

ANGLE OF REST

Purpose

To determine the angle of rest in loose sediments.

To determine if the angle of rest is affected by grain size, roundness or sphericity and whether it is different in wet and dry sediments.

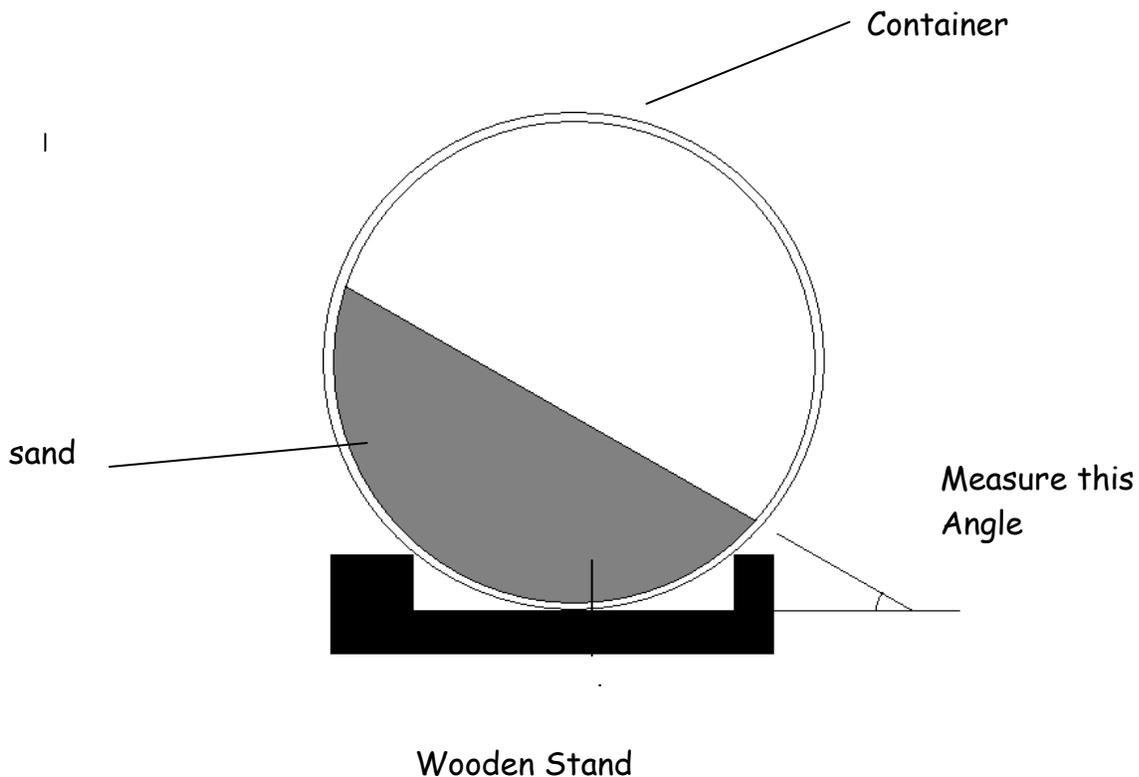
Geological relevance

It is important to know the angle of rest because it will determine the angle of scree slopes, the stability of the sides of slag heaps and of piles of sand and gravel. It also determines the stability of embankments and of road cuttings made in loose sediment.

Instructions

Activity I Dry sediment

1. Choose one container and note the grain size.
2. Turn the container until the sediment slides.
3. Use a protractor to measure the angle of slope.



4. Repeat for all the containers.
5. Use a protractor measure the angle of slope of the sand and gravel in the photographs.
6. Plot your results and draw your conclusions.

Activity II

Repeat the instructions above using the additional containers to find the effect of water, roundness and sorting.

Teacher's Section

Requirements

Activity I

Transparent circular containers. Honey jars or any large diameter squat container.

Five containers, each containing dry sediment of a different grain size, say 0.25, 0.5, 1.0, 2.0, 4.0 mm. The containers should be one third full.

Protractor or angle measurer (see [Making equipment](#)).

Photographs of the sides of sand and gravel piles whose grain size is known and on which a student is holding a metre ruler horizontally.

Supports for the containers (see diagram).

Activity II

Two containers with the same size sediment, one dry and the other half full of water (seal lid with plumbers' sealant).

