

EQuIP Review Feedback



Lesson/Unit Name: Seeing Sums

Content Area: Mathematics

Grade Level: 7

Overall Rating:

E/I

Exemplar if Improved

Dimension I – Alignment to the Depth of the CCSS

<p><i>The lesson/unit aligns with the letter and spirit of the CCSS:</i></p> <ul style="list-style-type: none"> ✓ 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. 	<p>This cluster of standards is meant to apply and extend previous understandings of operations of addition and subtraction to add and subtract rational numbers. The identified standards focus on the mastery of the number line model for sums of rational numbers. Being a lesson (and not a unit) there are parts of these standards that are not fully developed. For example; 7.NS.A.1c (the lesson does not require students to show that the distance between two rational numbers on the number line is the absolute value of their difference $abs(a-b) = abs(b-a)$ or $a-b = -(b-a)$, nor is there any application to real-world contexts); 7.NS.A.1b (students are not required to Interpret sums of rational numbers by describing real-world contexts.); and 7.NS.1d: the lesson includes some mention of additive inverses and additive identities but does not include other properties of operations such as the commutative and associative properties which also could be done easily with the number line and reinforce their prior work with non-negative numbers.</p> <p>The Standards for Mathematical Practice are evident in the lesson, but they are not specifically identified. There is evidence in the plan that students need to persevere with problems (SMP.1) and reason abstractly and quantitatively (SMP.2) in the workshop section, construct viable reasoning and critique the reasoning of others (SMP.3) in the Post, Share, Comment Section, and look for and make use of structure(SMP.7) in the Focus Problem: Same Content in a New Context section. It would be beneficial to specifically identify the desired Standards for Mathematical Practice that the educator should work to develop during the lesson.</p> <p>Seeing Sums is especially strong in developing conceptual understanding for addition and subtraction of rational numbers by focusing on representing these operations, both with numbers and variables, on a number line. By doing repeated representations, students are challenged to generalize their reasoning based on the regularity they are seeing in their representations. By developing the "rules" for adding and subtracting rational numbers from the patterns and results they have developed on their own, students are more likely to internalize and remember the procedures to add and subtract rational numbers.</p>
<p>Rating: 2 – Meets many of the criteria in the dimension</p>	

