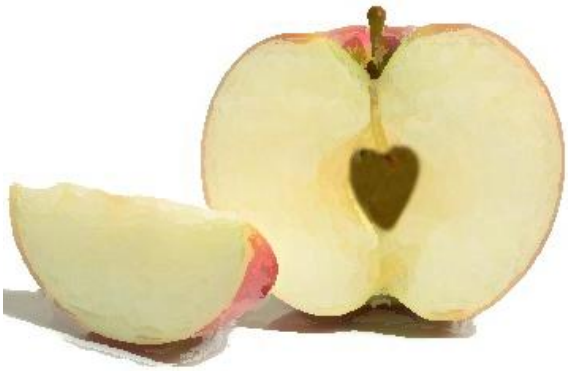

Getting to the Core

Math 6

Ratios & Proportional Relationships

Updated: May 14, 2013

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Math 6 – Ratios & Proportional Relationships
Table of Contents

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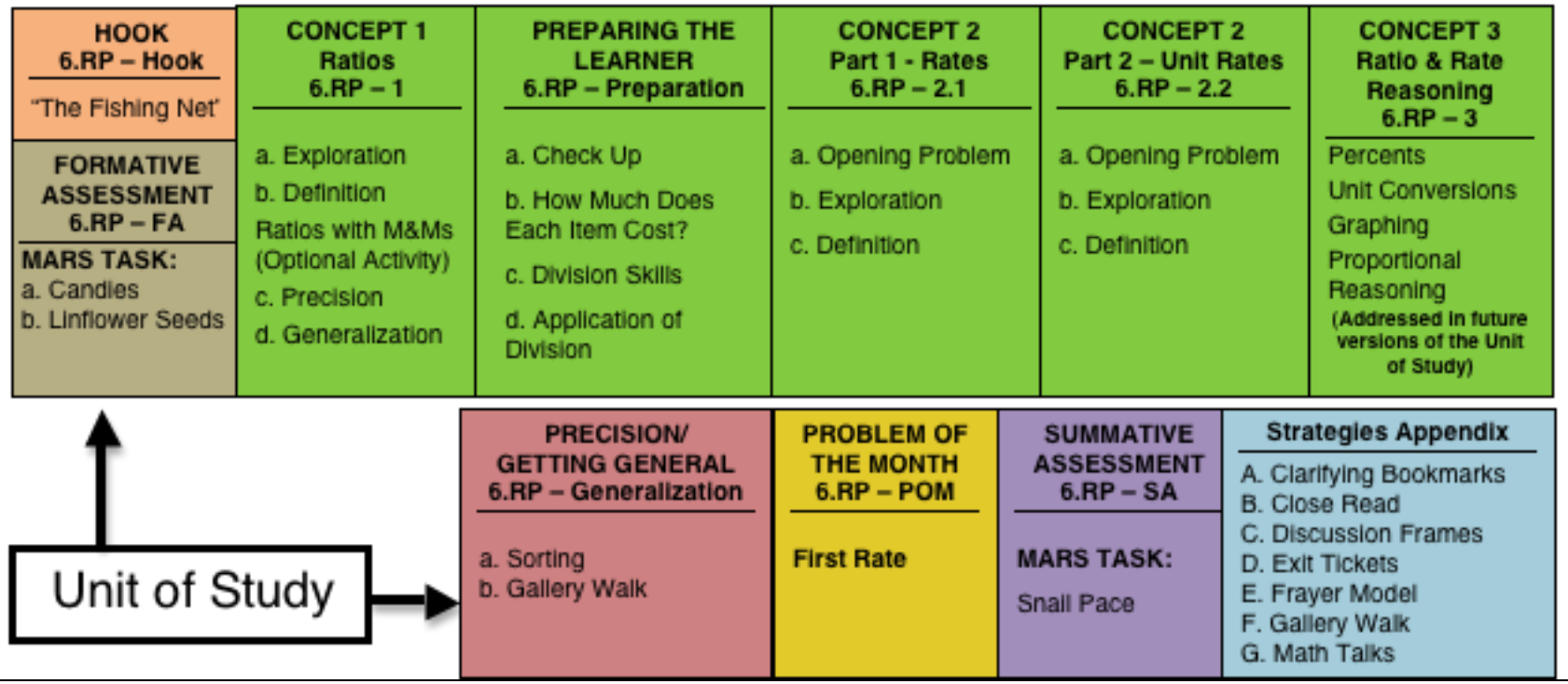
Santa Ana Unified School District Common Core Unit Planner-Mathematics

Unit Title:	Ratios and Proportional Relationships	
Grade Level/Course:	Math 6	**Time Frame: 6 – 12 days**
Big Idea (Enduring Understandings):	Relationship between two quantities. or Proportional relationships express how quantities change in relation to each other.	
Essential Questions:	1. What are the differences between ratio, rate, and unit rate? 2. How can ratio and rate reasoning be used to solve real-world mathematical problems? 3. How can a visual model help to find the percent of a quantity? 4. How can a visual model help to find a quantity given the part of the whole?	

Instructional Activities: Activities/Tasks



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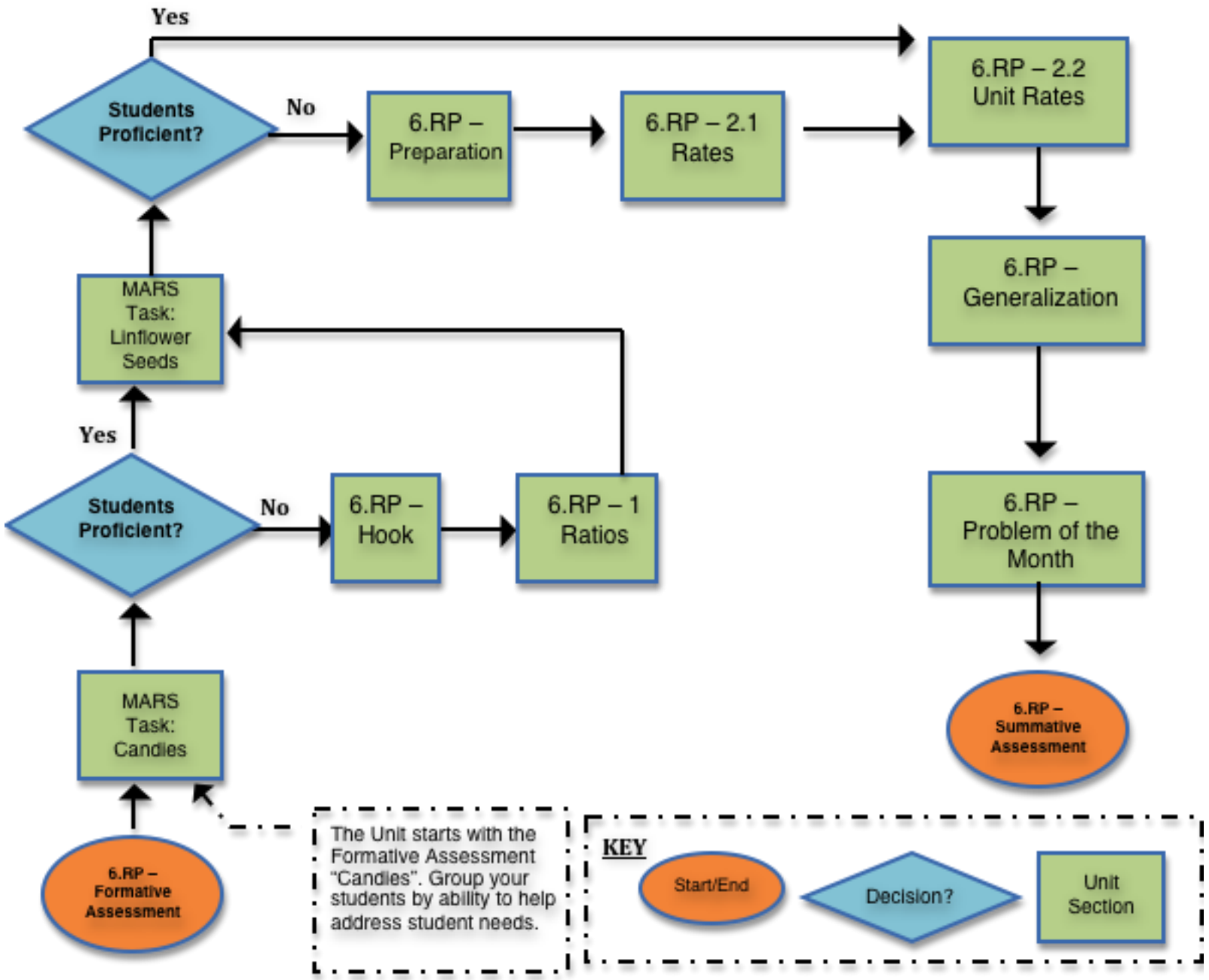
Math 6 – Ratio and Proportional Relationships Unit Sequence Flow Map



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21st Century Skills:	**Learning and Innovation:** ☒ Critical Thinking & Problem Solving ☒ Communication & Collaboration ☒ Creativity & Innovation **Information, Media and Technology:** ☐ Online Tools ☐ Software ☐ Hardware		
Essential Academic Language:	**Tier II:** Convert Calculate Context Demonstrate Compare Trends Predict Representation	**Tier III:** Ratio Rate Unit rate Proportion Percent Simplest form Relationship Equivalent Per For every/ for each	
What pre-assessment will be given? Preparing the Learner assignment "Check Up".		**How will the pre-assessment guide instruction?** It will advise the teachers as to which groups to place the students in (varying by ability level).	
Standards		**Assessment of Standards** (include formative and summative)	
Common Core Learning Standards Taught and Assessed **Cluster: Understand ratio concepts and use ratio reasoning to solve problems.**		**What assessment(s) will be utilized for this unit?** *(include the types of both **f**ormative assessments (**F**) that will be used throughout the unit to inform your instruction and the summative assessments (**S**) that will demonstrate student mastery of the standards.)*	**What does the assessment tell us?**
Common Core Mathematics Content Standard(s): **6.RP.1** Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."* **6.RP.2** Understand the concept of a unit rate a/b associated with a ratio a:b with b≠0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is ¾ cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is rate of $5 per hamburger."* **6.RP.3**		F: MARS Task: "Candies" F: MARS Task: " Linflower Seeds" Problem of the Month: "First Rate" S: MARS Task: "Snail Pace"	Ongoing evidence of students' understanding of the concepts presented. Diagnostic information for intervention or acceleration.

Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.		
Opportunities for listening, speaking, reading, writing, and thinking **Bundled Language Standards:** 3. Use knowledge of language and its conventions when writing, speaking, reading, or listening. 6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships (e.g., however, although, nevertheless, similarly, moreover, in addition) **Bundled Speaking and Listening Standards:** 1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics and texts, building on others' ideas and expressing their own clearly. a. Come to discussions prepared having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions and carry out assigned roles.		

c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others. d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions. 4. Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.		

Standards of Mathematical Practice:	(*Check all that apply*) ☒ 1. Make sense of problems and persevere in solving them. ☒ 2. Reason abstractly and quantitatively. ☒ 3. Construct viable arguments and critique the reasoning of others. ☒ 4. Model with mathematics. ☒ 5. Use appropriate tools strategically. ☒ 6. Attend to precision. ☒ 7. Look for and make use of structure. ☒ 8. Look for and express regularity in repeated reasoning.	**Opportunities for Observable Data** *(How will students* demonstrate *these Mathematical Practices?)* 1. Students will describe problems in their own words. 2. Students will describe a relationship between two numbers. 3. Students will listen to the arguments of others and ask useful questions to determine if an argument makes sense as in Problem of the Month. 4. Students will create visual models to represent information. 5. Students will use tools such as a double- sided number line and a t-chart to answer problems. 6. Students will label their double-sided number lines accurately. 7. Students will identify patterns and see relationships between ratios, rates and unit rates. 8. Students will recognize generalizations among problems and apply their knowledge to similar situations.
Resources/ Materials:	**Text(s) Titles:** N/A **Mathematical Tools:** Calculators (Students with Disabilties) **Media/Technology:** Internet, Document Camera **Supplementary Materials:** Strategies Appendix	
Interdisciplinary Connections:	**Cite several interdisciplinary or cross-content connections made in this unit of study (i.e. literature, science, social studies, art, etc.)**	

Differentiated Instruction:	**Based on desired student outcomes, what instructional variation will be used to address the needs of English Learners by language proficiency level?** • Use of sentence frames (appropriate for language level) to facilitate academic language and conversations. Use of visual organizers to assist processing mathematical ideas • Use of manipulatives to facilitate conceptual understanding • Use of collaboration to promote socio-cultural learning • Opportunities for verbal rehearsal of concepts • Flexible grouping to support language acquisition and target instruction	**Based on desired student outcomes, what instructional variation will be used to address the needs of students with special needs, including gifted and talented?** **Students with Disabilities** • Provide accommodations as indicated within student IEPs: read aloud paragraphs, test questions and answer choices; give visual supports such as word banks, formulas, sentence starters. • Explicitly teach key academic vocabulary. • Monitor student responses for corrective teaching • Use of games, peer study buddies. • Calculators or Multiplication Charts **GATE** • Use of pre-assessment results to accelerate/compact curriculum and instruction for students who demonstrate mastery (85%+). • Use technology for independent acceleration.

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: Math 6 **Lesson:** **6.RP - FA**	**Grade Level/Course:** Math 6	**Duration: One Period** **Date:**

Common Core and Content Standards

Ratios and Proportional Relationships

Understanding ratio concepts and use ratio reasoning to solve problems.

6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

6.RP.2 Understand the concept of a unit rate a/b associated with a ratio a:b with b≠0, and use rate language in the context of a relation relationship.

6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g. by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

Materials/ Resources/ Lesson Preparation

Pg. #	Student Edition
5	MARS TASK: Candies
7	MARS TASK: Linflower Seeds

Objectives

Content:	**Language:**
Students will work with fractions and ratios.	Students will explain in writing how they arrived at their answers.

Depth of Knowledge Level

☐ **Level 1: Recall** ☐ **Level 2: Skill/Concept**

☐ **Level 3: Strategic Thinking** ☐ **Level 4: Extended Thinking**

Standards for Mathematical Practice

☐ **1. Make sense of problems and persevere in solving them.**
☒ **2. Reason abstractly and quantitatively.**
☐ **3. Construct viable arguments and critique the reasoning of others.**
☒ **4. Model with mathematics.**
☐ **5. Use appropriate tools strategically**
☐ **6. Attend to precision.**
☐ **7. Look for and make use of structure.**
☐ **8. Look for and express regularity in repeated reasoning.**

Common Core Instructional Shifts in Mathematics

☐ **Focus on the Standards**
☒ **Coherence within and across grade levels**
☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**

Academic Vocabulary (Tier II & Tier III)

	KEY WORDS ESSENTIAL TO UNDERSTANDING	WORDS WORTH KNOWING
PROVIDES TEACHER SIMPLE EXPLANATION		
STUDENTS FIGURE OUT THE MEANING		

Pre-teaching Considerations			
Lesson Delivery			
Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☐ **Guided Practice** ☐ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☐ **Reflection**		
	Prior Knowledge, Context, and Motivation:		
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**<u>Lesson Overview</u>** **Teacher: Review the flow map on Pg. 7 of this unit. Follow the correct path of completing this unit based on your students' performance on these Mars Tasks. For the assessments, group students by ability level (homogeneous), whereas for the remainder of the unit mix ability levels within groups. (heterogeneous)** **Begin with the formative assessment: Candies then based on the results consult the flow map on pg. 7 to determine how to proceed with the unit.** **The second formative assessment is titled Linflower Seeds.**	**Differentiated Instruction:** **English Learners:** **Students Who Need Additional Support:** **Accelerated Learners:**	
Lesson Reflection			
Teacher Reflection Evidenced by Student Learning/ Outcomes			

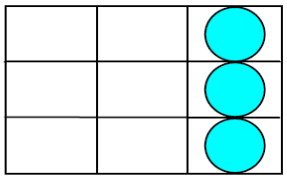
Lesson Continuum

Formative Assessment **Name _____ Period ___**

Candies

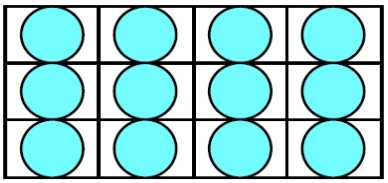
This problem gives you the chance to:
• work with fractions and ratios

1. This is Amy's box of candies.
   She has already eaten 6 of them.



   What fraction of the candies has Amy eaten? _____

2. Valerie shares some of the 12 candies from this box.
   She gives Cindy 1 candy for every 3 candies she eats herself.



   How many candies does she give to Cindy? _____
   Show how you figured this out.

3. In a packet of mixed candies there are 2 fruit centers for every 3 caramel centers.
   There are 30 candies in the packet.

   How many caramel centers are there? _____
   Show how you figured this out.

4. Anthony makes candies.
   First, he mixes 1 cup of cream with 2 cups of chocolate.
   In all, he uses 9 cups of these two ingredients.
   How many cups of chocolate does he use in this candy recipe? _____

   Explain how you figured this out.

_____

_____

Formative Assessment – Rubric

Task 1: Candies		Rubric	
The core elements of performance required by this task are: • work with fractions and ratios Based on these, credit for specific aspects of performance should be assigned as follows		points	section points
1.	Gives correct answer: **2/3** or **6/9**	1	1
2.	Gives correct answer: **3**	1	
	Shows work such as: 1 + 3 = 4 12 ÷ 4 =		
	Accept diagrams.	1	2
3	Gives correct answer: **18**	2	
	Shows work such as: 2 + 3 = 5 30 ÷ 5 = 6 6 x 3 =		
	Accept diagrams.	1	3
4.	Gives correct answer: **6**	1	
	Gives a correct explanation such as: Anthony mixes a ratio of one cup of cream to two cups of chocolate. The ratio stays the same for different amounts. So I wrote the numbers in a chart like this 1 to 2 = a total of 3 2 to 4 = a total of 6 3 to 6 = a total of 9	1	
	Accept diagrams.		2
	Total Points		**8**

Formative Assessment **Name _____ Period ___**

LINFLOWER SEEDS

This problem gives you the chance to:
- show your understanding of proportional reasoning.

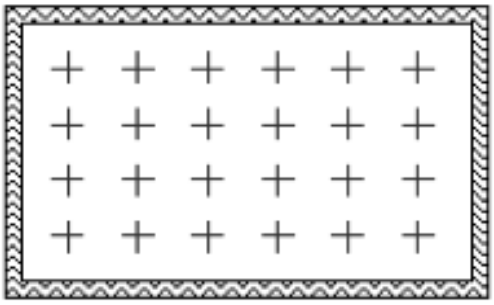
Tim grows linflowers from seeds. But not all of his seeds start to grow.

He has found that for every 100 seeds he sows, only about 75 start to grow.

1, Tim sows 20 linflower seeds. How many would you expect to start to grow? Explain your reasoning.

---

2. Tim sows 24 seeds in a box. Each cross marks the position of a seed.



Guess which of the seeds start to grow. Draw circles around the crosses to show the seeds which do **not** start to grow. There is more than one correct answer to this question.

Explain your reasoning.

Formative Assessment

Sample Solution

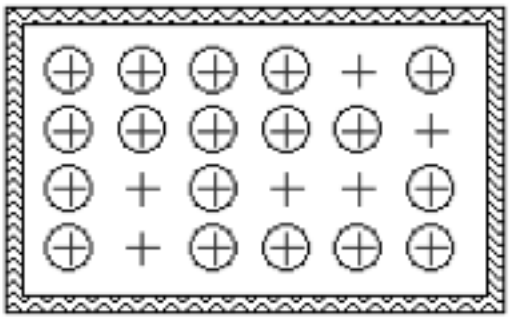
1, Tim sows 20 linflower seeds. How many would you expect to start to grow? Explain your reasoning.

