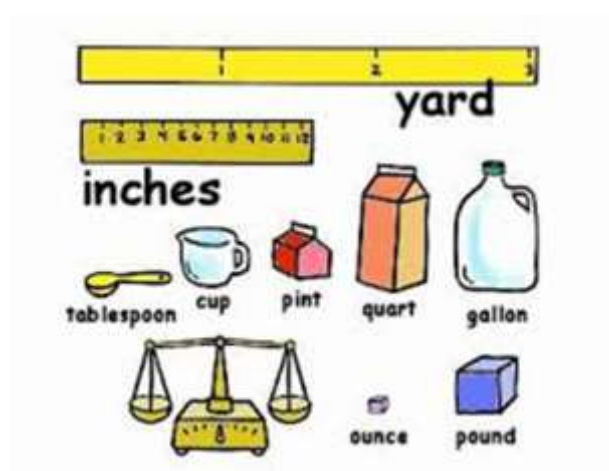


Ratio and Measurement Units Guide Notes

Converting Measurements Using Ratio

The concept of "ratio" and "proportion" are very helpful in converting measurements. These measurements include **customary units** such as feet, yard, inches, etc., and **metric units** such as meter, centimeter, millimeter, etc.



$$1\text{m} = 100\text{cm} = 1000\text{mm}$$

Ratio and Measurement Units

 Guide Notes

Table of Conversion

Refer to table to convert one unit to another.

Customary Units		
Length	Weight	Capacity
1 foot = 12 inches 1 yard = 3 feet 1 mile = 1760 yards	1 pound = 16 ounces 1 ton = 2000 pounds	1 cup = 8 fluid ounces 1 pint = 2 cups 1 quart = 2 pints 1 gallon = 4 quarts
Metric Measurements		
Length	Mass	Capacity
1 kilometer = 1000 meters 1 meter = 100 centimeters 1 centimeter = 10 millimeters	1 kilogram = 1000 grams 1 gram = 1000 milligrams	1 liter = 1000 milliliters

Conversion Rules Using RATIO

Example: How many gallons is equivalent to 40 quarts?

Rule 1: Determine the measurement or any information that you need to create a ratio.

Measurements involved: **gallon and quarts**

Ratio: $\frac{1 \text{ gallon}}{4 \text{ quarts}}$

Ratio and Measurement Units Guide Notes

Rule 2: Go back to the problem and set up an equivalent ratio. Take note that it is important to include the units to avoid confusion.

$$\frac{1 \text{ gallon}}{4 \text{ quarts}} = \frac{x \text{ gallons}}{40 \text{ quarts}}$$

This information is given in the problem. Be careful to set up the ratio properly so the units match up!!!

Rule 3: Multiply or divide to find what you're looking for.

Cross multiply the values.

$$\frac{1 \text{ gallon}}{4 \text{ quarts}} = \frac{x \text{ gallons}}{40 \text{ quarts}}$$

$$4x = 40$$

$X = 10$ Therefore, there are 10 gallons in 40 quarts.

Finding the scale factor can also help.

$$\frac{1 \text{ gallon}}{4 \text{ quarts}} = \frac{x \text{ gallons}}{40 \text{ quarts}}$$

$$\frac{1 \text{ gallon} \times 10}{4 \text{ quarts} \times 10} = \frac{10 \text{ gallons}}{40 \text{ quarts}}$$

Ratio and Measurement Units

 Guide Notes

Sample Problem 1:

How many feet is 72 inches?

Converting Measurements Using A Conversion Factor

Consider the previous example "How many gallons is equivalent to 40 quarts?" with its conversion factor 4 quarts = 1 gallon, if we treat it as an equation and divide both sides by 4 quarts...here's what we get.

$$\frac{4 \text{ quarts}}{4 \text{ quarts}} = \frac{1 \text{ gallon}}{4 \text{ quarts}}$$

Cancelling **4 quarts** gives us "1" on the left side of the equation and a ratio of **1 gallon is to 4 quarts** on the right side.

$$1 = \frac{1 \text{ gallon}}{4 \text{ quarts}}$$

Now, we can go back to the problem...

Ratio and Measurement Units

 Guide Notes

How many gallons is equivalent to 40 quarts?

Rule 1: Multiply the unit we want to convert by 1. Remember that anything multiplied by 1 will never change its value.

$$40 \text{ quarts} \times 1$$

Rule 2: Replace "1" with the ratio that we obtained using the conversion factor. In this case, since $1 = \frac{1 \text{ gallon}}{4 \text{ quarts}}$, we'll replace 1 by the ratio $\frac{1 \text{ gallon}}{4 \text{ quarts}}$.

$$40 \text{ quarts} \times \frac{1 \text{ gallon}}{4 \text{ quarts}}$$

Rule 3: Cross out the measuring units that can be cancelled out

$$40 \cancel{\text{ quarts}} \times \frac{1 \text{ gallon}}{4 \cancel{\text{ quarts}}}$$

Rule 4: Multiply or divide the remaining values

$$\frac{40 \times 1 \text{ gallon}}{4} = 10 \text{ gallons}$$

Ratio and Measurement Units Guide Notes

Sample Problem 2:

How many feet does 132 inches have?

Use the conversion factor: 1 foot = 12 inches

Solving Word Problems Using Ratio to Convert Units

The methods above can be used to solve problems involving unit conversions.

Example:

Matt rode 4 kilometers on his bike while his sister rode 6,000 meters. Who rode the farthest (in kilometers)?

Ratio and Measurement Units Guide Notes

Solution:

Since the problem requires us an answer in kilometers, we will convert the distance traveled by Matt's sister in kilometers. We know that 1 kilometer = 1000 meters.

$$\text{Rule 1: } \frac{1 \text{ kilometer}}{1000 \text{ meters}}$$

$$\text{Rule 2: } \frac{1 \text{ kilometer}}{1000 \text{ meters}} = \frac{x \text{ kilometers}}{6000 \text{ meters}}$$

$$\text{Rule 3: } 1000x = 6000$$

$x = 6$ kilometers, therefore Matt's sister travelled the farthest.

Sample Problem 3:

Sam is cutting a piece of rope that measures 70 cm. Jenny is cutting a piece of rope that measures 900 mm. How long are the two pieces of ropes combined together in centimeters?