

Mathematical Approach to Problem Solving

Chambersburg Area School District

Course Map Timeline

Unit	Suggested Timeline
Unit 1: The Mathematics of Numbers and Quantities	6 weeks
Unit 2: The Mathematics of Informed Decision Making	6 weeks
Unit 3: Illustrative Mathematics	6 weeks
Unit 4: The Mathematics of Chance	6 weeks
Unit 5: The Mathematics of Starting a Business	6 weeks
Unit 6: The Mathematics of Coding	6 weeks

Course Description: This course emphasizes mathematical reasoning skills needed for informed citizens to understand the world around them. Authentic, project-based learning activities embedded into “real world” situations incorporate concepts of numbers and operations, geometry, measurement, data and probability, and algebraic concepts.

Standards for Mathematical Practice

- *Make sense of problems and persevere in solving them.*
- *Reason abstractly and quantitatively.*
- *Construct viable arguments and critique the reasoning of others.*
- *Model with mathematics.*
- *Use appropriate tools strategically.*
- *Attend to precision.*
- *Look for and make use of structure.*
- *Look for and make sense of regularity in repeated reasoning.*

Unit 1: The Mathematics of Numbers and Quantities

Big Idea: Students will use number sense and draw conclusions based on analysis and critique of quantitative information, using proportional reasoning to solve real-world problems in a variety of contexts.

Unit Essential Questions:

- How do you translate given situations into math expressions, equations and formulas and use these to solve problems?
- How are fractions, decimals, percents, and ratios related and used to represent real-world situations including those dealing with proportionality?
- How can data be used to make inferences and justify conclusions?

Concept: Ratios and Proportions	Concept: Functions, Sequences, Equations	Concept: Math Models and Data
2.1.HS Numbers and Operations (CC.2.1.HS.F.5) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (CC.2.1.HS.F.3.) Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays	2.2 HS Algebraic Concepts (CC.2.2.HS.C.1.) Use the concept and notation of functions to interpret and apply them in terms of their context (CC.2.2.HS.C.3) Write functions or sequences that model relationships between two quantities. (CC.2.2.HS.C.5.) Construct and compare linear, quadratic, and exponential models to solve problems. (CC.2.2.HS.D.7.) Create and graph equations or inequalities to describe numbers or relationships. (CC.2.2.HS.D.10.) Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically	2.4 HS Measurement, Data, and Probability (CC.2.4.HS.B.5) Make inferences and justify conclusions based on sample surveys, experiments, and observational studies. (CC.2.4.HS.B.3.) Analyze linear models to make interpretations based on the data
Lesson Essential Question(s): • How are fractions, decimals, and percents used to represent real-world situations including those dealing with proportionality? • How are ratios used to represent real-world situations including those dealing	Lesson Essential Question(s): • How do you translate given situations into math expressions, equations and formulas? • How do you use math expressions, equations and formulas to solve problems? • How can patterns, relations, and functions be used as tools	Lesson Essential Question(s): • How can we use mathematical models to describe physical relationships? • How do geometric relationships help to solve problems and/or make sense of phenomena? • How can measurements be used to solve problems? • How can we use mathematical models to describe

with proportionality? • How can we use mathematical models to describe physical relationships?	to best describe and help explain real-life situations?	physical relationships?
Vocabulary: Rates, ratios, proportions, bar graph, line graph, circle graph, frequency table, prediction, equally likely	Vocabulary: Relation, function, variable, formula, equations	Vocabulary: Inferences, Rates, ratios, proportions, bar graph, line graph, circle graph, frequency table, prediction, equally likely

Sample Projects:

1. **City Planner** - The Americans with Disabilities Act (ADA) was enacted into law to help individuals with disabilities have the same access as those individuals without disabilities. Based upon federal mandates, state and local governments are required to follow specific building standards in the new construction and alteration of areas such as pedestrian walkways.
2. **Landscape Architect** - As a landscape architect, you will work to create and design a landscape plan/blueprint for the grounds of your school. You will research the need for this change and the cost involved. You will create a design that includes walkways, shrubs, flowers, benches, etc., taking into account the necessary mathematical and engineering concepts that will make your design cost-effective, while increasing the visual appeal of the school grounds. You will develop a model that will be used in your presentation to the audience in hopes of securing the job. Analyzing the cost of your design will be necessary in order to obtain support from the school board.
3. **Pyro technician** - Fireworks displays are very popular all over the country. They can be found in small towns and big cities. People often take for granted the beauty of the displays and how they happen. These displays actually take a great deal of planning and knowledge of science and math. These math and science concepts help ensure that people are kept safe while they watch an incredible show.
4. **Structural Engineer: Bridges** - The nation is greatly concerned about the quality of the bridges in the United States. This quality directly affects individual safety creating concern among citizens and government officials. Most state departments of transportation provide information regarding bridge quality.

