to food chains.	N	N	N	R
30	*Measuring Lionfish* | Randomly select lionfish specimens within a certain habitat and compare their length values in feet using hundredths. Expand their exploration by comparing the first habitat to a second.	N	N	R	R

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	MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
STEAM **Design Challenge** 31	*Sailing Regatta* | Engineer a sailboat given requirements. Students must plan their sailboat and utilize knowledge of basic shapes and 3D printing to create a boat model which prints and performs well.	N	N	N	H
32	*Ocean Mapping* | Ccreate a color-coded topographic map of an unknown ocean landform. After analyzing their maps, groups switch and try to describe the landforms of the other groups based solely on their maps.	N	N	N	R
33	*Topography Mapping* | Analyze a feature from our Landform Topography Kit and create a color-coded topographic map. After building their maps, program a robot to read and decode another group's map without looking at it.	H	N	N	R
34	*Mudslide Mitigation* | Introduce students to erosion and the impact vegetation can have on preventing it through this engaging discussion and demonstration.	N	N	N	R
35	*National Parks Travel Planning* | Students will be assigned one of the National Parks. They will then use online sources to research climate, plants, animals, and landmarks found within the park to create a brochure.	N	N	N	E
STEAM **Design Challenge** 36	*3D Derby* | 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.	N	N	N	H
37	*Magnetic Binary* | Explore the workings of magnets and how the polarity can affect the attraction or repulsion of other magnets.	N	N	N	H
38	*Using Binary Magnets* | Explore the workings of magnets and how the polarity and distance can affect the attraction or repulsion of other magnets to perform actions.	N	N	N	H
39	*Discovering Binary (4th Grade)* | Explore how decimal numbers can be represented in binary using only 0 and 1, which represent switches that either use or don't use values in an 8-bit string. Convert between base ten & base two.	N	N	N	H
40	*How Does My Computer Use Binary? (4th)* | See how computers use binary digits to communicate and how data is stored using binary logic. Consider the history of magnetism & electricity in hard drives & SSD.	N	N	N	N

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41	*(optional) All Charged Up* | Learn about the history of batteries and unified specifications thereo. Explore the parts and functions of batteries to learn how they work. Then, they'll graph voltage of common batteries.	N	R	N	N
42	*Converting Binary (4th Grade)* | Use their subtraction or division computational skills to convert from the base-ten system to base two. Enhance their number sense and reasoning, helping to solidify foundations of numeracy.	N	N	N	E
43	*Programming Challenge: Binary & Magnetism (4th)* | 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.	N	N	N	R
44	*(optional) What's the pHuss?* | Explore material attributes by comparing the pH of common liquids to explore how the pH of the liquid is optimized for the purpose at hand. Then, students research how pH impacts our lives.	N	R	N	N
STEAM **Design Challenge** 45	*Coding Custom Clocks: 4th Grade* | In this Codeblocks challenge, students must decode a sample piece of code, identify the function of the parts, and reverse-engineer the code to make a clock!	N	N	N	H
46	*Earth-Moon System Phase Cards* | The first of 4 in an Earth-Moon system unit, students will use Moon Phase Cards to analyze the 8 major divisions of the Moon's cycle and use a model to analyze features found on the Moon.	N	N	N	H
47	*Earth-Moon Systems in 3D* | Students Use the Moon Stages Kit to model and explore the Moon's location relative to Earth and the Sun.	N	N	N	H
48	*Earth-Moon System Animation* | Use Scratch to create a computer animation of the Earth, Moon, and Sun showing how the relative position of each is important to the phase of the Moon that we see from Earth.	N	N	N	E
49	*Earth-Moon System Writing* | Use knowledge of the Moon, Earth & Sun system to develop a writing piece about the interactions that occur within the system & ways that people have built models to help with learning.	N	N	N	H
STEAM **Design Challenge** 50	*Home on the Moon* | Dive into this interactive project to understand how systems work on Earth and how they can be modified to work on the Moon. Then, build your dream moon base in Tinkercad.	N	N	N	H

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MyBot **Robot** *Labdisc* **Sensors** **Virtual** *STEM Kit** **3D** *Printer**

The majority of the remaining lessons in this pathway use the Giant Mars Map bundle from ShareSpace that includes the *Welcome to Mars* book and our MyBot robot. If you do not have that bundle, you will not be able to complete some of these lessons.

51	*Where is Mars?* | Explore the orbits of planets within the Solar System with this adaptable lesson plan as students get an intuitive view of just how large the solar system is.	N	N	N	E
52	*Our Heart Rate* | Introduce students to the function of the heart and see how it adapts to our behavior. Utilize the Labdisc heart rate sensor to measure each students' heart rate at rest and just after exercise.	N	R	N	E
53	*(optional) Surviving on Mars* | Learn about the challenges associated with traveling to and visiting Mars including limited oxygen, energy, food, fuel, and water. Utilize the *Welcome to Mars* book & Giant Mars Map.	N	N	N	N
STEAM Design Challenge 54	*Lift Off!* | Analyze rocket parts and 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.	N	N	N	R
55	*(optional) Mars Mission Planning* | Determine an optimal location for a landing zone, transit zone, and mission zone and create a topographic map of your site using the Giant Mars Map.	E	N	N	N
56	*(optional) Landing on Mars* | Teams will learn about how travel to Mars has been portrayed in the popular media and will compare/contrast this to reality. Students will examine potential sites for finding water on Mars.	E	N	N	N
57	*(optional) Establishing Mars Research Stations* | Students will form a mission organization to create and execute a plan for establishing Mars Research Stations in scientific and logistically strategic locations.	R	N	N	N
STEAM Design Challenge 58	*Rover Wheels* | Engineer 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.	H	N	N	R
59	*(optional) Mars Expedition: Part I* | Teams will learn about the required resources for conducting a Mars expedition as well as the importance of planning ahead and acquiring the resources needed for survival.	E	N	N	N

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		MyBot Robot	Labdisc Sensors	Virtual STEM Kit*	3D Printer*
60	*(optional) Mars Expedition: Part II* | Teams will learn about the required resources for conducting a Mars expedition as well as the importance of planning ahead and acquiring the resources needed for survival.	E	N	N	N
61	*(optional) Occupying Mars* | Engage in further study of Mars through using the *Welcome to Mars* book and consider what a long-term habitat on Mars would need to successfully support human life.	N	N	N	N
62	*(optional) Big Red Planet Tour* | Students must plan and execute a Tour of Mars that follows a clear theme. Working as a group, students must plan a route, write a script, and create marketing materials for their tour.	H	N	N	N

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Pathways: *Integrated STEM | Grade 5*

