

STUDY GUIDE – UNIT CONVERSIONS

THE REFERENCE SHEET IS ON THE LAST PAGE!!!

A **unit** is a chosen, standard (or “consistent”) measurement amount for things like length, weight, or volume, which can be expressed as other units. By extension, a **unit conversion** can be simply defined as changing one unit measurement to another unit, or expressing one unit as a different one. This has many practical uses in real life – would it make sense to express a few feet as thousandths of a mile, or the hundreds of gallons in a swimming pool in potentially tens of thousands of ounces?

Although unit conversions can seem a little intimidating, they’re really not that bad! Just remember a few simple rules when you’re reading a conversion sheet and performing a conversion.

- The larger unit is always expressed in terms of 1, and the smaller unit is always more than one. For example, **we know that cups are smaller than gallons**. The conversion follows this rule:

$$1 \text{ gallon} = 16 \text{ cups}$$

- If you have a larger unit, and convert to a smaller unit, you will **multiply**.
- If you have a smaller unit, and convert to a larger unit, you will **divide**.

Don’t feel afraid to use the dance we learned in class for this!

Example 1

Tresdin is preparing for a marathon, which is approximately 26.2 miles long. She is using her fitness watch to break up her practice into 4192-yard long sprints. How many sprints will Tresdin run in a marathon practice?

Answer: First, we need to see that we have one unit in miles, and one unit in yards. According to our conversion sheet: **1 mile = 1760 yards.**

Dividing 4192 by 1760 to turn yards into miles is tricky, so instead let's turn miles into yards by **multiplying** **26.2 mi × 1760 yards** instead. Why? Miles are **larger** than yards, and when going from large to small, we multiply.

$$26.2 \text{ mi.} \times 1760 \text{ yd.} = 46112 \text{ yd.}$$

Now we know, there are 46112 yards in a marathon, so let's split that over 4192 yards per sprint by dividing.

$$46112 \text{ yd.} \div 4192 \text{ yd.} = 11 \text{ sprints.}$$

Example 2: The Metric System

You will also be required to **memorize** the metric prefixes. Remember the saying: **King Hector Died By Drinking Chocolate Milk**, which in order is:

k h da B d c m

Short for:

Kilo- Hecto- Deca- BASE deci- centi- milli-.

Larger Units ----- > Smaller Units

Remember that whenever you move from one prefix to the prefix next to it, you are multiply **or** dividing by 10 over and over. If you multiply or divide depends on the same rules from before – are you going small to large, or large to small?

Lanaya has 6500mL of a concoction in a cauldron that she must put into 1L bottles. How many bottles will she need to store all of her concoction?

Try it on your own first – the answer is on the next page.

Answer: It's easier to think of 6500mL (milliliters) as Liters. Let's convert it to Liters using two methods: **conversion chain**, or **decimal jumping**. **BOTH** methods require you to know your order of metric prefixes. **IT IS NOT AN OPTION TO MEMORIZE!** First, let's write out our prefix order **before** beginning.

kilo- hecto- deca- Base deci- centi- milli-



Then, as the arrows indicate, we need to go from milli- to the Base unit (Liters). We are going from a smaller unit to a larger unit, so we need to **divide**. Since we have three arrows, we divide by 10 **three individual times**.

$$6500mL \div 10 \div 10 \div 10 = 6.500L$$

I repeat – these are three individual divide-by-10's. **IT IS THE SAME AS DIVIDING BY 1000, IT IS NOT DIVIDING BY 30!!!**

If you worry you may make a mistake here doing division or multiplication, do not fear. You can also use the decimal jump method. Simply move the decimal in the original number (if it's a whole, remember it's at the end of the number) **the same number of times and in the same direction as how you moved between prefixes**. Here, we moved three times to the left, so our decimal moves three times to the left.

$$6500mL = 6.500L$$

To wrap up this question, Tresdin has 6.5L of liquid. She will need **SEVEN** bottles to store all the liquid, since the first six will hold 6L, and she will need one more to hold the remaining 0.5L.

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Your Turn

1. Carlos drinks 1900 milliliters of water every day for 10 days. How many liters of water does he drink during these 10 days?

2. Remi needs 28 inches of ribbon for an art project. He has a $1\frac{1}{4}$ -foot roll of red ribbon and a 1-foot roll of blue ribbon. Does he have enough for this art project?

3. Ed bought 3 liters of water, 2750 milliliters of Gatorade, and 2.25 liters of juice.
 - a. True / False: Ed bought 250 milliliters more water than sports drink.

 - b. True / False: Ed bought 1.25 liters more water than juice.

 - c. True / False: Ed bought 50 milliliters more sports drink than juice.

4. Johana is making a low-sugar fruit punch for a party. The recipe calls for 3 cups of fruit juice mix, 2 pints of water, and 8 ounces (fl. oz.) of lemon juice for a single serving.
- How many quarts of liquid does this mix make?
 - Johanna can't transport the liquid in the bowl and needs to move it in pint bottles. She has four $\frac{3}{4}$ -pint sized bottles she can use. Does she have enough bottles, or will she need to buy another?
5. Ayumu is making dresses with fabric. One dress uses 4 yards of fabric for the base of it, and 18 inches of trim.
- How many feet of **fabr**ic does each dress use?
 - How many feet of **tr**im does each dress use?
 - In total, how many feet of fabric does each dress use?
 - How much of all materials would she need to make 5 dresses?

6. Michelle has 40 fl. ounces of iced tea. She serves a guest 3 cups of iced tea. How many **pints** of ice tea remain in the pitcher?

7. Feroz buys 3 gallons of fertilizer for his garden and sprays until there is only 1 quart of it left. How many quarts of fertilizer did he use?

8. A large cartwheel moves a cart forward 48 inches forward when it rotates. How many rotations would be necessary to move the cart forward 40 yards?

9. Raj is making checkpoints on a racetrack when he realizes he made a mistake in the instructions. He made a checkpoint mark every 2 decimeters, when he should have made a checkpoint mark every 2 decameters.
 - a. How many times greater is a decameter than a decimeter?

 - b. The racetrack is 100 meters long. How many checkpoints did Raj **originally** make? How many checkpoints should Raj have made instead?

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10. A crate of animal feed for a company weighs 2.25 tons (remember, 1 ton = 2000 lbs).

a. There are 200 boxes in the crate. How much does **each** box weigh?

b. Due to a shipping error, only $\frac{3}{4}$ of all the boxes were full. How much did the crate **actually** weigh?

Grade 5 FAST Mathematics Reference Sheet

Customary Conversions

1 foot = 12 inches
 1 yard = 3 feet
 1 mile = 5,280 feet
 1 mile = 1,760 yards

1 cup = 8 fluid ounces
 1 pint = 2 cups
 1 quart = 2 pints
 1 gallon = 4 quarts

1 pound = 16 ounces
 1 ton = 2,000 pounds

Time Conversions

1 minute = 60 seconds
 1 hour = 60 minutes
 1 day = 24 hours
 1 week = 7 days

Formulas

Rectangle $P = l + l + w + w$
 $P = 2l + 2w$
 $A = l \times w$

Rectangular Prism $V = l \times w \times h$
 or
 $V = B \times h$

Metric Conversions

1 centimeter = 10 millimeters
 1 meter = 100 centimeters
 1 meter = 1000 millimeters
 1 kilometer = 1000 meters

1 liter = 1000 milliliters

1 gram = 1000 milligrams
 1 kilogram = 1000 grams

Key	
l = length w = width h = height B = area of the base	P = perimeter A = area V = volume