75 out of 100 start to grow.

On average I would expect 20 x 75 / 100 = 15 seeds to grow.

But the actual number could be slightly more or slightly less than 15.

2. … Guess which of the seeds start to grow. Draw circles around the crosses to show the seeds which start to grow. There is not one right answer to this question.



I would expect about 24 x 75 / 100 = 18 of the flowers to grow but it could be more or less. The pattern in the box would be random.

(For full marks the pattern offered should be realistically random. A pattern that puts all the ungerminated seeds on one side of the box is unsatisfactory.)

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

<table>
<tr><td>Unit: Math 6
Lesson:
6.RP Hook</td><td>Grade Level/Course:
Math 6</td><td colspan="2">Duration: Day 1 of 1 Period of (50 Minutes)
Date:</td></tr>
<tr><td>Common Core and Content Standards</td><td colspan="3">Common Core: 6.RP - Ratios and Proportional Relationships</td></tr>
<tr><td>Materials/ Resources/ Lesson Preparation</td><td colspan="3"><u>Pg. #</u> <u>Student Edition</u>
9 The Fishing Net
<u>Pg. #</u> <u>Strategies Appendix</u>
114 Discussion Frames

Organize students to accommodate groups of approximately four, for discussion and group work.
Pre-select strategies from the lesson for student collaboration, sharing, and discussion.
Prepare notes on the board, or an example for student notes, to explicitly teach and train students to utilize the strategies.
Lined paper for students' discussion notes (optional)</td></tr>
<tr><td>Objectives</td><td colspan="2">Content:
Students will utilize basic understandings of proportional relationships to make sense ratios, rates, and proportional relationships presented in a practical scenario.</td><td>Language:
Students will be given opportunities to read, discuss, and analyze information given in a graphic and in text.</td></tr>
<tr><td>Depth of Knowledge Level</td><td colspan="3">☒ Level 1: Recall ☐ Level 2: Skill/Concept
☒ Level 3: Strategic Thinking ☐ Level 4: Extended Thinking</td></tr>
<tr><td>Standards for Mathematical Practice</td><td colspan="3">☒ 1. Make sense of problems and persevere in solving them.
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☐ Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)</td></tr>
<tr><td rowspan="3">Academic Vocabulary
(Tier II & Tier III)</td><td>PROVIDES TEACHER SIMPLE EXPLANATION</td><td>KEY WORDS ESSENTIAL TO UNDERSTANDING</td><td>WORDS WORTH KNOWING</td></tr>
<tr><td></td><td>Hypothesize</td><td>Abiotic
Biotic</td></tr>
<tr><td>STUDENTS FIGURE OUT THE MEANING</td><td>Concerned
Predict
Relationship
Comparison</td><td></td></tr>
</table>

Pre-teaching Considerations	This lesson requires students to work in a variety of different groups. Students are expected to be able to communicate their understanding and findings with their classmates. Please reference the Strategies Appendix for additional information.

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☐ **Independent Practice** ☒ **Guided Inquiry** ☐ **Reflection**
	Prior Knowledge, Context, and Motivation:

Lesson Continuum

Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

Lesson Overview

The Fishing Net
Day 1 of 1:

Preparing the Learner
Part 1: 10 Minutes

- **Independent Group Effort: Reading Comprehension & Collaboration**
- **Mathematical Practice(s) Being Monitored:**
  1 Make sense of problem and persevere in solving them:
  Objective: Mathematical proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution.

Teacher: Have students work in groups of 4 to answer Part 1 of *"6.RP - Hook: The Fishing Net"*.
Provide the following structure for their interaction in this activity. (Teacher may project the structure below to support discussion activity).

Quick Write with Round Robin:
***{Round Robin Description** - Cooperative-learning structure in which team members share ideas verbally on a topic. Group members share in order, without interruption, comment, discussion, or questions from other members so that everyone has an opportunity to share.}*

Prompt for students:

- Read Part 1 by yourself and fill in the blanks provided in this part. Be prepared to share your thinking and where you got the information.

Students: Are provided with 3-4 minutes to read and write.
Round Robin:

- Student 1 shares responses/answers in groups of four while the rest of the team listens and holds off their responses.
- Student 2 shares while the rest of the group listens. Student 3 shares; and finally, student 4 shares. (Everyone shares).

Differentiated Instruction:

Students Who Need Additional Support:
Teacher, paraprofessional or peer study buddy:
Read paragraphs aloud

Teacher: provide vocabulary card with simple definitions of academic vocabulary (teacher to create)

Example:
Hypothesize: guess

Accelerated Learners:
Part 3: If time allows, have this group of students perform both Options for Part 3

	• Others may not interrupt or comment until everyone has expressed their ideas. **Teacher:** May choose to stay with 1 group or 2 during this Round Robin activity to understand students' responses and to make adjustments to the entire class later. **Teacher:** Now provide the class 1 minute to make corrections/changes to each student's paper based on the feedback they heard from other team members. **Interacting With Tasks** **Part 2: Questions 1: 10 Minutes** • **Independent Group Effort: Critical Thinking & Collaboration** • **Mathematical Practice(s) Being Monitored:** 2 Reason abstractly and quantitatively Objective: Students are to attend to the meaning of quantity, not just how to compute them. 1 Make sense of problem and persevere in solving them Objective: Students are to make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. **Teacher:** Students have the flexibility to work either independently or collaboratively with a partner. **Students:** Are to work either independently or collaboratively with a partner to work on problems a, b and c in question 1. **Teacher:** Play as a facilitator to ask leading questions to help students make a logical comparison and prediction of the entire lake given the ratio of a part of the lake. Please see the following suggested leading questions to help guide students' thinking. Please avoid showing or explaining explicitly the reasoning for each part of the question. **Part 2 – Question 1** **Students:** *Possible Misconception***:** students may compare more or less rather than for every 5 striped fish you find 3 spotted fish. **Teacher:** Please see the suggested leading questions below to help guide students to comparing ratio rather than more or less. **Suggested Set of Guided Inquiry/Questions:** 1. **Question:** Is there another relationship between striped fish and spotted fish can you find in this net (besides more or less)? 2. **Question:** Let's assume that the net is being thrown in the lake a second time. Can you make any prediction of the next items in the net? In terms of striped fish to spotted fish? 3. **Question:** Assume that this net is being thrown over and over again and the number of striped fish compared to spotted fish remains constant. Can you make another comparison between striped and spotted fish? **Answers to 1-3:** The objective for these questions is to get students to say "For every 5 striped fish caught, there is 3 spotted fish caught in the net" 4. **Question:** In order to answer part c of question 1, imagine	**English Learners:** Teacher: Please make sure that students receive the leading questions (both oral and written) as scaffolds build thinking and inferences to the right direction.

multiple nets are being thrown in the lake simultaneously. How many nets can be thrown in the lake at the same time? How many striped fish or spotted fish can you predict?

Purpose: Mathematical Practice 1: Make sense of problem and persevere in solving them; student should be able to make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt.

Part 2 – Questions 2 – 4: 10 Minutes

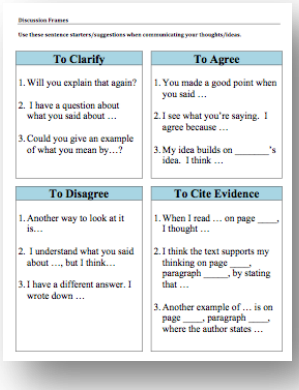
Teachers: Once you help provide the scaffolds (leading questions) for question 1, questions 2 – 4 will be smoother for students to make their reasoning as these questions are built off from the reasoning of question 1. Continue facilitation by asking leading questions to guide students to the understanding of Ratios, Rates, and Unit Rate without explicitly explaining or solving the problems.

Students: Continue working with their team members to come up with reasoning.

10 Minutes

- **Independent Group Effort: Communication & Collaboration**
- **Mathematical Practices Being Monitored:**
  3 Construct viable argument and critique the reasoning of others.
  Objective: Mathematical proficient students justify their conclusions, communicate them to others, and respond to the arguments of others.

Teacher: Now have students in each group share their answers for problems 1-4 with everyone in the team. Use *"Strategies Appendix C: Discussion Frames"* to assist in communication.


Discussion Frames

Use these sentence starters/suggestions when communicating your thoughts/ideas.

To Clarify	To Agree
1. Will you explain that again? 2. I have a question about what you said about … 3. Could you give an example of what you mean by…?	1. You made a good point when you said … 2. I see what you're saying. I agree because … 3. My idea builds on _____'s idea. I think …
To Disagree	**To Cite Evidence**
1. Another way to look at it is… 2. I understand what you said about …, but I think… 3. I have a different answer. I wrote down …	1. When I read … on page ____, I thought … 2. I think the text supports my thinking on page ____, paragraph _____, by stating that … 3. Another example of … is on page ____, paragraph _____, where the author states …

Objective: Students (in groups of 4) need to share their answers for problems 1-4 with their team members. If there is a disagreement on the answer, figure out the correct answer and understand why and what makes this a correct answer.

Students: Using the discussion frames given to you by the teacher, students should communicate/explain their understanding/answers/ reasoning with peers.

Example: I agree with your answer 1b because I found that there are always two more striped fish than spotted fish. I also disagree with your answer because the difference between these two types of fish stays constant the entire time. So, for every 5 striped fish there are 3 spotted fish.

Teacher: May provide the sentence frame for their conversation as in: For every _____ I see _____.

Extending Understanding
Option 1:
Part 3 – Collaborative Discussion: 10 Minutes

- **Independent Group Effort: Critical Thinking, Collaboration, and Communication**
- **Mathematical Practice(s) Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others
  Objective: Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and – if there is a flaw in an argument – explain what it is.

Teacher: Have students work on questions 1 -4 in Part 3 collaboratively in pairs. Use the same structure provided earlier in Part 2 to support students' collaborative effort.
Students: Continue working on problems 1-4 using the same strategy in Part 2 where students are work with a partner to arrive to the answers for questions 1-4. Then each pair of four will share their answers and arrive to a final conclusion.
Option 2:
Teacher: Have students work either independently or collaboratively in pairs to answer the following prompts for the Triple-Entry Journal
Students: Are to compile and questions from Parts 1 & 2 to see a general idea across the problems which is comparison of quantities to make prediction in a more general and larger scale.
Triple-Entry Journal

Part 1 Main Idea	Part 2 Main Idea	My Understanding
What I learned from Part 1 was to _____ _____.	What I did from Part 2 was to _____. Then I did _____.	What I understand from this lesson was to _____ _____.

Teacher: If time allows, please have students from each group share their understanding (last column) to the class to have the same understanding.
Students: Are to synthesize their understanding from two parts of the lesson to reflect-write-share their final understanding.

Lesson Reflection

Teacher Reflection Evidenced by Student Learning/ Outcomes	

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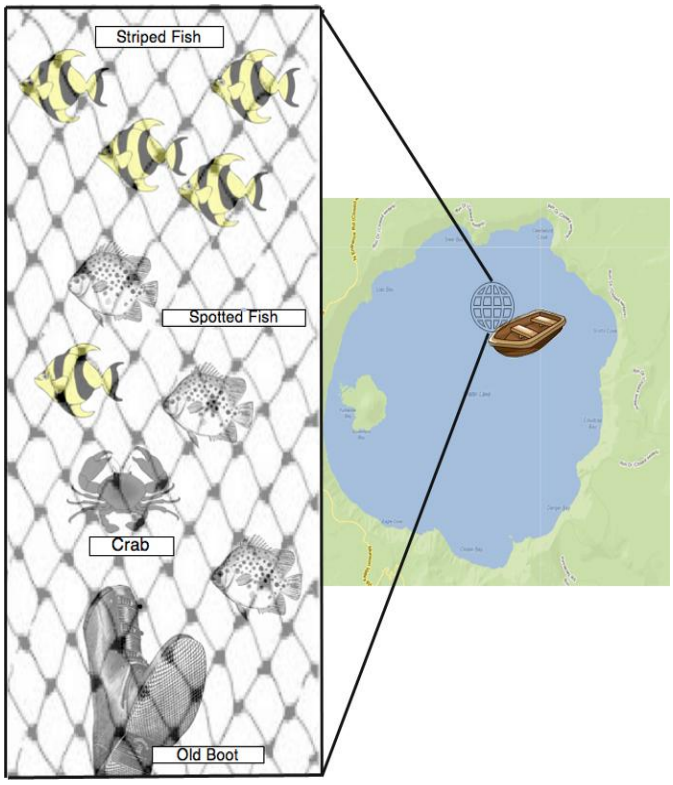
 Name: _____ Period: _____

The Fishing Net

Part 1:



Scientists are concerned about the striped fish that live in this lake and want to investigate the biotic (living) organisms and the abiotic (non-living) factors in the lake. They decided to study an area of the lake to help them hypothesize about the condition of the entire lake.

They went fishing with a net in the lake. The diagram on the left shows a map of the lake and what they caught in the area of the circle on the map. Record your observations below.

- I see _____ striped fish; _____ spotted fish, _____ crab(s), and _____ in the net.
- I see _____ biotic (living) organisms and _____ abiotic (non-living) factors in the net.

Part 2: What can we learn from the net above? Use the diagram to answer questions 1 – 4 below.

1. There are _____ striped fish and _____ spotted fish in the net.
   a. How does the number of striped fish compare with the number of spotted fish caught?
   _____
   _____
   b. How could this sample help scientists predict the relationship between the striped fish and the spotted fish in the entire lake?
   _____
   _____
   c. With the above information, can you make a prediction of the number of striped fish and spotted fish in the entire lake? Explain your reasoning.
   _____
   _____
2. There are _____ crabs and _____items total in the net.
   a. How many crabs are there compared to all of the items in the net?
   _____
   _____

b. Can this comparison help you predict the relationship between crabs and fish in the entire lake? Explain.

_____

_____

3. There are _____ living things and _____ non-living things in the net.
   a. How many living things are there compared to non-living things in the net?

      _____

      _____

   b. What can we conclude about the relationship between living and non-living things in the net? In the entire lake? Explain your reasoning.

      _____

      _____

4. How do the living things compare with the total number of items in the net? Using this relationship between the things in the net, what might we conclude about the relationship between living and non-living things in the entire lake? Explain your reasoning.

_____

_____

_____

Part 3: Collaborative Discussions:

1. If scientists used their net many more times to fish the entire lake, what do you think they might catch? Predict how many striped fish, spotted fish, crabs, and non-living things you think we could count then? Explain your thinking.
   _____ striped fish _____ spotted fish _____ crabs _____ non-living things

_____

_____

2. Knowing what we have sampled from the net, if scientists believe that a healthy lake should have at least two striped fish for each spotted fish, and at least five striped fish for every two crabs, what might we learn about the entire lake from what we see in the net?

_____

_____

3. Share your answers with your team. Be prepared to answer the following questions.
   a. Look at questions 1 & 2. What are some differences or similarities in your answers compared to your group.

_____

_____

   b. What are some common methods you and your group used in this activity?

_____

_____

4. With your team, discuss and predict the math topic that we are about to investigate. Explain your thoughts.

_____

_____

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: Ratios **Lesson:** **6.RP - 1**	**Grade Level/Course:** 6th Grade Math	**Duration: 2 days** **Date:**
Common Core and Content Standards	**Rates and Proportional Relationships** **6.RP 1** - Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2"1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes.	
Materials/ Resources/ Lesson Preparation	**Pg. # Student Edition** 11 Ratio Exploration 13 Definition of a Ratio 17 Definition of Ratios (Frayer Model) 19 M&M Activity 21 Precision of Ratios 23 Generalization with Ratios **Pg. # Strategies Appendix** 112 Clarifying Bookmarks 114 Discussion Frames 115 Exit Tickets 116 Frayer Model **1 piece of Chart Paper or Poster Paper is needed to create a large-scale Frayer Model.**	
Objectives	**Content:** Students will solve problems involving ratios and model their findings in multiple different ways.	**Language:** Students will explain orally and in writing what a ratio is, the multiple representations of a ratio and the real-world applications by creating their own scenarios
Depth of Knowledge Level	☒ **Level 1: Recall** ☒ **Level 2: Skill/Concept** ☐ **Level 3: Strategic Thinking** ☐ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☐ **1. Make sense of problems and persevere in solving them.** ☐ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☒ **4. Model with mathematics.** ☐ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☒ **7. Look for and make use of structure.** ☐ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** ☒ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
ca bul ary (TI TEAC HER SIMPL E EXPL	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**

		Ratio Quantity	Relationship Represent/ Representation Simplest Form
	STUDENTS FIGURE OUT THE MEANING	Compare/Comparison	Interpretation Cylinder Hexagon
Pre-teaching Considerations		This lesson requires students to work in a variety of different groups. Students are expected to be able to communicate their understanding and findings with their classmates. Please reference the Strategies Appendix for additional information.	

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☒ **Guided Practice** ☒ **Collaboration** ☒ **Independent Practice** ☒ **Guided Inquiry** ☐ **Reflection**
	Prior Knowledge, Context, and Motivation: **Prior Knowledge:** Students know what a fraction represents (part to whole) and how to write them in simplest form. They know how to multiply and divide integers. **Context:** Concrete: Students learn how to compare different quantities by counting the number of objects and modeling by providing pictures, drawings and creating their own scenarios. **Motivation:** Concrete: Students are provided with a manipulative (M&M's or other materials) to group and sort.

Lesson Continuum

Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview** **Day 1 of 2:** **Ratio Exploration** **10 minutes:** • **Guided Inquiry to support Generalization & Mathematical Understanding: Communication** • **Mathematical Practice(s) Being Monitored:** 6 Attend to precision Objective: Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. **Teacher:** Ask students to turn to pg. 11, "6.RP-1a - Ratio Exploration". Allow the students, with a partner, 3 minutes to complete question 1 with a partner. Provide students with the discussion frames from Strategies Appendix C to help students communicate their thoughts with their partner/class. **Students:** With a partner, students will discuss and provide a written answer for *1a, 1b, 1c* and *1d*. They will use the provided discussion frames to help communicate their thoughts with their partner/class. **Teacher:** Ask students to share their answers for *1a, 1b, 1c* and *1d*.	**Differentiated Instruction:** **English Learners:** Provide linguistic frames to assist students with their discussions/ explanations. **Students Who Need Additional Support:** Teacher, paraprofessional or peer study buddy: Read questions aloud

	Debrief question 1 with the class using the following questions to lead discussion. **Suggested Guided Inquiry/Questions:** 1. What does it mean to compare two things? 2. What observations did you make about questions 1*a* and 1*b*? 3. What approach did you use to answer letter *d*? 4. What is the main idea of question 1? **Students:** Share their answers to question 1 with the class. **Teacher:** Question *d* asks students to make another comparison between the squares and triangles. Write down all student responses on the board and discuss possible solutions. If another group has duplicated a question, the teacher will place a checkmark next to that question. **Students:** Share their response for question *d*. Provide solutions to possible questions asked by fellow classmates. **Teacher:** Allow students 3 minutes to complete question 2. **Students:** Count the number of boys and girls (students only) in the classroom and record their findings. Use the Problem Stem strategy to list 3 possible questions that can be asked using the information they gathered by counting the number of boys and girls in the classroom. When the 3 minutes is up, students will pair up with 2 other partner groups (to form a total of 6 students per group) and share their questions. **Teacher:** Ask a volunteer from each group to share the questions they created. One group could have a possible question, "Compare the number of boys to the number of girls" while another group might have "Compare the number of girls to the number of boys". If this scenario arises, ask the following question to generate discussion. • Are the two questions the same? Why or why not? **Students:** Share their answers to question 2 with the class and participate in whole class discussion. **Teacher:** Instruct students to work individually to answer question 1 from part 2 of the Ratio Exploration assignment. **Students:** Write the answer to question 1 from part 2 of the Ratio Exploration assignment. **6.RP-1a** **Definition of Ratio** **Part 1-3** **15 minutes:** **Teacher:** Ask students to turn to pg. 13, "6.RP-1b - Definition of Ratio". **Option 1:** **Teacher:** Have students read closely *Part 1*. While students are reading, circulate from group to group to provide clarification/ answer questions. **Students:** In groups of 4, student 1 reads out loud while the rest of the team is following along. At the end of the text, student 2 is to	Teacher: scaffold Q2: "What else can these numbers tell us?" **Accelerated Learners:** These questions are more language-intensive where Accelerated Learners are more likely to lead discussions. **Accelerated Learners:** Use option 1 as this option provides less scaffolds, but more dependent on students' comprehension skills. **English Learners and Students Who Need Additional Support:** Use option 2 to provide supportive scaffolds to help students comprehend the text. Provide students with a printed copy of Linguistic Frames to use with Part 2. Provide visual support for Part 3:

state the key vocabulary; student 3 is to draw meaning to the text and student 4 is to state the main idea. All students note their understanding of the main idea.