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STEAM **Design Challenge** 1 — *Number Block Building* | Create stacking number blocks. Students will utilize measuring, tolerances, and calculations to ensure the blocks stack well. Personalize their blocks using numbers or letters.	N	N	N	E
2 — *Measuring Lionfish* | Randomly select lionfish specimens within a certain habitat and compare their length values in feet using hundredths. Expand their exploration by comparing the first habitat to a second.	N	N	R	R
3 — *Stacking Fractions* | Investigate multiplication of fractions by a whole number by stacking 3D-printed or virtual fraction manipulatives to see how they stack up. This activity will focus on proper fractions.	N	N	R	E
4 — *Multiplying Movement with Fractional Measurements* | Multiply fractions by whole numbers through coding! Program your robot to move a fractional distance of a meter. Then, change how many times it repeats.	R	N	N	N
STEAM **Design Challenge** 5 — *Home Sweet 3D Home* | Design the house from our City Engineering Kit. Students will utilize their understanding of basic shapes, decimals, and scale to recreate the existing model..	N	N	N	H
6 — *What's the pHuss?* | Explore material attributes by comparing the pH of common liquids to explore how the pH of the liquid is optimized for the purpose at hand. Then, students research how pH impacts our lives.	N	R	N	N
7 — *Magnetic Mixtures Binary* | Explore mixtures and how to separate them based on each material's properties.	N	N	N	H
8 — *Sifting Magnetic Mixtures* | Explore mixtures and different ways to separate them.	N	N	N	R
9 — *Discovering Binary (5th)* | Explore how decimal numbers can be represented in binary using 0 and 1, which represent switches that either use or don't use values in an 8-bit string. Convert between base ten & base two.	N	N	N	R
10 — *How Does My Computer Use Binary (5th)* | See how computers use binary digits to communicate and how data is stored using binary logic. Consider the history of magnetism & electricity in hard drives & SSD.	N	N	N	N

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
11	*Converting Binary (5th Grade)* | Use their subtraction or division computational skills to convert from the base-ten system to base two. Enhance their number sense and reasoning, helping to solidify numeracy.	N	N	N	E
12	*Programming Challenge: Binary & Magnetism (5th)* | 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.	N	N	N	R
13	*Introducing the Coordinate System* | Discover the basic structure of the coordinate plane and how it can be used to describe the location of points. Apply their understanding by graphing points given their coordinates.	N	N	N	E
14	*Graphing Shapes on the Coordinate Plane* | Apply their understanding of graphing on the coordinate plane. Practice graphing points given the coordinates and describe the polygons created the points.	N	N	N	E
15	*Catapults & Coordinates* | Students will use a miniature catapult to launch a series of projectiles into a grid and then identify the nearest coordinate landing point.	N	N	N	R
16	*Graphing Data on the Coordinate Plane* | 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.	N	N	N	E
17	*Programming Coordinates* | Introduce programmatic variables while reinforcing coordinates. Create a program that will allow them to enter a set of coordinates for the robot will travel from the origin to the point.	R	N	N	E
STEAM **Design Challenge** 18	*Lift Off!* | Analyze rocket parts and 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.	N	N	N	R
19	*Graphing with Gravity* | It's ready for takeoff in this interdisciplinary activity. Students decorate and build a paper rocket. Then, launch the rockets to discuss gravity and practice graphing on the coordinate plane.	N	N	H	R
20	*(optional) What's it Like Out There?* | Send your Labdisc into near space with this out of this world activity! This inspiration guide will help you plan how you can explore the atmosphere with your Labdisc and a weather balloon.	N	R	N	N

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		MyBot Robot	Labdisc Sensors	Virtual STEM Kit*	3D Printer*
21	*Earth-Moon System Phase Cards* | The first of 4 in an Earth-Moon system unit, students will use Moon Phase Cards to analyze the 8 major divisions of the Moon's cycle and use a model to analyze features found on the Moon.	N	N	N	H
22	*Earth-Moon Systems in 3D* | Students Use the Moon Stages Kit to model and explore the Moon's location relative to Earth and the Sun.	N	N	N	H
23	*Earth-Moon System Animation* | Use Scratch to create a computer animation of the Earth, Moon, and Sun showing how the relative position of each is important to the phase of the Moon that we see from Earth.	N	N	N	E
24	*Earth-Moon System Writing* | Use knowledge of the Moon, Earth & Sun system to develop a writing piece about the interactions that occur within the system & ways that people have built models to help with learning.	N	N	N	H
STEAM Design Challenge 25	*Home on the Moon* | Dive into this interactive project to understand how systems work on Earth and how they can be modified to work on the Moon. Then, build your dream moon base in Tinkercad.	N	N	N	R
26	*Where is Mars?* | Explore the orbits of planets within the Solar System with this adaptable lesson plan as students get an intuitive view of just how large the solar system is.	N	N	N	E
27	*Starlight* | Explore the relative brightness of the sun and stars by using a light sensor and investigate scale in the universe by measuring out distances of the Earth, the Sun, and the Alpha Centauri system.	N	R	N	H
28	*Light Absorbance* | Students must design an experiment to compare the absorbance of light from a variety of different sunglasses to see which ones are the most effective glasses!	N	R	N	N
29	*(optional) Surviving on Mars* | Learn about the challenges associated with traveling to and visiting Mars including limited oxygen, energy, food, fuel, and water. Utilize the *Welcome to Mars* book & Giant Mars Map.	N	N	N	N
30	*(optional) Landing on Mars* | Teams will learn about how travel to Mars has been portrayed in the popular media and will compare/contrast this to reality. Students will examine potential sites for finding water on Mars.	H	N	N	N

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Pathways: *Integrated STEM | Grade 5*

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
31	*(optional) Mars Mission Planning* | Determine an optimal location for a landing zone, transit zone, and mission zone and create a topographic map of your site using the Giant Mars Map.	E	N	N	N
32	*(optional) Establishing Mars Research Stations* | Students will form a mission organization to create and execute a plan for establishing Mars Research Stations in scientific and logistically strategic locations.	R	N	N	N
STEAM **Design Challenge** 33	*Rover Wheels* | Engineer 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.	H	N	N	R
34	*(optional) Mars Expedition: Part I* | Teams will learn about the required resources for conducting a Mars expedition as well as the importance of planning ahead and acquiring the resources needed for survival.	E	N	N	N
35	*(optional) Mars Expedition: Part II* | Teams will learn about the required resources for conducting a Mars expedition as well as the importance of planning ahead and acquiring the resources needed for survival.	E	N	N	N
36	*(optional) Occupying Mars* | Engage in further study of Mars through using the *Welcome to Mars* book and consider what a long-term habitat on Mars would need to successfully support human life.	N	N	N	N
37	*(optional) Big Red Planet Tour* | Students must plan and execute a Tour of Mars that follows a clear theme. Working as a group, students must plan a route, write a script, and create marketing materials for their tour.	H	N	N	N
38	*Project Nest Box (PBL)* | Learn about birds, weather, and the interactions between humans and the world in this PBL inspiration guide. Build and monitor your own bird nesting box and present on your findings.	N	R	N	N
39	*Day and Night* | 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.	N	R	N	H
40	*National Parks Travel Planning* | Students will be assigned one of the National Parks. They will then use online sources to research climate, plants, animals, and landmarks found within the park to create a brochure.	N	N	N	E

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Pathways: *Integrated STEM | Grade 5*

