# Math 8 units, quizzes, tests, participation, and projects

These are the Math 8 units for this school year. Each unit has two or three sections (18 total). For each unit, we will:

- Take **notes** and go over examples together. You will receive credit for your notes.
- After each section, we'll have a **class quiz**. You can use your notes to help you, and will receive credit for your notes at that time.
- After all the unit sections are complete, we'll have a **class unit test**. You can use your notes.
- After we correct and review the class test, we'll have the **SJUSD unit test**. The material will be the same as on our class test, and for the district test notes are not allowed.
- For each unit, we have class **participation points** (party points) for volunteering to read, review class examples, help the class by trying to solve an example, and other ways of participating to help the class.
- We have **two projects** to practice real-world use of math to improve your life; you will receive those instructions on their own pages.

You can make-up any failed test to improve your learning and/or grade. Make-ups that do not help your grade will be discarded, and you may make-up a test as many times as you need to pass. Make-ups upgrade an "F" to the highest "D" possible.

Keep this packet safe for reference. It will help you :)

## UNIT 1: BIVARIATE DATA

Because statistics hold such a prominent place in modern society, they are a natural starting point for 8th grade math. Students will create and analyze tables, scatter plots, lines of best fit, and other visual representations of bivariate data. *Statistics* means counting what's important to understand something, like various numbers in baseball (batting average, fielding average, earned run average, etc.) *Bivariate data* means looking at two areas of information, often in relationship, such as:

- Hoover MS students playing more video games in summer than during the school year.
- San Jose residents buying more clothing of local sports teams after successful seasons.
- Hoover MS students having higher grades if they study before tests.

*Useful text: pages 224 - 232*

**Section 1**: Creating a graph for bivariate data (like video game playing hours, and month of year to show more playing during vacation).

**Section 2**: Bivariate data relationships and terms:

a. *Positive, negative, or no relationship* between the two areas measured.
b. *Outlie*r data (unusual relationship with some data points).
c. *Clusters* of data.
d. *Line of best fit* to create a straight line on the graph showing the trend of the data.
e. *Slope* showing how steep a line of best fit is measured.
f. Completing a two-way table of bivariate data (like 10+ hours of video games Mon-Fri in July versus 10+ hours in September).

## UNIT 2: REPRESENTING LINEAR FUNCTIONS

Students will define slope as measurable rate of change, and suggest possible real-world applications. Students will understand a linear function shown as a table, graph, and algebra equation. *Linear function* is like the data of

- How much money you make for any amount of time worked while earning $25/hour.
- How far you travel walking if your average speed is 5 mph.
- How much it costs to go to the movies with family/friends if each ticket is $8.

*Useful text: Chapter 5: Linear Functions, pages 253 - 324*

**Section 1**: Recognizing a *function*. Function means each input (x value) only has one output (y value). This is easiest by making a graph and using the vertical line test. If any vertical line (straight up/down) intersects the graph in 2+ places, that relationship is not a function.
**Section 2**: Creating a table, graph, and equation with data of a *linear function*, and recognizing a *linear function*. A linear function graphs as a straight line in the form of $y = mx + b$. The variable $m$ is the *slope*, and $b$ is the *y-intercept* point. *Slope* means how steep the line is measured as rise (change in $y$ from one point to another) over run (change in $x$ from those same two points). *Y-intercept* means where the graphed line crosses the $y$-axis; that is, what $y$ equals when $x = 0$, or what $y$ equals at the beginning of a story if $x$ measures time.
**Section 3**: Use a linear equation ($y = mx + b$) to test if a set of points belong to the equation or not, and to graph a linear equation.

## UNIT 3: SOLVING LINEAR EQUATIONS

Students will create, simplify, and interpret solutions to linear equations with one variable, such as:

- Is $120 = $25h - $30 an equation that represents working 6 hours at $25/hour and then spending $30 to buy your family dinner?
- Create an equation for buying a PS4 for $400 if you currently have $75 saved and then work at $25/hour to earn the rest.
- If you walked at 5 mph for two hours, then walked at the same rate for 3 more hours, create an equation for how far you walked.

*Useful text: Chapter 2: Equations, pages 69 - 132*

**Section 1**: Recognize and create equations for one variable (like the above examples).
**Section 2**: Solve simple one-variable equations, including being able to simplify the equation first by isolating the variable, then dividing to get just one of the variable.
**Section 3**: Interpret whether equations have one, many, or no solutions.

## UNIT 4: SYSTEMS OF EQUATIONS

A system of equations means to compare two linear equations, and see if there are any common solutions; that is, a point where two linear equations cross on a graph. Applications include:

- Should you buy a season pass to Great America?
- Should you pay for unlimited data on your phone plan?
- Should you buy a monthly bus pass?

*Useful text: Chapter 6: Systems of equations and inequalities, pages 325 - 390*

**Section 1**: Use algebra and graphing to solve two linear equations. The solution will have either one solution as one intersection point, many solutions (be the same line), or no solution (parallel or other non-intersecting lines).
**Section 2**: Compare a system of two linear equations to evaluate a purchasing decision.

## UNIT 5: EXPONENTS IN OUR WORLD

Students will learn the properties of exponents, use of scientific notation, and formulas to calculate volumes of cylinders, spheres, and cones.
*Useful text: pages 391 - 429, and SB21 (Skills Bank, back of book)*

**Section 1**: Apply rules of exponents for multiplication and division.
**Section 2**: Use scientific notation for really big numbers in the universe, and really small numbers under the microscope.
**Section 3**: Use exponents in formulas for volume. For a cylinder, V = base x height = $\pi$ $r^2$ h. For cone, V = (1/3) $\pi$ $r^2$ h. For sphere, V = (4/3) $\pi$ $r^3$

## UNIT 6: ROOTS AND THEIR APPLICATIONS

Students will understand square roots and cube roots. This includes the use of squares and square roots in use of the Pythagorean Theorem: $a^2 + b^2 = c^2$. *Useful text: pages 26 - 37, SB19, SB21*

**Section 1**: Understand how square roots and exponents are reciprocal operations, like multiplication and division are reciprocal operations. Use these ideas to manipulate examples for the volume of a cube.
**Section 2**: Estimate the values of numbers using exponents and roots. This includes use of the Pythagorean Theorem.
**Section 3:** Use the Pythagorean Theorem to find the missing side of a right triangle, and to determine if a triangle of given side lengths is or is not a right triangle.

## UNIT 7: TRANSFORMATIONS AND ANGLE RELATIONSHIPS

Students will use transformations in the forms of translation (move), reflection (flip image as in a mirror), rotation (spin), and dilation (expand or decrease size). Students will also use angle relationships with intersecting and parallel lines, combined with simple one-variable algebra. Finally, students will identify identify *similar* shapes. Similar means the same shape, with one of the images being bigger and the other smaller. *Useful text: SB24, SB14*

**Section 1**: Transformations.
**Section 2**: Angle relationships with intersecting and parallel lines, combined with simple one-variable algebraic equations. Similar shapes.