District Resource: www.definedstem.com

Unit 2: The Mathematics of Informed Decision Making

Big Idea: Students learn how to use mathematics to make important decisions and learn how mathematics is used in many areas of their lives.

Unit Essential Questions:

- How can relations and functions be represented and analyzed using words, tables, graphs and equations?
- How can data be collected, represented, and analyzed in order to answer questions in context of a real world situation?
- How can numerical quantities, calculations, and measurements be estimated or analyzed using appropriate strategies and tools?
- How can geometric relationships be described, analyzed and classified based on spatial reasoning and/or visualization?

Concept:
Units, Scales and Data Displays

Concept:
Geometry: Shapes and Dimension

Concept:
Functions and Equations

2.1.HS Numbers and Operations

(CC.2.1.HS.F.5) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

(CC.2.1.HS.F.3) Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.

2.3 Geometry

(CC.2.3.HS.A.12) Explain volume formulas and use them to solve problems.

(CC.2.3.HS.A.7) Apply trigonometric ratios to solve problems involving right triangles.

2.2.HS Algebraic Concepts

(CC.2.2.HS.C.3) Write functions or sequences that model relationships between two quantities.

(CC.2.2.HS.C.5) Construct and compare linear, quadratic, and exponential models to solve problems.

(CC.2.2.HS.C.6) Interpret functions in terms of the situations they model.

(CC.2.2.HS.D.7) Create and graph equations or inequalities to describe numbers or relationships.

(CC.2.2.HS.D.8) Apply inverse operations to solve equations or formulas for a given variable

(CC.2.2.HS.D.1) Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

(CC.2.2.HS.D.10.) Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically

Lesson Essential Question(s):	Lesson Essential Question(s):	Lesson Essential Question(s):
- How are relationships represented mathematically? - In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted? - How can some questions be answered by collecting, representing and analyzing data?	- How are spatial relationships, including shape and dimension, used to draw real situations? - How are spatial relationships used to construct real situations? - How are shapes and dimensions used to model, and represent real situations and solve problems?	- How can expressions and equations be used to quantify and solve mathematical situations? - How can inequalities be used to quantify and solve mathematical situations? - How can expressions, equations, and inequalities be used to analyze mathematical situations?
Vocabulary: Qualitative data, quantitative data, frequency, variance, inference	Vocabulary: Surface area, volume, lateral area, slant height, diameter, radius, trigonometric ratio	Vocabulary: Relation, function, function notation, correlation

Sample Projects:

- 1. Accident Scene Investigation** - Regional law enforcement and the District Attorney's Office have just created a new forensic science department. Within this department there will be an accident scene investigation unit. This department will be funded through taxpayer dollars and as such the community is very interested in the benefits that this department can provide to the community. Working with a reporter from the local newspaper, you will need to develop a variety of resources that can help educate the public regarding forensic science.
- 2. Computer Manufacturer**-The United Nations has put forth an initiative to supply computers to students in all parts of the world. These are needed most by countries with economically depressed populations. As part of this initiative, the cost for the computers is required to cost a maximum of \$100. The computers may only be purchased by governments that request them. Your new technology company has been approached by the governments of two South American countries. They have inquired about your ability to provide 1,000,000 computers in the next (x) number of months. The embedded simulation will help you develop a plan as to the number of workers and shifts that will be required to meet this demand. Can you help your company pull this off?
- 3. Packaging Analyst: Determining Packaging Effectiveness for a New Energy Drink**- Energy drinks are incredibly popular with people of all ages. Millions of dollars are spent each year buying these drinks in single cans and in bulk packages. The marketplace has a number of different energy drink choices. These energy drink companies have an advantage over new companies in that they are known by consumers. This new energy company will need to become known and will need to create a can that is user-friendly and can shipped cost-effectively and efficiently to maximize profits and to be able to reach consumers all over the country.
- 4. Virologist: Virus and Vaccine Dosing**- The Zika virus is a disease transmitted by mosquitos. This virus has spread to many parts of the world. Its transmission and symptoms have caused great concern for scientists, doctors, world leaders and the citizens they protect. This disease has occurred in numerous parts of the world with cases also occurring in the United States.

