

Name: _____

Date: _____

UNIT CONVERSIONS COMMON CORE ALGEBRA I



Units are amazingly important in mathematics, science, and engineering. They are how we decide on what constitutes the number 1 (i.e. 1 gallon, 1 pound, etcetera). We often need to **convert** from one unit to another in practical problems. In this situation we can almost always use proportional reasoning to do the job.

Exercise #1: John has traveled a total of 4.5 miles. If there are 5,280 feet in each mile, how many feet did John travel? Set up and solve a proportion for this problem. Also, do the problem by multiplying by a ratio.

Exercise #2: If there are exactly 2.54 centimeters in each inch, how many centimeters are in one foot? Show the work that leads to your answer.

Sometimes it is helpful to be able to convert so that a rate makes more sense. Take a look at the next problem.

Exercise #3: A bathtub contains 14.5 cubic feet of water. If water drains out of the bathtub at a rate of 4 gallons per minute, then how long will it take, to the nearest minute, to drain the bathtub? There are 7.5 gallons of water per cubic foot. Show the work that leads to your answer.

Exercise #4: The mile and the kilometer are relatively close in size. Can you convert 1 mile into an equivalent in kilometers? Here's what I'll give you. There are 2.54 centimeters in an inch, 5,280 feet in a mile, 100 centimeters in a meter, and 1000 meters in a kilometer. All else you should be able to do for yourself. Round your answer to the nearest tenth of a kilometer. This takes quite a string of multiplications, but you can do it!



We can also convert the ratio of two quantities, or rates, into different units if need be.

Exercise #5: One interesting conversion is from a speed expressed in feet per second to a speed in miles per hour. We sometimes think better in miles per hour because that is how the speeds of our cars are measured.

(a) Convert a speed of 45 miles per hour into feet per second given that there are 5,280 feet in a mile.

(b) The current fastest human is Usain Bolt, from Jamaica. In 2009, Usain ran 100 meters in a blazing 32.2 feet per second average speed. How does this compare to a typical car driving speed?

Exercise #6: A local factory has to add a liquid ingredient to make their product at a rate of 13 quarts every 5 minutes. How many gallons per hour of the ingredient do they need to add? Show the work that leads to your answer.

Exercise #7: A tractor can plant a field at a rate of 2.5 acres per 5 minutes. If a mammoth farm measuring 4 square miles needs planting, how long will it take in hours to plant the field? There are 640 acres in a square mile. Determine your answer to the nearest hour. If the tractor can run 8 hours a day, what is minimum number of days it will take to plant the farm?



5. A high school track athlete sprints 100 yards in 15 seconds.
- (a) Determine the number of feet per second the runner is traveling at. Show your work.
- (b) If there are 5280 feet in a mile and 3600 seconds in an hour, determine the runner's speed in miles per hour. Round to the nearest tenth.
6. A cafeteria is trying to scale a small pancake recipe up in order to feed a group of tourists. The recipe feeds 6 people and the cafeteria is trying to feed 75. The recipe calls for 4 cups of flour and $1\frac{1}{2}$ cups of milk and $\frac{1}{2}$ cup of sugar (as well as some other minor ingredients such as baking powder).
- (a) One 10 pound bag of flour contains 38 cups of flour. Will it be enough for this recipe? Justify.
- (b) If one 10 pound bag of flour contains 38 cups of flour, how many pounds of flour will be needed for this recipe? Round to the nearest tenth of a pound.
- (c) If there are 4 cups in a quart and 4 quarts in a gallon, will we need more or less than a gallon of milk for this recipe?
- (d) The cafeteria has a 1.5 kilogram bag of sugar. If a cup of sugar weighs 0.5 pounds and there are 2.2 pounds per kilogram, does the cafeteria have enough sugar to make this recipe?
- (e) If the original recipe made 14 pancakes and the cafeteria plans to charge \$.50 per pancake, how much money will they make if they sell all of the pancakes made for the 75 people?

