Bristol Public Schools

Office of Teaching & Learning

Department	Mathematics
Department Philosophy	*Students learn by doing math, solving problems in mathematical and real-world contexts, and constructing arguments using precise language.* The Bristol mathematics curricula embeds this *learn-by-doing* philosophy by focusing on high expectations for all students and providing students with opportunities that build conceptual understanding, computational and procedural fluency, and problem solving through the use of a variety of strategies, tools, and technologies. The mathematics curriculum is responsive to the individual needs of students, while providing a structure tied to the Common Core State Standards in Connecticut. The *learn-by-doing* philosophy develops mathematically literate and productive students who can effectively and efficiently apply mathematics in their lives to make informed decisions about the world around them by doing math. To be mathematically literate, one must understand major mathematics concepts, possess computational facility, and have the ability to apply these understandings to situations in daily life. Making connections between mathematics and other disciplines is key to the appropriate application of mathematics skills and concepts to solve problems. The ability to read, discuss, and write within the discipline of mathematics is an integral skill that supports mathematical understanding, reasoning and communication. The opportCoursey to think critically and creatively to solve problems is important to deepen mathematical knowledge and foster innovation. A rich hands-on mathematical experience is essential to provide the foundational knowledge and skills that prepare students to be mathematically literate, productive citizens.
Series	Bristol Preparatory Academy Mathematics
Course Description for Program of Studies	BPA has a compilation of 20 mathematics courses anchored in real world contexts. Each hexmester course provides students with access to Common Core Standards for high school math through 6 week mini courses that provide learning in a context, so students can see the relevance of the mathematics. Each course has a problem-based learning (PBL) approach and is fitted with performance tasks to see student application of the content in the real world content as posed by the PBL. The Mathematics content falls into 6 categories: 1-topics in geometry, 2-topics in statistics, 3-consumer math, 4-math test preparation, 5-topics in algebra, and 6-applied math.
Grade Level	9-12
Pre-requisites	All courses are designed to be run independent of one another, without a specific scope and sequence.
Credit (if applicable)	0.2 credits per hexamester course

Table of Contents (Bold items in table of contents are presented to Student Achievement as Phase 1)

Alignment of BPA Course to Common Core Standards

Matrix of CCS by Hexamester Course

Topics in Geometry 1: Art and Art Sales

Pacing-6 weeks

UNWRAPPED STANDARDS

Grade Level Standard	Standard Progression	Connection to Problem-based Learning (PBL)-Art	Academic Vocabulary (Standard Based)
HS.G-MG.A.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).	Any mathematical object that represents a situation from outside mathematics and can be used to solve a problem about that situation is a mathematical model. Modeling often involves making simplifying assumptions that ignore some features of the situation being modeled. In geometry, in order to study how the illuminated percentage of the moon's surface varies during a month, students might represent the moon as a rotating sphere, half black and half white.	• PBL Video for students • Describing art according to geometric shape. • Spatially plan a piece of art work using geometric models • Art curator-describe the properties of the art for the math audience • Jewelry/sports trophies-Describe the piece	Geometric shapes-*hexagon, triangle, square, rectangle, trapezoid, rhombus, pentagon, quadrilateral, cylinder, prism* Ratio Property Design problem Geometric method Physical constraint
HS.G-MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).	**A Fermi Problem: How Many Leaves on a Tree?** Amy and Greg are raking up leaves from a large maple tree in their yard and Amy remarks "I'll bet this tree has a million leaves." Greg is skeptical. Amy suggests the following method to check whether or not this is possible: • Find a small maple tree and estimate how many leaves it has. • Use that number to figure out how many leaves the big maple tree has. 1. Describe the assumptions and calculations needed to carry out Amy's strategy. 2. Amy and Greg estimate that their maple tree is about 35 feet tall. They find a 5-foot-tall maple tree and estimate that it has about 400 leaves. Use the calculations that you described to estimate the number of leaves on Amy and Greg's tree. (adapted from Illustrative Mathematics, illustrativemathematics.org/content-standards/tasks/1137)	• Sculptures and amount of clay/medium • Terracotta Soldiers-What goes into making a single hollow sculpture? How much material was needed to create all of the sculptures? How did the artists define the amount of space needed to "protect" the emperor in the afterlife? Provide students with a space-How many sculptures can you fit? How much material is needed for solid vs hollow sculptures? Think about shipping your art work.	Density Area Volume Cubic measurements Estimate Surface area Hollow
HS.G-MG.A.3	N/A	• Planning to build a sculpture in a	Minimize cost

Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).		green ● Fitting an image on a specifically sized canvas	Geometric methods Design problem Physical constraints Typographic grid system Ratios Proportion
HS.G-SRT.A.1 Verify experimentally the properties of dilations given by a center and a scale factor:	**A Fermi Problem: How Many Leaves on a Tree?** Amy and Greg are raking up leaves from a large maple tree in their yard and Amy remarks "I'll bet this tree has a million leaves." Greg is skeptical. Amy suggests the following method to check whether or not this is possible: • Find a small maple tree and estimate how many leaves it has. • Use that number to figure out how many leaves the big maple tree has. 1. Describe the assumptions and calculations needed to carry out Amy's strategy. 2. Amy and Greg estimate that their maple tree is about 35 feet tall. They find a 5-foot-tall maple tree and estimate that it has about 400 leaves. Use the calculations that you described to estimate the number of leaves on Amy and Greg's tree. (adapted from Illustrative Mathematics, illustrativemathematics.org/content-standards/tasks/1137)	● Scaling a photo to a different size ● Graphic arts connection ● Instagram (what happens within the instagram app to make the ears apply in the right space?) ● How is a picture a dilation?	Ratio Dilation Scale factor Fixed center

Topics in Geometry 1: Art and Art Sales

The course *Geometry in Art Sales* focuses students on the concepts of geometry while working as a mock art dealer. Students learn how to describe art work using the principles of geometry. In the art and sales world, accurately describing and measuring artwork is important and provides the customer with a greater understanding of the piece. Once students have a grasp on the describing and measuring of various pieces using geometric principles, students are tasked with applying the principles of dilation and scale factor to transfer a piece of artwork to a new medium based on customer request. Students must be able to mathematically explain the dilation and scale factor in the transfer. This also requires students to place a materials order for the final product and must order the appropriate amounts of medium for the replication. To do so, students must accurately find the surface area and volume of the intended dilation. The final sequence of this course focuses on the shipping of artwork. As a dealer, you must attend to profits and ensure that your shipping containers and pieces are cost effective, protect the piece, and minimize waste. Students will be provided with an order for which they will determine the best size package, number of pieces per package, and estimate total shipping costs.

CCSS Standards #	**Learning Targets:** I can	Summative Assessment Strategy	Lesson Progression and Connection to Math Practices	Common Learning Experiences and Assessments
HS.G-MG.A.1	Describing your piece (shape) of artwork: ● I can use principles of math and geometry to describe the shapes in a piece of artwork. ● I can describe the properties of the art piece. ● I can describe how geometric shapes are related. ● I can use math/geometric vocabulary to create a marketing description for a piece of art (100 words or less).		**Lesson Progression and connections:** ● Company wants you to market _____, what do you mathematically need to know to describe the object? ● Compare the shapes of a given object. ● Identify key components needed in a marketing description. ● Write marketing description.	**Mandatory Lessons/Activities:** ● Esty - compare the shapes of jewelry or trophies. ● Read sample marketing descriptions.
Pacing: 1 week			**Math Practices:** ● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them. ● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning. ● CCSS.MATH.PRACTICE.MP4 Model with mathematics.	**Assessments:** ● Geometric marketing description.
HS.G-SRT.A.1	Describing the piece (size) of artwork: ● I can measure a piece of artwork. ● I can determine the type of dilation and scale factor of a piece of artwork. ● I can describe the dilation of a piece of artwork. ● I can create a dilation of a piece		**Lesson Progression and connections:** ● Company wants you to create a replica of _____, what do you need to know mathematically to do this? ● Determine if two objects are a dilation. ● Describe components of dilation. ● Create and describe a dilation.	**Mandatory Lessons/Activities:** ● Esty - transfer picture onto different objects (t-shirts, blankets, mugs, key-chains) with scale description of both. ● Shrinky Dinks-creates dilation, then students determine scale factor and type of dilation.
Pacing:			**Math Practices:**	**Assessments:**

	Selected Response
x	Constructed Response
x	Performance
	Observation

	Selected Response
x	Constructed Response
x	Performance
	Observation

<table>
<tr>
<td>1 week</td>
<td>of art.</td>
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CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
CCSS.MATH.PRACTICE.MP4 Model with mathematics.
CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.

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Replication of a piece of art.

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<tr>
<td rowspan="2">HS.G-MG.A.3

Pacing:
2 weeks</td>
<td rowspan="2">Determining the amount of material needed, and cost of a piece of artwork:

I can formulate the dilation type and scale factor to fit a physical constraint.
I can create a proportion of two ratios.
I can solve the proportion of two ratios.
I can use mathematical principles to determine the amount of material needed to create a piece of artwork.
I can calculate and justify the total cost for creating a piece of artwork.
I can write a cost proposal for a piece of artwork (100 words or less).

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<table>
<tr><td></td><td>Selected Response</td></tr>
<tr><td>x</td><td>Constructed Response</td></tr>
<tr><td>x</td><td>Performance</td></tr>
<tr><td></td><td>Observation</td></tr>
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Lesson Progression and connections:

Company wants you to write a cost proposal for _____, what do you need to know to determine the total cost of creating a replica of the piece of art?
Determine scale factor and type of dilation given a physical constraint.
Calculating surface area, area, perimeter, and volume.
Calculate the amount of material needed for the dilation.
Input formulas into Google Sheets.
Calculate the total cost of all the materials.
Identify key components of a cost proposal.
Write a cost proposal.

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Mandatory Lessons/Activities:

Esty - Comparing two companies' cost proposals.
Google Sheets - writing cost proposal.

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Math Practices:

CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
CCSS.MATH.PRACTICE.MP4 Model with mathematics.
CCSS.MATH.PRACTICE.MP6 Attend to precision.

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Assessments:

Cost analysis of a piece of art

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<td>HS.G-MG.A.2</td>
<td>Determining the type of shipping, how many items, and total cost of the artwork:

I can calculate the number of pieces of artwork per container, given a set packaging parameters.
I can determine the best method for shipping a large order of artwork.
I can write a cost proposal for shipping (100 words or less) using geometric concepts and

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<table>
<tr><td></td><td>Selected Response</td></tr>
<tr><td>x</td><td>Constructed Response</td></tr>
<tr><td>x</td><td>Performance</td></tr>
<tr><td></td><td>Observation</td></tr>
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</td>
<td>
Lesson Progression and connections:

The company approved your proposal, what do you need to know to ship the artwork?
Calculate volume.
Compare shipping containers’ volume.
Estimate how many items can fit in the volume.
Determine how to protect the artwork.
Determine amount of supply and cost to protect artwork.
Compare cost of driving versus cost of driving and flying.
Calculate cost of shipping.

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Mandatory Lessons/Activities:

Terracotta Soldiers - calculate/estimate how many, amount of clay, total cost.
Fedex boxes, shape, and cost
Fedex Package Guidelines

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</table>

Pacing: 2 weeks	calculations.		**Math Practices:** ● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them. ● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively. ● CCSS.MATH.PRACTICE.MP4 Model with mathematics.	**Assessments:** ● Cost analysis of shipping multiple pieces of artwork.

ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	**PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS COURSE**	**ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY**	**OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE COURSE**
All quadrilaterals are NOT squares. All quadrilaterals are NOT rectangles. A fraction scale factor does NOT mean the dilation will be a reduction.	List standards in the Course and link to achieve the core coherence map for each standard HS.G-MG.A.1 HS.G-MG.A.2 HS.G-MG.A.3 HS.G-SRT.A.1		Through the Problem Based Learning approach, all of the tasks in learning throughout the unit are student lead.
RESOURCES			
Resources are linked in sequences as needed. Rubrics are in the Bristol Prep Academy folder of the Bristol Math Units Shared Drive.			

Topics in Geometry 2: Math Construction			
UNWRAPPED STANDARDS			
Grade Level Standard	**Standard Progression**	**Connection to Problem-based Learning (PBL)-Construction**	**Academic Vocabulary (Standard Based)**
HS.G-CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.	The different tools available to students for studying geometry in high school—straightedge and compass, transparencies or translucent paper, dynamic geometry software—lead to different insights and understandings, and can be used throughout for different purposes (MP5).	● Designing Houses for the Future ● Floor Plan Examples ● Energy Efficient House Designs ● Create angles ● Create lines, angle bisectors, line bisectors ● Create lines through a point ● Use a compass ● Use a protractor	Perpendicular lines Parallel lines Perpendicular bisector Bisector Angle bisector Line segment Compass Protractor Alternate interior angles Alternate exterior angles Vertical angles Transversal
HS.G-GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.	N/A	● Use a coordinate plane to create design. ● Find measure of diagonals using distance formula and Pythagorean theorem. ● Calculate perimeter and area	Area Perimeter Polygons Triangles Rectangles Distance formula Pythagorean Theorem Coordinate Plane
HS.G-SRT.B.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	There is also another advantage of [the transformation] approach to congruence and similarity. Because most of the theorems in plane geometry before the introduction of similarity depend only on the three triangle congruence criteria, once these have been established, it is possible to transition into the traditional way of	● Use similar triangles and congruence to find missing sides ● Solve proportions ● Determine congruent angles ● Practice using Ratios	Similarity Congruence Dilation translation ASA SAS AA Similarity SSS Ratios

	proving theorems at this point, without further use of basic rigid motions, if so desired. The use of dilations to treat similarity can likewise be limited to the initial stage if so desired.		Proportions Alternate interior angles Alternate exterior angles Vertical angles Transversal Angle of depression
HS.G-CO.A.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	Students in high school start to formalize the intuitive geometric notions they developed in Grades 6–8. For example, in Grades 6–8 they worked with circles and became familiar with the idea that all the points on a circle are the same distance from the center. In high school, this idea underlies the formal definition of a circle: given a point O and a positive number r, a circle is the set of all points P in the plane such that |OP| = r. This definition will be important in proving theorems about circles, for example the theorem that all circles are similar.	● Definitions ● Learn to measure an angle ● Determine difference between parallel and perpendicular ● Learn to use compass ● Determine radius and diameter	Angle Circle Radius Diameter Perpendicular lines Parallel lines Line segment Line ray Distance Compass Protractor

Topics in Geometry 2: Math in Construction

Math in Construction provides students with a hands on approach to using geometric thinking and problem solving in a real world capacity as they through a construction/remodel lens. Students apply concepts such as similarity, parallel, perpendicular, pythagorean theorem, area, perimeter, and more to the floor plans of a construction project and home remodel.

