

# M<sup>2</sup>=Math Mediator Lesson 3: Properties of Numbers

**\*NOTE: This lesson requires some prep and materials: See the second and next to last items.**

<p>Total Recall (Warm-up) (5 minutes approx.)</p>	<p>Total Recall: 2 exercises from yesterday's lesson</p> <ol style="list-style-type: none"> <li>1. Formula: <math>d = rt</math>; Drive to Phoenix, need to be there by 2 p.m. average speed will be 60 miles per hour. When should you leave? (What about lunch?).</li> <li>2. Formula: Circumference of a circle is <math>2\pi r</math>; Solve the formula for radius and find the radius of a circle with 728 inches circumference.</li> </ol>
<p>Direct Instruction (15 minutes approx.)</p> <p>-Slide: ~Number Sets ~Properties</p> <p><b>CA Std 5.0</b></p> <p>“Grammar of Math”</p>	<p>Rates/Ratios: Complex, Real, Rational, Integers, Whole and Irrational numbers</p> <ol style="list-style-type: none"> <li>1. Show a drawing (<u>slide</u>) of the subsets of numbers (let students make notes)             <ol style="list-style-type: none"> <li>a. Q. How can the whole number, 5, be expressed as a ratio (rational number) of 2 whole numbers?</li> <li>b. Q. Order the following numbers from lowest to highest; make a number line graph to display them. 1.75; <math>\frac{1}{4}</math>; -2; <math>\frac{20}{10}</math>; <math>\pi</math>.</li> </ol> </li> <li>2. Properties of Numbers (<u>show slide</u>): Closure, Commutative, Associative, ID, Inverse, and Distributive (let students make notes).             <ol style="list-style-type: none"> <li>a. These properties are applied to Addition and Multiplication</li> <li>b. Subtraction is same as adding the number with the opposite sign.</li> <li>c. Division is the same as multiplying by the reciprocal.</li> </ol> </li> </ol>
<p>Activity (10 minutes approx.)</p>	<p>Practice:</p> <ol style="list-style-type: none"> <li>1. Is <math>\frac{1}{3}</math> rational or Irrational? (Ans: Rational, because it can be expressed as the ratio of two whole numbers and because the decimal repeats. Irrational numbers are non-terminating, non-repeating).</li> <li>2. Is 2 a rational number? Is it a whole number? (Ans: yes, yes)</li> <li>3. Is <math>\frac{1}{2}</math> a whole number? Is it a rational number? (Ans: No, yes)</li> <li>4. Name the property used:             <ol style="list-style-type: none"> <li>a. <math>6 + 3 = 3 + 6</math> (Commutative)</li> <li>b. <math>12 \cdot \frac{1}{12} = 1</math> (Inverse)</li> <li>c. <math>3(1 + 0.5) = 3 + 1.5</math> (Distributive)</li> <li>d. <math>0.75 \cdot 3 = 2.25</math> Rational times rational equals rational (Closure)</li> <li>e. <math>(7.2) \cdot 5 = 5 \cdot (7.2)</math> (Associative)</li> <li>f. <math>700 + 0 = 700</math> (ID)</li> </ol> </li> </ol>
<p>Direct Instruction and Practice (10 minutes)</p>	<p>Unit Analysis:</p>

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approx.)	<p>1. <math>t = \text{time (hours)} = \frac{d(\text{miles})}{r(\text{miles / hour})} = d(\text{miles}) \times \frac{1(\text{hour})}{r(\text{miles})}</math> (Notice how miles cancel out, and you end up with hours.)</p> <p>2. U-DO: You work 8 hours earning \$96.00. What was your rate of earning?</p> <p>3. Some typical rates: miles per hour (per equals division sign); \$ per hour; gallons per mile; \$ per gallon; kbits/sec; \$ per song; \$/min (cell phone).</p>
<p>Direct Instruction: (10 minutes approx.)</p> <p>Handout: Conversion List (of common conversions)</p>	<p>Conversions: dollar to euro; feet to meters; pints to cups</p> <p>These are very similar to unit analysis. Make sure you cancel out the units.</p> <p>Ex. <math>\frac{1(\text{dollar})}{1.6(\text{euro})}</math> is the ratio of the exchange rate; one dollar is to 1.6 euros</p> <p>You have \$1000 dollars and wish to convert it to euros.</p> <p>Bad: <math>\frac{1(\text{dollar})}{1.6(\text{euro})} \times \\$1000 \text{ dollars} \neq (1000/1.6) \text{ (dollars}^2\text{/euros)}</math></p> <p>Good: <math>\frac{1.6(\text{euro})}{1(\text{dollar})} \times \\$1000 \text{ dollars} = 1600 \text{ euros}</math> (dollars cancel)</p> <p>U-DO:</p> <ol style="list-style-type: none"> <li>Convert 2400 euros into dollars.</li> <li>Convert 4 meters into feet using: <math>\frac{3.281(\text{feet})}{1(\text{meter})}</math></li> <li>Convert 6 pints to in<sup>3</sup> using: <math>\frac{28.87(\text{cu.in})}{1(\text{pint})}</math></li> </ol>
Wrap-up (5 minutes approx.)	Wrap up closing comments and housekeeping. Suggest small homework to give them a chance to practice the properties and for teaching discipline.