Getting to the Core

Math 6
Ratios & Proportional Relationships
Updated: May 8, 2013

Student Name ___________________________ Period ______
# Math 6 – Ratios & Proportional Relationships

## Table of Contents

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Title Page</td>
<td>Math 6 – Ratios &amp; Proportional Relationships</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Table Of Contents</td>
<td>3</td>
</tr>
<tr>
<td>6.RP – FA</td>
<td>Formative Assessment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mars Task: Candies</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Mars Task: Linflower Seeds</td>
<td>7</td>
</tr>
<tr>
<td>6.RP – Hook</td>
<td>Hook</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hook Activity: The Fishing Net</td>
<td>9</td>
</tr>
<tr>
<td>6.RP – 1</td>
<td>Concept 1: Ratios</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ratio Exploration</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Definition Of A Ratio</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Definition Of A Ratio – Frayer Model</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>M &amp; M Activity <em>(Optional Activity)</em></td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Precision Of Ratios</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Generalization With Ratios</td>
<td>23</td>
</tr>
<tr>
<td>6.RP – Preparation</td>
<td>Preparing The Learner</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check Up Assignment</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>How Much Does Each Item Cost?</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Division Skills</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Application of Division</td>
<td>33</td>
</tr>
<tr>
<td>6.RP – 2.1</td>
<td>Concept 2: Rates</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rates Opening Problem</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Rates Exploration</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Definition Of Rates</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Definition Of Rates – Frayer Model</td>
<td>43</td>
</tr>
<tr>
<td>6.RP – 2.2</td>
<td>Concept 2: Unit Rate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unit Rate Opening Problem</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Unit Rate Exploration</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>Definition Of Unit Rate</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Definition Of Unit Rate – Frayer Model</td>
<td>55</td>
</tr>
<tr>
<td>6.RP - Generalization</td>
<td>Precision/Getting General</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sorting Activity</td>
<td>57</td>
</tr>
<tr>
<td>6.RP - POM</td>
<td>Problem of the Month</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First Rate</td>
<td>61</td>
</tr>
<tr>
<td>6.RP – SA</td>
<td>Summative Assessment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mars Task: Snail Pace</td>
<td>67</td>
</tr>
</tbody>
</table>
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.

________________________________________

________________________________________

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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.

-----------------------------------------------

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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.

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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.

_______________________________________________________________

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.

_______________________________________________________________________________________________
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:

   ![Diagram of squares and triangles]

   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.

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
## Definition of Ratio

### Part 1:

<table>
<thead>
<tr>
<th>What is Ratio?</th>
<th>How to represent a Ratio?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A ratio is a comparison of two values or amounts.</td>
<td>• There are multiple ways to represent Ratios:</td>
</tr>
<tr>
<td>• <strong>Example:</strong> If there are 13 boys and 15 girls at the Youth Club in your school, the ratio of</td>
<td>a. Write “to”</td>
</tr>
<tr>
<td>• Girls to boys is 15 to 13</td>
<td>b. Write : (colon)</td>
</tr>
<tr>
<td>• Boys to girls is 13 to 15</td>
<td>• From the example given on the left, the ratio of girls to boys can be represented as</td>
</tr>
<tr>
<td>• Girls to the club is 15 to 28</td>
<td>a. 15 to 13; say: 15 to 13</td>
</tr>
<tr>
<td>• Boys to the club is 13 to 28</td>
<td>b. 15:13; say: 15 to 13</td>
</tr>
<tr>
<td>• Interpretation:</td>
<td>• Interpretation:</td>
</tr>
<tr>
<td>For every 15 girls in the club, there are 13 boys.</td>
<td>For every 15 girls in the club, there are 13 boys.</td>
</tr>
</tbody>
</table>

### 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.
   ![Diagram with stars and circles]
   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.
   ![Diagram with sharks and fish]
   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.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>◢</td>
<td>□</td>
<td>◢</td>
</tr>
<tr>
<td>△</td>
<td>◢</td>
<td>△</td>
</tr>
<tr>
<td>◢</td>
<td>□</td>
<td>△</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is the ratio of _________________ to _________________?</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
</tbody>
</table>
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.

__________________________________________________________________________________________________
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__________________________________________________________________________________________________
__________________________________________________________________________________________________
__________________________________________________________________________________________________
__________________________________________________________________________________________________
__________________________________________________________________________________________________
__________________________________________________________________________________________________
Part 4: Ratio Definition Comprehension

<table>
<thead>
<tr>
<th>Definition in your own words</th>
<th>Facts/ Characteristics (Symbols, representations)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Non-Examples
What does a ratio not look like?
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.
### Part 1: In your group, discuss the following problems. Make sure all representations of Ratios are expressed in the table.