Option 2:

Suggested Metacognitive Activity – Clarifying Bookmarks

Teacher: Refer to Strategies Appendix A for more details and practice on a Clarifying Bookmarks Activity.

Students: Use the following linguistic frames to communicate/explain their understanding with their classmates.

What I can do	**What I can say**
I am going to think about what the selected text may mean.	*I'm not sure what this is about, but I think it may mean…*
	This part is tricky, but I think it means…
	After rereading this part, I think it may mean…
I am going to summarize my understanding so far.	*What I understand about this reading so far is …*
	I can summarize this part by saying…
	The main points of this section are …

Teacher: Ask students the following questions to check for understanding:

1. Who can provide a definition of *ratio* using your own words?
2. What are the ways to represent a ratio?
3. Provide your own example involving a ratio.

Students: Complete parts 3 and 4 with their group.

Teacher: Instruct students to complete parts 2 and 3 of "6.RP-1b - Definition of Ratio". Circulate around the room to help struggling students.

Students: Work in their small groups to complete Part 2 and 3 of "6.RP-1b - Definition of Ratio".

6-RP-1b
Definition of Ratio
Part 4 – Definition Comprehension
15 minutes:

- **Independent Group Effort**
- **Mathematical Practice(s) Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others
  7 Look for and make use of structure
  Objective: Mathematically proficient students understand and use stated assumptions, definitions, and previously

Ways To Show Ratios

To boys TO girls
Colon girls : boys
Meaning: for every __ boy, there are __ girls

For Part 3, Question 5 suggest items for table.

Students who need additional support: These leading questions will help the students who are unsure of question/ task without giving them the answer.

Accelerated Learners: There is not enough time in a 45 minute period for

	established results in constructing arguments. **Teacher:** Ask students to turn to pg. 17, "6.RP-1b – Frayer Model". Do not explain each quadrant to the students (they should be discussing the meaning of each section as a group). For more information/directions on using a Frayer Model, refer to Strategies Appendix E. Below are some possible prompts to help students if they are struggling with the meaning of a particular section. • **Definition in your own words:** 1. What does the word *ratio* mean to you? 2. Take a look at *Part 1 - Definition of* Ratio to refresh your memory. 3. If you were writing a definition for someone who has never heard the word *ratio* before, what information would you include? • **Facts/Characteristics:** 1. What does a ratio look like? 2. Is there a certain way/ways to write a ratio? 3. Is there anything necessary to include when writing a ratio? • **Examples:** 1. Can you think of ratio that involves some objects in this room? 2. Where have you compared two objects before? Write down the example. 3. Refer back to some of the problems in *Section 3- Collaboration* to give you some ideas of possible examples. • **Non-Examples:** Two items/objects that are not compared properly. 1. Think of the conditions that a ratio must meet. Then create an example that does not follow these conditions (ex: order matters, using "to" or colon to represent ratios). **Students:** Using the Hook lesson and the Ratio Exploration activity, work with a partner to complete all 4 boxes to the best of their ability. Each group will be given one worksheet to complete together. **Teacher:** Debrief the results by creating one large Frayer Model on chart paper using the students' responses for each of the 4 categories. This will be posted in the room to refer back to throughout the unit. **Students:** Share their responses with the class to create one large Frayer Model that all students agree upon. **(Optional Activity)** **Ratios with M&M's** **(M&M's can be substituted with another multi-colored**	most students to complete the M&M activity. If you have students who finish their work early, the M&M activity is great hands-on activity for students. This activity could be offered to all learners as an after-school or lunchtime "math lab" if class time is not sufficient. **English Learners:** Provide linguistic frames to assist students with their discussions/ explanations.

	manipulative.) **10 minutes:** **Teacher:** Separate 30 M&M's into plastic bags (or paper cups) and give one to each group (2-4 students). Ask students to turn to pg. 19, "6.RP – 1 M&M Activity". Walk around the room, ensuring students are solving/modeling the problems correctly in their group. **Students:** Work in their groups to first separate the M&Ms by color and then answer questions 1-3 by writing the ratio using both representations and filling in the sentence frames. Work collaboratively to model questions 4 and 5 and provide drawings to represent their findings. **5 minutes:** • **Closure:** Getting students to understand the essential understanding of this lesson. • **Mathematical Practice(s) Being Monitored:** 6 Attend to precision **Question:** Write 3 things you learned about ratios. Provide your own example or pictorial representation of a ratio. **Day 2 of 2** **6.RP-1c** **Precision with Ratios** **20 minutes:** • **Guided Inquiry to support Generalization & Mathematical Understanding: Communication** • **Mathematical Practice(s) Being Monitored:** 4 Model with mathematics 6 Attend to precision 7 Look for and make use of structure Objective: Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. **Teacher:** Ask students to turn to pg. 21, "6.RP-1c – Precision of Ratios". Allow the students 10 minutes to complete Parts 1 and 2. While the students are working, circulate from group to group to provide clarification if necessary. If students are having a difficult time seeing the relationship between the 3 representations, you may ask these questions: 1. What is the relationship between the two representations you already know (with a colon and the word "to") and the fraction representation? 2. Is there a certain pattern being followed? If students are struggling with a diagram/context to include in numbers 6-8, encourage them to use questions 1-5 as an example to guide them (possibly include different shapes, another odd/even question or incorporate colors like the M&M activity from the previous day).	**Students who need additional support:** The Dyad Share will help the students who are unsure of question/ task without giving them the answer. **Students who need additional support:** If unable to do so on their own, these questions will help the students to recognize a pattern/ relationship among the two models. **English Learners:** Provide linguistic frames to assist students with their discussions/ explanations. **English Learners:** Provide suggested questions in writing (either on the board or in the form of a printed handout).

Students: Work with a partner to complete parts 1 and 2.
Teacher: Lead a whole class discussion where student volunteers share their answers for Part 2. Provide students with the discussion frames from Strategies Appendix C to help students communicate their thoughts with their partner/class.
Students: Share their responses for Part 2 (questions 1 and 2). Use the discussion frames to communicate/explain their understanding with peers.

Teacher: Instruct students to join with another group of 2 (to form a group of 4) and work on Part 3. Part 3 is very similar to part 2 but the *Diagram/Context* section is more language intensive where the students are asked to create 3 ratio examples that involve more than just counting or using basic symbols. Walk around the room while the students are working and provide assistance to struggling students by prompting them with the following:

1. Provide the sentence frame "The ratio of _____ to _____ is _____."
2. Think of situation where you encounter more than one object (ex: dogs and cats in a neighborhood, pens and pencils in your backpack, girls and boys in your family).

Students: Using the multiple contexts of ratios they have encountered in the last 2 days, students will answer the questions in part 3 with their group of 4 students.

6.RP-1d
Generalization with Ratios
20 minutes:

- **Guided Inquiry to support Generalization & Mathematical Understanding: Communication**
- **Mathematical Practice(s) Being Monitored:**

4 Model with mathematics
6 Attend to precision
7 Look for and make use of structure
Objective: Mathematically proficient students look closely to discern a pattern or structure.

Teacher: Ask students to turn to pg. 23, "6.RP-1d - Generalization with Ratios" and allow the students 5-10 minutes to complete Part 1 and 2 with their partner. Students are being asked to explain the meaning of a diagram and write their own understanding, which does not require teacher assistance.
Students: Complete Part 1 and 2 with their partner by first discussing information and then writing about it.
Teacher: When students have completed parts 1 and 2 ask for student volunteers to share their interpretation of the diagram (question 1) by asking the following questions:

1. What type of information is given in the diagram?
2. What is this diagram trying to portray?
3. What is the importance of this information following a circular pattern?

	Ask students to share their "new learning" (question 2). To help students share their ideas, you can: 1. Provide students with the sentence starter "Given the new information, I learned _____." 2. Ask students "What information do you see in this definition/representation of ratios that wasn't included in the previous lesson?" **Teacher:** Instruct students to work in groups on Part 3. Students are making a discovery that when writing ratios; they must be in simplest form. If students are unable to recognize the relationship among diagrams, prompt them with the following questions: 1. What is the relationship between the original picture and the one below the arrow? 2. Is there a pattern between the pictures? 3. How do we move from the first picture to the second picture (within the same diagram)? 4. Count the number of each object in the first picture and each object in the second picture (and third for Diagram 2). What do you notice about the numbers? Are they the same? Different? **Students:** Work in small groups (3-4 students) to complete Part 3. Students will analyze the 2 diagrams and fill in the provided Bridge Maps, demonstrating an understanding of writing ratios in simplest form. They will then answer 2 questions on their new learning. **Teacher:** Split the class into 2 groups – those who feel confident with the material and their responses in part 3 and those that do not. Have each group stand on opposite sides of the room. Students from opposite sides of the room will pair up with one another to form groups of 4 (there must be at least one student from each side of the room in each group) and discuss their answers. Circulate around the room to monitor student discussions and clarify concepts to groups who are not as confident as others. Provide students with the discussion frames from Strategies Appendix C to help students communicate their thoughts with their partner/class. **Students:** Discuss their interpretation of the diagrams, the Bridge Maps and their answers to the questions. Use the discussion frames to communicate/explain their understanding with peers. **Teacher:** Instruct students to return to their seats and ask student volunteers to share their responses with the class. Use the suggested questions to guide discussion: 1. What observations did you make about…? 2. What did you notice when…? 3. What patterns did you find? 4. How do you know when something is a pattern? 5. Do you always need to create a diagram/ Bridge Map or is there another way to get the end result (in *Diagram 1* and *Diagram 2)*. **<u>Important:</u>** Students should make the connection that ratios must be written in simplest form. Students don't always need to create a diagram or use a Bridge Map to find	

the answer. They can find the simplest form of a ratio by simplifying the ratio the same way we reduce fractions. Give students the following scenario "Marisa went whale watching on Saturday and saw 4 whales and 12 dolphins. What is the ratio of whales to dolphins in simplest form?" Show students all three ways to find the answer – creating a diagram, using a Bridge Map and reducing the ratio in fraction form.

Students: Share their answers with the class by reading what they wrote or summarizing their findings.

Closure

5 minutes:

Exit Ticket - Students will answer the following questions individually:

For more information/directions on using Exit Tickets, refer to Strategies Appendix D.

Option 1: **Write the following ratios in simplest form.**

18 to 12	22 : 66	6 to 24	99 : 22	$\frac{20}{32}$

Option 2:	**(Reduce your answer if appropriate)**

There are 25 cats and 40 dogs in a local neighborhood.

Represent the ratio of dogs to cats in all 3 ways.

Lesson Reflection

Teacher Reflection Evidenced by Student Learning/ Outcomes	

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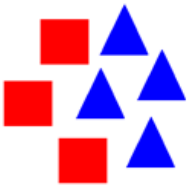
6.RP – 1a Name: _____ Period: _____

Ratio Exploration

Use the discussion frames provided to help communicate your thoughts, ideas or questions.

Part 1: With a partner, answer questions 1 & 2 below.

1. Use the diagram below to answer the following questions:



a. Compare the number of squares to the number of triangles.

b. Compare the number of triangles to the number of squares.

c. What is the difference between the two questions above?

d. Can you make another comparison? Describe.

2. There are _____ girls and _____ boys in the classroom.

List 3 possible questions that could be asked using this information.

1. _____

_____.

2. _____

_____.

3. _____

_____.

Part 2: Main Idea: With a partner or in your group, answer the following question.

1. Where do you encounter similar comparisons in your everyday life? Provide at least 3 examples.

6.RP – 1b Name: _____ Period: _____

Definition of Ratio

Part 1:

What is Ratio?	**How to represent a Ratio?**

• A **ratio** is a comparison of two values or amounts.
• **Example:** If there are 13 boys and 15 girls at the Youth Club in your school, the **ratio** of
  • Girls to boys is 15 to 13
  • Boys to girls is 13 to 15
  • Girls to the club is 15 to 28
  • Boys to the club is 13 to 28.
	• There are multiple ways to represent Ratios:
	  a. Write "*to*"
	  b. Write : (colon)
	• From the example given on the left, the ratio of girls to boys can be represented as
	  a. 15 to 13; say: 15 to 13
	  b. 15:13; say: 15 to 13
	• Interpretation:
	For every 15 girls in the club, there are 13 boys.

Part 2: Synthesizing Ratios

You have explored and hypothesized Ratios through Ratio Exploration and Definition of Ratios activities. During that work, you learned how to compare, read, and represent two quantities. With your team member, state your new understanding of Ratios. _____

_____

_____

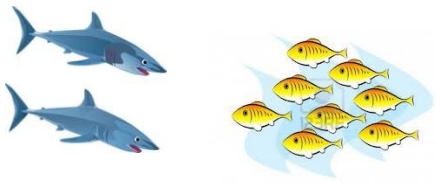
Part 3: Collaboration: Now, with your team, apply your understanding of Ratio to answer problems 1 – 6 below.

1. Use the diagram below, answer questions a & b.

a. What is the ratio of circles to stars? Express your answer using all of the above representations.

b. Fill in the blank:
For every _____ circles there are _____ squares.

2. Use the diagram below, answer questions a & b.

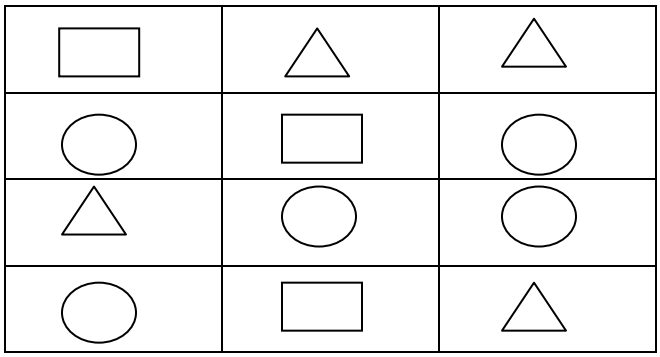


a. What is the ratio of sharks to fish? Express your answer using all of the above representations.

b. Fill in the blank:
For every _____ shark (s) there are _____ fish.

3. a. What is the ratio of short haired students (shorter than shoulder length) to long haired students (longer than shoulder length) in your class? Express your findings in multiple representations. b. For every _____there are _____.	4. a. What is the ratio of solid colored backpacks to multiple colored (or designed) backpacks in the classroom? Express your findings in multiple representations. b. For every _____there are _____.

5. Using the information in the table below:
   - Create 4 ratio questions.
   - Include solutions for each problem, providing at least 2 representations for each ratio.



Question	**Solution**
1. What is the ratio of _____ to _____?	
2.	
3.	
4.	

6. Use the previous problems as a guide to create your own situation that involves ratios. Please also include all possible questions to the problem and be prepared to answer them.

6.RP-1b Name _____Period _____
Frayer Model

Part 4: Ratio Definition Comprehension

Definition in your own words

Facts/ Characteristics
(Symbols, representations)

Ratio

Examples
(What does a ratio look like? – model, Illustration, diagram)

Non-Examples
(What does a ratio not look like?)

Ratios with M&Ms Name _____ Period _____

Complete the following for questions 1-3.

- Write the ratios in two ways (using : and "to")
- Fill in the sentence frame : For every _____ there are _____.

1. What is the ratio of blue M&M's to green M&M's?

2. What is the ratio of yellow M&M's to red M&M's.

3. What is the ratio of green and brown M&M's to the ratio of yellow and red M&M's.

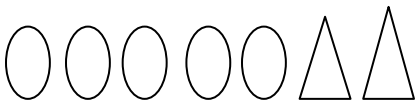
4. Model the ratio 3:1. Use colored pencils to demonstrate three possible ways of representing the ratio.

5. Model the ratio 2 to 5. Use colored pencils to demonstrate 4 possible ways of representing the ratio.

6.RP-1c Name _____ Period _____

Precision of Ratios

Part 1: In your group, discuss the following problems. Make sure all representations of Ratios are expressed in the table.

Diagram / Context	**Ratio represented by *"to"***	**Ratio represented by ":"**	**Ratio represented by " —"**
1. Write the ratio of circles to triangles. 	5 to 2	5:2	$\frac{5}{2}$
2. Write the ratio of triangles to circles. 	2 to 5	2: 5	$\frac{2}{5}$
3. Write the ratio of hexagons to triangles. 			
4. 3. Write the ratio of even numbers to odd numbers. **11, 9, 8, 4, 22, 10**			
5.	2 to 7		$\frac{2}{7}$
6.		1 : 5	

Part 2: Discussion Points: (Answer the following questions with your group).

1. How many different ways are there to represent Ratios? List them.

   _____
   _____
   _____.

2. If you're given one representation, can you come up with the rest of the representations? Explain how.

_____
_____
_____.

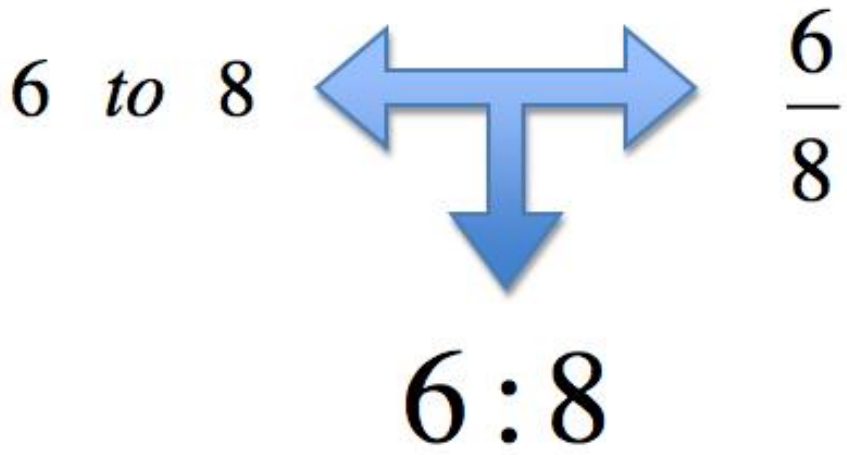
Part 3: Problems 1 – 4 below. On your own or with a partner, complete the chart below.

Diagram / Context	**Ratio represented by** ***"to"***	**Ratio represented by** **":"**	**Ratio represented by** **" —"**
1. The ratio of pencils to markers in Raquel's backpack is 3 to 8.			
2. The ratio of iPhones being used by teenagers to iPhones produced is 120 to 133.			
3.		2:11	
4.			$\frac{9}{2}$

6.RP-1c Name _____ Period _____

Generalization with Ratios

Part 1: With your partner, discuss the diagram.



