In October 2018 the South Carolina Department of Education convened a panel of experts to review item data on the SC READY grades 6 – 8 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.

**General Suggestions:**
The following are general suggestions that arose for multiple items.

- 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 the panel is encouraging 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 suggested 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 SC READY.
- 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.
- 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 on both calculator and non-calculator items.
- 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 wanted to emphasize teaching concepts, understanding, and drawing connections between seemingly disparate units.
• Offer practice answering multi-select items. The panel wanted to remind both teachers and students that multi-select items will have more than one correct answer and fewer than all correct answers.

• Continue practicing graphs and data displayed in tables. Students should be prepared to interpret data displays.

• When planning both instruction and review the panel had two suggestions. First, the panel wanted to remind teachers to consider the test blueprint available on the SCDE website. Secondly, the panel wanted to encourage teachers to spiral instruction and review of previous concepts all year long to prepare for SC READY.

• The panel thought that students may need more exposure to the following structure of an item. Some items are formatted so there is a block of important text, then a large graph/table/equation followed by another block of important text to include the question. The panel felt that students are likely skipping some or all of the text above and below the image.
**Grade 6 Suggestions:**
The following suggestions are specific to grade 6 items. They are organized by key concept.

**General:**
- The panel wanted to make sure that teachers are spending enough time on statistics.
- The panel wanted to encourage teachers to include instruction on geometry and statistics throughout the year.
- The panel suggested collaborating early in the year with science and social studies teachers to get interdisciplinary graphs and tables to study. Be sure to expose students to multiple types of data displays including circle graphs.
- The panel suggested that when studying percents be aware of overusing sports items. Be mindful of choosing different topics for balance, e.g. test scores, number of questions correct, discount or sale price, online shopping spree, cheerleading, or top five percent.

**Number System (NS):**
- 6.NS.1 – The panel felt that students needed to deepen their conceptual understanding of fractions. The panel thought that a hands-on activity here would help. For instance, asking the question how many 1/3 scoops of rice can fit into a two cup bowl? Then having students actually perform the experiment to see that the quotient is not just the smallest answer choice. When dividing mixed numbers and proper fractions students are handling the mixed numbers by “flipping” the fraction part of a mixed number only and ignoring the whole number. Be sure to emphasize making a mixed number into a fraction first. Further, the panel recommended spiraling this concept through geometry and statistics to reinforce these ideas later in the year. Alternatively, drawing geometry and statistics earlier in the year and again using them for review of this skill.
- 6.NS.9 – Students should be careful not to convert \( \frac{4}{5} \) as 45% or 4.5. Remind students that fractions are division items and use them as a way to keep practicing long division skills. The panel also recommended practicing fact fluency to help with number sense. The panel stressed that teachers should balance calculator and non-calculator skills during instruction and assessment. Teachers should either mirror having tests with both calculator and non-calculator sections or give the students the test and then allow them to go back when finished to check their work with a calculator.

**Ratios and Proportional Relationships (RP):**
- 6.RP.2c – Students should practice items with multiple representations of the same rate or finding matching rates. Expose students to items where they are given a rate and then they find a real-world situation to match that rate.
Expressions, Equations, and Inequalities (EEI)

- 6.EEI.4 – Students should be exposed to the various symbols we use to indicate multiplication in mathematics. Be sure that students understand that multiplication is just repeated addition. Further, explain to them that this is similar to the way that exponents are just shorthand for repeated multiplication. Contrast $3m = m + m + m$ with $m^3 = m \cdot m \cdot m$.
- 6.EEI.5 – When practicing items in this standard it is not enough to end up with a single inequality for an answer. Students should understand that the inequality represents a solution set with many discrete answers. Practice giving students an inequality and a list of possible solutions. Then ask students which numbers from the list make the inequality true. Emphasize that these are just some of the solutions in the solution set.

Geometry and Measurement (GM):

- 6.GM.2 – Teachers should be sure to provide adequate practice items with fractions as edge lengths. In addition, show students that cubes need not be unit cubes. Cubes can have fractional edge lengths and the resulting stacking can also have a fractional edge length. For instance, a cube could have $\frac{1}{6}$ unit edges. If two are stacked then the length and width of the stack are still $\frac{1}{6}$ unit, but the height is now $\frac{1}{3}$ unit. The panel noted that this is also a good place to connect GM standards back to rational numbers and practice both calculator and non-calculator skills.

Data Analysis and Statistics (DS):

- 6.DS.2 – Here in particular the panel wanted to stress the use of correct mathematical vocabulary. For instance, stressing the difference between a symmetrical distribution and a skewed distribution. The panel wanted to stress that when describing a distribution students should include the shape, center, spread, and any unusual characteristics. Have students describe the data to each other in mathematical discussions.
- 6.DS.5 – The panel wanted to make sure that teachers spend ample time on measures of center and spread. The panel encouraged having mathematical discussions with students concerning what those measures say about the data.
Grade 7 Suggestions:
The following suggestions are specific to grade 7 items. They are organized by key concept.

Number System (NS):

- 7.NS.1d – Students had difficulty finding the distance between rational numbers. In particular, the students had difficulty when the rational numbers had opposite signs. The panel suggested having students draw a number line. Then treat the item by starting with the negative rational number and asking “how far is it to zero?” Then ask, “how far is it from zero to the second number?” Then add the two distances. Further, teachers need to stress that distance is never negative. The panel also suggested phrasing the question without the word “distance.”
- 7.NS.2 – The panel suggested that a good way to practice these standards is with an activity. Each student could get a piece of paper with a different number. The teacher then posts more expressions than there are students. Students find the expression(s) that have the value on their paper. Students then stand next to an expression that yields their answer.
- 7.NS.3 – Students must be able to work with fractions and decimals in the same item. Students must be able to execute this standard with and without a calculator. The panel reiterated here that students need a familiar problem solving strategy they can use on most items.

