X429 (all options)

KNOW:

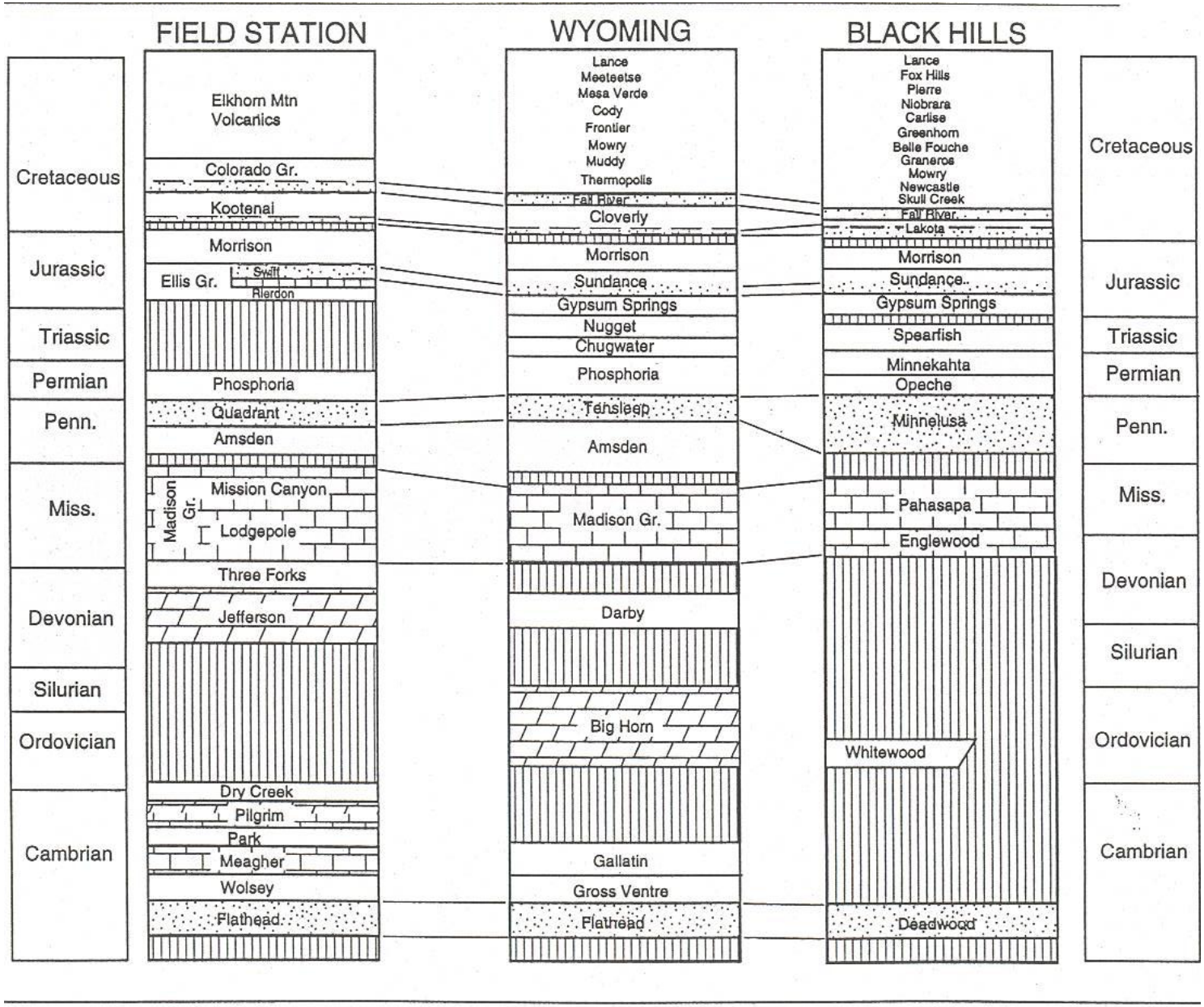
1. Geologic time scale
2. Local stratigraphic column (Cambrian Flathead - $\mathcal{E}_f$, Cambrian Wolsey - $\mathcal{E}_w$, Cambrian Meagher - $\mathcal{E}_m$, ...) *(page 3 of this document)*
3. General geographic setting
4. Strike and dip (definition, symbols, measurement)
5. Relationship between dip of beds and topography (assessment of high, medium, and low dips, direction of dip, succession of stratigraphic units)
6. 3-point problem for determination of the dip of a plane (bed, fault, axial plane)
7. Map patterns for:
    a. Anticline- geometries, horizontal, plunging
    b. Syncline- geometries, horizontal, plunging
    c. Normal fault
    d. Strike-slip fault
    e. Thrust Fault (high angle reverse fault)
    f. Fold cut by fault (various combinations)
    g. Unconformity, disconformity
8. Standard map symbols (strike and dip, fold axes, minor structures, contacts, faults)
9. Stereo plots (plotting of a plane, pole to plane, β - plot, π- plot)
10. Relationship between dip of sedimentary units and stratigraphic succession
11. Rule of V=s
    a. For topography (contour lines V upstream)
    b. For closure on a fold (plunging fold determination requires knowing age of units)
    c. For unit with respect to topography (dependent on relative dips)
12. Use of topographic maps (navigation, location, elevation, relief, profiles for geological cross sections)
13. Construction of a topographic profile for a geological cross section (1:1 scaling, bend in line of section)
14. Selection of location and construction of geologic cross section (perpendicular and parallel to regional strike)
15. Determination of sedimentary rock types (gross rock type ID, fossils, depositional environment)
16. Fossils (identification, age of abundance, depositional environment)
17. Determination of metamorphic rock types (gross distinctions, metamorphic facies)
18. Mineral identification in the field with hand lens
19. Determination of igneous rock types (gross distinctions, intrusive vs. extrusive, dike vs. sill)
20. General geological history of the Rocky Mountain Region