In your own words, explain the meaning of the diagram above.

_____
_____
_____
_____.

Part 2: Expressions of Ratios

What is Ratio?	**How to represent Ratios?**

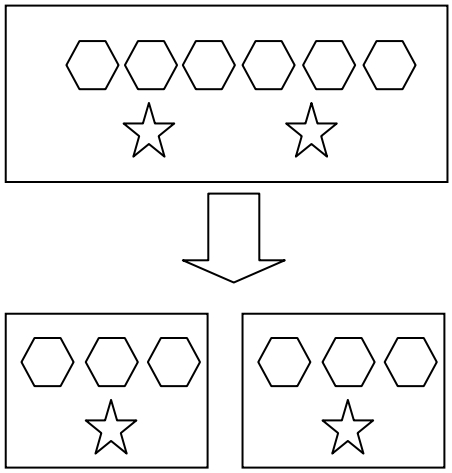
• A **ratio** is a comparison of two values or amounts.
• Ratio is an expression to compare *part* to *whole, part* to *part,* or *whole* to *part.*
• **Example:** There are 13 boys and 15 girls in the Youth Club in your school, the **ratio** of
  • *part* to *part:* Girls to boys is 15 to 13
  • *part* to *part:* Boys to girls is 13 to 15
  • *part* to *whole:* Girls to the club is 15 to 28
  • *whole* to *part:* The number of members to boys is 28 to 13.
	• There are multiple ways to represent Ratios:
	  c. Write "*to*"
	  d. Write : (colon)
	  e. Or write a fraction
	• From the example given on the left, the ratio of girls to boys can be represented as
	  c. 15 to 13; say: 15 to 13
	  d. 15:13; say: 15 to 13
	  e. **;** say: 15 to 13
	• Interpretation:
	  For every 15 girls in the club, there are 13 boys.

1. With your partner, write a "new learning" from the explanation above. Explain.

_____
_____
_____
_____
_____
_____

Part 3: In groups, discuss what is happening in the diagrams below and complete the bridge maps. Afterwards, answer the questions at the bottom of the page.

Diagram 1

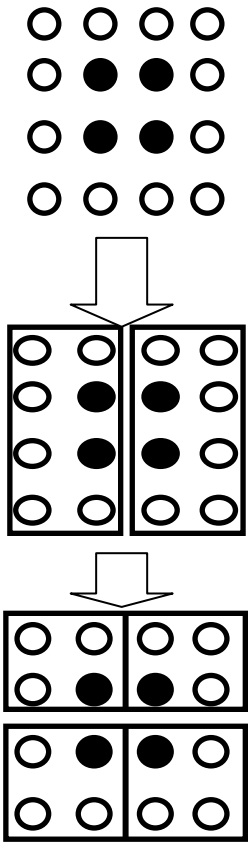


Hexagon

Star

6 as 2

Diagram 2



Filled

4 as as 12

Explain what happens when a ratio can be divided into equal groups. _____

_____

_____

_____

_____


The ratio of strawberries to blueberries is 50 to 10. What is the end result after grouping? Explain your answer. _____

_____

_____

_____

_____

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: Math 6 **Lesson:** **6.RP – Preparation (Preparing the Learner)**	**Grade Level/Course:** 6th Grade	**Duration:** 50 minutes **Date:**
Common Core and Content Standards	5.NBT: 6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. 7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value and the properties of operations.	
Materials/ Resources/ Lesson Preparation	**Pg. #** **Student Edition** 25 Check Up Assignment 27 How Much Does Each Item Cost? 31 Division Skills 33 Application of Division Use the following websites for division skills practice: Discovery Education - **http://tinyurl.com/dedivision (Discovery Education Log-in Required)** Khan Academy - **http://tinyurl.com/kadivision**	
Objectives	**Content:** Students will re-learn the concept and skills required for this unit. **Concept:** Students will understand that the concept of sharing or finding the price of one unit means they will use the operation division. **Skills:** Students will have opportunities to consolidate their fluency with division. **Application:** Students will be able to apply their understanding of division to various situations.	**Language:** Students will be able to communicate, orally, and in writing, about concepts, procedures, strategies, claims, and arguments related to problem solving. **Concept:** Students will use language to show they understand the concept of finding the price of one item. **Skills:** Students will master the language of the division process in different contexts. **Application:** Students will be able to apply the language of division to new contexts. .
Depth of Knowledge Level	☒**Level 1: Recall** ☒**Level 2: Skill/Concept** ☒ **Level 3: Strategic Thinking** ☒ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☒ **1. Make sense of problems and persevere in solving them.** ☐ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☒ **4. Model with mathematics.** ☐ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☒ **7. Look for and make use of structure.** ☒ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** **Teacher:** Help students focus on the understanding of why division is used and the skill of applying division. ☒ **Coherence within and across grade levels** **Teacher:** Although division with its understanding and skill was taught in elementary school, it continues to	

	haunt some students for years to come as it is the foundation for many units in intermediate school as well as high school. Some forms and applications of division include scale, rate, slope, and similarity. ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)** **Teacher:** Ensure that students are being re-introduced to the knowledge that they show lack of understanding on or fluency in. At the same time, connecting the three types of knowledge is essential in building the coherence and rigor of the topic.	
Academic Vocabulary (Tier II & Tier III) **PROVIDES TEACHER SIMPLE EXPLANATION**	**KEY WORDS ESSENTIAL TO UNDERSTANDING** compute operation division quotient divisor dividend	**WORDS WORTH KNOWING** Units from the Imperial System and Metric System – while these systems are not being taught in the Preparing the Learner Lessons, some familiarity with words like pounds and ounces will help students. (Include abbreviations for units of measure (lb, oz., in, qt, etc.)
STUDENTS FIGURE OUT THE MEANING		
Pre-teaching Considerations	**Teacher: It is assumed that students know how to round numbers to the tenth and hundredth place. If this is not the case, a short mini-lesson may be necessary.**	
Lesson Delivery		
Instructional Methods	**Check method(s) used in the lesson:** ☒ **Modeling** ☒ **Guided Practice** ☒ **Collaboration** ☒ **Independent Practice** ☐ **Guided Inquiry** ☐ **Reflection**	

Prior Knowledge, Context, and Motivation:

Teacher: Have students start with the "6.RP – Preparation - Check Up Assignment" in order to diagnose gaps. Encourage students to honestly show areas of need for proper placement.

Make sure students know that this assessment will not count towards their grade. It's being used to see where they need additional help. Students correct their own paper using a red/green pen. You may use this rubric as a guide to determine which assignments the students receive. Since this lesson is only one period long, if a student answers many questions incorrectly you may want to start him/ her off with the assignment "How Much Does Each Item Cost?" which combines the concept and the skill. The other assignments may be given as a homework assignment or done at a later date.

Students: Individually take the **Check Up Assignment**

20 minutes

Rubric and Classification of Questions:

1. Operation is division 60 ÷ 3 This skill is addressed in the "How Much Does Each Item Cost?" assignment.	2. Answers vary Students will benefit from completing the "How Much Does Each Item Cost?" assignment.
3. 525 ÷ 5 = 105 Division is addressed in the "Division Skills" assignment.	4. Difference between 20 ÷ 4 and 4 ÷ 20 Students should indicate that the dividend and divisor have been switched and there is a big difference in the answer. In the first expression the quotient is 5 whereas in the second expression the quotient is .

	This question is not directly addressed in the assignments but students who got this incorrect will benefit by completing the "How Much Does Each Item Cost?" assignment.
5. 233 ÷ 7 = 33.29 rounded to the nearest hundredth. Division is addressed in the "Division Skills" assignment.	6. $6.48 ÷ 9 = $0.72 per orange If a student has this problem incorrect, teacher decides which of the three assignments s/he needs.

Suggestion for Differentiated Instruction:

- The assignment "How Much Does Each Item Cost?" has 8 problems that don't all need to be done. You may assign the even numbers or all depending on the needs of your students.
- The assignment "Division Skills" contains division problems for students who need more practice to gain fluency with division skills.
- If students don't make any errors on the Check Up Assignment and you feel that their division skills are good, they may work on the "Application of Division" assignment.

Lesson Continuum

Body of the Lesson:
Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement

25 minutes
Level 2 – Skills/Concepts
Level 3 – Strategic Thinking

- **Mathematical Practices used in this lesson:**

1 Make sense of problems and persevere in solving them
4 Model with Mathematics
6 Attend to precision
7 Look for and make use of structure

Teacher: Have students work collaboratively in groups of 3 or 4. Assign work depending on the needs of your students. It would be best if all students working on the same assignment sit together. Allow students the time to grapple with the concept and skill. Walk around the room guiding students and paying attention to where they are in their understanding. If possible encourage students to use the academic vocabulary of division (dividend, quotient, and divisor). If technology is available in the classroom students may visit the websites suggested under Resources.

Suggestions for Activities:
Students do a **quick write** on one of the prompts in one of the following ways suggested below:

Suggested Prompts:
1. Explain the operation of division so that its meaning is very clear. Illustrate the concept with a diagram/representation.
2. Describe the steps in dividing a number. Give an example.
3. Explain the words "dividend", "quotient", and "divisor" and use a numeric example to illustrate their meaning.

Students may use one of the following strategies to answer the

Differentiated Instruction:
English Learners:
See suggestion above for grouping students according to need.
Use the Concept/Skill Lesson "How Much Does Each Item Cost?" for students who are still struggling with the understanding of what the operation of division means or still needing assistance with the procedure of division.
Use "Division Skills" for students who need more practice in division.

Special Needs:
See suggestion above for grouping students according to need.
Use the Concept/Skill

	suggested prompts above: ✓ ***Quick write with Three-Step Interview***. Step One – Student A asks Student B the quick write question. Student B responds. Student A must listen carefully because s/he will have to repeat it to the table group. Step Two – Student B now asks Student A the quick write question. Student A responds. Student B must listen carefully because s/he will have to repeat it to their table group. Step Three – Share, in a round robin format at your table group, your partner's response to the quick write. ✓ ***Think – Write – Pair – Share*** ✓ ***Exit Ticket*** For more information/directions on using Exit Tickets, refer to Strategies Appendix D. ***"DIVISION SKILLS"*** **Teacher:** These eight problems can be assigned to students still struggling with the division process. Students can work in small groups depending on the students and their needs. Once students understand the process, they can try completing their problems independently. They can also correct the problems they got wrong on the "Check Up Assignment". ***"APPLICATION OF DIVISION"*** **Teacher:** Have students work collaboratively in groups of 2, 3, or 4 depending on the number of students who scored 100% on the initial assessment. Pass out the "Application of Division" . Students should help each other while the teacher acts as a facilitator. If students in this group get done early have them act as peer tutors to students who still need assistance. They can help students to correct their errors on the "Check Up Assignment". This group of students can also be given the **Exit Ticket** assignment, writing on one of the three prompts below: 1. Explain the operation of division so that its meaning is very clear. Illustrate the concept with a diagram/representation. 2. Describe the steps in dividing a number. Give an example. 3. Explain the words "dividend", "quotient", and "divisor" and use a numeric example to illustrate their meaning.	Lesson "How Much Does Each Item Cost?" for students who are still struggling with the understanding of what the operation of division means or still needing assistance with the procedure of division. Use "Division Skills" for students who need more practice in division. Some students may use a calculator as needed. **Accelerated Learners:** Ensure students understand the concept of division as well as the skill of division before placing them in the Application group. The activity, "Application of Division" extends students' thinking by having them write their own word problems, given an expression and a picture.
Lesson Reflection		

Teacher Reflection Evidenced by Student Learning/ Outcomes	

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6.RP – Preparation - a Name: _____ Period: _____

Preparing the Learner - Check Up Assignment

1. Write which operation you would use for the following problem and set up the operation.

Mrs. Quintero shared $60 between her three children at Disneyland.

Operation: _____
Set up: _____

2. Write a word problem that can be answered with the following computation 120 ÷ 6.

3. Divide 525 by 5

4. What is the difference between 20 ÷ 4 and 4 ÷ 20? Explain your answer.

5. Calculate 233 ÷ 7 (Round your answer to the nearest tenth)

6. John sells a bag of 12 oranges for $4.85. How much is each orange? (Round to the nearest cent)

Preparing the Learner – Conceptual Understanding and Skill Practice

HOW MUCH DOES EACH ITEM COST?

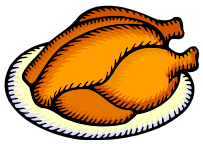
Complete the following table. (Round to the nearest cent)

1. 3 cupcakes for $6.00 	2. 6 oranges for $3 	3. 10 pens for $15 
How much does each cupcake cost? Work this out mentally if you can.	How much does each orange cost? Work this out mentally if you can.	How much does each pen cost? Work this out mentally if you can.
What operation did you use to calculate this?	What operation did you use to calculate this?	What operation did you use to calculate this?
Set up the problem mathematically.	Set up the problem mathematically.	Set up the problem mathematically.
Compute the problem, showing all the steps.	Compute the problem, showing all the steps.	Compute the problem, showing all the steps.

 Name: _____ Period: _____

Preparing the Learner – Conceptual Understanding

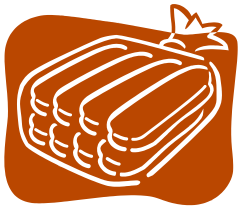
Complete the following table. (Round to the nearest cent)

4. 12 ounces of chicken for $14.24 	5. 6 lb. of almonds for $24.96 	6. A store sells glue sticks for $2.78 for a pack of four. 
What operation will you use to find the price of one ounce?	What operation will you use to find the price of one pound?	What operation will you use to find the price of one glue stick?
Set up the problem mathematically.	Set up the problem mathematically	Set up the problem mathematically
Compute the problem, showing all steps.	Compute the problem, showing all steps.	Compute the problem, showing all steps.

 Name: _____ Period: _____

Preparing the Learner – Conceptual Understanding

Complete the following table. (Round to the nearest cent)

7. Sedgeway is selling 6 sodas for $9. 	8. Yummy is selling a bag of 8 hot dog buns for $2.85. 
Set up the problem to find the cost of each soda.	Set up the problem to find the cost of each bun.
Compute showing all steps.	Compute showing all steps.
How much does each soda cost?	How much does each bun cost?

6.RP – Preparation - c Name: _____ Period: _____

Preparing the Learner – Division Skills

Try these division problems on your own now. (Round to the nearest cent/hundredth where needed)

1. $387 \div 3$

2. $9248 \div 6$

3. $856 \div 8$

4. $\$9.37 \div 4$

5. $584 \div 7$

6. $4814 \div 12$

7. $\$37.05 \div 9$

8. $\$601.99 \div 11$

6.RP – Preparation - d Name: _____ Period: _____

Preparing the Learner – Application of Division

Complete the following table.

Word Problem	**1.** Make up a word problem for the expression $2 ÷ 8	**2.** Make up a word problem for the expression $0.60 ÷ 4	**3.** Make up a word problem that involves the operation of division for the picture below.
Illustrate the expression			
	What is the question?	What is the question?	What is the question?
	Answer the question.	Answer the question.	Answer the question.

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

<table>
<tr><td>Unit: Ratios
Lesson:
6.RP – 2.1</td><td>Grade Level/Course:
Math 6</td><td colspan="2">Duration: 1.5 days
Date:</td></tr>
<tr><td>Common Core and Content Standards</td><td colspan="3">6.RP.2
Understand the concept of a unit rate a/b associated with a ratio a:b with b≠0, and use rate language in the context of a ratio relationship. For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is ¾ cup of flour for each cup of sugar.” “We paid $75 for 15 hamburgers, which is rate of $5 per hamburger.”</td></tr>
<tr><td>Materials/ Resources/ Lesson Preparation</td><td colspan="3"><u>Pg. #</u> <u>Student Edition</u>
35 Rates Opening Problem
37 Rates Exploration
39 Definition of Rates
43 Definition of Rates (Frayer Model)
<u>Pg. #</u> <u>Reference Material</u>
112 Clarifying Bookmarks
114 Discussion Frames
115 Exit Tickets
116 Frayer Model
1 piece of Chart Paper or Poster Paper is needed to create a large-scale Frayer Model.</td></tr>
<tr><td>Objectives</td><td colspan="2">Content:
Students determine the reading rate per minute and convert words per minute to minutes per page.</td><td>Language:
Students will read, speak, and write about the content of reading rate.</td></tr>
<tr><td>Depth of Knowledge Level</td><td colspan="3">☐ Level 1: Recall ☐ Level 2: Skill/Concept
☒ Level 3: Strategic Thinking ☒ Level 4: Extended Thinking</td></tr>
<tr><td>Standards for Mathematical Practice</td><td colspan="3">☒ 1. Make sense of problems and persevere in solving them.
☒ 2. Reason abstractly and quantitatively.
☒ 3. Construct viable arguments and critique the reasoning of others.
☐ 4. Model with mathematics.
☐ 5. Use appropriate tools strategically
☐ 6. Attend to precision.
☒ 7. Look for and make use of structure.
☐ 8. Look for and express regularity in repeated reasoning.</td></tr>
<tr><td>Common Core Instructional Shifts in Mathematics</td><td colspan="3">☐ Focus on the Standards
☐ Coherence within and across grade levels
☐ Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)</td></tr>
<tr><td rowspan="2">Academic Vocabulary (Tier II & Tier III)
PROVIDES TEACHER SIMPLE EXPLANATION</td><td colspan="2">KEY WORDS ESSENTIAL TO UNDERSTANDING</td><td>WORDS WORTH KNOWING</td></tr>
<tr><td colspan="2">hypothesized
assessment</td><td></td></tr>
</table>

	STUDENTS FIGURE OUT THE MEANING	tricycle faucet traits tandem shower head	
Pre-teaching Considerations			

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☒ **Independent Practice** ☒ **Guided Inquiry** ☐ **Reflection**
	Prior Knowledge, Context, and Motivation: Prior Knowledge: Students can draw on past experiences subtracting to find the distance between two points (pages). They will also need to apply knowledge of ratios, and equivalent ratios from previous lesson in this unit. Context: Concrete: Students use the page provided to make assumptions about the average number of words on a page. They also use information provided to determine hector's reading rate and convert words per minute to minutes per page. Motivation: Students make sense of problem. Work to come up with a reasonable estimate. Dialog about a complex problem with many possible approaches.

