SC READY Data Review Report: Spring 2017
Grade 6

In November 2017 the South Carolina Department of Education convened panels of experts to review item data on SC READY. The panels 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. The panel recognizes the hard work of SC educators and offers the following as suggestions for ways to improve student success on SC READY.

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

- Use proper academic vocabulary. Use the word ‘denominator’ and other grade level appropriate academic vocabulary. Saying “the number on the bottom” is ok for scaffolding, but must be phased out quickly. Mathematics is a language. The committee suggested using the Frayer model for teaching new mathematical vocabulary. Another suggestion was to use anchor charts as a review of vocabulary and to leave them posted for reference in subsequent units. One teacher noted, “I speak mathematically to my students, and I expect the same in return.”

- Have mathematical discussions with your students. This is an opportunity to hear how your students are experiencing the math. Have students explain their reasoning and provide thoughtful responses to the reasoning of others.

- Students should know they must read and answer the question being asked. During a mathematical discussion give students a story item without the question. Then ask students to provide questions to complete the item. This allows student to see a traditional item with multiple questions. The hope is when the students get to the test they will not see a traditional item and think they automatically know the question.

- Use graph paper as scratch paper. This is useful for some students to keep numbers lined up when performing operations. Others may find it useful in recreating diagrams, tables, or number lines on the test.

- Practice multi-step items. Many students are stopping after one step of a multi-step item. This is particularly apparent when items are from the geometry and measurement or data analysis and statistics key concepts.

- Students need to be exposed to multi-select items. Students should be instructed to treat each answer choice as a true/false question. The only guarantee on a particular item is that there will be more than one correct answer choice and they will not all be correct.

- Give some tests on a computer or have students practice not writing on a paper test. This will prepare them for not being able to write on a computer screen.

- 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.

- Teaching procedures or shortcuts and not conceptual understanding will hurt students eventually. It is clear that students are fluent in certain procedures, but do not understand the basic underlying principle. For instance, a conceptual understanding of perimeter involves knowing that it is the distance around an object. Some procedures for finding
perimeter are $2L + 2W$ or $L + L + W + W$. However, those are ways of finding perimeter, not the definition.

- Being efficient includes taking the time to first choose an appropriate or best strategy. Efficiency is not blindly doing the same procedure really fast. For instance, using cross products is not the most efficient way to compare $\frac{5}{3}$ and $\frac{5}{8}$.
- Items on SC READY are not grouped by key concept or standard. In fact, we tend to not group items from the same/similar standards together. Students should practice a test that is likewise ungrouped before SC READY.
- Students should be encouraged to fully read story items before putting pencil to paper. Students may need a strategy for organizing the information they read and should always note what the item is asking them to find.

**Grade 6 Suggestions:**
The following suggestions are specific to grade 6 items. They are organized by key concept.

**Number System (NS):**
- The committee did not identify any items in NS as having low or concerning statistics. Keep up the good work on this key concept.

**Ratios and Proportional Relationships (RP):**
- 6.RP.3d – When finding a unit rate, it may be best to find the rate with respect to the next larger unit. For example if a person takes 4 sips of water per half mile and the item is asking how many sips does the person take in 5 miles, then the best unit rate is 8 sips per mile. Students could calculate that every 1/8 of a mile was 1 sip and then work from there. While correct, this is more difficult. Again, students need conceptual understanding rather than procedural skills. Refer to the bullet above about being efficient. Continue to model items to help students build conceptual understanding. Ask the question, what is the most reasonable scale unit?
- 6.RP.3d – RP items involve much more than cross multiplying and dividing. Students need an understanding of ratios, unit rates, and proportions. Students should also pay close attention to the question. Have students practice items with tables displaying key information for the item, for instance a chart about the costs of different quantities of apples at different stores and asking which is the cheapest or most expensive. In addition, practice finding equivalencies using ratio tables and models without an algorithm or trick.

**Expressions, Equations, and Inequalities (EEI)**
- 6.EEI.2b – Be sure students master the academic vocabulary in this standard. The vocabulary in this standard is going to serve students well into high school. One suggestion was to use anchor charts.
- 6.EEI.2c – Some items on the no-calculator section may have challenging arithmetic. Estimation is one technique to help find reasonable answers.
Geometry and Measurement (GM):

- **6.GM.1** – Students should be exposed to more than just irregular shapes and especially more than a block E. Be sure to include standard shapes such as trapezoids, pentagons, hexagons, etc. and have students decompose regular shapes as well. Many students are just picking the two largest numbers and multiplying.

