EOCEP Algebra 1
Data Review Report: Spring 2018

In October 2018 the South Carolina Department of Education convened a panel of experts to review item data on the End-of-Course Examination Program Algebra 1 test. The panel looked at items with a high percentage of students answering correctly and items with a low percentage of students answering correctly. The discussions of that panel yielded the recommendations that follow. Teachers on this year's panel felt that last year's suggestions were still extremely relevant and that teachers should be reminded to look at last year's Data Review Report (2017). The panel recognizes the hard work of SC educators and offers these suggestions as an addendum to those from last year.

Algebra 1 General Suggestions:

- The panel encourages teachers to look at the 2018 Sample Release Items located on the SCDE webpage: https://ed.sc.gov/tests/assessment-information/quick-links-for-teachers/2018-sample-release-items-for-scpass-sc-ready-and-eocep/
- Instruction should stress the use of correct mathematical vocabulary. Mathematics is a language. Correct use of mathematical vocabulary provides content consistency across grades. Compel students to use proper mathematical vocabulary when explaining and justifying their work. Insist on proper mathematical vocabulary during mathematical discussions.
- Mathematical discussions are a great tool to use with your students. This year's panel encourages teachers to use mathematical discussions to introduce error analysis and to critique other students' work. When critiquing work, the work does not need to be authentic. Use mathematical discussions as a way to explore the Mathematical Process Standards with your students.
- Students should be familiar with the testing environment and have established test day routines. These routines could include using graph paper as scratch paper and showing work for all items. The panel suggests making a matrix on scratch paper with a box for each item's work. During classroom testing require that students show work in the boxes. Teachers and students should then use these same routines for the EOCEP Algebra 1 test.
- Practice story items and multi-step story items. Give students tools and techniques for dealing with story items. Have students write out what is given and what they are finding. Have students draw a picture or recreate the picture if it is given. Be careful bolding and underlining too many words on your assessments.
- Practice the Online Tools Training (OTT). The OTT is there to minimize test day stress. The OTT familiarizes students with the mechanics of the test and the tools that are there to help them.
- Teachers should favor conceptual understanding over strictly teaching procedures. The panel recognizes the importance of procedural fluency. However, again this year it is clear that students are fluent in certain procedures, but do not understand the basic underlying principle. The panel wants to emphasize teaching concepts, understanding, and drawing connections between seemingly disparate units.
- The real-world does not always occur in sets of numbers with easy arithmetic. It is critical that teachers include real-world items with numbers other than whole numbers. Be sure to

include decimals, fractions, and number combinations that will force most students to exert some arithmetic effort.

Standard Specific Suggestions:

Creating Equations (ACE)

- The panel wants to remind teachers that exponential equations are included in both A1.ACE.1 and A1.ACE.2.

Reasoning with Equations and Inequalities (AREI)

- A1.AREI.3 – The panel wants to remind teachers to review area and perimeter of common shapes when setting up and solving equations.
- A1.AREI.4 – Students should be able to solve quadratics in the abstract. Teachers should allow students to interpret solutions when the solutions are abstract. Encourage mathematical discussions to explore abstract solutions.
- A1.AREI.4b – While the committee recognizes that there are subtle differences between the terms, students should understand that zeros, roots, and x-intercepts are essentially the same. Those words should be used interchangeably and invoke the same conceptual recognition. Further, the committee suggested that students need to see the same quadratic solved for zeros in multiple ways. Let students pick the way that they feel solves the quadratic most efficiently. Require students to check their work. The panel was insistent that teachers draw connections between quadratics in different forms. Please do not let textbooks or other curriculum compartmentalize solving techniques, forms, or graphs for quadratics. Teachers must practice translating from verbal to analytic forms, graphing, and tables throughout the year. Ask students what a solution looks like graphically? As a table? In words?
- A1.AREI.6 – Students are doing well finding solutions of systems graphically. Continue to draw a distinction between this standard and A1.AREI.11.
- A1.AREI.12 – When graphing linear inequalities the panel recommend picking points on the y-axis above and below the y-intercept to determine where to shade. They recommend this method over only using the origin. The feeling was this gives the students a point that will yield a true statement and one that will yield a false statement. Additionally, the little arithmetic involved discourages having students attempt to make the decision in their heads too soon. Allow the students to make broader connections.

