Math Grade 8 Overview 2019-2020

This document is designed to provide parents/guardians/community an overview of the curriculum taught in the FBISD classroom. Included, is an overview of the Mathematics Instructional Model and Pacing, TEKS, Unit Overview, Big Ideas, Essential Questions, and Concepts for each unit.

Definitions:

Overview – The content in this document provides an overview of the pacing and concepts covered in a subject for the year.

TEKS – Texas Essential Knowledge and Skills (TEKS) are the state standards for what students should know and be able to do.

Process Standards – The process standards describe ways in which students are expected to engage in the content. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use knowledge learned efficiently and effectively in daily life.

Unit Overview – The unit overview provides a brief description of the concepts covered in each unit.

Big Ideas and Essential Questions - Big ideas create connections in learning. They anchor all the smaller isolated, facts together in a unit. Essential questions (questions that allow students to go deep in thinking) should answer the big ideas. Students should not be able to answer Essential Questions in one sentence or less. Big ideas should be the underlying concepts, themes, or issues that bring meaning to content.

Concept – A subtopic of the main topic of the unit

Instructional Model – The structures, guidelines or model in which students engage in a particular content that ensures understanding of that content.

Parent Supports:

The following resources provide parents with ideas to support students in mathematical understanding

- Advice for Parents: Helping Children with Math
- How Math Should be Taught
- The Most Important Mathematical Habit of Mind
- Math: Why Doesn't Yours Look Like Mine?
**Instructional Model:**

The instructional model for mathematics is the Concrete-Representational-Abstract Model (CRA). The CRA model allows students to access mathematics content first through a concrete approach (“doing” stage) then representational (“seeing” stage) and then finally abstract (“symbolic” stage). The CRA model allows students to conceptually develop concepts so they have a deeper understanding of the mathematics and are able to apply and transfer their understanding across concepts and contents. The CRA model is implemented in grades K-12 in FBISD.

**Math Workshop:**

During math instruction in grades K-8 in FBISD, we follow the Math Workshop structures. Instruction during a math class follows one of the three structures: Task and Share, Mini Lesson, Guided Math and Learning Stations, and Guided Math and Learning Stations. The structure that is used each day is determined by the content covered as well as student need.

<table>
<thead>
<tr>
<th>Task and Share</th>
<th>Mini Lesson, Guided Math and Learning Stations</th>
<th>Guided Math and Learning Stations</th>
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<tbody>
<tr>
<td>Number Sense Routine</td>
<td>Number Sense Routine</td>
<td>Number Sense Routine</td>
</tr>
<tr>
<td>Math Task</td>
<td>Mini Lesson</td>
<td>Guided Math</td>
</tr>
<tr>
<td>Task Share and Student Reflective Closure</td>
<td>Student Reflective Closure</td>
<td>Student Reflective Closure</td>
</tr>
</tbody>
</table>

**Number Sense Routine** – An engaging accessible, purposeful routine to begin math class that promotes a community of positive mathematics discussion and thinking.

**Math Task** – A problem-solving task that students work on in small groups. The teacher monitors and probes student thinking through questions. The task should have multiple entry points, allowing for all students to have access to the problem.

**Task Share with Student Reflective Closure** – Students come together as a whole class and discuss the various strategies they used to solve a rich mathematical task. Students ask questions, clarify their thinking, modify their work, and add to their collection of strategies.

**Mini Lesson** – A well-planned whole group lesson focused on the day’s learning intention and accessible to all levels of learners.

**Guided Math** – Small group instruction that allows the teacher to support and learn more about students’ understandings and misconceptions. Can include intervention, more on-level support, or enrichment.

**Learning Stations** – Activity in which students engage in meaningful mathematics and are provided with purposeful choices. Could include individual, partner or group tasks.

