



## Frost Heave – Teacher Notes

In areas where the ground freezes and thaws during winter, expanding freezing ground water causes the land surface to rise and fall. After repeated freezing and thawing farmers go into the fields to pick up the large rocks which have been brought to the surface by frost heave.

Materials per student or group

- A disposable cup (paper or plastic)
  - Half a cup of soil (preferably clay rich soil rather than sandy)
  - Water
  - 5 toothpicks, straight sticks
  - Access to a freezer
1. Half fill a clear plastic drinking glass or small beaker with wet soil.
  2. Mark the level of the soil on the outside of the container with a pen or piece of sticky tape.
  3. Stick 5 toothpicks or broken skewers vertically into the wet soil.
  4. Freeze and describe what happened.

What happened to the toothpicks? **They were moved around as the expanding ice heaved the soil.**

What do you think will happen to roads or houses constructed on soil which freezes and thaws? **They will be tossed about and uprooted from their foundations. In permafrost areas roads have to be re-laid frequently and houses are built on wooden raft-like structures so they “float” on the surface of the heaving soil.**

Where in Australia would people suffer from this problem? **In the Australian Antarctic Territories. On the heights of the Dividing Range and mountain tops in Tasmania.**

Can you suggest anything that might minimise this problem? **Build houses on a raft of wood or concrete so that the framework can “float” as one unit and not be broken by conflicting stresses**

During winter, air temperatures can be cooler than ground temperature. Soils can melt from below, reducing friction and causing avalanches on slopes.

Dissolved materials reduce the freezing temperature of water. This is why we put salt on mountain roads in winter and why pure juice icy poles are more difficult to freeze solid. It is possible however to freeze fresh water out of salt solution. This explains ice shelves and icebergs.