

Measuring acidity with the pH scale

Grade 8 science (Year 9 · Class 8) · Worksheet

Name: _____ Date: _____ Class: _____

These problems train you to read pH values, link indicator colours to acidity, and calculate how dilution changes a pH. They start with recall and finish with multi-step data and planning tasks.

The set is written for Grade 8 science, Year 9 and Class 8 students, and matches NGSS MS-PS1-2 as well as KS3 and IGCSE foundations.

Level: Grade 8 science (Year 9 · Class 8) · **Curriculum:** MS-PS1-2

Problem 1 Acid, neutral or alkaline? (easy)

Diego in Texas measures four liquids with a pH meter.

1. State whether each is acidic, neutral or alkaline: pH 3, pH 7, pH 11 and pH 6.5.
2. Identify the one that is closest to neutral but is still not neutral.

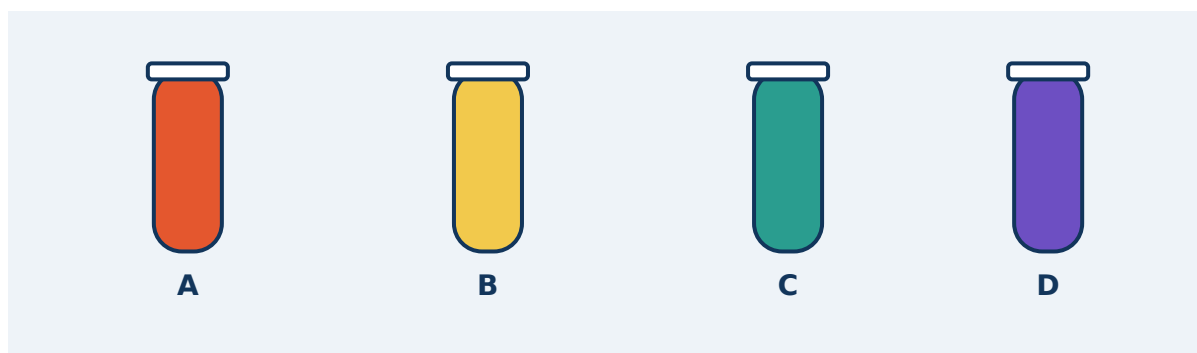
Problem 2 Litmus colours (easy)

Wanjiru in Nairobi has red litmus paper and blue litmus paper.

1. Predict the colour of blue litmus in lemon juice.
2. Predict the colour of red litmus in soap solution.
3. Predict what happens to both papers in pure water.

Problem 3 Reading universal indicator (easy)

Chiamaka in Lagos adds universal indicator to four unknown solutions and gets the colours shown.



Four solutions with universal indicator.

1. Estimate a pH or pH range for each tube.
2. State which tubes are acidic and which is alkaline.

Problem 4 Ordering by acidity (easy)

Mei in Singapore measures five liquids: lemon juice (2.0), orange juice (3.5), tap water (7.2), toothpaste mixed with water (8.5) and bleach (12.5).

1. List them from most acidic to most alkaline.
2. Name the strongest acid and the strongest alkali.

Problem 5 Lab safety rules (easy)

1. State three safety rules for working with acids.
2. Explain why a concentrated acid is diluted by adding the acid to water and not water to the acid.

Problem 6 Finding a dilution factor (easy)

Kofi in Accra dilutes liquids with water in the school lab.

1. Calculate the dilution factor when 20 mL of acid is made up to 200 mL.
2. Calculate the dilution factor when 10 mL is made up to 1000 mL.

Problem 7 pH after dilution (medium)

Bilal in Lahore has a strong acid of pH 2.

1. State its pH after a tenfold dilution.
2. State its pH after a thousandfold dilution.
3. Explain whether the diluted acid is still an acid.

Problem 8 Water needed (medium)

Kofi has 50 mL of a strong acid of pH 1 and wants pH 3.