District Resource: www.definedstem.com

Unit 3: Illustrative Mathematics

Big Idea: Students explore geometry and mathematics through design projects that incorporate real world applications such as technical drawings, constructions, and experimental studies.

Unit Essential Question(s):

- How can geometric concepts be applied to create models for real world situations?
- How can numbers, measures, expressions, equations, and inequalities represent mathematical situations and structures in many equivalent forms?

Concept: Geometry Drawings and Constructions	Concept: Surveys and Experimental Studies	Concept: Functions and Graphs	Concept: Scales, Graphs, and Data Displays
2.3 Geometry (CC.2.3.HS.A.4) Apply the concept of congruence to create geometric constructions. (CC.2.3.HS.A.14) Apply geometric concepts to model and solve real world problems.	2.4 HS Measurement, Data, and Probability (CC.2.4.HS.B.5) Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.	2.2 Algebraic Concepts (CC.2.2.HS.C.8) Choose trigonometric functions to model periodic phenomena and describe the properties of the graphs.	2.1 Numbers and Operations (CC.2.1.HS.F.3) Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays. (CC.2.1.HS.F.5) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities
Lesson Essential Question(s): • How is congruence for constructions? • How can geometry be applied to create models? • How can real world problems be solved by applying geometric concepts?	Lesson Essential Question(s): • How can inferences be made to contribute to conclusions for real world problems? • How can surveys be used to justify conclusions for real world situations? • How can experiments and studies be used to develop and justify a conclusion for real world problems?	Lesson Essential Question(s): • How can functions be used to create models? • How can properties of graphs be used to model phenomena? • How can functions and graphs be used to model solutions for real world problems?	Lesson Essential Question(s): • How can quantitative reasoning be used to interpret data displays? • How can units and scales be interpreted in formulas for data displays? • How can an appropriate level of accuracy be chosen to report quantities in real world situations?
Vocabulary: Congruence, corresponding angles, corresponding sides, congruent polygons	Vocabulary: Types of data displays, experiment, trial, outcome, probability, prediction	Vocabulary: Functions, types of graphs	Vocabulary: Units, scales, bar graph, line graph, circle graph

Sample Projects:

1. **Botanical Design** - Your firm has a vision for a state grant that allows one company to select a public space in the community and redesign it to improve its aesthetics and utility. Your firm wants an opportunity to prepare a community space that is aesthetically pleasing, incorporating elements of native plants from your region, containing educational materials related to these plants, and including areas for gathering and recreation. In creating your proposed design, keep in mind the wishes of the individuals from the community and the goals of the grant. The grant committee will be expecting to see that you maintained the integrity of the space while also promoting the goals of the grant.
2. **Sunglass Manufacturer**- As a product designer, you will work to create a new line of sunglasses that will keep the wearer safe from harmful radiation, while at the same time, being fashionable. You will create a design for your product, including the necessary scientific concepts to make your product visually and financially appealing to your targeted group. You will develop scale drawings of your sunglasses that will be used as part of the advertising campaign along the New Jersey coast. An understanding of how sunglasses work to keep the eyes safe will be a very important point of the summer marketing along the coast.
3. **Web Design and the Golden Ratio** - Greek architecture frequently incorporated the golden ratio and other mathematical concepts in the design and building processes of structures such as the Parthenon. A museum opening an exhibit on Greek architecture is hoping to attract people to see it by utilizing some of those concepts in its advertising campaign. The museum has requested that your website design and poster design represent use of the golden ratio, along with mathematical ideas, where appropriate. Through this process you may want to consider the golden rectangle, golden triangle and Fibonacci numbers. Your final designs will need to be presented to the board of trustees.

District Resource: www.definedstem.com

Unit 4: The Mathematics of Chance

Big Idea: Students explore how chance and probability can affect daily life.

