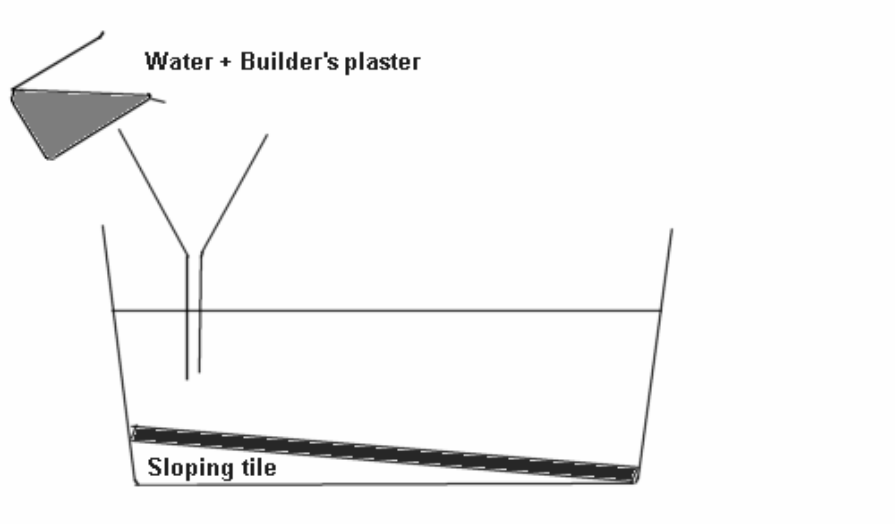
A density flow demonstration – illustrating pyroclastic flows and turbidity currents

Context & Aim:
Although explaining the nature of density flows goes well beyond the requirements of KS3, this very quick and simple demonstration can give students an insight into both the nature of pyroclastic flows (the most dangerous of all volcanic products) and, also, of turbidity currents (which transport land-derived sediment out onto the ocean floor). In our experience, students find it fascinating to watch.
Background Notes and a video clip can be found in the Teachers' Zone section.

Requirements:
Plastic aquarium (or similar) with a tile (cut to fit) forming a gentle slope (diagram).
Beaker + stirrer
Builder's plaster (around a heaped tablespoon-full to ½ a 250 ml beaker of water)
Large filter funnel



Procedure:
The aquarium needs to be $^{1}/_{2}$ to $^{2}/_{3}$ filled with water, which should be given a few minutes to settle after filling. Make up a thin slurry of plaster using roughly the proportion suggested above. Simply pour some of the plaster slurry into the filter funnel and observe the density flow move down the slope. After a minute or two, the plaster "cloud" will settle and the flow can be repeated. Apparatus should be cleaned as soon as possible afterward as the plaster will solidify in about 10 minutes or so, even under water.

Follow-up:
This experiment can be used to view the property of density in an unusual context, as well as to illustrate two important geological phenomena. The author has found this demo most useful in the context of explaining the nature of pyroclastic flows as a serious volcanic hazard; the demo can be compared with a suitable video clip of such a flow ("Crystallisation of magma" pages) to show how well this model works.