<table>
<thead>
<tr>
<th>Diagram / Context</th>
<th>Ratio represented by “to”</th>
<th>Ratio represented by “:”</th>
<th>Ratio represented by “—”</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Write the ratio of circles to triangles.</td>
<td>5 to 2</td>
<td>5:2</td>
<td>( \frac{5}{2} )</td>
</tr>
<tr>
<td>2. Write the ratio of triangles to circles.</td>
<td>2 to 5</td>
<td>2:5</td>
<td>( \frac{2}{5} )</td>
</tr>
<tr>
<td>3. Write the ratio of hexagons to triangles.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. 3. Write the ratio of even numbers to odd numbers.</td>
<td>11, 9, 8, 4, 22, 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>2 to 7</td>
<td>2:7</td>
<td>( \frac{2}{7} )</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td>1:5</td>
<td></td>
</tr>
</tbody>
</table>
**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.

<table>
<thead>
<tr>
<th>Diagram / Context</th>
<th>Ratio represented by “to”</th>
<th>Ratio represented by “:”</th>
<th>Ratio represented by “___”</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The ratio of pencils to markers in Raquel’s backpack is 3 to 8.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The ratio of iPhones being used by teenagers to iPhones produced is 120 to 133.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>2:11</td>
<td></td>
</tr>
</tbody>
</table>
| 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?
- 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.

How to represent Ratios?
- There are multiple ways to represent Ratios:
  - Write “to”
  - Write : (colon)
  - Or write a fraction
- From the example given on the left, the ratio of girls to boys can be represented as
  - 15 to 13; say: 15 to 13
  - 15:13; say: 15 to 13
  - ; 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 6
Star 2

Diagram 2

Filled 4

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.
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)
**HOW MUCH DOES EACH ITEM COST?**

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

<table>
<thead>
<tr>
<th></th>
<th>1. 3 cupcakes for $6.00</th>
<th>2. 6 oranges for $3</th>
<th>3. 10 pens for $15</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How much does each cupcake cost? Work this out mentally if you can.</td>
<td>How much does each orange cost? Work this out mentally if you can.</td>
<td>How much does each pen cost? Work this out mentally if you can.</td>
</tr>
<tr>
<td></td>
<td>What operation did you use to calculate this?</td>
<td>What operation did you use to calculate this?</td>
<td>What operation did you use to calculate this?</td>
</tr>
<tr>
<td></td>
<td>Set up the problem mathematically.</td>
<td>Set up the problem mathematically.</td>
<td>Set up the problem mathematically.</td>
</tr>
<tr>
<td></td>
<td>Compute the problem, showing all the steps.</td>
<td>Compute the problem, showing all the steps.</td>
<td>Compute the problem, showing all the steps.</td>
</tr>
</tbody>
</table>
**Preparing the Learner – Conceptual Understanding**

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

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4. 12 ounces of chicken for $14.24</strong></td>
<td><strong>5. 6 lb. of almonds for $24.96</strong></td>
<td><strong>6. A store sells glue sticks for $2.78 for a pack of four.</strong></td>
</tr>
<tr>
<td><img src="image1" alt="Chicken" /></td>
<td><img src="image2" alt="Almonds" /></td>
<td><img src="image3" alt="Glue" /></td>
</tr>
<tr>
<td>What operation will you use to find the price of one ounce?</td>
<td>What operation will you use to find the price of one pound?</td>
<td>What operation will you use to find the price of one glue stick?</td>
</tr>
<tr>
<td>Set up the problem mathematically.</td>
<td>Set up the problem mathematically</td>
<td>Set up the problem mathematically</td>
</tr>
<tr>
<td>Compute the problem, showing all steps.</td>
<td>Compute the problem, showing all steps.</td>
<td>Compute the problem, showing all steps.</td>
</tr>
</tbody>
</table>
Complete the following table. (Round to the nearest cent)

<table>
<thead>
<tr>
<th>Problem Number</th>
<th>Description</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>Sedgeway is selling 6 sodas for $9.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Set up the problem to find the cost of each soda.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compute showing all steps.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How much does each soda cost?</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Yummy is selling a bag of 8 hot dog buns for $2.85.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Set up the problem to find the cost of each bun.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compute showing all steps.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How much does each bun cost?</td>
<td></td>
</tr>
</tbody>
</table>
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. $601.99 \div 11$
Complete the following table.

<table>
<thead>
<tr>
<th>Word Problem</th>
<th>Illustrate the expression</th>
<th>What is the question?</th>
<th>Answer the question.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Make up a word problem for the expression $2 ÷ 8$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Make up a word problem for the expression $0.60 ÷ 4$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Make up a word problem that involves the operation of division for the picture below.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.RP.2.1a  
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.

