



# CONCENTRATION AND UNIT CONVERSIONS



2021 | NOVEMBER



# Introduction

1 cup of salt contains approximately one million grains of salt.

1 grain of salt is about one in a million grains (in 1 cup).

Or

**1 part per million (ppm)**



Source: Articulate Content Library



# LEARNING OUTCOMES



1. Explain concentration and unit conversion
2. Apply unit conversions for different concentrations



# Concentration and Unit Conversions

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# Colour

**The amount of a component per volume of a solution.**

- Test results are reported as concentrations
- Concentration in water quality testing is the amount of a component (microorganism or chemical) per volume of water, stated in units.

For example: milligrams per litre (mg/L).





# Units

## A standard of measurement.

- Without units test values are meaningless
- Measurements are of no use unless they can be compared

For example: NTU's, CFU, mg, L, mL, ppm, ppb, etc.



Source: Articulate Content Library





# Parts per Million

## PPM

1 grain of rice in a 20 kg bag of rice represents 1 ppm

**Note: approximately 1 million grains of rice in a 20 kg bag**



Source: Articulate Content Library



# Parts per Billion

## PPB

1 grain of rice in one thousand 20 kg bags of rice represents **1 ppb**



Source: Wikimedia





# Parts per Million

The units ppm are equal to mg/litre

$$1 \text{ ppm} = 1 \text{ mg/L} = 1/1 \text{ million} = 0.000001$$





# Parts per Billion

The units ppb are equal to  $\mu\text{g}/\text{litre}$

$$1 \text{ ppb} = 1 \mu\text{g}/\text{L} = 1/1 \text{ billion} = 0.000000001$$





# Unit Conversion Chart

$$1 \text{ ppm} = 1 \text{ mg/L}$$

$$1 \text{ ppb} = 1 \text{ } \mu\text{g/L}$$

$$1 \text{ mg/L} = 1000 \text{ } \mu\text{g/L}$$

$$1 \text{ ppm} = 1000 \text{ ppb}$$

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To convert ppb to ppm divide by 1,000

