RISE AND FALL OF THE WATER TABLE

Purpose

To show the relationship between rainfall and the level of the water table.

Instructions

1. ***Set up a table like this with 10 lines***

Rainfall (H)	*Cumulative rainfall*	*Height of water table (in cylinder B)*

2. ***Add 2 or 3 cm of water to cylinder A and measure the height H of the water.***

3. ***Pour this into cylinder B. This is equivalent to rainfall of H cm because both cylinders have the same diameter.***

4. ***Measure the height of the water table in cylinder B.***

5. ***Repeat instructions 2 to 4 until the water table is close to the top of the sediment.***

6. ***Now record the volume of the sediment <u>below</u> the water table by using the volume scale on the measuring cylinder.***

7. ***Carefully drain the water out using the board to prevent the sediment escaping. The water should be drained into cylinder A. Record the volume of water using the volume scale on the measuring cylinder.***

8. ***Plot a graph of water table height against cumulative rainfall.***

9. ***Convert the total rainfall to total volume of water added by marking the total rainfall on the height scale of the measuring cylinder and reading the corresponding volume on the volume scale***

10. ***You now need to calculate the porosity of the sediment. The porosity is***

$$\frac{\text{volume of water added} \times 100}{\text{volume of sediment filled with water}}$$

11. *Describe the relationship between the rainfall, the change in height of water table and porosity in words.*

12. *What is the mathematical relationship between rainfall, porosity and change in height of water table?*

Questions

1. *The diameter of the two cylinders is the same. Explain why the change in level is much greater in the gravel than in the measuring cylinder.*

2. *If the sediment were well sorted sand instead of gravel would the amount of rise or fall of the water table be different? Explain.*

3. *If the porosity of the sediment were only 15% would you expect the rise of the water table to be larger or smaller or the same?*

4. *In May 1992 Anglia Water reported that the water table in parts of Cambridgeshire was 26 feet (7m) below its normal level for that time of year. If the soil porosity is 10% how many centimetres of rain is needed to restore the water table to its normal level?*

Teacher's Section

Requirements

2 large measuring cylinders, preferably 2000 ml.
One labelled A should be empty and the other, labelled B should be filled with well sorted pebbles about 8mm diameter. Both should have a centimetre scale stuck on them (scalafix selotape).
1 piece of board 10cm by 10cm.

Results

The change in height of the water table $= \frac{\text{the rainfall}}{\text{porosity}}$

where the porosity is given as a fraction e.g. 40/100

Time
30 minutes

Cylinders for rise and fall of the water table