ABE MATHEMATICS SCOPE AND SEQUENCE

**Level Three-Unit One** GLE 7-8

Teachers: Christina Cronin and Martha Mangan

Unit Title: Understanding the Number System

Amount of time for the unit: 14 hours

Purpose of Unit: The purpose of this unit is to expand the students’ knowledge of rational numbers to include integers and negative fractions and decimals. The concepts of absolute value and irrational numbers will be introduced in this unit. The use of the number line is important here as students will be asked to place values in their exact or approximate position on the number line.

Unit Goals and Outcomes-Students will be able to:

* Represent situations which indicate positive and negative values by placing them on a number line.
* Understand ordering and absolute value of rational numbers.
* Graph statements of inequalities on the number line.
* Convert a rational number to a decimal using long division; knowing that the decimal form of a rational know terminates in 0 or eventually repeats.
* Know that there are numbers that are not rational and approximate them by rational numbers
* Find and position pairs of integers and other rational numbers on a coordinate plane and use absolute value to find the distance between points.

Priority Standards:

Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (6.NS.5)

Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. (6.NS.6) (NOTE: See page 70 for full text)

Understand ordering and absolute value of rational numbers. (6.NS.7)

* Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.* (6.NS.7a)
* Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3º C > –7º C to express the fact that –3º C is warmer than –7º C.* (6.NS.7b)
* Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.* (6.NS.7c)
* Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.* (6.NS.7d)

Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. (6.NS.8)

Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π2). *For example, by truncating the decimal expansion of √*2, *show that √*2 *is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations*. (8.NS.2)

Coherence:

Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. (5.NBT.1)

Read, write, and compare decimals to thousandths. (5.NBT.3)

• Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). (5.NBT.3a)

• Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. (5.NBT.3b)

Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

(4.NF.2)

Standards for Math Practice:

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

MP.3 Construct viable arguments and critique the reasoning of others.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.

Assessment of Priority Standards and Key Content:

|  |  |
| --- | --- |
| Represent situations which indicate positive and negative values by placing them on a number line. |  |
| Understand ordering and absolute value of rational numbers. |  |
| Graph statements of inequalities on the number line. |  |
| Convert a rational number to a decimal using long division; knowing that the decimal form of a rational know terminates in 0 or eventually repeats. |  |
| Know that there are numbers that are not rational and approximate them by rational numbers |  |
| Find and position pairs of integers and other rational numbers on a coordinate plane and use absolute value to find the distance between points. |  |
| General Assessments |  |

Main Texts and Tools of Instruction:

|  |  |
| --- | --- |
| The *Math Assessment Project* provides lesson plans with formative assessments  <http://map.mathshell.org/download.php?fileid=1625> |  |
| <http://map.mathshell.org/download.php?fileid=1710> |  |

<https://www.illustrativemathematics.org/>

<http://www.math-aids.com/>

<http://www.commoncoresheets.com/Values.php>

*The GED Math Problem Solver*, 2nd Edition Student Text, McGraw Hill Co., 2003

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ABE MATHEMATICS SCOPE AND SEQUENCE

**Level Three-Unit Two** GLE 7-8

Teachers: Christina Cronin and Martha Mangan

Unit Title: Operations in the Number System

Amount of time for the unit: 14 hours

Purpose of Unit: The purpose of this unit is to expand the students’ knowledge of operations to include integers and negative fractions and decimals. In addition, real life problems and tasks will be presented with positive and negative values.

Unit Goals and Outcomes-Students will be able to:

* Apply properties of numbers as strategies to add and subtract rational numbers.
* Apply properties of numbers as strategies to multiply and divide rational numbers.
* Solve multi-step real-life and mathematical problems posed with positive and negative numbers in any form.

Priority Standards:

Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. (7.NS.1)

* Describe situations in which opposite quantities combine to make 0. *For example, if a check is written for the same amount as a deposit, made to the same checking account, the result is a zero increase or decrease in the account balance.* (7.NS.1a)
* Understand *p* + *q* as the number located a distance |*q*| from *p,* in the positive or negative direction depending on whether *q* is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. (7.NS.1b)
* Understand subtraction of rational numbers as adding the additive inverse, *p* – *q* = *p* + (–*q*). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. (7.NS.1c)
* Apply properties of operations as strategies to add and subtract rational numbers. (7.NS.1d)

Apply and extend previous understandings of multiplication and division and of fractions to multiply

and divide rational numbers. (7.NS.2)

* Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. (7.NS.2a)
* Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If *p* and *q* are integers, then–(*p*/*q*) = (–*p*)/*q* = *p/(– q).* Interpret quotients of rational numbers by describing real-world contexts. (7.NS.2b)
* Apply properties of operations as strategies to multiply and divide rational numbers. (7.NS.2c)
* Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. (7.NS.2d)

Solve real-world and mathematical problems involving the four operations with rational numbers. (7.NS.3)

Coherence:

Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. (4.NF.2)

Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. (4.NF.7)

Perform all operations in word problems with whole numbers, mixed numbers, and mixed decimals.

Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (6.NS.5)

Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. (6.NS.6) (NOTE: See page 70 for full text)

Standards for Math Practice:

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

MP.3 Construct viable arguments and critique the reasoning of others.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.

Assessment of Priority Standards and Key Content:

|  |  |
| --- | --- |
| Apply properties of numbers as strategies to add and subtract rational numbers. |  |
| Apply properties of numbers as strategies to multiply and divide rational numbers. |  |
| Solve real world problems or tasks involving all four operations with rational numbers. |  |
| General Assessments |  |

Main Texts and Tools of Instruction:

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| The *Math Assessment Project* provides lesson plans with formative assessments  <http://map.mathshell.org/download.php?fileid=1596> |  |

<https://www.illustrativemathematics.org/>

<http://www.math-aids.com/>

<http://www.commoncoresheets.com/Values.php>

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ABE MATHEMATICS SCOPE AND SEQUENCE

**Level Three-Unit Three** GLE 7-8

Teachers: Christina Cronin and Martha Mangan

Unit Title: Ratio, Proportion and Percent

Amount of time for the unit: 12 hours

Purpose of Unit: The purpose of this unit is to expand on the concepts of ratio, proportion and percent presented in Level Two. Percent applications will include interest, percent of increase or decrease and multi-step problems. Students will be able to connect these concepts to life skills such as mortgages, investments, and filling out tax forms. Proportionality will be connected with linearity. The students will be able to represent the proportional relationship in a table, graph and/or equation.

Unit Goals and Outcomes-Students will be able to:

* Solve ratio and proportion problems with fractions and decimals.
* Test to determine if two quantities are in a proportional relationship
* Use multiple representations for proportional relationships
* Use proportional relationships to solve percent problems

Priority Standards:

Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.* (7.RP.1)

Recognize and represent proportional relationships between quantities. (7.RP.2)

• Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. (7.RP.2a)

• Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. (7.RP.2b) [Also see 8.EE.5]

• Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.* (7.RP.2c)

• Explain what a point *(x, y)* on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r)* where *r* is the unit rate. (7.RP.2d)

Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.* (7.RP.3) [Also see 7.G.1 and G.MG.2]

Coherence:

Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.”* (6.RP.1)

Understand the concept of a unit rate *a*/*b* associated with a ratio *a*:*b* with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar.” “We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger.”* (6.RP.2)

Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. (6.RP.3)

* Solve unit rate problems including those involving unit pricing and constant speed. *For example,* *if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* (6.RP.3b)
* Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. (6.RP.3c)
* Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. (6.RP.3d)

Standards for Math Practice:

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

MP.3 Construct viable arguments and critique the reasoning of others.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.

Assessment of Priority Standards and Key Content:

|  |  |
| --- | --- |
| Solve ratio and proportion problems with fractions and decimals. |  |
| Test to determine if two quantities are in a proportional relationship |  |
| Use multiple representations for proportional relationships |  |
| Use proportional relationships to solve percent problems |  |
| Summative assessment |  |

Main Texts and Tools of Instruction:

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| The *Math Assessment Project* provides lesson plans with formative assessments  <http://map.mathshell.org/download.php?fileid=1623> |  |
| This site has complete yearlong curriculum modules aligned to the standards.  <https://www.engageny.org/resource/grade-7-mathematics>  Assesments above are taken from Module 1, Lesson A Topic 2, 4, and 5 | Lesson 6 is a group activity calling for multiple representations |

<https://www.illustrativemathematics.org/>

<http://www.math-aids.com/>

<http://www.commoncoresheets.com/Values.php>

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ABE MATHEMATICS SCOPE AND SEQUENCE

**Level Three-Unit Four** GLE 7-8

Teachers: Christina Cronin and Martha Mangan

Unit Title: Algebra: Expressions and Equations

Amount of time for the unit: 16 hours

Purpose of Unit: This unit will bring together many earlier skills and knowledge. It is based on the properties of numbers, order of operations, understanding of proportional relationships and solving equations and inequalities. Modeling will be used in finding the application of algebraic expression to real world situations.

