GRAIN SIZE ANALYSIS OF SEDIMENT

Purpose
To determine the percentage by weight of each of the size fractions present in a sediment and then to use this information to make deductions about the parent rock, transport and environment of deposition.

Instructions for sieving
1. *Make sure the sieves are in correct order, coarsest at the top and the pan at the bottom as in the list below.*

2. *Weigh the bag with sample in it.*

3. *Tip the sample into the top sieve and place the lid on the top.*

4. *Weigh the bag and calculate the weight of the sample.*

5. *Weigh an empty polythene bag with a label inside.*

6. *.Place a piece of polythene under the sieves so the table does not get scratched. Shake for 5 minutes by moving the sieves to and fro quickly on the table.*

7. *Empty each sieve in turn onto a large sheet of paper and tip into a polythene bag. Write the sample number and the sieve size on a label and put it into the polythene bag.*

8. *Weigh each polythene bag with the sample inside and record the weight on the chart below.*

Instructions for the calculations and plotting
1. *For the sediment on each sieve calculate actual weight of sediment caught on that sieve, the percentage of the total weight and the cumulative percent. Check that the total weight of sediment in the initial bag is within 2% of the sum of all the individual weights.*

2. *Plot your data as a bar graph. Plot percent on the vertical axis using 2cm for each 10% and the phi units on the horizontal axis with 2cm for each phi unit. Along with the phi units you should also*

plot the corresponding size in millimetres. The lowest phi number and thus the coarsest sediment should be on the left hand side. The sediment caught on a sieve will be coarser than the sieve size so the bar should be drawn to the left of the vertical line representing that sieve size.

3. *Convert your bar graph to a frequency curve by drawing a line through the centre of the top of each bar.*

4. *Plot a cumulative curve using the graph paper in portrait orientation. Plot percentage 0% to 100% on vertical axis and phi units on the horizontal axis.*

5. *Calculate the following:*
   The mode. That is the grain size with the largest weight of sediment.
   The range.   Maximum size to minimum size present in the sample.
   The median. Half the sample by weight is above this size and half below. Use the cumulative curve to find this.
   The sorting coefficient in figures and words.
   The skewness in figures and words.

The sorting of a sediment can be found from the cumulative curve using the following equation $\frac{\Phi 84 - \Phi 16}{2}$

> *<0.35 is very well sorted*
> *0.35 to 0.5 is well sorted*
> *0.5 to 1 is moderately sorted*
> *1 to 2 is poorly sorted*
> *> 2 is very poorly sorted*

Skewness is also found from the cumulative curve using the equation
$$\underline{(\Phi 84 + \Phi 16) - (2 \times \Phi 50)}$$
> *1.0 to 0.1 Positively skewed*
> *0.1 to -0.1 normal distribution*
> *-0.1 to -1.0 negatively skewed*

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Sample number or name……………………………………………………….

Weight of sample in bag… g…………………… Weight of bag…g………………………………………

Weight of sample…g………………………………….

Caught on sieve mm or µm	Φ phi	Weight of bag g	Weight of sample in bag g	Weight of sample g	percent	cumulative percent
32	-5					
16	-4					
8	-3					
4	-2					
2	-1					
1	0					
500	1					
250	2					
125	3					
63	4					
pan	5					

total weight   total percent

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Teacher's Section

Requirements
A set of sieves with pan and lid
Samples of sediment of about 1kg
Polythene bags about 25cm by 20cm, about 10 per sample
Scales suitable for measuring the complete sample
Scales suitable for measuring each size fraction
Sheet of polythene or paper to rest the set of sieve on during shaking so the table does not get scratched.
Sheets of A2 paper to tip sediment onto from each sieve
Watch or timer
Small squares of paper to use as labels

Notes
Check the sieves are in the correct order. Check students are writing the correct size on the labels. Each label should have the sample number and sieve size written on.

Cost
A set of sieves is very expensive, at least £50 per sieve if new.

Time
 Allow about 30 minutes per sample for the sieving itself.