

## Soil layers puzzle

### Make your own soil profile and investigate others

Explain to the pupils that a soil profile refers to all the layers that can be seen between the top of the soil and the rock beneath. Some soils are thin, 10 - 20cm, but some can be thick, at over 1m.

Cut the diagram below into seven cards and give one jumbled set of cards to each small group of pupils.

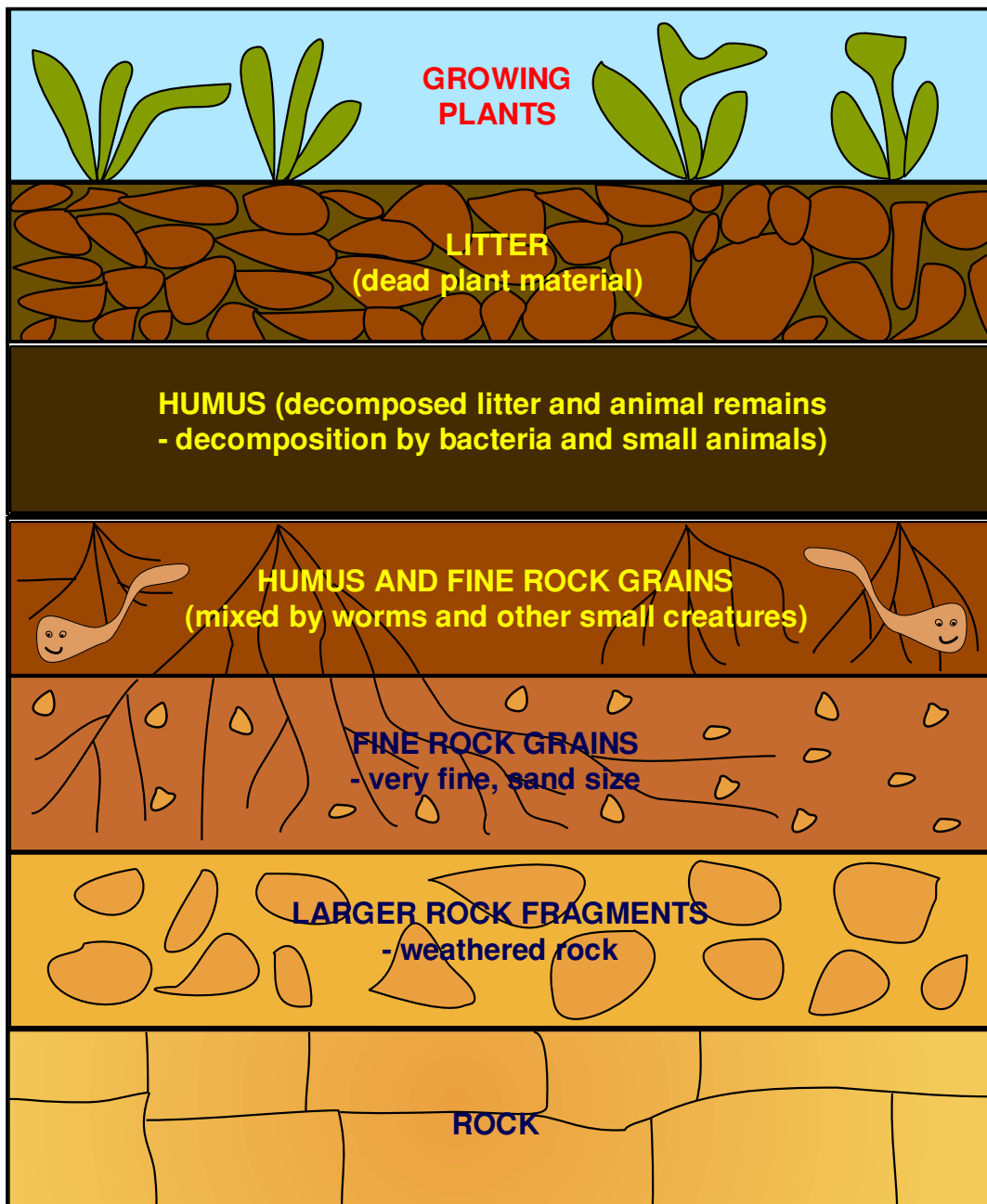
#### Ask the pupils

- to arrange the cards in the correct order to make a soil profile  
*Check that they have the correct order*
- is a soil profile in the UK likely to be the same as a soil profile in the Sahara desert in Africa - if not, why not?
- how will the two soil profiles differ?
- is a soil profile that develops above a sandstone

likely to be the same as one that develops above a limestone?

