



## ***The Over Incarceration of America***

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This curriculum unit is recommended for:  
Middle and High School / Math I or II / 8<sup>th</sup>, 9<sup>th</sup>, and 10<sup>th</sup> grade

**Keywords:** Statistics, Measures of Center, Measures of Spread, Box and Whiskers Plot, Histogram, Linear Regression, Math 1

**Teaching Standards:** See [Appendix 1](#) for teaching standards addressed in this unit.

**Synopsis:** This unit will cover the Math 1 statistics unit on one and two variable data. The purpose of this unit is to provide students with an understanding of how to represent, analyze, and interpret statistical data in order to understand real world ideas. *The Over Incarceration of America* unit specifically will focus on the American prison system and how it affects our society. Students will use measures of central tendency, measures of spread, box and whisker plots, histograms, and regression functions to investigate key ideas on the incarceration problem in America. Students will create a regression equation and predict the future state of our prison population based on current trends. The unit will end with an application of all of these topics to a set of data on the current salaries of ex-convicts. Students will also research how that compares to their expected career plans and create a presentation synthesizing what they have learned throughout this unit.

*I plan to teach this unit during the coming year to 90 students in Common Core Mathematics I.*

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## Introduction

### Rationale

In every class I have taught over the last six years, students have always asked the “why” questions; “why are we learning this” or “why is this important”. The student’s age or the class they are taking does not change their curiosity, and students consistently want to engage in material they feel is relevant to life outside of school. This lesson is designed to help students make connections between mathematics and the real world. Analyzing actual situations and data can increase student engagement and retention. In this particular unit, scholars will focus on the current state of the American prison system. This is important because of the sheer number of Americans that are affected by the criminal justice system. Students are able to analyze the impacts of incarceration on our society, as well as make conclusions as to the equity of the justice system.

In North Carolina, students take end of grade (EOG) or end of course (EOC) tests at the end of specific years or courses to assess whether they are on track to be career or college ready. Unfortunately, the importance the state puts on these tests suggests to teachers that certain topics or skills are more important than others. This leaves little room in the curriculum for creativity or application of topics geared towards student interest because teachers are focused on preparing the students for the standardized test instead of preparing them for the real world. I wanted to find a way to both teach the content the students will see on their Math 1 EOC, while also showing them a way that the content is applicable outside of school. Through this unit, students will engage and explore real world data and use statistical analysis and application to make conclusions. This unit allows students to learn the Math 1 standards, while also relating the standards to tangible social justice problems in our country.

### Student Demographics

West Charlotte High School has 1,442 students enrolled 9-12<sup>th</sup> grade during the 2017-2018 school year. The school is set up similar to a college campus with 14 different academic building as well as north campus and south campus trailer classrooms. The school offers International Baccalaureate Programs in Middle Years (9<sup>th</sup> and 10<sup>th</sup> grade), and the Diploma Program (11<sup>th</sup> and 12<sup>th</sup> grade). It also offers advanced placement courses, Junior ROTC, and both exceptional children’s and English language learner’s programs. Students are engaged in the arts through band, chorus, and various art courses including crafts, ceramics, and photography. They also participate in career and technical courses and have the opportunity to work for E2D; a non-profit focused on eliminating the digit divide for students in low-socioeconomic areas. West Charlotte students work to refurbish old computers that E2D sells for \$50. Students are also offered athletics and student run organizations after school. The following table reflects the current student demographics.

African American	Hispanic	Caucasian	Asian	2 or more races	Pacific Islander	Native American
82.4 %	9.4%	1.5%	3.7%	1.8%	0.4 %	0.8%

West Charlotte High School is a Title I Priority school and is currently part of the Project Lift Zone in the Charlotte Mecklenburg School (CMS) district. The school has a higher population of freshman than any other grade level. The foundations of Math 1 classes contain approximately 25 students each and regular or honors Math 1 classes contain approximately 30 students each. The following unit focuses on statistical representations of data are taught at the end of a Math 1 course. In both a regular and foundations Math 1 course, students would learn the Math 1 statistical standards in conjunction with the ideas represented in this unit. A second context to teach this unit is through a repeater Math 1 course. This year I have one section of repeaters, and they engage best with the content when it is relevant to real life situations. Since they already have some knowledge of the standards, application as well as showing significance creates high engagement in class as well as allows students to go in depth with the content.

## Unit Goals

As mathematics educators, we are well versed in our content area. We understand how learning concepts in one grade level will support concepts in the next, and plan each lesson with a purpose. We also are able to apply the mathematics we teach to the world around us. While we can make connections to the usefulness of mathematics, sometimes our students cannot. Many of them feel disconnected from the content, and therefore learning the content has no purpose to them. The main goal of this curriculum unit is to show students the relevance of applying mathematics to social issues. Students will use real data to dive into the topic of over-imprisonment in America. This lesson will not only teach students about that problem, but will also model how to use data to understand other social issues that could connect to their interests. Students will learn to draw conclusions from real data instead of assuming what they see in the news or on social media is correct.

Another goal of this unit is for students to learn how to use statistical concepts to show their data accurately. This goal supports North Carolina Common Core Standards S-ID.2 and S-ID.3. The way they display data or what measure of central tendency they use can change the way an outside viewer interprets the data. For example, a histogram and box and whisker plot both represent data visually, however one will be more appropriate for what information the students are trying to visually represent. For students to be able to look at information and interpret it accurately, they need to understand the way that data can be represented, and how that can change view perspective.

The measure of central tendency that students use to represent data can also suggest to a reader how to interpret the data. The median of the data is the best measure of center to use if the data is ordinal or skewed left or right because skewed data can drag the mean in that direction. The mean is extremely susceptible to outliers. The mean is ideal for data that is normally distributed. If the data is nominal, the mode is the more accurate measure of central tendency to use. The mode being the best measure of center is problematic when the most common number is at one end of the data set. The goal is for students to understand that if they have an outlier and use the wrong measure of center, they could change a viewer's understanding of the data and what it means in the context of the social issue.

The last goal of this unit is for students to be able to predict outcomes given data. Standard S-ID.6 requires students to summarize, represent, and interpret data on two categorical and quantitative variables. One purpose of this unit plan is to support that standard so that they can calculate future effects. Students will use technology to create equations, and then predict forthcoming data using those equations.