**Student Reflective Closure** – A deliberate and meaningful time for students to reflect on what they’ve learned and experienced during a math task, at activities in learning stations, or in a guided math group.
**Adopted Resources:**
**Middle School:** [https://www.fortbendisd.com/Page/93918](https://www.fortbendisd.com/Page/93918)

**Supplemental Resource and Tool Designation**
The TI Nspire CX calculator is a standardized technology integration tool used for Mathematics and Science in FBISD

**Mathematical Process Standards:**
The student uses mathematical process to acquire and demonstrate mathematical understanding. The student is expected to:

- **8.1A** Apply mathematics to problems arising in everyday life, society, and the workplace
- **8.1B** Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution
- **8.1C** Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems
- **8.1D** Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate
- **8.1E** Create and use representations to organize, record, and communicate mathematical ideas
- **8.1F** Analyze mathematical relationships to connect and communicate mathematical ideas
- **8.1G** Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication

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**Grading Period 1**

**Week of Inspirational Maths**
Estimated Date Range: Aug. 14 – Aug. 20

**Unit Overview:** This unit is a set of 5 lessons to begin the school year. Lessons focus on growth mindset and how we learn mathematics.

<table>
<thead>
<tr>
<th>Themes for the Week</th>
<th>TEKS Link to Math TEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>The themes for the week promote important mathematical ideas such as:</td>
<td>8.1A, 8.1B, 8.1C, 8.1D, 8.1E, 8.1F, 8.1G</td>
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<tr>
<td>- learning from mistakes</td>
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<tr>
<td>- doing mathematics visually</td>
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<td>- productive struggle</td>
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<td>- working together</td>
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<tr>
<td>- communicating about mathematics</td>
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# Unit 1: Represent and Apply Real Numbers

**Estimated Date Range: Aug. 21 – Sept. 18**

**Unit Overview:** In this unit, students will continue to examine the relationship of sets and subsets of rational numbers to discover the real number system including irrational numbers. Students will use prior knowledge of exponents and square units as a measure of area to build models to represent square roots and approximate square root numbers to locate the numbers on a number line. Students will build on prior knowledge of ordering rational numbers by comparing and ordering all real numbers by their magnitude. Students will also define radical and square root for both rational and irrational numbers as a subset of the real number system, convert between standard decimal notation and scientific notation, order a set of real numbers to include both rational and irrational numbers in both mathematical and real-world contexts. Students will also examine right triangles more closely within this unit by using models to explain the Pythagorean Theorem, use Pythagorean Theorem and its converse to solve problems, and apply these understandings to determine the distance between two points on a coordinate plane.

**Big Ideas:**
- The relationship between real numbers can be compared and contrasted categorically and numerically.
- Numbers can be compared by their relative values.
- The relationship of a shape's attributes can be used to determine different measures within the shape.
- Geometric applications, such as Pythagorean Theorem, can be used to solve real-life problems that include a right triangle.

**Essential Questions:**
- How are different sets and subsets of numbers related?
- How do you estimate irrational numbers by comparing them to rational numbers?
- What are the properties of special right triangles and how are these properties used?
- What are the applications of the Pythagorean Theorem and its converse?
- How is Pythagorean Theorem used to solve real world problems?

<table>
<thead>
<tr>
<th>Concepts within Unit #1</th>
<th>TEKS</th>
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<tbody>
<tr>
<td>Concept #1: Representing Real Numbers</td>
<td>8.2A, 8.2B, 8.2C, 8.2D</td>
</tr>
<tr>
<td>Concept #2: Modeling Pythagorean Theorem</td>
<td>8.6C</td>
</tr>
<tr>
<td>Concept #3: Application of Pythagorean Theorem</td>
<td>8.6C, 8.7C, 8.7D</td>
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</tbody>
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# Unit 2: Transformations and Similar Figures