Two containers with the same grain size, one with angular and one with rounded grains.

Two containers one with poorly sorted and the other with well sorted sediment.

Notes

Activity I is a good experiment because students expect there to be a difference and there is not.

If you have access to a gravel works it makes a good field exercise to measure to slopes and grain size. This experiment can be done without the containers by just gently pouring sand/pebbles onto a sheet of paper or into a

box but it is more messy and more difficult to measure the angle. You can also do this just as a short activity using the photographs.

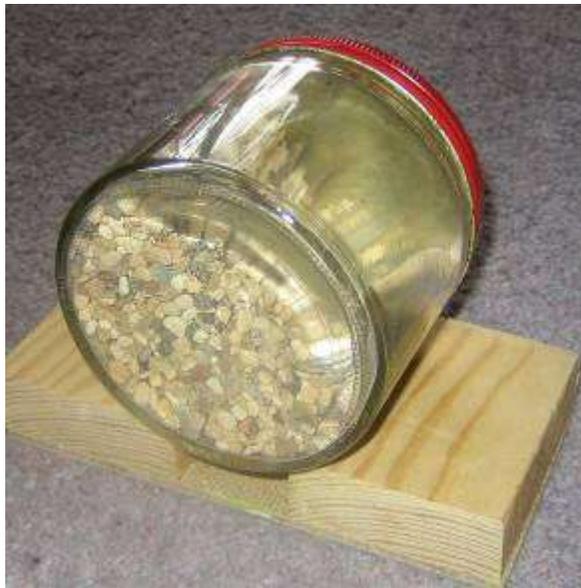
The correct phrase for angle of rest is "static angle of repose".

Results

Grain size has no effect on the angle of rest. Most sediment rests at about 35° . The angles are lower under water. Angular grains have a steeper slope. Damp sand can stand vertically. Poorly sorted sand has a slightly higher angle

Time

3 minutes per container. 1 hour for 12 containers and 6 photos.



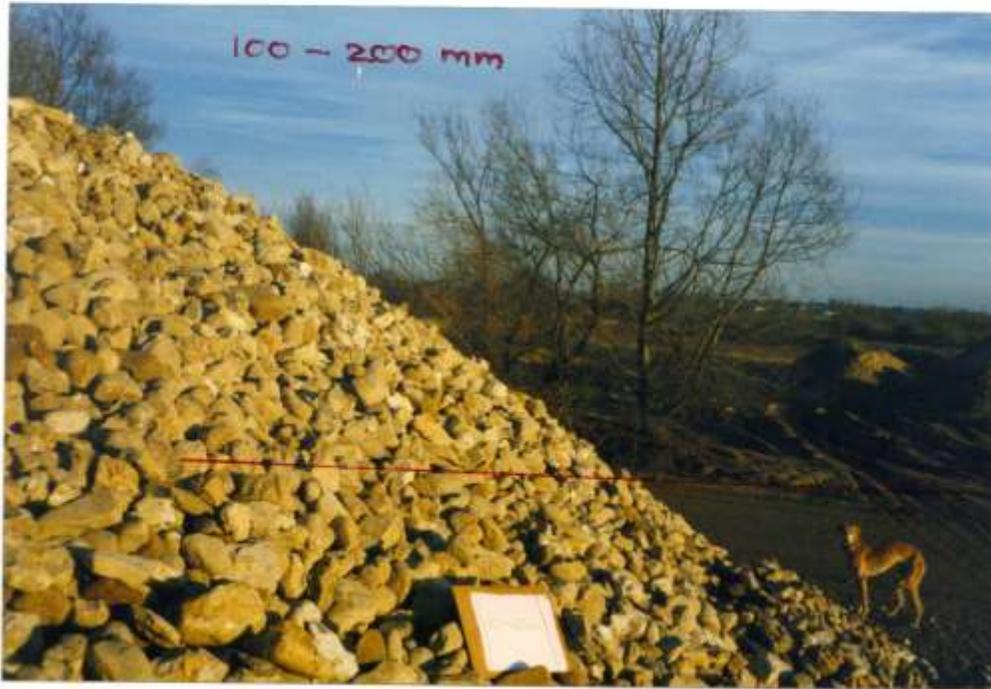
Angle of rest



The red line and the orange level are horizontal.



The grass horizon and the red line are horizontal



The red line and the orange level are horizontal.