Unit Essential Question(s):

- Mathematical relationships among numbers can be represented, compared, and communicated for making decisions.
- The probability of an event's occurrence can be predicted with varying degrees of confidence.
- Real World situations can be represented symbolically and graphically.
- How can mathematics support effective communication?

Concept: Probability	Concept: Statistics and Inferences	Concept: Graphing Functions	Concept: Data Analysis
2.4 Measurement, Data, and Probability (CC.2.4.HS.B.6) Use the concepts of independence and conditional probability to interpret data.	2.4 Measurement, Data, and Probability (CC.2.4.HS.B.6) Use the concepts of independence and conditional probability to interpret data. (CC.2.4.HS.B.4) Recognize and evaluate random processes underlying statistical experiments.	2.2 Algebraic Concepts (CC.2.2.HS.C.2) Graph and analyze functions and use their properties to make connections between the different representations (CC.2.2.HS.D.9) Use reasoning to solve equations and justify the solution method. (CC.2.2.HS.D.10) Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.	2.1 Number and Quantity (CC.2.1.HS.F.3) Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.
Lesson Essential Question(s): • How do you use concepts of independence and conditional probability to interpret data? • How do you apply rules of probability to compute probabilities of compound events in a uniform probability model? • How can probability and data analysis be used to make predictions?	Lesson Essential Question(s): • How do you recognize and evaluate random processes underlying statistical experiments? • How do you make inferences and justify conclusions based on sample surveys, experiments, and observational studies? • How do you summarize, represent, and interpret data on a single count or measurement variable? • How do you summarize, represent, and interpret data on two categorical and quantitative variables?	Lesson Essential Question(s): • How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations? • How can graphs be used to represent and analyze functions for different situations? • How can equations and inequalities be solved and graphed?	Lesson Essential Question(s): • How can data be organized and represented to provide insight into the relationship between quantities? • How does the type of data influence the choice of display? • How can the collection, organization, interpretation, and display of data be used to

	How do you analyze linear models to make interpretations based on the data?		answer questions?
Vocabulary: Conditional probability, conditional statement, dependent variable, deduction, likelihood	Vocabulary: Qualitative data, quantitative data, frequency, variance, inference	Vocabulary: Relation, function, function notation, correlation, types of graphs	Vocabulary: Units, scales, bar graph, line graph, circle graph

Sample Projects:

- 1. Carnival Game Designer** - You are in charge of creating games of chance for a local carnival. Since the carnival raises money for the local firehouse, you want to make sure that your games will be appealing so many people will play, and you want the probability of winning low enough that you and the firehouse make money, but high enough so people will want to try their luck.
- 2. Sabermetrician: Baseball Stats** - Baseball is a game of statistics. A few percentage points often determine offensive and defensive success. These statistics are an important point of management decision making regarding what players play and are recruited by baseball teams. A sabermetrician is an individual who utilizes analytical tools and decision making to provide information to sports management regarding players. These individuals utilize and create statistics from all aspects of the game.
- 3. Research Analyst: Data Gathering and Analysis**- The local university has purchased an old theater in town and refurbished it. The university has invited a local theater group to work with the theater department and theater students. The theater is now beautiful and many people are visiting and enjoying a variety of plays and musicals for people of all ages. The group has a concern, however, that very few high school students are attending the shows. The theater group wants this venture to be successful for years to come. For this to happen they must engage the teenagers who will become adults and potential patrons of the theater and the group for the future.

District Resource: www.definedstem.com

Course: Mathematical Approach to Problem Solving
Unit 5: The Mathematics of Starting a Business

