



## The Water Challenge!

Your Challenge: Create a soil with at least three layers. Which group manages to let one liter of water seep through their soil in the shortest time?

### Required materials:

Soils:

- Sand
- Clay
- Silt
- Gravel

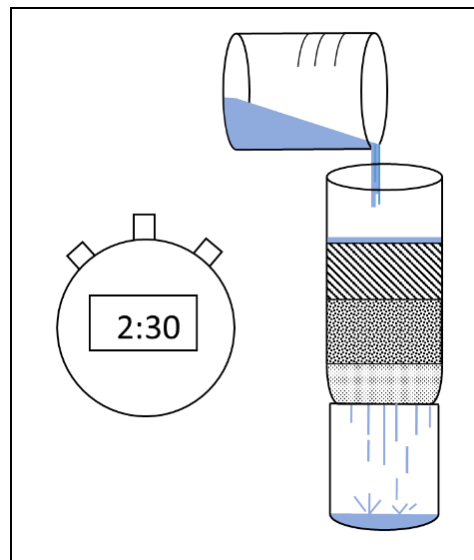
Bottle with cut-off bottom

Measuring cup

Stop watch

1 liter of water

### Experimental set-up:



### Procedure:

1. Write down your research question for this experiment.
2. Watch the properties of the different soil components. Write them down in the table.  
The following words might help you:

loose – firm – crumbly – fine – clumpy – heavy – light – coarse

Sand	Silt	Clay	Gravel

3. Now the task is to stack three layers of soil on top of each other. Write down a hypothesis, which layering and order of soils (in the bottle) will let one liter of water seep through it in the shortest time.

4. Fill the bottle as written down in the hypothesis up to the mark.
5. Wait until your teacher gives the start signal. Then, all groups pour the water into the bottle onto the soil and measure the time the water needs to seep through it.
6. The group where the water seeped through the soil in the shortest time wins.

## Teacher information: Water Challenge

The water challenge has two main goals:

1. The students practice the scientific method and repeat the steps of the research cycle. This is meant as a contribution to fostering trust in the method of science by hands-on experience.
2. The students learn about different soils and their ability to hold water or let it percolate. This is important knowledge in the context of the water cycle and therefore very helpful when trying to understand weather and climate.

The students have to decide on a layering of the different materials. This is a hypothesis against the background of the research question “Which sequence of layers results in the fastest seepage of 1 l of water?” A complete test of the hypothesis will usually not be feasible in the context of a school course since all possible sequences would have to be tested. Therefore, the interpretation of the results may become ambiguous.

Practical advice:

1. First, the bottle should be filled with some material that prevents the soil from falling through the bottle’s neck. Some filter paper, for example, is suitable for this purpose.
2. As the soil saturates with water, not all of the filled liter will flow through. Therefore, a quantity of water must be determined, at which the time is stopped. In that case, a measuring cup is also needed. Alternatively, a time can be set in which no more water is allowed to drip out (e.g. one minute).