If possible, go into the school grounds and dig a small pit into the soil. It should be possible to distinguish some layers as far as humus and fine rock grains. It may be possible to visit a nearby site where a soil profile can be seen easily. If these are not possible, there are some very good images on the internet. Put 'soil profile images' into a search engine such as Google.

**Now ask the pupils** to measure, draw and label the layers in one of the soil profiles they have seen. Send the drawings to us ([info@earthlearningidea.com](mailto:info@earthlearningidea.com)) so we can publish them!



## The back up

**Title:** Soil layers puzzle

**Subtitle:** Make your own soil profile and investigate others

**Topic:** This activity can be used in any lesson about the environment, rocks and landscape, agriculture, gardening or investigations out of doors.

**Age range of pupils:** 10 - 16 years

**Time needed to complete activity:** 10 minutes to do the puzzle - longer to go outside to measure and draw a profile.

**Pupil learning outcomes:** Pupils can:

- distinguish the major soil layers;
- realise that most soils have these layers but that they vary in thickness from one soil type to another;
- realise the importance of worms in mixing the humus with the rock grains;
- appreciate that all soils have organic and inorganic components;
- realise that climate, vegetation and rock type affect soil types.

### Context:

The correct order for the cards:-

- growing plants
- litter
- humus
- humus and fine rock grains
- fine rock grains
- larger rock fragments
- rock

Suggested answers to the questions:-

- Is a soil profile in the UK likely to be the same as a soil profile in the Sahara desert in Africa - if not, why not?  
*Pupils should say that the two soil profiles are not the same and should suggest that the climates are different.*
- How will the two soil profiles differ?  
*Pupils should suggest that there will be very little litter or humus, if any, in the desert soil profile because there is not much vegetation, few animals and not much rain. There will be weathered rock.*
- Is a soil profile that develops above a sandstone, likely to be the same as one that develops above a limestone?  
*They are not the same as the two rocks have different chemical compositions.*

## Following up the activity:

Pupils could carry out some research into different types of soil profiles in a variety of climatic regions. Pupils could try the other Earthlearningideas in the soil series listed in the table.

### Underlying principles:

- Most soil profiles have some element of the sequence shown in the generalised soil profile.
- Climate, vegetation and rock type all influence soil type.
- Sandstone weathers to give a sandy soil.
- Limestone weathers to give a lime-rich soil, although insoluble constituents of the limestone can result in a surprisingly clay-rich soil

### Thinking skill development:

By looking carefully at a variety of soil profiles, pupils will realise that there is a pattern in their structure. Discussion within the group involves metacognition. Applying the correct cut-out cards sequence to a real soil profile involves bridging.

### Resource list:

- cut-out cards from page 1
- scissors
- spade to go outside or access to the internet or photos
- rulers
- disposable gloves if the pupils are handling the soil outside or access to washing facilities
- paper, pencils, coloured pencils

**Useful links:** Soil-net <http://www.soil-net.com>

**Source:** Elizabeth Devon, Earthlearningidea team



Soil profile in temperate grassland  
Image from [www.geo.msu.edu/SoilProfiles](http://www.geo.msu.edu/SoilProfiles)



Soil profile in temperate heathland  
Image from [www.geo.msu.edu/SoilProfiles](http://www.geo.msu.edu/SoilProfiles)



Soil profile in temperate woodland  
Image from [www.geo.msu.edu/SoilProfiles](http://www.geo.msu.edu/SoilProfiles)

| Earthlearningidea                                                                                                        | Strategies and skills development                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Make your own soil: investigating type and origin of the ingredients of soil.                                            | Pupils discover the ingredients of soil. The ingredients can be varied to make different soils.                                            |
| Soil doughnuts: sorting out soils.                                                                                       | By experimenting with different soils, pupils discover that different soils have different properties depending on their ingredients.      |
| Soil layers puzzle: make your own soil profile and investigate others.                                                   | Pupils now realise that other factors apart from ingredients, affect soil types.                                                           |
| Permeability of soils - 'The great soil race': investigating the properties of different soils by pouring water on them. | Different soils have different permeability.                                                                                               |
| Why does soil get washed away? - investigating why some farmers lose their soil through erosion whilst others do not.    | The essential minerals in soils, and even whole soil profiles, can be easily eroded. Pupils become aware of this and can suggest remedies. |
| Darwin's 'big soil idea': can you work out how Charles Darwin 'discovered' how soil formed?                              | Pupils discover for themselves how a great scientist formed his ideas about soils.                                                         |

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