

# CMS NC Math 1: Unit 1 and 2

## One-variable Statistics, Linear Equations and Inequalities

### Design an Asynchronous eLearning Class

#### Project Resources

| ROLE                        | NAME                                     |
|-----------------------------|--|
| Instructional Designer      | Mary Ashley Lozano                       |
| Subject Matter Expert (SME) | Monica Little                            |
| Primary Client              | Ardrey Kell High School- Math 1 Teachers |
| Other                       | Charlotte Mecklenburg Schools (CMS)      |

#### Front End Analysis

##### Organizational Description

The organization is Ardrey Kell High School in the Charlotte Mecklenburg School District. Ardrey Kell is one of thirty two high schools in the district. Ardrey Kell has a current enrollment of 3,509 students in 9th grade through 12th grade. The student population has a demographic breakdown of Caucasian 48.7%, Asian 25%, African American 12.6%, Hispanic 10.8%, and Other 2.9%. Of the student population 4.6% of the students are English Language Learners and 6.4% have an Individualized Education Plan (IEP). The mission statement of the school: “Provide a well-balanced high school experience for all students, staff and parents.” The SME for this project is a Math 1 teacher at Ardrey Kell High School with over twenty years of experience teaching this level of math.

##### Description of the Course and Class

The High School Math 1 Curriculum covers eight units and at the end of the class students have to take a state Math 1 End of Course (EOC) Test. Last year in CMS, less than 5% of students that took the Math 1 EOC scored as College and Career Ready. Less than 10% of the students at Ardrey Kell passed the Math 1 EOC. State wide, 6.5% of students scored as College and Career Ready.

The CMS District is implementing a new High School Math 1 Curriculum throughout the district. This “curriculum was designed to ensure that all students in Math 1 across CMS have consistent opportunities to equitable math instruction using a guaranteed, viable, standards-aligned, and culturally relevant curriculum, regardless of their needs.”. This new curriculum was created by Illustrative Mathematics.

This asynchronous eLearning Class is being designed for a year long Math 1 class for 9th grade students at Ardrey Kell High School. Students in this class have learning difficulties and are taking the traditional Math 1 class over a full year, where most students take it over 1 semester. This class has one certified math teacher delivering the content daily and one special education teacher that is in the class for half of the class to help differentiate instruction for students with

disabilities. There are thirty three students in this class, nine females and twenty four males. In the class, thirteen of the students have an identified disability with an IEP. Seven students are identified as English Language Learners. Two students have a 504 and receive accommodations. Two students are identified as having a disability and an English Language Learner. This is a similar make up of other year long Math 1 classes at the school.

### **Learning Management System (LMS) Chosen**

The LMS that CMS uses is Canvas for all kindergarten - 12th grade students. There are many features that Canvas has to offer and some of the features are not turned on for use with CMS. Canvas has several options for communication that include messaging, discussion boards, and built in web conferencing tools. Units of work can be posted in modules for students to complete and tests and quizzes can be added within Canvas. Grades can be synchronized to PowerSchool for report cards. As an instructor, you can use the analytics to view reports and student participation. Courses can be shared and saved on Canvas and more than one instructor can be added to a class. Parents can observe on Canvas and see what is due and how their child is progressing in class. Canvas can be challenging for new users and takes some time to learn all of the features.

### **Desired Outcomes**

The CMS District has the following vision and mission for district mathematics:

“All CMS students will engage in the learning of mathematics in an environment that fosters positive mathematics identity, distributes the power and agency in the learning of mathematics to students, and is inclusive.

- Students will develop the necessary discipline- specific skills, competencies, and behaviors through rich mathematics experiences that center high expectations, mathematics discourse, reasoning and sense-making, collaboration, and opportunities to examine ideas of social and racial justice, engage in current events, and expand and apply mathematics into everyday life.
- Teachers will intentionally plan using instructional resources that leverage these mathematics experiences and work deliberately to create and sustain strong classroom culture that centers on equity and inclusivity. They will be steadfast in facilitating these experiences using research- based effective mathematics teaching practices.

Through such experiences, CMS students will be poised to enter college or careers more deeply and successfully, feeling confident with their abilities to engage in and find solutions for societal challenges.”

All math teachers at Ardrey Kell High School are new to this math curriculum. Mrs. Lozano will design an Asynchronous eLearning class using the Math 1 curriculum on the first two units for the Math 1 teachers at Ardrey Kell High School to use who are teaching the year long foundations class.

