

EQIP Review Feedback



Lesson/Unit Name: Unit Rate

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 targets the full depth of 6.RP.A.2. Through the activities students will come to understand the meaning and usefulness of a unit rate, including the phrasing using "per." This lesson also addresses 6.RP.A.3b, although constant speed is not addressed in the lesson.

This lesson features the use of SMP # 1, 3, 4 and 6. If the lesson is completed with fidelity, allowing students to struggle with their own understanding as they apply the mathematics, critique others, and communicate clearly the mathematical practices will have been addressed.

Lesson develops students' conceptual understanding of unit rate through the card sort activity and through comparison of rates. There is a strong emphasis on procedural fluency, especially in Activity 2 where the teacher works examples for students and students do several problems in the Gallery Walk activity. Students then are required to apply this understanding in several scenarios.

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 responsible for material from later grades.
- ✓ **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:
 - **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

Focus: This unit focuses on 6.RP.A.2, which is one of the four critical areas for 6th grade and is also considered Major Content.

Coherence: This lesson builds on the prior lessons on ratio, as well as work from 4th and 5th grade around fractions. Some of the activities in the gallery walk will also engage students in 5.MD.1, converting among units. This work lays the foundation for later work with percents, measurement unit conversions, and proportions in Grade 7. It would be beneficial to include the next steps in the progression of learning this standard. Future standards that are dependent on this understanding include 6.RP.3, 7.RP.1, 7.RP.2, and 7.RP.3.

RIGOR:

Application: There is a strong emphasis on application, as all the problems are associated to real-world situations. Students have opportunities to work in groups and independently to solve problems that require perseverance and the opportunities to apply a variety of strategies.

Conceptual Understanding: Conceptual understanding is developed through the card sort, where students identify that some ratios compare different quantities, and some of those ratios give an amount per quantity of 1. Another way students can develop conceptual understanding is by using rate tables to solve some of these problems, a method not addressed in the lesson but likely to come up given students' experiences in Grade 6. More opportunity for students to speak and write about their understanding could

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| <p>situations.</p> <ul style="list-style-type: none"> - 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>make this lesson stronger. For instance, in the Hamburger problem, if students were allowed to struggle with the question themselves they might devise another way to get at the unit rate, and they could present this to the class.</p> <p>Procedural Fluency: The lesson demonstrates how to convert a ratio or rate into a unit rate. Students get opportunities to practice this during the gallery walk. The closure activity gives students a chance to demonstrate their procedural fluency. All students could be given access to the game on the mathisfun website in order to give more practice on procedural fluency.</p> |
| <p>Rating: 3 – Meets most to all 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"> <input type="checkbox"/> 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. ✓ 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><i>A unit or longer lesson should:</i></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 | <p>This lesson includes some guidance to support teaching and learning of the targeted standards. The layout of the lesson lends itself to ease of educator use. The Background Information gives a big-picture view of the lesson and helps users know what the learning outcomes are and how this lesson connects to the rest of the grade. The sequencing of activities allows students to develop an understanding of ratio and unit rate in situations that commonly occur.</p> <p>The expectation of accurate mathematics and precise language is evident in the development of understanding through the chart and the subsequent discussion. On page 2, under "Method for Determining Student Readiness," the definition of ratio given limits ratios to same units, but that is not the full definition of ratio since it can involve different units. Use the full definition of ratio as "comparison of two quantities" and omit the distinction of "same kind", in order to avoid developing misconceptions in students. In that same part, the sentence "The comparison between two measures, expressed as the number of times one is bigger or smaller than the other" should be omitted. It seems to allude to unit rate, but is not in student-friendly language and will not enhance student understanding. Students will definitely get a chance to understand the definition of unit rate after the card-sort activity. Precise language might be enhanced if the responses to the 8 problems around the room were expected to include the use of ratio, rate, and unit rate.</p> <p>Productive struggle is evidenced through the opportunities for problem solving that do not have immediately obvious conclusions and that elicit mathematical thinking. Novice educators might need additional encouragement to allow that to happen. There are examples of "telling/demonstrating to students." Productive struggle might be better served if students draw those conclusions from their own efforts without being shown by the teacher.</p> <p>In Activity 2, page 7, using variables at this stage may lead teachers to introduce cross-multiplying at this time, which will not lead to conceptual understanding. The lesson should have students focus instead on coming up with equivalent ratios. Consider instead writing another ratio and ask students what the numerator would be if the denominator is one, and omit the expression $x/1$. We would suggest that rather than having the teacher present a method for finding unit rate, allow students to develop a method</p> |
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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.

for finding unit rate. This will allow students to develop their own correct methods based on their understanding of fractions. Students may develop ratio tables to solve this problem, which will set them up for 6.RP.3a. The video from Brain Pop is inappropriate to use at this time, as it deals with comparing linear functions rather than just unit rates and will confuse students rather than increase understanding.