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	MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
41 *Sunshine Smorgasbord* | Students lead the way in this informal activity. Develop an understanding that the smorgasbord of food and the energy gained from it all starts with the sun! Perfect intro to food chains.	N	N	N	R
42 *An Intro. to Using Venn & Euler Diagrams* | Students are introduced to Venn & Euler diagrams as a means of displaying relationships among objects. Construct & interpret Venn diagrams using real-world sets.	N	N	N	H
43 *Classifying Triangles Using Venn & Euler Diagrams* | Use Venn diagrams to show the relationships among the sets of scalene, isosceles, equilateral, acute, right, obtuse, and equiangular triangles.	N	N	N	R
44 *Classifying Quadrilaterals Using Venn & Euler Diagrams* | Review the defining attributes of the special quadrilaterals. Use Venn diagrams to show the relationships among these sets.	N	N	N	E
45 *Coordinate Design* | Use the coordinate plane and polygons to create designs to reinforce graphing on the coordinate plane.	N	N	N	H
STEAM **Design Challenge** **46** *3D Dream Home* | Design and model a dream house. Students must plan and draw their building and utilize their understanding of basic shapes and 3D printing to create a house model which prints well.	N	N	N	E
47 *Engineering a City* | Students use the coordinate plane and their knowledge of polygon attributes to engineer a map of a city that adheres to certain criteria.	N	N	N	E

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Pathways: *Earth Science & Ecosystems | 6 - 8*

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	MyBot **Robot**	Labdisc **Sensors**	**Virtual** STEM Kit*	**3D** Printer*
1	*Layers of Detail: Part 1 - Landforms* | Create and compare topography maps with different levels of detail to see how the clarity varies. Then, use your MyBot robot's sensors to read and analyze another group's map.	H	N	N	R
2	*Sea Floor Topography* | Collect data, model the process of echo sounding, and create models to determine the shapes of several sea floor models.	N	N	N	R
3	*(optional) Where is Mars?* | Explore the orbits of planets within the Solar System with this adaptable lesson plan as students get an intuitive view of just how large the solar system is.	N	N	N	E
4	*(optional) Layers of Detail: Part 2 - Martian Landscape* | Use the Aldrin Family Foundation Giant Mars Map to plot out and identify Martian landforms. Program their MyBot to collect topographic data.	R	N	N	N
5	*(optional) Mars Mission Planning* | Determine an optimal location for a landing zone, transit zone, and mission zone and create a topographic map of your site using the Giant Mars Map.	E	N	N	N
6	*Weather Mapping* | Interpret weather data to construct weather maps identifying air masses and types of weather fronts.	N	N	N	E
7	*Temperature Variation Between Day and Night* | 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 their Labdisc.	N	R	N	N
8	*Greenhouse Atmosphere* | 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.	N	E	N	R
9	*Greenhouse Planet* | Explore the effect of a greenhouse atmosphere on a planet's temperature.	N	E	N	R
10	*(optional) What's it Like Out There?* | Send your Labdisc into the atmosphere to measure temperature, air pressure, sound, and GPS location during a high-altitude near-space weather balloon's ascent and descent.	N	R	N	N

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Pathways: *Earth Science & Ecosystems* | *6 - 8*

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	MyBot **Robot**	Labdisc **Sensors**	**Virtual** STEM Kit*	**3D** Printer*
11 *Planetary Thermometer* | Use data to explore the effect of light & heat as the distance increases from the source & the impact of a model greenhouse atmosphere. Relate the slope of lines to model temp. equilibrium.	N	E	N	R
12 *(optional) Surviving on Mars* | Learn about the challenges associated with traveling to and visiting Mars including limited oxygen, energy, food, fuel, and water. Students will utilize the *Welcome to Mars* book & Giant Mars Map.	N	N	N	N
13-16 *(Optional) Water Filtration Unit* | If desired, you may choose to implement one of the Water Filtration Units into this pathway as well. These four-lesson units are available for 6th, 7th, & 8th grades. We suggest implementing the water filtration unit of your choice here. These units also introduce code & logic.	N	R	N	R
17 *Cruising for Circumference* | What impact does wheel diameter have on distance travelled? Students investigate circumference as they compare different wheel designs. Calculate speed and unit rates.	E	N	N	R
STEAM **Design Challenge 18** *(Optional) Rover Wheels* | Engineer 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.	H	N	N	R
19 *The Coriolis Effect* | Identify an underlying principal associated with the Coriolis Effect. Use math to begin to understand the behavior of a rotating object.	N	N	N	H
20 *Coriolis Effect and Weather* | 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.	N	N	N	R
21 *Surface Ocean Currents* | 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.	N	N	N	R
22 *Ocean Currents* | 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.	N	N	N	E
23 *Sea Ice Analysis (6th or 7th)* | Using data from the National Snow and Ice Data Center, students will use technology to quickly generate graphs for each month, looking for trends, patterns, or deviations over time.	N	N	N	N

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Pathways: *Earth Science & Ecosystems* | 6 - 8

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
24	*(optional) Landing on Mars* | Teams will learn about how travel to Mars has been portrayed in the popular media and will compare/contrast this to reality. Students will examine potential sites for finding water on Mars.	H	N	N	N
25	*(optional) Establishing Mars Research Stations* | Students will form a mission organization to create and execute a plan for establishing Mars Research Stations (MRS). Place MRS in scientific and logistically strategic locations.	R	N	N	N
26	*(optional) Mars Expedition: Part I* | Teams will learn about the required resources for conducting a Mars expedition as well as the importance of planning ahead and acquiring the resources needed for survival.	E	N	N	N
27	*(optional) Mars Expedition: Part 2 - Learning from Experience* | Revise the Mars expedition based on what was learned in Part 1 and write a paper to highlight the challenges and successes of each attempt.	E	N	N	N
28	*Occupying Mars* | Engage in further study of Mars through using the *Welcome to Mars* book and consider what a long-term habitat on Mars would need to successfully support human life.	N	N	N	N
29	*Let There Be Light* | 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.	N	R	N	N
30	*A Walk Through the City* | 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 sensors.	N	R	E	E
31	*Project Nest Box (PBL)* | Learn about birds, weather, and the interactions between humans and the world in this PBL inspiration guide. Build and monitor your own bird nesting box and present on your findings.	N	R	N	N
STEAM Design Challenge 32	*(optional) 3D Dream Home* | Design and model a dream house. Students must plan and draw their building and utilize their understanding of 3D printing to create a house model which prints well.	N	N	N	E
33	*Mars Colony (PBL)* | 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 using your MyBot robot & speed calculations.	H	N	N	E

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Pathways: *Earth Science & Ecosystems* | *6 - 8*

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
34	*Energy Efficiency* | Gather information about different types of light bulbs and their efficiency at producing light. Based on their findings, they will identify costsaving measures that people can take to reduce energy consumption.	N	E	N	H
35	*Wind Farm Challenge* | Students are challenged to create the most efficient wind turbine while balancing cost constraints. Students will apply their knowledge of surface area and graphing.	N	N	N	R
STEAM **Design Challenge** 36	*Turbine Design* | Use in conjunction with the Wind Farm Challenge, this interdisciplinary design challenge integrates renewable energy, engineering design, and mathematics.	N	N	N	R
37	*Scattering Conkers* | Explore bivariate data collection by dropping conkers, tracking seed dispersion, and performing statistical analysis of the data. Students will create scatterplots of the data to look for trends.	N	N	N	R
38	*Lionfish and Histograms* | 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.	N	N	R	R

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Pathways: *Waves* | *Grades 6 - 8*

