

EQuIP Review Feedback



Lesson/Unit Name: Defining and Writing Ratios

Content Area: Mathematics

Grade Level: 6

Overall Rating:

E/I

Exemplar if Improved

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 lesson addresses 6.RP.A.1, which is part of the Major content of the grade, and is one of the four critical areas identified in the Common Core State Standards for 6th grade. Students learn to write ratios based on visual and physical models. Students learn the concept of part-to-part and part-to-whole. While the concept of whole-to-part is listed in the Enduring Understandings on page 1, there is no point in the lesson where students actually do this. This unit could be made stronger if the students were required to use the phrasing suggested in the standard, "The ratio of wings to beaks in the bird house at the zoo was 2:1."

This lesson targets Standards for Mathematical Practice #1,2, 4, 6, and 7. These are identified in the lesson where they are appropriate, and there are specific descriptions of what the students will be doing in this lesson that engages the identified SMP. Some of the identified SMPs seem to be a stretch. For example, explaining that students are using SMP1 "as they see relationships between various ratios in a problem" is vague because there aren't any specific problems identified that students are engaged in solving. Also in Activity 2, part A, the use of SMP #6 is mentioned, "Students attend to precision as they calculate efficiently and accurately in each given situation", but students aren't doing any calculations in this activity, and there is not a need to be efficient that is compelling.

Students do get procedural practice during the activities where they are asked to create ratios based on the pictures or objects they are working with. However, there does not seem to be targeted practice where students are asked to demonstrate and/or improve their procedural skill - the lesson involves more "noticing" and "wondering" where it seems like any answer could be correct. Using visual and physical models will help students develop the concept of ratio because they will be able to see it. This lesson is more of a concept-development lesson, so the emphasis on conceptual development seems appropriate.

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:

- ✓ **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

FOCUS: The lesson is appropriately focused on major work of the grade. Ratios are part of the major work of 6th grade mathematics. In this introductory lesson, students are expected to focus on the different ways to write ratios, how ratios can represent different kinds of relationships (part-to-part, part-to-whole, etc), and how ratios are connected to (but not the same as) fractions.

COHERENCE: The lesson also highlights the coherence by specifically noting standards from previous grades as well as the current grade. The warm-up is a great example of within grade coherence. It helps students recall fractions

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| <p>responsible for material from later grades.</p> <ul style="list-style-type: none"> <input type="checkbox"/> 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. <input type="checkbox"/> 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>so that they can better connect fractions to ratios.</p> <p>RIGOR:</p> <p>Application: This lesson could be strengthened in terms of application. The scenarios with the ball and the birds could be given more context, which would allow students to connect the use of ratios to everyday situation and would strengthen their understanding of them.</p> <p>Conceptual Understanding: There is evidence of conceptual understanding with how ratios are presented as part to part, part to whole or whole to whole. The flow of developing the conceptual understanding of ratio and ratio notation (compared to that of fractions) is not clear, and could be improved. In Activity 1, students first write fractions for part-to-whole relationships. In bullet point two, the teacher is told to ask students to write fractions to represent part-to-part relationships, which seems misleading. Then the teacher tells students to write more ratios, before actually defining the term with the students. This may lead to students confounding the idea of fraction with the idea of ratio, rather than clarify it. We would suggest that students be introduced to the word ratio earlier in the lesson, either in the ball activity, where the teacher could help students make comparison statements and then rephrase using ratio language, or in the shaded rectangles part of the activity, asking students to compare the number of shaded sections to unshaded sections. Then students could be asked to write the ratio of shaded to whole as a fraction, discussing what the numerator and denominator mean. The teacher could then ask students about the ratio of shaded to unshaded, and introduce the three ways to write a ratio. Asking students to write a statement using "to" without ratio language may be confusing, because it would not be everyday language to use "to" without the word "ratio". The more natural way to describe it would be "there are 2 basketballs for every 5 soccer balls".</p> <p>Procedural Fluency: There is not an emphasis on procedural fluency but that is appropriate for the lesson.</p> |
| <p>Rating: 2 – Meets many of the criteria in the dimension</p> | |

