**8th Grade Math Syllabus**

**Course Description:**

This eighth math course focuses on transformations, dilations, linear relationships, linear equations and systems of equations, functions, association and data, exponents and the Pythagorean theorem.

**Course Content:**

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| **Semester One Topic**  | **UNIT Overview:**  |
| **Topic 1: Rigid Transformations and Congruence** | In this unit, students learn to understand and use the terms “reflection,” “rotation,” “translation,” recognizing what determines each type of transformation, e.g., two points determine a translation. They learn to understand and use the terms “transformation” and “rigid transformation.” They identify and describe translations, rotations, and reflections, and sequences of these, using the terms “corresponding sides” and “corresponding angles,” and recognizing that lengths and angle measures are preserved. They draw images of figures under rigid transformations on and off square grids and the coordinate plane. They use rigid transformations to generate shapes and to reason about measurements of figures. They learn to understand congruence of plane figures in terms of rigid transformations. They recognize when one plane figure is congruent or not congruent to another. Students use the definition of “congruent” and properties of congruent figures to justify claims of congruence or non-congruence. |
| **Topic 2: Dilations and Similarity**  | In this unit, students learn to understand and use the term “dilation,” and to recognize that a dilation is determined by a point called the “center” and a number called the “scale factor.” They learn that under a dilation, the image of a circle is a circle and the image of a line is a line parallel to the original. They draw images of figures under dilations on and off the coordinate plane. They use the terms “corresponding sides” and “corresponding angles” to describe correspondences between a figure and its dilated image, and recognizing that angle measures are preserved, but lengths are multiplied by the scale factor. They learn to understand similarity of plane figures in terms of rigid transformations and dilations. They learn to recognize when one plane figure is similar or not similar to another. They use the definition of “similar” and properties of similar figures to justify claims of similarity or non-similarity. Students learn the terms “slope” and “slope triangle,” and use the similarity of slope triangles on the same line to understand that any two distinct points on a line determine the same slope. |
| **Topic 3: Linear Relationships**  | In this unit, students learn to understand and use the terms “rate of change,” “linear relationship,” and “vertical intercept.” They deepen their understanding of slope, and they learn to recognize connections among rate of change, slope, and constant of proportionality, and between linear and proportional relationships. They learn to understand that lines with the same slope are translations of each other. They represent linear relationships with tables, equations, and graphs that include lines with negative slopes or vertical intercepts, and horizontal and vertical lines. They learn to use the term “solution of an equation” when working with one or two linear equations in two variables, and learn to understand the graph of a linear equation as the set of its solutions. Students use these terms and representations in reasoning about situations involving one or two constant rates. |
| **Topic 4: Linear Equations and Systems**  | In this unit, students write and solve linear equations in one variable. These include equations in which the variable occurs on both sides of the equal sign, and equations with no solutions, exactly one solution, and infinitely many solutions. They learn that any one such equation is false, true for one value of the variable, or true for all values of the variable. They interpret solutions in the contexts from which the equations arose. Students write and solve systems of linear equations in two variables and interpret the solutions in the contexts from which the equations arose. They learn what is meant by a solution for a system of equations, namely that a solution of the system is a solution for each equation in the system. Students use the understanding that each pair of values that make an equation true are coordinates of a point on the graph of the equation and conversely that the coordinates of each point on the graph of an equation make the equation true. Thus, a pair of values that satisfies a system of equations are coordinates of a point that lies on the graphs of all the equations in the system, and, conversely, a point that lies on the graphs of all the equations in the system has coordinates that satisfy all the equations in the system. Students learn to understand and use the terms “system of equations,” “solution for the system of equations,” “zero solutions,” “no solution,” “one solution,” and “infinitely many solutions.” |

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| **Semester Two Topics** | **UNIT Overview:**  |
| **Topic 5: Functions of Volume**  | In this unit, students are introduced to the concept of a function. They learn to understand and use the terms “input,” “output,” and “function,” e.g., “temperature is a function of time.” They describe functions as increasing or decreasing between specific numerical inputs, and they consider the inputs of a function to be values of its independent variable and its outputs to be values of its dependent variable. (The terms “Independent variable” and “dependent variable” were introduced in grade 6.) They use tables, equations, and graphs to represent functions, and describe information presented in tables, equations, or graphs in terms of functions. In working with linear functions, students coordinate and synthesize their understanding of “constant of proportionality” (which was introduced in grade 7), “rate of change” and “slope” (which were introduced earlier in grade 8), and increasing and decreasing. Students perceive similarities in structure between pairs of known and new volume formulas: for a rectangular prism and a cylinder; and for a cylinder and a cone. Students rearrange these formulas to show functional relationships and use them to reason about how the volume of a figure changes as another measurement changes, e.g., the height of a cylinder is proportional to its volume; if the radius of a cylinder triples, its volume becomes nine times larger. |
| **Topic 6: Associations in Data**  | In this unit, students generate and work with bivariate data sets that has more variability than in previous units. They learn to understand and use the terms “scatter plot” and “association,” and describe associations as “positive” or “negative” and “linear” or “non-linear.” Students describe scatter plots, using a term previously used to describe univariate data “cluster,” and the new term “outlier.” They fit lines to scatter plots and informally assess their goodness of fit by judging the closeness of the data points to the lines, and compare predicted and actual values. Students learn to understand and use the terms “two-way table,” “bar graph,” and “segmented bar graph,” using two-way tables to investigate categorical data. |
| **Topic 7: Exponents and Scientific Notation**  | In grade 6, students studied whole-number exponents. In this unit, they extend the definition of exponents to include all integers, and in the process codify the properties of exponents. They apply these concepts to the base-ten system, and learn about orders of magnitude and scientific notation in order to represent and compute with very large and very small quantities. |
| **Topic 8: Pythagorean Theorem and Irrational Numbers**  | In this unit, students work with geometric and symbolic representations of square and cube roots. They understand and use notation such as $\sqrt{2}$ and $\sqrt[3]{5}$for square and cube roots. They understand the terms “rational number” and “irrational number,” using long division to express fractions as decimals. They use their understanding of fractions to plot rational numbers on the number line and their understanding of approximation of irrationals by rationals to approximate the number-line location of a given irrational. Students learn (without proof) that $\sqrt{2}$ is irrational. They understand two proofs of the Pythagorean Theorem—an algebraic proof that involves manipulation of two expressions for the same area and a geometric proof that involves decomposing and rearranging two squares. They use the Pythagorean Theorem in two and three dimensions, e.g., to determine lengths of diagonals of rectangles and right rectangular prisms, and to estimate distances between points in the coordinate plane. |

