

## **Who's Being Left Behind?**

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### **Exploring the racial achievement gap on standardized tests**

**Social Justice Goals:** Students will consider commonly reported standardized test statistics and think about some of the institutional causes of these problems.

**Course level:** Recommended: Discrete Math

Portions applicable to: Algebra I, Algebra II, Advance Functions and Modeling

#### **A. Objectives:**

The learners will...

- Represent statistics on student achievement by race on a graph
- Analyze the differences between achievement scores of students from different racial subgroups
- Use TI-83 graphing calculators or Microsoft Excel to find lines of best fit for each of the racial subgroups and discuss the varying rates of change
- Use this information to make predictions about the future of racial achievement gaps in school.

#### **B. Activities:**

- Part I: Discover meaning of standardized test scores and how they are calculated
- Part II: Graph recent test scores and analyze the achievement gap between students of different races to discover how it is changing
- Part III: Analyze the impact of economic inequity on those test scores

#### **C. Assessment:**

Collect the students' completed handouts, graphs, and final writing assignment.

#### **Lesson packet includes:**

- a.) Teacher resources and answer keys
- b.) A sample normal curve
- c.) Examples of Excel Spreadsheets and graphs for part 2
- d.) Student handouts

## TEACHER RESOURCES

### **Who's Being Left Behind? Exploring the racial achievement gap on standardized tests**

#### **Social justice motivation:**

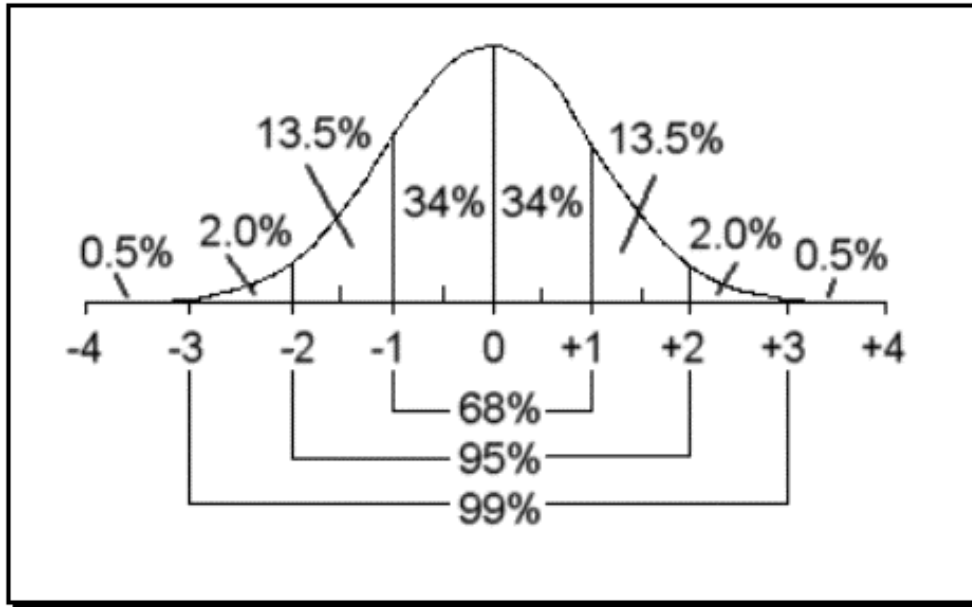
"One of the state's most prestigious high schools, East Chapel Hill High, failed federal testing standards this year. Only 20 percent of East's black students passed an end-of-course reading exam, compared with the goal of 35 percent set by the federal No Child Left Behind testing program. Likewise, 54 percent of black students passed the math exam, compared with the goal of 71 percent." "East Chapel Hill fails U.S. goals", *The News and Observer*, July 23, 2005

In the No Child Left Behind era, communities are inundated with statistics like the ones above. Without a proper understanding of standardized testing methods, statistical reports, and the social contexts that have produced these results, reports such as this one can have damaging impact on students' self concepts. These reports tend to implicitly place blame on the victims of inequitable education systems, further disassociating oppressed students from school communities. With a more complete understanding of standardized test scores, students might be empowered by these reports to advocate against the school structures that serve to reproduce current social stratifications.

**Introduction:** You may want to provide some background for the lesson by discussing two important characteristics of End of Course Tests.

