

EQuIP Review Feedback



Lesson/Unit Name: Unit 4 - Functions

Content Area: Mathematics

Grade Level: 8

Overall Rating:

E

Exemplar

Dimension I – Alignment to the Depth of the CCSS

The lesson/unit aligns with the letter and spirit of the CCSS:

- ✓ Targets a set of grade-level CCSS mathematics standard(s) to the full depth of the standards for teaching and learning.
- ✓ Standards for Mathematical Practice that are central to the lesson are identified, handled in a grade-appropriate way, and well connected to the content being addressed.
- ✓ Presents a balance of mathematical procedures and deeper conceptual understanding inherent in the CCSS.

This is a unit designed for grade 8 to introduce functions across 8 weeks. The unit states that the focus is on content standards 8.EE.5 and 8.EE.6 under "Understand the connections between proportional relationships, lines, and linear equations" and 8.F.1, 8.F.2, 8.F.3, 8.F.4, and 8.F.5 under "Define, evaluate, and compare functions". However, the lesson submitted for review address 8.F.2 through 8.F.4 most closely. The in-depth strategies and scaffolding for the lessons are designed to ensure student understanding of the content. If all lessons are allowed to develop completely, then the essence of the identified standards will be met.

The unit incorporates all eight of the Standards for Mathematical Practice with emphasis concentrated on SMP #2 - "Reason abstractly and quantitatively.", SMP #4 - "Model with mathematics.", SMP #5 - "Use appropriate tools strategically.", SMP #6 - "Attend to precision.", and SMP #8 - "Look for and express regularity in repeated reasoning." In the actual lessons, for example on page 1 of Lesson 2, there is a section where these same practices are checked next to the practice name. However, on page 2 of Lesson 2, only SMP 2 and SMP 4 are described in terms of the actual lesson content in the Practice Look For(s) section. Lesson 3 SMPs match on pages 1 and 2, but like Lesson 2, the Lesson 4 SMPs listed on page 1 do not match those in the Look For(s) section on page 2. It is a suggestion that the practices checked on the first page of the lesson match those that are described in terms of the actual lesson content in the subsequent Math Practice Look For(s) section. In addition, the Math Practices Look For(s) section is much more valuable to teachers because it describes the practices in terms of the lesson content. Consideration might be given to eliminating the checklist section and focusing on the Look For(s) section.

This unit provides a balance of deeper conceptual understanding with mathematical procedures. Lessons begin with mathematical ideas for which students should be familiar, such as input/output tables and graphing coordinates on a coordinate grid. The lesson then expands these ideas to develop the definition of a function and ways in which functions can be represented. Lesson 2 primarily builds conceptual understanding leading to the use of procedures. Lessons 3 and 4 are geared towards procedures and application. There is also a clear expectation that students be able to explain functions versus non-functions and to discern between the concept of a function and a linear function.

Rating: 3 – Meets most to all of the criteria in the dimension

Dimension II – Key Shifts the CCSS

The lesson/unit reflects evidence of key shifts that are reflected in the CCSS:

Some assumptions are being made about lesson 1 and lesson 5 which were not provided for this review. The comments pertain only to the lessons included for the review. The lessons provided for review provide in-depth