## **Content Research**

Edmund Burke, a British philosopher and statesman, stated in a letter “The only thing necessary for the triumph of evil is for good men to do nothing”<sup>5</sup>. America has taken this idea and over time created a complex prison system that addresses the many evils in our society. The United States currently has the highest percentage per population incarcerated, however America did not always imprison its citizens at the rate and for the length it currently does. When the British created colonies in America, the colonizers were already familiar with the use of an English Workhouse as a prison like infrastructure. The workhouses required those convicted of crimes to work in them as punishment. Some of the first colonizers were criminals that had experienced the workhouse themselves. Others chose to avoid the death penalty in England by coming to America; a punishment the British viewed as worse than death. In the 17<sup>th</sup> and 18<sup>th</sup> century, prisons were used to house people only until they could be sentenced for their crimes. Individuals would face sentences such as public humiliation, fines, physical chastisement, or execution, but at this time, imprisonment wasn’t part of the sentence. Pennsylvania Quakers were the first to campaign against the death penalty, and advocated for incarceration as a more humane alternative<sup>4</sup>. Many Americans agreed with the Quaker’s belief and the Era of Enlightenment caused policy creators to speculate on how to humanely deal with offenders.

The closest penitentiary to our modern day jails was built in Pennsylvania in 1789. At this time the idea of a single person per cell was installed into the prison system. It was common to allow prisoners to eat and work together, however many jails required their offenders to be silent at all times. In spite of the progress the criminal system had made with regards to humanitarian treatment of prisoners, by 1865 American prisons had been commandeered by “overcrowding, corruption, and cruelty”<sup>6</sup>. The focus of prisons had changed from rehabilitation to how to keep costs low. This caused the condition of the prisons themselves, and the competency of the staff members to weaken. Attention was brought to the worsening conditions and it created two necessary reforms; first the creation of fixed maximum sentencing. The second was indeterminate sentencing which provided “prisoners with the opportunity to participate in reformatory activities and behaviors and later be evaluated for a sentence based on “proof of reformation”<sup>7</sup>.

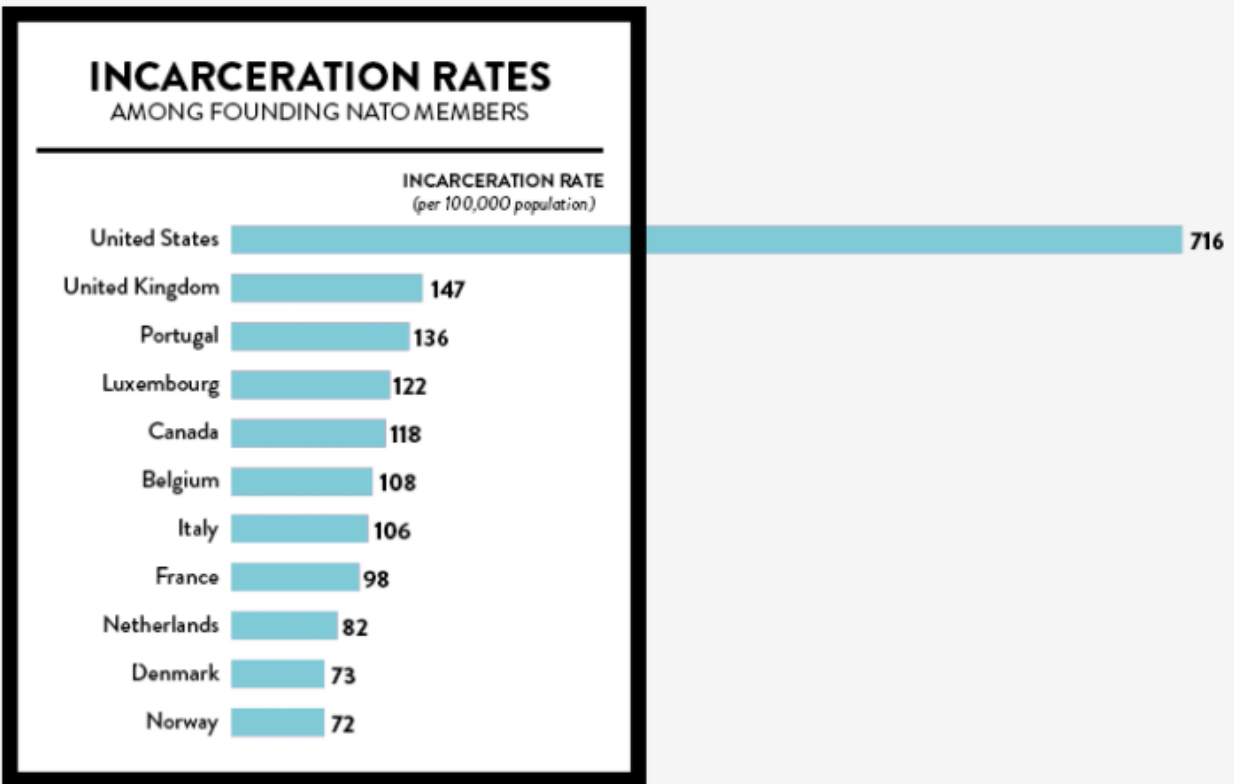
The next big change in the American criminal system came as a result of John F. Kennedy’s inauguration. His policies “inspired a civil rights movement, which decidedly influenced the history of American prisons”<sup>7</sup>. While African Americans were fighting for their civil rights, prisoners also began to demand that they had civil rights which should be recognized and supported. The writ of habeas corpus permitted that offenders could dispute their sentences that violated any constitutional right, and the 24 Civil Rights Act shielded prisoners from mistreatment and ensured that they had both constitutional rights and religious freedom even while incarcerated<sup>7</sup>.

The last big historical event that changed how American incarcerate their convicts was the election of Ronald Reagan and his “War on Crime” policy stance. Ronald Reagan purposed that Americans “utterly reject philosophies placing blame for crime on society rather than individual offenders, and he did not hesitate to act on what he saw as a mandate for harsher criminal justice policies”<sup>8</sup>. In addition, the introduction of cocaine and heroin in the 1960s and the continue drug-related stories in the media caused voters to support a war against drugs. Mandatory minimum sentencing became a focus and became a proponent in the rapid increase of incarcerations during this time. The Rockefeller Drug Law were created in New York to create a longer prison term for those convicted of four ounces of more of narcotics. The minimum sentence was 15 years, the same at the time as second degree murder. By 1983, twenty-nine states had passed similar laws<sup>8</sup>. Then, in 1986 Congress endorsed the Anti-Drug Abuse Act which increased minimum sentencing for low level drug offenses. The laws increased the number of incarcerated individuals exponentially.