- These tests are "norm referenced." You may want to explain this concept using the "normal-curve" (see below for an example). This kind of test score is problematic for two reasons: 1) With a normal curve, it is impossible for all students to pass the test. 2) In order to spread scores out across the normal curve, test-makers intentionally include questions on these exams that they think a high percentage of the students taking the test will get wrong. This means that norm-referenced tests are less likely to ask about the basic skills that students need to understand a subject, because these questions would be answered correctly by too many of the students.
- Secondly, the EOC's are "achievement tests" not "aptitude tests". They are (in theory) not meant to test "how smart" a student is, but how much she/he has learned over the course of the semester. This characteristic of the tests means that it is inappropriate to hold students solely responsible for their results on these tests because research has shown that many factors out of the students' control can affect how much they learn in a given course (i.e. quality of instructional materials, quality of instruction, length of time in the course, the structure of the course, etc.).

## Normal Curve



**Part 1:** Students discover how achievement statistics are calculated and what they mean.

- a) Student/teacher discussion on how officials calculated the scores that are reported:
  - Students' "raw scores" were determined based on how many questions the students answered correctly; school officials graphed these results and determined which raw scores were considered "passing" by comparing all the scores to one another.
  - Using this number a percentage of passing students for each ethnic group on each test is calculated.
  - Finally, the average percent passing for all the tests was determined by finding the average of from each of the 10 NC End of Course Tests for a given group.
  - This is recorded for each group, and is represented in the chart on the student handout.
- b) Students work through the questions on handouts one-to calculate the percent of students of ethnic group Z who passed the 4 EOC's-and two-looking more closely at actual achievement statistics.

**Part 2:** In this section students will present achievement data graphically, and determine lines of best fit to model the rate of change experienced by each group. Students will work through handouts 3 and 4.

Note: See answer key for an example of how the data looks graphed in Excel.

**Part 3:** In this section students will explore the context of those test scores, by looking at statistics about poverty rates in NC and student achievement by economically advantaged and disadvantaged students. Students work through handouts 5 and 6.

Additionally, teachers may want to hand out and discuss the final assignment with students.

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

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

**Which Children are Left Behind?  
Exploring the racial achievement gap on standardized tests**

**Part 1, Where did these numbers come from?**

Use the made up numbers in the chart below to determine the average percent of students from ethnic group Z who passed these four NC End of Course Tests in 1999.

Table 1. Group Z Scores

Test	US History	Algebra I	Geometry	Biology
Number of students from Ethnic group Z who took the test in 1999	2341	1050	2290	2106
Number of students from Ethnic group Z who "passed" the test in 1999	2144	1000	2095	1993

Determine the percent of students who passed each test, and write your answer (round to the nearest tenth) in the space provided.

1. US History: \_\_\_\_\_ %
2. Algebra I: \_\_\_\_\_ %
3. Geometry: \_\_\_\_\_ %
4. Biology: \_\_\_\_\_ %
5. What is the average of these percentages? \_\_\_\_\_ %

State officials used a similar process with all 10 NC End of Course tests to determine the numbers you will see in the chart on the next page.

**Part 1 (cont.)**

Table 2. Percentages of Students who passed the North Carolina End of Course Tests in the years 2001-2004, broken down by racial categorizations

<b>Year</b>	<b>White</b>	<b>African-American</b>	<b>Latino/a</b>	<b>Asian-American</b>	<b>Native American</b>
2001-2002	81 %	52 %	60 %	78 %	59 %
2002-2003	83 %	58 %	61 %	80 %	66 %
2003-2004	86 %	61 %	66 %	83 %	69 %

**Use the information from the class discussion on EOC test scores and the above chart to answer the following questions.**

6. If you randomly selected 100 Native American students from North Carolina, how many would you expect to have received a passing grade on all their End of Course Tests in the 2001-2002 school year? Explain your answer.

7. True or False: The number of Latino/a students who failed the end of course test in 2001-2002 was greater than the number of White students who failed the test that year. Explain your answer.

8. An investigative reporter learns from an anonymous government official that individual African-American students received the highest scores on 10 of the 11 End of Course tests in the 2003-2004 school year. Based on this information, she publishes a story saying the scores of students from that year must have been misreported. Is the reporter justified in forming this conclusion? Why or why not?

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

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

### Which Children are Left Behind?

#### Part 2, What do these numbers mean?:

1. Plot the data on a graph with the x-axis representing the years in which the data was collected and the y-axis representing the percentage of students who passed the test that year.

Using a Microsoft Excel or a graphing calculator determine the line of best fit (or trend line) the data points of each racial group. Write the equation of the line in standard form below (round all decimals to the nearest hundredth).