Dimension III – Instructional Supports

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| <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. <input type="checkbox"/> 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. <input type="checkbox"/> Provides appropriate level and type of scaffolding, differentiation, intervention and | <p>GUIDANCE: Overall, this lesson has clear instructions and is easy to use. It does not note the use of technology, but it is not necessary to use technology to convey the material. There are a few places where the guidance to teachers could be clearer:</p> <p>In activity 1, there should be instructions to the teacher to monitor what students are writing for ratios with their rainbow cubes to make sure that they are understanding the distinction between part-to-whole ratios and part-to-part ratios. There should be explicit instructions for the teacher to discuss the relationship between ratios and fractions, i.e. that fractions are a subset of ratios where the ratio is in a part-to-whole relationship. We would suggest including this during the part of Activity 1 where they are considering the shaded sections of the rectangle.</p> <p>It would help if there were suggestions for how teachers might use the formative assessment. Should they walk around the room observing and taking notes on students? Should they collect them and sort them by misconception and address misconceptions with the whole class or in small groups? Specify how will it be used to inform instruction.</p> |
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| <p>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> <ul style="list-style-type: none"> <input type="checkbox"/> 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). <input type="checkbox"/> Gradually remove supports, requiring students to demonstrate their mathematical understanding independently. <input type="checkbox"/> Demonstrate an effective sequence and a progression of learning where the concepts or skills advance and deepen over time. <input type="checkbox"/> 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>At three different points in the lesson the teacher is directed to put students in groups. It is unclear if the same groups should be used each time, and if not, that may be too many reconfigurations for a one period lesson.</p> <p>The instructions for how the teacher should carry out Part B could be made clearer. What should the teacher say or do to ask this question of the students, how should he/she have students engage with the question, and how should he/she have students share their solutions?</p> <p>In the left column for each activity, after the UDL components, there is a list which includes "Key questions, formative assessment, and summary", but these are not present in the lesson plan. It may improve the lesson to either remove these from that list when they are not present, or to add them in to each activity of the lesson plan.</p> <p>PRECISION & REPRESENTATIONS Precise and accurate terminology is used as appropriate in this lesson. We would encourage using the phrasing of "The ratio of . . ." as mentioned in Dimension 1. Also, spending some time in class clarifying the relationship between fractions and ratios seems crucial, or else students may begin using the terms interchangeably.</p> <p>PRODUCTIVE STRUGGLE Although the tasks of this lesson will help students gain a better understanding of ratios, they are very teacher directed and there is not a lot to them that would engage students in productive struggle. We would encourage the developer to think of ways to increase the opportunity for productive struggle.</p> <p>INSTRUCTIONAL EXPECTATIONS Except for the suggestions on directions given above, the lesson is clearly laid out and would be easy for even a new teacher to follow. All needed handouts are provided.</p> <p>SUPPORT/DIFFERENTIATION Although the needs of a variety of learners are addressed, they not addressed to an in-depth level. The extension for gifted students does not advance their thinking, it just requires them to create more ratios in the same way that they had done the previous tasks. This lesson does make it clear that vocabulary will be a barrier for students, which is important to note.</p> <p>OTHER The list of resources is helpful. There are a few places where there are typographical errors:</p> <ol style="list-style-type: none"> 1) In the Warm-Up, #5, it refers the students to the model given in #3, but it seems like it was meant to refer to the model given in #4. 2) In Activity 1, for SMP #6, it says "Students give attend". The "give" should be deleted. 3) In the Closure, it says "representation the value". Replace "representation" with "represent". |
| <p>Rating: 2 – Meets many of the criteria in the dimension</p> | |

Dimension IV – Assessment

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| <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 independently demonstrate the targeted CCSS. | <p>While this is clearly a single introductory lesson, and as such not much in the way of assessment would be expected, there are several ways the assessment components present could be improved.</p> <p>The lesson needs answer keys, scoring rubrics or guidance, and commentary about interpreting student performance and common student</p> |
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| <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>misconceptions.</p> <p>The formative assessment activity should have some guidance to the teacher for how to use the results to inform instruction in the next activity.</p> <p>The closure activity could be used as a summative assessment for the day, but it would be more rigorous and robust if it asked students to distinguish between the different types of ratios, and also how ratios are similar to, but not the same as, fractions.</p> |
| <p>Rating: 2 – Meets many of the criteria in the dimension</p> | |

Summary Comments

Overall, this lesson does clearly address 6.RP.1. It would be easy for a novice teacher to pick this lesson up and carry it out without confusion. In order to make it exemplary, we would suggest the following improvements.

Because we have concerns about the flow of activity 1, a major revision of this part of the lesson is needed in order to ensure full conceptual understanding of ratio and how ratios are related to (but not the same as) fractions. Revising the flow of Activity 1 will also increase the precision in language between fraction and ratio.

Using more engaging real-life applications that are relevant to 6th graders, rather than balls and birds, may make the work more motivating and engaging.

More attention to how to differentiate and scaffold, especially for gifted learners, is needed.

Answer keys and rubrics are needed for all parts of the lesson.

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.