- **6.GM.1** – Many students took a typical shape such as a block T and decomposed it into two rectangles that overlapped in a square at the top of the T. Thus, they double counted the square area where the horizontal and vertical rectangles overlap. Encourage students to draw the picture especially when presented on a computer screen. Have students shade and label the areas they are figuring with the area value for that region. Teachers may consider moving Geometry earlier in the curriculum or spiraling throughout.

- **6.GM.2** – In Geometry items be sure students are minding their arithmetic. Some students multiplied a mixed number times a whole number by only multiplying the integer parts.

- **6.GM.3a** – Require students to draw figures that are described verbally. Students will be given a series of ordered pairs that form a geometric figure. Students should have practice with figures that lie in all four quadrants or some subset of the four quadrants. The data indicated some students likely attempted to answer the question without drawing the figure.

- **6.GM.3b** – Some students disregarded the negatives when finding the distance between pairs of points in the coordinate plane. Remind students to pay attention to the signs of numbers when finding distances in the coordinate plane. Encourage students to plot the points on a graph and then ask themselves if their answer is reasonable.

Data Analysis and Statistics (DS):

- **6.DS.2** – Students need more practice with statistical vocabulary. For instance, a graph skews in the direction of the tail. Include pictures with the definitions to help students visualize this concept.

- **6.DS.4** – Students need more practice creating and understanding displays of numerical data. It would be helpful to have students describe their displays using the vocabulary for shape, center, and spread from 6.DS.2.

- **6.DS.5f** – Students need practice with statistical vocabulary. Students need help understanding symmetrical and non-symmetrical distributions, and within each the relationship between mean, median, and mode. More generally, students need help understanding the interplay of all statistical terms.
Grade 7 Suggestions:
The following suggestions are specific to grade 7 items. They are organized by key concept.

**General:**

- Items that are testing conceptual knowledge sometimes only ask for the initial setup, the correct way to solve an item, a technique for finding the solution, or justification of a step. To be successful students should be able to show their work on paper and explain their method of solution to a peer.
- Students would benefit from slowing down instead of jumping to procedural skills. Some items may be solved simply by investigation or reasoning about the relative values in the item. For instance, a student with a solid conceptual understanding of an average would not pick 7 as the average of 1, 2, 3, 4, 5.
- Overall the no-calculator section was weak in 7th grade. Students should not be relying on the calculator too much in this grade.

**Number System (NS):**

- 7.NS.1d – Students should practice using number lines, and creating number lines for fractions that are more than just $\frac{1}{4}, \frac{1}{8}$ etc. Students should be exposed to this concept using more varied denominators such as $\frac{1}{9}, \frac{1}{13}$ etc.
- 7.NS.3 – Students need practice working with rational numbers. Students should be able to perform operations on rational numbers without a calculator. In addition, students should be prepared for multi-step story items.
- 7.NS.5 – Students should be prepared to compare ratios, proportions, and percents all in the same item. Students tend to think that any number written as a percent is greater than any decimal. For instance, a student may think 17% is greater than 0.75.

**Ratios and Proportional Relationships (RP):**

- #7.RP.2c – The committee noted a few times that the language of standard is the language used in the item. An item may ask students to identify both the constant of proportionality and the unit rate for a particular situation.
- 7.RP.2d – When using equations to model proportional relationships students should understand what each part of the equation expresses. Story items for this standard may ask for the equation. Students should ask themselves what is the correct rate for this equation? Teachers should give items that have students calculate the rate as part of the item. In addition, remind students that rates may be proper or improper fractions and that the numerator of the rate depends on the context of the item. Many students mistakenly select the first number as the numerator and the second as the denominator regardless of context. Help students develop meaning from what the item is saying by giving students a way to organize information from story items.
• 7.RP.3 – With regard to discount items, the committee asked if using the complement is still taught. For instance, a 30% discount is the same as paying 70%. This can take a multi-step item and make one of the steps much easier. Encourage perseverance; make sure that students have actually answered the item. Many students selected the discount as the final price.

