

DOBBS FERRY MIDDLE SCHOOL
Dobbs Ferry, New York 10522

COURSE OUTLINE

SUBJECT: Mathematics

GRADE: 7

Course Description:

Students start grade 7 by studying scale drawings, an engaging geometric topic that supports the subsequent work on proportional relationships in the second and fourth units. It also makes use of grade 6 arithmetic understanding and skill, without arithmetic becoming the major focus of attention at this point. Geometry and proportional relationships are also interwoven in the third unit on circles, where the important proportional relationship between a circle's circumference and its diameter is studied. By the time students reach the fifth unit on operations with rational numbers, both positive and negative, students have had time to brush up on and solidify their understanding and skill in grade 6 arithmetic. The work on operations on rational numbers, with its emphasis on the role of the properties of operations in determining the rules for operating with negative numbers, is a natural lead-in to the work on expressions and equations in the next unit. Students then put their arithmetical and algebraic skills to work in the last two units, on angles, triangles, and prisms, and on probability and sampling.

Unit 1: Scale Drawings

In this unit, students learn to understand and use the terms “scaled copy,” “to scale,” “scale factor,” “scale drawing,” and “scale,” and recognize when two pictures or plane figures are or are not scaled copies of each other. They use tables to reason about measurements in scaled copies, and recognize that angle measures are preserved in scaled copies, but lengths are scaled by a scale factor and areas by the square of the scale factor. They make, interpret, and reason about scale drawings. These include maps and floor plans that have scales with and without units.

Statement of Inquiry: Changes in quantity allow us to determine meaningful relationships.

Unit 2: Introducing Proportional Relationships

In this unit, students learn to understand and use the terms “proportional,” “constant of proportionality,” and “proportional relationship,” and recognize when a relationship is or is not proportional. They represent proportional relationships with tables, equations, and graphs. Students use these terms and representations in reasoning about situations that involve constant speed, unit pricing, and measurement conversions.

Statement of Inquiry: Changes in quantity allow us to determine meaningful relationships.

Unit 3: Measuring Circles

In this unit, students learn to understand and use the term “circle” to mean the set of points that are equally distant from a point called the “center.” They gain an understanding of why the circumference of a circle is proportional to its diameter, with constant of proportionality π . They see informal derivations of the fact that the area of a circle is equal to π times the square of its radius. Students use the relationships of circumference, radius, diameter, and area of a circle to find lengths and areas, expressing these in terms of π or using appropriate approximations of π to express them numerically.

Statement of Inquiry: Logic is a powerful tool for justifying what we discover through measurement and observation.

Unit 4: Proportional Relationships and Percentages

In this unit, students use ratios, scale factors, unit rates (also called constants of proportionality), and proportional relationships to solve multi-step, real-world problems that involve fractions and percentages. They use long division to write fractions presented in the form $\frac{a}{b}$ as decimals, e.g., $\frac{11}{30} = 0.\overline{36}$. They learn to understand and use the terms “repeating decimal,” “terminating decimal,” “percent increase,” “percent decrease,” “percent error,” and “measurement error.” They represent amounts and corresponding percent rates with double number line diagrams and tables. They use these terms and representations in reasoning about situations involving sales taxes, tips, markdowns, markups, sales commissions, interest, depreciation, and scaling a picture. Students use equations to represent proportional relationships in which the constant of proportionality arises from a percentage, e.g., relationship between price paid and amount of sales tax paid.

Statement of Inquiry: Understanding how different representations can change the way we interpret the world around us.

Unit 5: Rational Number Arithmetic

In this unit, students interpret signed numbers in contexts (e.g., temperature, elevation, deposit and withdrawal, position, direction, speed and velocity, percent change) together with their sums, differences, products, and quotients. (“Signed numbers” include all rational numbers, written as decimals or in the form ab .) Students use tables and number line diagrams to represent sums and differences of signed numbers or changes in quantities represented by signed numbers such as temperature or elevation, becoming more fluent in writing different numerical addition and subtraction equations that express the same