<table>
<tr><th>CCSS Standards #</th><th>Learning Targets: I can</th><th>Summative Assessment Strategy</th><th>Lesson Progression and Connection to Math Practices</th><th>Common Learning Experiences and Assessments</th></tr>
<tr>
<td>HS.G-CO.A.1
HS.G-CO.D.12</td>
<td>Constructing angles and segments to design a floor plan:
● I can measure angles using a protractor.
● I can create a segment using a ruler and a compass.
● I can describe the difference between parallel and perpendicular lines.
● I can create angles using a protractor, a compass, and a ruler.
● I can create circles or portions of circles using a compass.
● I can calculate the diameter and the radius of a circle.</td>
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<table>
<tr><td></td><td>Selected Response</td></tr>
<tr><td>X</td><td>Constructed Response</td></tr>
<tr><td>X</td><td>Performance</td></tr>
<tr><td></td><td>Observation</td></tr>
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</td>
<td>Lesson Progression and connections:
● You bought a house to redesign, what do you need to know?
● Give different scenarios:
○ Mom has a toddler and wants to watch the child while cooking or doing laundry, how would you design the home?
○ Dad works from home one day a week, how can you design a home to meet his needs?
○ Family wants to sit down and eat breakfast and dinner together almost everyday, how would you design the home?
● Have groups plan types of rooms and how they want them to connect.
● Determine the difference between open and closed floor plan.
● Analyze example floor plans:
○ Measure angles.
○ Identify key rooms needed and optional rooms to include.
○ Measure segments.
○ Identify possible problems with the design
● Given a floor plan, have groups change the layout to meet the needs of one of the scenarios above.
● Draw their floor plan.</td>
<td>Mandatory Lessons/Activities:
● Floor Plan Examples
● Build Own Floor Plan in Google</td>
</tr>
<tr>
<td>Pacing:
3 weeks</td>
<td>Math Practices:
● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.</td>
<td>Assessments:
● Presentation of new Floor Plan</td>
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● CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.
● CCSS.MATH.PRACTICE.MP6 Attend to precision.
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<td>HS.G-SRT.B.5
HS.G-GPE.B.7</td>
<td rowspan="2">Determining size based on the square footage.
● I can determine wall measures using the Pythagorean theorem or the distance formula.
● I can calculate the size of the rooms and the house using proportions.
● I can determine the area and perimeter of rooms individually and the entire house.
● I can write an overview of a house.</td>
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<table>
<tr><td></td><td>Selected Response</td></tr>
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<tr><td></td><td>Observation</td></tr>
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Lesson Progression and connections:
● You bought land to build a house, what do you need to know to design your house?
● Give students a set amount of area for the land.
● Determine the number of bedrooms and bathrooms.
● Determine the types of rooms to include.
● Calculate area and perimeter.
● Calculate length and width of walls.
● Calculate length and width of house.
● Draw the floor plan.
● Identify key components of house overview
● Write a house overview
● Presentation of floor plan include:
○ Dimension of each room
○ Area of each room
○ Total area
○ Garage situation - attached or not
● Extension activity: research prices of houses in Bristol similar to their design. Set a price to sell their house.
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Mandatory Lessons/Activities:
● Practice using Ratios
● Calculate the area and the perimeter of Floor Plan Examples
● Use CAD if possible
● Floor Plan Creator (saves in Google)
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<tr>
<td>Pacing:
3 weeks</td>
<td>
Math Practices:
● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.
● CCSS.MATH.PRACTICE.MP6 Attend to precision.
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Assessments:
● Presentation of their own Floor Plan
● Build Tiny House
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ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	**PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS Course**	**ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY**	**OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE Course**
● There is no such thing as a left angle. ● There is no such thing as a left triangle. ● Right angles are called RIGHT because they have a right angle (90degrees). ● Right triangles are called RIGHT because they have a right angle (90 degrees). ● Perpendicular lines do not just intersect, they intersect to form 90 degree angles. ● Pythagorean theorem can only be used for Right Triangles. ● Perimeter is the distance around. ● Area is the space inside. ● Volume is the space to fill something. ● Circumference is the distance around a circle, similar to perimeter.	List standards in the Course and link to achieve the core coherence map for each standard HS.G-CO.A.1 HS.G-CO.D.12 HS.G-SRT.B.5 HS.G-GPE.B.7	HS.F-TF.A.1 HS.G-CO.D.13 HS.G-GPE.B.6	Through the Problem Based Learning approach, all of the tasks in learning throughout the unit are student lead.
RESOURCES			
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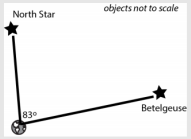
Topics in Geometry 3: Wheeling and Rolling Trigonometry

UNWRAPPED STANDARDS

Grade Level Standard	Standard Progression	Connection to Problem-based Learning (PBL)-	Academic Vocabulary (Standard Based)
HS.G-SRT.C.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	**Modeling with trigonometry** **Vector graphic** A digital artist using a computer drawing program clicked on a diagonal line segment and saw that it measured 216 units horizontally and 45 units vertically. How many units long was the line segment? If the artist wants to rotate the line segment to be vertical, what angle of rotation could be used? Give your answers to the nearest hundredth. *Answers.* 220.64 units long; 11.77° clockwise or 78.23° counter-clockwise. **Flight of the bumblebee** A bumblebee sitting on a tulip wanted to fly over to a daffodil located 100 meters due west. The bumblebee did fly in a straight line, but it mistakenly flew in a direction 5 degrees south of west. The bumblebee passed to the south of the daffodil—how far south? *Answer.* 8.75 meters or about 9 meters. **Star distance** Viewed from Earth, the North Star and Betelgeuse are separated by an angle of about 83 degrees. If the North Star is about 430 light years from Earth, and Betelgeuse is about 640 light years from Earth, then about how far apart are the North Star and Betelgeuse (measured in light years)?  *Answer.* About 726 light years. *Comment.* This could be solved using a G-SRT.10(+) strategy (Law of Cosines), or via G-SRT.8 by dropping a perpendicular to make two right triangles. **Crop Loss** One corner of a soybean field wasn't irrigated, and no soybeans could be harvested from that part of the field. How much money was lost if soybeans sold for $12 a bushel that year and an acre of irrigated land yields 54 bushels of soybeans? Note, 1 acre is approximately 4000 square meters.  *Answer*: $972 or approximately $1000. See `http://tinyurl.com/mtcn6zq`.	Representing Trig Functions Calculating height of Rocket Calculate height of building Buy gutters Calculate slope of roof and angle of elevation Designing front of house and roof Proving Pirate Attack Creating a ramp for physically disbaled	Marzano CCSS Vocab Book Trigonometry Ratio Sine Cosine Tangent Cosecant Secant Cotangent Pythagorean Theorem Right Triangle Hypotenuse Adjacent Opposite Inverse Sine (arcsine) Inverse Cosine (arccosine) Inverse Tangent (arctangent) Radians Degrees
HS.G-SRT.C.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of	Because all right triangles have a common angle, the right angle, the AA criterion becomes, in the case of right triangles, an “A criterion”; that is, two		Trigonometry Ratio Sine Cosine

trigonometric ratios for acute angles.	right triangles are similar if they have an acute angle in common. This observation is the key to defining a trigonometric ratio for a single acute angle.		Tangent Cosecant Secant Cotangent Pythagorean Theorem Right Triangle Hypotenuse Adjacent Opposite Inverse Sine (arcsine) Inverse Cosine (arccosine) Inverse Tangent (arctangent) Radians Degrees Acute Angles Similarity
HS.G-SRT.C.7 Explain and use the relationship between the sine and cosine of complementary angles.	N/A		Trigonometry Ratio Sine Cosine Tangent Cosecant Secant Cotangent Pythagorean Theorem Right Triangle Hypotenuse Adjacent Opposite Inverse Sine (arcsine) Inverse Cosine (arccosine) Inverse Tangent (arctangent) Radians Degrees Complementary Angles Supplementary Angles Acute Angles Right Angles

Topics in Geometry 3: Wheeling and Rolling Trigonometry

Students will be using trigonometric properties and identities along with the Pythagorean Theorem to plan and create a model ramp fto meet the demand of ADA compliance.

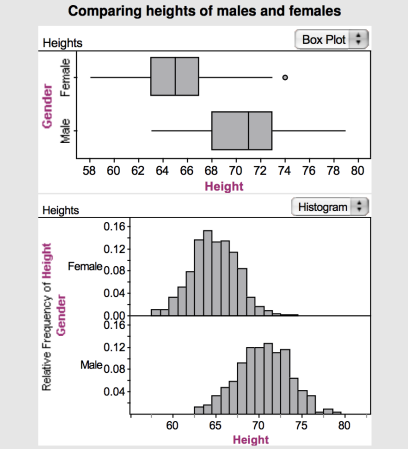
<table>
<tr><th>CCSS Standards #</th><th>Learning Targets: I can</th><th>Summative Assessment Strategy</th><th>Lesson Progression and Connection to Math Practices</th><th>Common Learning Experiences and Assessments</th></tr>
<tr><td>HS.G-SRT.C.6
HS.G-SRT.C.7</td><td rowspan="2">Writing Trig Ratios:
● I can label the sides of a right triangle.
● I can define “angle of elevation” and “angle of depression”.
● I can explain the difference between elevation and depression
● I can define and write trig ratios.
● I can explain the difference between sine and cosine.</td><td rowspan="2"><table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● In order to create a triangle, what do I need to know?
● Label parts of a triangle - side lengths and angles
● Compare and contrast angle of elevation and angle of depression
● Identify trig ratios
● Write trig ratios given right triangles (SOH CAH TOA)
● Define complementary angles
● Compare and contrast sine and cosine</td><td>Mandatory Lessons/Activities:
● Triangle
● Trig ratios problems</td></tr>
<tr><td>Pacing:
3 weeks</td><td>Math Practices:
● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP7 Look for and make use of structure.</td><td>Assessments:
● Designing front of house and roof
● Creating a ramp over “stairs” to be physically accessible to all (Max: 4.8 degree angle)</td></tr>
<tr><td>HS.G-SRT.C.8</td><td>Solving Using Trig Ratios:
● I can determine the best trig ratio to use.
● I can use the Pythagorean Theorem to calculate the side lengths of a right triangle.
● I can solve real world problems using trig ratios.
● I can measure elevation and depression using a clinometer.
● I can calculate missing side lengths using trig ratios.
● I can calculate angles using inverse trig ratios.</td><td><table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● Someone you know is now in a wheelchair, they can’t get into your house easily. What do you need to know to build a ramp for them?
● Determine angle of elevation
● Measure angle of elevation using clinometers
● Sketch triangle to represent the real world problem
● Label parts of triangle to determine trig ratio
● Calculate the distance from the stairs that the board needs to be (AKA - Calculate the base of a right triangle using trig ratios)
● Calculate the length that the board needs to be (AKA - Calculate the third side of a right triangle</td><td>Mandatory Lessons/Activities:
● Measuring height of building using clinometer</td></tr>
</table>

<table>
<tr><td></td><td rowspan="2"></td><td rowspan="2"></td><td>using Pythagorean Theorem)
● Build ramp</td><td></td></tr>
<tr><td>Pacing:
3 weeks</td><td>Math Practices:
● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.
● CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.
● CCSS.MATH.PRACTICE.MP6 Attend to precision.</td><td>Assessments:
● Creating a ramp over “stairs” to be physically accessible to all (Max: 4.8 degree angle)</td></tr>
<tr><td>Extension Activity</td><td rowspan="3">Unit Circle:
● I can change degrees to radians
● I can determine the trig ratio of specific degrees and radians
● I can create a unit circle.</td><td rowspan="3"><table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● Label special degrees as radians
● Create 45-45-90 degree triangle
● Create 30-60-90 degree triangle
● Create trig ratios using radians
● Create unit circle</td><td>Mandatory Lessons/Activities:
●</td></tr>
<tr><td>Pacing
1-2 weeks</td><td>Math Practices</td><td>Assessments:
● Creating a unit circle</td></tr>
</table>

ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	**PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS Course**	**ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY**	**OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE Course**
The adjacent side length is the side used to help make the specific angle. The angle determines which side is adjacent and which is opposite, not the hypotenuse. The angle should be inside the parentheses of the trig function, for example: sin(45)=x/5 Adjacent side length is not always smaller than the opposite side length.	List standards in the Course and link to achieve the core coherence map for each standard HS.G-SRT.C.6 HS.G-SRT.C.7 HS.G-SRT.C.8	HS.F-FT.A.1 HS.F-FT.A.2	Through the Problem Based Learning approach, all of the tasks in learning throughout the unit are student lead.
RESOURCES			
Resources are linked in sequences as needed. Rubrics are in the Bristol Prep Academy folder of the Bristol Math Units Shared Drive.			