**Expressions, Equations, and Inequalities (EEI)**

• The committee did not identify any items in EEI as having low or concerning statistics. Keep up the good work on this key concept.

**Geometry and Measurement (GM):**

• GM as a category was low overall. Thus, there were some comments specifically for GM, that are not tied directly to a standard:
  ▪ Teachers may try spiraling geometry standards. For instance, teach transformational geometry at the beginning of this grade. Then use it as a review of other concepts, such as adding and subtracting, solving one step equations, etc.
  ▪ Students must know the formulas from grade seven and below. There is no formula sheet.
  ▪ Help students to know basic formulas, and then see more complicated formulas as combination of easier ones. For instance, surface area and volume are just combinations or extensions of easier formulas.
  ▪ Students should have practice with one shape embedded in another. For instance, put a circle in a square, circle in a circle, etc. Then ask about areas or perimeters.
• 7.GM.1 – Remember to give items in context. Items typically do not give one side and a scale factor in isolation. Be sure to include items that give real-world objects and then ask for scale factors or have student use a scale factor in class.
• 7.GM.2b – Students should know how to use the triangle inequality to check that given side lengths form an actual triangle.
• 7.GM.4d – Remind students to pay attention to the vocabulary. Students tend to have issues when they are given the diameter of a circle and asked to find the area or circumference.
• 7.GM.4d – Students should understand that a rotation of a wheel describes the circumference. Items may test circumference without explicitly asking for the circumference. This is where conceptual knowledge and deep understanding are needed to solve an item.
• 7.GM.6d – Students will be asked to find surface area of an object. Many students miss a face when given a 3D object. The committee suggested that students write down the number of faces an object has, draw the net of the 3D object, and/or label each face with its area.

**Data Analysis, Statistics, and Probability (DSP):**

• The committee did not identify any items in DSP as having low or concerning statistics. Keep up the good work on this key concept.
Grade 8 Suggestions:
The following suggestions are specific to grade 8 items. They are organized by key concept.

Number System (NS):

- 8.NS.2 – Students should be able to approximate two different square roots that are not perfect squares. Students need to be able to reason about the approximate values of non-perfect square roots without a calculator.

Functions (F):

- The following are some more general suggestions to help the overall performance in the Functions key concept.
  - Students need to be able to graph lines.
  - Most linear equations items have a context.
  - Students need to be familiar with multiple forms of linear equations and be able to manipulate those forms.
  - Students must know what each part of a linear equation means.
  - Students should see the connections between all four representations of a function, specifically tables, graphs, symbolic expressions, and verbal descriptions.
  - Practice multiple forms or representations of a line, in context and make connections between them.
- 8.F.2 – Students need a clear understanding that when two linear equations have the same rate that means they have the same slope. Students need to know which part of a linear equation represents the rate in any form.

Expressions, Equations, and Inequalities (EEI)

- 8.EEI.1 – Students need to practice equivalent forms of integers with exponents. This would be good place for a mathematical discussion. Do not have students just find a single answer. Rather, ask them to create equivalent forms or select equivalent forms from a list. Students should be practicing this manipulation without a calculator.
- 8.EEI.4 – Students need to practice multiplying and dividing numbers in scientific notation without a calculator.
- 8.EEI.8d – Students need more practice solving systems of linear equations and interpreting how many solutions a system may have.

Geometry and Measurement (GM):

- 8.GM.2d – Be sure that students understand the definition of congruence and how it relates to similarity.
- 8.GM.3a – Students should be using graph paper. Students should practice drawing two-dimensional figures on graph paper from a computer screen or verbal description. Then have students solve the item.
- 8.GM.5 – Students need to recognize supplementary pairs of angles when two parallel lines are cut by a transversal. Students need more exposure than a single straight angle cut by a line to form a supplementary pair.
• 8.GM.9 – Students will not always be asked to find the volume of an object. They may be asked to find a single measure given the volume and some other information. Students should understand volume conceptually including seeing volume as base area multiplied by the height. In addition, items may also include the four operations and be multi-step.

Data Analysis, Statistics, and Probability (DSP):

• 8.DSP.5b – Students need to know matrices, matrix vocabulary, and matrix operations.