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** STEM Kit*	**3D** Printer*
1	*Car Curling* | Relate energy to speed in this gamified challenge! Students must design an experiment and use their MyBot robot to push a toy car to see how the speed of the robot changes the distance travelled by the car.	R	N	N	N
2	*What are Waves?* | Introduce waves through this student-led discussion and a collection of interactive stations where students get to see waves working.	N	R	N	H
3	*Graphing Waves* | Students will investigate properties of waves through simplified graphs. They will explore amplitude, frequency, and wavelength and relate energy and speed with amplitude.	N	N	N	R
4	*How do Waves Sound?* | Expand understanding of waves by looking at sound waves. Students will investigate how the shape of a wave tells us how it sounds and use their new terminology to explain waves.	N	R	N	E
5	*Wave Impact Alert!* | Introduce students to wave reflection, absorption, and transmission through a variety of hands-on experiments and visualizations.	N	H	N	N
6	*Light Absorbance* | Students must design an experiment to compare the absorbance of light from a variety of different sunglasses to see which ones are the most effective glasses!	N	R	N	N
7	*Albedo* | 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.	N	R	N	E
8	*Time to Reflect* | Apply their understanding of albedo to investigate and measure the albedo values of multiple surfaces around their school campus.	N	R	N	E
9	*(Optional) Find Your Exit Buddy!* | Angles are trapped in either the Complementary Chamber or the Supplementary Suite. Randomly select an angle & determine its correct exit buddy to escape!	N	N	R	R
10	*Mirror Maze* | Discover the relationship between a beam of light and the reflection of that beam as it applies to angle relationships. Use their knowledge to create mirror mazes to hit a specific target.	N	N	N	R

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Pathways: *Waves* | *Grades 6 - 8*

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
11	*Let There Be Light* | 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.	N	R	N	N
12	*Planetary Thermometer* | Use data to explore the effect of light & heat as the distance increases from the source & the impact of a model greenhouse atmosphere. Relate the slope of lines to model temp. equilibrium.	N	E	N	R
13	*Comparing Sensors: The Distance of Light* | Compare the Labdisc sensors with the MyBot Optical Distance Sensor to better understand how the ODS relies on light readings to sense changes in distance & color.	R	R	N	N
14	*Sound Interference* | Explore the impact of noise and interference on sound waves. This activity builds upon what students have learned of waves and sets the stage for the benefits of digital signals over analog signals.	N	R	N	N
15	*Morse Codebots* | Learn about digital and analog signals by building and reading Morse-coded messages. They'll focus on generating easy-to-understand outputs based on logic by creating a binary output.	R	N	N	N

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Pathways: *Code: Past, Present, & Future* | 6

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
1	*Calculator Energy* | Explore the inner workings of a calculator and identify the areas where potential and kinetic energy are at work. These first six lessons are a standalone unit on binary and introduce code & logic.	N	N	N	N
2	*Discovering Binary (6th)* | Understand how decimal numbers can be represented in binary. Explore the idea of binary notation and how it uses only 0 and 1 as its digits. Convert between base ten & base two.	N	N	N	R
3	*History of Binary Storage (6th)* | See how computers use binary digits to communicate and store data using binary logic. Investigate the history of using magnetism in hard drives & the current use of electric charges in solid state disks	N	N	N	R
4	*Converting to Binary (6th)* | Use subtraction or division computational skills to convert from the base-ten system to base two. Students will enhance their number sense, reasoning, and computational fluency.	N	N	N	E
5	*What is ASCII? (6th)* | Explore how computers use binary digits to communicate text. Use binary to write letters and characters while learning about the history of this coding language. Practice writing in binary.	N	N	N	R
6	*Logic Gates (6th)* | Explore how binary code is read using logic gates and transistors. Follow truth tables for AND, OR, and NOT gates used in a series to add two single-digit numbers on a "paper calculator."	N	N	N	E
STEAM **Design Challenge** 7	*Coding Custom Clocks (6th)* | Tackle a client-driven design in this Tinkercad Codeblocks challenge. Decode a sample of code and reverse-engineer it to to create a code-driven 3D-printable clock.	N	N	N	H
8	*Mars Colony (PBL)* | 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 using your MyBot robot & speed calculations.	H	N	N	E
9	*The Importance of Being Accurate* | Become aerospace engineers testing shuttle launches to see how even a few degrees from vertical can significantly impact the flight of the shuttle.	N	N	H	R
10	*Missed it by That Much: Part 1*| Discover how an error is compounded over time at a constant rate of change by investigating the historical Apollo 11 rocket launch.	N	N	N	E

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Pathways: *Code: Past, Present, & Future | 6*

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
11	*Missed it by That Much: Part 2* | Fast forward to the future and recreate living in a command module on Mars. Students must rely on calculations to rendezvous with an off-course robot to retrieve life-saving medical supplies.	H	N	N	N
12	*Stabilized Direction Control* | 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 ships do.	R	N	N	N
13	*Layers of Detail: Part 1 - Landforms* | Create and compare topography maps with different levels of detail to see how the clarity varies. Then, use your MyBot robot's sensors to read and analyze another group's map.	H	N	N	R
14	*(Optional) Layers of Detail: Part 2 - Martian Landscape* | Use the Aldrin Family Foundation Giant Mars Map to plot out and identify Martian landforms. Program their MyBot to collect topographic data.	R	N	N	N
15	*(Optional) Tour of Mars* | 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.	R	N	N	N
STEAM **Design Challenge** 16	*Bulldozer Blade* | Students are tasked with designing and testing an attachment to turn their MyBot into a bulldozer so it can move rocks around with ease.	R	N	N	R
17	*Moving Mars Rocks* | Investigate Newton's Laws of Motion in this interactive rock-pushing activity! Collect data, construct graphs, solve equations, & evaluate scientific concepts such as inertia, acceleration, & force.	R	N	N	H
18	*Warning System Water Filter (6th)* | 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.	N	N	N	N
19	*Warning System Water Filtration (6th)* | In this science and ELA-based lesson, students will analyze the systems and statistics associated with early warning systems.	N	N	N	N
20	*Warning System Flowchart (6th)* | Create a flowchart to outline the steps required in the development of a water quality warning system to help communities assess drinking water safety after a natural disaster.	N	N	N	E

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Pathways: *Code: Past, Present, & Future | 6*

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** STEM Kit*	**3D** Printer*
21	*Warning System Programming (6th)* | Students will code a computerized warning system based on specific parameters to help communities assess drinking water safety after a severe weather event.	N	N	N	N
22	*(Optional) Water Filtration Challenge (6th)* | Revisit the original water filter challenge or expand it with this PBL lesson. Students will design, test, and present a water filtration system that meets specific parameters.	N	R	N	H
23	*Temperature Variation Between Day and Night* | 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 their Labdisc.	N	R	N	N
24	*(Optional) A Walk Through the City* | 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 sensors.	N	R	E	E
25	*Albedo* | 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.	N	R	N	E
26	*(Optional) Time to Reflect* | Apply their understanding of albedo to investigate and measure the albedo values of multiple surfaces around their school campus.	N	R	N	E
27	*Comparing Sensors: The Distance of Light* | Compare the Labdisc sensors with the MyBot Optical Distance Sensor to better understand how the ODS relies on light readings to sense changes in distance & color.	R	R	N	N
28	*Morse Codebots* | Learn about digital and analog signals by building and reading Morse-coded messages. They'll focus on generating easy-to-understand outputs based on logic by creating a binary output.	R	N	N	N

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Pathways: *Statistics* | *Grade 6*