**Estimated Date Range: Sept. 19 – Oct. 10 and Oct. 15 – Oct. 21**

**Note:** Includes 1 day for PSAT

**Unit Overview:** Students will apply their prior knowledge of coordinate grids: including the use of the x and y-axis & the four quadrants. Proportional relationships will be used to describe dilations. Students will generalize that the ratio of corresponding sides of similar figures are proportional, including a shape and its dilation, compare and contrast the attributes of a shape and its dilations on a coordinate plane, and explain the effect of a given positive rational scale factor applied to two-dimensional figures using algebraic representation. Students will explore transformational geometry concepts such as translations, reflections, rotations, and dilations and differentiate between transformations that preserve congruence and/or orientation and those that do not. Students will use models to show the effect of dilations to linear and area measurements. Students will continue to use geometry to solve problems using the Pythagorean Theorem to calculate the distance between two points on a shape’s pre-image and/or image and use informal arguments to establish facts about the angle-angle criterion for similarity of triangles. The concepts in this unit include the following: Translations, Rotations and Reflections, Dilations and Effects of Dilation on Linear and Area Measurements.

**Big Ideas:**
- The algebraic representation of a translation is additive.
- The algebraic representation of a dilation is multiplicative.
- A reflection effects a 2D shape by a change to one coordinate while the other coordinate remains the same (based on the axis the shape is reflected).
- A rotation (around the origin) of a 2D shape can be described using modeling and algebraic representation.
- Certain transformations cause a change in orientation or congruence.

Essential Questions:
- What are the similarities and differences between the images and pre-images generated by translations?
- What is the relationship between the coordinates of the vertices of a figure and the coordinates of the vertices of the figure’s image generated by translations?
- How can translations be represented algebraically?

Concepts within Unit #2

<table>
<thead>
<tr>
<th>Concepts within Unit #2</th>
<th>TEKS</th>
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<tbody>
<tr>
<td>Concept #1: Translations, Rotations, and Reflections</td>
<td>8.10A, 8.10B, 8.10C</td>
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<tr>
<td>Concept #2: Dilations</td>
<td>8.3A, 8.3B, 8.3C, 8.7D, 8.8D, 8.10C</td>
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<tr>
<td>Concept #3: Effects of Dilation</td>
<td>8.10D</td>
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Grading Period 2

Unit 2: Transformations and Similar Figures
Estimated Date Range: Sept. 19 – Oct. 10 and Oct. 15 – Oct. 21
Note: Includes 1 day for PSAT

Note: This unit is continued from Grading Period 1. Please refer to Grading Period 1 for the Unit Overview, Big Ideas, and Essential Questions for this unit.

Unit 3: Foundations for Linear Functions
Estimated Date Range: Oct. 22 – Nov. 22 and Dec. 2 – Dec. 19
Note: Includes 7 days for semester exams and review

Unit Overview: In this unit, students will expand on their understanding of linear relationships and proportional relationships. Students will develop the concept of slope using similar triangles and relate this understanding to their understanding of rate, constant of proportionality and unit rate. Students will determine if a relation is a function from multiple representations. Students will write equations of linear in slope-intercept form from various representations.

Big Ideas:
- Functions provide a means for describing and understanding a specific relationship between variables.
- The rate of change, or slope, of a linear function describes the changing relationship between the independent and dependent quantities of the function.
- The graphical and tabular representation of a function provides critical information (y-intercept, slope) about the function in order to interpret situations.
- An equation that represents a linear relationship can be derived from multiple representations of data.

Essential Questions:
- What are the characteristics that define a function?
- What does the rate of change or slope tell us about a linear function?
- What type of information can be determined when analyzing the graphs and tables that represent a function?
- How do you use a given representation to model a linear relationship?

Concepts within Unit #3

<table>
<thead>
<tr>
<th>Concepts within Unit #3</th>
<th>TEKS</th>
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<tbody>
<tr>
<td>Concept #1: Determining a Function</td>
<td>8.5G</td>
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</table>
Concept #2: Developing and Finding Slope
8.4A, 8.4B, 8.4C

Concept #3: Proportional vs. Non-Proportional Linear Relationships
8.4C, 8.5A, 8.5B, 8.5E, 8.5F, 8.5H

Concept #4: Linear Functions in Slope Intercept Form
8.4C, 8.5F, 8.5I, 8.9A

Unit 4: Making Predictions from Data
Estimated Date Range: Jan. 7 – Jan. 28

Unit Overview: In this unit, students will take bivariate data from a real world situation and construct a scatterplot. Students will use the constructed scatterplot to analyze and determine relationship; this is done with or without trend lines. Students must understand that the purpose of modeling data is to look for trends or associations, from there we make predictions. Students will also look for variances in bivariate data in order to better understand and form conjectures between the samples. This is done through calculating absolute mean deviation and generating random samples.