American history has led to a shocking current state of American penitentiaries. The United States currently incarcerates 693 people for every 100,000 residents<sup>1</sup>. Currently, there are 2.3 million Americans imprisoned in state and federal prisons, juvenile correctional facilities, local jails, Indian Country jails, military prisons, immigration detention facilities, and civil commitment centers<sup>2</sup>. Many of these people are awaiting trial, and have yet to be convicted. Some will post bail and leave within a short period of time, while others are too poor and have to wait until trial. The over imprisonment of American citizens not only affects those incarcerated, but also their families and communities. Current inmates are unable to work and contribute to their family’s income. Incarcerations also leave children without parents. In addition to the cost of serving a prison sentence, there is a collateral cost for ex-convicts. Former inmates earn less money, work fewer hours, and struggle to climb the career ladder.

When compared with other countries, America incarcerates the highest number of citizens per 100,000 residents, as well as for much longer periods of time. In contrast to other countries that are equally as stable, secure, and industrialized the United States’ incarceration rate is more than five times higher<sup>1</sup> (see figure 1 below). Other countries with high incarceration rates have faced national turmoil such as civil wars or military coups, however the United States is relatively stable as the last civil war happened over 150 years ago. For example, China has the second highest prison population in the world equated to their total population at 118 per 100,000 people, however China also experienced a revolution in 1949 when Mao Zedong introduced the communist regime<sup>3</sup>. New Jersey and New York are aggressively trying to decrease their prison populations, however their combined prisoners per capita is comparable to Rwandas<sup>1</sup>. This is startling for two reasons; first, New York and New Jersey combine have 6 million more residents than Rwanda. Second, Rwanda experienced a mass genocide in 1994 that killed 800,000 people. Thousands of individuals are sentenced or still awaiting trial in connection with the genocide.

Figure 1: Incarceration Rates in Developed Nations <sup>1</sup>



### Mathematical Research

Measures of central tendency are one of the main topics of the statistics unit in Math 1. A measure of central tendency is a quantity that describes a set of data by identifying information about the data. The three measures of central tendency utilized in the Math 1 curriculum are mean, median, and mode. The most frequent used measure of center is the mean. The mean is the average of the data set, and can be found by adding all terms in the data set together, then dividing by the total number of terms. The mean is denoted by the equation  $\bar{x} = \sum x_i / n$  where  $\bar{x}$  is read as x bar and represents the mean,  $\sum$  is read as sigma and denotes the sum,  $x_i$  represents the data values of the set, and  $n$  is the number of terms in the data set. The mean can be calculated by hand or by using the stat programs in a graphing calculator. Students in Math 1 should learn both methods. The mean is the best measure of center to use when describing a data set if the data does not consist of an outlier. An outlier is a term that is much higher or lower than the other data values in the set, and does not fit with the general trend of the data. To find the outlier, students would need to understand measures of spread and the interquartile range (IQR). Outliers are data points that are more than 1.5 times the IQR above the upper quartile or more than 1.5 times the IQR below the lower quartile. Since measures of spread are only lightly covered in Math 1, students will learn how to find outliers mathematically and also recognize extreme outliers by sight.

The median is a measure of central tendency that is useful when analyzing data because it is the middle of the data set. It can be found by listing the data set in order from least to greatest, and crossing out one value on either end until the middle term is reached. If no true middle value exists, the median is found by taking the middle two values, adding them together, and dividing the number by 2. It can also be found using a graphing calculator. The median is best used when the data set does not contain an outlier because the outlier does not have a great effect on the median value. The last measure of center students will explore is the mode. The mode is the most common or frequent number in the data set. If there are two values that have the same frequency, then the data set is called bimodal. If the data values all have the exact same occurrence, then there is no mode. In this case, the mode would be an impractical description of the data. The mode is useful when the data items are nonnumeric or when choosing the most popular value from the data set.

In this unit, students will also represent data sets with histograms and box and whisker plots. Histograms are graphs that divide the data set into intervals and include a bar graph for each of those intervals. The height of each bar is proportional to the number of data points within the interval. They are useful for representing large numbers of data points. Histograms allow for a quick visual representation of the shape of the distribution, the amount of variation in the data, gaps in the data, outliers, and unusual points. The biggest disadvantages to a histogram is that it only shows numerical data and the intervals can be changed based on what the creator wants the readers to interrupt.

A box and whiskers plot is another type of visual representation of data using the five-number summary; the minimum, the first quartile (Q1), the median, the third quartile (Q3) and the maximum. The minimum and maximum constitute the “whiskers” while the Q1, median, and Q3 make up the box. The five-number summary can be found by hand or using a graphing calculator. To find by hand, students will identify both the smallest and largest number for the minimum and maximum. To find the median, students will identify the middle number. To find the Q1 and Q3, students will divide the data in half. The Q1 is the median or middle of the lower half of data and the Q3 is the median of the upper half of data. The biggest advantages of a box and whisker plot are that it summarizes large amounts of data, can display the range and distribution along a number line, shows skewed data, and shows outliers. Box and whisker plots also have disadvantages such as the original data is not clearly shown, but lumped together is different quartiles. Given just a box and whisker plot, the mean and mode can't be identified and only numerical data can be represented.

The last mathematical concept students will cover in the Math 1 statistics unit are scatterplots. While scatterplots can also be covered in the linear unit, I included it in the statistics unit because it allows students to look at bivariate data instead of just univariate. Scatterplots allow for a prediction of data that the other statistical concepts in this unit cannot do and therefore is a valuable addition. A scatterplot is an advantageous pictorial description of bivariate. The data is plotted before the statistician creates a line of best fit or regression model. The scatterplot lets viewers visually identify what type of function the data closely resembles. They can also be used to identify the correlation between two variables. A positive correlation would be displayed by an upward trend (positive slope). In this case, as one variable increases so does the other. A negative correlation would be demonstrated by a downward trend (negative slope). Here, as one

variable increases the other would decrease. Correlations can also be strong or weak based on how close the points are to the line of best fit. Student can visually identify this, or use regression tools in their graphing calculators to obtain the correlation coefficient. The closer the correlation coefficient is to  $|1|$ , the stronger the correlation between the two variables is. Regression is used in math 1 to identify linear, exponential, and quadratic functions, however the focus is on linear functions.