2. White: \_\_\_\_\_

3. African American: \_\_\_\_\_

4. Latino/a: \_\_\_\_\_

5. Asian-American: \_\_\_\_\_

6. Native American: \_\_\_\_\_

7. Which line has greatest **slope** largest? What does this tell you about the students in this group?

8. Which line has the largest **y-intercept** largest? What does this tell you about the students in this group?

We can use the lines whose equations you just determined to predict the percentages of students who will pass the End of Course tests in the future if these scores continue to increase in the same way. You can do this by simply looking at your graphs.

**Part 2 (cont.)**

Using the lines of best fit that you have created, predict the percentage of students in each subgroup who will pass the End of Course tests in the year 2007-2008 school year.

9. White: \_\_\_\_\_

10. African American: \_\_\_\_\_

11. Latino/a: \_\_\_\_\_

12. Asian American: \_\_\_\_\_

13. Native American: \_\_\_\_\_

14. Should we expect there to still be a gap between the percentages of African-American students and White students who pass the tests in this school year if student achievement continues as it has over the last 3 years? Explain your answer.

15. Is this gap smaller or larger than it was in the 2003-2004 school year? Explain your answer.

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

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

### Which Children are Left Behind?

#### Part 3, What else is involved?:

There are lots of other factors that seem to predict how well a student will do on the End of Course tests. One of these factors is whether or not a student is "Economically Disadvantaged." Using the information in the table below, create a new scatter plot showing the relationships between the percentages of students in different economic groups who pass the End of Course tests.

Table 3. Percentages of Students who passed the North Carolina End of Course Tests in the years 2001-2004, by students' economic status

<b>Year</b>	<b>Economically Disadvantaged</b>	<b>Not Economically Disadvantaged</b>
2001-2002	59	85
2002-2003	63	87
2003-2004	66	82

1. What advantages do students who are not economically disadvantaged have over poor students that play a role in creating this difference?

Below is a table with the percentages of the people in each racial group who are living in poverty. The “poverty line” is determined by government agencies; it is based on the amount of money people need to live in a certain area. People who are living “below the poverty line” do not have enough money to pay for all the things they need (food, shelter, electricity, health care, transportation, etc.).

Researchers determined the percentages in the chart below by executing the following steps for each group:

- They determined the number of people in the group who live in NC
- Using tax reports, they determine the number of people in the group who live below the poverty line
- They divided the second number by the first and multiplied by 100

Table 4. Percentage of the people in 5 racial subgroups who were living below the poverty line in the year 2000 in North Carolina

Racial Category	White	African-American	Latino/a	Asian-American	Native American
Percentage of population below the poverty line	8.4	22.9	25.2	10.1	21

2. Which two racial groups have the lowest percentages of people living in poverty? What can you say (in general) about the achievement on End of Course tests of students from these groups?

3. Which groups have the highest percentages of people living in poverty? What can you say (in general) about the achievement on End of Course tests of students from these groups?

4. Based on the information from the tables in part 3, does it surprise you that higher percentages of African-American, Latino/a, and Native American students fail End of Course tests in NC? Explain your answer.

## **Final assignment:**

Based on the information you have seen, graphs you have created, and questions you have answered, write a paragraph describing the following:

- a.) How students' test scores are related to their income level
- b.) How an individuals' income is related to her or his race
- c.) How a students' race is related to her or his test scores

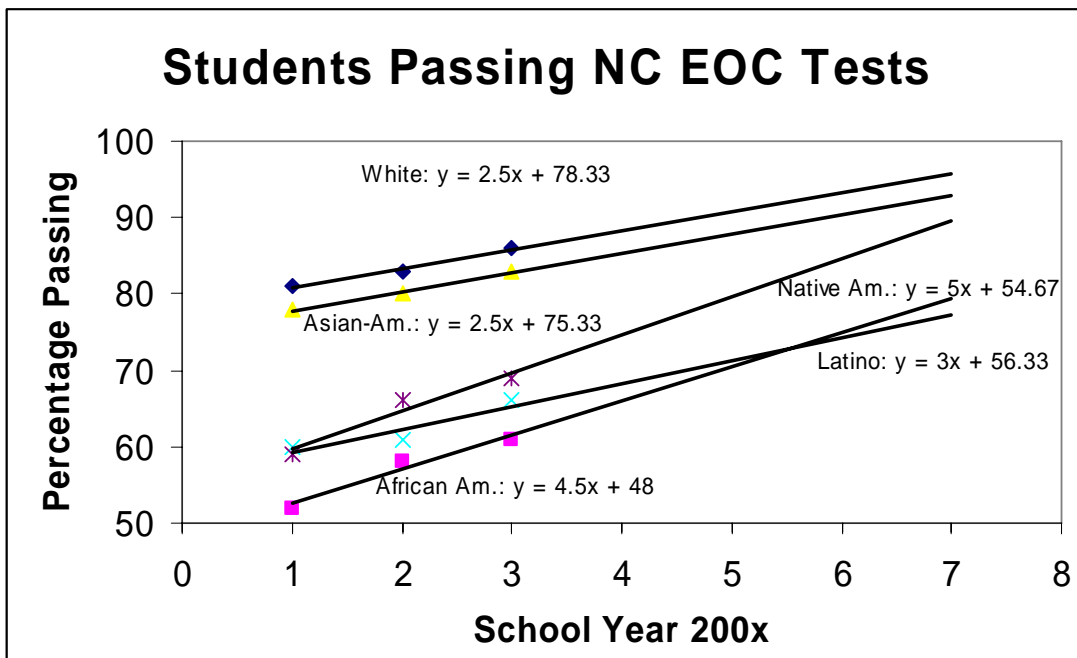
Finally, develop an educated guess about which some of the factors that might be at the root cause of differences in school achievement between students of different races.