Topics in Statistics 1: SnapChat Statistics

UNWRAPPED STANDARDS

Grade Level Standard	Standard Progression	Connection to Problem-based Learning (PBL)-Technology	Academic Vocabulary (Standard Based)
HS.S-ID.A.1Represent data with plots on the real number line (dot plots, histograms, and box plots).	 *Heights of U.S. males and females in the 20–29 age group.* Source: *U.S. Census Bureau, Statistical Abstract of the United States: 2009*, Table 201.	• Create graphs in Google Sheets-how many people have Snapchat, Instagram, Facebook… • Create graph for Snapchat to monitor activity (for parents or self-monitoring) • Daily journal monitor Snaps, who you snap the most, how many snaps per day, how many stories viewed a day • Which type of graph would be best to represent Snapchat data?	Dot plots Histograms Box plots(Box and Whisker) Parallel box plots Real number line Interval Bins Frequency Relative frequency Statistical question Quantitative Mean Median Standard deviation Range First quartile (Q1) Third quartile (Q3) Interquartile range (IQR) Five number summary
HS.S-ID.A.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more	Students should be able to sketch each distribution and answer questions about it just from knowledge of these three facts (shape, center, and spread). For either group, about 68% of the data values will be within one standard deviation of the mean. They should also observe that the two measures of center, median and mean, tend to be close to each other for symmetric distributions.	• Analysis graph in instagram, Facebook, or Setting (battery level and activity) • Compare instagram, facebook, or Setting graph to their graph • Analyze the graph created for Snapchat (distribution, measure of center, measure of spread)	Data distribution Symmetric Skewed Right/Left Measure of center Variability First quartile (Q1) Third quartile (Q3) Interquartile range (IQR) Mean Median Standard deviation Spread

HS.S-ID.A.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	Students should be able to sketch each distribution and answer questions about it just from knowledge of these three facts (shape, center, and spread). For either group, about 68% of the data values will be within one standard deviation of the mean. They should also observe that the two measures of center, median and mean, tend to be close to each other for symmetric distributions.	● Survey 20 students about the apps on their phones ● Input data into Google Sheets ● Create graphs to present data ● Analyze data (5 number summary, distribution, measure of center and spread, outliers	Mean Median Standard deviation Range First quartile (Q1) Third quartile (Q3) Interquartile range (IQR) Data distribution Spread Symmetric Skewed Right/Left Measure of center Outliers (extreme data) Population Random sample Statistics question

Topics in Statistics 1: Snapchat Statistics

<table>
<tr><th>CCSS Standards #</th><th>Learning Targets: I can</th><th>Summative Assessment Strategy</th><th>Lesson Progression and Connection to Math Practices</th><th>Common Learning Experiences and Assessments</th></tr>
<tr><td>HS.S-ID.A.1</td><td rowspan="2">Creating Graphs
● I can create bar graphs.
● I can create pie graphs.
● I can create histograms.
● I can create box plots.
● I can calculate the mean, median, range, Q1, Q3, and IQR.
● I can choose the correct graph to accurately represent activity on SnapChat.
● I can provide feedback on another student's product.
● I can properly input information into Google Sheets to meet the needs of a specific outcome.</td><td rowspan="2"><table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● Snapchat is hiring you to create a monitoring system of activity for parents, what do you need to know in order to do this?
● Calculate the mean, median, mode and range.
● Calculate Q1, Q3, and IQR.
● Record information in Google Sheets and Google Documents.
● Input formulas into Google Sheets.
● Create bar graphs in Google Sheets.
● Create pie graphs in Google Sheets.
● Create histograms in Google Sheets</td><td>Mandatory Lessons/Activities:
● M&M pie graph by hand activity.
● Physical histogram with students.
● Bar graph with sticky notes on white board.
● Log their use on Snapchat.</td></tr>
<tr><td>Pacing:
2 weeks</td><td>Math Practices:
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.
● CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.</td><td>Assessments:
● Create different graphs to represent your activity on Snapchat</td></tr>
<tr><td>HS.S-ID.A.2</td><td rowspan="2">Analyze Graphs:
● I can describe the distribution of a graph.
● I can determine the appropriate measure of center to use.
● I can determine the appropriate measure of spread to use.
● I can describe the graph using percentages, mean, median, standard deviation, Q1, Q3, and IQR.
● I can provide feedback on another student's product.</td><td rowspan="2"><table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● The initial Snapchat employer chose your graphs, but now you need to pitch your graphs to the board, what do you need to know in order to do that?
● Determine distribution of graph.
● Determine best measure of center.
● Determine best measure of spread.
● Describe key components about a graph.
● Create a presentation of their Snapchat graphs.
● Students vote on the presentation that was the best to win the job.</td><td>Mandatory Lessons/Activities:
● Analyze Instagram's graphs.
● Analyze Cell phone battery life's graph.
● Analyze their Snapchat graphs.</td></tr>
<tr><td>Pacing:
1 week</td><td>Math Practices:</td><td>Assessments:
● Presentation of SnapChat</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.</td><td>graphs they created.</td></tr>
<tr><td>HS.S-ID.A.3

Pacing:
3 weeks</td><td>Survey and Analyzing Results:
● I can determine outliers of a data set.
● Define what it means to be an outlier.
● Determine what an outlier is
● Margin of error.
● I can create a survey.
● I can input the information into Google Sheets.
● I can create appropriate graphs from the data collected.</td><td><table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● The company wants you to gather data on the students on how they use Snapchat, what do you need to know in order to do this?
● Identify key components of a survey
● Create a survey of 20 students in the school.
● Discuss population and sample size.
● Input information into Google Sheets.
● Input formulas into Google Sheets.
● Create graphs.
● Analyze graphs (see criteria for above)
● Determine outliers.
● Describe how outliers affect data.
● Create Presentations.

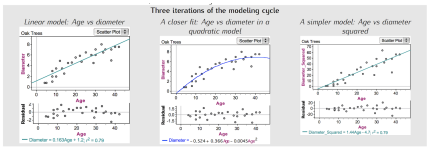
Math Practices:
● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.</td><td>Mandatory Lessons/Activities:
● Review/examine existing surveys.
● Create a survey on paper and in Google Forms (if time)..
● Determine outliers of previous graphs used (Instagram, Facebook, Battery life, etc.).

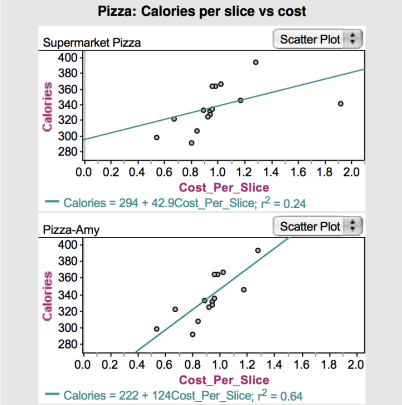
Assessments:
● Presentation of school stats on Snapchat</td></tr>
</table>

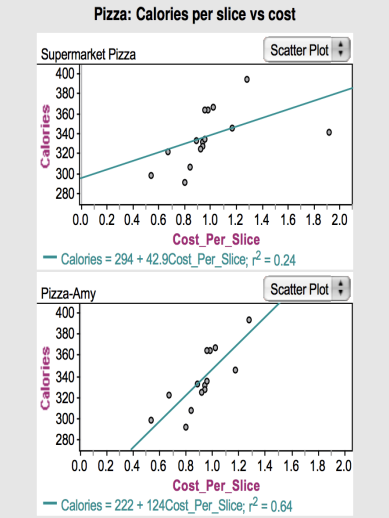
ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	**PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS Course**	**ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY**	**OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE Course**
• Histograms are different from bar graphs. • Histograms have bins not bars. • The angle used to create a pie slice is NOT the percentage of that pie slice.	List standards in the Course and link to achieve the core coherence map for each standard HS.S-ID.A.1 HS.S-ID.A.2 HS.S-ID.A.3	HS.S-ID.A.4	Through the Problem Based Learning approach, all of the tasks in learning throughout the unit are student lead.
RESOURCES			
Resources are linked in sequences as needed. Rubrics are in the Bristol Prep Academy folder of the Bristol Math Units Shared Drive.			

Topics in Statistics 2: Population Statistics

UNWRAPPED STANDARDS

Grade Level Standard	Standard Progression	Connection to Problem-based Learning (PBL)-	Academic Vocabulary (Standard Based)
HS.S-ID.B.6 (a-c) Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	It is readily apparent to students, after a little experience with plotting bivariate data, that not all the world is linear. The figure below shows the diameters (in inches) of growing oak trees at various ages (in years). A careful look at the scatter plot reveals some curvature in the pattern,which is more obvious in the residual plot, because the older and larger trees add to the diameter more slowly. Perhaps a curved model, such as a quadratic, will fit the data better than a line. The figure below shows that to be the case. 	● World Hunger Summit ● Bristol food bank data (may be run by mainstream foundation) ● CIA World Factbook ● Pick country - create fact sheet ● Honey Bee Colonies	Scatter plot Data set Quantitative Linear fit Correlation coefficient Variables Constant term Residual plot Correlation
HS.S-ID.C.8 Compute (using technology) and interpret the correlation coefficient of a linear fit.	Suppose you want to see if there is a relationship between the cost per slice of supermarket pizzas and the calories per serving. The margin shows data for a sample of 15 such pizza brands, and a somewhat linear trend. A line fitted via technology might suggest that you should expect to see an increase of about 43 calories if you go from one brand to another that is one dollar more in price. But, the line does not appear to fit the data well and the	● Use graphing calculator ● Use Google Sheets	Correlation Coefficient Linear fit Linear model Correlation Constant term Statistical regression Significant difference Projection Spurious correlation

	correlation coefficient r... is only about 0.5. Students will observe that there is one pizza that does not seem to fit the pattern of the others, the one with maximum cost. Why is it way out there? A check reveals that it is Amy's Organic Crust & Tomatoes, the only organic pizza in the sample. If the outlier (Amy's pizza) is removed and the discussion is narrowed to non-organic pizzas (as shown in the plot for pizzas other than Amy's), the relationship between calories and price is much stronger with an expected increase of 124 calories per extra dollar spent and a correlation coefficient of 0.8. Narrowing the question allows for a better interpretation of the slope of a line fitted to the data.  Source: *Consumer Reports*, January 2002.		
HS.S-ID.C.9 Distinguish between correlation and causation.	In situations where the correlation coefficient of a line fitted to data is close to 1 or 1, the two variables in the situation are said to have a high correlation. Students must see that one of the most common misinterpretations of correlation is to think of it as a synonym for causation. A high correlation between two	• Correlation is Not "cause and effect" • Given different scenarios, have students choose causation vs correlation? •	Correlation Causation Cause Effect Correlation Coefficient Variables Significant difference Statistical regression Linear fit

	variables (suggesting a statistical association between the two) does not imply that one causes the other. It is not a cost increase that causes calories to increase in pizza, and it is not a calorie increase per se that causes cost to increase; the addition of other expensive ingredients cause both to increase simultaneously. Students should look for examples of correlation being interpreted as cause and sort out why that reasoning is incorrect. Examples may include medications versus disease symptoms and teacher pay or class size versus high school graduation rates.  Source: *Consumer Reports*, January 2002.		Linear model Projection

Topics in Statistics 2: Population Statistics

The population statistics units provide students the opportunity to build their conceptual understanding of reading and analyzing statistical information through the lens of hunger related issues based on country OR the honey bee population decline. Students create scatter plots related to their population, identify the mathematical line of best fit, calculate the correlation coefficient, and analyze the data to identify trends.

CCSS Standards #	Learning Targets: I can	Summative Assessment Strategy	Lesson Progression and Connection to Math Practices	Common Learning Experiences and Assessments
HS.S-ID.B.6 (a-c) HS.S-ID.C.8	**Data Organization (show):** ● I can represent data in a table. ● I can use my calculator and Google Sheets to graph the data. ● I can create a scatter plot.	<table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table>	**Lesson Progression and connections:** ● You are representing a country at the Model United Nations Summit, what do you need to know about your country in order to propose recommendations for related hunger issues? ● Students choose a country. ● Students collect data on 6 of the 12 variables for their country (use data from 1980-present). ● Students create a scatter plot of their data . ● OR ● You are researching Honey Bees, what do you need to know about Honey Bees to help their species? ● Students collect data on Honey population and honey production throughout the US. ● Students also collect data on human population throughout the same states and cities in the US. ● Students create scatter plots of their data.	**Mandatory Lessons/Activities:** ● World Hunger Summit ● Research Guideline ● Best Fit Linear Function Practice ● CIA World Factbook ● Honey Bee Colonies
Pacing:			**Math Practices:** ● CCSS.MATH.PRACTICE.MP4 Model with mathematics. ● CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.	**Assessments:** ● Country Fact Sheet, includes graphs
HS.S-ID.C.8	**Data Analysis (analyze):** ● I can represent the data through an equation. ● I can create a linear model. ● I can calculate correlation coefficient. ● I can graph the line of best fit.	<table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr></table>	**Lesson Progression and connections:** ● What do you need to know in order to determine how your data is related? ● Students represent the data using 5 different types of functions. ● Students use the correlation coefficient to determine the best fit function to represent	**Mandatory Lessons/Activities:** ● Correlations Practice ● Controlled Variable Correlation Practice ● Honey Bee Colonies

	● I can determine if there is a correlation between the data and linear equations. ● I can determine the best type of regression to use for the data. ● I can explain the trend of the data in words.	X Performance Observation	their data. ● Students graph the function on the scatter plot. ● Students identify the type of regression used in other students' work.	
Pacing:			**Math Practices:** ● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them. ● CCSS.MATH.PRACTICE.MP4 Model with mathematics. ● CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.	**Assessments:** ● Continuation of Country Fact Sheet, includes graphs and line of best fit ● Identify the type of regression in the data set of another student.
HS.S-ID.C.9	**Data Discussion (communication):** ● I can discuss possible causes for an increase or decrease in the data set. ● I can explain the data, trends, and correlations discovered in my data. ● Based on the correlation, I can predict future patterns. ● I can determine the difference between correlation and causation.	Selected Response X Constructed Response X Performance Observation	**Lesson Progression and connections:** ● In order to propose helpful recommendations for your country (or to help the honey bee colonies), what do you need to know about the economic variables in your country? ● Determine strongest correlation among 6 variables chosen. ● Discuss possible reasons those variables are strongly related. ● Propose possible solutions to help your country.	**Mandatory Lessons/Activities:** ● Type of Regression Practice ● Best Fit Function Practice ● Population Test
Pacing:			**Math Practices:** ● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others. ● CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.	**Assessments:** ● Presentation at the Mock Model United Nations Summit

ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	**PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS Course**	**ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY**	**OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE Course**
Line of Best Fit does NOT mean that the line will touch all the data points. Line of Best Fit will NOT always be linear. Correlation does NOT mean Causation.	List standards in the Course and link to achieve the core coherence map for each standard HS.S-ID.B.6 (a-c) HS.S-ID.C.8 HS.S-ID.C.9	HS.S-IC.B.6	Through the Problem Based Learning approach, all of the tasks in learning throughout the unit are student lead.
RESOURCES			
Resources are linked in sequences as needed. Rubrics are in the Bristol Prep Academy folder of the Bristol Math Units Shared Drive.			