<p>✓ Focus: Lessons and units targeting the major work of the grade provide an especially in-depth treatment, with especially high expectations. Lessons and units targeting supporting work of the grade have visible connection to the major work of the grade and are sufficiently brief. Lessons and units do not hold students responsible for material from later grades.</p> <p>☐ Coherence: The content develops through reasoning about the new concepts on the basis of previous understandings. Where appropriate, provides opportunities for students to connect knowledge and skills within or across clusters, domains and learning progressions.</p> <p>✓ Rigor: Requires students to engage with and demonstrate challenging mathematics with appropriate balance among the following:</p> <ul style="list-style-type: none"> - Application: Provides opportunities for students to independently apply mathematical concepts in real-world situations and solve challenging problems with persistence, choosing and applying an appropriate model or strategy to new situations. - Conceptual Understanding: Develops students' conceptual understanding through tasks, brief problems, questions, multiple representations and opportunities for students to write and speak about their understanding. - Procedural Skill and Fluency: Expects, supports and provides guidelines for procedural skill and fluency with core calculations and mathematical procedures (when called for in the standards for the grade) to be performed quickly and accurately. 	<p>treatment of the targeted standards of 8.F.1-4. The content and activities of the lessons hold students to high expectations with regards to the understanding of functions. The author provided insight to the assessments for 8.F.5, even though those lessons were not included. One important suggestion is to closely review the alignment of the some of the expectations for the non-linear functions with regards to identifying the minimum and maximum local or absolute values such as #5 and #6 on the Pre-Test for 8.F.5. It is fine to have these on the test for extra credit, but all students should not be responsible for these expectations.</p> <p>In the lesson overview, the connections to previous learning and subsequent learning are clearly identified and addressed within the unit. The overview identifies the prerequisite skills and concepts that students should already be able to do, as well as, advanced skills and concepts that students may be ready to do. The pre- and post assessments are beneficial tools to help determine where the students are in this regard so that the adjustments can be made. The inclusion of the progressions from the Progressions Document is extremely beneficial to educators who are using the lesson to understand the sequence of learning that helps students learn the desired content. The descriptions and examples at the educator's fingertips is an asset. Those progressions are also evident as the unit unfolds. Each step throughout the unit builds upon previous understandings. Students begin with defining functions (linear and non-linear), next they construct linear functions, and finally they compare functions with multiple representations.</p> <p>All three components of rigor are evident in the reviewed lessons. Students develop conceptual understanding of functions in the provided instructional activities, such as card sorts of functions that contain multiple representations. They apply their understanding of functions in real-world contexts and move to the level of procedural skill where they are expected to write a linear function given a verbal description, problem context, graph, or table of inputs and outputs. It is admirable that there is actually a section for Rigor provided on the Lesson Plan Template that enables an author to directly note the aspects of conceptual understanding, application, and procedural skill included in the lesson. Those sections that were completed were accurate and directly related to the content of the lessons.</p> <p>Without review of Lesson 1, it was difficult to determine if some of the expectations for students were appropriate, such as the expectation on page 3 of Lesson 3 that students quickly identify $y = mx + b$ as the form for a linear equation and also to identify "m" as the slope and "b" as the y-intercept.</p>
<p>Rating: 3 – Meets most to all of the criteria in the dimension</p>	