Structure and Expressions (ASE)

- A1.ASE.1, A1.ASE.2, A1.ASE.3 – When analyzing the structure teachers must connect ideas across equation forms. Teacher should ask routine questions from non-routine equation forms. For instance, ask for the axis of symmetry from standard form. Graph from a form other than slope-intercept form. Practice graphing from point-slope form. Challenge students to see the connections between various equation forms.
- A1.ASE.3 – Students must be competent when talking about math in the abstract. When planning mathematical discussions have students discuss named functions in terms of their names, f(x), g(x), etc. Items may include a variable where students would normally see a constant. Then students may be asked what would happen for various values for that variable. Some items are in a context, but still ask a question in the abstract. The panel wanted to stresses that conceptual knowledge is tested.

Interpreting Functions (FIF)

- A1.FIF.1 – The panel wants to remind teachers to be careful restating or wrongly generalizing definitions of mathematical terms. Be particularly careful when stating the definition of a function. The definition of a function does not say that "x-values cannot repeat." What it implies if that an x-value repeats, it must be associated with the same y-value.
- A1.FIF.1 – In Algebra 1 teachers must define range two different ways. Students need to know range as in the image of a function and range as in the difference between the largest and smallest values in a data set. The panel suggests this is an issue best addressed directly with students.
- A1.FIF.2 – Teachers need to spend ample time practicing function notation. Students are having trouble finding f(a), where 'a' is an integer, when given f(x).
- A1.FIF.7 – Regularly give linear equations in forms other than $y = mx + b$. Challenge students with $f(x) = b + mx$ or other non-traditional forms. Remind students to pay attention to signs in equations. For example, $f(x) = k – j(x)$, where 'k' and 'j' are positive real numbers.
- A1.FIF.8 – Students need practice exhibiting and interpreting equations that are meant to highlight aspects of the graph. Stimulate a mathematical discussion by asking, "What is the purpose of the different forms we are studying?" Continue by asking students why they may translate between forms. What properties are revealed and how can one understand them better in a particular form? For instance, one translates to slope-intercept form in order to plainly reveal the slope and intercept of a linear equation.

Linear, Quadratic, and Exponential (FLQE)

- A1.FLQE.2 – Include practice items where students are given a table and then asked to create the symbolic representation. The panel recommends giving these items as both free response and multiple choice items.

Quantities (NQ)

- A1.NQ.2 – Include formulas and examples from science in this standard. The panel recommends combining this standard with A1.ACE.4 and asking, "What units would the answer have?"
- A1.NQ.3 – Ask students for reasonable answers before jumping into working a story item. Encourage students to fully read an item before starting to work. Give students some prompts for a mathematical discussion that include some good and bad examples of rounding and otherwise working with measurements. Ask them if multiplying or dividing a measurement can make the measurement more precise.

Real Number System (NRNS)

- A1.NRNS.1 – Up to now students have only had to work with integer bases. Watch for students mixing up power rules and product rules. Students are not sure when to multiply and when to add exponents. Reiterate that exponents are shorthand for repeated multiplication.

Interpreting Data (SPID)

- The panel wanted to emphasize that teachers should be teaching the full depth of these standards. These standards are unchanged from the standards in Probability and Statistics.
- A1.SPID.6 – Given information in a context students need to interpret scatter plots using the information and the scatterplot. Students are asked to select the most reasonable scatterplot to a context rather than an equation. Students need the skills to interpret both the context and model in this case.
- A1.SPID.8 – The panel recognized that teachers need to add some categories to the interpretation of the correlation coefficient. Students should know conventionally agreed upon ranges for weak, moderate, and strong correlation. Given a scatterplot, a context, and sometimes a correlation coefficient students need practice generalizing positive/negative and weak/moderate/strong correlation. For instance, $r = 0.9$ (with a scatterplot that indicated a linear model was appropriate) should be categorized as "strong positive correlation."