Lesson Continuum

Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview** **Day 1of 2:** **6.RP-2.1a** **Rates Opening Problem** **10 Minutes:** **Teacher:** Provide students with the discussion frames from Strategies Appendix C to help students communicate their thoughts with their partner/class. Ask students to turn to pg. 35, "6.RP-2.1 Rates Opening Problem". Divide students into groups of 4, even though at times they may work individually or in pairs. Ask students to silently and independently read the opener. Instruct them to think about how they would estimate the time needed if they were in Hector's situation. Remind students that they are only reading and thinking and not answering any of the questions at the bottom of the opener. **Students:** Students will read the problem silently for 3 minutes and should consider the problem as if they were Hector. As students read they need to be thinking about Hector's scenario and how they could estimate the time needed to read the rest of the book. Students should only be reading and not answering the questions at this time. **Teacher:** While the students are reading, write these suggested sentence starters on the board: After reading this, I think we are supposed to… We can use Hector's reading assessment to… We can look at the sample page to figure out… These are to help guide students as they communicate with each other in their partner groups. Having them work in partner groups will facilitate reluctant speakers to communicate their ideas; it also gives them the opportunity to consider the ideas of one other thinker. Encourage use of the Discussion Frames to further aid in communication. **Students:** Students should turn to their partner and take turns completing each of the 3 sentence starters. Students should be speaking in complete sentences and referencing information from the opener. Students can use the Discussion Frames	**Differentiated Instruction:** **English Learners and Students Who Need Additional Support:** Teacher, paraprofessional or peer study buddy: Read questions aloud Teacher: provide vocabulary card with simple definitions and illustration if applicable of Academic Vocabulary. Use sentence starters for short answer responses (p. 51,52, 53, 55) **Accelerated Learners:**

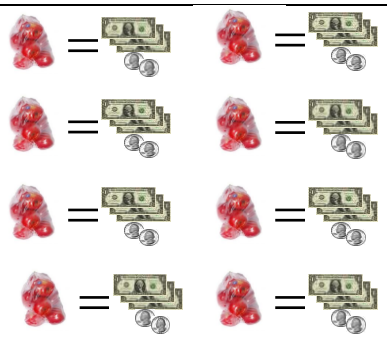
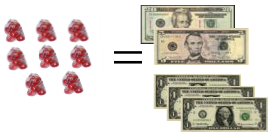
to help them communicate their thoughts/questions.
Teacher: As partner groups are discussing, circulate the room and listen for valid approaches to solving the situation. Students may need to be reminded that there can be many valid approaches to finding a reasonable estimate. They should consider their partner's approach and its validity and give courteous critiques. Encourage use of the Discussion Frames to further aid in communication.

6.RP-2.1b
Rates Exploration
20 minute period:

- **Guided Inquiry to support Generalization & Mathematical Understanding: Communication**
- **Mathematical Practice(s) Being Monitored:**
  6 Attend to precision

Objective: Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning.

Context: Students need to draw concrete models that represent both the units and the relationships between quantities before moving on to more representational models. After creating concrete models students can use models that only represent the relationship between quantities (tape diagrams and double sided number lines).
Teacher: Ask students to turn to pg. 37, "6.RP-2.1b - Rates Exploration".
Instruct students to draw pictures for problems one and two. As you walk the room, encourage the groups to be very literal in the drawing. At this stage they should be drawing pictures that match the word problem.
Students might come up with different representations, such as the one's shown below.

Student A	Student B
	

Through discussion help students to understand that while they may have created drawings that appear different, they may all still be valid representations of the stated problem.
Students: On a separate sheet of paper draw a literal model to find their predictions for problems one and two.
Teacher: Calls on some groups to share models for problem one.
Have them create this next to their concrete model.
Teaching Double Number Line
Students are challenged to model how the quantities increase and decrease relative to each other without doing a drawing of the two units.
Teacher: "Let's try to model the relationship between bags of apples and dollars on these two parallel number lines. What labels should we start with? Let's start by putting zero apples over here at the left end of the number line. How much would zero apples cost? Where should we put that amount on the other number line? Now what if I put five apples here? What should I put up here? ($3.50) If zero apples are here and 5 apples are here what should we put here? Good 10

	apples. And here? Now complete the number lines so that the answers for problem one a, b, and c are shown." **Students:** Contribute to whole group discussion while drawing their own version of the double-sided number line. They work to fill in the rest of the number line so that it models the predictions for all of problem one. **Teacher:** Instruct students to model and make predictions for problems 2 and 3 in any way they like. They should not be limit to the double-sided number line or any other method. They need to be challenged to develop their own methods for recognizing the pattern and understanding the relationship between the quantities. The teacher walks the room, asking student to explain their approach to the problems. **Teacher:** Instruct students to work individually or in pairs to answer question 4 from part 2 of the Rates Exploration assignment. **Students:** Write the answer to question 4 from part 2 of the Rates Exploration assignment. **20 minutes:** **6.RP-2.1c** **Definition of Rates** **Teacher:** Ask students to turn to pg. 37, "6.RP-2.1c - Definition of Rates". Students with their partner read Part 1. Recall to students some of the problems completed in the Rates Exploration as examples of Rates. Ask students the following questions to check for understanding: 1. Who can provide a definition of *rates* using your own words? 2. Provide your own example involving a ratio. **Students:** With a partner, read Part 1 closely, and then share out some examples. **Students:** Complete parts 2 and 3 with their group. **Teacher:** Instruct students to complete part 2 of "6.RP-2.1c - Definition of Rates". Circulate around the room to help struggling students. **Students:** Work in their small groups to complete Part 2 of "6.RP-2.1c - Definition of Rates". **Teacher:** To begin part 4, a suggested intro is offered, "In our exploration of rates we worked with drawing exact models to make predictions about rate progression. Then we worked with double number lines that let us show how the unit's quantities progress relative to each other. Working with these methods has helped use to understand that missing quantities in rates can be predicted using multiplication and division. With this understanding we are now ready to start organizing our data graphically without always having to model the relative distance between quantities." For question 1, the tandem bicycle: On the document camera use the data from the table in column three to create a double sided number line in column two. Then fill in the answers in column one **Students:** Copy as you work the bike problem. Then they work with their groups to complete problems 2 through 4. **Teacher:** Should walk around the room asking students answer the following sample critical thinking questions: How are you able to transfer data between the columns? How are you able to predict missing quantities in the table? How is the table similar to the double number line? How are they different? **Exit ticket:** Share one idea you heard during class today and give credit to the student who shared that idea with the group. (On a piece of paper or orally as they leave) For more information/directions on using Exit Tickets, refer to Strategies Appendix D.	

Day 2 of 2 (partial day)

6.RP-2.1c
Definition of Rates
Part 4 – Definition Comprehension
15 minutes:

- **Independent Group Effort**
- **Mathematical Practice(s) Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others
  7 Look for and make use of structure
  Objective: Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments.

Teacher: Ask students to turn to pg. 43, "6.RP-2.1c – Frayer Model". Do not explain each quadrant to the students (they should be discussing the meaning of each section as a group). For more information/directions on using a Frayer Model, refer to Strategies Appendix E. Below are some possible prompts to help students if they are struggling with the meaning of a particular section.

- **Definition in your own words:**
  1. What does the word *rate* mean to you?
  2. Take a look at *Part 1 - Definition of* Rates to refresh your memory.
  3. If you were writing a definition for someone who has never heard the word *rate* before, what information would you include?
- **Facts/Characteristics:**
  1. What do rates look like?
  2. Is there a certain way/ways to write rates?
  3. Is there anything necessary to include when writing rates?
- **Examples:**
  1. Can you think of a rate that involves some objects in this room?
  2. Where have you compared two objects before? Write down the example.
  3. Refer back to some of the problems in *Part 3: Charts and Tables* to give you some ideas of possible examples.
- **Non-Examples:** Two items/objects that are not compared properly.
  1. Think of the definition of rates. Then create an example that does not follow this definition.

Students: Complete all 4 boxes to the best of their ability. Each group will be given one worksheet to complete together.
Teacher: Debrief the results by creating one large Frayer Model on chart paper using the students' responses for each of the 4 categories. This will be posted in the room to refer back to throughout the unit.
Students: Share their responses with the class to create one large Frayer Model that all students agree upon.

Lesson Reflection	
Teacher Reflection Evidenced by Student Learning/ Outcomes	

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6.RP-2.1a Name _____ Period _____

Rates Opening Problem

Directions: With your Group read about Hectors situation. Then come up with a reasonable time estimate for the scenario and explain your group's approach to this problem.

On Friday afternoon Hector's teacher told him he needed to finish reading his library book by Monday. Hector is wondering how he will ever finish the book in just one weekend.

According to a reading assessment that his teacher gave him, Hector knows that he can read approximately 150 words in 3 minutes.

Hector had already read a little of the book. He's on page 15; the page is shown on the right. The book has a total of 205 pages.

With your group, think about how long it should take Hector to read the rest of the book. Come up with a plan to find a reasonable time estimate. Put your plan into action.

Approximately how many **hours** will it take Hector?

_____

Do you think he will finish? _____

Explain what your group did to make your estimate.

_____

_____

_____

_____

_____

_____

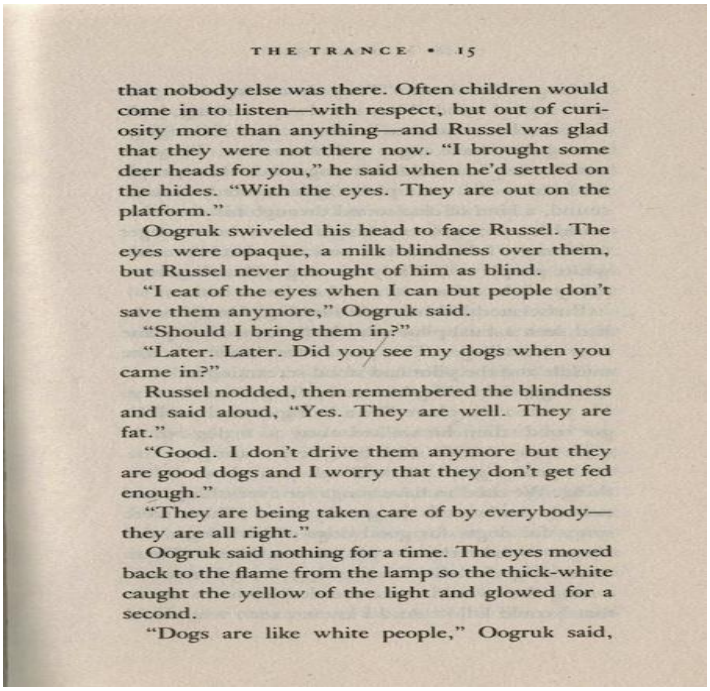
_____

_____

_____

_____

_____



THE TRANCE • 15

that nobody else was there. Often children would come in to listen—with respect, but out of curiosity more than anything—and Russel was glad that they were not there now. "I brought some deer heads for you," he said when he'd settled on the hides. "With the eyes. They are out on the platform."

Oogruk swiveled his head to face Russel. The eyes were opaque, a milk blindness over them, but Russel never thought of him as blind.

"I eat of the eyes when I can but people don't save them anymore," Oogruk said.

"Should I bring them in?"

"Later. Later. Did you see my dogs when you came in?"

Russel nodded, then remembered the blindness and said aloud, "Yes. They are well. They are fat."

"Good. I don't drive them anymore but they are good dogs and I worry that they don't get fed enough."

"They are being taken care of by everybody—they are all right."

Oogruk said nothing for a time. The eyes moved back to the flame from the lamp so the thick-white caught the yellow of the light and glowed for a second.

"Dogs are like white people," Oogruk said,

Work Space:

6.RP – 2.1b Name: _____ Period: _____

Rates Exploration

Part 1: Directions: With you team, discuss and predict the following scenarios. Explain your reasoning (either by writing your thought or using the double-sided number line below).

1) Given the ratio of **$3.50 per bag of five apples**.

Predict:
a) the cost of giving 30 students each an apple.

b) the number of bags that $28.00 can buy.

c) the number of apples you can buy with $28.00.

2) Given the ratio of **seats: wheels** on a tricycle is 1:3.

Predict:
a) the number of wheels for 2 tricycles.

b) the number of seats for 12 wheels.

3) Edwin runs two laps in 12 minutes.

Predict:
a) The number of laps he could run in an hour.

b) The time it would take to run one lap.

c) The time it would take to run three laps.

Part 2: With your team, discuss and answer the following question.

4) What method did you develop for working out these problems? Explain. Did anyone in your group find a different method? If not, can you find a different way?

_____

_____

_____

_____

_____

_____

6.RP – 2.1c Name: _____ Period: _____

Definition of Rates

Part 1: Definition of Rates

Rates are ratios that remain equivalent as the value of the units change.
With a partner, come up with some examples of Rates.

Part 2: Synthesizing Rates

1. You have explored and hypothesized Rates through Rates Exploration and Definition of Rates activities. During that work, you learned how to compare, read, and represent two quantities. With your team member, state your new understanding of Rates.

   _____
   _____
   _____

2. List and describe (in 2 sentences) the methods that were used in the Rates Explorations assignment.

   _____
   _____
   _____.

Double-sided Number Line: (use student language to define.)

3. With you group, list, discuss, and write all methods you and your team members have used to solve Rates problems. Please be as descriptive and detailed as possible.

   _____
   _____
   _____
   _____
   _____
   _____
   _____.

Part 3: Charts and Tables

There are multiple ways to solve a math problem. It is important to learn as many ways to solve a problem as possible in order for you to critique the understanding and explanation of others. Please see below another tool that could be used in solving Rates problems, called a **Chart or Table.** With your team, solve the following problems using both representations: Double-sided Number Line and Table.

<table>
<tr><th>Problem</th><th>Double-sided Number Line</th><th>Table Representation</th></tr>
<tr>
<td> 
1) Given a ratio of pedals to handle bars on a tandem bicycle is 4:2. Predict…
a)…the number of handle bars to 28 pedals.
b)…the number of 20 handle bars to pedals.</td>
<td></td>
<td>
<table>
<tr><th>Handle Bars</th><th>Pedals</th></tr>
<tr><td>1</td><td>2</td></tr>
<tr><td>2</td><td>4</td></tr>
<tr><td>3</td><td>6</td></tr>
<tr><td>10</td><td>20</td></tr>
<tr><td>20</td><td>40</td></tr>
</table>
</td>
</tr>
<tr>
<td> 
2) A bag of 3 avocados costs $2.40. Find…
a)…the number of avocados you can purchase with $12.00.
b)…the number of avocados you can purchase with $8.00.
c)…the number of avocados you can purchase with $4.80 .
d)…the cost for 11 avocados.</td>
<td></td>
<td></td>
</tr>
<tr>
<td> 
3) My showerhead has a maximum flow rate of 5 gallons every two minutes.
If you shower for…
a)…20 minutes, how much water have you used?
b)…<u>20 minutes a day</u>, how much water do you use in a week? (hint: 7 days a week)</td>
<td></td>
<td></td>
</tr>
</table>

4) Create a rate problem using the given table.

Hours	Dollars
1	
2	$22.00
	$27.50
5	$55.00
11	

6.RP-2.1c
Frayer Model

Name _____Period _____

Part 4: Rates Definition Comprehension

Definition in your own words	Facts/characteristics
Examples	**Non-examples**

Rates

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

Unit: Ratios **Lesson:** **6.RP – 2.2**	**Grade Level/Course:** 6th Grade Mathematics	**Duration: 1.5 days** **Date:**
Common Core and Content Standards	**6.RP.2** Understand the concept of a unit rate a/b associated with a ratio a:b with b≠0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is ¾ cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is rate of $5 per hamburger."*	
Materials/ Resources/ Lesson Preparation	**Pg. # Student Edition** 45 Unit Rate Opening Problem 47 Unit Rate Exploration 51 Definition of Unit Rate 55 Definition of Unit Rate (Frayer Model) **Pg. # Reference Material** 112 Discussion Frames 114 Exit Tickets 115 Frayer Model 116 Math Talks **1 piece of Chart Paper or Poster Paper is needed to create a large-scale Frayer Model.**	
Objectives	**Content:** Students will be able to define unit rate and differentiate it from rate. Students will be able to solve unit rate problems.	**Language:** .Students will be able to read problems in order to make sense of them and solve them. Students will also create scenarios that are applicable to unit rates for others to solve.
Depth of Knowledge Level	☒ **Level 1: Recall** ☒ **Level 2: Skill/Concept** ☐ **Level 3: Strategic Thinking** ☐ **Level 4: Extended Thinking**	
Standards for Mathematical Practice	☒ **1. Make sense of problems and persevere in solving them.** ☐ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☒ **4. Model with mathematics.** ☐ **5. Use appropriate tools strategically** ☒ **6. Attend to precision.** ☒ **7. Look for and make use of structure.** ☐ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** **Students understand the concept of Unit Rate and use that knowledge to solve unit rate problems.** ☒ **Coherence within and across grade levels** **7.RP.1 Compute unit rates with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
ca bul ary (TEACHER SIMPLE EXPL	**KEY WORDS ESSENTIAL TO UNDERSTANDING**	**WORDS WORTH KNOWING**

		Ratio Rate Unit Rate	Per For every For each Non-example
	STUDENTS FIGURE OUT THE MEANING		Purpose Value
Pre-teaching Considerations		This lesson requires students to work collaboratively and be able to communicate their understanding with other students. Students should also be familiar with the concept of a Math Talk. Please reference the Strategies Appendix for additional information.	

Lesson Delivery

Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☒ **Guided Practice** ☒ **Collaboration** ☐ **Independent Practice** ☒ **Guided Inquiry** ☐ **Reflection**	
	Prior Knowledge: Students have already been instructed on Ratios and Rates **Context: Students will understand that a uniet rate is a kind of rate with a denominator of 1.** **Motivation:**	
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview** **Day 1 of 2** **Unit Rate Opener** **(4 minutes)** • **Guided Inquiry to support Generalization and Mathematical Understanding: Communication & Critical Thinking** • **Mathematical Practice (s) Being Monitored:** **1** Make sense of problems and persevere in solving them. **3** Construct viable arguments and critique the reasoning of others. **Objective: Students make conjectures and build a logical progression of statements to explore the truth of their conjectures.** **Teacher:** Project the "Unit Rate Opening Problem", via Document Camera or Smart board. Provide students with the discussion frames from Strategies Appendix C *t*o help students communicate their thoughts with their partner/class. **Students:** Students are to read the problem silently (student pg. 45) (1 minute) **Teacher:** Have students turn to a partner and discuss what they understood about the situation shown on the opener. (1 minutes) Remind them to utilize the Discussion Frames to aid in their conversation. Provide scaffolds by asking some of the following questions: 1. Can you picture your situation? What is your setting? What is your purpose? 2. What do you think about when you are making the decision to purchase an item? (Do I need it? Can I afford it?) 3. How do you determine which product to purchase based on your conditions? **Students:** Students are expected to discuss the scenario with their partner and	**Differentiated Instruction:** **English Learners:** Refer to Preparing The Learner Lesson for details on how to diagnose and scaffold Concept and Skills of unit rates. **Students Who Need Additional Support:** Refer to Preparing The Learner Lesson for details on how to diagnose and scaffold Concept and Skills of unit rates. Teacher, paraprofessional or peer study buddy: Read questions aloud Teacher: provide vocabulary card with simple definitions and illustration if applicable of Academic Vocabulary and Words Worth Knowing; put scaffolds and sentence starters (p. 59, 60, 61 (70), 63 (72), 65, 66) on board.

Lesson Continuum

	possibly answer some of the leading questions provided by the teacher. **Teacher:** Have partners discuss in their group of 4. Have them come up with 2 or 3 ideas to share with the whole group later on. (2 minutes) **Students:** Students discuss and have one person take notes on their comments. **<u>Whole Group Discussion</u>** **(6 minutes)** **Teacher:** Summarize the last 4 minutes for the students. They have read the scenario and discussed it in pairs and as a group. Now the teacher should ask leading questions to facilitate a group discussion. Please refer to some of these suggested questions to facilitate the discussion: 1. Where are you? 2. What is your purpose? 3. What information are you given? 4. What information would you like to know? 5. How will the information support your decision? 6. Does it fit the purpose of your visit? **Students:** Students should make sense about the scenario and provide responses that show their ability to hypothesize their purpose. One goal is to have students be able to give the following response(s): 1. Students should predict what kinds of questions could be asked based on the scenario. 2. Students should consider why it's important to consider choices when shopping and make good choices based on mathematical thinking. 3. Some students may choose the less expensive choice because they want to save money. 4. Some students may consider size as a factor before price. 5. Based on the students needs they should be able to share out why they made their decision. **Teacher:** Based on the student's discussion, you should notice that some students might have made their decision based on need or based on value. Lead a concluding discussion on what drives us when we make decisions. Include mathematical understanding behind the scenario as a factor in this process. **6.RP-2.2b** **Unit Rate Exploration: Part 1 Questions 1 - 3** **(15 minutes)** • **Independent Group Effort: Reading Comprehension & Collaboration** • **Mathematical Practice(s) Being Monitored:** **1** Make sense of problems and persevere in solving them. 3 Construct viable arguments and critique the reasoning of others. **6** Attend to precision. **7** Look for and make use of structure. **Teacher:** Ask students to turn to pg. 47, "Unit Rate Exploration". Have students continue working in their groups of 4 to answer Part 1 questions # 1-3. Students should work on these in class. **Students:** Students should collaborate to come up with answers for each problem, either as a whole group or in pairs within their group. Students should only work on questions #1-3. **Teacher:** Walk around and support the mathematical thinking and reasoning to each group. The main purpose for this activity is that students will be discussing their mathematical thinking behind their decision-making. Students should be able to explain the reasoning behind their decisions. The purpose of walking around is to ensure students are thinking about unit rates and performing the skill of dividing to compare units within each scenario. Do not explicitly tell the students to divide the units but lead them into comparing the units.	**Accelerated Learners:** Refer to Preparing The Learner Lesson for details on how to diagnose and scaffold Concept, Skills, and Application of unit rates.