Topics in Statistics 3: Probability in Gaming

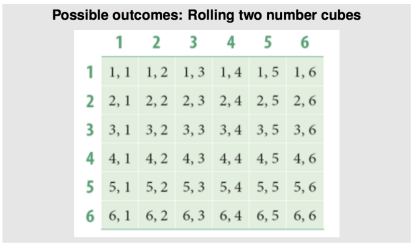
UNWRAPPED STANDARDS

Grade Level Standard	Standard Progression	Connection to Problem-based Learning (PBL)-	Academic Vocabulary (Standard Based)
HS.S-CP.A.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").	Suppose a student is randomly guessing the answers to all four true–false questions on a quiz. The outcomes in the sample space can be arranged as shown in the margin. [Insert figure here] Probabilities assigned to these outcomes should be equal because random guessing implies that no one outcome should be any more likely than another. By simply counting equally likely outcomes, P(exactly two correct answers) = 6/16 and P(at least one correct answer) = 15/16 = 1 - P (no correct answers). Likewise, P(C on first question) = 1/2 = P(C on second question) as should seem intuitively reasonable. Now, P[(C on first question) and (C on second question)] = 4/16 = 1/4 = 1/2 * ½. **Possible outcomes: Guessing on four true–false questions** Number correct / Out-comes: 4 CCCC; 3 ICCC; 3 CICC; 3 CCIC; 3 CCCI; 2 CCII; 2 CICI; 2 CIIC; 2 ICCI; 2 ICIC; 2 IICC; 1 CIII; 1 ICII; 1 IICI; 1 IIIC; 0 IIII *C indicates a correct answer; I indicates an incorrect answer.*	● Game Night	Sample space Outcomes Unions Intersections Complements Events Subsets Or Not Random Sample Random Variable Probability Chance
HS.S-CP.A.3 Understand the conditional probability of A given	Another way of viewing independence is to consider the conditional	● Getting a Ace, given 3 have been played	Conditional Probability Independent

B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.	probability of an event A given an event B, P(A|B), as the probability of A in the sample space restricted to just those outcomes that constitute B. In the table of outcomes for guessing on the true-false questions, P(C on second question | C on first question) = 4/8 = ½ = P(C on second) and students see that knowledge of what happened on the first question does not alter the probability of the outcome on the second; the two events are independent. In the selecting students scenario, the conditional probability of a girl on the second selection, given that a girl was selected on the first is P(girl on second | girl on first) = 6/12 = ½ and P(girl on second) = 3/5. So, these two events are again seen to be dependent. The outcome of the second draw does depend on what happened at the first draw. **Possible outcomes: Guessing on four true–false questions** Number correct / Out-comes / Number correct / Out-comes / Number correct / Out-comes 4 CCCC / 2 CCII / 1 CIII 3 ICCC / 2 CICI / 1 ICII 3 CICC / 2 CIIC / 1 IICI 3 CCIC / 2 ICCI / 1 IIIC 3 CCCI / 2 ICIC / 0 IIII 2 IICC *C indicates a correct answer; I indicates an incorrect answer.* **Selecting two students from three girls and two boys** Number of girls / Outcomes 2 AB BA 2 AC CA 2 BC CB 1 AD DA 1 AE EA 1 BD DB 1 BE EB 1 CD DC 1 CE EC 0 DE ED		Mutually exclusive Outcome Events If then Sample space
HS.S-CP.B.7 Apply the Addition Rule, P(A or B) = P(A) + P(B) –	Suppose two fair six-sided number cubes are rolled, giving rise to 36	•	Addition rule Probability

P(A and B), and interpret the answer in terms of the model.	equally likely outcomes. Outcomes for specified events can be diagramed as sections of the table, and probabilities calculated by simply counting outcomes. This type of example is one way to review information on conditional probability and introduce the addition and multiplication rules. [Insert figure here] For example, defining events: A is “you roll numbers summing to 8 or more” B is “you roll doubles” Now, by counting outcomes P(A or B) = 18/36 or by using the Addition Rule P(A or B) = P(A) + P(B) - P(A and B) = 15/36 + 6/36 – 3/36 = 18/36. **Possible outcomes: Rolling two number cubes** 1 2 3 4 5 6 1 1, 1 1, 2 1, 3 1, 4 1, 5 1, 6 2 2, 1 2, 2 2, 3 2, 4 2, 5 2, 6 3 3, 1 3, 2 3, 3 3, 4 3, 5 3, 6 4 4, 1 4, 2 4, 3 4, 4 4, 5 4, 6 5 5, 1 5, 2 5, 3 5, 4 5, 5 5, 6 6 6, 1 6, 2 6, 3 6, 4 6, 5 6, 6		Probability model Event Outcome Chance Independent Mutually exclusive
HS.S-CP.B.8 Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.	Suppose two fair six-sided number cubes are rolled, giving rise to 36 equally likely outcomes. Outcomes for specific events can be diagrammed as sections of the table, and probabilities calculated by simply counting outcomes. This type of example is one way to review information on conditional probability	•	Multiplication Rule Probability model Probability Chance Event Outcome Independent Mutually exclusive

	and introduce the addition and multiplication rules. [Insert figure here] For example, defining events: A is “you roll numbers summing to 8 or more” B is “you roll doubles” By the Multiplication Rule P(A and B) = P(A)P(B|A) = 15/36 * 3/15 = 3/36. **Possible outcomes: Rolling two number cubes** 1 2 3 4 5 6 1 1,1 1,2 1,3 1,4 1,5 1,6 2 2,1 2,2 2,3 2,4 2,5 2,6 3 3,1 3,2 3,3 3,4 3,5 3,6 4 4,1 4,2 4,3 4,4 4,5 4,6 5 5,1 5,2 5,3 5,4 5,5 5,6 6 6,1 6,2 6,3 6,4 6,5 6,6		
HS.S-CP.B.6 Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A, and interpret the answer in terms of the model.	Suppose two fair six-sided number cubes are rolled, giving rise to 36 equally likely outcomes. Outcomes for specific events can be diagrammed as sections of the table, and probabilities calculated by simply counting outcomes. This type of example is one way to review information on conditional probability and introduce the addition and multiplication rules. [Insert figure here] For example, defining events: A is “you roll numbers summing to 8 or more” B is “you roll doubles” and counting outcomes leads to P(A) = 15/36 P(B) = 6/36	•	Probability Probability model Chance Event Outcome Conditional probability Independent Mutually exclusive Addition rule Multiplication rule

	P(A and B) = 3/36, and P(B|A) = 3/15, the fraction of A's 15 outcomes that also fall in B. **Possible outcomes: Rolling two number cubes** 		
HS.S-CP.A.2 Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	Suppose a student is randomly guessing the answers to all four true–false questions on a quiz. The outcomes in the sample space can be arranged as shown in the margin. [Insert first figure here] Probabilities assigned to these outcomes should be equal because random guessing implies that no one outcome should be any more likely than another. P(C on first question) = 1/2 = P(C on second question) as should seem intuitively reasonable. Now, P[(C on first question) and (C on second question)] = 4/16 = 1/4 = 1/2 * ½, which shows that the two events (C on first question) and (C on second question) are independent, by the definition of independence (Two events A and B are said to be independent if P(A) * P(B) = P(A and B)). This, too, should seem intuitively reasonable to students because the random guess on the second question should not have been influenced by the random guess on the first. Students may contrast the		Probability Probability model Event Outcome Chance Independent

	1	2	3	4	5	6
1	1, 1	1, 2	1, 3	1, 4	1, 5	1, 6
2	2, 1	2, 2	2, 3	2, 4	2, 5	2, 6
3	3, 1	3, 2	3, 3	3, 4	3, 5	3, 6
4	4, 1	4, 2	4, 3	4, 4	4, 5	4, 6
5	5, 1	5, 2	5, 3	5, 4	5, 5	5, 6
6	6, 1	6, 2	6, 3	6, 4	6, 5	6, 6

quiz scenario above with the scenario of choosing at random two students to be leaders of a five-person working group consisting of three girls (April, Briana, and Cyndi) and two boys (Daniel and Ernesto). The first name chosen indicates the discussion leader and the second the recorder, so order of selection is important. The 20 outcomes are displayed in the margin. [Insert second figure here] Here, the probability of selecting two girls is: P(two girls selected) = 6/20 = 3/10 whereas P(girl selected on first draw) = 12/20 = 3/5 = P(girl selected on second draw). Because 3/5 * 3/5 ≠ 3/10, these two events are not independent. The selection of the second person does depend on the selection of the first when the same person cannot be selected twice.

Possible outcomes: Guessing on four true–false questions

Number correct	Out-comes	Number correct	Out-comes	Number correct	Out-comes
4	CCCC	2	CCII	1	CIII
3	ICCC	2	CICI	1	ICII
3	CICC	2	CIIC	1	IICI
3	CCIC	2	ICCI	1	IIIC
3	CCCI	2	ICIC	0	IIII
		2	IICC		

C indicates a correct answer; I indicates an incorrect answer.

Selecting two students from three girls and two boys

Number of girls	Outcomes	
2	AB	BA
2	AC	CA
2	BC	CB
1	AD	DA
1	AE	EA
1	BD	DB
1	BE	EB
1	CD	DC
1	CE	EC
0	DE	ED

Topics in Statistics 3-Probability in Gaming

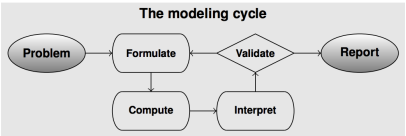
CCSS Standards #	Learning Targets: I can	Summative Assessment Strategy	Lesson Progression and Connection to Math Practices	Common Learning Experiences and Assessments
HS.S-CP.A.1 **Pacing:** 1 week	Simple Rules of Probability: ● I can explain that probability is the *chance* of something happening. ● I can determine the probability of rolling a dice and getting a specific number. ● I can determine the probability of a specific card in a deck of cards. ● I can determine the total outcomes of a specific probability. ● I can write probability as ratios. ● I can calculate probability as a fraction, a decimal, and percentage.	<table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table>	**Lesson Progression and connections:** ● When playing games with dice or cards, what do you need to know about probability? ● Students will play simple dice and card games and activities. ● Students will write probability as ratios. ● Students will calculate the probability as a fraction, a decimal, and a percentage. ● Students will determine the total outcomes of a given situation. **Math Practices:** ● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them. ● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.	**Mandatory Lessons/Activities:** ● Probability of specific numbers while rolling a dice and dices ● Probability of specific cards in a deck of cards **Assessments:** ● Students will calculate probability of basic dice and card games
HS.S-CP.A.1 HS.S-CP.A.2 HS.S-CP.B.7 HS.S-CP.B.8	More complex Rules of Probability: ● I can explain that probability is the *chance* of something happening. ● I can determine the total outcomes of a specific probability. ● I can determine if the probability is a union, an intersection, or a complement. ● I can determine if an event is independent or dependent. ● I can determine if an event is mutually exclusive. ● I can use the addition rule to calculate the probability of a given game. ● I can use the multiplication rule to	<table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table>	**Lesson Progression and connections:** In order to win a card or dice game, what do you need to know about probability? ● Students will determine the total outcomes of a given situation. ● Students will compare the probability to their actual results. ● Students will compare the probability to the class results. ● Students will calculate the probability from a given chart. ● Students will explain the probability of a given situation. ● Students will explain the relationship between probability and actual results in real life.	**Mandatory Lessons/Activities:** ● Performance Task-Interpreting a Game of Chance

<table>
<tr>
<td>Pacing:
2.5 weeks</td>
<td>calculate the probability of a given game.
● I can determine when to use the addition rule vs the multiplication rule.</td>
<td></td>
<td>Math Practices:
● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.</td>
<td>Assessments:
● Students will calculate probability of specific card/dice games</td>
</tr>
<tr>
<td>HS.S-CP.B.6
HS.S-CP.A.3</td>
<td rowspan="2">Modeling Probability:
● I can create a tree diagram to represent the probability situation.
● I can create an area model to represent the probability situation.
● I can create a Venn diagram to represent the probability situation.
● I can calculate probability using different models.
● I can determine the total outcomes of a conditional probability.
● I can outline and calculate the probability of my own new game.</td>
<td rowspan="2"><table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td>X</td><td>Observation</td></tr></table></td>
<td>Lesson Progression and connections:
In order to create a dice or card game, what do you need to know about probability?
● Students will create a tree diagram to represent the probability situation.
● Students will create area models to represent the probability situation.
● Students will create Venn Diagrams to represent the probability situation.
● Students will calculate probability using different representation models.
● Students will calculate conditional probability from a given chart.
● Students will create their own game.
● Students will outline and calculate the probability of winning their game.
● Students will play each other’s games and provide feedback.
● Students will use their knowledge of probability to generate s PSA about underage gambling in CT.</td>
<td>Mandatory Lessons/Activities:
● PT-Interpreting a Game of Chance
● Dunkin Choices
● Gambling Prevention-PSA</td>
</tr>
<tr>
<td>Pacing:
2.5 weeks</td>
<td>Math Practices:
● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.</td>
<td>Assessments:
● Students will create their own game
● Students will outline how to win and calculate the probability of winning.</td>
</tr>
</table>

ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	**PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS Course**	**ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY**	**OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE Course**
• Probability is the *chance* of something happening, NOT that it *will* happen. • "And" is an intersection, where both parts occur (must be true for both). • "Or" is a union, where it could happen in one OR the other (does Not have to be true for both, just needs to be true for one of them).	Students can write ratios. Students can calculate decimals and percentages from fractions. List standards in the Course and link to achieve the core coherence map for each standard HS.S-CP.A.1 HS.S-CP.A.2 HS.S-CP.B.7 HS.S-CP.B.8 HS.S-CP.B.6 HS.S-CP.A.3	HS.S-CP.B.9	Through the Problem Based Learning approach, all of the tasks in learning throughout the unit are student lead.
RESOURCES			
Resources are linked in sequences as needed. Rubrics are in the Bristol Prep Academy folder of the Bristol Math Units Shared Drive. Gambling Prevention-(1-CT Council Problem Gambling, 2-Problem Gambling Services			

