

## SHARK BLOOD, a hands-on activity about **concentration**

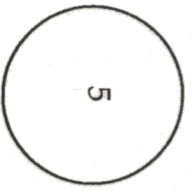
When you make “old-fashioned” Kool-Aid, you mix 1 package of drink mix and 2 cups of sugar with 2 quarts of water. You could say that the **concentration** of flavor is “one package in 2 quarts of water.” That would be the same concentration as 2 packages in a gallon of water, half a package in a quart of water, and other equivalent units. If you used lots more water than the directions say, you’d think the drink is “too weak” or too **dilute**. It would be “too strong” or too **concentrated** if you used less water.

Just like cooks, scientists use concentration units to measure how much of something (called a **solute**) is dissolved in a larger amount of something else (called the **solvent**), which is often a liquid. Dissolving a **solute** in a solvent makes a **solution**. Common concentration units are grams per liter (g/L) and parts per million (ppm).

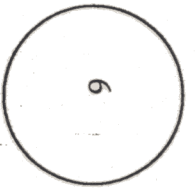
The experiment described on the other side of this page is a series of dilutions (called **serial dilution**) that will give a solution of 1 part Kool-Aid per million parts of water. It’s called SHARK BLOOD because sharks can detect the blood from wounded prey in concentrations as low as 1 ppm in seawater. Can you see, smell, or taste 1ppm of Kool-Aid?

1 part per million is approximately: 1 inch in 16 miles 4 drops of ink in a bathtub full of water 1 minute in 2 years a pinch of salt in 20 pounds of potato chips 1 second in 12 days 4 people in Minnesota’s population	1 part per million is exactly:  1 millimeter in 1 kilometer 1 penny in \$10,000 1 milliliter in 1000 liters a milligram (.001 gram) in a kilogram (1000 grams)
---	--

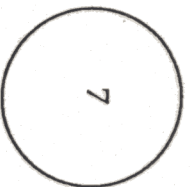
Can you find more examples? -



cup 5: 1 spoon from cup 4  
+ 9 spoons water



cup 6: 1 spoon from cup 5  
+ 9 spoons water

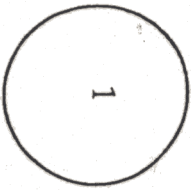


cup 7: 1 spoon from cup 6  
+ 9 spoons water

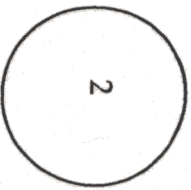
1 in 10,000

1 in 100,000

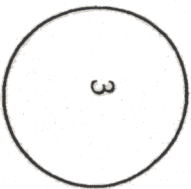
1 in 1,000,000



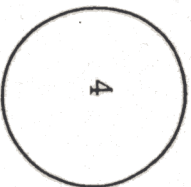
cup 1: pure Kool-aid



cup 2: 1 spoon Kool-aid  
+ 9 spoons water



cup 3: 1 spoon from cup 2  
+ 9 spoons water



cup 4: 1 spoon from cup 3  
+ 9 spoons water

pure Kool-aid  
start here

1 in 10

1 in 100

1 in 1000

**CAN YOU SEE 1 PART PER MILLION?  
CAN YOU TASTE 1 PART PER MILLION?**