Dimension II – Key Shifts the CCSS

<p><i>The lesson/unit reflects evidence of key shifts that are reflected in the CCSS:</i></p> <ul style="list-style-type: none"> ✓ Focus: Lessons and units targeting the major work of the grade provide an especially in-depth treatment, with especially high 	<p>Seeing Sums is focused on major work of the grade for adding and subtracting rational numbers. The lesson holds high expectations for the students in the Pose a Problem portion of the lesson when students first work with adding and subtracting integers on the number line, but then are asked on side B to generalize their understandings to any rational number "a" or "b" based on their position and distance from 0. One</p>
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<p>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> <ul style="list-style-type: none"> ✓ 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. ✓ Rigor: Requires students to engage with and demonstrate challenging mathematics with appropriate balance among the following: <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>suggestion for improvement regarding the content of the lesson would be to provide a bridge in the Pose a Problem portion to justify that "$a - b$" is always the same as "$a + -b$".</p> <p>The continuation of the number line model to add and subtract rational numbers is a natural progression of the work from earlier grades. Because set models are also commonly used for operations with number in earlier grades, this lesson provides a connection during the Launch to those previous understandings particularly noting that the set model might not work as well for subtracting rational numbers when the second number is negative and has a greater absolute value than the first number. This conceptual foundation developed in this lesson would be further enhanced by providing students opportunities to eventually utilize the number line strategy in problem solving situations. To fully meet the expectations of the targeted standards, real-world applications are necessary. If this is to come later, it would be helpful to indicate it in the overview.</p> <p>Students utilize a variety of situations for finding sums as they work through the workshop tasks using the number line model. This level of practice should help students become proficient in the use of the strategy.</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> <ul style="list-style-type: none"> ✓ Includes clear and sufficient guidance to support teaching and learning of the targeted standards, including, when appropriate, the use of technology and media. ✓ 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. ✓ Engages students in productive struggle through relevant, thought-provoking questions, problems and tasks that stimulate interest and elicit mathematical thinking. 	<p>The lesson has six phases in which student understanding of objectives is developed. Each phase moves students toward using a number line to represent addition and subtraction of rational numbers. The launch includes concrete examples of adding and subtracting integers. Problems are then given so students can practice using the number line to represent sums. Small group work with an online number line tool is then used and students have an opportunity to play a game that has them guessing about the sums of two rational numbers. Students then are expected to identify strategies and generalize sums of rational numbers by creating a poster. All groups then share their solutions and groups have an opportunity to comment on others' solutions. A whole group discussion is then led by the teacher to solidify their understandings of adding negative and positive numbers. Finally, students work individually (or as a group) on a focus problem that addresses the same concepts. All materials, including handouts, videos, slides and the actual lessons for teachers are easily downloaded from the www.math.SERPmedia.org website. The six components of the Poster Problem lessons - Launch, Pose a Problem,</p>
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<p>✓ Addresses instructional expectations and is easy to understand and use.</p> <p>❑ Provides appropriate level and type of scaffolding, differentiation, intervention and support for a broad range of learners.</p> <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> <p>❑ 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).</p> <p>❑ Gradually remove supports, requiring students to demonstrate their mathematical understanding independently.</p> <p>❑ Demonstrate an effective sequence and a progression of learning where the concepts or skills advance and deepen over time.</p> <p>❑ 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>	<p>Workshop, Pose-Share-Comment, Strategic Teacher-Led Discussion, and Focus Problem provide a structure for the flow of a lesson. The Teacher Tune-Up provides opportunities for educators to refresh their understanding of the mathematics behind the content in the Poster Problem.</p> <p>Suggestions for improvement include:</p> <ul style="list-style-type: none"> - Although attention to specific vocabulary is listed as an objective, the vocabulary is not specifically brought out in the lesson, the slides, or the video. The author might consider adding some more documented vocabulary support for the teacher. - The creation of a poster product may be daunting to some students. The author might consider a simple rubric to guide the students (not for grading purposes) as to what components would be seen on an exemplar poster. - Provide more supports and directions for teachers for the intent of this lesson as a conceptual introduction to adding and subtracting rational numbers using a number line representation. This might include stating at the end of the lesson considerations for where the teacher should go next with the generalizations on the anchor posters from the Workshop. The author might consider providing some direction at the end of the lesson to guide teachers in how to intentionally have the students connect the conceptual understanding and generalizations on the anchor posters to creating "rules" for adding and subtracting rational numbers to develop their fluency. - Suggestions for how students might be grouped, how to support students with diverse backgrounds, and probing questions for the teacher to ask the groups during the Workshop period could be added to support instruction.
<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> <p>❑ Is designed to elicit direct, observable evidence of the degree to which a student can independently demonstrate the targeted CCSS.</p> <p>✓ Assesses student proficiency using methods that are accessible and unbiased, including the use of grade-level language in student prompts.</p> <p>✓ Includes aligned rubrics, answer keys and scoring guidelines that provide sufficient guidance for interpreting student performance.</p> <p><u>A unit or longer lesson should:</u></p> <p>❑ Use varied modes of curriculum-embedded assessments that may include pre-, formative, summative and self-assessment measures.</p>	<p>The lesson's activities provide several opportunities for the teacher to informally assess student understanding. Answer keys are provided for handouts that provide sufficient guidance for expected student performance.</p> <p>At the end of the lesson, the Focus Problem does provide students with an individual opportunity to "show what they know". This is an opportunity for teachers to gauge just how well each student understands the basic concepts of how to add and subtract rational numbers. However, teachers are not directed to use the Focus problem in that way. The author might consider some more direction for teachers on how to assess individual student understanding of adding and subtracting rational numbers on a number line as is the expectation of 7.NS.1.</p>
<p>Rating: 2 – Meets many of the criteria in the dimension</p>	

Summary Comments

The number line model is used well as a tool for representing addition of integers. The lesson encourages following a particular procedure for using a number line to add/subtract integers. It also provides opportunities for students to build preliminary generalizations about addition and subtraction of integers through the use of a number line. Several standards that are listed in this 2-day lesson are not addressed. Teachers using this lesson should know that future lesson(s) are required to address the depth of the standards listed in this lesson, which include 7.NS.A.1a-d. Building upon students learning of integers in grade 6 and their work with addition and subtraction of fractions, future lessons should include opportunities to relate addition and subtraction of rational numbers in real-world contexts. Future lesson should also support students to formalize a set of rules, in their own words, for adding/subtracting rational numbers when a number line is not present. These standards also require that students apply properties of operations as strategies to add and subtract rational numbers. Using the number line model to show that the properties of operations extend to rational numbers could be added to this or future lessons. Experimenting with the properties of operations in a number line model is a good venue for reasoning about these properties.

Following is a summary of suggestions for improvement.

- Include connections between the student expectations for engaging in the 7.NS.1 content and related Standards for Mathematical Practice. The practices are in the lesson, but just need to be made apparent to the teacher.
- Remind teachers of the vertical connected standards for adding and subtracting on the number line from elementary grades and the rational number standards from Grade 6 to activate prior knowledge during the Launch.
- Provide more strategies for teachers and students to engage in the terminology and vocabulary stated in the lesson, especially "additive identity" which would help to fulfill the expectation for one of the properties of operations that can be included in this lesson.
- Provide more directions and probing questions for teachers to use during both the Pose a Problem and Workshop portion of the lesson. As written, this lesson is fine for teachers experienced with the workshop model of teaching, but new teachers and direct-instruction teachers may really struggle. Directions should also include suggestions for how to develop a student mindset that hypotheses are meant to be tested and they may or may not turn out to be true and that learning takes place through many tests of hypotheses to come to a valid conclusion that is true under all circumstances.
- Supply teachers with more direction as to what might come next after this 2-day introductory lesson and where students will need more experiences to fully master 7.NS.1, especially in dealing with actual computation with full domain of rational numbers, including fractions and their opposites, and applying these skills in the context of solving real-world and mathematical problems.

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.