

Ratios, Rates, and Conversions

Guided Notes

What is a Ratio?

A ratio is a comparison of a number ***a*** and a non-zero number ***b*** using division.

There are three different ways of writing a ratio:

$$\frac{a}{b}$$

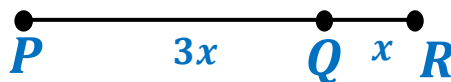
$$a : b$$

$$a \text{ to } b$$

The ratio is written in simplest form and can be simplified if the quantity in the numerator and denominator is of same units.

$$4\text{ft}:6\text{ft} \rightarrow \frac{4\text{ft}}{6\text{ft}} \rightarrow \frac{2\text{ft}}{3\text{ft}} \rightarrow 2\text{ft}:3\text{ft}$$

Problem 1: In the figure below, $PQ : QR$ is $3 : 1$. Find the values of PQ and QR if $PR = 28$.



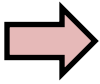
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Rate

It is a comparison of two numbers with different units using division.

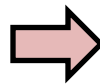
Example:

• 2000 miles per 20 hours 
$$\frac{2000 \text{ miles}}{20 \text{ hours}}$$

Unit Rate

It is the rate having 1 as the denominator.

Example:

2000 miles per 20 hours, so in 1 hour, $\frac{2000 \text{ miles}}{20 \text{ hours}}$ 
$$\frac{100 \text{ miles}}{1 \text{ hour}}$$

Problem 2: Two shops are selling T-shirts in deals (given below). Which shop is offering the best deal?

Shop 1: 3 T-shirts for 27\$

Shop 2: 4 T-shirts for 20\$

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Conversion of Units

Conversion of units means converting from one unit of measurement to another using a pre-defined conversion factor.

Conversion Factor:

It is a ratio of two equivalent measures in different units. It is always equal to 1.

Example:

$$\frac{1 \text{ ft}}{12 \text{ inches}} \Rightarrow 1 \text{ ft} = 12 \text{ inches}$$

- When going from larger to smaller unit, we multiply with the conversion factor.
- When going from smaller to larger unit, we divide with the conversion factor.

Different Conversion of Units

Length:

$$12 \text{ inches} = 1 \text{ foot}$$

$$3 \text{ feet} = 1 \text{ yard}$$

$$5280 \text{ feet} = 1 \text{ mile}$$

Capacity:

$$8 \text{ ounces} = 1 \text{ cup}$$

$$2 \text{ cups} = 1 \text{ pint}$$

$$2 \text{ pints} = 1 \text{ quart}$$

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

Weight:

$$16 \text{ ounces} = 1 \text{ pound}$$

$$2000 \text{ pounds} = 1 \text{ ton}$$

Time:

$$60 \text{ seconds} = 1 \text{ minute}$$

$$60 \text{ minutes} = 1 \text{ hour}$$

$$24 \text{ hours} = 1 \text{ day}$$

Name: _____ Period: _____ Date: _____

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Problem 3: Convert 36 inches to yards.