Ratios and Proportional Relationships (RP):

- 7.RP.3 – The panel suggested that teachers give some variety in these items. For instance, give students a rate and have them find the real-world situation or another rate with which it pairs. The panel wanted to remind teachers that these items may be multi-step items. Students often find a result that is a stepping stone to the answer, see that in the answer choices, and pick that choice without stopping to consider if they answered the actual question. Give students an organizational routine for real-world story items. Have them rewrite or highlight the question or list given information and what is asked. The panel again suggested providing a visual model for percent increase and decrease. Finally, the panel recommended working with benchmark percents such as 1%, 5%, and 10% and building the decrease or increase from those.

Expressions, Equations, and Inequalities (EEI):

- 7.EEI.3 – The panel encourages teachers to practice working with percent increase/decrease by adding or subtracting the percents before working with the values in the item. Again the panel recommended providing students with visuals. Here the panel recommended using concrete objects such as blocks of dough to examine the relationship between percent increase and decrease. The panel felt students need fluency moving between percents and decimal equivalents in order to complete items. Lastly, students must read items and consider the situation described in the item. If an item concerns three people and each spends $5 then students need to understand the total spent is $15. It is not enough to pull numbers from an item and perform an operation.

Geometry and Measurement (GM):
• 7.GM.1 – In addition to entry level items that ask only one conversion students need to practice items where they must perform more than one re-expression based on a scale and then occasionally perform an operation with the new numbers. The panel suggested using this standard as reinforcement of the RP standards. They further suggested students practice setting up and solving items with fractional lengths both with and without a calculator. The panel recognized this as just one use of the theme of proportional reasoning in 7th grade.

• 7.GM.4b – Here again the panel pointed out that this is an application of the RP standards. Students are having trouble with their understanding of the circumference formula and the role of pi in that formula. The panel suggested allowing students to explore some of the relationships in 7.GM.4 in an activity.

Data Analysis, Statistics, and Probability (DSP):

• 7.DSP.4 – Students had difficulty solving items in this standard when the data included fractions or decimals. Definitely include items with more fractions and decimals on both calculator and non-calculator items.

• 7.DSP.5 – Students missed an item that assessed the basic vocabulary in this standard. The panel wanted to make sure that teachers give probability enough time in class. The panel suggested that the DSP standards in this grade would make for a great series of “Friday” lessons or lessons for after a test. These standards lend themselves to activities and discovery. Consider a “probability carnival” as a culminating activity where students design and play their own games.

• 7.DSP.5c – The panel again encourages students to pay attention to the task the item is asking them to perform. Pay attention to least to greatest vs greatest to least. When working probability items reducing does not always make sense in particular when ordering probabilities. Give students a few events from the same sample space. Then have students order the events based on their probabilities.

• 7.DSP.7a – The panel felt that students think that if they have equal numbers of objects then the experiment is uniform by definition. However, consider an experiment where a bag is filled with equal numbers of unequal sized objects. Depending on the experiment this could result in a non-uniform probability model. Students need more work with this standard.
Grade 8 Suggestions:
The following suggestions are specific to grade 8 items. They are organized by key concept.

Number System (NS):
- 8.NS.1 – The panel suggested that when asking which numbers are rational and irrational put them in a context. The panel recommended giving more than just one or two numbers in isolation. Include repeating decimals in some comparisons.

Functions (F):
- 8.F.3 – When working with the definition of linear equations include tables, graphs, and equations. Inverse functions are just one counter-example to linear functions. Include examples of non-linear functions in equation form in addition to graphs. This is a good place for a mathematical discussion. Have students justify and explain their reasoning.

Expressions, Equations, and Inequalities (EEI)
- 8.EEI.1 – Even though this standard is limited to numerical expressions students need to practice more than one rule per item when simplifying expressions.
- 8.EEI.4 – Students need more exposure to dividing in scientific notation. The panel suggested using error analysis and mathematical discussions to examine all of the common errors. One such common error is given \( \frac{a \times 10^b}{c \times 10^d} \) students subtract all around and get \( (a - c) \times 10^{b-d} \). Dividing all around is another common error. Provide practice with this skill both with and without a calculator. Additionally, have students work items for this standard in a context where they have to determine the correct operations.
- 8.EEI.5c – Again students must take the time to read items. Some students encountered a graph and found the unit rate from a graph. The item asked a comparison question about another unit rate given in the text and some students missed that part.

Geometry and Measurement (GM):
- 8.GM.6 – Expose students to the area model for Pythagorean theorem as well as other common models for the Pythagorean theorem.
- 8.GM.7 – Some students are adding side lengths without squaring them. The panel wanted to encourage teachers to teach with visuals to aide students with this standard.

Data Analysis, Statistics, and Probability (DSP):
- Students largely did well in this category. The panel wanted to reassure teachers that teaching the bivariate data standards (8.GM.1-4) set the stage for some important conceptual understanding in Algebra 1. The panel also wanted to confirm that 8.DSP.5 is a standard where students are doing well. The panel asked that teachers keep up the good work.