## **Instructional Implementation**

### Teaching Strategies

The two biggest strategies I will use to engage students in the Math 1 statistics unit are blended learning and PEAK strategies. Blended learning is the replacement of face-to-face learning with online instruction. My classroom is designated as blended learning, and students are expected to spend 50% of their time learning online, and 50% of their time in face to face instruction. In this unit, students will use both Edpuzzle and Nearpod to learn online. Edpuzzle is an online tool that allows teachers to create their own or utilize YouTube or other educational website videos to teach their students. The paramount characteristic of Edpuzzle is that teachers are able to collect live data by embedding check for understanding questions anywhere in a video. These questions can be free response or multiple choice. Nearpod is another online platform that allows teachers to create an engaging PowerPoint. Teachers are able to upload guided notes into nearpod through google slides or a PowerPoint presentation. They then can also include interactive slides such as a poll, quiz, collaboration board, or the draw feature. The draw feature provides an opportunity for students to show their work. Teachers can then highlight successful students by showing their work to the whole class. From previous use in my own classroom, I have found that students love to be recognized for being successful and the draw it tool allows students to be acknowledged in real time. I have incorporated screenshots of what these activities look like in the appendix , however teachers can choose to teach this lesson without the use of electronic devices.

Peak strategies will also be used to teach this unit. PEAK was developed by Spence Rogers and is a collection of essential concepts, strategies, techniques, and processes for ensuring performance excellence for all kids<sup>9</sup>. The PEAK strategies that are utilized in this unit plan are launch buttons, deflected directions, one step at a time directions, model exactly, over and over, and preview material. Launch buttons are auditory, visual, or physical cues or signals that indication to the students that it is time to start an activity or follow a direction. The purpose of this is to improve and strengthen classroom management, amplify the amount of students who follow directions correctly the first time, and save instructional time. In my class I utilize phrases such as “I need everyone’s attention in 5, 4, 3, 2, 1” and by the time I get to one students are quiet. I also use the phrase “When I say go” and then follow the phrase with the students expected movement, voice level, and purpose. This decreases the number of students asking “What are we doing...?”

Deflected directions are instructions that require students to check and make sure their peers are following directions. An example of this might be “make sure everyone around you has taken out their homework”. Deflected directions work because students are asked to perform actions by



their peers, not the teacher. This saves a lot of time when giving instructions, increases the probability all students follow directions accurately, and enables all students to get on track without being called out. When a teacher singles out a student, they don't feel safe in the learning environment. If everyone around them is having the conversation of what to do, students who weren't paying attention the first time feel that they can safely follow the directions even if it's delayed. One step at a time directions are instructions that give precise directions about what students are to do. An example of this would be "1. Log onto the computer (wait for execution) 2. Go to google classroom (wait for execution) 3. Click on the Edpuzzle for today's date and watch the Edpuzzle video". The value in this is that it saves time, reduces management issues, increases instructional time, and decreases frustration for students who have a hard time following multiple directions.

Model exactly is another peak strategy that will be used in this statistics unit. Model exactly means that when "teaching a procedure, model EXACTLY what the student will be asked to do after you model and explain – NOT a similar one, but exactly the same one or thing"<sup>9</sup>. While you do this, students are silent and not writing. This can lead into the over and over strategy that requires students to write the same problems over and over as many times as they can in a predetermined amount of time. The value of these strategies are they increase the success of students being able to do the problem, improves motivation because students know they can't fail, and increases retention. If students practice the same problem over and over and then are asked to do a similar problem, they have internalized the process and can follow the same steps on other problems. The last strategy is preview material. Preview material is when classroom content and standards are presented to students before it is scheduled to be taught according to the class pacing guide on posters around the classroom. Before this unit starts I will utilize this strategy in two ways; the first is by hanging up posters with measures of center, histograms, box and whisker plots, and scatterplots around the room two weeks prior to the unit. When we finally get to the unit, students will recognize that this content has been present for weeks. We can also refer to the posters for reminders on the concepts. Students will also see a preview of this content during the "Do Nows". Students will be given one review question and one future question during the first five minutes of class. This foreshadows what's to come, and gives students a small foundation on the unit before we cover the content.

## Teaching Implementation

The statistics unit in Math 1, as suggested by Charlotte Mecklenburg Schools, consists of representing data sets, comparing data sets, and interrupting data sets using measures of center, measures of spread, histograms, box and whisker plots, and scatterplots as topics.

### *Day One: Measures of Central Tendency*

Student's nearpod notes (see appendix 2 for screenshot of what nearpod notes should look like) will start with a collaboration activity where they will respond to the following prompt:

"When students get in trouble at school, what is the most common amount of days they are suspended? What is the average number of days?"

Allow students 2-3 minutes to respond to this question. Then, discuss their responses by reading them off the board. The teacher should specifically read student responses that show the idea that the most common amount of days and the average number of days don't have to be the same number. Students should discuss whole class what would make these numbers different. Students then complete notes on measures of central tendency. Students should focus on how to find the mean, median, and mode, as well as what each measure signifies and when it is the best measure of center to represent the data. Teacher should use the model exactly strategy the first time students find the mean, median, and mode of a set of data so that students have an opportunity to focus on the mathematics. Students should then use the over and over strategy, and find the mean median and mode of the same set of data as many times as they can within 3 minutes. During this time, teacher should monitor to make sure each student is completing every step. Teacher should also utilize the future stuff strategy by pointing out a poster on mean, median, and mode that has already been hung in the room.

After reviewing the content, include a YouTube video entitled "Mass Incarceration in the US"<sup>10</sup>. Once students watch this video, end the nearpod with another collaboration activity where students write the most shocking statistics they heard from this video. Allow 5 minutes for class discussion of trends in student responses. The goal of this video is for students to understand how differently the United States incarcerates offenders as opposed to other countries. It also allows students to preview how large the number of incarcerated individuals will be in the worksheet they will complete next.

Using the sentencing project website<sup>11</sup>, students will then pull data on the number of people incarcerated in each state per 100,000 residents. Students will then identify the measures of central tendency of the data and interpret what the data means in the context of the problem (appendix 3).