	Students: Students are expected to review each scenario and compare choices to determine which option is the better deal. **6.RP-2.2b** **Unit Rate Exploration: Part 1 Questions 4 - 5** **(5 minutes)** • **Independent Group Effort: Reading Comprehension & Collaboration** • **Mathematical Practice(s) Being Monitored:** **1** Make sense of problems and persevere in solving them. **3** Make viable arguments and critique the reasoning of others. **6** Attend to precision **7** Look for and make use of structure **Teacher:** Have students continue working in their groups of 4 to answer Part 1 questions # 4-5. **Students:** Students should collaborate to come up with answers for each problem, either as a whole group or in pairs within their group. **Teacher:** Questions 4 talks about comparing distance versus time and question 5 deals with fuel efficiency. Even though the contexts have changed the concept of unit rates remains unchanged. The context for unit rate comparison in questions 4 is less biased because there is no need to determine purpose, but value. Question 5 resumes the context of both. Students should be thinking about unit rates in multiple contexts. Regardless of the context "unit rate" can be applied across all scenarios in the exploration. Walk around and support the mathematical thinking and reasoning to each group. The main purpose for this activity is that students will be discussing their mathematical thinking behind their decision-making. Students should be able to explain the reasoning behind their decisions. The purpose of walking around is to ensure students are thinking about unit rates and performing the skill of dividing to compare units within each scenario. Do not explicitly tell the students to divide the units but lead them into comparing the units. **Students:** Students are expected to review each scenario and compare choices to determine the option that fits the situation best. Students should be thinking about unit rates in multiple contexts. **6.RP-2.2b** **<u>Unit Rate Exploration: Part 1: Questions 1 – 5 debrief & Part 2: Hypothesize</u>** **(5 minutes)** **Teacher:** Student groups will be sharing with the class their thinking/decision making process for each of the Unit Rate Exploration problems. **Students**: Resume working in groups of 4. Groups take turns sharing their responses to some of the Unit Rate Exploration problems. Possible Student Responses: 1. Students may share their choices for each question. 2. Students may express mathematical thinking and reasoning behind value decisions. 3. Students may express their decisions based on a pattern or rule. 4. Students may express how they compared their units. **Teacher:** Facilitate a discussion based on the student's responses. Read the directions for part 2 and give students a chance to discuss within their group what they should write and then have students fill out Part 2. Walk around and make sure students are discussing/writing down their methods for solving. Encourage students to look for a common thread that they may have seen while working with all of the Unit Rate Exploration questions. If students have not mentioned the use of a rule or pattern (dividing the units to compare them) don't explicitly tell them to do so. The next section "Definition of Unit Rate" will go into that aspect in greater detail. Give student groups an opportunity to share their	

response to Part 2 before moving on to the next section.
Students: Students should be discussing with their partners their methods for solving the Unit Exploration questions and should discover that in comparing the units they may have followed the same rule or pattern.
Students will then share out their responses to part 2 with the whole class.

Day 2 of 2

Math Talk: Unit Rate
(5 minutes)

- **Guided Inquiry to support Generalization & Mathematical Understanding: Communication**
- **Mathematical Practice(s) Being Monitored:**

3 Construct viable arguments and critique the reasoning of others.

Objective: Make conjectures and build a logical progression of statements to explore the truth of their conjectures.

For more information/directions on using Math Talks, refer to Strategies Appendix G.

Teacher: Begin today's class with a math talk about Unit Rate. Use the following math problem for your math talk (write or project on board):
"A Motorcycle travels 230 miles on 5 gallons of gasoline. What are some questions can you ask based on this information? Write at least 2 questions. Be prepared to share.

Students: Students should take about 2 minutes to silently read the problem and come up with their questions, which they write down. They then turn to an elbow partner and share their questions. They may then share with the whole class.

6.RP-2.2c
Definition of Unit Rate: Part 1 - 3
(20 minutes)

- **Guided Inquiry to support Generalization & Mathematical Understanding: Communication**
- **Mathematical Practice(s) Being Monitored:**

1 Make Sense of problems and persevere in solving them.
3 Construct viable arguments and critique the reasoning of others.
4 Model with mathematics

Teacher: Ask students to turn to pg. 51, "6.RP-2.2c - Definition of Unit Rate"
Teacher: Review with students Definition of Unit Rate: Part 1. Start with a review of the concept of Rate and have students read through the Unit Rate definition and blinking example. This is also a time to review alternate examples. Make sure the emphasize the main difference between rate and unit rate is that unit rate compares two quantities measured in different units with a denominator of 1. Often referred to as "per unit". This is a time to wrap up all of the previous activities, which have given students a broad overview of Unit Rate. The next section Part 2: Synthesizing takes all of the completed activities and combines them into a coherent whole.
Students: Students listen to the teacher's recap of Rate and silently review the example of Unit Rate provided. If the teacher provides other examples, students are encouraged to participate in recognizing the difference between rate and unit rate. Students should understand that synthesizing is a step taken at the end of our exploration and definition making to put together all that they have understood so far about Unit Rate.
Teacher: Students are ready to complete part 3 in their groups of 4. Students

should read each of the "Synthesizing" questions and answer them within their group. As students begin to read and answer the questions circulate the room helping groups who may be having trouble summarizing their experience so far with Unit Rate. Encourage students to look back at their information from the previous days activities (Opening, Exploration) to help them complete the questions in this part. Students should state their understanding of unit rates and performing the skill of dividing to compare units.

Teacher: Have students work on questions 1-6 from part 3.
Students: Are to work collaboratively and encouraged to reason and discuss. Encourage use of the Discussion Frames to further aid in communication. Students should show their work appropriately for each question.

- **Example:** Question 1: John works 6 hours a day and earns $150.00 Peter works 8 hours a day and earns $160.00. Who earns more money per hour?
- Students should show their comparison of each person's hours and pay by division. Once they find out how much each person earns per hour they can determine which person is paid more.

Teacher: Once students have had sufficient time to complete the questions from part 4, ask student groups to share their methods for solving select questions. Give each partner group a chance to share their mathematical reasoning, encourage students to not just shout out answers, but instead to give detail to their thinking and give other groups a chance to critique the reasonableness of their methods.
Please refer to some of these suggested questions to facilitate the discussion:

1. Do you agree with the method presented?
2. Did any group find the answer in another way?
3. Was their answer reasonable?
4. Could they have taken a different approach?
5. Is a shortcut for this scenario?

Students: Once the teacher has started asking for volunteers to share, be ready to explain your mathematical reasoning behind solving the questions from Part 4. Listen carefully to other groups and if you feel you can add or provide guidance/correction, raise your hand and volunteer your thoughts.
Possible sentence starters for students to aid in critiquing the thoughts/work of other groups:

1. Something I would have done differently would be…
2. I agree with _____ but I did it this way…
3. I don't think their answer was reasonable because…
4. I agree with the reasonableness of their answer because…
5. I used _____ shortcut to help find the solution.

Provide students with the discussion frames from Strategies Appendix C to help students communicate their thoughts with their partner/class.

Definition of Unit Rate: Part 4
(10 minutes)

- **Guided Inquiry to support Generalization & Mathematical Understanding: Communication**
- **Independent Group Effort: Reading Comprehension, Collaboration & Creativity**
- **Mathematical Practices(s) Being Monitored:**

Objective: Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

Teacher: Part 4 of Unit Rate asks students to create their own Unit Rate scenarios. This can be something similar to any of the previous work completed

on unit rate. Students will work with their partner to create one unique scenario. Students should write the problems down, include illustrations if necessary and on a separate piece of paper, work out a complete solutions making sure to include all work shown and properly labeled units.
(10-15 minutes for the creation)
Students will then give their newly created problem to another partner group for them to solve. Each scenario should feature a different context. (i.e. price per unit, miles per hour, miles per gallon, etc…)
(10-15 minutes for solving)
Remind students that the point of this exercise is show their mathematical understanding of unit rate and not create complex arithmetical problems.
Students: In their partner group from earlier, students are tasked to create a unique scenario where Unit Rate is applied. Students should reference previously solved questions (Part 3) as a guide to help them with creating their scenarios or they can come up with something new. Each scenario should feature a different context. (i.e. price per unit, miles per hour, miles per gallon, etc…) Students can include illustrations if they would like. Each scenario should be created on a separate paper or one paper torn in halves. Students, also on a separate piece of paper, should provide detailed solutions including their mathematical reasoning behind the solution and proper labeling of units. Once students create their scenarios, they need to turn to a different partner group to trade scenarios.
Teacher: Once students have finished creating and solving, encourage students to share some of their favorite student created scenarios as well as their mathematical reasoning when solving them. Students can also critique the reasoning of each other or point out scenarios that did not fit as "Unit Rate" problems. Students may disagree incorrectly and this would be a good time to remind students of our agreed upon definition of Unit Rate: "A unit rate is a rate that has a denominator of 1."
Some possible focusing questions for the class are:

1. Does this scenario fit under the category of Unit Rate? Why/Why not?
2. What strategy could we use to find the solution/make the best choice?

(5 minutes for groups to share)
Students: During the closing share time, students should describe scenarios they liked or scenarios that did not properly fit into "unit rate."
Possible sentence starters for student critiques/presentations:

1. I know that my scenario fits as a unit rate problem because…
2. I don't agree that (student's) scenario is a good unit rate problem because…
3. I used (insert strategy/rule/procedure here) to solve this problem.

Provide students with the discussion frames from Strategies Appendix C to help students communicate their thoughts with their partner/class.

6.RP-2.2c
Definition of Unit Rate
Part 5 – Definition Comprehension
15 minutes:

- **Independent Group Effort**
- **Mathematical Practice(s) Being Monitored:**
  3 Construct viable arguments and critique the reasoning of others
  7 Look for and make use of structure
  Objective: Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments.

Teacher: Ask students to turn to pg. 55, "6.RP-2.2c – Frayer Model". Do not explain each quadrant to the students (they should be discussing the meaning of each section as a group). For more information/directions on using a Frayer Model, refer to Strategies Appendix E. Below are some possible prompts to help students if they are struggling with the meaning of a particular section.

- **Definition in your own words:**
  4. What does the term *unit rate* mean to you?
  5. Take a look at *Part 1 - Definition of Unit Rate* to refresh your

	memory. 6. If you were writing a definition for someone who has never heard of *unit rate* before, what information would you include? • **Facts/Characteristics:** 4. What do unit rates look like? 5. Is there a certain way/ways to write unit rates? 6. Is there anything necessary to include when writing a unit rate? • **Examples:** 4. Can you think of a unit rate that involves some objects in this room? 5. Refer back to some of the problems in *Part 3* to give you some ideas of possible examples. • **Non-Examples:** Two items/objects that are not compared properly. 2. Think of the definition of unit rate. Then create an example that does not follow this definition. **Students:** Complete all 4 boxes to the best of their ability. Each group will be given one worksheet to complete together. **Teacher:** Debrief the results by creating one large Frayer Model on chart paper using the students' responses for each of the 4 categories. This will be posted in the room to refer back to throughout the unit. **Students:** Share their responses with the class to create one large Frayer Model that all students agree upon. **Closing Activity - Exit Tickets:** **Option 1**: One example and one non-example of a Unit Rate problem. **Option 2:** Sentence frame exit ticket: "Unit Rate is a rate with a _____ of _____." **Option 3**: Open-ended exit ticket: Students can write down 1 or 2 facts that they learned about Unit Rates today. For more information/directions on using Exit Tickets, refer to Strategies Appendix D.	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

6.RP-2.2a Name _____ Period _____

Unit Rate Opening Problem

Directions: Read the situation below with your partner(s). Be prepared to discuss your thoughts.

You are at the supermarket shopping for your favorite cereal and you come across two options: a 12 oz (340 g) box that costs $4.50 and a 9.5 oz (266 g) box for $3.75.

6.RP – 2.2b Name: _____ Period: _____

Unit Rate Exploration

Part 1: Directions: With you team, discuss and predict the following scenarios. Explain your reasoning (please be as specific as you can to communicate your thought process).

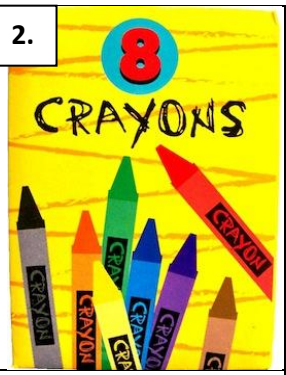
1.

Granny Smith	$1.50 for 2lb
Golden Delicious	$2.00 for 3lb
Red Delicious	$3.00 for 4lb

a. Which is a better deal?

b. How do you know? Explain your decision. Be ready to share why.

2.



8-count box - $1.00

12-count - $2.40

24-count box - $3.80

a. Which is a better deal?

b. How do you know? Explain your decision. Be ready to share why.

3.

Brand A $3.75 for 20oz	Brand B $4.50 for 30oz

a. Which is a better deal?

b. How do you know? Explain your decision. Be ready to share why.

4.

Albert traveled 300 miles in 5 hours.

Benny traveled 250 miles in 4 hours.

a. Who is driving faster?

b. How do you know? Explain your decision. Be ready to share why.

5.	You are shopping for a new car. Which car will save you the most money in overall fuel costs?		
	Car A	**Car B**	**Car C**
Miles on a full tank of gas	340 miles	286 miles	320 miles
Tank Size	12 gallons	10 gallons	11 gallons

a. Which car is more fuel-efficient?

b. How do you know? Explain your decision. Be ready to share why.

Part 2: Hypothesize: With a partner or in your group, discuss and answer the following questions.

What is/are methods that you and your team members used in solving this type of problems? What is the method that is being used across these problems?

6.RP – 2.1c Name: _____ Period: _____

Definition of Unit Rate

Part 1: Definitions

Rate Definition: A rate is a ratio that compares two quantities measured in different units.

Unit Rate Definition: A unit rate is a rate that has a denominator of 1.

Example: On average a person blinks a hundred times in four minutes. How many times does a person blink in one minute?
Solution: The unit rate is 25 blinks per minute.

Part 2: Synthesizing:

1. You have explored and hypothesized Rates through Unit Rate Exploration and Definition of Unit Rate activities. During that work, you learned how to read, make sense of the problems, and show solution to make the best decision. With your team member, state your new understanding of Unit Rates.

   _____
   _____
   _____

2. List and describe (in 2 sentences) the methods that were used in finding Unit Rates.

   _____
   _____
   _____.

3. With you group, list, discuss, and write all methods you and your team members have used to solve Unit Rate problems. Please be as descriptive and detailed as possible.

   _____
   _____
   _____
   _____
   _____
   _____
   _____.

Part 3: In your group show your understanding of Unit Rates by showing solution and answer to the following problems.

1. John works 6 hours a day and earns $150.00. Peter works 8 hours a day and earns $160.00. Who earns more money per hour?	2. A box of 2 light bulbs costs $5.96. A box of 3 light bulbs costs $8.85. Which box is the better buy?
3. Cindy travels 10 miles in 40 minutes. Maria travels 15 miles in 30 minutes. Who is traveling faster?	4. Sergio's 3 acre property has 318 trees while Nick's 5 acre property has 525 trees. Who has the most trees per acre?
5. Six yards of rope costs $5.50 while four yards costs $4.75. Which has the lower unit price?	6. Three bunches of flowers can be bought for $9.48. Four bunches can be bought for $10.64. Which is the better buy?

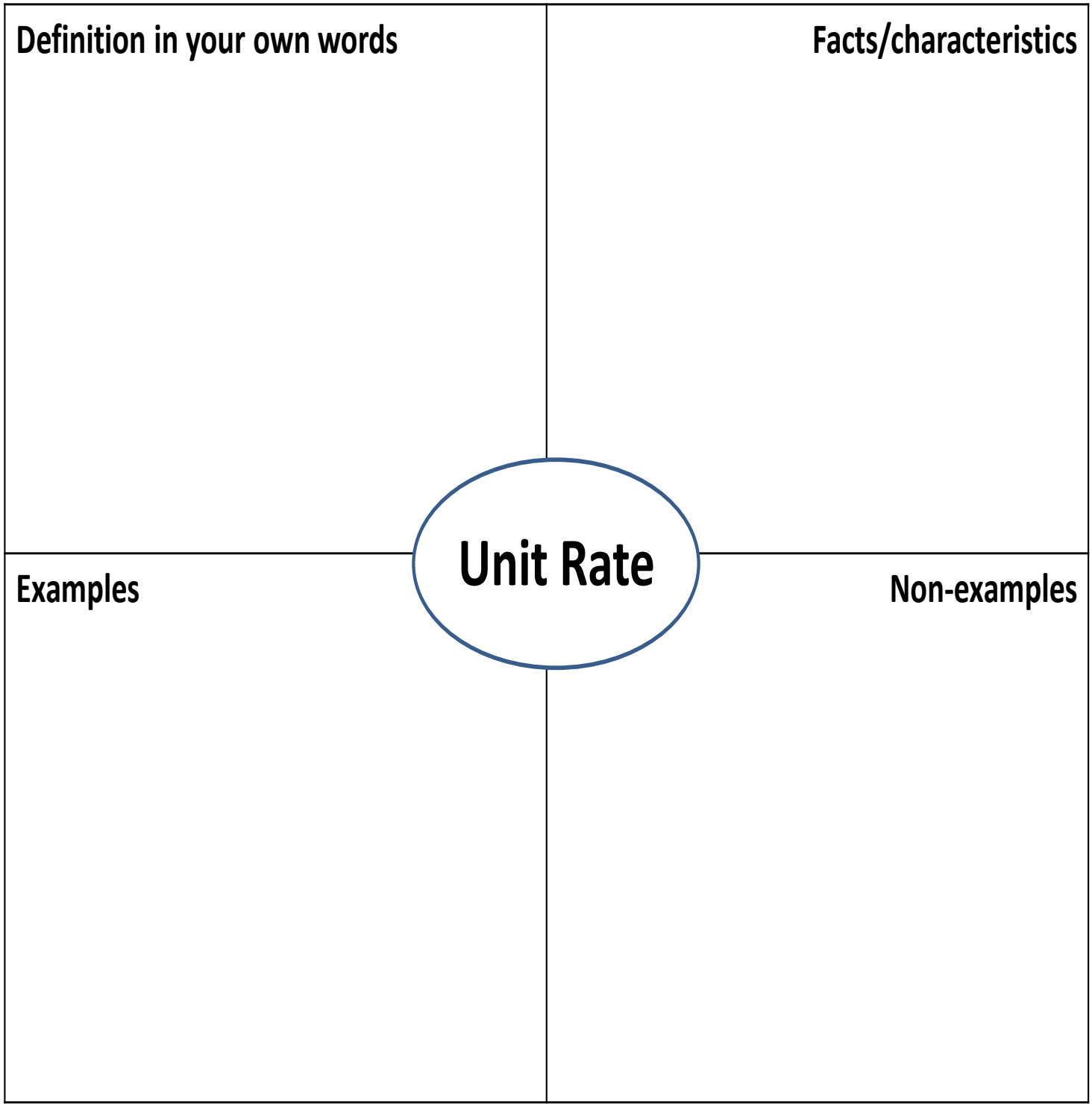
Part 4: With a partner, create a scenario where Unit Rate is applied. Be prepared to present to the whole group or class. (write worked out solutions on a separate piece of paper)

Use the space below for any diagrams or extra information.

