89.352 - SEDIMENTATION & STRATIGRAPHY
PROBLEM SET II

1. Mechanical size analyses of three samples collected from various locations in eastern Massachusetts yields the following results (grams of sediment as a function of size fraction):

	Sample		
φ	A	B	C
-3 to -2	0	0	10
-2 to -1	4	0	15
-1 to 0	5	1	28
0 to 1	65	5	22
1 to 2	20	35	15
2 to 3	3	59	4
3 to 4	2	0	5
4 to 5	1	0	1

For each of the samples calculate the moment measure Mean, Standard Deviation and Skewness. The appropriate equations are found in Table 3.4 on p. 70 of the textbook. Show your calculations. Use the back of this page if you require additional space. Note that these equations can be readily solved using a spreadsheet. If you do the problem this way attach a copy of the spreadsheet printout.

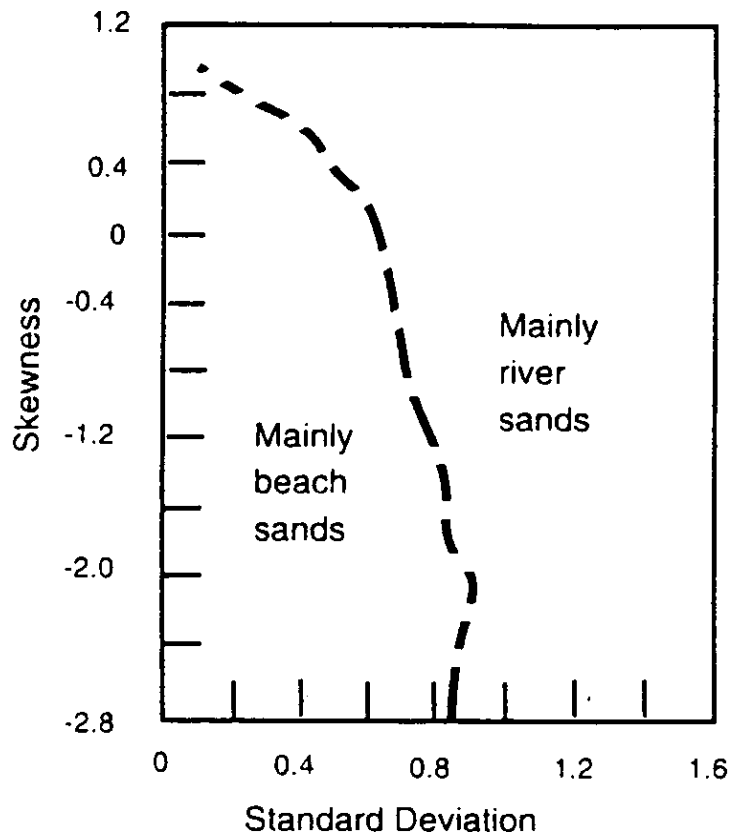2. Plot the three samples from problem 1 on Figure 1.

Figure 1. Moment standard deviation versus moment skewness showing the fields in which most beach and river sands plot.

a. What is the most likely depositional environment for each sample?

b. Samples A and C were collected from the same environment, but not from the same location. How would you explain the differences in the size analysis data for the two samples?

3. For samples A-C convert the mean φ size to millimeters.

Answer the following questions by reference to either the diagram on p. 41 (Fig. 2.9) or Figure 6.15 on the course web site. Note that Figure 2.9 is appropriate for one-way flow (e.g. a stream) while Figure 6.15 is appropriate for two-way flow (e.g. the seafloor).

a. Ripple marks were observed at the location where sample B was collected. Were these symmetrical or asymmetrical ripple marks? Defend your answer. What is the range of fluid velocities for this environment?

b. Ripples were also observed at location A. Were these symmetrical or asymmetrical and defend your answer. What is the range of fluid velocities for this environment?

c. At location C the bed was planar but there was evidence of high fluid velocities. What is the range of fluid velocities for this environment?

4. Sediment samples were collected from a stream at three different locations. The following data were obtained:

	1	2	3
Discharge (cms)	0.6	4	60
Width (m)	5	10	20
Depth (m)	0.2	0.4	1.0
Mean Sed. Size (mm)	0.12	0.5	1.5

a. Using the relationship:

Discharge = Width X Depth X Velocity

Calculate the stream velocity at each location.

b. Using Figure 2.11 (p. 42) predict the bedform that will be observed at each location.

5. A channel sandstone is observed in the geologic record and ripple marks are found in the sandstone. The channel has a mean thickness of 5 m and the sandstone has a mean grain size of 0.5 mm. Using Figure 2.12 (p. 43) predict the possible range of current velocities for this paleostream.