### *Day Two and Three: Histograms Vs. Box and Whisker Plots*

Students will learn about histograms and box and whisker plots through Edpuzzle notes. Students will focus on how to create, interpret, and compare histograms to other histograms, and box and whisker plots to other box and whisker plots. Students will receive guided notes with sets of data in which they can create visual representations. Students should identify how to create intervals for the histograms, and how changing the intervals will change the readers interpretation of the data.

After students complete the notes, have them reflect on yesterday's lesson. On the board write the following thinking prompts:

1. What does the mean, median, and mode from yesterday's rate of incarceration in state prisons per 100,000 residents imply about the current state of the judicial system in our country?
2. Do you think that breaking the data would look identical if we represented it by race?

Here, students should write their answers on an index card. The students will get out of their seats and walk around the room with their cards. As they pass another student, have them switch

cards. They want to do this as many times as they can within a minute. Then, have students return to their seats. Ask them to read their cards, and to raise their hands if that card has a very insightful answer on it. This activity encourages all students feel successful because if they couldn't think of something astute to write, they have now handed that card to someone else. It gives students who struggle a chance to see a correct answer and participate in the mathematical discourse.

Next, students will watch a video entitled *Mass Incarcerated, Visualized*<sup>12</sup>. This video gives an overview of the statistics of incarceration based on race. It introduces the data students are going to pull from the sentencing project website. The video will spark conversation among students because it focuses on the over imprisonment of black men specifically. The teacher should anticipate conversations students will have based on the demographic of the school, and be prepared to facilitate those conversations and respond appropriately.

Students will then use the sentencing project website<sup>11</sup> again to pull data on the number of incarcerated people per state. This time, students will work with a partner to obtain the data broken down by race per 100,000 for each state (appendix 4). Students will then create box and whisker plots, and histograms to represent this data and compare the rate at which white, black, and Hispanic individuals are incarcerated. It will take students approximately two days to obtain all of this data, as well as create all of the box and whisker plots and histograms necessary to interpret and compare the information. There should be posters on the wall of box and whisker plots and histograms that students can use as a reference in addition to their notes. The goal of this assignment is to utilize the content to compare and contrast incarceration rates in America between races. Students should acknowledge that the incarceration rate for Black Americans is much higher than other races even though White Americans account for the largest percentage of the population.

#### *Day Four: Scatterplots and Regression*

Students will focus on scatter plots, regression, and the correlation coefficient to demonstrate how accurate their data is and predict future data. Students will complete notes through nearpod. The nearpod will begin with a review of the previous two days material in the format of a quiz. This will enable teachers to gain a quick look into student understanding of previous material. The notes will focus on how to create a scatterplot in the calculator, find the linear regression equation for that scatterplot, and find the correlation coefficient to identify the relationship between bivariate data. Students should know that the closer the correlation coefficient is to  $|1|$ , the stronger the relationship between the variables is. Students will use the draw tool to create their own scatterplots on the nearpod app. The teacher can pull accurate drawings to highlight successful students. Emphasizing correct student responses can also be used as a form of deflected directions. During this activity, students who answered incorrectly can use their peers correct examples to fix their own mistakes without being isolated or embarrassed in front of their classmates.

Next, students will use the sentencing project website<sup>11</sup> one last time to collect data. Each student pair will pick a different state and pull data from 1980 to the present on the number of incarcerated individuals in that state. To do this, they will have to use the graph to highlight

points from each year. Students will create a scatterplot by hand, draw in the line of best fit, and find the linear regression equation of that data (See appendix 5). Students analyze whether the regression equation strongly fits that data as well as predict future numbers of incarcerated individuals for specific years. The purpose of this activity is to see an upward trend in the data of incarcerations over the last thirty years. Students will research what events changes led to the upward trend and calculate how this trend will continue in the future.

#### *Day Five and Six: Assessment*

In place of a traditional test or assessment, students will be given a set of data and asked to represent and analyze it in multiple ways in the form of a presentation.

Teacher should start by posing the question “How could a prison sentence affect your life once you are released?”

Then allow students turn and talk with their neighbor and come up with a list of ways it could change an individual’s future. Use a launch button to get student’s attention back as the conversation could be lengthy. Have each pair of students suggest one way that an incarceration could affect their future. Teacher should record answers on the board so that students can expand on each other’s ideas.

Next, inform students that they will be focusing on how a jail sentence affects one’s income potential. Through this activity (appendix 6), students will identify what career they plan on pursuing, as well as the education they need for that occupation. The goal is for students to identify based on their career and education, how much their yearly salary should be. Students will then be given data from the Center for Community Transition (CT). CT is a non-profit organization who helps those with a criminal background become successful members of society. They shared data of salaries from those who were released from prison and trying to reintegrate into their communities. Students will compare this data with their future plans, and analyze how an incarceration could affect their future. The final product is a presentation in a pre-approved platform where students present their analysis. The assessment should take two days to complete.

## **Appendix 1: Implementing Teaching Standards**

### ***North Carolina Standards***

NC.M1.S-ID.1 Use technology to represent data with plots on the real number line (histograms, and box plots).

Students will use graphing calculators to create histograms and box and whisker plots themselves in the calculator, as well as obtain the five- number summary.

NC.M1.S-ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. Interpret differences in shape, center, and spread in the context of the data sets.

Students will identify the best measure of center to use based on the data and the context of the problem. Students will be taught this through the guided notes as well as through the worksheet in appendix 3.

NC.M1.S-ID.3 Examine the effects of extreme data points (outliers) on shape, center, and/or spread.

Students will identify outliers while looking at the state's prison data and through the guided notes. They will also identify the effects of extreme data points on the shape, center, and spread of the data while creating histograms and box and whisker plots.

NC.M1.S-ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

- a. Fit a least squares regression line to linear data using technology. Use the fitted function to solve problems.

Students will create a scatterplot when looking at the trend of incarcerated individuals on their chosen state. They will use data points and their calculators to find the regression equation. They will also describe how the variables are related based on the correlation coefficient or "r" value as it is seen in the calculators.

## Appendix 2

Below is a screenshot of what nearpod notes could look like. It incorporates polls, videos, draw it, and a quiz to increase student engagement in the content.