Unit Goals and Outcomes-Students will be able to:

* Use properties of operations to generate equivalent expressions
* Write and solve equations, and inequalities to represent problem situations and tasks
* Solve multi-step problems posed with positive and negative rational numbers in any form.
* Use square root and cube root symbols to represent solutions to equations
* Use scientific notation to express very large quantities in multiplied by an integer power of 10.
* Graph proportional relationships, interpreting the unit rate as the slope of the graph.
* Represent and analyze quantitative relationships between dependent and independent variable.
* Solve linear equations in one variable.

Priority Standards:

Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. (7.EE.1)

Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that “increase by* *5%” is the same as “multiply by 1.05.”* (7.EE.2) [Also see A.SSE.2, A.SSE.3, A.SSE.3a, A.CED.4]

Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.* (7.EE.3)

Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (7.EE.4) [Also see A.CED.1 and A.REI.3] NOTE: See page 73 for the full text.

Use square root and cube root symbols to represent solutions to equations of the form *x*2 = *p* and *x*3 = *p*, where *p* is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational*.* (8.EE.2) [Also see A.REI.2]

Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 × 108 and the population of the world as 7 × 109, and determine that the world population is more than 20 times larger.* (8.EE.3)

Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.* (6.EE.9)

Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.* (8.EE.5) [Also see 7.RP.2b]

Solve linear equations in one variable. (8.EE.7) [Also see A.REI.3] NOTE: See page 74 for the full text.

Coherence:

Write and evaluate numerical expressions involving whole-number exponents. (6.EE.1)

Write, read, and evaluate expressions in which letters stand for numbers. (6.EE.2)

Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are* *equivalent because they name the same number regardless of which number y stands for.* (6.EE.4 )

Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (6.EE.6)

Standards for Math Practice:

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

MP.3 Construct viable arguments and critique the reasoning of others.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.

Assessment of Priority Standards and Key Content:

|  |  |
| --- | --- |
| Use properties of operations to generate equivalent expressions |  |
| Write and solve equations, and inequalities to represent problem situations and tasks | NOTE: Remove quadratic question |
| Solve multi-step problems posed with positive and negative rational numbers in any form. |  |
| Use square root and cube root symbols to represent solutions to equations |  |
| Use scientific notation to express very large quantities in multiplied by an integer power of 10. |  |
| Graph proportional relationships, interpreting the unit rate as the slope of the graph. |  |
| Represent and analyze quantitative relationships between dependent and independent variable. |  |
| Solve linear equations in one variable. |  |

Main Texts and Tools of Instruction:

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| --- | --- |
| The *Math Assessment Project* provides lesson plans with formative assessments  <http://map.mathshell.org/download.php?fileid=1635> |  |
| <http://map.mathshell.org/download.php?fileid=1629> |  |
| <http://map.mathshell.org/download.php?fileid=1674> |  |
| This site has complete year-long curriculum modules aligned to the standards.  <https://www.engageny.org/resource/grade-7-mathematics>  <https://www.engageny.org/resource/grade-8-mathematics> | |

<https://www.illustrativemathematics.org/>

<http://www.math-aids.com/>

<http://www.commoncoresheets.com/Values.php>

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ABE MATHEMATICS SCOPE AND SEQUENCE

**Level Three-Unit Five** GLE 7-8

Teachers: Christina Cronin and Martha Mangan

Unit Title: Algebra: Functions

Amount of time for the unit: 12 hours

Purpose of Unit: The purpose of this unit is to introduce the students to the function rule and represent it by the equation for a straight line. They will expand on the use of slope, x and y-intercepts. Real life proportional situations will be defined by functions and graphs.

Unit Goals and Outcomes-Students will be able to:

* Understand the function rule assigning each input to exactly one output
* Interpret the equation for a straight line graph, y *= mx +b.*
* Construct a function to model a linear relationship between two quantities
* Analyze the trend shown in a graph and distinguish between linear and non-linear.