To convert  $\mu\text{g/L}$  to mg/L divide by 1,000

To convert ppm to ppb multiply by 1,000

To convert mg/L to  $\mu\text{g/L}$  multiply by 1,000





# GROUP ACTIVITY



In small groups solve the questions in the handout



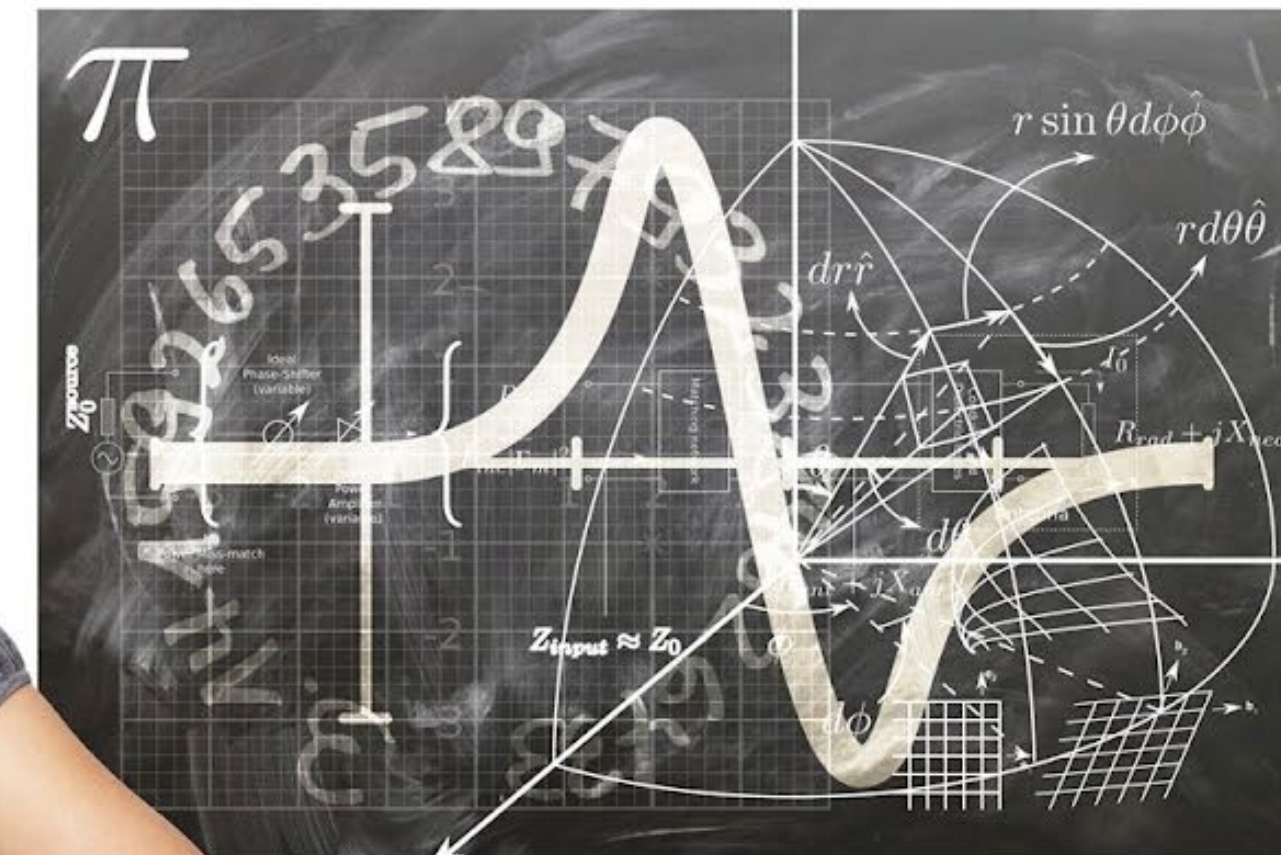
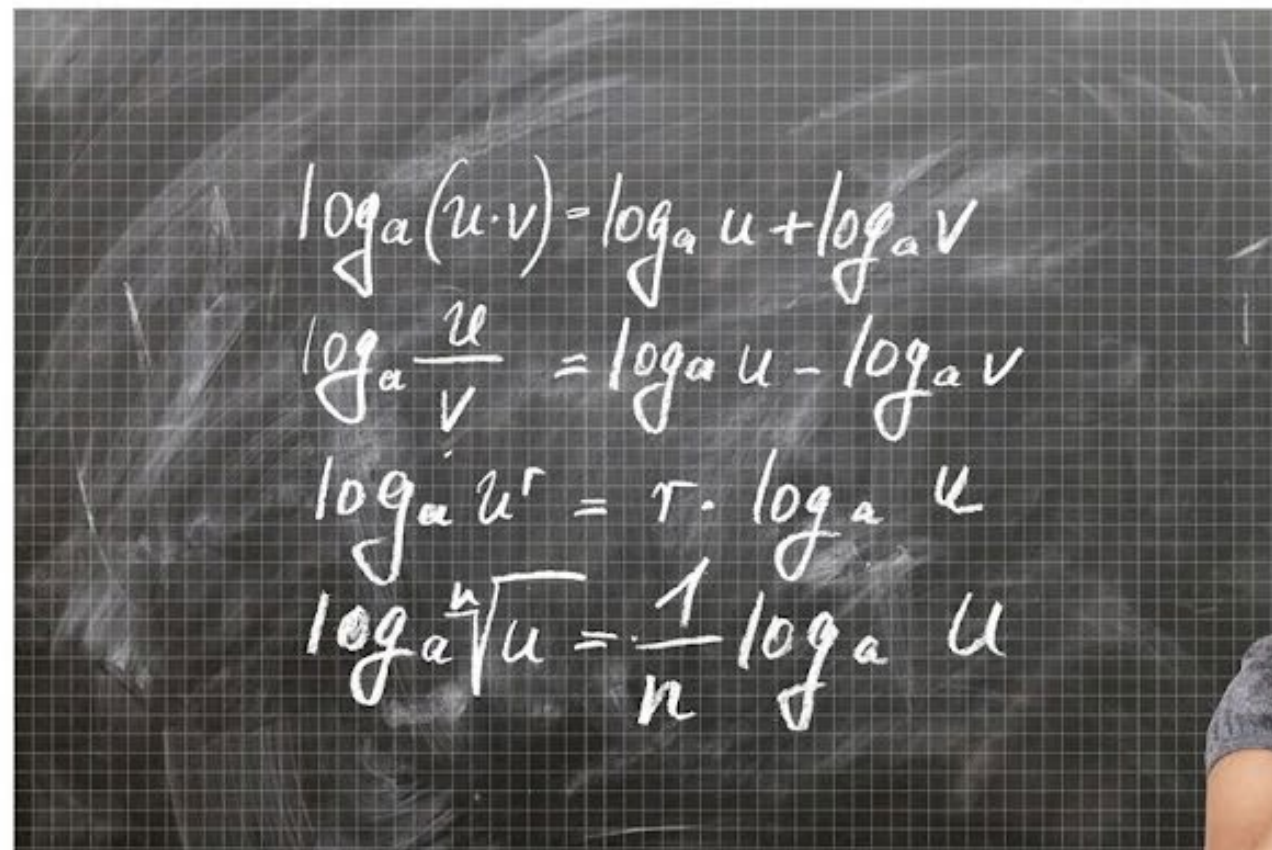


# Convert

0.01 ppm into ppb

AND

20  $\mu\text{g}/\text{L}$  into  $\text{mg}/\text{L}$



## Scenario

The WHO guidelines for drinking water is **< 0.01 mg/L for Arsenic.**

You are the project manager for a large NGO that has implemented a borehole drilling project in your area. Water quality testing was done on one of the boreholes and you have received a lab report stating that the arsenic concentration is 8 ppb.

Is the borehole water within acceptable limits?





# REVIEW



## TRUE or FALSE?

One finger up = TRUE

One finger down = FALSE



Thank you!

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