Explore
Create
Up

<p>Add Slide</p>	<p>Poll</p>	<p>Mean</p>	<p>Draw It</p>
<p>1 When students get in trouble at s...</p>	<p>2</p>	<p>3</p>	<p>7</p>
12.2 - Measures of Central Tendency	12.2 - Measures of Central Tendency	12.2 - Measures of Central Tendency	12.2 - Measures of Central Tendency
<p><b>Example:</b> Ten students were polled as to the number of siblings in their individual families. The raw data is the following set: {3, 2, 2, 1, 3, 6, 3, 3, 4, 2}. Find the mean number of siblings for the ten students.</p> $\bar{x} = \frac{x_1 + x_2 + \dots + x_n}{n}$	<p style="text-align: center; color: red;"><b>Median</b></p> <p>Another measure of central tendency, is the <b>median</b>. <b>This measure divides a group of numbers into two parts, with half the numbers below the median and half above it.</b> The median is not as sensitive to extreme values as the mean.</p> <p>To find the <b>median</b> of a group of items:</p> <ol style="list-style-type: none"> <li>1. Rank the items.</li> <li>2. If the number of items is <b>odd</b>, the median is the middle item in the list.</li> <li>3. If the number of items is <b>even</b>, the median is the mean of the two middle numbers.</li> </ol>	<p style="text-align: center; color: red;"><b>Median</b></p> <p><b>Example:</b> Ten students in a math class were polled as to the number of siblings in their individual families and the results were: 3, 2, 2, 1, 1, 6, 3, 3, 4, 2. Find the median number of siblings for the ten students.</p>	<p style="text-align: center; color: red;"><b>Median</b></p> <p><b>Example:</b> Ten students in a math class were polled as to the number of siblings in their individual families and the results were: 3, 3, 3, 1, 4, 2. Draw the median number of siblings for the ten students.</p>
<p>4</p>	<p>5</p>	<p>6</p>	<p>7</p>
12.2 - Measures of Central Tendency	12.2 - Measures of Central Tendency	12.2 - Measures of Central Tendency	12.2 - Measures of Central Tendency
<p style="text-align: center; color: red;"><b>Mode</b></p> <p>The <b>mode</b> of a data set is the value that occurs the most often. If a distribution has two modes, then it is called <b>bimodal</b>. In a large distribution, this term is commonly applied even when the two modes do not have exactly the same frequency.</p> <p><b>Example:</b> Ten students in a math class were polled as to the number of siblings in their individual families and the results were: 3, 2, 2, 1, 3, 6, 3, 3, 4, 2. Find the mode for the number of siblings.</p>	<p style="text-align: center; color: red;"><b>Symmetry in Data Sets</b></p> <p>The analysis of a data set often depends on whether the distribution is <b>symmetric</b> or <b>non-symmetric</b>. <b>Symmetric distribution:</b> the pattern of frequencies from a central point is the same (or nearly so) from the left and right.</p> <div style="display: flex; justify-content: space-around;"> </div>	<p style="text-align: center; color: red;"><b>Symmetry in Data Sets</b></p> <p><b>Non-symmetric distribution:</b> the patterns from a central point from the left and right are different. <b>Skewed to the left:</b> a tail extends out to the left. <b>Skewed to the right:</b> a tail extends out to the right.</p> <div style="display: flex; justify-content: space-around;"> </div>	<p style="text-align: center; color: red;"><b>Web Content</b></p>

### Appendix 3

Name: \_\_\_\_\_

Date: \_\_\_\_\_

#### Measure of Central Tendency Worksheet

Directions: Visit the site <http://www.sentencingproject.org/the-facts/#map> and complete the table below. Then answer the questions regarding the data you have collected.

State	Rate of incarceration per 100,000 people	State	Rate of incarceration per 100,000 people
Alabama		Montana	
Alaska		Nebraska	
Arizona		Nevada	
Arkansas		New Hampshire	
California		New Jersey	
Colorado		New Mexico	
Connecticut		New York	
Delaware		North Carolina	
Florida		North Dakota	
Georgia		Ohio	
Hawaii		Oklahoma	
Idaho		Oregon	
Illinois		Pennsylvania	
Indiana		Rhode Island	
Iowa		South Carolina	
Kansas		South Dakota	
Kentucky		Tennessee	
Louisiana		Texas	
Maine		Utah	
Maryland		Vermont	
Massachusetts		Virginia	
Michigan		Washington	
Minnesota		West Virginia	
Mississippi		Wisconsin	
Missouri		Wyoming	

1. Use the data from the table to find the **mean** by adding all the rates together and dividing by 50. Then, interpret the significance of the mean in the context of the rate incarcerated individuals by state.

2. Use the data in the table to find the **median** by listing the rates in order and finding the middle number. Then, interpret the significance of the median in the context of the rate incarcerated individuals by state.
  
3. Find the **mode** of the data by finding the most common rate. Then, interpret the significance of the mode in the context of the rate incarcerated individuals by state.
  
4. What is the distribution of the data? Which measure of central tendency gives the most accurate representation based on the distribution of the data ?
  
5. Are there any outliers in this data set? If so, research why that state has a higher or lower incarceration rate than others and explain below.
  
  
  
  
  
  
  
  
  
  
6. While not a state, Puerto Rico is a U.S territory and has an incarceration rate of 313 people per 100,000 residents. How does including Puerto Rico's data change the
  - a. Mean:
  
  
  
  
  
  
  
  
  
  
  - b. Median:
  
  
  
  
  
  
  
  
  
  
  - c. Mode:
  
  
  
  
  
  
  
  
  
  
  - d. Does including Puerto Rico change the distribution of the data? If so, how?
  
  
  
  
  
  
  
  
  
  
  - e. Does including Puerto Rico's data create any outliers in the data set? If so, which states are now outliers?



## Appendix 4

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Histograms And Box and Whisker Plots

Directions: Visit the site <http://www.sentencingproject.org/the-facts/#map> and complete the table below. Then answer the questions regarding the data you have collected.