Consumer Math 1-Store Budget

UNWRAPPED STANDARDS

Grade Level Standard	Standard Progression	Connection to Problem-based Learning (PBL)- School Store	Academic Vocabulary (Standard Based)
HS.A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.	The repertoire of functions that is acquired during high school allows students to create more complex equations, including equations arising from linear and quadratic expressions, and simple rational and exponential expressions. All the standards in the Creating Equations group carry a modeling star, denoting their connection with the Modeling category in high school. This connotes not only an increase in the complexity of the equations studied, but an upgrade of the student's ability in every part of the modeling cycle.	PBL Personal Finance Curriculum (11 personal finance projects) ● Open for Business ● Compare prices of hot pockets at 1.00 vs 1.50 ● Compare mac and cheese at 1.00 vs noodle cups at 1.50 ● Profit = Revenue – Cost ● Revenue = pq ● Malena's equation vs our equation for our store ● Determine how much we want as profit for school microwave	Equation Inequality Coefficient Like terms Linear equation Variable Slope Intercept Vertical axis Horizontal axis Slope intercept form Standard form Profit Revenue Cost Demand
HS.A-CED.A.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non- viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.	All the standards in the Creating Equations group carry a modeling star, denoting their connection with the Modeling category in high school. This connotes not only an increase in the complexity of the equations studied, but an upgrade of the student's ability in every part of the modeling cycle. 	● Use the Profit and Revenue equations to solve the system ● Maximize profit ● Determine how a solution of a system relates to profit, demand, and revenue	System of equations Infinitely many No solution One solution Intersection point Solution set System of inequalities Inequality Independent variable Dependent variable Maximum Minimum Profit Substitution Elimination

			Revenue Cost Demand
HS.A-SSE.A.1 Interpret expressions that represent a quantity in terms of its context: HS.A-SSE.A.1.a Interpret parts of an expression, such as terms, factors, and coefficients. HS.A-SSE.A.1.b Interpret complicated expressions by viewing one or more of their parts as a single	The middle grades standards in Expressions and Equations build a ramp from arithmetic expressions in elementary school to more sophisticated work with algebraic expressions in high school. As the complexity of expressions increases, students continue to see them as being built out of basic operations; they see expressions as sums of terms and products of factors. In "Animal Populations" students compare P + Q and 2P by seeing 2P as P + P. They distinguish between (Q–P)/2 and Q – P/2 by seeing the first as the quotient where the numerator is a difference and the second as a difference where the second term is a quotient. [This example] illustrates how students are able to see complicated expressions as built out of simpler ones. **Animal Populations** Suppose P and Q give the sizes of two different animal populations, where $Q > P$. In 1–4, say which of the given pair of expressions is larger. Briefly explain your reasoning in terms of the two populations. 1. $P + Q$ and $2P$ 2. $\frac{P}{P+Q}$ and $\frac{P+Q}{2}$ 3. $(Q - P)/2$ and $Q - P/2$ 4. $P + 50t$ and $Q + 50t$ Task from Illustrative Mathematics. For solutions and discussion, see http://www.illustrativemathematics.org/illustrations/436.	• Break down the parts of the equations above • Determine the items we want to sell • Define variables • Write expressions to represent the items	Expression Equation Coefficient Combine like terms Linear equation Linear expression Variable Term constant
HS.A-SSE.A.2 Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a	Seeing structure in expressions entails a dynamic view of an algebraic expression, in which potential	• Rewrite revenue and profit equations from above to solve • Use Malena's in link as example	Variable Expression Equation

difference of squares that can be factored as (x2 – y2)(x2 + y2).	rearrangements and manipulations are ever present. An important skill for college readiness is the ability to try possible manipulations mentally without having to carry them out, and to see which ones might be fruitful and which not.	● Rewrite our equations	Equivalent Order of operations Term Constant Coefficient

Consumer Math 1-Store Budget

The *Consumer Math: Budget* course uses the Bristol Prep Academy school store as the premise for all mathematical application and learning. The learning focuses on three principles: profit, pricing, and revenue. In the first sequence of learning, students investigate various items and define which they would like to include in the store. Students use algebraic expressions to determine the potential pricing for each of the items they intend to sell in the school store. Students have to investigate bulk purchase prices versus standard consumer prices. Students not only have to identify the items to sell, but the number of items they wish to keep in stock. Students use algebraic thinking to identify the best value item for the needs of the BPA store. The second sequence applies the concepts of stocking and pricing goods to maximize profit. To make profit predictions for the different items in the store, students must interpret expressions that represent a quantity of goods and interpret parts of an expression, such as terms, coefficients, and variables.

<table>
<tr><th>CCSS Standards #</th><th>Learning Targets: I can</th><th>Summative Assessment Strategy</th><th>Lesson Progression and Connection to Math Practices</th><th>Common Learning Experiences and Assessments</th></tr>
<tr><td>HS.A-SSE.A.1
HS.A-SSE.A.1.a
HS.A-SSE.A.1.b</td><td rowspan="2">Determining Stock Items and Quantity:
● I can conduct a cost analysis of various items and determine which items to sell.
● I can define and identify variables.
● I can determine amount per item to stock.</td><td rowspan="2"><table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● We are opening the school store, what do we need to know to create a proper budget?
● Create a schedule for workers.
● Determine items and amount to keep in stock.
● Create a shopping list for school store and determine location to buy it from</td><td>Mandatory Lessons/Activities:
● Review pricing of Stop and Shop, Costco, and Sams.
● Review Malena’s lesson</td></tr>
<tr><td>Pacing:</td><td>Math Practices:
● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.</td><td>Assessments:
● Google Sheet of items and amount of each item</td></tr>
<tr><td>HS.A-CED.A.1
HS.A-SSE.A.2</td><td>Determining item pricing and profit
● I can write an expression to represent the item.
● I can define profit, demand, cost.
● I can identify potential profit.
● I can determine pricing of an item based on demand.
● I can calculate profit per item.</td><td><table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● We want to sell more items, what do we need to know?
● Determine cost of each.
● Determine pricing.
● Set a weekly budget.
● Enter information into Google Sheets.
● Input formulas into Google Sheets
● Calculate profit per item.
● Calculate sales prices and profit.</td><td>Mandatory Lessons/Activities:
● Review Malena’s lesson
● Lemonade lesson plan example
● Compare pricing of last year's items.</td></tr>
</table>

<table>
<tr>
<td>Pacing:</td>
<td>● I can identify which item creates the most profit.
● I can calculate mark-up percentages of items.
● I can describe the relationship between sale prices and profit.</td>
<td></td>
<td>Math Practices:
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.
● CCSS.MATH.PRACTICE.MP6 Attend to precision.</td>
<td>Assessments:
● Open-ended worksheet during practice.
● Creation of cost, prices, and profit chart on Google Sheets.</td>
</tr>
<tr>
<td>HS.A-SSE.A.2
HS.A-CED.A.3</td>
<td rowspan="2">Determining Store Revenue:
● I can calculate the total cost.
● I can calculate total profit.
● I can make a plan to maximize profit.
● I can determine the best pricing to gain the most revenue.
● I can estimate revenue for the month and year.</td>
<td rowspan="2"><table>
<tr><td></td><td>Selected Response</td></tr>
<tr><td>x</td><td>Constructed Response</td></tr>
<tr><td>x</td><td>Performance</td></tr>
<tr><td></td><td>Observation</td></tr>
</table></td>
<td>Lesson Progression and connections:
● We want to buy a microwave with our profit, what do we need to know?
● Calculate the total cost of all items.
● Calculate total profit of all items.
● Analyze cost versus profit.
● Determine prices to maximize profit.
● Calculate projected revenue for the month and year.
● When will we meet our goal for the microwave?</td>
<td>Mandatory Lessons/Activities:
● Review Malena's lesson
● Lemonade lesson plan example</td>
</tr>
<tr>
<td>Pacing:</td>
<td>Math Practices:
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.
● CCSS.MATH.PRACTICE.MP7 Look for and make use of structure.
● CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.</td>
<td>Assessments:
● PowerPoint presentation of weekly Revenue, monthly Revenue, and projected yearly revenue.</td>
</tr>
</table>

ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	**PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS Course**	**ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY**	**OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE Course**
X and Y are NOT the only variables that can be used. All the numbers in a word problem do NOT have to be used in the equation. All equations do NOT need to be in slope-intercept form.	List standards in the Course and link to achieve the core coherence map for each standard HS.A-SSE.A.1 HS.A-SSE.A.2 HS.A-CED.A.1 HS.A-CED.A.3	HS.A-CED.A.2 HS.A-REI.C.6 HS.A-REI.C.7	Through the Problem Based Learning approach, all of the tasks in learning throughout the unit are student lead.

RESOURCES
Resources are linked in sequences as needed. Rubrics are in the Bristol Prep Academy folder of the Bristol Math Units Shared Drive.

Consumer Math 2: Stock Market

UNWRAPPED STANDARDS

Grade Level Standard	Standard Progression	Connection to Problem-based Learning (PBL)-	Academic Vocabulary (Standard Based)
HS.F-IF.B.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*	Functions are often described and understood in terms of their behavior. Over what input values is it increasing, decreasing, or constant? For what input values is the output value positive, negative, or 0? What happens to the output when the input value F-IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. gets very large in magnitude? Graphs become very useful representations for understanding and comparing functions because these "behaviors" are often easy to see in the graphs of functions (see "Warming and Cooling" in the margin).	The Stock Market Game Student Activity Packet from SMG PBL Personal Finance Curriculum (11 personal finance projects) Stock Market PBL TD Bank Stock Market Activities - Investing and Stocks	Function Relationship Intercepts Intervals Decreasing function Increasing function Negative function Positive function Maximums Minimums Relative maximums Relative minimums Symmetry End behavior Periodicity Input Output Magnitude Quantitative relationship Increasing Decreasing Constant

			Table of values
HS.F-IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*	Graphs and contexts are opportunities to talk about the notion of the domain of a function.		Domain Range Function Quantitative relationship
HS.F.IF.B.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	Students learned in Grade 8 that the rate of change of a linear function is equal to the slope of the line that is its graph... "The rate of change" has an unambiguous meaning for a linear function. For nonlinear functions, however, rates of change are not constant, and so we talk about average rates of change over an interval.		Average rate of change Rate of change Intervals Slope Linear functions Functions Nonlinear functions Constant Constant rate of change

Consumer Math 2: Stock Market

<table>
<tr><th>CCSS Standards #</th><th>Learning Targets: I can</th><th>Summative Assessment Strategy</th><th>Lesson Progression and Connection to Math Practices</th><th>Common Learning Experiences and Assessments</th></tr>
<tr><td>HS.F-IF.B.4</td><td rowspan="2">Researching Stocks:
● I can interpret intercepts on a graph.
● I can determine intervals where the function is increasing or decreasing from a graph.
● I can determine intervals where the function is positive or negative from a graph.
● I can determine the relative maximum and minimum on a graph.
● I can explain the end behavior of a graph.
● I can sketch graphs when given key features.
● I can define stocks.
● I can explain how a stock is doing over a specific period of time.</td><td rowspan="2"><table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● What do you need to know about graphs in order to buy and sell stocks?
● Students will define what a stock is.
● Students will view graphs on three major stocks.
● Students will describe the intervals where the stock is increasing and decreasing.
● Students will determine the relative maximum and minimum of the stock graphs.
● Students will sketch graphs of stocks of future predictions.</td><td>Mandatory Lessons/Activities:
● Hyperlink to kendall hunt IM lessons/Activities</td></tr>
<tr><td>Pacing:
3 weeks</td><td>Math Practices:
● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.
● CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.</td><td>Assessments:
● Hyperlink to kendall hunt IM assessment/assistment</td></tr>
<tr><td>HS.F-IF.B.5
HS.F.IF.B.6</td><td rowspan="2">Buying and Selling Stocks:
● I can determine the domain and range of a function from a graph.
● I can determine the domain of a function in the context of the problem.
● I can limit the domain of a function to fit the context of the problem.
● I can estimate the rate of change</td><td rowspan="2"><table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● What do you need to know about graphs in order to buy and sell stocks at the most profitable time?
● Students will be able to calculate the average rate of change of a stock given a specific time interval.
● Students will be able to calculate</td><td>Mandatory Lessons/Activities:
● Hyperlink to kendall hunt IM lessons/Activities</td></tr>
<tr><td>Pacing:</td><td>Math Practices:</td><td>Assessments:</td></tr>
</table>

3 weeks	from a graph. ● I can calculate average rate of change. ● I can interpret average rate of change in the context of the problem.		● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them. ● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively. ● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning. ● CCSS.MATH.PRACTICE.MP4 Model with mathematics. ● CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically. ● CCSS.MATH.PRACTICE.MP6 Attend to precision. ● CCSS.MATH.PRACTICE.MP7 Look for and make use of structure. ● CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.	● Hyperlink to kendall hunt IM assessment/assistment

ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	**PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS Course**	**ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY**	**OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE Course**
	List standards in the Course and link to achieve the core coherence map for each standard		Through the Problem Based Learning approach, all of the tasks in learning throughout the unit are student lead.
RESOURCES			
Resources are linked in sequences as needed. Rubrics are in the Bristol Prep Academy folder of the Bristol Math Units Shared Drive.			