The desired learning outcomes of the Asynchronous eLearning Class:

1. Students will be able to solve one variable statistical questions.
2. Students will be able to solve measures of center questions.
3. Students will be able to solve measures of variability questions.
4. Students will be able to solve linear equations questions.

5. Students will be able to solve inequalities.
6. Students will be able to create, manipulate, interpret data to models.

### **Performance Analysis**

Through the CMS District, all schools are using a new High School Math 1 curriculum. Teachers and students have been provided with workbooks to complete. How each school and teacher is delivering the instruction will vary. All provided materials are paper and meant for in person learning.

By offering a eLearning course shell in Canvas, teachers who are teaching the year long Math 1 foundations class will have an asynchronous class that will be easy to implement for an online class. Teachers who are teaching the semester long Math 1 class, can make a few changes to the lesson pace to meet the needs of the students in their class.

### **Problem Statement**

The new High School Math 1 Curriculum provides teachers with a foundation for in person instruction, and locally developed asynchronous eLearning classes will be provided for teachers on Canvas to use in the event of asynchronous learning for the first two units, more units will be added over time.

## **Learner Analysis Section**

### **Basic Demographics**

The intended audience for the completed Canvas class will be 9th grade high school students at Ardrey Kell High School taking the year long Math 1 foundations class. Slight changes could be made for the semester-long Math 1 class such as having those students complete more than one lesson a day. All students are at least 13 years old and the average age is 14 years old. The students are a mix of male and female. The ethnicities of the students include Caucasian, Asian, African American, Hispanic, and Other races.

Common traits of all the students is they are attending high school at the same location and have completed the 8th grade math prerequisite class. All current CMS students have experience using the LMS Canvas. A few differences among learners within the group is the grade earned in 8th grade math, some students have learning disabilities, some students are English Language Learners, and the level of interest in math.

Students should be motivated to complete this eLearning class as it is a requirement for moving on to 10th grade. Some students enjoy math and others do not. The instruction will be effective, efficient, and appealing to the target audience, by using both auditory and visual materials that are easy to use and to the point. The designer will have built in accommodations for the learners, such as enlarged text, transcripts of videos, read aloud, and contrast with colors. This course will have built in assessments to determine the success of understanding the mathematical concepts. The instructional designer will do a member check with someone from the eLearning class and teacher to determine the success.

### **Interest Level of Your Learners**

Passing Math 1 is a requirement of promotion to 10th grade and graduating high school with a standard diploma and the Occupational Course of Studies Diploma. Some students will be more interested in this learning class than others. To create materials that are appealing and engaging to the audience, the instructional designer will create simple materials and handouts with the math steps that are simple and to the point.

Math 1 teachers are stressed with implementing the new math curriculum and currently do not have pre-made materials to pull from that align with the curriculum. Students will be stressed with taking a math class online without live instruction. Therefore, this eLearning class needs to be easy to use, to the point, and give opportunities for feedback. Both teachers and students have been issued a CMS laptop or Chromebook, have access to Canvas, Google Drive, and the website Desmos. They are familiar with using the CMS devices, Canvas, and Google Drive. Not all users are familiar with Desmos.com. The materials will be a combination of videos, images, text, Google Slides, and Google Forms.

### **Entry Level Behaviors**

We assume students have passed the 8th grade level math and have the prerequisite skills needed for this eLearning class. We assume students and teachers are familiar with Canvas and are able to independently navigate it. It is assumed the learners have their non-instructional needs met, but are under stress due to Covid-19.

## **Content Analysis**

### **Module Structure**

Each unit of the Math 1 eLearning class will be completed during one module on Canvas. The length of each module will vary based on the number of lessons. The whole module will be posted at the start of the unit. Each module will be composed of weeks with five lessons each week. The week of a test will have three new lessons, one review, and a test at the end of the week. Students will need a code to take the test and that will be posted the day of the test and students will have until 11:59 pm that day to complete the test. The work that is posted during the week, will be due at 11:59 pm on Sunday. Late work will be accepted following the CMS district policy, work will be accepted up to five days after the unit assessment.

Each lesson is designed to be completed in 45 minutes, which is less time than a typical in person class. This will give students the opportunity to go back and rewatch videos and have plenty of time to complete the work. In math, daily practice is needed.