State	White imprisonment rate per 100,000 people	Black imprisonment rate per 100,000 people	Hispanic imprisonment rate per 100,000 people
Alabama			
Alaska			
Arizona			
Arkansas			
California			
Colorado			
Connecticut			
Delaware			
Florida			
Georgia			
Hawaii			
Idaho			
Illinois			
Indiana			
Iowa			
Kansas			
Kentucky			
Louisiana			
Maine			
Maryland			
Massachusetts			
Michigan			
Minnesota			
Mississippi			
Missouri			
Montana			
Nebraska			
Nevada			
New Hampshire			
New Jersey			
New Mexico			
New York			
North Carolina			
North Dakota			

Ohio			
Oklahoma			
Oregon			
Pennsylvania			
Rhode Island			
South Carolina			
South Dakota			
Tennessee			
Texas			
Utah			
Vermont			
Virginia			
Washington			
West Virginia			
Wisconsin			
Wyoming			

1. On a separate sheet of paper, create a histogram and a box and whisker plot for each race's data. Make sure each histogram has the same intervals.
2. Answer the following questions in regards to the box and whisker plots created:
  - a. What are the median rates of incarceration for each race?
  - b. What does the median illustrate about the incarceration rate for each race?
  - c. State the upper 25% rate per 100,000 individuals incarcerated for each race. What differences do you see?
  - d. Which state had the lowest rate of incarceration for African Americans? Research what that state does differently than other states in regards to incarcerations.
  - e. Which state had the highest rate of incarceration for Hispanics? Research why that is and explain below.



## Appendix 5

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Scatterplots, Linear Regression, and Correlation Coefficient

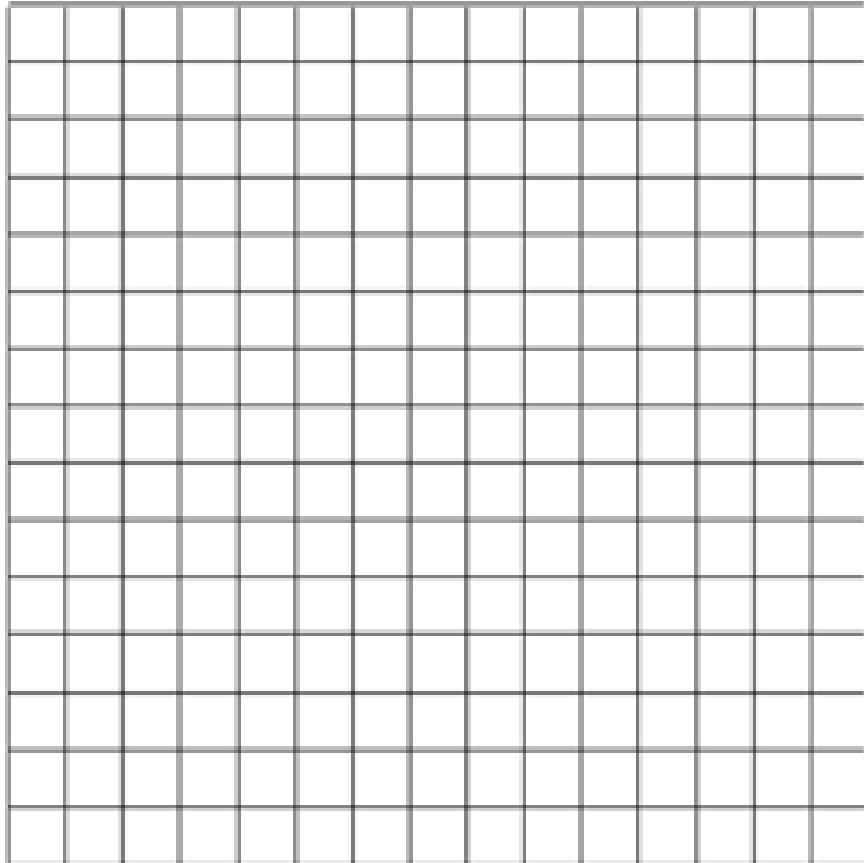
Directions: Visit the site <http://www.sentencingproject.org/the-facts/#map> and complete the table below. Then answer the questions regarding the data you have collected.

The state I am choosing is: \_\_\_\_\_

Year	Total Prison Population
1980	
1981	
1982	
1983	
1984	
1985	
1986	
1987	
1988	
1989	
1990	
1991	
1992	
1993	
1994	
1995	
1996	
1997	
1998	
1999	
2000	
2001	
2002	
2003	
2004	
2005	
2006	
2007	
2008	
2009	
2010	
2011	
2012	

2013	
2014	
2015	

1. On the grid provided, create a scatterplot of the data. Use the year as the independent variable and the number of incarcerated individuals as the dependent variable.



2. Draw a line of best through the data. As a guide, try to have as many points of data fall above the line as below the line.
3. Use linear regression in your calculator to find the equation for the data in the table. Write the equation below.



## Appendix 6

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Unit 6 Assessment

Future Career: \_\_\_\_\_

Level of Education Needed: \_\_\_\_\_

Yearly Salary: \_\_\_\_\_

Job	Salary (per hour)	Job	Salary (per hour)
Goodwill	\$7.45	Terrace Café	\$10.00
Home Depot	\$10.00	Salsarita	\$8.25
AlSCO	\$8.65	Quad Graphics	\$8.00
Randstad Staffing	\$13.00	Food Staff	\$8.75
Select Staffing	\$9.00	DSS Café	\$7.75
American Excellence	32,000	Staff Masters	\$10.00
Levy Restaurants	\$9.00	Terrace Café	\$10.00
Sonic Drive-In Dinner	\$8.00	Salsarita	\$8.25
Goodwill	\$7.45	Quad Graphics	\$8.00
Home Depot	\$10.00	Food Staff	\$8.75
AlSCO	\$8.65	Costal Hospitality	\$8.50
Randstad Staffing	\$13.00	Goodwill	\$7.45
Supportive Housing Community	\$15.00	Huntersville Family Fitness	\$17.00
KFC/ Taco Bell	\$8.25	AlSCO	\$8.65
Home Depot	\$10.00	Carrabas	\$8.00
Chartwell Staffing	\$9.00	Labor Ready	\$8.25
AlSCO	\$10.14	Randstad Staffing	\$13.00
D2 Water Proofing	\$10.00	Pactiv	\$9.00
Debbie Staffing @ Pactiv	\$9.00	LSG Sky Chef	\$7.50
Solar Phone		Costal Hospitality	\$8.50
Reserves Network @ Morris Customes	\$9.60	House Staffing/ Quad Graphics	\$8.00
McLeod	\$15.00	Church's Chicken	\$7.25
Sonic Drive-In Dinner	\$8.00	Employment Plus	\$8.50
Resource Employment Solutions	\$9.00	Select Staffing	\$9.00
Lance	\$10.00	Pactiv	\$9.00

1. Are any of the careers above similar to your plans for a future career?
2. Use either the career from question #1 or choose another career to find the early salary. You can work 40 hours per week for 50 weeks max! Compare and contrast that salary to your future career plans above.
3. Find the measures of center from the data. Interpret what they each mean in the context of the situation.