Dimension III – Instructional Supports

<p><i>The lesson/unit is responsive to varied student learning needs:</i></p> <p>✓ Includes clear and sufficient guidance to support teaching and learning of the targeted standards, including, when appropriate, the use of technology and media.</p> <p>☐ Uses and encourages precise and accurate mathematics, academic language, terminology and concrete or abstract representations (e.g., pictures, symbols, expressions, equations, graphics, models) in the discipline.</p>	<p>The overview section identifies Connections to Previous Learning, Focus for the Unit, Connections to Subsequent Learning, Reference to the Progressions documents, Identifies the Content Standards, the Understandings, Essential Questions, the targeted Mathematical Practices, the prerequisite and extension skills, the knowledge targets, skills targets, terms, and assessments related to the unit.</p> <p>The lesson plan template is extremely comprehensive with each lesson identifying the specific Essential Questions for the lesson, the targeted content and practices standards, the student-friendly learning targets, and supporting content standards, the purpose of the lesson, and explanation of the rigor (conceptual, procedural, application), vocabulary and the evidence</p>
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<ul style="list-style-type: none"> ✓ Engages students in productive struggle through relevant, thought-provoking questions, problems and tasks that stimulate interest and elicit mathematical thinking. ✓ Addresses instructional expectations and is easy to understand and use. ☐ Provides appropriate level and type of scaffolding, differentiation, intervention and support for a broad range of learners. <ul style="list-style-type: none"> – Supports diverse cultural and linguistic backgrounds, interests and styles. – Provides extra supports for students working below grade level. – Provides extensions for students with high interest or working above grade level. <p><u>A unit or longer lesson should:</u></p> <ul style="list-style-type: none"> ✓ Recommend and facilitate a mix of instructional approaches for a variety of learners such as using multiple representations (e.g., including models, using a range of questions, checking for understanding, flexible grouping, pair-share). ✓ Gradually remove supports, requiring students to demonstrate their mathematical understanding independently. ☐ Demonstrate an effective sequence and a progression of learning where the concepts or skills advance and deepen over time. ✓ Expect, support and provide guidelines for procedural skill and fluency with core calculations and mathematical procedures (when called for in the standards for the grade) to be performed quickly and accurately. 	<p>of learning which includes pre-assessments, formative assessments, and summative assessments. This is vital information for the users of the lesson plan so that they and the students can have a clear understanding of where the lesson is going, the expectations and determination if the appropriate learning has been met.</p> <p>The Lesson Procedures clearly identify the specific segment, the approximate time frame, lesson format and resources needed. Another helpful segment is the Math Practice Look For(s). This section identifies more specifically how the students will apply the practices within that segment. Another beneficial section identifies the Potential Pitfalls. Especially for novice teachers or teachers new to the content, this is good information to know up-front to help avoid them from happening. The Independent Practice/Homework section is another useful feature. The step-by-step directions and explanations with live links to any technology connections make these lesson segments easy to follow. The Teacher Notes/Reflections section is valuable information for educator preparation as well as additional instructional ideas to make the process flow more smoothly. Within the directions there are connections to various resources or assessments that will be utilized in the lesson segment. This format makes the unit and lessons contained within user-friendly for any educator to implement.</p> <p>Throughout the unit the use of precise and accurate mathematics, academic language, terminology and concrete or abstract representations is encouraged. The vocabulary and terms for each segment are clearly identified and carried throughout the unit in the graphics, equations, models, and activities. There are multiple opportunities for students to engage in productive struggle as they work to make sense of the rate of change and the initial value in the context of situations. They must reason abstractly and quantitatively as they model situations with linear functions and they use repeated reasoning to determine the rate of change. As the unit progresses there is a gradual release of supports pushing for independent student work, as well as, within each segment of each lesson. There is a direct progression of student understanding, procedures and application. However, the lesson would benefit from additional scaffolding and supports for students.</p> <p>There are a few minor errors on answer keys. For example, in "Graphing a Function Machine", #4 and #10 have incorrect answers on the answer key. It is recommended that answer keys be reviewed for accuracy.</p> <p>There is some evidence for providing differentiation and support for a broad range of learners. For example, there is a note in Lesson 3 that the teacher could use the class discussion in step 3 as an opportunity for enrichment. In addition to providing suggestions for enrichment, this unit could be strengthened by providing suggestions for differentiation for English Language Learners and ways to support students struggling with the content.</p>
<p>Rating: 2 – Meets many of the criteria in the dimension</p>	

