

SC READY Data Review Report: Spring 2017 Grade 3-5

In November 2017 the South Carolina Department of Education convened a panel of experts to review item data on SC READY grades 3-5. 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. 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 or measurement and data analysis key concepts.
- 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 3 Suggestions:

The following suggestions are specific to grade 3 items. They are organized by key concept.

Number Sense and Base Ten (NSBT):

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

Number Sense – Fractions (NSF):

- 3.NSF.2c – Be sure to include context when teaching the standard. The context may only consist of a few sentences. Beware of students misunderstanding that a fraction is always equivalent to a whole number. Practice writing a whole number as a fraction. In addition, recall that equals signs do not imply a direction. Teacher should teach that $\frac{4}{1} = 4$ and $4 = \frac{4}{1}$. Help students work with whole number and unit fractions. Compare and contrast the two during a mathematical discussion.

Algebraic Thinking and Operations (ATO):

- 3.ATO.4 – Items do not always specify the operation by name, especially when there is a story item. For example, students should know sorting is dividing.
- 3.ATO.5 – While student need to identify the properties by name, they also need to apply the properties. An item may not signal that the student is using a property of equality to rewrite an expression. The item may just ask for an equivalent expression or which expressions are the same. This is another opportunity for mathematical discussions.
- 3.ATO.8 – Students had trouble with multi-step story items. Students are only completing the first step and finding that answer. These items were about 5 short sentences in length. Caution students to solve items fully and then look for their answer choice. Some students may need a strategy for story items such as drawing a picture or table.

Geometry (G):

- 3.G.1 – Students may be asked to identify the attributes of a shape. They may also have items that give them a list of attributes of a figure and then ask which attribute does **not** describe the figure. Expose students to multiple representations of the same shape. For instance show a rhombus as a square and not always as a diamond. Convince students that the attributes do not change based on the orientation.

Measurement and Data Analysis (MDA):

- 3.MDA.1 – Students should practice elapsed time using a number line. Give students a number line filled in and ask them time questions before having students create their own number lines. This is a good time to remind students that number lines may start at numbers other than zero. Students need knowledge of and practice with elapsed time. An item may have two processes in a time period and ask how much time the first process took. These may be multi-step items and students need a good grasp of algebraic thinking. Students should be familiar with real life examples of elapsed time. This can begin before teaching time. Ask students how long until recess or when will we be back from the library?
- 3.MDA.4 – This standard has two distinct parts that may be tested separate or together. Student must practice measuring by $\frac{1}{4}$ inch. Students must also be able to complete a line plot that has been started or create and complete one themselves. Help students by giving them half of the data plotted and then have them add data to the partially completed line plot. Be sure to teach the measuring and plotting together.
- 3.MDA.5c – Items may not always explicitly ask for area. Items may ask how much or many of something is needed to cover a surface. Some items may never use the word area, but rather rely on a student's conceptual understanding of area. Students should work items in context. Expose students to concrete models for area, then focus on the vocabulary, and finally work on real-world items.
- 3.MDA.6 – Students need more practice working with perimeter. They need to find a missing side using a given perimeter and another side. This needs to be practiced with a variety of grade level appropriate shapes. Students need to practice multi-step items in geometry. Students should take into account all the sides of a shape.

Grade 4 Suggestions:

The following suggestions are specific to grade 4 items. They are organized by key concept.

Number Sense and Base Ten (NSBT):

- 4.NSBT.5 – Strategies listed in the standard will be tested. Specific to this standard, items may have students work with arrays, area models, or equations without having the students evaluate the multiplication.
- 4.NSBT.6 – Students would be well served to use divisibility rules as a strategy for division.

Number Sense – Fractions (NSF):

- 4.NSF.2 – Students should have a good understanding of unit fractions and benchmark fractions.
- 4.NSF.3a – Students should have some practice decomposing mixed numbers as well as proper fractions. This is a good place for a mathematical discussion comparing and contrasting different approaches.
- 4.NSF.4c – Students need to be able to multiply a whole number by a fraction without a visual model provided. In addition, at this grade level, answers may not be simplified.
- 4.NSF.6 – Students may still use visual models. Students should understand that 0.7 is 7 out of ten. Teachers should have students read 0.7 as “seven tenths” to help with re-expressing. In addition, teachers should have students read “two and six tenths,” not “two point six.”
- 4.NSF.7 – Remind students the number of digits after decimal is not meaningful when comparing numbers. Reinforce place value with students. One strategy is to have students add the unnecessary zeros to make the numbers the same number of digits.
- 4.NSF.7 – Students should understand that larger numbers are not always better. In particular, have students race, record their times, and use their actual times to practice ordering decimals. Use real-life examples other than money such as reaction time, race time, closest distance to a target (darts or bocce ball).

