

**Mathematics-Finding the Unit Rate**

**Teacher: Arnold, Olivierre, Sinto, Nilsson**

**Unit: Ratio and Proportional Relationships**

**Grade Level: 6**

**Duration: 2 days**

**Essential Question**

(Domain 1: Planning and Preparation-Component 1c: Designing Coherent Instruction)

How are rates and unit rates used in the real world?  
How is a unit rate similar to and different from a ratio?

Extended Understanding: A unit rate is a special ratio with a denominator of one that compares different types of measures.

**Background Knowledge**

**Background Summary:**

- Students will have an understanding of ratios and ratio language to compare two quantities.

**Lesson Objective:**

- Students will understand the concept of finding a unit rate. Students will use the unit rate in real-mathematical contexts by reasoning through tables to compare ratios. Students will solve unit rate problems involving

**Scenario**

- You are an engineer hired by a company to investigate the different mileage capacity of different cars. You have been given a robot that has the capability to mimic the driving functions of different cars given different amounts of fuel. The company has asked you compare the unit rate of miles per gallon for each car to determine which is most efficient. To complete this task, you must run trials, collect data, calculate the unit rate, and compare them to the other cars.

**Standards**

(Domain 1: Planning and Preparation- Component 1a: Demonstrating Knowledge of Content and Pedagogy)

6.R.P

1. Understand ratio concepts and use ratio reasoning to solve problems. 1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
2. Understand the concept of a unit rate  $a/b$  associated with a ratio  $a:b$  with  $b \neq 0$ , and use rate language in the context of a ratio relationship.
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.
  - b. Solve unit rate problems including those involving unit pricing and constant speed.

<p>Vocabulary (Domain I: Planning and Preparation - Component 1e: Demonstrating Knowledge of Students.)</p>	<p>Prep Work/Materials (Domain 1 Planning and Instruction-Component 1e: Designing Coherent Instruction, Domain 3 Instruction-Component 3c: Instruction Engaging Students in Learning)</p>	<p>Cross Curricular Connection (Domain I: Planning and Preparation - Component 1a: Demonstrating Knowledge of Content and Pedagogy, Component 1b: Demonstrating Knowledge of Students.)</p>
<p>Ratio Equivalent ratio Unit Rate Per Quantity Efficiency Rate Ratio Table Proportions</p>	<p>Lego Robot Worksheet to collect data Measuring tape/Ruler Post-it notes (for student's questions that may arise) Calculators (for struggling students)</p>	<p>Science-Collecting and analyzing data  ELA-inferencing; written responses</p>
<p>Differentiation (Domain I Planning and Preparation-Component 1e: Designing Coherent Instruction, Domain 3: Instruction - Component 3b: Using Question and Discussion techniques Domain 3: Instruction - Component 3c: Engaging Students in Learning)</p>		
<p><b><u>Students with Disabilities/Struggling Learners</u></b> Provide calculator for students who need it. pair these students with someone who can help them.</p> <p><b><u>Grade Level Students</u></b> Have the students play this game. <a href="http://www.mathsisfun.com/measure/unit-price-game.html">www.mathsisfun.com/measure/unit-price-game.html</a> Have students look for misleading ads based on unit pricing.</p>		

<p>Procedure (Domain I Planning and Preparation-Component 1e: Designing Coherent Instruction, Domain 3: Instruction - Component 3b: Using Question and Discussion techniques Domain 3: Instruction - Component 3c: Engaging Students in Learning)</p>	<p>Student Engagement (Teacher Assessment)</p>
<ul style="list-style-type: none"> <li>● Steps for students to follow</li> <li>● Place robot at the start line created by teacher</li> <li>● Select Unit Rate Cars program from the program screen</li> <li>● Select appropriate car and gallon measurement for the trial they are running. <ul style="list-style-type: none"> <li>● Allow the program to run</li> <li>● Once the robot has come to a stop students will measure the distance the robot went using the key provided by the teacher <ul style="list-style-type: none"> <li>● FOR THE WAY THE PROGRAM IS ORIGINALLY PLANNED EACH CAR WILL MOVE 3 INCHES PER MILE PROGRAMMED SO A MAXIMUM OF 90 INCHES FOR THE 5 GALLON ROUND IS NEEDED (This can be changed in the move forward myblock by changing the multiple in the math block. <ul style="list-style-type: none"> <li>● Using the 1 gallon program, students will easily calculate the unit rate of the car in miles per gallon</li> <li>● Students will then make predictions as to how far each car will run on 2 gallons and then 5 gallons based on the unit rate calculated previously.</li> </ul> </li> </ul> </li> </ul> </li> </ul> <p>Procedural Skill: As students have the opportunity to practice multiplication and division of whole numbers, fractions and decimals while working real world problems.</p>	<p>Students are attending to precision as they collect and record their data.</p> <p>Students attend to precision is done in this activity as the students communicate with others and try to use clear mathematical language when discussing their reasoning. .</p>
<p>Assessment (Formative or Summative) (Domain 1 Planning and Instruction- Component 1e: Designing Coherent Instruction, Domain 3 Instruction- Component 3c: Engaging Students in Learning, Domain 3 Instruction- Component 3d: Using Assessment in Instruction)</p>	<p>Student Engagement (Teacher Assessment)</p>
	<p>Students are able to successfully answer the exit question as a result from learning the information during instruction.</p>
<p>Additional Resources</p>	

[https://youtu.be/liW\\_ALj4Qj8](https://youtu.be/liW_ALj4Qj8)  
[www.BrainPop.com/math/dataanalysis/comparingprices/](http://www.BrainPop.com/math/dataanalysis/comparingprices/)  
[www.mathsisfun.com/measure/unit-price-game.html](http://www.mathsisfun.com/measure/unit-price-game.html)

***Do Now:***

Explain the difference between a rate and a ratio.

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What are some features your ideal car would have? Why did you choose those?

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Name \_\_\_\_\_ Date \_\_\_\_\_

**Finding the Unit Rate**

Make a prediction on which car you think will use the least amount of gas for a particular distance. Collect and record your data. Calculate the unit rate. Be sure to show your work.

**1st Trial**

Prediction \_\_\_\_\_

<b><u>Name of Car</u></b>	<b><u>Distance Traveled/Inches</u></b>	<b><u>Gas Used</u></b>	<b><u>MPG/Unit Rate- Show your calculations</u></b>
<b><u>Hummer</u></b>			
<b><u>Hybrid</u></b>			
<b><u>Maybach</u></b>			
<b><u>BMW</u></b>			
<b><u>Hyundai</u></b>			

What does your data prove? Was your prediction correct?

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**2nd Trial**

<u>Name of Car</u>	<u>Distance Traveled/Inches</u>	<u>Gas Used</u>	<u>MPG/Unit Rate- Show your calculations</u>
<u>Hummer</u>			
<u>Hybrid</u>			
<u>Maybach</u>			
<u>BMW</u>			
<u>Hyundai</u>			

**3rd Trial**

<u>Name of Car</u>	<u>Distance Traveled/Inches</u>	<u>Gas Used</u>	<u>MPG/Unit Rate- Show your calculations</u>
<u>Hummer</u>			
<u>Hybrid</u>			

<u>Maybach</u>			
<u>BMW</u>			
<u>Hyundai</u>			

**Scaffolded Discussion Questions**

**How did the unit rate differ between trials? Why do you think that is?**

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**How is this information relevant to daily life?**

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**How does this information inform your car purchasing decisions?**

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**Which car did you pick as the most environmentally friendly? Why was this one your choice?**

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