Dimension IV – Assessment

<p><i>The lesson/unit regularly assesses whether students are mastering standards-based content and skills:</i></p> <ul style="list-style-type: none"> ✓ Is designed to elicit direct, observable evidence of the degree to which a student can 	<p>The assessment plan for this unit provides a comprehensive set of quality formative and summative assessments aligned to standards and designated as testing "conceptual understanding", "procedural skill and fluency", or "application". Answer keys are provided which will be helpful for teachers. This unit is built around the use of multiple assessment measures to</p>
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<p>independently demonstrate the targeted CCSS.</p> <ul style="list-style-type: none"> ✓ Assesses student proficiency using methods that are accessible and unbiased, including the use of grade-level language in student prompts. ✓ Includes aligned rubrics, answer keys and scoring guidelines that provide sufficient guidance for interpreting student performance. <p><u>A unit or longer lesson should:</u></p> <ul style="list-style-type: none"> ✓ Use varied modes of curriculum-embedded assessments that may include pre-, formative, summative and self-assessment measures. 	<p>determine students' readiness, progress towards, and achievement of the identified content and practices standards.</p> <p>A few minor suggestions include:</p> <ul style="list-style-type: none"> - In the preview of the assessments for Lesson 1, there are not questions that align to 8.EE.6. This standard definitely expects that students use the proportional relationships between similar triangles whose hypotenuses lie on the same linear graph to understand slope. - It can be a challenge to produce accurate reproductions of graphs. For example in #3 on the Proportional Relationships and Slope Pre-Test, it does not appear that the line passes through (1, -1) and therefore is hard to see that the slope is -1/1. You may want to try decreasing the range or changing the scale so that the line more accurately passes through (1, -1). If the lines are hand-drawn just adjust the unit rate point or other points of clear intersection so that students can easily use them to determine the slope. It is suggested that all handouts for students are checked for this level of precision.
<p>Rating: 3 – Meets most to all of the criteria in the dimension</p>	

Summary Comments

Based on the lessons from this unit that were submitted for review, this is an excellent beginning to a high-quality unit meeting the depth of expectations for 8.F.A.1-3, and 8.F.B.4. The author is to be commended for a thorough unit overview/map that contains essential elements for teachers to understand and teach the content. Likewise the Lesson Template is very well designed and contains the sections that will enable teachers to be successful with instruction once they are completed. A strength of the unit is the comprehensively embedded use of assessment to implement formative instructional practices and the annotated directions. The use of LiveBinders to store the content for teachers is excellent. The binder organization was easy to navigate and very comprehensive. This system of documentation allows for easy communication of revisions to all teachers. You may want to consider providing Word documents in case teachers want to copy and paste into their own school/district lesson template.

The only strong suggestions are to include more instructional strategies for a broad range of cultural and learning differences, ensure that all students are not held to above-grade level expectations for 8.F.5, and to check the precision of the graphs for the interpretation of slope questions.

All in all, this set of lessons meets most of the criteria for the dimensions for an Exemplar rating.

Rating Scales

Rating Scale for Dimensions I, II, III, IV:

3: Meets most to all of the criteria in the dimension

2: Meets many of the criteria in the dimension

1: Meets some of the criteria in the dimension

0: Does not meet the criteria in the dimension

Overall Rating for the Lesson/Unit:

E: Exemplar – Aligned and meets most to all of the criteria in dimensions II, III, IV (**total 11 – 12**)

E/I: Exemplar *if* Improved – Aligned and needs some improvement in one or more dimensions (**total 8 – 10**)

R: Revision Needed – Aligned partially and needs significant revision in one or more dimensions (**total 3 – 7**)

N: Not Ready to Review – Not aligned and does not meet criteria (**total 0 – 2**)

Rating Descriptors

Descriptors for Dimensions I, II, III, IV:

3: Exemplifies CCSS Quality - meets the standard described by criteria in the dimension, as explained in criterion-based observations.

2: Approaching CCSS Quality - meets many criteria but will benefit from revision in others, as suggested in criterion-based observations.

1: Developing toward CCSS Quality - needs significant revision, as suggested in criterion-based observations.

0: Not representing CCSS Quality - does not address the criteria in the dimension.

Descriptor for Overall Ratings:

E: Exemplifies CCSS Quality – Aligned and exemplifies the quality standard and exemplifies most of the criteria across Dimensions II, III, IV of the rubric.

E/I: Approaching CCSS Quality – Aligned and exemplifies the quality standard in some dimensions but will benefit from some revision in others.

R: Developing toward CCSS Quality – Aligned partially and approaches the quality standard in some dimensions and needs significant revision in others.

N: Not representing CCSS Quality – Not aligned and does not address criteria.