Priority Standards:

Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.22 (8.F.1) [Also see F.IF.1]

Interpret the equation *y* = *mx* + *b* as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function A = s2 giving the area of a square as* *a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.* (8.F.3)

Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (*x*, *y*) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. (8.F.4) [Also see F.BF.1 and F.LE.5]

Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. (8.F.5) [Also see A.REI.10 and F.IF.7]

Coherence:

Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.* (8.EE.5) [Also see 7.RP.2b]

Solve linear equations in one variable. (8.EE.7) [Also see A.REI.3]

Standards for Math Practice:

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

MP.3 Construct viable arguments and critique the reasoning of others.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.

Assessment of Priority Standards and Key Content:

|  |  |
| --- | --- |
| Understand the function rule assigning each input to exactly one output |  |
| Interpret the equation for a straight line graph, y *= mx +b.* |  |
| Construct a function to model a linear relationship between two quantities |  |
| Analyze the trend shown in a graph and distinguish between linear and non-linear. |  |

Main Texts and Tools of Instruction:

|  |  |
| --- | --- |
| The *Math Assessment Project* provides lesson plans with formative assessments  <http://www.map.mathshell.org/download.php?fileid=1684> |  |
| <http://www.map.mathshell.org/download.php?fileid=1682> |  |
| This site has complete year-long curriculum modules aligned to the standards.  <https://www.engageny.org/resource/grade-8-mathematics>  Module 5 Topic A |  |

<https://www.illustrativemathematics.org/>

<http://www.math-aids.com/>

<http://www.commoncoresheets.com/Values.php>

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ABE MATHEMATICS SCOPE AND SEQUENCE

**Level Three-Unit Six** GLE 7-8

Teachers: Christina Cronin and Martha Mangan

Unit Title: Geometry

Amount of time for the unit: 14 hours

Purpose of Unit: The material in this unit expands on earlier geometric concepts by drawing polygons on the coordinate plane and using nets to explore three-dimensional figures. Meanwhile new material such as circumference and area of a circle, volume of a cylinder, congruence, similarity and the Pythagorean Theorem are all introduced at this level.

Unit Goals and Outcomes-Students will be able to:

* Understand concepts of angle and measure angles
* Understand angle and line relationships
* Represent three-dimensional figures using nets to find the surface area of these figures.
* Understand congruency and identify correct rotations, translations and reflections of congruent geometric figures.
* Understand similarity in figures and apply it to situational problems
* Solve real world and mathematical problems involving area, surface area, and volume.
* Understand and apply the Pythagorean Theorem to sides’ lengths in a right triangle and finding the distance between two points on the coordinate axes.
* Use the formulas for circumference and area of a circle to solve problems and tasks.
* Graph points on the coordinate plane to solve real-world and mathematical problems

Priority Standards:

Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. (7.G.4)

Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. (7.G.5)

Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. (6.G.4)

Solve real-world and mathematical problems involving area, volume and surface area of two- and three- dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. (7.G.6) [Also see G.GMD.3]

Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. (8.G.2) [Also see G.SRT.5]

Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. (8.G.4) [Also see G.SRT.5]

Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.* (8.G.5)

Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (8.G.7)

Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. (8.G.8)

Coherence:

Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4.G.1)

Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. (6.G.1)

Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. (6.G.3)

Standards for Math Practice:

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

MP.3 Construct viable arguments and critique the reasoning of others.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.

Assessment of Priority Standards and Key Content:

|  |  |
| --- | --- |
| Understand concepts of angle and measure angles |  |
| Understand angle and line relationships |  |
| Represent three-dimensional figures using nets to find the surface area of these figures. |  |
| Understand congruency and identify correct rotations, translations and reflections of congruent geometric figures. |  |
| Understand similarity in figures and apply it to situational problems |  |
| Solve real world and mathematical problems involving area, surface area, and volume. |  |
| Understand and apply the Pythagorean Theorem to sides’ lengths in a right triangle and finding the distance between two points on the coordinate axes. |  |
| Use the formulas for circumference and area of a circle to solve problems and tasks. |  |
| Graph points on the coordinate plane to solve real-world and mathematical problems |  |

Main Texts and Tools of Instruction:

|  |  |
| --- | --- |
| *Massachusetts Community College Workforce*  *Development Transformation Agenda* has developed contextualized modules for three key **Industry Sectors**—healthcare, advanced manufacturing and information technology.  <http://mccwdta.etlo.org>  Free log in is required. |  |
| Math Assessment Project  <http://map.mathshell.org/lessons.php?unit=6310&collection=8> |  |
| <http://map.mathshell.org/download.php?fileid=1584> |  |
| <http://www.map.mathshell.org/download.php?fileid=1696> |  |
| EngageNY Lesson  <https://www.engageny.org/resource/grade-7-mathematics-module-3-topic-c-lesson-16> |  |