6.RP-2.2c Name _____Period _____

Frayer Model

Part 5: Unit Rate Definition Comprehension



SAUSD Common Core Lesson Planner Mathematics Teacher:_____

<table>
<tr><td>Unit: Ratios & Proportional Relationships
Lesson: RP-Generalization</td><td>Grade Level/Course:
Math 6</td><td colspan="2">Duration: 50 min.
Date:</td></tr>
<tr><td>Common Core and Content Standards</td><td colspan="3">6.RP.1
Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.”

6.RP.2
Understand the concept of a unit rate a/b associated with a ratio a:b with b≠0, and use rate language in the context of a ratio relationship. For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is ¾ cup of flour for each cup of sugar.” “We paid $75 for 15 hamburgers, which is rate of $5 per hamburger.”

6.RP.3
Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.</td></tr>
<tr><td>Materials/ Resources/ Lesson Preparation</td><td colspan="3"><u>Pg. #</u> <u>Student Edition</u>
57 6.PR-Generalization – Sorting Activity
<u>Pg. #</u> <u>Reference Material</u>
94 6.PR-Generalization (solutions)
95 Sample Student Poster
114 Discussion Frames
116 Frayer Model
118 Math Talks

✓ Poster or Chart Paper (one per group)
✓ Scissors
✓ Glue sticks
✓ Markers</td></tr>
<tr><td>Objectives</td><td colspan="2">Content:
Students will place given problems in the correct category: Ratio, Rate or Unit rate.</td><td>Language:
Students will explain (both verbally and in writing) why each problem belongs in the category they placed it in.</td></tr>
<tr><td>Depth of Knowledge Level</td><td colspan="3">☒Level 1: Recall ☒Level 2: Skill/Concept
☐ Level 3: Strategic Thinking ☐ Level 4: Extended Thinking</td></tr>
</table>

Standards for Mathematical Practice	☒ **1. Make sense of problems and persevere in solving them.** ☐ **2. Reason abstractly and quantitatively.** ☒ **3. Construct viable arguments and critique the reasoning of others.** ☐ **4. Model with mathematics.** ☐ **5. Use appropriate tools strategically** ☐ **6. Attend to precision.** ☒ **7. Look for and make use of structure.** ☒ **8. Look for and express regularity in repeated reasoning.**	
Common Core Instructional Shifts in Mathematics	☒ **Focus on the Standards** Students understand the concept of a ratio, rate and unit rate and can place these types of problems in the appropriate category. ☐ **Coherence within and across grade levels** ☒ **Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)**	
Academic Vocabulary (Tier II & Tier III) — **PROVIDES TEACHER SIMPLE EXPLANATION**	**KEY WORDS ESSENTIAL TO UNDERSTANDING** Constant Per Average unit	**WORDS WORTH KNOWING** Represent Compare
STUDENTS FIGURE OUT THE MEANING	pace	
Pre-teaching Considerations	Since students will need to communicate with other group members about their understanding of rates, ratios and unit rates, it is crucial to prepare the students with the necessary communication skills for open discussion on the topic. Use Preparing the Learner Lessons prior to teaching this lesson to ensure the students have the necessary communication skills and that they know how to do a Gallery Walk.	
Lesson Delivery		
Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☐ **Guided Practice** ☒ **Collaboration** ☒ **Independent Practice** ☐ **Guided Inquiry** ☒ **Reflection**	
	Prior Knowledge, Context, and Motivation: **Prior Knowledge:** Students have an understanding of the concepts of rate, ratio and unit rate and can define them. **Context:** Students can develop an understanding of words used in context.	
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview** **Day 1 of 1** **Sorting Activity and Poster Creation** **30 minutes:** • **Independent Group Effort: Collaboration and Generalization** • **Mathematical Practice(s) Being Monitored:** 3 Construct viable argument and critique the reasoning of others. Objective: Mathematical proficient students justify their conclusions, communicate them to others, and respond to the	**Differentiated Instruction:** **English Learners:**

Lesson Continuum

	arguments of others. 6 Attend to precision Objective: Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. 7 Look for and make use of structure Objective: Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. **Teacher:** Distribute scissors to each group of 4: ✓ **Scissors** Read the following direction to students: "Each group has been provided with a sorting activity consisting of 12 problems. With your group, cut out each of the 12 questions so that each question is on its own strip of paper". (Student Pg. 57 "6.RP – Generalization – Sorting Activity) **Students:** Students will work in groups of 3-4 to cut out each question resulting in 12 strips of paper. **Teacher:** Once all questions have been cut out, read the following direction to students "In front of you are 12 questions relating to ratios, rates and unit rates. With your group, classify these questions into 3 categories – ratio, rate and unit rate." Explain to the students that the ratio problems should be in one group, the rate problems in another and the unit rate problems separately as well. Allow the students 5 minutes to sort the problems accordingly. Provide students with the discussion frames from Strategies Appendix C to help students communicate their thoughts with their partners/class. **Students:** Read the questions and decide amongst the group which questions to include in each of the 3 categories. Encourage use of the Discussion Frames to further aid in communication. **Teacher:** Distribute one chart-paper (or poster), markers and glue sticks to each group. Explain to the class that each group is responsible for dividing their poster in 3 sections (Ratio, Rate and Unit Rate) and gluing the problems they assigned to each category. Students are also responsible for providing their own written definition of ratio, rate and unit rate on the poster. Allow students 15 minutes to create the poster. **Students:** Working as a group, glue the 12 questions to their pre-determined categories. Using their knowledge of ratio, rate and unit rate (and the problems they assigned to each category) students will create their own definition of ratio, rate and unit rate and write it on the poster. **Gallery Walk** **10 minutes** **For more information/directions on a Gallery Walk, refer to Strategies Appendix F.** **Teacher:** Tape the charts (posters) around the room. Charts should be placed far enough apart so that groups of students will be dispersed around the room to minimize significant crowding in one area. **Teacher:** Communicate the following structure for students to perform the Gallery Walk. Student 1 will be the docent. They will stand next to their group's chart (poster) during the Gallery Walk and answer questions or provide clarifications/explanations to the members of other groups. Assign the remaining students in the group the following problems: Student 2 (Problems 1-3), Student 3 (Problems 4-6) and Student 4	**Students Who Need Additional Support:** Teacher, paraprofessional or peer study buddy: Read questions aloud Teacher: provide vocabulary card with simple definitions and illustration if applicable of Academic Vocabulary and Words Worth Knowing; put scaffolds and sentence starters (p. 79) on board. Post student roles and expectations for Gallery Walk. **Accelerated Learners:**

	(Problems 7-8). Tell Students 2-4 their role in the Gallery Walk. They are to do the following: • Focus on the problems they have been assigned as they view other group's posters. • Take notes on whether their group was in agreement or disagreement with the other groups for each problem they were assigned and note "aha"s. • Ask the other group's docents for clarifications/explanations if needed. • If their group was in disagreement with the majority of the other groups, the student needs to take notes on how other groups solved the problem and be able to report their findings back to their group once the Gallery Walk has been completed. • Mind Gallery Walk norms and be respectful of the work shared by other groups. **Students:** Perform their role in the Gallery Walk. **5 minutes:** **Teacher:** Have the students assemble back in their groups. Instruct Students 2-4 to share their findings with their group members. Tell the groups that they have 10 minutes to finalize their answers based on information they received from the Gallery Walk. **Students:** Students 2-4 share the information they obtained during the Gallery Walk. After discussion among the group members, the group will finalize their answer (change their answer or leave it as originally written). **5 minutes:** **Teacher:** Display the correct category of each question so students can check their work/understanding. **Students:** Correct their work by checking their poster with the teacher's answers.	
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

6.RP-Generalization.a

Sorting Activity

Directions: Cut out each of the following problems into 12 strips.

1.) At the Santa Ana Zoo there are twelve monkeys for every three anteaters. If the Santa Ana Zoo is 20 acres and the San Diego Zoo is 100 acres, how many monkeys and anteaters are at the San Diego Zoo?

2.) If Luis can type 168 words in 4 minutes, what is his speed per minute?

3.) If a 16 oz jar of peanut butter costs $8.00 and a 26 oz jar of peanut butter costs $12.00, which would be the best deal?

4.) In the American flag there are 7 red stripes for every 6 white stripes. How many red stripes and white stripes are there in 120 American flags?

5.) If a frog can hop 48 feet in 4 seconds, how many feet can it hop per second?

6.) A bus drove 265 miles from Los Angeles to Las Vegas in 4 hours. If it traveled at a constant speed, how many hours will it take to travel to Salt Lake City from Las Vegas given that the distance from Las Vegas to Salt Lake City is 425 miles?

7.) Maribel sold some boxes of Girl Scout cookies. For every boy there were three girls that bought her cookies. She has sold cookies to 10 boys. How many girls does she expect to buy her cookies?

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6.RP-Generalization.a

Sorting Activity

Directions: Cut out each of the following problems into strips.

8.) For every 4 two-point shots Kobe Bryant made, he made three three-point shots. If he makes 60 two-point shots, what can you conclude about the number of three-point shots he made last year?

9.) A car can travel 80 miles in 5 hours. How many miles can the car travel in one hour?

10.) Students attend school 180 days every year. What is the number of days students attend school compared to the number of days students do not attend school.

11.) Fifteen quarts of motor oil costs $60. How much will you have to spend for 20 quarts?

12.) Represent the number of triangles to the number of circles in the diagram below.

6.RP-Generalization.a

Sorting Activity - Solutions for Teacher

Directions: Cut out each of the following problems into 12 strips.

1.) At the Santa Ana Zoo there are twelve monkeys for every three anteaters. If the Santa Ana Zoo is 20 acres and the San Diego Zoo is 100 acres, how many monkeys and anteaters are at the San Diego Zoo?
Rate

2.) If Luis can type 168 words in 4 minutes, what is his speed per minute?
Unit Rate

3.) If a 16 oz jar of peanut butter costs $8.00 and a 26 oz jar of peanut butter costs $12.00, which would be the best deal?
Unit Rate

4.) In the American flag there are 7 red stripes for every 6 white stripes. How many red stripes and white stripes are there in 120 American flags?
Rate

5.) If a frog can hop 48 feet in 4 seconds, how many feet can it hop per second?
Unit Rate

6.) A bus drove 265 miles from Los Angeles to Las Vegas in 4 hours. If it traveled at a constant speed, how many hours will it take to travel to Salt Lake City from Las Vegas given that the distance from Las Vegas to Salt Lake City is 425 miles?
Rate

7.) Maribel sold some boxes of Girl Scout cookies. For every boy there were three girls that bought her cookies. She has sold cookies to 10 boys. How many girls does she expect to buy her cookies?
Rate

8.) For every 4 two-point shots Kobe Bryant made, he made three three-point shots. If he makes 60 two-point shots, what can you conclude about the number of three-point shots he made last year?
Rate

9.) A car can travel 80 miles in 5 hours. How many miles can the car travel in one hour?
Unit Rate

10.) Students attend school 180 days every year. What is the number of days students attend school compared to the number of days students do not attend school.
Ratio

11.) Fifteen quarts of motor oil costs $60. How much will you have to spend for 20 quarts?
Rate

12.) Represent the number of triangles to the number of circles in the diagram below.
Ratio

Sample Student Poster

Ratios

10) Students attend school 180 days every year. What is the number of days students attend school compared to the number of days students do not attend school.

12) Represent the number of triangles to the number of circles in the diagram below.

Ratios are problems that

_____
_____
_____
_____

Rates

13.) At the Santa Ana Zoo there are twelve monkeys for every three anteaters. If the Santa Ana Zoo is 20 acres and the San Diego Zoo is 100 acres, how many monkeys and anteaters are at the San Diego Zoo?

4) In the American flag there are 7 red stripes for every 6 white stripes. How many red stripes and white stripes are there in 120 American flags?

6) A bus drove 265 miles from Los Angeles to Las Vegas in 4 hours. If it traveled at a constant speed, how many hours will it take to travel to Salt Lake City from Las Vegas given that the distance from Las Vegas to Salt Lake City is 425 miles?

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11) Fifteen quarts of motor oil costs $60. How much will you have to spend for 20 quarts?

Rates are problems that

_____
_____
_____
_____

Unit Rates

2) If Luis can type 168 words in 4 minutes, what is his speed per minute?

3) If a 16 oz jar of peanut butter costs $8.00 and a 26 oz jar of peanut butter costs $12.00, which would be the best deal?

5) If a frog can hop 48 feet in 4 seconds, how many feet can it hop per second?

9) A car can travel 80 miles in 5 hours. How many miles can the car travel in one hour?

Unit Rates are problems that

_____
_____
_____
_____

SAUSD Common Core Lesson Planner Mathematics Teacher:_____

<table>
<tr><td>Unit: Math 6
Lesson:
6.RP – POM
(Problem of the Month)</td><td colspan="2">Grade Level/Course:
Math 6</td><td>Duration: One Period
Date:</td></tr>
<tr><td>Common Core and Content Standards</td><td colspan="3"></td></tr>
<tr><td>Materials/ Resources/ Lesson Preparation</td><td colspan="3"><u>Pg. #</u> <u>Student Edition</u>
61 Problem of the Month: First Rate</td></tr>
<tr><td>Objectives</td><td colspan="2">Content:</td><td>Language:
.</td></tr>
<tr><td>Depth of Knowledge Level</td><td colspan="3">☐ Level 1: Recall ☐ Level 2: Skill/Concept
☐ Level 3: Strategic Thinking ☐ Level 4: Extended Thinking</td></tr>
<tr><td>Standards for Mathematical Practice</td><td colspan="3">☐ 1. Make sense of problems and persevere in solving them.
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☐ 4. Model with mathematics.
☐ 5. Use appropriate tools strategically
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<tr><td>Common Core Instructional Shifts in Mathematics</td><td colspan="3">☐ Focus on the Standards
☐ Coherence within and across grade levels
☐ Rigor (Balance of conceptual understanding, procedural skill & fluency, and application of skills)</td></tr>
<tr><td rowspan="3">Academic Vocabulary (Tier II & Tier III)</td><td>PROVIDES TEACHER SIMPLE EXPLANATION</td><td>KEY WORDS ESSENTIAL TO UNDERSTANDING</td><td>WORDS WORTH KNOWING</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>STUDENTS FIGURE OUT THE MEANING</td><td></td><td></td></tr>
<tr><td>Pre-teaching Considerations</td><td colspan="3"></td></tr>
</table>

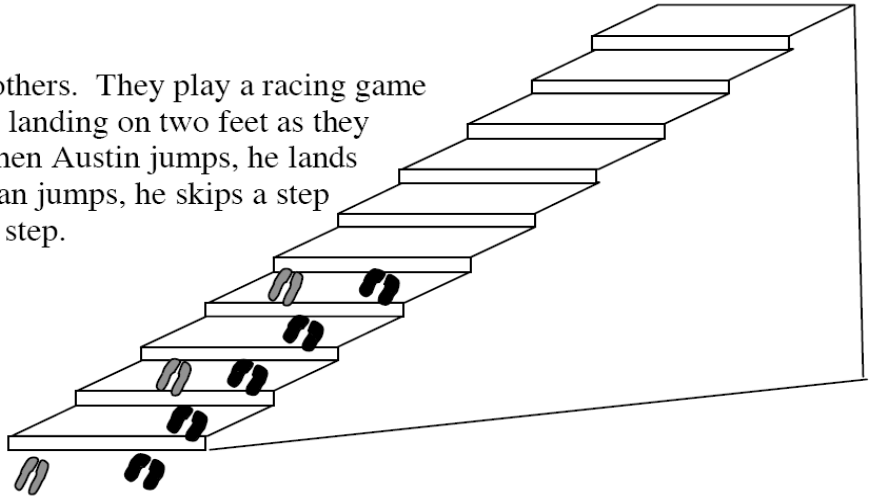
Lesson Continuum

Lesson Delivery		
Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☐ **Guided Practice** ☐ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☐ **Reflection**	
	Prior Knowledge, Context, and Motivation:	
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**<u>Lesson Overview</u>** **Teacher:** Pass out the "Problem of the Month – First Rate" - containing all levels A through E. This set of problems uses measurement, rates of change and algebraic thinking to solve problems involving proportional relationships, metrics and multiple relationships. Students should be in groups of 3 or 4 to work their way through some of the levels starting at level A. Students create a poster for the purpose of a Gallery Walk: For more information/directions on a Gallery Walk, refer to Strategies Appendix F. their concluding thoughts on an **explanation poster** for a level they feel they have completed ***AND/OR*** their current thoughts on a **status poster** for a level they are still exploring. Groups tape their poster to the wall Each group selects a docent who stands next to the poster and answers questions Groups walk from poster to poster looking for different approaches to the problems, any new insights, etc. Whole class share-out if appropriate	**Differentiated Instruction:** **English Learners:** **Students Who Need Additional Support:** **Accelerated Learners:**
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

Problem of the Month
First Rate

Level A

Dylan and Austin are brothers. They play a racing game up the stairs. They jump landing on two feet as they race up the staircase. When Austin jumps, he lands on each step. When Dylan jumps, he skips a step and lands on every other step.



1. Who has to take more jumps to get to the top of the stairs?

2. When Dylan jumps up the staircase, how many jumps does he make?

3. When Austin jumps up the staircase, how many jumps does he make?

4. If Austin and Dylan each took 5 jumps, who would be farthest up the stairs?

5. At the end of the race who took less jumps?

6. Who do you think won the race? Explain your answer.

Level B

Tom and Diane start to race. Tom took 4 seconds to run 6 yards. Diane ran 5 yards in 3 seconds.

If they continued to run at the same speeds, who would get to 30 yards first? Show how you figured out.

Who runs faster? How can you compare their speeds?

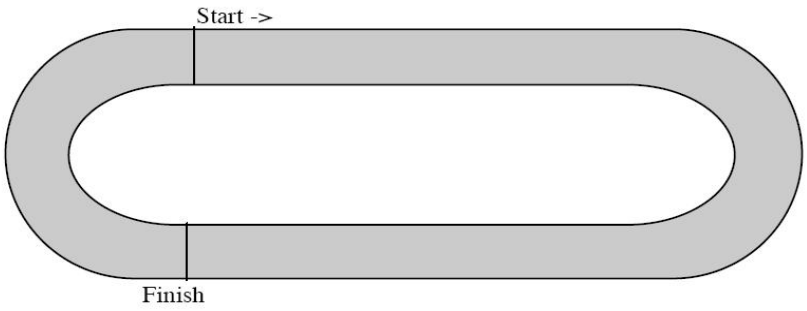
Level C

The Environmental Club at school attends an annual community clean-up event. They have recycling games. A team is assigned an area of land that is scattered with litter. The goal is for a pair of participants to clean up the area in the fastest time possible.

