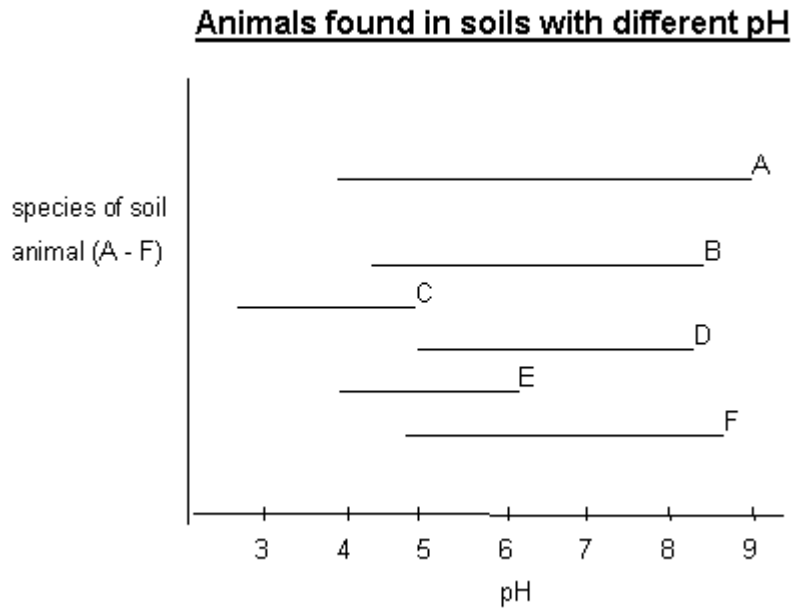
Grade 8 Natural Science Worksheet

Effects of acid on the environment

Part One: Animals found in soils with different pH

The following graph shows the range of pH within which each of six soil animals is found to occur.



1. Which species occurs over the widest range of pH conditions?
2. Which species appears to be the least tolerant of acidic conditions?
3. Which species is the most tolerant of alkaline conditions?
4. Which species can survive in conditions of pH below 3.75?
5. How many species can tolerate pH 4?
6. You measured the pH of a soil sample in which D was living and the pH was 7. What would happen if you moved that species to a new soil sample with a pH of 5?
7. You locate a soil sample that has only species C living in it, although all the other species had access to it. What would you estimate the pH of that sample to be?

[14 marks]

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Part Two: Acid in your environment

What to do:

Look around the walls of your house or your school. Find two chunks of cement that have crumbled off a wall. You could ask at a building site for two small lumps of dried cement. Take your cement home and place each piece in a transparent glass container. Cover the cement in one glass with vinegar or lemon juice. Label this glass "acid". Cover the other piece of cement with water. Label this glass "water".

Place the glasses on a shelf in your bathroom or wherever you stand to clean your teeth. Everytime you clean your teeth, use the back of your toothbrush to prod the cement and note down any changes to the cement that you observe. Prod the one lump, rinse your toothbrush, then prod the other lump. Record dates, times and description of the concrete. (Using your toothbrush to prod the cement has little significance. It is simply to remind you to do it a set time each day, and the toothbrush has a useful handle. You could use the handle of a spoon and do it every morning when you have your coffee.)

After a week or two, explain what happened to the cement.

Relate your answer to the effect acid rain has on cement and buildings in the environment.

You will be assessed on the way your report is submitted. Did you treat this as a scientific investigation?

[16 marks]

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Suggested Solutions

Question number	Possible marks	Solution
1	14	1. A ✓✓ 2. D ✓✓ 3. A ✓✓ 4. C ✓✓ 5. 3 ✓✓ 6. Some may die, but generally, the species should survive. ✓ However, if the pH of the soil sample started falling any lower, the species will no longer be able to tolerate the acidity. ✓ 7. 2.5 – 3.5 ✓✓
2	16	The cement chunk in the acid will begin to crumble after a day or two. After two weeks, the cement should be totally crumbled. ✓✓ The cement in the water should not react in the same way. ✓✓ The acid in the vinegar/lemon juice "ate" away at the cement. There is a carbonate in the cement – calcium carbonate ($CaCO_3$), and it is with this carbonate that the acidic vinegar reacts. ✓✓ This simulates the effect of acid rain in the environment, particularly on buildings made with cement. ✓✓ Award marks for the way in which the learner presents the report. ✓✓✓✓✓✓✓