

Instructional Plan

Teacher	School	Subject/Course	Grade	Class Length
Barbara Cleveland	Wilson Middle School	Math	7th	88 minutes
Topic/Lesson Title				
CMP: Investigation 3: Comparing and Scaling Rates Problem 3.1 Technology on Sale				

DESIRED RESULTS

7^{ca} a ^{cb} 7^{cf} Y MathYa ^{UjWj} Standards

- CCSS.Math.Content.7.RP.A.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
- CCSS.Math.Content.7.RP.A.2 Recognize and represent proportional relationships between quantities.

Learning Targets/Lesson Objectives

- I can connect the idea of ratios to the idea of a rate and a unit rate.
- I can make and use a rate table.
- I can write an equation that matches the problem.

BACKGROUND INFORMATION

<p>Resources Used To Develop Lesson</p> <ul style="list-style-type: none"> • CMP: Mathematics Overview • Implementation Guide • John Van de Walle: Teaching Student-Centered Mathematics • Teacher's Development Group: Best Practices in Mathematics • STAR Protocol Lesson Planning Tool, BERC Group 	<p>Interdisciplinary Connections</p> <ul style="list-style-type: none"> • Grade Level Interdisciplinary Team Goal—GIVE EVIDENCE to support and communicate understanding and/or to justify reasoning. This team goal is emphasized and specifically targeted by all three academic core teachers on the team (science, math, English language arts). It is a shared norm for the work accomplished in each classroom.
<p>Assessment Of Prior Learning</p> <ul style="list-style-type: none"> • Ratios written as percents • Ratios as equivalent fractions • Similarity and geometric figures, using scale factors to scale up and down 	<p>Materials/Equipment/Tools</p> <ul style="list-style-type: none"> • CMP Textbook • Document camera • Projector • Calculators • Group Role Cards • Unit label flash cards

FORMATIVE AND SUMMATIVE ASSESSMENT

Formative Assessment

- Students use a discussion protocol to analyze homework solutions, share ideas, build vocabulary, and refine strategies by learning from each other.
- Students utilize the “Big Brain” protocol during group work time to advise and reflect on each other’s thinking and reasoning as they investigate the journal problem for the day.
- Listen to students’ thinking and analyze their journal work in progress.
- Ask students clarifying questions to evaluate the mathematical direction of their ideas.
- Monitor students as they share solutions in a whole group format, debate ideas, clarify thinking, and make adjustments to their work.

Summative Assessment

- Check Up quiz at the end of the “4 day Investigation” to determine need for any additional practice or intervention.
- Participate in a study session at the completion of the entire unit (4 Investigations). The study guide allows for recall and application of key concepts.
- Summative unit test. After the summative test is scored all students will collaborate to repair any errors with the help of their table group teams.
- Any student who scores less than 80% mastery will have the opportunity to take the test again to improve his or her score. Additional practice will be required, study sessions are offered.

LESSON PLAN

Lesson Overview

1. Entry task: Table groups review, share, and revise previous night's homework.
2. Teacher introduces Investigation 3.
3. Students work collaboratively on the investigation while teacher monitors and asks clarifying questions.
4. Class comes together to share and summarize solutions to the investigation.

Teacher Tasks

1. Entry Task: Table groups review previous night's homework. Remind students to share by swapping papers and verbal explanations. Give 3–5 minutes to revise and edit.
2. Introduce Investigation 3 with the Learning and Communication target. Point out the concept versus how students will be showing their understanding today.
3. Assign the introduction as a "Partner Read."
Ask Clarifying Questions:
What is a rate?
What 2 things are being compared?
Do all situations show something being compared to just "one" of something else?
Use wait time. Use flash cards to check for understanding of common units.
4. Define a unit rate for the class and work through a new situation.
A car travels 440 miles using 20 gallons of gas.
Is this a rate or a unit rate? Why?
How can we make it a unit rate?
5. Intentionally leave the solution open for further exploration.
6. Read the Journal problem for the day. Show some catalogues that sell calculators. Offer time to consider using a catalogue to buy items. Assign the group to work as a "Big Brain" on this problem.
7. Monitor students as they work. Ask questions that focus on the meaning of a unit rate. Explore how students are finding out how to fill in missing data in the table. Check to see that students are including labels as evidence.
8. Bring class together to summarize their solutions and give feedback.

Student Tasks

1. Table groups discuss (only) how they solved, or how they plan on solving the homework if it has not been started. Spend a few minutes to edit or revise.
2. Choral read, then copy the learning and communication target. Students move into "Partner Reading" arrangements to read the introduction and discuss the "getting ready" questions.
3. Listen carefully and share ideas, help make a list of the "units" in each situation.
4. Students discuss possible solution strategies for the new problem.
5. Big Brain: One member reads the question for the group. All members brainstorm possible solutions. When ready, each member records her or his ideas. When finished members swap papers, reflect, and advise each other.
6. Students share their thinking and their work in a whole class format.
7. Students debate ideas and clarify thinking together. Take the opportunity to revise ideas and work.
8. Bring class together to summarize their solutions and give feedback.

LESSON REFLECTIONS

Pacing:

The pacing was satisfactory. The use of the timer and bells helps keep everyone focused and on task. I would have liked to have more time at the end of the lesson for the debrief. However, what we didn't discuss can be carried over as an entry to tomorrow's work.

Homework Review:

Good engagement. Students are honoring the "discussion only" part of this process and are really listening to each other. I heard some good questions being asked. Handling homework this way is based on students' needs for developing and refining content ideas, vocabulary, confidence, and deprivatizing practice. There is a much higher completion rate of homework practice since adopting this strategy.

Introduction to the Investigation: Partner reading strategy is now automatic. Students got into position quickly and started immediately. I am seeing evidence of moving beyond just reading the words to each other and into greater interaction with the text. There is still work to be done with this.

Getting ready for the problem felt like it was a little too teacher-centered and long, but that is often the case for the introduction and first problem of an investigation. Set up is important, and during the next three days the time will be more student-centered. I would change the review of common unit labels that I did with flash cards and have students use the Go-Around protocol and brainstorm in their table groups instead.

Connecting key vocabulary, I forgot to take down the arrows and definitions from the previous class. The writing was too small but the arrows were a good visual. This would have been a good opportunity to let a student attach the definition on the wall instead of me doing it.

I didn't feel that I utilized wait time well during this part.

Big Brain and Journal Work:

This went very well. I think almost all students felt they could tackle this work and they paced themselves well. There were genuine personal interactions, debates, challenges, and equitable participation. I observed students comparing, considering alternatives, and monitoring thinking.

For Group Roles, the students are getting better at performing their duties and I am getting better at incorporating the group work jobs into the lessons. There is a lot more work to do here. I have been trying the idea of pulling groups over for mini consults on how to do their job. This would have been great to do with the relater/summarizers and have them go back and encourage a quick conversation on connections and relevance. In reflection, using manipulatives such as unit cubes could have been a resource for visualizing the idea of proportion and unit rate. This could also become an entry task for continuing the work.

Summary:

From my observations during the group work, there was a high degree of success which meant that it would be a comfortable experience for me to randomly select a table group to share with the whole group. This also went well. Students were able to speak with confidence, challenge each other respectfully, and explore alternative pathways to solutions. Because of pacing, students didn't get quality time to continue and/or refine their own work after the summarization. I generally like to give time for this. In hindsight, I would have gone back to the learning target before students were dismissed and given them the opportunity to reflect on whether or not the target was met. The energy level was good, there were opportunities to laugh a little, and powerful work got accomplished!