**Answer Key. Part 1.**

1. US History: 91.6%,
2. Algebra I: 95.2%
3. Geometry: 91.5%
4. Biology: 94.6%
5. Average of these percentages? 92.9 %
6. 59 students. This is an average.
7. False. In the 2000 census, people of Latin American descent made up only about 4.7% of NC's population, by contrast Whites made up about 70.2% of the population. Even though the highest percentage of students passed the Algebra I exam the actual number of students who passed was the smallest.
8. No, the reporter would not be justified in making such a claim. First of all, students' actual scores are not factored into this statistic, since it only looks at the numbers of student who passed the test. A student who got all the responses correct would (for the purposes of this statistic) be no different than a student who barely passed the exam. Additionally (and perhaps more importantly in terms of the conversation around test scores with high school students), since so many students took the test it is a fallacy to think that you could use these tests to predict the performance of individual students. In reality, there are thousands of students in each lower achieving racial group who perform much better than White and Asian American students, additionally thousands of students in higher achieving racial groups score much worse than most African Americans, Latino/as, or Native Americans.

**Answer Key. Part 2**

1.



**Answer Key. Part 2 (cont.)**

2. White:  $y=2.50x + 78.33$
3. African American:  $y= 4.5x + 48$
4. Latino/a:  $y=3x + 56.33$
5. Asian-American:  $y= 2.5x + 75.33$
6. Native American:  $y=5x+54.67$
7. *The line for the Native Americans, this means that the percentage of students who pass the tests each year is increasing more quickly for this group than for any other.*
8. *The line for the White students, this means that the percentage of students who started out passing the tests was higher for this group than for any other.*
9. White: *approximately 95.8 percent*
10. African American: *approximately 79.5 percent*
11. Latino/a: *approximately 77.3 percent*
12. Asian American: *approximately 92.83 percent*
13. Native American: *approximately 89.7 percent*
14. *Yes, according to the lines of best fit, less than 80 percent of African-American students would be passing the test at this point as compared to close around 96 percent of Whites.*
15. *Yes, the prediction for the 2007-2008 school year is smaller than the gap from the data for the 03-04 year. Students can determine this either by looking at their graph and noticing that the White and African-American lines are getting closer together or by subtracting the African-American percentage from the White percentage in each year to see that while 25% more Whites passed the exams in 03-04 only about 16% more passed in the prediction for 07-08.*

**Answer Key. Part 3.**

1. *Here students may include any of the various advantages that students gain with money, such as ability to afford tutors, technological resources, homes that are generally conducive for studying, plenty of food, etc.*
2. *White and Asian American, students from these groups tend to pass the EOC tests more frequently than students from the other groups.*
3. *African-American, Latino/a, and Native American, these groups tend to pass the EOC tests less frequently than students from other groups.*
4. *This should not be surprising to the students. The poverty statistics suggest that a higher percentage of students in these racial groups would fall into the economically disadvantaged status. Since these students, in general, fail the exams more often, it makes sense that higher percentages of African-American, Latino/a, and Native American students fail the exams*

**Answer Key. Final assignment.**

*In their essays, students should include some version of the following sentences:*

- a.) *Students who are economically disadvantaged are more likely to fail NC EOC tests than students who are not economically disadvantaged.*
- b.) *African-American, Latino/a, and Native American individuals are more likely to live below the poverty line.*
- c.) *African-American, Latino/a, and Native American individuals are more likely to fail the NC EOC tests than their White or Asian-American counterparts.*