Hint Sheet about Units on the Geologic Map of the Grand Canyon

Qs – Landslide – this unit is Late Cenozoic and developed soon after the canyon was formed by erosion.

Note: For ***Worksheet 10C-1***, no rocks of middle Cenozoic age, early Cenozoic age, or any Mesozoic age are preserved in this part of the Grand Canyon, so you cannot say anything about the geologic history of those time periods in ***Worksheet 10C-1***; this is why we wrote "no rocks preserved" in these spaces on the worksheet. The monocline folds and some of the faults formed in the Late Mesozoic and Early Cenozoic, so the region must have been squeezed and probably uplifted at that time.

>m – Triassic Moenkopi Formation – unit is not present on this part of the geologic map.

Pk – Permian Kaibab Formation – limestone and mudrocks formed in shallow seas and along the shoreline.

Pt – Permian Toroweap Formation – you have a *sample* of this unit so you can figure out the environment in which it formed.

Pc – Permian Coconino Sandstone – you have a *sample* of this one too; unit displays large cross beds (indicates deposited by wind) and locally contains tracks of small reptiles, like lizards.

Ph – Permian Hermit Shale – this is a reddish mudrock that forms a slope below the cliff of Coconino and that locally contains plant fossils.

P!s – Pennsylvanian-Permian Supai Formation – red sandstones and mudrocks that form ledges and slopes in the middle of the canyon walls; mostly deposited on land or in very shallow water.

Mr – Mississippian Redwall Limestone – a cliff-forming limestone that contains fossils of coral and other reef-dwelling critters; a gray rock but cliffs are stained red from the overlying Supai.

\m – Cambrian Muav Limestone – greenish limestone with mudstone; locally contains marine fossils.

\ba – Cambrian Bright Angel Shale – you have a *sample* of this unit, which locally contains trilobites and other marine fossils.

\t – Cambrian Tapeats Sandstone – you have a *sample* of this unit, which also locally contains pieces of shells and other bits of marine fossils.

Late Precambrian Units – Includes the Rama Formation, Dox Formation, Shinumo Sandstone, Hakatai Shale, and Bass Limestone; deposited in marine and continental settings; age on ***Worksheet 10C-1*** is Late Precambrian.

Early Precambrian Units – Includes Vishnu Schist, Brahma Schist, and Zoroaster Granite; the schist units were originally volcanic rocks and sediments that were metamorphosed (buried, heated, and deformed) at great depth (10 miles or so), then intruded by the granite. The rocks were then uplifted to the surface and eroded before deposition of the Late Precambrian units. The age of these rocks on *Worksheet 10C-1* is Early Precambrian.