Date: October 30, 2017

Big Idea: Students determine if a business will be profitable by considering the needs of a community.			
Unit Essential Question(s): • How can a product or service be determined if it can be profitable in a community? • How can startup costs, fixed and variable expenses, and approximate generated revenue of a business be determined?			
Concept: Numbers and Graphing	Concept: Graphing Equations	Concept: Geometric Constructions	Concept: Probability and Data Interpretation
2.1 Numbers and Operations (CC.2.1.HS.F.3) Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays. (CC.2.1.HS.F.5) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	2.2 Algebraic Concepts (CC.2.2.HS.C.3) Write functions or sequences that model relationships between two quantities. (CC.2.2.HS.C.5) Construct and compare linear, quadratic, and exponential models to solve problems. (CC.2.2.HS.D.7) Create and graph equations or inequalities to describe numbers or relationships. (CC.2.2.HS.D.8) Apply inverse operations to solve equations or formulas for a given variable. (CC.2.2.HS.D.10) Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.	2.3 Geometry (CC.2.3.HS.A.12) Explain volume formulas and use them to solve problems. (CC.2.3.HS.A.4) Apply the concept of congruence to create geometric constructions.	2.4 Data and Probability (CC.2.4.HS.B.2) Summarize, represent, and interpret data on two categorical and quantitative variables. (CC.2.4.HS.B.6) Use the concepts of independence and conditional probability to interpret data.
Lesson Essential Question(s): • How can real world situations be represented symbolically and graphically? • How can you choose a scale for your graphs so that it best represents a situation?	Lesson Essential Question(s): • How can collecting, representing, and analyzing data answer questions to determine the data to be collected, how best to collect it, and how best to represent it? • How can patterns, relations, and functions be used as tools to best describe and help explain real-life situations? • How can mathematical relations and functions be modeled through multiple representations and analyzed to raise and answer questions?	Lesson Essential Question(s): • How is the concept of congruence applied to geometric constructions? • How can volume formulas be used to solve problems? • How can geometric concepts be applied to create models?	Lesson Essential Question(s): • How can the collection, organization, interpretation, and display of data be used to answer questions? • How can probabilities be used to make predictions or draw conclusions? • How can real world situations be represented symbolically and graphically?
Vocabulary: Units, scales, bar graph, line	Vocabulary: Relation, function, function notation, correlation	Vocabulary: Congruence, corresponding angles,	Vocabulary: Conditional probability, conditional

graph, circle graph		corresponding sides, congruent polygons	statement, dependent variable, deduction, likelihood
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Sample Projects:

- 1. Forester-** As a forester you will be in charge of designing informational materials. You will need to learn about factors relating to local forest management, as well as the various ecological concerns affecting different types of forests. Researching what makes a forest profitable will be critical. Your recommended strategies must allow landowners to use their forest(s) as a beneficial resource
- 2. Grain Farmer-** In order to optimize the value of grain, storage facilities are a critical part of the farm system. Due to national and international economics, more and more grain is being sold at market rather than being used for family subsistence. New varieties of grain and high yields increase the need for storage facilities that minimize loss of grain to temperature, moisture, and pests. New technologies have entered the market place, which help to automate the storage environment, thus maximizing the grain that can enter the marketplace. These technologies also add safety measures to help those working in the storage bins
- 3. Healthcare Analyst: The Cost and Benefits of a Surgical Robot-** The board of trustees is hopeful that you can provide information that will support their decision to purchase a surgical robot system. Many of the products that they have asked you to create are intended to help educate and inform the community of the value of a surgical robot in their community. However, they have asked you for an honest financial appraisal of the situation and based on your findings, they will make a final decision.
- 4. Noise Canceling Headphone Designer-** You are starting a new business designing and selling headphones. You want your headphones to have the best design from the earphones to the cord. You will need to conduct research to develop the most innovative product. You will also want to share with potential customers why your product is better than others currently on the market.
- 5. Wind Energy Specialist -** As an energy specialist, you have the opportunity to present information on the environmental benefits, as well as financial benefits, of wind energy. You will be presenting your research regarding this form of alternative energy to communities and electric companies. Your goal is to have the electric companies agree to add wind energy to their electric grid as part of the electrical services that they offer to regional communities.