A typical lesson will follow the same format for ease of use for students. Each lesson will have six parts:

1. Learning Goal(s): A short video telling the students learning goals for the lesson.
2. Warm-up: To help students get ready for the day's lesson, or gives an opportunity to strengthen their number sense and fluency.
3. Instructional Activities: Lessons consist of one or more activities and videos that are the heart of the lesson and make up the majority of the time spent during the lesson.
4. Practice Problems: Students will be given practice problems to complete related to the lesson's learning goal(s).

5. Lesson Review: Students will take time to review what they have learned and review the notes and or handout from the lesson.
6. Cool-down: This serves as a brief formative assessment to determine whether students understood the lesson.

Posting the module at the start of the unit allows for students to see what is expected from them. Students who feel comfortable will be able to work at a faster pace and others will have extra time to complete all required work. By following the same format, students will know what is expected of them daily. These six part lessons will give students opportunities to break up the work into manageable chunks. The teacher will be able to see the work the students are completing and make sure they have completed the work and review before attempting the unit test.

## **Major Units and Learning Goals**

### Module 1 Unit 1: One Variable Statistics:

GOAL: This unit builds on the work students did in 6th-8th grade using data displays in histograms, dot plots, and box plots to summarize data. This is revisited in the unit, but now focuses on the interpretation of the data. This will also build on the understanding students develop around measures of center and measures of variability.

1. Students will be able to solve one variable statistical questions.
2. Students will be able to solve measures of center questions.
3. Students will be able to solve measures of variability questions.

## **Learning Goals for students**

### **Week 1**

**Day 1:** I can tell statistical questions from non-statistical questions and can explain the difference.

**Day 2:** I can tell the difference between numerical and categorical data.

**Day 3:** I can find the five-number summary for data. I can use a histogram or box plot to represent data.

**Day 4:** I can graphically represent the data I collected and critique the representations of others.

**Day 5:** I can describe the shape of a distribution using the terms “symmetric,” “skewed,” “bell-shaped,” “uniform,” and “bimodal.”

- Symmetric- where one side is a mirror image or reflection of the other
- Skewed- shifted to the left or to the right
- Bell shaped- graph depicting the normal distribution, which has a shape like a bell
- Uniform- The graph of a uniform distribution is flat and the same
- Bimodal- a graph with two peaks

### **Week 2**

**Day 1:** I can calculate interquartile range, mean, and median for a set of data.

**Day 2:** I can create graphic representations of data and calculate statistics using technology ([Desmos](#)).

**Day 3:** I can apply what I have learned to analyze and create graphical representations of data sets to answer questions and make informed decisions.

**Day 4:** I can describe how some data points can affect the mean and median. I can use the shape of a distribution to compare the mean and median.

**Day 5:** I can describe standard deviation as a measure of variability. I can use technology to compute standard deviation.

### Week 3

**Day 1:** I can arrange data sets in order of variability given graphic representations.

**Day 2:** I can compare two data sets using the measures of center and variability. I can tell how an outlier will impact mean, median, IQR, or standard deviation.

**Day 3:** I can compare and contrast situations using measures of center and measures of variability.

**Day 4:** Test Review: I can demonstrate mastery on all unit 1 objectives.

**Day 5:** TEST: I can demonstrate mastery on all unit 1 objectives.

### Module 2 Unit 2:

GOAL: In middle school, students began building an understanding of how variables, expressions, equations, and inequalities could be used to represent quantities and relationships. In this unit, students will further develop their skills to create, manipulate, interpret, and connect these representations and use them for modeling.

1. Students will be able to solve linear equations questions.
2. Students will be able to solve inequalities.
3. Students will be able to create, manipulate, interpret data to models.

### Week 4

**Day 1:** I can explain the meaning of the term “constraints.” I can tell which quantities in a situation can vary and which ones cannot.

- Constraints- something that limits or controls what you can do, like  $x=2$

**Day 2:** I can use numbers and variables to write equations representing the relationships in a situation.

**Day 3:** I can use words and equations to describe the patterns I see in a table of values or in a set of calculations.

**Day 4:** When given a description of a situation, I can use representations like diagrams and tables to help make sense of the situation and write equations for it.

**Day 5:** I can explain what it means for a value or pair of values to be a solution to an equation.

### Week 5

**Day 1:** I can find solutions to equations by reasoning about a situation or by using algebra.

**Day 2:** I can tell whether two expressions are equivalent and explain why or why not.

**Day 3:** I know and can identify the moves that can be made to transform an equation into an equivalent one.

**Day 4:** I understand what it means for two equations to be equivalent, and how equivalent equations can be used to describe the same situation in different ways.