**Class Materials/Textbooks:**

All students will need the following every class period:

Computer

Internet Access

Ability to log onto:

* Canvas
* Microsoft Teams
* Student E-Mail
* Infinite Campus

Illustrative Mathematics Workbook

**Course Policies:**

**Class Activities:** Students will be required to participate in variety of class activities. Some of these will be assessed for basic student understanding in order to direct instruction and will not have a direct impact on report card grades. Other activities will be used as an artifact in a body of evidence to determine student proficiency on a specific learning goal.

**Assessments**: Student performance will be assessed formatively throughout the year in various ways including quizzes and exit passes and other tasks. Students will also have at least three assessments and/or assignments for every topic taught this year. These will be the main pieces of evidence used to determine if students have mastered topics. Assessments will be graded using SRG and IB criteria.

**Absences/Tardies:** Students are expected to participate through: entry and exit passes, participating with the microphone, chat, and having the camera on as much as possible. Simply showing with the camera off and microphone disengaged does **NOT** qualify for attendance.

**Class Rules:**

* “**Be Respectful**.” The student is always expected to treat the teacher and other students with respect.   Offensive language and hatefulness are not acceptable in this class.  Basically, treat others how we would like to be treated.
* “**Be Responsible**.” Students are expected to be online and prepared for class at the start of class.
* “**Be Ready**.” Being prepared for class means having all materials, books, pencils, etc. out and ready.

**Grading Plan:**

1. Grades are based on a consistent four-point system.

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| **Scale Score** | **Academic Descriptor** |
| 4 | Exceeding |
| 3 | Proficient |
| 2 | Developing |
| 1 | Beginning |
| 0 | No evidence of student understanding in submitted work. |
| M | Missing- Student has not submitted evidence. |

1. Letter grades, derived from the 4-point scale, will be based solely on achievement of 8th grade science standards. Student participation, work completion, and ability to work with others will be reported separately using the ‘DMPS Citizenship and Employability Skills Rubric.’
2. Scores will be based on a body of evidence.
3. Achievement will be organized by standard/learning topic and reported as a scale score. Cross topic scale scores will be converted to a letter grade for the course.
4. Students will have multiple opportunities to demonstrate proficiency.
5. Incomplete or late work will remain a zero in the grade book until it is completed
6. Accommodations and modifications will be provided to students with special needs.
7. **Grading Scale**:

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| A | 3.00-4.00 |
| B | 2.50-2.99 |
| C | 2.00-2.49 |
| D | 1.50-1.99 |
| F | Below 1.49 |

**IB Grading:**

MYP assigns four (4) criteria to each subject. Each teacher must assess each criterion two times per semester. Criteria based assessments are assessed using an MYP 8-point rubric. When more than one criterion is assessed in a task, there will be multiple grades. For example if an essay is assessed using Criteria A: Analyzing, B: Organizing C: Producing Text, and D: Using Language, then the teacher will input a separate score for each criterion, thus there will be four (4) grades for the essay.

The Assessment Criteria for all eight subject areas are listed below.

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| **Subject Area** | **A** | **B** | **C** | **D** |
| Language and Literature (formerly known as English Language Arts) | Analyzing | Organizing | Producing Text | Using Language |
| Language Acquisition (formerly known as World Language) | Comprehending Spoken and Visual Text | Comprehending Written and Visual Text | Communicating | Using Language |
| Individuals and Societies (formerly known as history and/or social science) | Knowing and Understanding | Investigating | Communicating | Thinking Critically |
| Sciences | Knowing and Understanding | Inquiring and Designing | Processing and Evaluating | Reflecting on the Impacts of Science |
| Mathematics | Knowing and Understanding | Investigating Patterns | Communicating | Applying Mathematics in Real-World Contexts |
| Arts (visual and performing) | Knowing and Understanding | Developing Skills | Thinking Creatively | Responding |
| Physical and Health Education | Knowing and Understanding | Planning for Performance | Applying and Performing | Reflecting and Improving Performance |
| Design (technology & culinary courses) | Inquiring and Analyzing | Developing Ideas | Creating the Solution | Evaluating |

**Extra Help:**

I will be available via Microsoft Teams for students who need extra help. Please use the chat or e-mail to set up an appointment.,

**Consequences:**

Students who are unable to follow class rules may have one or more of the following consequences.

* **Warning**: Everyone needs to be reminded of expectations. I will always give students 1-2 warnings and redirections before I use another consequence.
* **Parent Contact**: I will contact home as I feel necessary.

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