Tammy, working alone, could clean one-half the area in one hour. Her partner Melissa, working alone, could clean one-third of the area in one hour. During the contest when they work together, how long will it take them to clean the area? Explain how you found your solution.

Level D

You are an Olympic runner. You have just qualified to be in the finals of the 1,500-meter race. The track is 400 meters in an oval shape. The race is three and three-fourth laps around the track.



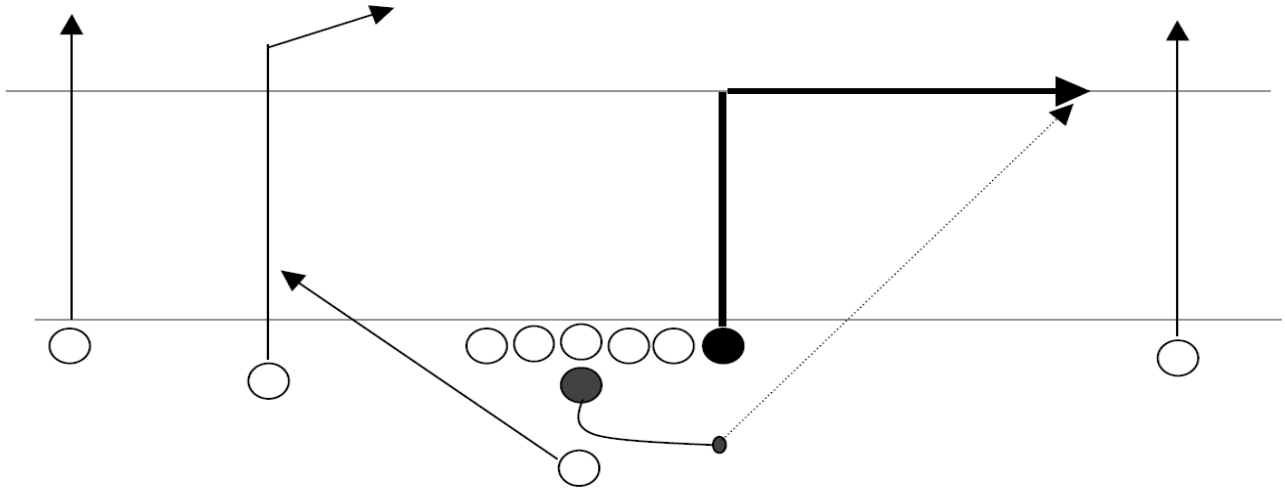
The favorite to win the race is a Kenyan, who holds the current best time, which is 3 minutes 29.4 seconds. The Kenyan runs a very steady race. Each of the Kenyan's lap times (400 meters) are within a second of each other.

You run a completely different type of race. You have a very strong kick, which means you usually lag behind for the first three laps to save energy and then when the leader has 300 meters to go you pour it on to win at the tape. You like to save energy in the first three laps, but you don't want to be more than 50 meters behind when you start your kick to the finish line.

Determine your strategy to win this race. What is the average speed you need to run the first part of the race? What is the average speed you need to run during your kick to win the race? How might your race change if the Kenyan runs two seconds faster?

Level E

It is third down, ten yards to go for a first down. The quarterback calls his favorite play, a roll out to the right and a square out pass to his tight end. See the diagram of the play below:



On the snap from center, the tight end runs straight ahead for ten yards, makes a sharp right turn and runs towards the side lines. The quarterback rolls to his right and stops directly behind where the tight end began, but six yards behind the line of scrimmage. The quarterback does not make the pass until after the tight makes his break towards the sidelines. The tight end is running towards the sideline at a speed of 8 yards/sec. The quarterback tracks the receiver deciding when to throw the pass and the flight path of the ball. If the tight end makes the catch 12 yards after the break, how far does the quarterback throw the pass (in straight line) and at what rate is the distance between the receiver and quarterback changing?

Suppose the quarterback threw the pass sooner, and the receiver is running at the same speed. The distance the ball traveled was 17.3 yards. How many yards after the break was the ball caught and at what rate is the distance between the receiver and quarterback changing?

Given the constant speed of the receiver, consider several locations where the square out pass could be completed. Explain the relationship between the spot of the completion, the distance of the pass and at what rate is the distance between the receiver and quarterback changing?

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SAUSD Common Core Lesson Planner Mathematics Teacher:_____

<table>
<tr><td>Unit: Math 6
Lesson:
6.RP - SA
(Summative Assessment)</td><td colspan="2">Grade Level/Course:
Math 6</td><td>Duration: One Period
Date:</td></tr>
<tr><td>Common Core and Content Standards</td><td colspan="3"></td></tr>
<tr><td>Materials/ Resources/ Lesson Preparation</td><td colspan="3"><u>Pg. #</u> <u>Student Edition</u>
67 MARS TASK: Snail Pace</td></tr>
<tr><td>Objectives</td><td colspan="2">Content:
This assessment gives students the chance to work with distances, time and speeds in inches and minutes.</td><td>Language:
.</td></tr>
<tr><td>Depth of Knowledge Level</td><td colspan="3">☐ Level 1: Recall ☐ Level 2: Skill/Concept
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Lesson Continuum

Lesson Delivery		
Instructional Methods	**Check method(s) used in the lesson:** ☐ **Modeling** ☐ **Guided Practice** ☐ **Collaboration** ☐ **Independent Practice** ☐ **Guided Inquiry** ☐ **Reflection**	
	Prior Knowledge, Context, and Motivation:	
Body of the Lesson: Activities/ Questioning/ Tasks/ Strategies/ Technology/ Engagement	**Lesson Overview** Summative Assessment: Snail Pace This problem allows students the opportunity to work with distances, time and speeds in inches and minutes. (Page 1) A rubric is attached and allows for partial credit. (Page 2-3)	**Differentiated Instruction:** **English Learners:** **Students Who Need Additional Support:** **Accelerated Learners:**
Lesson Reflection		
Teacher Reflection Evidenced by Student Learning/ Outcomes		

Snail Pace

This problem gives you the chance to:
• work with distances, time and speeds in inches and minutes

These snails move very slowly. Here are their speeds.

Snail A
5 inches in 10 minutes

Snail B
3 inches in 20 minutes

Snail C
1 inch in 15 minutes

Snail D
6 inches in 30 minutes

1. How far can snail D travel in 1 hour? _____ inches

2. How far can snail C travel in half an hour? _____ inches

3. How far can snail B travel in 2 hours? _____ inches
   Show how you figured this out.

4. Which snail moves more quickly than the others? _____
   Explain how you figured this out.

_____

_____

_____

Summative Assessment - Rubric

Snail Pace		Rubric
• The core elements of performance required by this task are: • • work with distances, time and speeds in inches and minutes • Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: **12** inches or **1 foot**	1	1
2. Gives correct answer: **2 inches**	1	1
3. Gives correct answer: **18** inches or **1 foot 6 inches** or **1 1/2 feet** Shows correct work such as: 60 divided by 20 = 3 3 x 3 = 9 inches in 1 hour 9 x 2 = 18 inches	1 2	3
4. Gives correct answer: **Snail A** Accept 5 Gives correct explanation such as: In 1 hour Snail A travels 30 inches. In 1 hour Snail B travels 9 inches. In 1 hour Snail C travels 4 inches. In 1 hour Snail D travels 12 inches. *Partial credit* For 1 error	1 2 (1)	3
Total Points		**8**

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Strategies Appendix

A. Clarifying Bookmarks

B. Close Read

C. Discussion Frames

D. Exit Tickets

E. Frayer Model

F. Gallery Walk

G. Math Talks

A. Clarifying Bookmarks

Common Core encourages academic discussions among students as well as reading rich texts. Dr. Aida Walqui offers a versatile tool she calls "clarifying bookmarks", which support students in gaining the language necessary to engage in such academic discussions and high-level reading. Introduce clarifying bookmarks one at a time based on the students comprehension needs. Be sure to include several responses as shown in the example so language remains authentic and flexible.

What I Can Do	What I Can Say
I am going to think about what the selected text may mean.	I'm not sure what this is about, but I think it may mean…
	This part is tricky, but I think it means…
	After rereading this part, I think it may mean…

What I Can Do	What I Can Say
I am going to summarize my understanding so far.	What I understand about this reading so far is…
	I can summarize this part by saying…
	The main points of this section are…

What I Can Do	What I Can Say
I am going to use my prior knowledge to help me understand.	I know something about this from…
	I have read or heard about this when…
	I don't understand the section, but I do recognize…

What I Can Do	What I Can Say
I am going to apply related concepts and/or readings.	One reading/idea I have encountered before that relates to this is…
	We learned about this idea/concept when we studied…
	This concept/idea is related to…

What I Can Do	What I Can Say
I am going to ask questions about ideas and phrases I don't understand.	Two questions I have about this section are…
	I understand this part, but I have a question about…
	I have a question about…

What I Can Do	What I Can Say
I am going to use related text, pictures, tables, and graphs to help me understand unclear ideas.	If we look at this graphic, it shows…
	The table gives me more information about…
	When I scanned the earlier part of the chapter, I found…

B. Close Read

A close read is a 2nd or 3rd reading of the text. It is an intensive analysis of a text in order to come to terms with what it says, how it says it, and what it means. It is the process one goes through to make meaning of the text to understand a big idea or answer an essential question. Furthermore, looking closely at text will lead to stronger writing and an ability to communicate their newly found ideas, knowledge, or opinions. The determination of what type of close read depends on student need or what the text best reveals.

Examples Of Basic Statements Or Questions A Close Read Could Include:
Let's look closer at this section of the text.
Let's investigate this part further.
According to the text…
Let's use evidence from the text to…
Let's see how the author…
We need to look at this part of the text again in order to….
What is meant by…?
What does this image tell you about the text?
What key terms or words do you need to know?
How does this help answer…?
What more have you learned about … after reading…?

C. Discussion Frames

Use these sentence starters/suggestions when communicating your thoughts/ideas.

To Clarify

Will you explain that again?

I have a question about what you said about …

Could you give an example of what you mean by…?

To Agree

You made a good point when you said …

I see what you're saying. I agree because …

My idea builds on _____'s idea. I think …

To Disagree

Another way to look at it is…

I understand what you said about …, but I think…

I have a different answer. I wrote down …

To Cite Evidence

When I read … on page ____, I thought …

I think the text supports my thinking on page ____, paragraph _____, by stating that …

Another example of … is on page ____, paragraph ____, where the author states …

D. Exit Tickets

The Exit-Slip strategy requires students to write responses to questions you pose at the end of class. Exit Slips help students reflect on what they have learned and express what or how they are thinking about the new information. Exit Slips easily incorporate writing into your content area classroom and require students to think critically.

How to use exit slips

1. At the end of your lesson ask students to respond to a question or prompt.
2. You may state the prompt orally to your students or project it visually.
3. You may want to distribute small slips of paper for students to write down their responses.
4. Review the exit tickets to determine how you may need to alter your instruction to better meet the needs of all your students.
5. Collect the exit tickets as a part of an assessment portfolio for each student. (optional)

Differentiated instruction

(Second language learners, Students of varying reading skills and Students with learning disabilities)

- ✓ Have a variety of exit tickets and differentiate which students get which ones
- ✓ Allow students to work on their exit tickets in pairs or small groups
- ✓ Allow students to verbally express the information

Sample Exit Tickets:

Exit Tickets That Document Learning
Write one thing you learned today.
Discuss how today's lesson could be used in the real world.

Exit Tickets That Emphasize The Process Of Learning
I didn't understand…
Write one question you have about today's lesson.

Exit Tickets To Evaluate The Effectiveness Of Instruction
Did you enjoy working in small groups today?

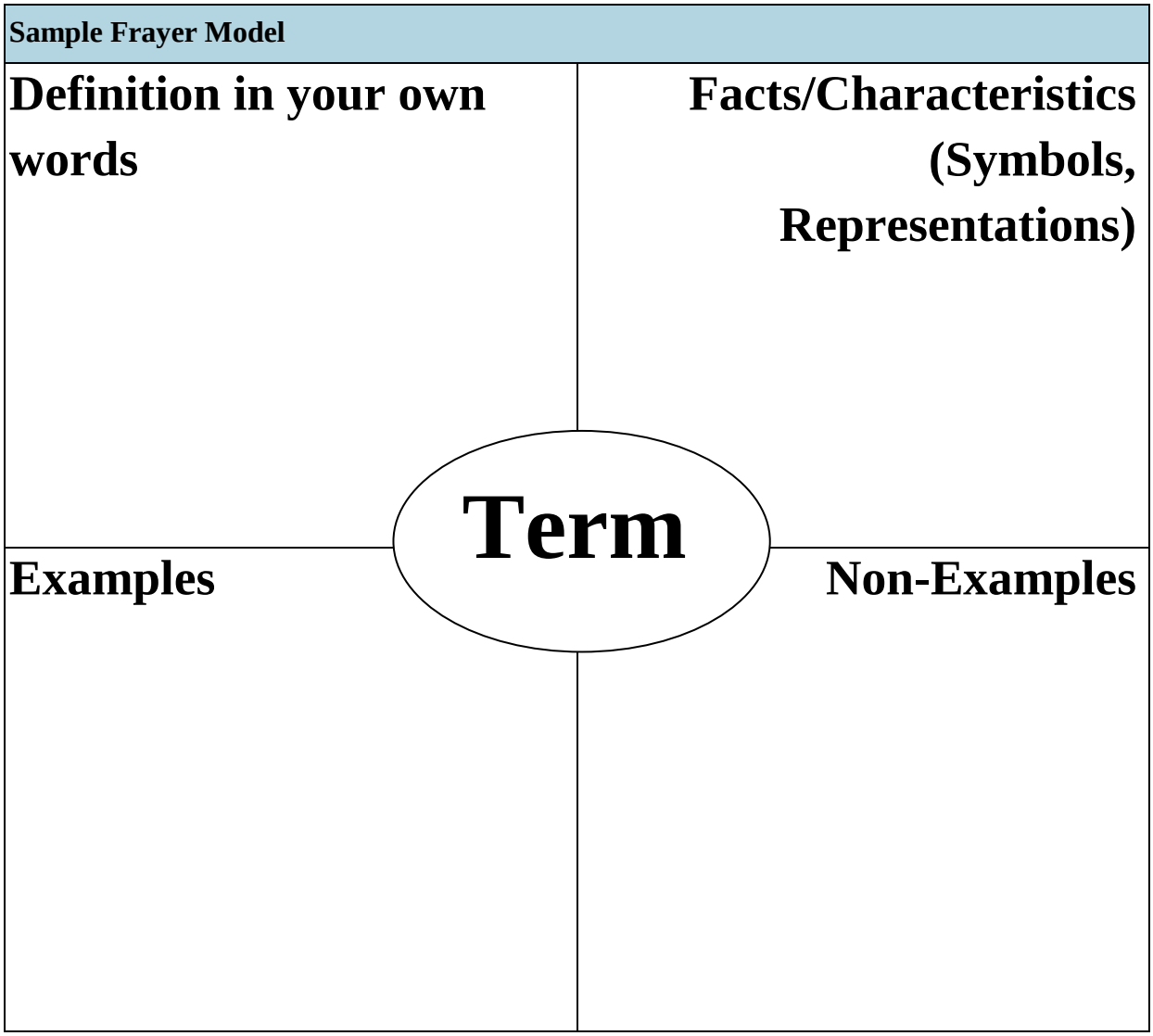
Additional Examples
Please explain more about…
I would like to learn more about…
The thing that surprised me the most today was…

E. Frayer Model

The Frayer Model is a strategy that uses a graphic organizer for vocabulary building. This technique requires students to (1) define the target vocabulary words or concepts, and (2) apply this information by generating examples and non-examples. This information is placed on a chart that is divided into four sections to provide a visual representation for students.

This instructional strategy promotes critical thinking and helps students to identify and understand unfamiliar vocabulary. The Frayer Model can be used with the entire class, small groups, or for individual work. The Frayer Model draws on a student's prior knowledge to build connections among new concepts and creates a visual reference by which students learn to compare attributes and examples.

After individual, partner or small-group Frayer Models have been created; facilitate a classroom discussion on each of the quadrants. A suggested activity during the discussion is the creation of a larger version on chart paper to be hung up in the classroom. Publishing the students' thoughts/contributions is engaging and creates a reference poster during the unit of study.



F. Gallery Walk

Gallery Walk is a processing and/or review strategy in which students create a product that visually or pictorially represents the learning that has just taken place. The products are posted around the classroom, and the students walk around the room checking out their classmates work. If the students work in groups, one student may act as the docent explaining the fine points of their project. A docent is someone who is an expert on the work product (one of the creators) who will guide visitors through the experience of it.

Gallery Walk gets students out of their chairs and actively involves them in synthesizing important concepts. The technique closes with an oral presentation or "report out" in which each group synthesizes comments to a particular question.

Gallery Walk is flexible and has many benefits. Gallery Walk can be organized for a simple fifteen-minute icebreaker or for a week long project involving graded oral and written reports. The technique encourages students to speak and write the language of earth science rather than just hearing it from the instructor. In addition to addressing a variety of cognitive skills involving analysis, evaluation, and synthesis, Gallery Walk has the additional advantage of promoting cooperation, listening skills, and team building.

G.

- Each group will display their poster.
- **Group Structure:**
  - **Student 1:** Docent: answer or provide clarifications / explanations to visitors
  - **Student 2:** What is a unique method that is very different from the rest of the team?
  - **Student 3:** What is the method that is found across the teams?
  - **Student 4:** Pick one method/poster that gives a different answer from yours. Evaluate that method.

Math Talk

A daily ritual with the entire class for the purpose of developing conceptual understanding of and efficiency with numbers, operations and other mathematics such as geometry and algebra. (no more than 10 minutes per day)

Math Talks are used to:

- ✓ Support active student engagement through signaling
- ✓ Review and practice procedures and concepts
- ✓ Introduce a concept before diving into the lesson of the day
- ✓ Support students in deepening their understanding of the Properties of Arithmetic and our Place Value System
- ✓ Explore mathematical connections and relationships
- ✓ Encourage students to construct viable arguments and critique the reasoning of others
- ✓ Support students in using precise mathematical language in sharing their different strategies and approaches

Math Talk is not just taking turns telling your method or meandering undirected talk. It is an instructional conversation directed by the teacher but with as much direct child-to-child talk as possible. Math Talk is focused on developing understanding for all children in the class.

The classroom is transformed as children and teacher take on new roles and responsibilities in a variety of areas. At the beginning of this process, teachers model Math Talk for children and elicit responses. Teachers wait patiently and refrain from intervening immediately to correct children's errors in order to create space and support for children's voices to emerge. Teachers eventually guide children from the side or the back of the classroom so that children can sense that their questions, ideas, and discoveries are the focal point of instruction.

Math Talks create a shift from teacher as sole questioner to both children and teacher as questioners children increasingly explaining and articulating their math ideas a shift from teacher as the source of all math ideas to children's ideas also influencing the direction of lessons children increasingly taking responsibility for learning and for the evaluation of themselves and others increasing amounts of child-to-child talk with teacher guidance as needed.

4 Levels of Math Talks

- ✓ **Level 0:** This is a traditional teacher- directed classroom with brief answer responses from students.
- ✓ **Level 1:** The teacher is beginning to pursue student mathematical thinking. The teacher plays a central role in the Math Talk community.
- ✓ **Level 2:** The teacher models and helps students build new roles. Some co-teaching and co-learning begins as student-to- student talk increases. The teacher physically moves to the side or back of the room and directs from there.
- ✓ **Level 3:** The teacher is a co-teacher and co-learner. The teacher monitors all that occurs and is still fully engaged. The teacher is ready to assist, but now in a more peripheral and monitoring role (coach and facilitator).