Composition and texture of sediments

Grain size ***A P 5 min***

Students are given 5 or so rocks ranging in grain size from conglomerates to shale and must put them in order of decreasing grain size. This helps students understand what grain size is.

Sieving ***E P F 30 min***

Students weigh a sediment sample (about 500g), then sieve it and weigh each fraction. They should then plot frequency graphs and cumulative curves and calculate sorting.

Homemade grain size card ***A I 10 min***

Students are provided with strips of stiff card 3cm wide and 16cm long and glue. The strips are divided into seven 2cm long divisions and the lines labelled with the phi numbers. The strip is then covered with a bed of glue and sediment of the correct size placed and pressed into each division.

Visualising Wentworth grain sizes ***TE***

Silt is invisible but feels rough on the tongue. Sand is smaller than a poppy seed. Granules are smaller than peanuts. Pebbles are smaller than tennis balls. Cobbles are smaller than footballs. Boulders are larger than footballs.

Sand cards ***A I 5 min per card***

Sands from a variety of environments are stuck to cards using solid glue (e.g. Pritstick). Students must describe the size, sorting, roundness, and colour using a hand lens or x30 magnifier and a grain size card.

Sorting using photos of beach sediment ***A P F 2 min***

Students examine about 6 close-up photos of beaches showing different degrees of sorting and then put them in order of increasing sorting.

Sorting using boxes of sediment ***A P 5 min.***

Students are given small boxes of sediment each with sediment with a different degree of sorting. The students must put them in order of increasing sorting. They can use a chart to give a numerical value to the degree of sorting in each box.

Co-efficient of sorting ***Pa I 5 min each***

Students calculate sorting co-efficient of a variety of cumulative curves from sediments deposited in different environments. (phi84 –phi16)/2.

Roundness ***A I 3 min***

Students put six lettered pebbles ranging from very angular to very rounded in order of increasing roundness.

Using a roundness chart ***I 1 minute per sample***

Students are given several pebbles of different degrees of roundness. They must give each pebble a roundness value by comparing it to a roundness chart.

Sphericity and roundness ***D***

To distinguish between the two terms remember a football and a rugby ball have differing sphericities but a similar degree of roundness. A ball and a cube have different degrees of roundness but both have the same sphericity. Show students angular and rounded pebbles with high and low sphericities. It works well if they are placed on the OHP.

Sphericity ***A P 2 min***

Students are given six lettered pebbles with different sphericities. They must arrange them in order of increasing sphericity.

Sphericity ***A P 15 min per sample***

Students are given a few pebbles and must use a chart to measure the sphericity. Or they can use callipers to measure the three orthogonal diameters and then calculate Krumblein's sphericity index

Sphericity = $3\sqrt{}$ bc/a^2

Sphericity and fruit ***D***

Show the students several different types of fruit, such as an orange, a avocado, a kiwi fruit, an aubergine, a cucumber and ask them to but the fruit in order of increasing sphericity.

Shape of pebbles ***E P F 45 min***

Students are provided with quartzite pebbles from Buddleigh Salterton or Keele all showing signs of bedding. Students examine the pebbles and see

if the bedding is parallel to any of planes containing the axes of the pebble,
and thus if the bedding has controlled the sphericity.

Zingg Chart *A P F 5 min per sample*
Students use callipers to measure the three orthogonal axes of a variety of pebbles and plot them on a Zingg chart.

Cubic and hexagonal packing polystryrene balls *D*
To demonstrate the different types of packing use polystyrene balls (5cm diameter) glued together with araldite in cubic packing arrangement and in hexagonal packing arrangement. You will need 36 balls for each and the balls need to be held in place while the glue sets.

Packing using steel balls *A P 5 min*
Students are given a small clear plastic box containing 20 5mm steel balls (ball bearings). Students try to arrange them in cubic or hexagonal packing.

Packing using Maltesas *A P 5 min or 15 min*
Students arrange one layer of Maltesas or aniseed balls on a tray in cubic and hexagonal packing. Students can build a hexagonal model using Maltesas and a tea light to soften the edges so they stick together.