Big Ideas:
- Good mathematicians analyze and describe bivariate data in real world situations to make connections and predictions within or beyond a set of data.

Essential Questions:
- What is the purpose of modeling data?
- What can be determined from a model of a set of data?

Concepts within Unit #4

<table>
<thead>
<tr>
<th>Concept</th>
<th>TEKS</th>
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<tr>
<td>Concept #1: Scatter Plots and Making Predictions</td>
<td>8.5C, 8.5D, 8.11A</td>
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<tr>
<td>Concept #2: Mean Absolute Deviation and Random Samples</td>
<td>8.11B, 8.11C</td>
</tr>
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Unit 5: Equations and Inequalities
Estimated Date Range: Jan. 29 – Feb. 24

Unit Overview: In this unit, students will write real world situations from an equation or inequality as well as write equations and inequalities from verbal situations where there is a variable on both sides of the symbol. Students will also use concrete models, manipulatives, and inverse operations to solve equations with variables on both sides of the equal sign, represent solutions to equations and determine if a solution makes an equation true. In order to build conceptual understanding for solving equations it is essential that all the students have practice with writing equations, then representing and solving with models before solving using inverse operations.

Big Ideas:
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be determined
- A solution represents a value(s) that make a statement true in mathematical and real-world situations.
- The process to solve an equation must preserve equivalence, and that equivalence can be preserved using inverse operations, graphing, and modeling, using concrete and pictorials manipulatives.

Essential Questions:
- How can you interpret the solution to an equation?
- What strategy can you use to solve an equation with variables on both sides?
- How can you determine if a solution is reasonable?

Concepts within Unit #5

<table>
<thead>
<tr>
<th>Concept</th>
<th>TEKS</th>
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<tbody>
<tr>
<td>Concept #1: Writing Equations and Inequalities</td>
<td>8.8A, 8.8B</td>
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<tr>
<td>Concept #2: Model and Solve Equations</td>
<td>8.8A, 8.8C, 8.9A</td>
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</table>
Unit 6: Geometric Applications of Equations
Estimated Date Range: Feb. 25 – Mar. 6 and Mar. 16 – April 3

Unit Overview: In this unit, students will apply knowledge from 7th grade as well as from unit 5 (Writing and Solving Equations) to geometric applications. Students will use prior knowledge on angle relationships to develop informal arguments, and write equations to calculate missing angle measurements. Students will also build their conceptual knowledge on surface area (lateral/total) and volume to better understand and apply formulas to real world problem situations.

Big Ideas:
- Geometric attributes and their measures can be used to describe figures and their relationships.
- Mathematical operations and strategies may be used to represent and solve a variety of problem situations dealing with surface area.
- Objects in space can be oriented in an infinite number of ways, and an object’s location in space can be described quantitatively
- Some angles have special relationships based on their position or measures
- In a plane, when a line intersects two parallel lines the angles formed are related in special ways

Essential Questions:
- How will applying appropriate techniques, tools and formulas help determine the solutions to problems involving surface area/ volume?
- How does previous knowledge of the sum of the interior angles of a triangle assist in finding remote exterior angle measurements of a triangle?
- How does previous knowledge of congruent and supplementary angle properties assist in solving for unknown angle measurements?