relationship. They compute sums and differences of signed numbers. They plot points in the plane with signed number coordinates, representing and interpreting sums and differences of coordinates. They view situations in which objects are traveling at constant speed (familiar from previous units) as proportional relationships. For these situations, students use multiplication equations to represent changes in position on number line diagrams or distance traveled, and interpret positive and negative velocities in context. They become more fluent in writing different numerical multiplication and division equations for the same relationship. Students extend their use of the “next to” notation (which they used in expressions such as $5x$ and $6(3+2)$ in grade 6) to include negative numbers and products of numbers, e.g., writing $-5x$ and $(-5)(-10)$ rather than $(-5) \cdot (x)$ and $(-5) \cdot (-10)$. They extend their use of the fraction bar to include variables as well as numbers, writing $-8.5 \div x$ as well as $\frac{-8.5}{x}$.

Statement of Inquiry: Establishing **patterns** and forming **generalizations** in the natural world can help in understanding **relationships**.

Unit 6: Expressions, Equations & Inequalities

In this unit, students solve equations of the forms $px+q=r$ and $p(x+q)=r$ where p , q , and r are rational numbers. They draw, interpret, and write equations in one variable for balanced “hanger diagrams,” and write expressions for sequences of instructions, e.g., “number puzzles.” They use tape diagrams together with equations to represent situations with one unknown quantity. They learn algebraic methods for solving equations. Students solve linear inequalities in one variable and represent their solutions on the number line. They understand and use the terms “less than or equal to” and “greater than or equal to,” and the corresponding symbols. They generate expressions that are equivalent to a given numerical or linear expression. Students formulate and solve linear equations and inequalities that represent real-world situations.

Statement of Inquiry: Creating **equivalent** and **simplified forms** of situations helps us understand the interconnectedness of the world in which we live.

Unit 7: Angles, Triangles & Prisms

In this unit, students investigate whether sets of angle and side length measurements determine unique triangles or multiple triangles, or fail to determine triangles. Students also study and apply angle relationships, learning to understand and use the terms “complementary,” “supplementary,” “vertical angles,” and “unique.” The work gives them practice working with rational numbers and equations for angle relationships. Students analyze and describe cross-sections of prisms, pyramids, and polyhedra. They understand and use the formula for the volume of a right rectangular prism, and solve problems involving area, surface area, and volume.

Statement of Inquiry: **Logic** is a powerful tool for **justifying** what we discover through measurement and observation.

Unit 8: Probability and Sampling

In this unit, students understand and use the terms “event,” “sample space,” “outcome,” “chance experiment,” “probability,” “simulation,” “random,” “sample,” “random sample,” “representative sample,” “overrepresented,” “underrepresented,” “population,” and “proportion.” They design and use simulations to estimate probabilities of outcomes of chance experiments and understand the probability of an outcome as its long-run relative frequency. They represent sample spaces (that is, all possible outcomes of a chance experiment) in tables and tree diagrams and as lists. They calculate the number of outcomes in a given sample space to find the probability of a given event. They consider the strengths and weaknesses of different methods for obtaining a representative sample from a given population. They generate samples from a given population, e.g., by drawing numbered papers from a bag and recording the numbers, and examine the distributions of the samples, comparing these to the distribution of the population. They compare two populations by comparing samples from each population.

*Statement of Inquiry: **Logic** is a powerful tool for **justifying** and **modeling** what we discover through measurement and observation.*

Materials required:

1. Two Folders
2. Composition notebook
3. Scientific calculator [*Suggested calculator: TI-30XB MultiView (Texas Instruments)*]
4. Mechanical pencils/ pencils with sharpener/erasable pens
5. Red pens
6. Highlighters

Criteria for grading:

Grades will be determined by the percentage of *points earned* out of the *total number of possible points*. These points will be earned by student performance in the following areas: assessments (65% - classroom tests and MYP assessments), Independent Practice /Homework (15%), and class participation (20%) based on the Approaches to Learning (ATL) skills rubric.

All graded assignments will be available on the parent portal.

Resources:

[Illustrative Math: Grade 7 Course](#)

[DFSD IM K-8](#)

Students are encouraged to use resources posted on Google Classroom. Students can also use **ixl.com** to practice skills online.

Outline updated by: Mathematics Department

Date: Winter 2024