Unit 3 Notes

Topic	Description	Example
Ratios and Proportions	1) A **ratio** is a comparison of numbers and can be written as a fraction, with "to", or with a ": " 2) A **unit rate** is a simplified ratio whose denominator is one.	1) $\frac{30\ hours}{18\ hours}$ 30 hours to 18 hours 30 hours: 18 hours 2) $\frac{\$16}{2\ lbs}$ unit rate is $\frac{\$8}{1\ lb}$
Constant of Proportionality	1) Proportional relationships have a **constant ratio,** meaning the ratios are equivalent fractions. 2) The **Constant of Proportionality** is the unit rate.	1) $\frac{1}{2}$ is proportional to $\frac{2}{4}$ and 4 $\frac{1}{2}$ is not proportional to $\frac{2}{3}$ 2) When the circumference and diameter of any circle are divided, their constant of proportionality is 3.14.
Direct Proportions	1) A direct proportion has an equation in the form of **y = kx** where k is the constant of proportionality. 2) In a direct proportion, as x increases, y increases at a **constant rate** (k). 3) The graph of a direct proportion is a straight line going to or through the origin on a coordinate plane where x is the independent variable and y is the dependent variable. 4) To find the constant, k, divide y by x.	• Sam washed 12 cars in 3 hours • The unit rate would be 4 cars in 1 hour. • The equation that shows the relationship between x (hours) and y (cars) is **y = 4x**.
Inverse Proportions	1) An inverse proportion has an equation in the form of y = $\frac{k}{x}$ where k is the constant of proportionality. 2) In an inverse proportion, as x increases, y decreases at a constant rate (k). 3) The graph of an inverse proportion is a curved line that never touches either the x or y axes. X is the independent variable and y is the dependent variable. 4) To find the constant, k, multiply y by x.	• Don can cut the grass in 3 hours. If his son helps (assuming they are working at the same rate), it will take 1 $\frac{1}{2}$ hours. If his neighbor also helps (three people working now), it will take one hour. • What is the constant? (What can you divide the number of people (x) by to get the number of hours (y) it will take to do the work?) 3 • Y = $\frac{3}{x}$
Solving Proportions	1) A **proportion** is an equation stating that two ratios are equal. 2) The **cross products of ratios are equal**… that is how you know the proportions are equal. (cross multiply) 3) **If one piece of the proportion is missing,** it can be solved for by cross multiplying and then dividing by the remaining number.	1) $\frac{2}{3} = \frac{4}{6}$ 2) Cross products of #1: 12 = 12 3) $\frac{2}{9} = \frac{n}{36}$ $(36 \bullet 2) \div 9 = 8$
Scale Model Proportions	1) The **scale** is the ratio of a given length of the model compared to the actual size of the object. 2) The **scale factor** is when the scale is written in simplest form. To find the scale factor make sure the scale and actual units match.	1) 1 inch = 3 feet 2) Scale factor 1 in =36 inches or 1:36

Fractions, Decimals, and Percents	1) To change a **fraction to a decimal**, divide the numerator by the denominator. 2) To change a **decimal to a %,** multiply by 100. 3) To change a **% to a decimal**, divide by 100. 4) To change a **decimal to a fraction**, put the entire number over the last digit's place value.	1) $\frac{2}{5}$ = 2 ÷ 5 = .4 2) .07 = .07 · 100 = 7% 3) 6% = 6 ÷ 100 = .06 4) .09 = $\frac{9}{100}$
Solving Percent Proportions	A **percent proportion** compares two equal ratios. One ratio is a part of a quantity compared to the whole. The other is the equivalent percent compared to 100. You cross multiply and then divide by the remaining number to solve the proportion.	What % of 10 is 2? $\frac{2}{10} = \frac{n}{100}$ 2 · 100 ÷ 10 = 20%
Solving Percent Equations	Write an equation using **clue words "is" and "of"** Is means "equal" Of means "multiply" *Remember when writing % in an equation to change the number to a decimal first.	18 is 45% of what number? 18 = .45 · n Solve for n by dividing both sides by .45. n=40
Percent Change	Find the difference between the two quantities. Then **divide the difference by the original amount**. Look at the original numbers and determine if the % change was an increase or decrease.	$63 shirt is on sale for $56 (63-56) ÷ 63 7 ÷ 63 = .11 or 11 % decrease
Discount and sale price	1) If you are asked to find the original price and you are given the % off and sale price. Decide what % you are paying (100 - % off). Set up an equation that shows the percent of the original price that you are paying. Then solve the equation. 2) If you are given the % off and the original price, you find the % that you pay (100 - % off) and multiply that by the original price.	A shirt is on sale for 20% off. The sale price is $28, what was the original price? You pay 80% of the original price. .80 · n = 28 $28 ÷ .80 = $35 2) A $50 dress is on sale for 25% off .75 · $50 = $37.50
Tax, Tip, and Commission	Tax, tip, and commission are all added to the cost. If given the % tax, tip or commission, change the % to a decimal and then multiply the cost by the decimal number. Now add this amount back to the cost.	Dinner costs $25.40 and you want to leave an 18% tip. What would your total be for dinner and tip? $25.40 · .18 = $4.57 $25.40 + $4.57 = $29.97 OR you could multiply 1.18 by the cost of dinner. $25.40 · 1.18 = $29.97
Simple Interest	I = prt Interest ($ amount earned) Principal ($ amount deposited or borrowed) Rate (% earned… or) Time (in years) Plug in the information you have and solve the equation for the missing information.	What is the interest rate if $150 is invested for two years and earned $18 simple interest? I = prt 18 = 150 · r · 2 18 = 300r .06 = r The interest rate is 6%.