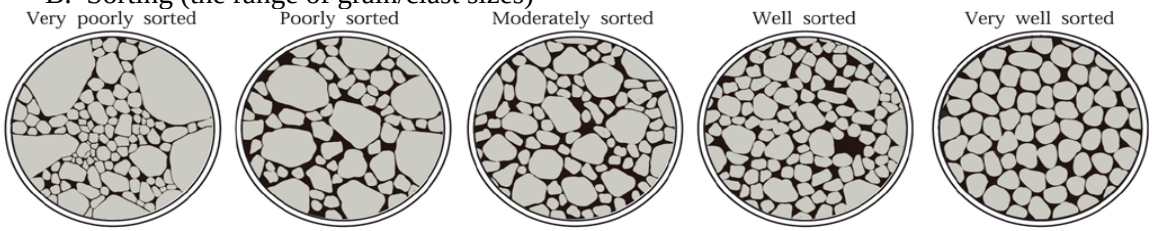
Interpreting the Sedimentary Rocks at _____

Step 1: Describe the texture and composition of the clastic (detrital) rocks.

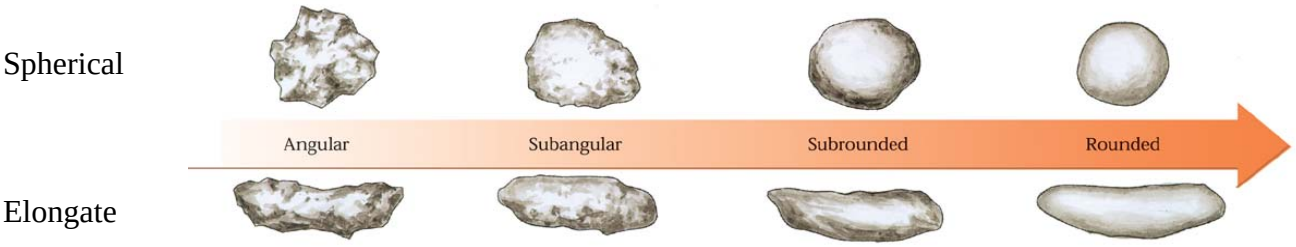
A. Grain/clast size

Gravel	Grains >2 mm	Rounded grains Angular grains	**Conglomerate** **Breccia**
Sand	Grains <2 mm & visible to naked eye	General term Grains mainly quartz Grains mainly rock frags Grains mainly feldspar	**Sandstone** **Quartz ss** **Lithic ss** **Arkose**
Mud	Grains not visible to naked eye Silt Clay	General term Easily split into thin layers Grains may be felt between fingers or across teeth Smooth to fingers or across teeth	**Mudrock** **Shale** **Siltstone** **Claystone**

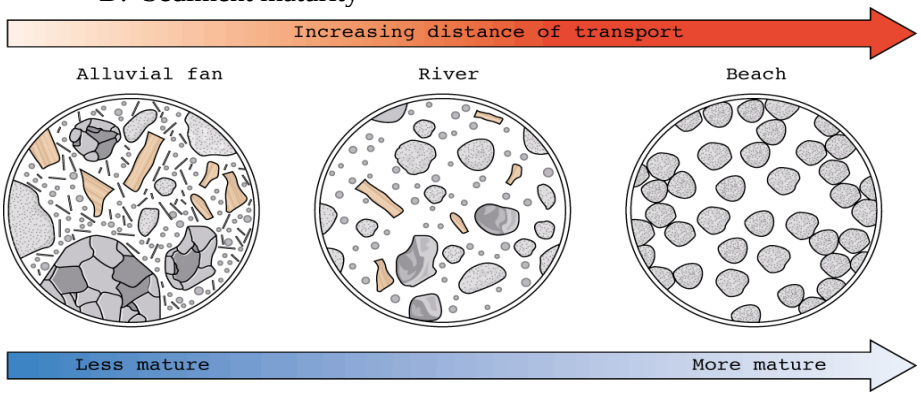
B. Sorting (the range of grain/clast sizes)



C. Shape of grains/clasts (sphericity and roundness)



D. Sediment maturity



Step 2: Look for these physical features to try to figure out the depositional environment.

A. Rock Color

Black	Enriched in organic matter & pyrite (FeS_2)	Oxygen-poor, stagnant settings and high organic productivity **Coal swamp or restricted basin**
Red	Enriched in iron oxides such as hematite (Fe_2O_3)	Oxidizing conditions, often associated with subaerial exposure & hot arid climates. **Terrestrial or shallow marine**

B. Surface markings

Ripple	Small-scale ridge of sand	Environment was affected by flowing water, wave action, or wind motion e.g., **river, estuary, sand dune**
Mudcrack	Polygonal-shaped cracks formed in mud that has dried out in a terrestrial environment	Environment affected by alternating wet and dry conditions **Tidal flat, lake shore, desert**

C. Internal bedding features

Lamination	Very fine layering composed of discrete layers of sediment a millimeter or so in thickness	Settling of sediment in suspension **Lake:** Seasonal deposition of fine (winter) and coarse (summer) sediment **Marine**: Indicates lack of bioturbation and therefore stressed conditions, e.g., low oxygen.
Graded bedding	Upward gradation in grain size from coarser or finer material	Fining-upward - deposition from a waning current (**turbidity flow**) Coarsening-upward – deposition under increasingly high energy conditions (**environment is shallowing**)
Cross-bedding	Formed by the migration of the slip-faces of ripped bedforms or dunes	Environment was affected by flowing water, wave action, or wind motion e.g., **river, estuary, sand dune** (large-scale cross-beds)
Heterolithic bedding	Closely interbedded deposit of sand and mud	Deposition in environment where current flow varies considerably **Tidal flat, estuary**
Convolute bedding	Folds whose intensity dies out both upwards and downwards within a single bed	Subjection of water-rich sediments to an external shock (**earthquake, large waves**)

Step 3: Check yourself by reading about the depositional environment you inferred.

Environment	Common Lithologies	Sedimentary Structures	Fossils
Terrestrial River	Sandstone	Unidirectional ripples and/or cross-bedding; channel forms in cross-section	Rare
Terrestrial Floodplain	Mudrock, shale, siltstone	None or lamination; evidence for soil development	Plant rootlets; coaly seams, plant debris
Terrestrial Lake	Mudrock, shale, siltstone, limestone	None or lamination Bioturbation on bed surfaces	Rare; microscopic fossils such as diatoms
Terrestrial Sand dune	Sandstone	Ripples; large-scale cross-bedding	Rare
Coastal Estuary	Sandstone	Ripples and/or cross-bedding; channel forms in cross-section Evidence for tidal influence; Bioturbation	Often rare; organisms that can withstand brackish conditions
Offshore/shelf	Mudrock, shale, siltstone; sandstone interbeds possible	Common bioturbation	Common; organisms that require normal marine conditions to live