4. Which measure of center is the most accurate measure for the above data? How do you know?
5. Create a box and whisker plot, and a histogram for the above data.
6. Analyze the distribution of the data. What does the distribution say about the earning potential of convicts once released?
7. Create a presentation using a platform of your choosing (google slides, prezi, etc.) to reflect on what you have learned about the American prison system. The presentation should include the information from the entire unit. See rubric below

<b>Traits</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
Rate of Incarceration in America as a whole (day 1)	Student found measures of center and interpreted meaning in the context of incarceration rates correctly	Student found measures of center and interpreted meaning in the context of incarceration rates with only 1-2 mistakes	Student found measures of center and interpreted meaning in the context of incarceration rates correctly with only 3-4 mistakes	Student found measures of center and interpreted meaning in the context of incarceration rates with 5 or more mistakes
Rate of Incarceration based on race (days 2-3)	Student included data on incarceration rates based on race and interpreted meaning in the context of incarceration rates correctly	Student included data on incarceration rates based on race and interpreted meaning in the context of incarceration rates with only 1-2 mistakes	Student included data on incarceration rates based on race and interpreted meaning in the context of incarceration rates correctly with only 3-4 mistakes	Student included data on incarceration rates based on race and interpreted meaning in the context of incarceration rates with 5 or more mistakes
Future prediction of incarceration (day 4)	Student accurately gathered data on a specific state and presented it using an equation and a correlation coefficient. Student also analyzed the future trend of the data correctly.	Student gathered data on a specific state and presented it using an equation and a correlation coefficient. Student also analyzed the future trend of the data correctly with only 1-2 mistakes	Student gathered data on a specific state and presented it using an equation and a correlation coefficient. Student also analyzed the future trend of the data with only 3-4 mistakes.	Student gathered data on a specific state and presented it using an equation and a correlation coefficient. Student also analyzed the future trend of the data with 5 or more mistakes.
Earning potential of incarcerated individuals (day 5)	Student accurately compared their future career to one of the careers given correctly. Student also interpreted earning potential of ex-convicts in comparison to their earning potential correctly.	Student compared their future career to one of the careers given. Student also interpreted earning potential of ex-convicts in comparison to their earning potential all with 1-2 mistakes.	Student compared their future career to one of the careers given. Student also interpreted earning potential of ex-convicts in comparison to their earning potential all with 3-4 mistakes.	Student compared their future career to one of the careers given. Student also interpreted earning potential of ex-convicts in comparison to their earning potential all with more than 5 mistakes.



## Notes

1. Wagner & Walsh 2016
2. Wagner & Rabury 2017
3. Ocbazghi 2016
4. Lynch 2011
5. Colman 2016
6. Morris & Rothman 1998
7. O'conner 2014
8. Newell 2016
9. Rogers 2014
10. vlogbrothers 2014
11. State-by-State Data 2017
12. The Atlantic 2015

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2. Wagner, Peter, and Bernadette Rabury. "Mass Incarceration: The Whole Pie 2017" Prison Policy Initiative. March 14, 2017. Accessed October 15, 2017. <http://prisonpolicy.org/reports/pie2017.html>. This website gives a statistical analysis of the American incarceration rate as of 2017.
3. Ocbazghi, E. "These are the countries with the highest prison populations" Business Insider, Business Insider. December 15, 2016. Accessed October 16 2017. <http://www.businessinsider.com/highest-prison-populations-world-usa-brazil-india-china-russia-incarceration-2016-12>. This website gives statistics on the countries with the highest incarceration rates.
4. Lynch, Jack. "Cruel and Unusual: Prisons and Prison Reform." Colonial Williamsburg. Summer 2011. Accessed October 26, 2017. <http://www.history.org/foundations/journal/summer11/prison.cfm>. The website gives the history of prisons in America, and explains how punishment for different crimes has changed over time.
5. Colman, Dan. "The only thing necessary for the triumph of evil is for good men to do nothing. – Edmund Burke." Open Culture. March 13, 2016. Accessed October 26, 2017. <http://www.openculture.com/2016/03/edmund-burkeon-in-action.html>. This website gives the quote used in the research section of the curriculum unit by Edmund Burke.
6. Morris, Norval, and David J. Rothman. *The Oxford history of the prison: the practice of punishment in Western society*. New York: Oxford University Press, 1998. The article refers to how crime and punishment has changed over time in the West.
7. O'conner, Rachel. "The United States Prison System: A Comparative Analysis." *University of South Florida Scholar Commons*, May 2014. The article gives a brief history of American prison systems as well as how our approach to crime and punishment has changed over time.
8. Newell, Walker. "The Legacy of Nixon, Reagan, and Horton: How the Tough On Crime Movement Enabled a New Regime of Race-Influenced Employment Discrimination." *Berkeley Journal of African-American Law & Policy*, 2nd ser., 15, no. 1 (January 2013). Accessed October 14, 2017. doi:<http://dx.doi.org/https://doi.org/10.15779/Z38CW3X>. The article gives a concise explanation of how Nixon, Reagan, and Horton have impacted our legal and prison system in America.
9. Rogers, Spence. *Teaching for excellence: essential concepts, strategies, techniques, and processes for ensuring performance excellence for all kids*. Conifer, CO: Peak Learning

Systems, 1994. Spence Rogers gives a list of best practices that engage students, help them feel successful, and increases retention of classroom content.

10. vlogbrothers. "Mass Incarceration in the US". Filmed [April 2014]. YouTube video, 3:40. Posted [April 2014]. <https://www.youtube.com/watch?v=NaPBcUUqbew>. This YouTube video visually shows the rate of incarceration in the United States.

11. "State-by-State Data." The Sentencing Project. 2015. Accessed November 13 2017. <http://www.sentencingproject.org/the-facts/#map>. The website allows viewers to see the incarceration rate on a state by state basis. It breaks down statistically the rate by subgroups such as race and gender.

12. The Atlantic. "Mass Incarceration, Visualized". Filmed [October 2015]. YouTube video, 2:33. Posted [October 2015]. <https://www.youtube.com/> This YouTube video shows how the incarceration rate for is skewed based on race in America.