Lay out some different soil types ranging from sandy to heavy clay. Show the pupils a copy of the table opposite.

**Ask the pupils to:-**
- if possible, wear the plastic gloves provided. (If these are not available, hands must be washed carefully after handling soil);
- take a plastic cupful of one of the soil types;
- the soil should be damp, not wet - add a little water if necessary, (help may be needed with this);
- squeeze the soil and knead it like bread dough;
- try to make the shapes shown on the table in order from 1 to 7;
- identify their soil type by looking at the table. If they can make a ball but not a sausage, then their soil is a sandy loam. If they can make a horseshoe but not a tyre, their soil is a clay loam;
- suggest which soil will let rain go through most easily and which one will hardly let any rain through;
- decide which soil it would be best to have in a garden;
- suggest why the type of soil in a garden, or on a farm, is important.

<table>
<thead>
<tr>
<th>Shape</th>
<th>Soil type</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>cone</td>
<td>sandy</td>
<td><img src="image" alt="Sandy soil" /></td>
</tr>
<tr>
<td>ball</td>
<td>sandy loam</td>
<td><img src="image" alt="Sandy loam" /></td>
</tr>
<tr>
<td>sausage</td>
<td>silt loam</td>
<td><img src="image" alt="Silt loam" /></td>
</tr>
<tr>
<td>worm</td>
<td>loam</td>
<td><img src="image" alt="Loam" /></td>
</tr>
<tr>
<td>horseshoe</td>
<td>clay loam</td>
<td><img src="image" alt="Clay loam" /></td>
</tr>
<tr>
<td>tyre</td>
<td>light clay</td>
<td><img src="image" alt="Light clay" /></td>
</tr>
<tr>
<td>inner tube</td>
<td>heavy clay</td>
<td><img src="image" alt="Heavy clay" /></td>
</tr>
</tbody>
</table>

Three different soil types  *Photo: Elizabeth Devon*

**The back up**

**Title:** Soil doughnuts

**Subtitle:** Sorting out soils

**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:** 6 - 18 years
Time needed to complete activity: 20 minutes

Pupil learning outcomes: Pupils can:
• identify types of soil;
• decide which soil lets water through easily and which does not;
• suggest a suitable garden soil;
• realise that the type of soil is important for good crops to be produced.

Context: Sandy soils allow water through easily and clay soils do not. Gardeners usually prefer loam soils. For a farmer or gardener, it is important to know the soil type so that it can be managed properly and crop production increased.

Following up the activity: Pupils could find out how soils develop and why it is important to understand and conserve soils. They could try the following Earthlearningideas:-
- Make your own soil
- Soil layers puzzle
- Permeability of soils - ‘The great soil race’.
- Why does soil get washed away?
- Darwin’s ‘big soil idea’ (make your own wormery).

Underlying principles:
• Loam is a mixture of 40% sand (usually quartz grains), 40% silt (usually quartz and feldspar grains, smaller than sand) and 20% clay (very small particles of clay minerals).
• Loam soils contain more nutrients and humus (decayed material) than sandy soils.
• Loams are easier for gardeners and farmers to dig and plough than clay soils.
• Loams are easy to work over a range of moisture conditions; they retain more moisture than sandy soils and allow better drainage than clay soils.
• The soils of most successful farming areas around the world are loams.

Thinking skill development:
Pupils can see a pattern as they try to make various shapes. Many children think all soils are the same and finding that there is a lot of variety causes cognitive conflict. Discussion of soil types is metacognition and applying the soil types to the farming world involves bridging.

Resource list:
• a range of soil types from very sandy to heavy clay
• disposable plastic gloves (if available)
• hand washing facilities
• plastic cups
• jug of water

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

Source: Elizabeth Devon, Earthlearningidea team.

The progression of thinking skills shown by the Earthlearningidea ‘Soils’ activities

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