Concepts within Unit #6

| Concept #1: Angles of Triangles | TEKS: 8.8A, 8.8C, 8.8D |
| Concept #2: Parallel Lines | TEKS: 8.8A, 8.8C, 8.8D |
| Concept #3: Surface Area | TEKS: 8.7B, 8.8A, 8.8C |
| Concept #4: Volume | TEKS: 8.6A, 8.6B, 8.7A, 8.8A, 8.8C |

Grading Period 4

Unit 6: Geometric Applications of Equations (Continued)
Estimated Date Range: Feb. 25 – Mar. 6 and Mar. 16 – April 3

Note: This unit is continued from Grading Period 3. Please refer to Grading Period 3 for the Unit Overview, Big Ideas, and Essential Questions for this unit.

| Concept #1: Angles of Triangles | TEKS: 8.8A, 8.8C, 8.8D |
| Concept #2: Parallel Lines | TEKS: 8.8A, 8.8C, 8.8D |
| Concept #3: Surface Area | TEKS: 8.7B, 8.8A, 8.8C |

Unit 7: Financial Literacy
Estimated Date Range: April 6 – April 23
Note: Includes 2 days for state testing

Unit Overview: In this unit, students will learn the basic concepts of financial literacy in regards to spending and the importance of saving for the future. Students will use technology to solve problems comparing the interest rate and loan length, and calculate the cost of repaying a loan. Students will formulate strategies for making good financial decisions by investigating the different types of credit, loans, and the costs associated with borrowing money and various methods of payment. Students will conclude the unit by identifying situations that represent financially responsible decisions, and estimate the costs of attending various education institutions.
Big Ideas:
- Developing an economic way of thinking and problem solving is useful in one's life as a knowledgeable consumer and investor.

Essential Questions:
- Why do we study financial literacy?

<table>
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<th>Concepts within Unit #7</th>
<th>TEKS</th>
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<tbody>
<tr>
<td>Concept #1: Saving for the Future</td>
<td>8.12C, 8.12D</td>
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<tr>
<td>Concept #2: Borrowing Money</td>
<td>8.8C, 8.12A, 8.12B</td>
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<tr>
<td>Concept #3: Methods of Payment</td>
<td>8.12E</td>
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<tr>
<td>Concept #4: Financially Responsible Decisions</td>
<td>8.12F</td>
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<tr>
<td>Concept #5: Devise a College Savings Plan</td>
<td>8.8A, 8.12G</td>
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Unit 8: Applications for Algebraic Reasoning
Estimated Date Range: April 24 – May 28
Note: Includes 2 days for state testing and 7 days for semester exams and review

Unit Overview: In this unit, students will review a combination of concepts taught earlier this year (Linear Functions) and concepts taught in 7th grade (write, model and solve equations/inequalities). Students will refine their understanding of linear relationships and proportional relationships. Students will determine if a relation is a function from multiple representations. Students will write equations of linear in slope-intercept form from various representations. Students will also use concrete models, manipulatives, and inverse operations to solve equations with variables on both sides of the equal sign as well as inequalities, represent solutions to equations/inequalities and determine if a solution makes an equation/inequality true. Use a pre-assessment to determine the need for Tier 1, Tier 2, or Tier 3 intervention for both concepts in this unit.

Big Ideas:
- Functions provide a means for describing and understanding a specific relationship between variables.
- A solution to an equation or inequality represents a value(s) that makes the statement(s) true in mathematical and real-world situations.
- Equations and inequalities can be modeled and solved using concrete, pictorial, and algebraic models.
- The process to solve an equation must preserve equivalence. Equivalence can be preserved using inverse operations with models and algebraically.

Essential Questions:
- What are the characteristics that define a function?
- What does the solution to an equation or inequality mean? How can you determine a solution for an equation or inequality?
- How are negative values represented with concrete and pictorial models?
- How do you preserve equality when solving an equation or inequality?

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<thead>
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<th>Concepts within Unit #8</th>
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<tr>
<td>Concept #1: Linear Functions</td>
<td>8.4C, 8.5F, 8.5G, 8.5I, 8.9A</td>
</tr>
<tr>
<td>Concept #2: Write, Model, and Solve Equations and Inequalities</td>
<td>7.10A, 7.10B, 7.11A, 7.11B, 8.8A, 8.8C, 8.9A</td>
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</tbody>
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