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
1	*Statistical Questions* | Explore how scientists and mathematicians develop and plan investigations with statistical questions, taking into account a variety of attributes as part of the inquiry.	N	N	R	R
2	*Statistical Questions and Surveys* | Explore how mathematicians develop and plan investigations with statistical surveys while taking into account a variety of attributes, including wording bias.	N	N	N	N
STEAM **Design Challenge** 3	*Stacking Block Building* | Work from technical drawings to create their own stacking blocks given specific requirements. Utilize measuring, tolerances, and calculations to ensure the blocks stack well.	N	N	N	H
4	*Height Histograms* | 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 creating histograms.	N	N	N	H
5	*Lionfish and Histograms* | 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.	N	N	R	R
6	*It Can be a Zoo of Data* | Discover the difference between statistical measures of center and measures of variation when given data pertaining to real-life data that could be collected at a zoo. Introduce mean, median, and range.	N	N	N	N
7	*Mean and Median Modification* | Explore how the mean and median are affected by different data distributions. Enhance their knowledge of mean & median while challenged to create a variety of distributions.	N	N	N	H
8	*Greenhouse Atmosphere* | 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.	N	E	N	R
9	*Marshmallow Catapults* | Students will be presented with situations that require them to synthesize the knowledge they have gained over the statistics unit. Determine the best statistical measure & graph to use.	N	N	E	R
10	*It's Raining Cats and Dogs* | Discover how to create and interpret box plots. Students will also be introduced to the interquartile range as a measure of variability.	N	N	N	N

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Pathways: *Statistics* | *Grade 6*

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** *STEM Kit**	**3D** *Printer**
11	*Human Box Plot* | 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.	N	N	N	H
12	*Measurement and Data Collection* | 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.	N	R	N	N
STEAM **Design Challenge** 13	*Catapult Basket or Lever* | 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.	N	N	N	H
14	*Catapulting Data (6th)* | 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.	N	N	H	R
15	*MAD Bickering Boys* | 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.	N	N	N	N
16	*Lionfish and Dot Plots* | Visualize the frequency of randomly-sampled lionfish age groups at five different locations. Analyze the relationship between quantitative measures of dispersion and graphical distributions.	N	N	R	R
17	*Sea Ice Analysis (6th)* | 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.	N	N	N	N
18	*Let's Go to the Mall* | 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.	N	N	N	N
19	*Sensoring Data* | Use a scientific method of inquiry to plan an investigation of their own using their Labdisc. This activity is meant to allow students to use a variety of skills they have acquired throughout a statistics unit.	N	R	N	N
20	*(Optional) Catapults and Data Collection* | 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.	N	N	H	R

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Pathways: *Applied Geometry* | *Grade 7*

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** STEM Kit*	**3D** Printer*
1	*Wind Farm Challenge (PBL)* | Students are challenged to create the most efficient wind turbine while balancing cost constraints. Students will apply their knowledge of surface area and graphing.	N	N	N	R
STEAM **Design Challenge** 2	*Turbine Design* | Use in conjunction with the Wind Farm Challenge, this interdisciplinary design challenge integrates renewable energy, engineering design, and mathematics.	N	N	N	R
3	*Fractions, Decimals, and Percents* | Discover efficient ways to convert a fraction to a decimal and to a percent by knowing the decimal value of the base unit fraction. Determine equivalencies.	N	N	R	R
STEAM **Design Challenge** 4	*Spinner Fractions* | Create a useful tool to quickly partition the CD Spinner Kit into equal fractional amounts. Students will be challenged to design around the existing kit before creating a fraction disk.	N	N	N	H
5	*(Optional) Fractions & Decimals* | Discover that the decimal form of a rational number will be either a terminating or repeating decimal. Validating or invalidating conjectures is one of the overarching goals.	N	N	R	R
STEAM **Design Challenge** 6	*Engineering 3D Vertices: Prisms* | Build an assigned vertex which attaches to straws so it can be used to construct a right regular triangular, pentagonal, hexagonal, or octagonal prism.	N	N	N	H
7	*(Optional) Historical Housing MEA (PBL)* | 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.	N	N	N	R
8	*Find Your Exit Buddy!* | Find the correct exit buddy! Angles are trapped in either the Complementary Chamber or the Supplementary Suite by a mathematician. Randomly select an angle & determine its correct partner to escape!	N	N	R	R
STEAM **Design Challenge** 9	*(optional) Houston, We Have an Engineer* | Compare rocket parts and build their own. Enhance their engineering, geometry, and problemsolving skills & determine the best way to test competing designs.	N	N	N	R
10	*(optional) Rocket Energy* | Introduce key terms related to energy and forces with this exploratory activity. Students will get a chance to build and decorate their own model rockets and will use knowledge of angles to launch them.	N	N	N	R

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Pathways: *Applied Geometry* | *Grade 7*

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	MyBot **Robot**	Labdisc **Sensors**	**Virtual** STEM Kit*	**3D** Printer*
11 *Mirror Maze* | Discover the relationship between a beam of light and the reflection of that beam as it applies to angle relationships. Use their knowledge to create mirror mazes to hit a specific target.	N	N	N	R
12 *(Optional) Albedo* | 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.	N	R	N	E
13 *(Optional) Time to Reflect* | Apply their understanding of albedo to investigate and measure the albedo values of multiple surfaces around their school campus.	N	R	N	E
14 *Comparing Sensors: The Distance of Light* | Compare the Labdisc sensors with the MyBot Optical Distance Sensor to better understand how the ODS relies on light to sense changes in distance & color.	R	R	N	N
15 *Roving Roombot* | Program your MyBot to behave like a cleaning robot! Practice using scale & area calculations to translate a scale drawing into an arena & program your robot to stay within the bounds. Investigate efficiency.	R	N	N	E
STEAM **Design Challenge 16** *Rover Wheels* | Engineer 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.	H	N	N	R
17 *Cruising for Circumference* | What impact does wheel diameter have on distance travelled? Students investigate circumference as they compare different wheel designs. Calculate speed and unit rates.	E	N	N	R
STEAM **Design Challenge 18** *3D Derby* | 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.	N	N	N	H
19 *(Optional) Meter Stick Cart* | Qualitatively and quantitatively analyze the motion of a cart undergoing uniform acceleration. Graph position and velocity versus time & generate a function from the data.	N	E	N	H

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Pathways: *Statistics* | *Grade 7*

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		MyBot **Robot**	Labdisc **Sensors**	**Virtual** STEM Kit*	**3D** Printer*
STEAM **Design Challenge** 1	*Catapult Basket or Lever* | 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.	N	N	N	H
2	*MAD Statapults* | 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.	N	N	H	R
3	*Analyzing MAD Lionfish* | 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.	N	N	N	N
4	*Soap Bubbles* | Blow soap bubbles and analyze the results. Compare two sets of data using graphical and numerical representations, including mean absolute deviation.	N	N	N	N
5	*Catapulting Data (7th)* | Explore data collection using a catapult. Create boxplots for data analysis that will help to demonstrate the scientific concepts of transfer of energy.	N	N	H	R
STEAM **Design Challenge** 6	*Houston, We Have an Engineer* | Compare rocket parts and build their own. Enhance their engineering, geometry, and problemsolving skills & determine the best way to test competing designs.	N	N	N	R
7	*(optional) Rocket Energy* | Introduce key terms related to energy and forces with this exploratory activity. Students will get a chance to build and decorate their own model rockets and will launch them.	N	N	N	R
8	*Baseball Statistics (PBL)* | Students are presented with a PBL challenge to showcase their previously-learned statistical skills. Students will use basic measures of center and variability to take opposing positions.	N	N	N	N
9	*Adjusting Data* | Explore how the mean and median are affected by adjusting values & enhance their knowledge of mean and median as they are challenged to create a variety of data sets with specific criteria.	N	N	N	N
10	*Reaction Time* | Gather reaction data using two different procedures to help illustrate the bias that can occur due to human perception. Begin to understand confidence intervals and reliability in data analysis.	N	N	N	N