District Resource: www.definedstem.com

Unit 6: The Mathematics of Coding

Big Idea: Students learn to create computer programs where they will study programming concepts, computational thinking, and development of interactive games.		
Unit Essential Question(s): - Understand the difficulty of translating real problems into programs. - Practice communicating ideas through codes and symbols.		
Concept: Foundational Skills of Coding	Concept: Loops	Concept: Digital Citizenship
Standards for Mathematical Practice <i>Reason abstractly and quantitatively.</i> <i>Model with mathematics.</i> <i>Attend to precision.</i> <i>Look for and make use of structure.</i> <i>Look for and make sense of regularity in repeated reasoning.</i>	Standards for Mathematical Practice <i>Reason abstractly and quantitatively.</i> <i>Model with mathematics.</i> <i>Use appropriate tools strategically.</i> <i>Look for and make use of structure.</i> <i>Look for and make sense of regularity in repeated reasoning.</i>	Standards for Mathematical Practice <i>Make sense of problems and persevere in solving them.</i> <i>Reason abstractly and quantitatively.</i> <i>Construct viable arguments and critique the reasoning of others.</i>
Lesson Essential Question(s): - How can you arrange sequential events into their logical order? - Explain how ideas may feel clear and yet still be misinterpreted by a computer? - How can you translate real problems into programs?	Lesson Essential Question(s): - How do you identify repetitive code and convert a series of multiple actions into a single loop? - How do you decode loops into a series of multiple actions? - Determine starting value, stopping value, and stepping value for a `for` loop?	Lesson Essential Question(s): - How do you compare and contrast responsibilities to online and offline communities? - Do you understand what type of information can put you at risk for identity theft and other scams? - Can you reflect on the characteristics that make someone an upstanding citizen? - Can you devise resolutions to digital dilemmas?
Vocabulary: Sequence, logical order	Vocabulary: Loop, starting value	Vocabulary: Online communities, offline communities
Concept: Conditionals	Concept: Variables	Concept: Functions
Standards for Mathematical Practice <i>Make sense of problems and persevere in solving them.</i> <i>Reason abstractly and quantitatively.</i> <i>Construct viable arguments and critique the reasoning of others.</i>	Standards for Mathematical Practice <i>Make sense of problems and persevere in solving them.</i> <i>Reason abstractly and quantitatively.</i> <i>Use appropriate tools strategically.</i> <i>Look for and make use of structure.</i> <i>Look for and make sense of regularity in repeated reasoning.</i>	Standards for Mathematical Practice <i>Make sense of problems and persevere in solving them.</i> <i>Reason abstractly and quantitatively.</i> <i>Look for and make use of structure.</i> 2.2 Algebraic Concepts (CC.2.2.HS.C.2) Graph and analyze functions and use

		their properties to make connections between the different representations.
Lesson Essential Question(s): - Can you define circumstances when certain parts of a program should run and when they shouldn't? - Can you determine whether a conditional is met based on criteria? - How do you traverse a program and predict the outcome, given a set of input?	Lesson Essential Question(s): - How do you identify variables and determine their values? - Can you define and call variables in the context of real-life activities? - Can you create situations which require the use of variables?	Lesson Essential Question(s): - How do you modify functions to accept parameters? - Can you describe how functions and parameters can make programs easier to write?
Vocabulary: Conditional, input	Vocabulary: variables	Vocabulary: Functions, parameters

Projects/Activities (Code.org- CS Fundamentals: Express)

- Graph Paper Programming-** Students write an algorithm (a set of instructions) using a set of predefined commands to direct their classmates to reproduce a drawing.
- Building a Foundation** - Students build a structure using only provided supplies. Structures must complete a task (reach a certain height or bear a certain weight), and students discuss the idea of being persistent when things get complicated.
- Loops: My Robotic Friends** - Here, students learn the simplicity and utility of loops by "programming" their friends using the language from "My Robotic Friends." Once loops are introduced, students will find that they can build bigger structures faster
- Digital Citizenship** - In collaboration with Common Sense Education, this lesson helps students learn to think critically about the user information that some websites request or require. Students learn the difference between private information and personal information, distinguishing what is safe and unsafe to share online.
- Events** - Students are introduced to the programming concept of "events," which are actions that a computer constantly monitors for. The teacher will press buttons on a paper remote and students will react depending on which button is pressed.
- Conditionals** - To learn about conditional statements, students play a card game and create rules like "If I draw a red card, I get a point" and "If I draw a black card, you get a point."
- Variables**- Variables allow for a lot of freedom in computer science. This lesson helps to explain what variables are and how we can use them in many different ways. Use this activity before (or in conjunction with) the lesson on abstraction to really hit the idea home.
- Functions**- One of the most magnificent structures in the computer science world is the function. Functions (sometimes called procedures) are mini programs that you can use over and over inside of your bigger program. This lesson will help students intuitively understand why combining chunks of code into functions is such a helpful practice.

RESOURCE: <https://studio.code.org/s/express>