Cracking the Code (Mathematics) – What Does It Mean for Me?

Grades 6 – 8

Prompts and Suggested Responses

Now that you have viewed the Cracking the Code Power Point, you will revisit some of the essential points of the presentation in order to expand your learning and create a common vocabulary. To do this, you will engage in an exercise that enables you to interact with the Common Core State Standards (CCSS) for your particular grade level/ span (K-5, 6-8, high school).

With your grade level/span colleagues you will complete and discuss a collection of tasks aimed at contextualizing the information from Cracking the Code. Following this exercise, you will be asked to reflect on your experience and consider actions that you will be able to take as a result of your new learning.

1. The Power Point states that there are three major components to the CCSS for Mathematics: Standards for Mathematical Practice, Standards for Mathematical Content, and a Glossary. The Standards for Mathematical Practice are described on pages 6-8 of the document. They trace their lineage to “processes and proficiencies” from two well regarded sources. **Name these two sources and discuss the “processes and proficiencies” as they currently apply to your practice.**

   **Suggested Response:**
   - NCTM process standards: problem solving, reasoning and proof, communication, representation, and connections
   - Strands of mathematical proficiency specified in the National Research Council’s report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy).

2. The eight Standards for Mathematical Practice appear repeatedly throughout the document, but are only described on pages 6-8. These descriptions relate “how” mathematically proficient students engage in the study of mathematics. **Skim through the descriptions of these two practices: “Model with mathematics” and “Look for and express regularity in repeated reasoning.” Cite examples of how the practices may be displayed by a middle school student.**

   **Suggested Response:**
   - **Model with mathematics**: In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community.
   - **Look for and express regularity in repeated reasoning**: By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation \((y – 2)/(x – 1) = 3\).
3. As visually depicted in the Venn diagram in “Cracking the Code”, the Standards for Mathematical Practice and the Standards for Mathematical Content should be intertwined during instruction. The concluding paragraphs of the Standards for Mathematical Practice offer guidance as to when the content standards lend themselves to integration with the practices. **What word in the content expectations signal a prime opportunity to link these two sets of standards? Why do you think this is the case?**

Suggested Response:
- **Understand.** The Mathematical Practices are behaviors that students should increasingly engage in as they become more mature practitioners of mathematics. They assist in deepening a student’s understanding of content and their ability to apply their knowledge in new, non-routine, and practical situations. The CCSS for Mathematics call for a “balanced combination of procedure and understanding”. If a student lacks a deep understanding of content they may be inclined to rely too heavily on procedural knowledge thus hindering their ability to truly use mathematics. Often the content standards that include the word “understand” are those that are foundational to the discipline of mathematics and “merit” focused attention.

4. Standards for each grade level (K-8) begin with an introductory page. These pages cite several critical areas of instruction for the grade level. **Locate the introduction page for grade 7 and list the four critical areas of instruction.**

Suggested Response:
- In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

5. **Domains** are large groups of related standards. One domain ranges across grades K-8 (Geometry), while other domains span only grades within the 6-8 continuums (The Number System). In the 6-8 sequence, there is one domain that is isolated to a particular grade level. **What is that domain and in what grade level does it appear? Why do you feel this domain may be isolated to this grade? What implications does this suggest to you with reference to instruction?**

Suggested Response:
- Functions in grade 8
- The CCSS Mathematics strives to establish strong foundational knowledge prior to advancing to more complex concepts. Content in grade 8 seems to simultaneously wrap up K-7 content while paving the way for the rigors of high school mathematics. The work with linear equations that begins in middle school serves as a natural segue to the concept of function. Additionally, the use of functions to model relationships sets the stage for the profound role of modeling in high school mathematics. Function work in eighth grade is pivotal. High school content builds on the premise that students understand the basics of functional relationships. It thus seems appropriate that eighth grade instruction focuses on this content to lend a sense of coherence and progression to high school mathematics.
6. Cluster Headings are bolded within the CCSS document. They describe smaller groups of related standards, clusters, within a domain. **List the three cluster headings in the domain of Expressions and Equations for grade 6.**

**Suggested Response:**
- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

7. The standards describe what students should know and be able to do. In order to facilitate communication around the standards, a code has been developed. **What can you say about the standard that is coded as 8.G.3?**

**Suggested Response:**
- It appears in the eighth grade under the domain of “Geometry”.
- It belongs to the cluster “Understand and apply the Pythagorean Theorem”.
- It is standard number three and reads, “Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.”

8. On page 43 of the Common Core State Standards, locate the standard typed below. **How would you code this standard?**

7. Understand ordering and absolute value of rational numbers.
   a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.*

**Suggested Response:** 6.NS.7a

9. Locate the standard 8.F.1. **Discuss the instructional significance of the footnote.**

**Sample Response:**
- Perhaps function notation is not required in this grade so as to emphasize the conceptual understanding of function. Once a solid foundation has been laid, the nuances of notation can be addressed in Algebra I.