Consumer Math 3: Banking and Loans			
UNWRAPPED STANDARDS			
Grade Level Standard	**Standard Progression**	**Connection to Problem-based Learning (PBL)-**	**Academic Vocabulary (Standard Based)**
HS.F-LE.A.1 Distinguish between situations that can be modeled with linear functions and with exponential functions:	Distinguishing between situations that can be modeled with linear functions and with exponential functions turns on these types of growth rates (MP.7). One indicator of these growth rates is differences over equal intervals, given, for example, in a table of values drawn from the situation—with the understanding that such a table may only approximate the situation (MP.4). To prove that a linear function grows by equal differences over equal intervals, students draw on the understanding developed in Grade 8 that the ratio of the rise and run for any two distinct points on a line is the same (see the Expressions and Equations Progression) and recast it in terms of function inputs and outputs... The equal intervals can be seen as the runs for two pairs of points. Be-cause these runs have equal length and the ratio of rise to run is the same for any pair of distinct points, the differences of the corresponding outputs (the rises) are the same...In the process of this proof, students note the correspondence between rise and run on a graph and symbolic expressions for differences of inputs and outputs (MP.1). Using such expressions has the advantage that the analogous proof showing that exponential functions grow by equal factors over equal intervals begins in an analogous way with expressions for di˙erences of inputs and outputs.	PBL Personal Finance Curriculum (11 personal finance projects) Exponentials ● Saving Account PBL ● Compare saving $5 a day in a piggy bank, putting $5 in a savings account every day, or just putting $5 in a savings account once and letting it sit there.	Function Exponential Linear Growth rate Decay rate Rate Interest Decreasing function Increasing function Slope Exponent Initial value Savings account Compound interest

HS.F-LE.A.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	The process of going from linear or exponential functions to tables can go in the opposite direction. Given sufficient information, e.g., a table of values together with information about the type of relationship represented,students construct the appropriate function. For example, students might be given the information that the table below shows inputs and outputs of an exponential function, and asked to write an expression for the function.	• Bring in banker - Kara's cousin • Review credit report • Example credit report activity • Credit Notes • Credit Card Statements activity • Create exponential equations to use with credit cards	Geometric sequence Arithmetic sequence Table of values Function relationship Linear Exponential Constant rate Decay Growth Interest Initial value Asymptote Mutual Fund Stock Certificate of Deposit (CD)
HS.F-LE.A.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	N/A	• Compare graphs of saving $5 a day in a piggy bank, putting $5 in a savings account every day, or just putting $5 in a savings account once and letting it sit there.	Table of values Exponential Linear Polynomial Function Increasing/decreasing exponentially Increasing/decreasing linearly Quantity Growth Decay Asymptote
HS.F-IF.C.8.b Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, y = (1.01)12t, y = (1.2)t/10, and classify them as representing exponential growth or decay.	Consistent with the practice of looking for and making use of structure (MP.7), students should also develop the practice of writing expressions for functions in ways that reveal the key features of the function.	• Write expressions to represent exponential growth or decay	Exponential Growth Exponential Decay Rate Expressions Functions Percent Rate

Consumer Math 3: Banking and Loans

<table>
<tr><th>CCSS Standards #</th><th>Learning Targets: I can</th><th>Summative Assessment Strategy</th><th>Lesson Progression and Connection to Math Practices</th><th>Common Learning Experiences and Assessments</th></tr>
<tr><td>HS.F-LE.A.1
HS.F-LE.A.2
HS.F-LE.A.3</td><td rowspan="2">Savings accounts:
● I can calculate compound interest.
● I can calculate the number of years for money to double.
● I can describe the difference between a savings account and a checking account.
● I can describe the difference between exponential and linear.
● I can create the equation to calculate compound interest.
● I can determine the difference between arithmetic and geometric sequences.</td><td rowspan="2"><table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● Compare saving $5 a day in a piggy bank, putting $5 in a savings account every day, or just putting $5 in a savings account once and letting it sit there.
● Write an equation to represent each scenario above.
● Graph each equation.
● Compare the graphs and determine which option makes the most money in the long run.</td><td>Mandatory Lessons/Activities:
● Saving Account PBL</td></tr>
<tr><td>Pacing:
2 weeks</td><td>Math Practices:
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.
● CCSS.MATH.PRACTICE.MP7 Look for and make use of structure.
● CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.</td><td>Assessments:
● Presentation of 3 graphs</td></tr>
<tr><td>HS.F-LE.A.1
HS.F-LE.A.2
HS.F-IF.C.8.b</td><td>Credit cards:
● I can define interest, principal, APR, hard and soft inquiries, and transactions.
● I can calculate interest accrued
● I can calculate the number of years to pay off a credit card by only paying the minimum.
● I can calculate the minimum I should pay to pay off the debt in a certain number of years.
● Input equations/formulas into Google Sheets.</td><td><table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● You are opening up a credit card, what do you need to know?
● Identify key components of a credit report.
● Banker speaks with students
● Students research credit cards and decide on one.
● Students randomly assigned a credit card charge every day for a week.
○ If absent, charged a late fee.
● Based on credit card selected, in Google sheets students will:
○ Calculate total interest paid.
○ Determine the number of years to pay it off using the minimum payment.</td><td>Mandatory Lessons/Activities:
● Bring in banker - Kara’s cousin
● Review credit report
● Example credit report activity
● Credit Card Debt Simulator
● NerdWallet to help research
● PBL Personal Finance Curriculum (11 personal finance projects)</td></tr>
</table>

<table>
<tr>
<td>Pacing:
2 weeks</td>
<td></td>
<td></td>
<td>Math Practices:
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.
● CCSS.MATH.PRACTICE.MP7 Look for and make use of structure.
● CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.</td>
<td>Assessments:
● Report of their “credit card use”</td>
</tr>
<tr>
<td>HS.F-LE.A.1
HS.F-LE.A.2
HS.F-LE.A.3</td>
<td rowspan="2">Loans:
● I can describe the difference between exponential growth and decay.
● I can calculate interest accrued.
● I can determine the number of years to pay off the loan based on the payment plan.
● I can compare payment plans and determine the best option based on down-payments and interest rates.
● I can compare the value of the car with the length it takes to pay off the loan.</td>
<td rowspan="2"><table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td>
<td>Lesson Progression and connections:
● You want to buy a car but you don’t have enough money, what do you need to know in order to buy the car?
● Car - research and pick car.
● Calculate the worth of the car over time.
● Have multiple credit score scenarios and determine the interest rate.
● Calculate minimum payment based on interest rate.
● Calculate minimum payment with and without down payments.
● Compare payment options.
● Why do I want to owe less money than the car is worth?
● Compare car value with amount left on loan at a certain number of years.</td>
<td>Mandatory Lessons/Activities:
● Research and select car
● Car Loan PBL</td>
</tr>
<tr>
<td>Pacing:
2 weeks</td>
<td>Math Practices:
● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.</td>
<td>Assessments:
● Presentation of the car & loan:
○ Type of car
○ Value of car over time
○ Total interest paid with different payment plans
○ Choose best payment plan
○ Compare value of car with length of car loan</td>
</tr>
</table>

ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	**PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS Course**	**ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY**	**OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE Course**
Compound interest is an exponential function, NOT linear. Savings accounts gain interest, checkings do not. Credit cards affect your credit score. Credit score is not an interest rate. Exponential growth graph moves away from zero, or the asymptote . Exponential decay graph approaches zero, or the asymptote	List standards in the Course and link to achieve the core coherence map for each standard HS.F-LE.A.1 HS.F-LE.A.2 HS.F-LE.A.3 HS.F-IF.C.8.b	HS.A-SSE.B.3.c	Through the Problem Based Learning approach, all of the tasks in learning throughout the unit are student lead.
RESOURCES			
Resources are linked in sequences as needed. Rubrics are in the Bristol Prep Academy folder of the Bristol Math Units Shared Drive.			

Math Test Preparation 1: SAT Heart of Algebra	
UNWRAPPED STANDARDS	
SAT Section	**Subcategory**
Heart of Algebra: Analyzing and fluently solving equations and systems of equations; creating expressions, equations, and inequalities to represent relationships between quantities to solve problems; rearranging and interpreting formulas	HA1: Create, solve, or interpret a linear expression or equation in one variable that represents a context. The expression or equation will have rational coefficients, and multiple steps may be required to simplify the expression, simplify the equation, or solve for the variable in the equation. HA 2: Create, solve, or interpret linear inequalities in one variable that represent a context. The inequality will have rational coefficients, and multiple steps may be required to simplify or solve for the variable. HA 3: Build a linear function that models a linear relationship between two quantities. The student will describe a linear relationship that models a context using either an equation in two variables or function notation. The equation or function will have rational coefficients, and multiple steps may be required to build and simplify the equation or function. HA 4: Create, solve, and interpret systems of linear inequalities in two variables. The student will analyze one or more constraints that exist between two variables by creating, solving, or interpreting an inequality in two variables or a system of inequalities in two variables to represent a context. Multiple steps may be required to create the inequality or system of inequalities or to determine whether a given point is in the solution set. HA 5: Create, solve, and interpret systems of two linear equations in two variables. The student will analyze one or more constraints that exist between two variables by creating, solving, or analyzing a system of linear equations to represent a context. The equations will have rational coefficients, and multiple steps may be required to simplify or solve the system. HA 6: Algebraically solve linear equations (or inequalities) in one variable. The equation (or inequality) will have rational coefficients and may require multiple steps to solve for the variable; the equation may yield no solution, one solution, or infinitely many solutions. The student may also be asked to determine the value of a constant or coefficient for an equation with no solution or infinitely many solutions. HA 7: Algebraically solve systems of two linear equations in two variables. The equations will have rational coefficients, and the system may yield no solution, one solution, or infinitely many solutions. The student may also be asked to determine the value of a constant or coefficient of an equation in which the system has no solution, one solution, or infinitely many solutions. HA 8: Interpret the variables and constants in expressions for linear functions within the context presented. The student will make connections between a context and the linear equation that models the context and will identify or describe the real-life meaning of a constant term, a variable, or a feature of the given equation. HA 9: Understand connections between algebraic and graphical representations. The student will select a graph described by a given linear equation, select a linear equation that describes a given graph, determine the equation of a line given a verbal description of its graph, determine key features of the graph of a linear function from its equation, or determine how a graph may be affected by a change in its equation.

Math Test Preparation A: SAT-Heart of Algebra

<table>
<tr><th>CCSS Standards #</th><th>Learning Targets: I can</th><th>Summative Assessment Strategy</th><th>Lesson Progression and Connection to Math Practices</th><th>Common Learning Experiences and Assessments</th></tr>
<tr><td>See Heart of Algebra Subcategories above</td><td rowspan="2">Heart of Algebra:
● I can define variables in the context of the problem.
● I can describe connections between algebraic and graphical representations.
● I can create linear expressions, equations, and inequalities.
● I can solve linear expressions, equations, and inequalities.
● I can represent a problem in function notation.
● I can create and solve a system of equations using graphing, substitution, or elimination.
● I can explain the solution to the system of equations in the context of the problem.
● I can interpret the word problem solution using the answer to the system of equations.
● I can create and solve a system of inequalities.
● I can explain the solution to the system of inequalities in the context of the problem.
● I can interpret the word problem solution using the answer to the system of inequalities.</td><td rowspan="2"><table><tr><td>X</td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td></td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● Extremely individualized
● Students will take a practice SAT test
● Students will use ALEKS to work on topics that they struggle with, within this section of the SAT</td><td>Mandatory Lessons/Activities:
● ALEKS
● SAT practice problems</td></tr>
<tr><td>Pacing:
6 weeks</td><td>Math Practices:
● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.
● CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.
● CCSS.MATH.PRACTICE.MP6 Attend to precision.
● CCSS.MATH.PRACTICE.MP7 Look for and make use of structure.
● CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.</td><td>Assessments:
● SAT practice test</td></tr>
</table>

Math Test Preparation 2: SAT Problem Solving and Passport to Advanced Math	
UNWRAPPED STANDARDS	
SAT Section	**Subcategory**
Problem Solving and Data Analysis: Creating and analyzing relationships using ratios, proportions, percentages, and units; describing relationships shown graphically; summarizing qualitative and quantitative data	PS/DA 1: Use ratios, rates, proportional relationships, and scale drawings to solve single- and multistep problems. The student will use a proportional relationship between two variables to solve a multistep problem to determine a ratio or rate; calculate a ratio or rate and then solve a multistep problem; or take a given ratio or rate and solve a multistep problem. PS/DA 2: Solve single- and multi-step problems involving percentages. The student will solve a multistep problem to determine a percentage; calculate a percentage and then solve a multistep problem; or take a given percentage and solve a multistep problem. PS/DA 3: Solve single- and multi-step problems involving measurement quantities, units, and unit conversion. The student will solve a multistep problem to determine a unit rate; calculate a unit rate and then solve a multistep problem; solve a multistep problem to complete a unit conversion; solve a multistep problem to calculate density; or use the concept of density to solve a multistep problem. PS/DA 4: Given a scatter plot, use linear, quadratic, or exponential models to describe how the variables are related. The student will, given a scatter plot, select the equation of a line or curve of best fit; interpret the line in the context of the situation; or use the line or curve of best fit to make a prediction. PS/DA 5: Use the relationship between two variables to investigate key features of the graph. The student will make connections between the graphical representation of a relationship and properties of the graph by selecting the graph that represents the properties described, or using the graph to identify a value or set of values. PS/DA 6: Compare linear growth with exponential growth. The student will infer the connection between two variables given a context in order to determine what type of model fits best. PS/DA 7: Use two-way tables to summarize categorical data and relative frequencies, and calculate conditional probability. The student will summarize categorical data or use categorical data to calculate conditional frequencies, conditional probabilities, association of variables, or independence of events. PS/DA 8: Make inferences about population parameters based on sample data. The student will estimate a population parameter given the results from a random sample of the population. The sample statistics may mention confidence intervals and measurement error that the student should understand and make use of, but need not calculate. PS/DA 9: Use statistics to investigate measures of center of data and analyze shape, center, and spread. The student will calculate measures of center and/or spread for a given set of data or use given statistics to compare two separate sets of data. The measures of center that may be calculated include mean, median, and mode, and the measures of spread that may be calculated include range. When comparing two data sets, the student may investigate mean, median, mode, range, and/or standard deviation. PS/DA 10: Evaluate reports to make inferences, justify conclusions, and determine appropriateness of data collection methods. The reports may consist of tables, graphs, or text summaries.