On Page 8, in the movie popcorn problem, it is possible that students could use other comparisons to answer this question (i.e., comparing 8 ounce or 32 ounce quantities of each). Thus this example doesn't really motivate the need for unit rate. Consider changing this problem so that comparison in ways other than unit rate is not easily done. Also, a correct answer to the question should say "The giant bag is the best buy because it costs less PER OUNCE than the other three kinds." Finally, it is unclear if this problem is meant to be solved together in a large group, small group, or with a teacher demonstration.

Include instructions for conducting the Gallery Walk activity, so that teachers who are unfamiliar with this protocol will know what to do. In the gallery walk, consider saving the milk and beef problems for students who need an extra challenge, because they require students to change units (5.MD.A.1) in addition to finding unit rate. Also, some of the problems in the Gallery Walk do lend themselves to unit rate, like the Juice and Pencil problem, but the Shampoo problem could easily be solved using units of 10 ounces. Due to the varying levels of difficulty in the Gallery Walk problems, and the requirement that they choose four, it is possible that students wouldn't have much opportunity to really struggle with comparisons and the necessity of finding unit rates. Consider making the difficulty level more consistent, or else indicating level of difficulty for students to choose (i.e. choose 1 easy, 1 medium, and 1 challenge). In the Maria problem, do not introduce "average speed", but rephrase the question to "How many miles (or what distance) did she travel per hour?" It would increase the rigor in the gallery walk if students were directed to explain their reasoning for each choice, in order to have them engage in SMP #3. Consider making this explicit in the instructions.

For ELL students, some scaffolding for the context of the problems may be needed. Consider pairing ELL student with a native English speaker and having them discuss the context of the problem before proceeding with the math. Consider adding pictures to the gallery walk prompt to help understand context.

Consider adding a section to debrief and provide closure to the Gallery Walk. We suggest that students share their answers with the class on the gallery walk, particularly since not all students will have solved all problems. Another suggestion to summarize learning would be to have students write instructions for how to determine "which is the better buy" in general.

For the closure activity, it seems that it is meant as an exit ticket. This should be clarified for the teacher. While it would be more interesting if the teacher chose examples from the local paper, it would be helpful to provide a sample problem for teachers to use in case they don't get to search for one before the lesson. Also, it might be helpful to put the 2 pictures of grocery ads of two brands of the same thing in the materials list.

Consider adding in commentary about tape diagrams, double number lines, ratio tables, etc. to include other ways students have learned to represent

ratios and unit rate.

Some technical errors that need fixing are listed below.

--In the RIGOR section, it might be better to remove the first word (as) and begin with Students so that it is a sentence. In the Modeling/Application, you might want to add the word (regarding) between models and their.

--In the Motivation/Warm Up, it might be best to state the question as it would be asked of students, i.e., What are some examples of ratios in your lives?

--In the Ratio/Rate Cards Sort- Attachment #1 is identified, but it is actually Attachment #2.

--The eight problems that are posted around the room during the Gallery Walk are really Attachment #3. Some of them say Attachment #2 and some say Attachment #3.

--The "capture sheet" is really Attachment #4, not #3.

Rating: 2 – Meets many of the criteria in the dimension

Dimension IV – Assessment

The lesson/unit regularly assesses whether students are mastering standards-based content and skills:

- ✓ Is designed to elicit direct, observable evidence of the degree to which a student can independently demonstrate the targeted CCSS.
- ✓ 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.

A unit or longer lesson should:

- Use varied modes of curriculum-embedded assessments that may include pre-, formative, summative and self-assessment measures.

Pre-Assessment is evident in the warm-up as students explain what a ratio is and how the parts of the ratio relate to one another. There are several options and guiding questions to help determine if students have the pre-requisite knowledge to proceed with the unit.

Student presentations of the gallery walk could be used as formative assessment.

The closure activity asks students to apply the use of unit rates to determine which brand is the better buy. It would yield richer and more formative information if students explained their reasoning.

Although there is an answer key for the gallery walk, there is no evidence of rubrics or scoring guidelines. More explanation or demonstration of expectations in student responses beyond answers would help teachers know what misconceptions students may have.

Rating: 2 – Meets many of the criteria in the dimension

Summary Comments

Overall this lesson will potentially allow students to develop understanding of unit rate. The lesson is easy to use and provide enough opportunity for students to develop understanding and need for unit rate. This lesson could be made stronger if more time at the beginning was spent on the development of conceptual understanding by motivating the need for unit rate when comparisons are not easily made otherwise. We strongly urge that the definition of ratio given in the Method for Determining Student Readiness be revised as suggested in order to avoid any misconceptions about what can be compared in ratios. Do not include the Brain Pop activity because it is not addressing a 6th grade standard. Consider selecting examples and problems more carefully so that the need for unit rate is clearly developed. Full inclusion of the Standards for Mathematical Practices will benefit the student understanding, especially if students are asked to justify their answers. Include development of different representations i.e. tape diagrams, ratio tables.

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
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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)**
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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.
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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.