1. Calculate the dilution factor needed.
2. Calculate the final volume in mL.
3. Calculate the volume of water to add.

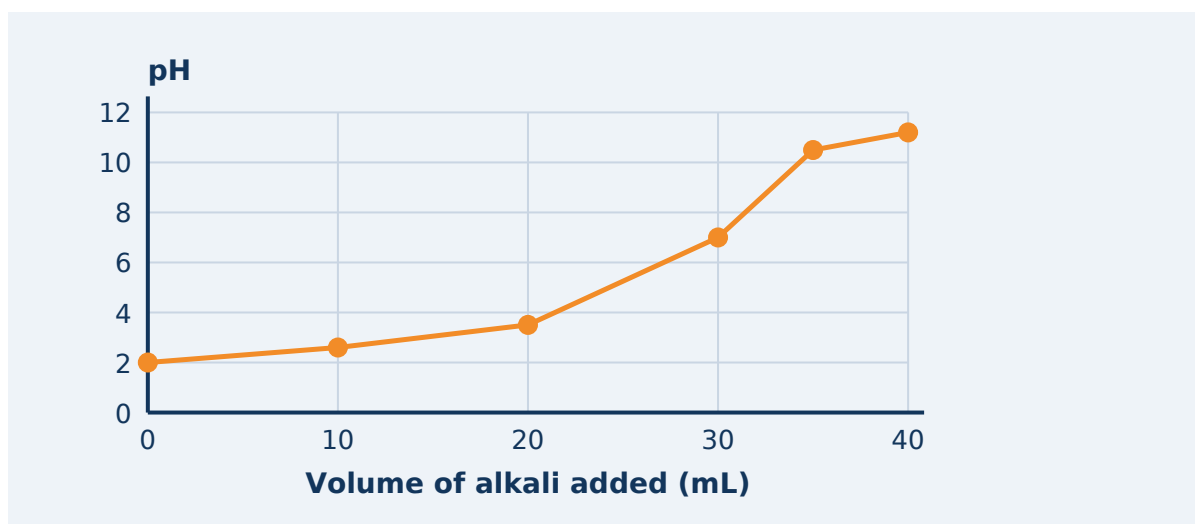
Problem 9 Diluting an alkali (medium)

A cleaning technician in Pune has a strong alkali of pH 13 and dilutes it 100 times.

1. Predict the new pH.
2. Explain the direction in which the pH moves when an alkali is diluted.

Problem 10 Reading a pH graph (medium)

Bilal adds an alkali solution little by little to 25 mL of acid and records the pH.



pH during neutralisation.

1. State the starting pH.
2. Find the volume at which the mixture is neutral.
3. Calculate the average pH change per mL between 30 mL and 35 mL.

Problem 11 Indicator or pH meter? (medium)

1. Compare litmus paper, universal indicator and a pH meter by the information each gives.
2. Suggest which one a gardener should use to test soil water and explain your choice.

Problem 12 Spot the errors (medium)

Emma writes: (a) pH 3 is twice as acidic as pH 6. (b) Adding enough water to hydrochloric acid will make it pH 9.

1. Correct statement (a) by calculating how many times more acidic pH 3 is.
2. Correct statement (b).

Problem 13 Comparing two acids (medium)

Liquid X has pH 2 and liquid Y has pH 5.

1. Calculate how many times more acidic X is than Y.
2. Predict what you would see if you tested both with universal indicator.

Problem 14 Word equations (medium)

Indigestion tablets contain magnesium hydroxide, which neutralises hydrochloric acid in the stomach.

1. Write the word equation for the reaction.
2. Predict whether the stomach contents move towards pH 1 or pH 7.

Problem 15 Soil on a farm (medium)

A farmer near Nakuru finds that the soil water has pH 5.0, but the crop grows best at pH 6.5.

1. State what type of substance she should spread.
2. State the direction the pH should move.
3. Explain why she should not add too much.

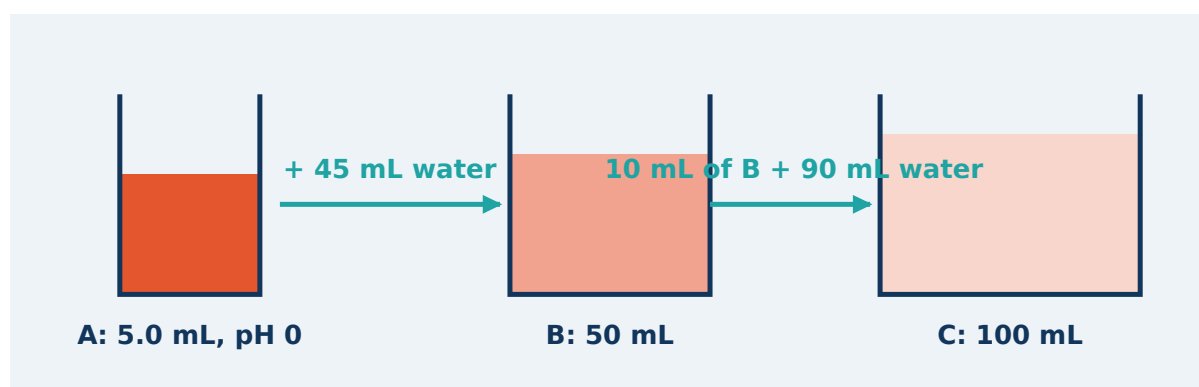
Problem 16 Dilute to pH 4 (hard)