Work Space:
Rates Exploration

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

<table>
<thead>
<tr>
<th>1) Given the ratio of <strong>$3.50 per bag of five apples.</strong> Predict:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) the cost of giving 30 students each an apple.</td>
</tr>
<tr>
<td>b) the number of bags that $28.00 can buy.</td>
</tr>
<tr>
<td>c) the number of apples you can buy with $28.00.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2) Given the ratio of <strong>seats: wheels</strong> on a tricycle is 1:3. Predict:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) the number of wheels for 2 tricycles.</td>
</tr>
<tr>
<td>b) the number of seats for 12 wheels.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3) Edwin runs two laps in 12 minutes. Predict:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) The number of laps he could run in an hour.</td>
</tr>
<tr>
<td>b) The time it would take to run one lap.</td>
</tr>
<tr>
<td>c) The time it would take to run three laps.</td>
</tr>
</tbody>
</table>

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?

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__________________________________________________________________________________________________
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 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.

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   ________________________________________________________________________________________________
   ________________________________________________________________________________________________
   ________________________________________________________________________________________________
   ________________________________________________________________________________________________
   ________________________________________________________________________________________________
   ________________________________________________________________________________________________
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>
<thead>
<tr>
<th>Problem</th>
<th>Double-sided Number Line</th>
<th>Table Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Tandem Bicycle" /> 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><img src="image" alt="Table with Handle Bars and Pedals" /></td>
</tr>
<tr>
<td><img src="image" alt="Avocados" /> 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><img src="image" alt="Showerhead" /> 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)...20 minutes a day, how much water do you use in a week? (hint: 7 days a week)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4) Create a rate problem using the given table.

<table>
<thead>
<tr>
<th>Hours</th>
<th>Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>$22.00</td>
</tr>
<tr>
<td></td>
<td>$27.50</td>
</tr>
<tr>
<td>5</td>
<td>$55.00</td>
</tr>
<tr>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>
Part 4: Rates Definition Comprehension

<table>
<thead>
<tr>
<th>Definition in your own words</th>
<th>Facts/characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examples</th>
<th>Non-examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rates</td>
<td></td>
</tr>
</tbody>
</table>
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.
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).

<table>
<thead>
<tr>
<th>1.</th>
<th>2.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granny Smith</td>
<td>$1.50 for 2lb</td>
</tr>
<tr>
<td>Golden Delicious</td>
<td>$2.00 for 3lb</td>
</tr>
<tr>
<td>Red Delicious</td>
<td>$3.00 for 4lb</td>
</tr>
<tr>
<td>8-count box - $1.00</td>
<td>12-count - $2.40</td>
</tr>
</tbody>
</table>

a. Which is a better deal?

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

a. Which is a better deal?

b. How do you know? Explain your decision. Be ready to share why.
3. a. Which is a better deal?

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

<table>
<thead>
<tr>
<th>Brand A</th>
<th>Brand B</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3.75 for 20oz</td>
<td>$4.50 for 30oz</td>
</tr>
</tbody>
</table>

4. a. Who is driving faster?

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

Albert traveled 300 miles in 5 hours.  
Benny traveled 250 miles in 4 hours.
5. **You are shopping for a new car. Which car will save you the most money in overall fuel costs?**

<table>
<thead>
<tr>
<th></th>
<th>Car A</th>
<th>Car B</th>
<th>Car C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miles on a full tank of gas</td>
<td>340 miles</td>
<td>286 miles</td>
<td>320 miles</td>
</tr>
<tr>
<td>Tank Size</td>
<td>12 gallons</td>
<td>10 gallons</td>
<td>11 gallons</td>
</tr>
</tbody>
</table>

a. Which car is more fuel-efficient?

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

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**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?

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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.

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

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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.

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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>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?</td>
<td>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?</td>
</tr>
<tr>
<td>3. Cindy travels 10 miles in 40 minutes. Maria travels 15 miles in 30 minutes. Who is traveling faster?</td>
<td>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?</td>
</tr>
<tr>
<td>5. Six yards of rope costs $5.50 while four yards costs $4.75. Which has the lower unit price?</td>
<td>6. Three bunches of flowers can be bought for $9.48. Four bunches can be bought for $10.64. Which is the better buy?</td>
</tr>
</tbody>
</table>
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.
Part 5: Unit Rate Definition Comprehension

<table>
<thead>
<tr>
<th>Definition in your own words</th>
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**Unit Rate**
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?
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.

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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?
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.