



Do roots always grow downwards?

### What you need?



pre-sprouted beans



paper towel



drinking glass



water



aluminum foil or  
cling film

### Step 1: How to pre-sprout your beans

For the geotropism-experiment you will need three pre-sprouted beans with equally long roots. Expect this to take 3-5 days.

1. Fit several rolled-up sheets of paper towel into a drinking glass. It should fill the whole glass.
2. Put ten beans into the glass - between the edge of the glass and the paper towel. The beans should be stuck in the middle of the glass. You can do this either with your finger or with the handle of a spoon.
3. Fill half the glass with water and cover it with aluminum foil or cling film.
4. Check your beans after three days. If there are no roots yet leave them for another 1-2 days.



### Step 2: The geotropism experiment

1. Take your pre-sprouted beans out of the glass. Choose three beans with equally long roots and put the others to the side.
2. Repeat the steps of your first experiment but make sure that the beans are oriented differently in the glass. The roots should point downwards, to the side and upwards.
3. Fill half the glass with water and cover it up.
4. What can you observe in the next few days?



**How does this work?** Due to the earth's gravitational pull the roots of plants automatically grow towards the center of the earth. You can observe this phenomenon in your experiment: Even the roots that were initially turned upwards or to the side grew downwards after some time. This is called geotropism, which is a coordinated process of growth by a plant in response to gravity. It helps the plants to make ideal use of their habitat and avoid dangers. This is of advantage if plants grow on a slope for example.

**Possible further experiments:** Try the experiment with different beans. Does it also work with cress seeds? Test it out.

**Did you know?** Roots can reach impressive lengths: The main root of a pine can grow seven meters deep into the earth.

By the way, you can plant the remaining pre-sprouted beans on your balcony or in the garden.