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11	*Measurement and Data Collection* | 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.	N	R	N	N
12	*Energy Efficiency* | Gather information about different types of light bulbs and their efficiency at producing light. Based on their findings, they will identify costsaving measures that people can take to reduce energy consumption.	N	E	N	H
STEAM **Design Challenge** 13	*(optional) Turbine Design* | Use in conjunction with the Wind Farm Challenge, this interdisciplinary design challenge integrates renewable energy, engineering design, and mathematics.	N	N	N	R
14	*Sea Ice Analysis (7th)* | Using data from the National Snow and Ice Data Center, students will use technology to quickly generate graphs for each month, looking for trends, patterns, or deviations over time.	N	N	N	N
15	*Ocean Floor Sampling: Part 1* | Use 3D-printed ocean models to gather measurements and estimate the average depth of two different regions of the ocean.	N	N	N	R
16	*Ocean Floor Sampling: Part 2* | Determine which portion has a deeper average depth. These activities facilitate understanding of how repeated random sampling techniques allow students to compare different populations.	N	N	N	R
17	*Statistical Quadrats* | Explore statistical sampling methods, specifically the quadrat method, and evaluate how well it produces samples similar to the population. Compare their results to the entire population.	N	N	N	H
18	*Lionfish Sampling Methods* | Develop an iterative sampling method to make inferences about the invasive lionfish. Students will carry out their investigation, create histograms, and calculate quantitative data.	N	N	E	R
19	*Bean Bag Toss (PBL)* | 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.	N	N	N	N
20	*Introduction to Probability* | Students will be introduced to the basic concept of probability and how to calculate the probability of simple events. Then they will visualize this using a 0-1 number line to connect to fractions.	N	N	N	R

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Pathways: *Statistics* | *Grade 7*

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21	*Predicting Outcomes* | Use probability to determine the relative frequency that a specific event is expected to occur. See how recording data from experiments can help them determine the long-run relative frequency.	N	N	N	N
STEAM **Design Challenge** 22	*Spinner Probabilities* | Design a tool to partition the CD Spinner Kit into designated non-equal amounts to represent a requested probability distribution.	N	N	N	H
23	*Which Bag is it?* | Explore the idea of probability in terms of confidence levels with repeated trials. Conceptualize the law of large numbers and its relationship to theoretical and experimental probability.	N	N	N	N
24	*Theoretical & Experimental Probability* | Explore the use of probability models to compare/contrast theoretical probability & experimental probability. Student will use repeated trials to help conceptualize the law of large numbers.	N	N	N	R
25	*Probability Dice* | Explore theoretical probability and sampling methods to make inferences and conclusions about basic claims to understand how knowledge of what "should" happen is essential for analyzing results.	N	N	N	R
26	*Modeling Genetics with Probability* | Create probability models to simulate determining the experimental probability of certain genetic combinations through exploring genotypes and phenotypes through Punnett squares.	N	N	N	R
27	*(Optional) Moth Selection* | Explore sampling techniques and will collect data to examine adaptive characteristics of the moths.	N	N	N	H
28	*Natural Selection with Probability Models* | Simulate natural selection of bunnies. Using both theoretical and experimental probability concepts will demonstrate that simulations do not always behave as expected.	N	N	N	H
29	*(Optional) Moth Survival* | 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.	N	N	N	H
30	*How Many Outfits?* | 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.	N	N	N	H

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31	*Compound Events* | Students will be introduced to the concept of compound events & will build conceptual understanding by relating the use of organized lists and/or tree diagrams to the multiplication rule of probability.	N	N	N	N
32	*Consumer Product Analysis* | 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.	N	N	N	N
33	*Cold Soda Cups* | 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.	N	E	N	N

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Pathways: *Code & Space Exploration | Grade 8*

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	MyBot **Robot**	Labdisc **Sensors**	**Virtual** STEM Kit*	**3D** Printer*
1	*Sand to Circuit* | Explore the process of building an integrated circuit. These first six lessons are a standalone unit on binary and introduce code & logic.	N	N	N	N
2	*Discovering Binary (8th)* | Understand how decimal numbers can be represented in binary. Explore the idea of binary notation and how it uses only 0 and 1 as its digits. Convert between base ten & base two.	N	N	N	R
3	*History of Binary Storage (8th)* | See how computers use binary digits to communicate and store data using binary logic. Investigate the history of using magnetism in hard drives & the current use of electric charges in solid state disks	N	N	N	R
4	*Converting to Binary (8th)* | Use subtraction or division computational skills to convert from the base-ten system to base two. Students will enhance their number sense, reasoning, and computational fluency.	N	N	N	E
5	*What is ASCII? (8th)* | Explore how computers use binary digits to communicate text. Use binary to write letters and characters while learning about the history of this coding language. Practice writing in binary.	N	N	N	R
6	*Logic Gates (8th)* | Explore how binary code is read using logic gates and transistors. Follow truth tables for AND, OR, and NOT gates used in a series to add two single-digit numbers on a “paper calculator.”	N	N	N	E
STEAM **Design Challenge** 7	*Space Station Modules* | Work from technical explanations to create specific space station modules. Students will utilize their understanding of basic shapes, measuring, tolerances, & calculations.	N	N	N	H
8	*Space Station MEA (PBL)* | 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 & then design a new module.	N	N	N	H
9	*Water Filter Amounts (8th)* | The first of four in a unit on water quality and filtering, students design, build, and test water filters with different amounts of materials so those in space / off-world can have safe water.	N	R	N	H
10	*Water from Mars* | Water as a resource on other planets is primary concern for exploration and colonialization. Analyze the technologies that can be used to extract drinking water from the native soils/materials on distant worlds.	N	N	N	N

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Pathways: *Code & Space Exploration | Grade 8*

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11	*Warning System Flowchart (8th)* | Create a flowchart to outline the steps required in the development of a regolith quantity, water quantity, and water quality warning system which can monitor specific parameters.	N	N	N	E
12	*Warning System Programming (8th)* | Code a computerized warning system for water collected on Mars based on specific parameters to help determine the quantity of water in Martian regolith & quality of the water.	N	N	N	N
13	*(optional) Establishing Mars Research Stations* | Students will form a mission organization to create and execute a plan for establishing Mars Research Stations in scientific and logistically strategic locations.	R	N	N	N
STEAM **Design Challenge** 14	*Bulldozer Blade* | Students are tasked with designing and testing an attachment to turn their MyBot into a bulldozer so it can move rocks around with ease.	R	N	N	R
15	*Moving Mars Rocks* | Investigate Newton's Laws of Motion in this interactive rock-pushing activity! Collect data, construct graphs, solve equations, & evaluate scientific concepts such as inertia, acceleration, & force.	R	N	N	H
16	*Scale, Speed, and Robots* | Explore code conventions, functions, and similar shapes while practicing using distance-time calculations. Introduce programmatic variables to create efficient programs.	R	N	N	E
17	*Pythagorean Proof: Conservation of Area* | Work with a tangible model to explore a proof of the Pythagorean Theorem. Incorporate the area of a square formed by right triangle sides into their understanding.	N	N	N	H
18	*Gliders & The Pythagorean Theorem* | Record results of flight trials as landing location coordinates & solve distance problems. Use with the Gliders Kit or keep in theme by doing the activity with the 3D or virtual Rockets Kit.	N	N	R	R
19	*Mars Colony (PBL)* | 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 using your MyBot robot & speed calculations.	R	N	N	H
20	*Calculating Intercepts* | Write functions based on coordinate data to quantify your route & calculate an intercept point with a nearby spacecraft. Utilize the Pythagorean Theorem to compare speeds so you arrive at the same time.	H	N	N	E

