

## Review Sheet: Ratio, Proportion, Percent, Interest, and Percent of Change

Concept	Sample Problem									
<p><b>Ratio:</b> A ratio shows a relationship between two numbers. Ratios can be written three different ways.  <math>5</math> to <math>3</math> or <math>5:3</math> or <math>\frac{5}{3}</math>                      Ratios are not fractions, but ratios can be reduced to their lowest terms. <math>\frac{12}{28} = \frac{3}{7}</math>  <math>12:28 = 3:7</math> or <math>\frac{12}{28} = \frac{3}{7}</math></p>	<p>Sally spends \$200 of her \$1,100 total monthly budget on food. What is the ratio of her food expenses to her total monthly expenses?  <math>\\$200</math> to <math>\\$1,100 = 2</math> to <math>11</math> or <math>2:11</math> or <math>\frac{2}{11}</math></p>									
<p><b>Proportion:</b> A proportion is an equation that shows that two ratios are equal. The <b>cross products</b> of a true proportion are equal. That is, when you multiply diagonally across the equals sign, the products are equal. (Be sure the same units are straight across from each other.)</p> <p><math>\frac{3 \text{ women}}{2 \text{ men}} = \frac{12 \text{ women}}{8 \text{ men}}</math>      <math>\frac{3}{2} \times \frac{12}{8} = 24</math>  <math>\frac{3}{2} \times \frac{12}{8} = 24</math></p>	<p>The directions on the hot chocolate mix say, "Add 3 teaspoons of mix to every 10 ounces of hot milk." Bill, Sam, and Fred mixed 9 teaspoons of mix with 30 ounces of hot milk. Did they make their hot chocolate correctly?</p> <p><math>\frac{3 \text{ mix}}{10 \text{ milk}} = \frac{9 \text{ mix}}{30 \text{ milk}}</math>      <math>\frac{3}{10} \times \frac{9}{30} = 90</math>      Yes, they did.  <math>\frac{3}{10} \times \frac{9}{30} = 90</math></p>									
<p><b>Proportion with Missing Number:</b> If you know three of the four numbers in a proportion, you can solve for the missing number. The cross product becomes the <b>numerator</b> and the remaining number the <b>denominator</b>.</p> <p><math>\frac{33}{9} = \frac{N}{30}</math>      <math>N = \frac{33 \times 30}{9} = 110</math></p>	<p>A map scale says that 2 inches = 150 miles. What actual distance would a map distance of 5 inches represent?</p> <p><math>\frac{2 \text{ in.}}{150 \text{ mi.}} = \frac{5 \text{ in.}}{N \text{ mi.}}</math>      <math>N = \frac{150 \times 5}{2} = 375 \text{ mi.}</math></p>									
<p><b>Change Percent to a Fraction:</b> Write the percent over 100 and reduce.</p>	<p>What fraction equals 80%?      <math>\frac{80}{100} = \frac{8}{10} = \frac{4}{5}</math></p>									
<p><b>Change Fraction to a Percent:</b> Divide the numerator by the denominator, move the decimal two places to the right, and add a percent sign.</p>	<p>What percent equals <math>\frac{5}{8}</math>?      <math>5 \div 8 = 0.625</math>  <math>0.625 = 62.5\%</math></p>									
<p><b>Change Percent to a Decimal:</b> Drop the percent sign and move the decimal two places to the left.</p>	<p>What decimal equals 22.5%?      <math>22.5\% = 0.225</math></p>									
<p><b>Change Decimal to a Percent:</b> Move the decimal two places to the right and add a percent sign.</p>	<p>What percent equals 3.75?      <math>3.75 = 375\%</math></p>									
<p><b>Percent by Proportion:</b> In any percent problem, there are three elements: the <b>Part</b>, the <b>Whole or Base</b>, and the <b>Percentage Rate</b>. These problems can be solved with this proportion setup, using 100 as the denominator on the right.</p> <p style="text-align: center;"><math>\frac{\text{Part}}{\text{Whole or Base}} = \frac{\% \text{ Rate}}{100}</math></p>	<p>The Mohameds pay 25% of their familys total monthly budget of \$2,100 to rent their apartment. How much is their monthly rent for their apartment?</p> <p><math>\frac{\\$ N}{\\$2,100} = \frac{25}{100}</math>      <math>N = \frac{2,100 \times 25}{100} = \frac{52,500}{100} = \\$525</math></p>									
<p><b>Percent by Diagram:</b> Percent problems can also be solved using this percent diagram. Cover the element you do not know. Do the indicated operation with the other two elements.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <table style="width: 100%; text-align: center; border-collapse: collapse;"> <tr> <td style="border: none;"></td> <td style="border: none;">Part</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;">÷</td> <td style="border: none;"> </td> <td style="border: none;">÷</td> </tr> <tr> <td style="border: none;">Whole or Base</td> <td style="border: none;">X</td> <td style="border: none;">Percentage Rate</td> </tr> </table> </div>		Part		÷		÷	Whole or Base	X	Percentage Rate	<p>The Mohameds pay 25% of their familys total monthly budget of \$2,100 to rent their apartment. How much is the monthly rent for their apartment?</p> <p style="text-align: center;"><math>\\$2,100 \times 25\% = \\$525</math></p> <hr style="border-top: 1px dashed black;"/> <p>Jerry gave his sister 30% of his Halloween candy. If he gave her 12 pieces of candy, how many pieces of candy did he start with?</p> <p style="text-align: center;"><math>12 \div 30\% = 40</math></p>
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Whole or Base	X	Percentage Rate								
<p><b>Simple Interest:</b> The formula to calculate simple interest is: Interest = Principal x Rate x Time. Rate is a percentage and time must be in years. Remember Interest + Principal = Total Payback.</p>	<p>Asher borrows \$2,500 from his uncle for three years at 6% interest. What is the total amount he will he pay back to his uncle for the loan.</p> <ul style="list-style-type: none"> <li>• <math>\\$2,500 \times 6\% \times 3 = \\$450</math> interest</li> <li>• <math>\\$2,500 + \\$450 = \\$2,950</math> total payback</li> </ul>									
<p><b>Percent of Change:</b> Percent is often used to describe the amount of change over time. Calculate percent of change in two steps:</p> <ol style="list-style-type: none"> <li>1. Subtract the smaller number from the larger number.</li> <li>2. Divide this <b>difference</b> by the <b>original</b> number (the number before the change).</li> </ol>	<p>A jacket is now on sale for \$90. Last week the same jacket was selling for \$120. By what percent was the price of the jacket reduced?</p> <ul style="list-style-type: none"> <li>• <math>\\$120 - \\$90 = \\$30</math></li> <li>• <math>\\$30 \div 120 = 0.25 = 25\%</math></li> </ul> <p style="text-align: center;">The jacket's price was reduced by 25%.</p>									