<https://www.illustrativemathematics.org/>

<http://www.math-aids.com/>

<http://www.commoncoresheets.com/Values.php>

<https://www.kutasoftware.com/freeige.html>

ABE MATHEMATICS SCOPE AND SECQUENCE

**Level Three-Unit Seven** GLE 7-8

Teachers: Christina Cronin and Martha Mangan

Unit Title: Measurement

Amount of time for the unit: 14 hours

Purpose of Unit: The material in this unit expands on earlier geometric concepts by drawing polygons on the coordinate plane and using nets to explore three-dimensional figures. Meanwhile new material such as circumference and area of a circle, volume of a cylinder, congruence, similarity and the Pythagorean Theorem are all introduced at this level.

Unit Goals and Outcomes-Students will be able to:

* Solve problems involving scale drawings of geometric figures
* Become familiar with both the metric and British measurement systems.
* Solve problems of elapsed time.
* Convert like measurement units within a given measurement system
* Solve problems involving measurement.

Priority Standards:

Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. (7.G.1) [Also see 7.RP.3]

Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. (5.MD.1)

Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (4.MD.2)

Coherence:

Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. (3.MD.1)

Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).18 Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.19 (3.MD.2)

Standards for Math Practice:

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

MP.3 Construct viable arguments and critique the reasoning of others.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.

Assessment of Priority Standards and Key Content:

|  |  |
| --- | --- |
| Solve problems involving scale drawings of geometric figures |  |
| Become familiar with both the metric and British measurement systems. |  |
| Solve problems of elapsed time and conversion of time to larger and smaller units. |  |
| Convert like measurement units within a given measurement system |  |
| Solve problems involving measurement. |  |

Main Texts and Tools of Instruction:

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| --- | --- |
| EngageNY Lesson  <https://www.engageny.org/resource/grade-7-mathematics-module-4-topic-c-lesson-15> |  |

<https://www.illustrativemathematics.org/>

<http://www.math-aids.com/>

<http://www.commoncoresheets.com/Values.php>

<https://www.kutasoftware.com/freeige.html>

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ABE MATHEMATICS SCOPE AND SEQUENCE

**Level Four-Unit Eight** GLE 7-8

Teachers: Christina Cronin and Martha Mangan

Unit Title: Statistics and Probability

Amount of time for the unit: 10 hours

Purpose of Unit: Based on earlier concepts of the measures of central tendency and types of graphs, this unit will develop concepts of statistical variability, summary statistics and distribution, and probability. Students will engage in sampling activities and make predictions based on their findings. They will investigate linear and non-linear relationships of bivariate data.

Unit Goals and Outcomes-Students will be able to:

* Summarize numerical data sets in relation to their context.
* Understand that statistics can be used to gain information about a population by examining a sample of the population
* Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.
* Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams.

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Priority Standards:

Summarize numerical data sets in relation to their context, such as by:

1. Reporting the number of observations.

b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. (6.SP.5)

Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. (7.SP.1)

Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling* *words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.* (7.SP.2)

Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. (7.SP.5)

Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. (7.SP.8a)

Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event. (7.SP.8b)

Coherence:

Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.* (6.SP.1)

Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. (6.SP.2)

Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. (6.SP.3)

Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (6.SP.4)

Standards for Math Practice:

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MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.

Assessment of Priority Standards and Key Content:

|  |  |
| --- | --- |
| Summarize numerical data sets in relation to their context. |  |
| Understand that statistics can be used to gain information about a population by examining a sample of the population |  |
| Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. |  |
| Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. |  |
| Summative Assessment |  |

Main Texts and Tools of Instruction:

|  |  |
| --- | --- |
| Math Assessment Project  <http://www.map.mathshell.org/download.php?fileid=1704> |  |
| <http://www.map.mathshell.org/download.php?fileid=1706> |  |
| <http://www.map.mathshell.org/lessons.php?unit=6400&collection=8> |  |
| EngageNY Lesson  <https://www.engageny.org/resource/grade-8-mathematics-module-6-topic-b-lesson-8> |  |

<https://www.illustrativemathematics.org/>

<http://www.math-aids.com/>

<http://www.commoncoresheets.com/Values.php>

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