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Pathways: *Statistics* | *Grade 8*

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1	*Rocket Balloons* | 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 & create the trend-line equation.	N	N	N	E
2	*(Optional) Wind Farm Challenge* | Students are challenged to create the most efficient wind turbine while balancing cost constraints. Students will apply their knowledge of surface area and graphing.	N	N	N	R
STEAM **Design Challenge** 3	*(Optional) Turbine Design* | Use in conjunction with the Wind Farm Challenge, this interdisciplinary design challenge integrates renewable energy, engineering design, and mathematics.	N	N	N	R
4	*Scattering Conkers* | Explore bivariate data collection by dropping conkers, tracking seed dispersion, and performing statistical analysis of the data. Students will create scatterplots of the data to look for trends.	N	N	N	R
5	*Let There Be Light* | 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.	N	R	N	N
6	*Bowling for Stats* | Use a 3D-printed bowling set to facilitate understanding of interpreting the correlation coefficient, slope, and y-intercept of a least squares regression model.	N	N	N	R
STEAM **Design Challenge** 7	*Catapult Lever* | 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.	N	N	N	H
8	*Catapulting Data (8th)* | Explore data collection using a catapult and perform statistical analysis of the data. Create scatterplots for analysis that will help demonstrate the scientific concepts of density.	N	N	H	R
9	*Adjusting Jumps* | 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.	N	N	N	N
10	*Height Scatterplot* | Investigate bivariate analysis, create scatterplots & estimate the line of best fit. Use their linear regression line for interpolation.	N	N	N	N

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Pathways: *Statistics* | *Grade 8*

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11	*Outlier Effect* | 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.	N	N	N	N
12	*Blindfold Target Practice* | This activity focuses on planning, collecting, and analyzing data with two numerical variables. Create scatterplots & estimate a best fit line. Use that linear regression line for interpolation.	N	N	N	N
13	*Sea Ice Analysis (8th)* | 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.	N	N	N	N
14	*Planetary Thermometer* | Use data to explore the effect of light & heat as the distance increases from the source & the impact of a model greenhouse atmosphere. Relate the slope of lines to model temp. equilibrium.	N	E	N	R
15	*(Optional) Planetary Temperatures* | Model the effect the Sun has on the temperature of the first three planets in our solar system. Explore the impact that a model greenhouse atmosphere will have on the three simulated planets.	N	E	N	R
16	*Minute Minded!* | Two-way tables provide a way to organize bivariate categorical data. Students will gather data and organize the data into a two-way table. They will analyze the data using relative frequencies.	N	N	N	N
17	*Categorically Catapulting Cheery Cereal* | 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.	N	N	E	R
STEAM Design Challenge 18	*Houston, We Have an Engineer* | Compare various rocket parts and build their own. Enhance their engineering, geometry, and problemsolving skills & determine the best way to test competing designs.	N	N	N	R
19	*Bivariate Rocket Launch* | Connect how data in a scatterplot and a two-way frequency table can show a relationship in bivariate data. Use both the scatterplot and two-way table to justify if there is a relationship.	N	N	E	R
20	*Water Filtration Challenge PBL (8th)* | Research and then 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.	N	R	N	H

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Pathways: *Biology* | *9 - 12*

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1	*Measuring Biodiversity* | Use various metrics to quantify plant biodiversity on their school grounds. Hypothesize about observed trends in biodiversity. Apply to an online data set to assess the diversity of plants around the world.	N	N	N	H
2	*Life Tables* | Examine mortality, specifically the age at which individuals die, in order to mathematically model survivorship in a human population. Construct life tables and create survivorship and mortality curves.	N	N	N	E
3	*Moth Natural Selection* | Explore sampling techniques and how they relate to the whole population and use the data to determine adaptive characteristics of the moths.	N	N	N	H
4	*Moth Variation* | 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.	N	N	N	H
5	*Food Web* | 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? Introduce energy transfer across trophic levels.	N	N	N	H
6	*Darwin's Finch Evolution* | Reconstruct the evolution of finches from their common ancestor. Compare beak measurements to diet & habitat data to explain how these finches evolved to exploit different food types.	N	N	N	R
7	*Hominin Evolution* | Explore trends in the evolutionary history of hominins, including the evolution of bipedalism, brain size, jaw size, and tool use. Examine specimens and place in the correct evolutionary sequence.	N	N	R	R
8	*Human Brain in 3D* | Students will explore the major structural regions of the human brain and associate them with particular behaviors or functions.	N	N	N	R
9	*Biological Macromolecules* | In this initial lesson explore the general concept of building blocks, monomers, and polymers as a way to understand the process of polymerization in this introductory lesson.	N	N	N	N
10	*Macromolecules: Carbohydrates* | Assemble models of carbohydrate macromolecules using simple sugars. Explore the variety of carbohydrate structures and explain how function relates to the structure.	N	R	N	H

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11	*Macromolecuels: Lipids* | Assemble models of lipids using fatty acids, the building blocks of lipids, and understand their vital function in health and in biology.	N	N	N	R
12	*Phospholipids* | Explore the structure of the fluid mosaic model of the cell membrane. Examine phospholipids and proteins found within the membrane. This lesson is an opportunity for discussion of a model.	N	N	N	R
13	*Macromolecules: Proteins* | Assemble a 3D 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.	N	N	N	R
14	*Protein Folding* | 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.	N	N	N	R
15	*Macromolecules: Nucleic Acids* | 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.	N	N	N	H
16	*DNA Replication* | 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.	N	N	N	R
17	*(Optional) Protein Synthesis (Cytochrome C)* | Students will learn about the biochemical components and processes required to produce a protein, starting with the nucleotides in a DNA molecule: Human Cytochrome C.	N	N	N	R
STEAM **Design Challenge** 18	*Missing Molecules* | Using only photographs and a portion of the Enzyme-Substrate Interaction Kit, students will be asked to recreate Molecules B and C. Must measure & account for tolerances.	N	N	N	R
19	*Enzyme Structure and Function* | Explore how enzymes interact with a variety of binding partners. Model how enzymes function through association with other molecules and speculate on how they can be regulated in vivo.	N	N	N	R
20	*Genetic Mutations* | Learn about DNA-level mutations and how such can result in changes to a resulting protein by observing a change in an amino acid sequence. Evaluate cellular level, proteins, & DNA sequences.	N	N	N	R