Diego has 25 mL of strong acid of pH 1.0 and needs a solution of pH 4.0.

1. Calculate the dilution factor.
2. Calculate the final volume in litres.
3. Calculate the volume of water to add, in mL.

Problem 17 Two-stage dilution (hard)

Mei starts with 5.0 mL of a strong acid of pH 0 (solution A). She adds 45 mL of water to make solution B. She then pours 10 mL of B into a beaker and adds 90 mL of water to make solution C.

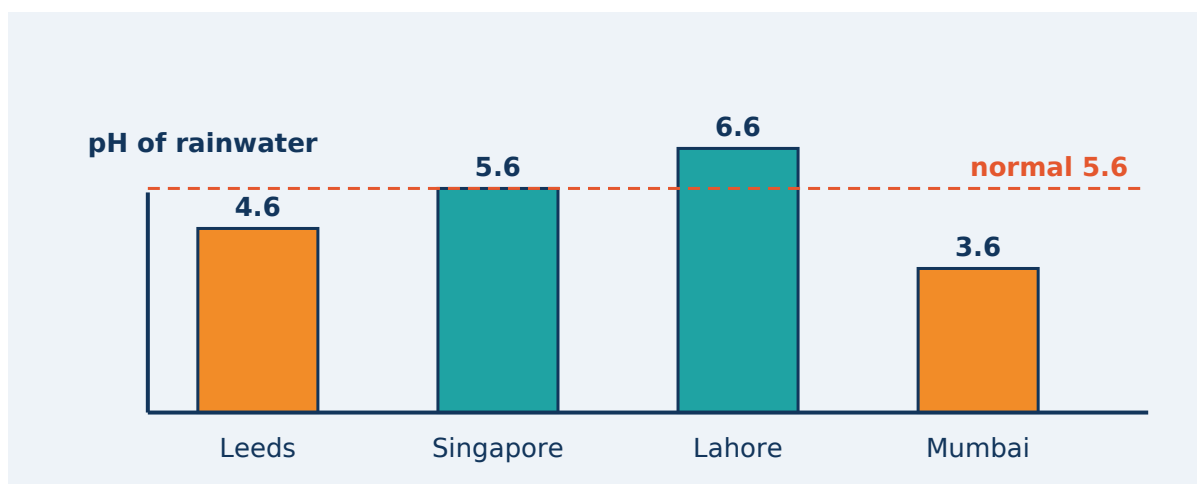


A two-stage dilution.

1. Calculate the dilution factor from A to B.
2. Calculate the dilution factor from B to C.
3. State the pH of C.
4. State how many times more dilute C is than A.

Problem 18 Rainwater data (hard)

Rain that has absorbed only carbon dioxide has a pH of 5.6. A class compares four towns.



Rainwater pH in four towns.

1. Name the towns whose rain is more acidic than normal.
2. Calculate how many times more acidic Mumbai's rain is than normal rain.
3. Explain why Lahore's rain is still acidic.

Problem 19 Planning an antacid test (hard)

Chiamaka wants to compare three brands of indigestion tablet. She has a pH meter, dilute hydrochloric acid that models stomach acid, beakers and a balance.

1. State the independent, dependent and control variables.
2. Describe the method in four steps.
3. Explain how you would decide which brand works best.

Problem 20 The swimming pool (hard)

A pool manager in Texas measures a pool at pH 8.4. The recommended range is 7.2 to 7.6.

1. State whether the pool is acidic or alkaline.
2. State what type of chemical she must add.
3. Explain two precautions when adding it.
4. Predict what a universal indicator would show.