**Day 5:** I can explain why some algebraic moves create equivalent equations, but some do not.

## Week 6

**Day 1:** I know how equivalent equations are related to the steps of solving equations.

**Day 2:** I know what it means for an equation to have no solutions and can recognize such an equation.

**Day 3:** I can solve equations. I understand why equations can be solved in multiple ways.

**Day 4:** I can solve story problems by writing and solving an equation.

**Day 5:** I can share what I know mathematically.

## Week 7

**Day 1:** I can continue to grow as a mathematician and challenge myself with real world questions.

**Day 2:** Given an equation, I can solve for a particular variable (like height, time, or length) when the equation would be more useful in that form.

**Day 3:** I know the meaning of the phrase “to solve for a variable.”

- To solve for a variable- solving the equation for the given variable/letter/shape

**Day 4:** I can write an equation to describe a situation that involves multiple quantities whose values are not known and then solve the equation for a particular variable.

**Day 5:** I know how solving for a variable can be used to quickly calculate the values of that variable.

## Week 8

**Day 1:** I can describe what a modeling prompt is.

**Day 2:** I can explain some elements of a good response to a modeling prompt.

**Day 3:** I can write inequalities that represent the constraints in a situation.

**Day 4:** I can graph the solution to an inequality in one variable.

**Day 5:** I can solve one-variable inequalities and interpret the solutions in terms of the situation.

## Week 9

**Day 1:** I understand that the solution to an inequality is a range of values (such as  $x > 4$ ) that makes the inequality true.

**Day 2:** I can analyze the structure of an inequality in one variable to help determine if the solution is greater or less than the solution to the related equation.

**Day 3:** I can write and solve inequalities to answer questions about a situation.

**Day 4:** 1 Test Review: I can demonstrate mastery on all unit 2 objectives.

**Day 5:** TEST: I can demonstrate mastery on all unit 2 objectives.

## Communication Strategy

This class will be completed completely online, asynchronously in [Canvas](#). Weekly, the teacher will post one class announcement with information you will need for the week. This will include telling you what will be graded and upcoming deadlines.

The teacher will be available for help with weekly office hours:

- Monday: By appointment
- Tuesday: 1:00pm-2:30pm
- Wednesday: By appointment

- Thursday: 10:00am-11:30am
- Friday: By appointment

On Tuesday and Thursday, you can drop in for help during the office hours above using this [link](#). If you would like to meet on Monday, Wednesday, or Friday, you will need to email the teacher 24 hours in advance to set up an appointment. You are encouraged to use the office hours, email or use Canvas to get in contact with the teacher. The teacher is here to help you.

The discussion board will be used with one thread, I have a question. You can use this to post questions about the class, a specific question for the lesson, or an assignment. You are encouraged to check the discussion board and respond if you know the answer. The teacher will be checking this regularly and responding as well.

### **How To Take This Class**

This [one page document](#) (*see the last page*) will be shared with students on how to take this eLearning class.

### **Assessment of Learners Materials**

This asynchronous eLearning class will have opportunities for both formative and summative assessments.

#### Formative Assessments

- Each lesson includes a cool-down to assess whether students understood the work of that day's lesson. Teachers can use this as a formative assessment to provide feedback or to adjust further instruction.
- Practice problems are provided for each lesson. The teacher can choose to have students submit them for a grade or to provide feedback.

#### Summative Assessment

- At the end of each unit is the end-of-unit assessment. The types of problems included are multiple-choice, multiple response, short answer, constructed response, and extended response.





# HOW TO TAKE THIS CLASS & PASS

**1**

## **MONDAY**

Read the weekly announcement that is posted in Canvas. This will tell you the important information for the week.

**2**

## **DAILY**

Login to Canvas daily and spend 45 minutes completing the lesson each day. All work is due by 11:59pm on Sunday.

**3**

## **ORDER**

The whole unit is posted in one module which is made up of weeks. Each week there will be daily lessons to complete. Work in order!

**4**

## **COMMUNICATE**

The teacher is available to help you daily. Use the office hours or the "I have a question" section on the discussion board.

## **FOLLOW THESE STEPS**

**Don't wait, ask for help**

Email: [marya.lozano@cms.k12.nc.us](mailto:marya.lozano@cms.k12.nc.us)