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21	*(Optional) Protein Synthesis (Sickle-Cell)* | Review the process of protein synthesis that includes transcription of DNA & translation into a peptide. The sequence of amino acids determines the structure & function of the protein.	N	N	N	R
22	*(Optional) Sickle Cell Hemoglobin* | Evaluate sickle cell disease, which results from a single nucleotide mutation in a hemoglobin gene, leading to an altered protein sequence and a different three-dimensional shape.	N	N	N	R
23	*Mendel's Mighty Model* | Demonstrate the law of segregation during meiosis. Use Mendel's model of inheritance to predict the genotype and phenotype of offspring from a particular cross. Simulate the results of particular crosses.	N	N	N	R
24	*Patterns of Inheritance: Will My Child Inherit a Genetic Disorder?* | The first lesson in an extended case study series, explore the transmission of genetic disease across generations. Complete a family pedigree to determine the risk of passing on a familial disease.	N	N	N	H
25	*Blood Type Compatibility* | Refine understanding of blood type compatibility. The models allow for investigation of a variety of donor-recipient scenarios. By assessing each scenario, determine whether blood types are compatible.	N	N	R	R
26	*Mendelian Genetics: Blood Type Inheritance* | Connect the process of meiosis to Punnett squares and Mendelian inheritance patterns. Students use Rh-factor blood type as an example to learn about Mendelian genetics in this medical case study lesson.	N	N	N	R
27	*Genetic Variation in Related Individuals: Identical Cousins?* | Learn how genetic variation occurs through random assortment and independent segregation of chromosomes. Investigate how genetic variation occurs even in the children of identical twins.	N	N	N	R
28	*Epigenetic Control of Identity: Are Identical Twins Always Identical?* | Model chromatin formation with 3D-printed materials and visualize the scale of DNA compactions. Investigate how even identical genomes result in variety, accounted for by their epigenomes.	N	N	N	H
29	*A Case Study in Chromosomal Disorders* | Investigate a case study during which they diagnose aneuploidy in a newborn infant. Learn about specific types of chromosomal disorders, how they occur, and diagnose healthy versus abnormal karyotypes.	N	N	N	H

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30	*DNA Structure and Replication: Cell Division in a Rapidly-Growing Fetus* | Understand DNA Replication in a developing fetus. This is a continuation of the ongoing genetic counseling scenario started in Patterns of Inheritance.	N	N	N	R
31	*Protein Synthesis and DNA Mutation: Sickle Cell Hemoglobin* | Explore protein synthesis and the pathway from DNA to RNA to protein. Use the example of sickle cell disease as a framework to investigate how protein is synthesized and the consequences of mutations.	N	N	N	R
32	*The Role of the Ribosome: Antibiotic Defense Against Infection* | Examine the ribosome complex. Students model a ribosome structure and investigate how antibiotics interact with the ribosome to cure bacterial infection.	N	N	N	R
33	*Biotechnology and Ethics: Editing Genes with CRISPR* | Learn about the remarkable potential of CRISPR-Cas9 technology and explore bioethical considerations through a close reading, 3D modeling, debate, and writing.	N	N	N	R

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Pathways: *Statistics* | *9 - 12*

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1	*Moth Natural Selection* | Explore sampling techniques and how they relate to the whole population and use the data to determine adaptive characteristics of the moths.	N	N	N	H
2	*(Optional) Lionfish Sampling Methods* | Develop an iterative sampling method to make inferences about invasive lionfish. Students will carry out their investigation, create histograms, and calculate quantitative data.	N	N	H	R
3	*Lionfish and Histograms* | 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.	N	N	N	N
4	*Sampling Lionfish* | Develop a sampling method to make inferences about the invasive lionfish. Carry out their investigation, create histograms, and calculate quantitative data like standard deviation to make conjectures.	N	N	R	R
5	*Lob the Lionfish* | Players roll lionfish and earn points for each of the different possible positions. Students will use data sets to determine whether the point allocation for the game is fair.	N	N	R	R
6	*Which Bag is it?* | Explore the idea of probability in terms of confidence levels with repeated trials. Conceptualize the law of large numbers and its relationship to theoretical and experimental probability.	N	N	N	N
7	*Bean Bag Toss (PBL)* | 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.	N	N	N	N
8	*(Optional) Ready, Aim, Fire!* | Apply the law of conservation of energy to determine the total mechanical energy of the projectile. Generate histogram plots to emphasize energy conservation.	N	N	E	R
9	*Reaction Time* | Gather reaction data using two different procedures to help illustrate the bias that can occur due to human perception. Begin to understand confidence intervals and reliability in data analysis.	N	N	N	N
10	*(Optional) Projectile Motion* | Use the kinematic equations to determine launch velocity, time of flight, and the maximum height attained by a projectile from only two data points.	N	N	E	R

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STEM **Design Challenge 11**	*Catapult Basket or Lever* | 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.	N	N	N	H
12	*Catapults and Standard Deviation* | Explore data collection and statistically analyze the data. Students will compare two sets of data using graphical and numerical representations including standard deviation.	N	N	H	R
STEM **Design Challenge 13**	*Houston, We Have an Engineer* | Compare various rocket parts and build their own. Enhance their engineering, geometry, and problemsolving skills & determine the best way to test competing designs.	N	N	N	R
14	*(Optional) Bivariate Rocket Launch* | Connect how data in a scatterplot & a two-way frequency table can show a relationship in bivariate data. Use both the scatterplot & two-way table to justify if there is a relationship.	N	N	H	E
15	*Ballista Data Set Comparison* | Launch projectiles from a model ballista to generate data. From launches at two or more angles, students will generate distance data. Calculate mean and standard deviation values for each data set.	N	N	E	R
16	*Ballista T-Test* | Explore the relationship of launch force and projectile distance traveled. Conduct a statistical analysis to evaluate the extent to which differences between the group means are statistically significant.	N	N	E	R
17	*Bivariate and Regression Catapult* | Create bivariate data using a catapult to launch projectiles with a variety of masses. Analyze results to discover trends and create regression lines. Graph data on a scatterplot.	N	N	H	R
18	*Moth Variation* | 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.	N	N	N	H
19	*Adjusting Jumps* | 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.	N	N	N	N
20	*Height Scatterplot* | Investigate bivariate analysis, create scatterplots & estimate the line of best fit. Use their linear regression line for interpolation.	N	N	N	N

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21	*Linear Regression and Volume* | Use linear regression models to examine the relationships between diagonal length, edge length, surface area, and volume. Use volume models to gather measurements & explore relationships.	N	N	N	H
22	*Outlier Effect* | 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.	N	N	N	N
23	*Blindfold Target Practice* | This activity focuses on planning, collecting, and analyzing data with two numerical variables. Create scatterplots & estimate a best fit line. Use that linear regression line for interpolation.	N	N	N	N
24	*Cold Soda Cups* | 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.	N	H	N	N
25	*Sensoring Data* | Use a scientific method of inquiry to plan an investigation of their own using their Labdisc. This activity is meant to allow students to use a variety of skills they have acquired throughout a statistics unit.	N	R	N	N
26	*(Optional) Carrying Cargo (PBL)* | Test the efficiency of various cargo boat designs. Collect data and determine which is superior. Explore scientific approaches, engineering design, and mathematical applications.	N	N	N	R
STEAM **Design Challenge** 27	*Ship Design* | Optimize a ship given requirements & constraints. Utilize their understanding of 3D modeling and 3D printing to engineer a model which prints and performs well.	N	N	N	H

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