Passport to Advanced Math: Rewriting expressions using their structure; creating, analyzing, and fluently solving quadratic and higher-order equations; purposefully manipulating polynomials to solve problems.	PAM 1: Create a quadratic or exponential function or equation that models a context. The equation will have rational coefficients and may require multiple steps to simplify or solve the equation. PAM 2: Determine the most suitable form of an expression or equation to reveal a particular trait, given a context. PAM 3: Create equivalent expressions involving rational exponents and radicals, including simplifying or rewriting in other forms. PAM 4: Create an equivalent form of an algebraic expression by using structure and fluency with operations. PAM 5: Solve a quadratic equation having rational coefficients. The equation can be presented in a wide range of forms to reward attending to algebraic structure and can require manipulation in order to solve. PAM 6: Add, subtract, and multiply polynomial expressions and simplify the result. The expressions will have rational coefficients. PAM 7: Solve an equation in one variable that contains radicals or contains the variable in the denominator of a fraction. The equation will have rational coefficients, and the student may be required to identify when a resulting solution is extraneous. PAM 8: Solve a system of one linear equation and one quadratic equation. The equations will have rational coefficients. PAM 9: Rewrite simple rational expressions. Students will add, subtract, multiply, or divide two rational expressions or divide two polynomial expressions and simplify the result. The expressions will have rational coefficients. PAM 10: Interpret parts of nonlinear expressions in terms of their context. Students will make connections between a context and the nonlinear equation that models the context to identify or describe the real-life meaning of a constant term, a variable, or a feature of the given equation. PAM 11: Understand the relationship between zeros and factors of polynomials, and use that knowledge to sketch graphs. Students will use properties of factorable polynomials to solve conceptual problems relating to zeros, such as determining whether an expression is a factor of a polynomial based on other information provided. PAM 12: Understand a nonlinear relationship between two variables by making connections between their algebraic and graphical representations. The student will select a graph corresponding to a given nonlinear equation; interpret graphs in the context of solving systems of equations; select a nonlinear equation corresponding to a given graph; determine the equation of a curve given a verbal description of a graph; determine key features of the graph of a linear function from its equation; or determine the impact on a graph of a change in the defining equation. PAM 13: Use function notation, and interpret statements using function notation. The student will use function notation to solve conceptual problems related to transformations and compositions of functions. PAM 14: Use structure to isolate or identify a quantity of interest in an expression or isolate a quantity of interest in an equation. The student will rearrange an equation or formula to isolate a single variable or a quantity of interest.

Math Test Preparation 2: SAT Problem Solving and Passport to Advanced Math

<table>
<tr><th>CCSS Standards #</th><th>Learning Targets: I can</th><th>Summative Assessment Strategy</th><th>Lesson Progression and Connection to Math Practices</th><th>Common Learning Experiences and Assessments</th></tr>
<tr><td>See Problem Solving & Data Analysis Subcategories above</td><td rowspan="2">Problem Solving & Data Analysis:
● I can create a scale drawing to represent a problem.
● I can calculate ratios, rates, and unit rates.
● I can calculate percentages.
● I can calculate unit conversions.
● I can solve problems using ratios, rates, unit rates, and proportional relationships.
● I can solve problems using percentages.
● I can select the correct line or curve of best fit for a problem.
● I can calculate the line of best fit.
● I can use linear, quadratic, or exponential models to describe a relationship in a scatter plot.
● I can interpret the line of best fit in the context of the problem.
● I can determine the correlation of the line of best fit.
● I can use the line of best fit to make a prediction.
● I can determine key features of a graph.
● I can identify a value or set of values from a graph.
● I can compare linear and exponential growth.
● I can calculate relative frequencies, conditional probabilities, and conditional frequencies from two-way tables.
● I can make inferences about</td><td rowspan="2"><table><tr><td>X</td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td></td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● Extremely individualized
● Students will take a practice SAT test
● Students will use ALEKS to work on topics that they struggle with, within this section of the SAT</td><td>Mandatory Lessons/Activities:
● ALEKS
● SAT practice problems</td></tr>
<tr><td>Pacing:
3 weeks</td><td>Math Practices:
● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.
● CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.
● CCSS.MATH.PRACTICE.MP6 Attend to precision.
● CCSS.MATH.PRACTICE.MP7 Look for and make use of structure.
● CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.</td><td>Assessments:
● SAT practice test</td></tr>
</table>

<table>
<tr>
<td></td>
<td>population from sample data.
● I can use confidence intervals and measurement error to estimate population.
● I can calculate the measures of the center of a given data set.
● I can calculate measures of spread given a data set.
● I can determine the best measure of the center of data.
● I can analyze the shape, center, and spread of a given data set.
● I can evaluate tables, graphs, or text summaries of data.
● I can justify conclusions using reports.
● I can determine appropriate methods of data collection.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>See Passport to Advanced Math Subcategories above

Pacing:
3 weeks</td>
<td>Passport to Advanced Math:
● I can create a quadratic equation.
● I can create an exponential equation.
● I can create equivalent expressions using rational exponents and radicals.
● I can simplify and rewrite expressions using rational exponents and radicals
● I can determine the best form of an expression or equation to use for a given context.
● I can solve quadratic equations.
● I can add, subtract, and multiply polynomial expressions into simplest forms.
● I can solve equations with radicals.
● I can solve equations with variables in the denominator.
● I can identify extraneous solutions.
● I can solve a system of one linear</td>
<td>
<table>
<tr><td></td><td>Selected Response</td></tr>
<tr><td></td><td>Constructed Response</td></tr>
<tr><td></td><td>Performance</td></tr>
<tr><td></td><td>Observation</td></tr>
</table>
</td>
<td>Lesson Progression and connections:
● Extremely individualized
● Students will take a practice SAT test
● Students will use ALEKS to work on topics that they struggle with, within this section of the SAT

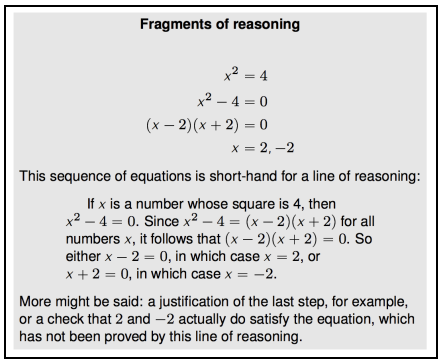
Math Practices:
● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.
● CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.
● CCSS.MATH.PRACTICE.MP6 Attend to precision.
● CCSS.MATH.PRACTICE.MP7 Look for and make use of structure.
● CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.</td>
<td>Mandatory Lessons/Activities:
● ALEKS
● SAT practice problems

Assessments:
● SAT practice test</td>
</tr>
</table>

	equation and one quadratic equation. ● I can add, subtract, multiply, or divide rational expressions into simplest forms. ● I can describe real-life meaning of a constant term, variable, or a feature of a given nonlinear equation in the context of the problem. ● I can describe the relationship between zeros and factors of polynomials. ● I can sketch graphs of polynomials using zeros or factors of the polynomial. ● I can select the correct graph that corresponds with a given nonlinear equation. ● I can determine key features of a graph from its equation. ● I can interpret graphs in the context of solving systems of equations. ● I can use function notation to solve problems related to transformations and compositions of functions. ● I can rearrange an equation to isolate a single variable or quantity of interest.			

Topics in Algebra A: Story of X

UNWRAPPED STANDARDS

Grade Level Standard	Standard Progression	Connection to Problem-based Learning (PBL)-	Academic Vocabulary (Standard Based)
HS.A-REI.A.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.  **Fragments of reasoning** $x^2 = 4$ $x^2 - 4 = 0$ $(x-2)(x+2) = 0$ $x = 2, -2$ This sequence of equations is short-hand for a line of reasoning: If x is a number whose square is 4, then $x^2 - 4 = 0$. Since $x^2 - 4 = (x-2)(x+2)$ for all numbers x, it follows that $(x-2)(x+2) = 0$. So either $x - 2 = 0$, in which case $x = 2$, or $x + 2 = 0$, in which case $x = -2$. More might be said: a justification of the last step, for example, or a check that 2 and -2 actually do satisfy the equation, which has not been proved by this line of reasoning.	A written sequence of steps to solve an equation is code for a narrative line of reasoning using words like "if," "then," "for all," " and "there exists." In the process of learning to solve equations, students learn certain standard "if-then" moves, for example "if x = y then x + 2 = y + 2." The danger in learning algebra is that students emerge with nothing but the moves, which may make it difficult to detect incorrect or made-up moves later on. Thus the first requirement in the standards in this domain is that students understand that solving equations is a process of reasoning. This does not necessarily mean that they always write out the full text; part of the advantage of algebraic notation is its compactness. Once students know what the code stands for, they can start writing in code	PEMDAS Comic Strip Story Flow charts	Equations Equality Expression Order of operations Solution set Possible value Variable Reflexive property of equality Constant rate Algebraic notation Domain Range Input Output
HS.A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	With an understanding of solving equations as a reasoning process, students can organize the various methods for solving different types of equations into a coherent picture. For example, solving linear equations		expressions Linear equations Linear inequalities Variable Coefficients Order of operations Equivalent

	involves only steps that are reversible (adding a constant to both sides, multiplying both sides by a non-zero constant, transforming an expression on one side into an equivalent expression). Therefore solving linear equations does not produce extraneous solutions.		Extraneous solutions Solution set Possible value Constant rate
HS.A-REI.A.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	Understanding solving equations as a process of reasoning demystifies "extraneous" solutions that can arise under certain solution procedures. The reasoning begins from the assumption that x is a number that satisfies the equation and ends with a list of possibilities for x. But not all the steps are necessarily reversible, and so it is not necessarily true that every number in the list satisfies the equation. Squaring both sides of an equation is a typical example of irreversible step, another is multiplying both sides of an equation by a quantity that might be zero.		Rational numbers Radical numbers Terminating decimal Rational equations Radical equations Radical expressions Equations Variable Extraneous solutions Solution set Possible value
HS.F-BF.A.1 Write a function that describes a relationship between two quantities. HS.F-BF.A.1.a Determine an explicit expression, a recursive process, or steps for calculation from a context.	The Algebra Progression discusses the difference between a function and an expression. Not all functions are given by expressions, and in many situations it is natural to use a function defined recursively. Calculating mortgage payment and drug dosages are typical cases where recursively defined functions are useful.		Functions Expression Recursive process Recursive rule Input Linear function Nonlinear function Output Algebraic function Domain Range Function notation Real-world function Simple function

HS.F-BF.A.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	In preparation for the deeper study of linear and exponential functions, students can study arithmetic sequences (which are linear functions) and geometric sequences (which are exponential functions). This is a good point at which to start making the distinction between additive and multiplicative changes.		Function Arithmetic sequence Geometric sequence Recursive equation Recurrence relationship Explicit formula Linear function Geometric function Exponential function Constant rate

Topics in Algebra B: Story of X

The Story of X allows students to describe the steps that describe the operations being performed on *x* or with *x* as well as the operations performed on the result of each step one with the result of each step. Students tell the story *x* by unpacking each of the steps in the solution and checking process. The story provides students the opportunity to use algebraic vocabulary and symbols to make sense of the algebraic expression.

CCSS Standards #	Learning Targets: I can	Summative Assessment Strategy	Lesson Progression and Connection to Math Practices	Common Learning Experiences and Assessments
HS.A-REI.A.1 HS.F-BF.A.2	**Writing the story of x:** ● I can define variables in the context of the problem. ● I can write recursive rules to present a problem. ● I can write an explicit rule to represent a problem. ● I can explain the difference between arithmetic sequence and a geometric sequence. ● I can use order of operations to explain the expression. ● I can use order of operations to simplify expressions. ● I can explain the difference between an expression and equation.	<table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table>	**Lesson Progression and connections:** ● In order to create and represent our own story, what do we need to know about expressions and equations? ● Students will explain how to make a PB&J ● Students will compare arithmetic and geometric sequences. ● Students will use flow charts to represent how to simplify an expression ● Students will simplify expressions. ● Students will write recursive and explicit rules to present a problem.	**Mandatory Lessons/Activities:** ● Partner work, explaining step by step how to make a PB&J. ● Order of Operations BINGO game
Pacing: 3 weeks			**Math Practices:** ● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively. ● CCSS.MATH.PRACTICE.MP4 Model with mathematics. ● CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.	**Assessments:** ● Simplifying expressions using PEMDAS
HS.A-REI.A.2 HS.A-REI.B.3 HS.F-BF.A.1	**Solving the story of x:** ● I can write an equation to solve a multi-step problem. ● I can describe a function and define its variables. ● I can explain how to solve multi-step equations in words. ● I can solve one step equations. ● I can solve two step equations. ● I can solve multi-step equations. ● I can explain the answer to the	<table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table>	**Lesson Progression and connections:** ● In order to find the answers to our own story, what do we need to know about solving equations? ● Students will create equations to represent a problem. ● Students will define variables in the context of the problem. ● Students will explain how to solve one-step, two-step, and multi-step equations. ● Students will use flow charts to explain how to	**Mandatory Lessons/Activities:** ● Solving equations practice ● Word problem practice

	problem in the context of the problem. ● I can check my solutions and make corrections as necessary.		solve equations. ● Students will solve one-step, two-step, and multi-step equations. ● Students will explain their answers in the context of the problem. ● Students will justify that their answer makes sense to the problem. ● Students will compare their answers with their peers.	
Pacing: 3 weeks			**Math Practices:** ● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them. ● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively. ● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning. ● CCSS.MATH.PRACTICE.MP4 Model with mathematics. ● CCSS.MATH.PRACTICE.MP6 Attend to precision.	**Assessments:** ● Students will create a comic strip. ● In the comic strip students will create their own problem, explain what is happening in words, write an equation, explain how to solve the equation in words, solve the equation, and explain their answer in the context of their problem.

ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	**PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS Course**	**ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY**	**OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE Course**
• An equation has an equal sign, an expression does NOT. • You can divide before you multiply, as long as it appears first, from left to right, in the expression or equation. • You can subtract before adding as long as it appears first, from left to right, in the expression or equation. • Adding and subtracting both come after multiplying and dividing. • You must follow order of operations inside the parentheses too. • If there is not left to simplify inside the parentheses, then you move on to the next step in order of operations. • When parentheses are used to present multiplication, you must simplify the exponents first. • Multiplication can be done in any order, division can't • Addition can be done in any order, subtraction can't	List standards in the Course and link to achieve the core coherence map for each standard HS.A-REI.A.1 HS.F-BF.A.2 HS.A-REI.A.2 HS.A-REI.B.3 HS.F-BF.A.1	HS.F-LE.A.2 HS.A-CED.A.1 HS.A-CED.A.4 HS.F-BF.B.4	Through the Problem Based Learning approach, all of the tasks in learning throughout the unit are student lead.
RESOURCES			
Resources are linked in sequences as needed. Rubrics are in the Bristol Prep Academy folder of the Bristol Math Units Shared Drive.			

Topics in Algebra B: Systems of Equations and Family Outings			
UNWRAPPED STANDARDS			
Grade Level Standard	**Standard Progression**	**Connection to Problem-based Learning (PBL)-**	**Academic Vocabulary (Standard Based)**
HS.A-CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*	There are situations where an equation is used to describe the relationship between a number of different quantities. For example, Ohm's Law V = IR relates the voltage, current, and resistance of an electrical circuit. An equation used in this way is sometimes called a formula. It is perhaps best to avoid using the terms "variable", "parameter", or "constant" when working with this formula, because there are six different ways it can be viewed as defining one quantity as a function of the other with a third held constant. All the standards in the Creating Equations group carry a modeling star, denoting their connection with the Modeling category in high school. This connotes not only an increase in the complexity of the equations studied, but an upgrade of the student's ability in every part of the modeling cycle.	Rearrange equations in order to solve using substitution or elimination	Equations Variables Constant term Formula Coefficient Function
HS.A-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.	Student work with solving systems of equations starts the same way as work with solving equations in one variable; with an understanding behind the various techniques. An	Family Outing Lake compounce vs Six Flags All inclusive resorts Airbnb vs hotels Compare rental cars Compare gas stations	System of equations System of linear equations Variables Substitution Elimination Solution set

	important step is realizing that a solution to a system of equations must be a solution [to] all of the quations in the system simultaneously. Then the process of adding one equation to another is understood as "if the two sides of one equation are equal, and the two sides of another equation are equal, then the sum of the left sides of the two equations is equal to the sum of the right sides." Since this reasoning applies equally to subtraction, the process of adding one equation to another is reversible, and therefore leads to an equivalent system of equations.		Equivalent system of equations No solution Infinite solutions Point of intersection Function
HS.A-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	[Systems of two linear equations with two variables] also have the advantage that a good graphical visualization is available; a pair (x,y) satisfies two equations in two variables if it is on both their graphs, and therefore an intersection point of the graphs.		System of equations System of linear equations Variables Solution set Equivalent system of equations No solution Infinite solutions Point of intersection Parallel lines Intersecting lines Function Linear function Table of values Intercept
HS.A-REI.D.12 Graph the solutions to a linear inequality in two	N/A	Combinations of activities and food during trip	System of equations System of inequalities

variables as a half- plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.			System of linear inequalities Variables Solution area Equivalent system of inequations No solution Infinite solutions Point of intersection Parallel lines Intersecting lines Function Linear function Table of values Intercept

Topics in Algebra B: Systems of Equations and Family Outings

CCSS Standards #	**Learning Targets:** I can	Summative Assessment Strategy	Lesson Progression and Connection to Math Practices	Common Learning Experiences and Assessments
HS.A-REI.C.6	**Graphing:** ● I can graph a system of equations. ● I can explain that the point of intersection is the solution to the system of equations. ● I can explain that parallel lines have no solution. ● I can explain that graphs of the same line have infinite solutions. ● I can explain the solution to the system in the context of the problem.		**Lesson Progression and connections:** ● You are planning a family trip, what do you need to know about graphs in order to visually represent vacation options? ● Students will research resort and lodging pricings. ● Students will create equations to represent the pricing at each location. ● Students will graph the systems of equations. ● Students will solve the system in the context of the problem. ● Students will interpret the best resort and lodging locations depending on the numbers of days.	**Mandatory Lessons/Activities:** ● Family Outing ● Lake compounce vs Six Flags ● All inclusive resorts ● Airbnb vs hotels ● Graphing systems of equations practice problems
Pacing: 1.5 Weeks			**Math Practices:** ● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them. ● CCSS.MATH.PRACTICE.MP4 Model with	**Assessments:** ● Students will create a presentation to the class ● In the presentation, students

	Selected Response
X	Constructed Response
X	Performance
	Observation

<table>
<tr><td></td><td></td><td></td><td>mathematics.
● CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.
● CCSS.MATH.PRACTICE.MP6 Attend to precision.</td><td>will have graphs to represent the system of equations and explain their solutions in the context of the problem.</td></tr>
<tr><td rowspan="2">HS.A-CED.A.4

Pacing:
2 weeks</td><td rowspan="2">Substitution:
● I can rearrange an equation to solve for a specific variable.
● I can solve a system of equations using substitution.
● I can explain how the system has one solution, no solutions, or infinite solutions.
● I can explain the solution to the system in the context of the problem.</td><td rowspan="2"><table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● Your family will be renting a car during the trip, what do you need to know about systems of equations to algebraically calculate the best deal?
● Students will research car rentals.
● Students will create a system of equations.
● Students will solve systems of equations using substitution.
● Students will explain the solution to the system of equations in the context of the problem.</td><td>Mandatory Lessons/Activities:
● Substitution practice problems.</td></tr>
<tr><td>Math Practices:
● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP6 Attend to precision.
● CCSS.MATH.PRACTICE.MP7 Look for and make use of structure.</td><td>Assessments:
● Students will create a presentation to the class.
● Students will present their options and show how they solved the system of equations algebraically.
● Students will explain their solution in the context of the problem.</td></tr>
<tr><td rowspan="2">HS.A-REI.C.5

Pacing:
1 week</td><td rowspan="2">Elimination:
● I can solve a system of equations using elimination.
● I can explain how the system has one solution, no solution, or infinite solutions.
● I can explain the solution to the system in the context of the problem.</td><td rowspan="2"><table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● You need to plan for getting gas for the rental car, what do you need to know about systems of equations to algebraically calculate the cheapest locations?
● Students will research gas stations.
● Students will create a system of equations.
● Students will solve systems of equations using elimination.
● Students will explain the solution to the system of equations in the context of the problem.</td><td>Mandatory Lessons/Activities:
● Elimination practice problems.</td></tr>
<tr><td>Math Practices:
● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.</td><td>Assessments:
● Students will present their options and show how they</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>● CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
● CCSS.MATH.PRACTICE.MP6 Attend to precision.</td><td>solved the system of equations algebraically.
● Students will explain their solution in the context of the problem.</td></tr>
<tr><td rowspan="2">HS.A-REI.D.12</td><td rowspan="2">Inequalities:
● I can graph a system of linear inequalities.
● I can determine the solution area to the system of inequalities.
● I can pick a point in the solution set and explain the solution in the context of the problem.</td><td rowspan="2"><table><tr><td></td><td>Selected Response</td></tr><tr><td>X</td><td>Constructed Response</td></tr><tr><td>X</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>Lesson Progression and connections:
● On your family trip,what do you need to know about systems of inequalities to plan for activities and food?
● Students will research activities and food to do at the resort.
● Students will create a system of inequalities to represent the activities and food at their selected resort.
● Students will graph the system of inequalities.
● Students will determine the solution area to the system of inequalities.
● Students will choose 3 different combinations of solution points and describe them in the context of the problem.</td><td>Mandatory Lessons/Activities:
● Graphing systems of inequalities practice problems.</td></tr>
<tr><td>Pacing:
1.5 weeks</td><td>Math Practices:
● CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
● CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning.
● CCSS.MATH.PRACTICE.MP4 Model with mathematics.
● CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.
● CCSS.MATH.PRACTICE.MP6 Attend to precision.</td><td>Assessments:
● Students will create a presentation to the class
● In the presentation, students will have graphs to represent the system of inequalities and explain their solutions in the context of the problem.</td></tr>
</table>

ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	**PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS Course**	**ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY**	**OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE Course**
Only parallel lines have no solution, if the	List standards in the Course and link to	HS.A-CED.A.3	Through the Problem Based Learning

lines are not parallel (different slopes) they will intersect. System of linear equations only has one point of intersection. System of inequalities have solution areas	achieve the core coherence map for each standard HS.A-REI.C.6 HS.A-CED.A.4 HS.A-REI.C.5 HS.A-REI.D.12	HS.A-REI.C.7 HS.A-REI.D.11	approach, all of the tasks in learning throughout the unit are student lead.
RESOURCE			
Resources are linked in sequences as needed. Rubrics are in the Bristol Prep Academy folder of the Bristol Math Units Shared Drive.			

Topics in Algebra C: Percent Change			
UNWRAPPED STANDARDS			
Grade Level Standard	**Standard Progression**	**Connection to Problem-based Learning (PBL)-**	**Academic Vocabulary (Standard Based)**
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book

Topics in Algebra C: Percent Change

CCSS Standards #	Learning Targets: I can	Summative Assessment Strategy	Lesson Progression and Connection to Math Practices	Common Learning Experiences and Assessments
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance ☐ Observation	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance ☐ Observation	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM

		Observation		assessment/assistment

Topics in Algebra D: Graphing Events			
UNWRAPPED STANDARDS			
Grade Level Standard	**Standard Progression**	**Connection to Problem-based Learning (PBL)-**	**Academic Vocabulary (Standard Based)**
HS.A-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	[Students use complex equations—including equations arising from linear and quadratic expressions, and simple rational and exponential expressions—to model] relationships between quantities with equations in two variables. All the standards in the Creating Equations group carry a modeling star, denoting their connection with the Modeling category in high school. This connotes not only an increase in the complexity of the equations studied, but an upgrade of the student's ability in every part of the modeling cycle.	Functions of Everyday SItuations Docs of functions of everyday situations	Marzano CCSS Vocab Book
HS.F-IF.C.7 (a-e maybe all) Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.			
HS.F.IF.B.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the	Students learned in Grade 8 that the rate of change of a linear function is equal to the slope of the line that is its graph... "The rate of change" has	I think yes but not sure	

rate of change from a graph.	an unambiguous meaning for a linear function. For nonlinear functions, however, rates of change are not constant, and so we talk about average rates of change over an interval.		

Topics in Algebra D: Graphing Events

CCSS Standards #	Learning Targets: I can	Summative Assessment Strategy	Lesson Progression and Connection to Math Practices	Common Learning Experiences and Assessments
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance ☐ Observation	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance ☐ Observation	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment

		Observation		

Applied Math 1: Culinary			
UNWRAPPED STANDARDS			
Grade Level Standard	**Standard Progression**	**Connection to Problem-based Learning (PBL)-**	**Academic Vocabulary (Standard Based)**
Achieve the core.	Achieve the core coherence map-Progression.	Culinary Unit 6	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book

Applied Math 1: Culinary

CCSS Standards #	Learning Targets: I can	Summative Assessment Strategy	Lesson Progression and Connection to Math Practices	Common Learning Experiences and Assessments
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance ☐ Observation	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance ☐ Observation	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment

		Observation		

Applied Math 2: Medical			
UNWRAPPED STANDARDS			
Grade Level Standard	**Standard Progression**	**Connection to Problem-based Learning (PBL)-**	**Academic Vocabulary (Standard Based)**
Achieve the core.	Achieve the core coherence map-Progression.	ALEKS	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book

Applied Math 2: Medical

CCSS Standards #	Learning Targets: I can	Summative Assessment Strategy	Lesson Progression and Connection to Math Practices	Common Learning Experiences and Assessments
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance ☐ Observation	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance ☐ Observation	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment

		Observation		

Applied Math 3-Maps and Mapping			
UNWRAPPED STANDARDS			
Grade Level Standard	**Standard Progression**	**Connection to Problem-based Learning (PBL)-**	**Academic Vocabulary (Standard Based)**
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book

Applied Math 3: Maps and Mapping

CCSS Standards #	**Learning Targets:** I can	Summative Assessment Strategy	Lesson Progression and Connection to Math Practices	Common Learning Experiences and Assessments
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance ☐ Observation	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment
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Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM

		Observation		assessment/assistment

Applied Math 4: Catapults and Rockets			
UNWRAPPED STANDARDS			
Grade Level Standard	**Standard Progression**	**Connection to Problem-based Learning (PBL)-**	**Academic Vocabulary (Standard Based)**
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book

Applied Math 4: Catapults and Rockets

CCSS Standards #	Learning Targets: I can	Summative Assessment Strategy	Lesson Progression and Connection to Math Practices	Common Learning Experiences and Assessments
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance ☐ Observation	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment
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Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment
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Pacing:			**Math Practices:** ●	**Assessments:** ● Hyperlink to kendall hunt IM assessment/assistment

		Observation		

Applied Math 5: Acid and Base Logarithms			
UNWRAPPED STANDARDS			
Grade Level Standard	**Standard Progression**	**Connection to Problem-based Learning (PBL)-**	**Academic Vocabulary (Standard Based)**
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book
Achieve the core.	Achieve the core coherence map-Progression.	Determined by teacher	Marzano CCSS Vocab Book

Applied Math 5: Acid and Base Logarithms

CCSS Standards #	Learning Targets: I can	Summative Assessment Strategy	Lesson Progression and Connection to Math Practices	Common Learning Experiences and Assessments
Hyperlink standard code to achieve the core.		☐ Selected Response ☐ Constructed Response ☐ Performance ☐ Observation	**Lesson Progression and connections:** ●	**Mandatory Lessons/Activities:** ● Hyperlink to kendall hunt IM lessons/Activities
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Unit: Template			
UNWRAPPED STANDARDS			
Grade Level Standard	**Standard Progression**	**Connection to Problem-based Learning (PBL)-**	**Academic Vocabulary (Standard Based)**
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Unit: Template

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Unit: Template

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	map-Progression.		

Unit: Template

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