Algebraic Thinking and Operations (ATO):

- 4.ATO.1 – Students should practice reading equations and multiplicative comparisons. Students should understand multiplicative comparison is a verbal equal sign, especially without “equals” or “is” in the item. Use other phrases such as “as many as”. Students should understand what an equals sign actually is, in particular that it does not mean “find an answer.”
- 4.ATO.2 – When teaching multiplicative comparison use bar or tape diagrams to build imagery for students.
- 4.ATO.3 – There were multiple items across standards where each person does the same task, receives the same number of an object, etc. Students should pay attention to the word “each.”

- 4.ATO.3 – A perimeter item may be more than a straightforward item where students are given the sides and asked to find the perimeter. An item may give students the perimeter and one side while asking for one of the missing side lengths. Items may or may not include a picture. Have students practice making a picture themselves. As a teacher model that one starts by drawing a picture. Students tend to just add/subtract the numbers in the item.
- 4.ATO.3 – Students tend to make a 2-step item into a 1-step item. An item may have a person buy a number of objects at the same price and have money left over. The question then could ask about the original price of each object. SC READY items do not typically have extra information. Be careful of overemphasizing items with extra information. Instead emphasize organizing relevant information when practicing multi-step items.

Geometry (G):

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

Measurement and Data Analysis (MDA):

- 4.MDA.1 – Students should practice measurement throughout the year. In addition, this standard deals only with conversions from larger units to smaller units within a single system.
- 4.MDA.2 –The committee suggested using containers and pouring liquid in class as one way to build the conceptual understanding of volume for students. Students benefit from practicing real-world items with concrete context.
- 4.MDA.2 – Items for this standard may be multi-step items. Show students how to draw pictures even on items that are not testing geometry. Student should practice items where the numbers are not in the order that they are going to use them.
- 4.MDA.7 – Items may ask for intermediate steps and not just computing from the stem and finding the answer. Students should be able to solve and express answers in different ways. Teacher may practice this by giving the class a picture then asking the students to write as many equations as they can to solve the item. Teacher may ask the student to “find three ways....”

Grade 5 Suggestions:

The following suggestions are specific to grade 5 items. They are organized by key concept.

General:

- 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.

Number Sense and Base Ten (NSBT):

- 5.NSBT.4 – Teachers should practice giving a number already rounded, and then asking “what numbers round to the given number?” Have students list a reasonable number of answers and then have a mathematical discussion. In addition, teachers may connect back to 5.NSBT.3 by having students order their suggestions from least to greatest. Finally, continue to teach rounding using a number line.

Number Sense – Fractions (NSF):

- 5.NSF.1 – Students may be asked to subtract two mixed numbers. When faced with an item such as $5\frac{1}{6} - 2\frac{7}{12}$ students tend to make the common mistake of subtracting $5 - 2$ and $\frac{7}{12} - \frac{1}{6}$. Generally, students are struggling with regrouping when adding/subtracting mixed numbers. Have students use linear models or number lines especially when regrouping fractions.
- 5.NSF.1 – Area and perimeter can also use fractions and decimals as edge lengths. Teachers should spiral concepts to include more than just whole numbers on edges.

Algebraic Thinking and Operations (ATO):

- 5.ATO.2 – Students had trouble translating expressions. Require students to use good math vocabulary.
- 5.ATO.2 – Embed the use of grouping symbols in short story items and have students write the resulting expression.

Geometry (G):

- 5.G.1c – Students are mixing up the x- and y- axis. They are starting on the y-axis. Students must understand that the x-coordinate is the first number in an ordered pair. Students should also have a conceptual understanding of the origin and be able to graph and interpret point on the axes.
- 5.G.2 – Some items for this standard will not have a plane given. Students should draw a Cartesian plane for themselves. Students need a solid conceptual understanding of the origin. Items assess more than just finding a point on a plane. Students need to practice comparing the relative position of two points on a Cartesian plane.

- 5.G.2 – Items may also have students analyze points on a plane in a context. Here the axes may be labeled as more than just the x- and y-axis. For instance, an item may have the axes labeled “Dogs Owned” and “Cats Owned.” In such an item, a single point would represent animal ownership for one person. Students may be asked to read, plot, or interpret points in a context.
- 5.G.4 – Students should see shapes turned differently. For instance, show a rhombus as a square. Students should know that a polygon can be classified in different ways. Teachers should deliberately use more than just the common shapes and orient the common shapes in an uncommon way.

Measurement and Data Analysis (MDA):

- 5.MDA.1 – Unit conversion items may be multi-step. For instance, students may be asked to add some measurements given in one unit and then asked for the answer in a different unit. Students tend to only do the first step. Teachers should continue to teach skills for solving story items within this standard. Students may need to draw a picture. Avoid teaching a procedure. Sometimes it is easiest to convert all of the measurements and then perform the arithmetic while other times the best strategy is to perform the arithmetic and then convert to the units asked for. Students should always be careful that all the data is in the same units when performing operations.
- 5.MDA.4 – Students need more than a situation, such as putting up fence, and a question about what measure is appropriate. Students should know how to find the perimeter of the bottom of box even when given all three dimensions. Ask students which numbers they would use to find the perimeter.