REVIEW MATERIAL:

If you have access to an introductory historical geology text (e.g. *Evolution of the Earth* by Dott and Batten, *Historical Geology* by Dunbar and Waage, *History of the Earth* by Kummel, or one of several others which are normally used in an introductory course) it would be worthwhile for you to read the sections containing information on the geologic history of eastern South Dakota, Wyoming, Montana, and Idaho. Pay particular attention to the history and timing of major orogenic events (e.g. Antler, Nevadan, and Laramide orogenies) and perhaps try to identify one or two exceptionally unusual or well-known events/characteristics in the history of the northern Rockies for each period of geologic time (e.g. Cambrian – west to east transgression; Late Jurassic – widespread deposition of continental facies (Morrison Fm.); Cenozoic – end of Laramide orogeny with vertical block uplift and associated non-marine deposition; etc.). Among other things, this exercise will ensure that you know the geologic time scale, at least to the period level. **Knowing the time scale is essential to the stratigraphic thinking that you will be doing, starting on the first day of the course.**

If some time has passed since you have worked with contour lines on topographic maps, it would be helpful to review basic principles of reading contours. This material can be found in almost all laboratory manuals written for introductory physical geology courses. Normally these manuals also have a chapter on geologic maps, which you also might wish to review. Topographic and geologic maps will be used extensively in your work at the Field Station. An efficient way to review techniques of contour reading is to select the topographic map from the area in which you reside and use it to practice location in the field. Go to an area that has good contour character and traverse around, stopping every few hundred yards in order to locate yourself on the map. Use only the contours to get your location. On geologic maps, make sure that you are familiar with the map patterns of plunging folds, faults, and to review basic principles of strike and dip as applied to geologic map interpretation.

The course textbook, which will be given to you in Bloomington or Rapid City, contains most of the pertinent geologic information that you will need during the trip to the Field Station. Topographic maps and state geologic maps will be placed in the caravan vehicles to supplement the information in the textbook. Two-way radios will be used to point out details of the geology along the route, to discuss regional geology, and to expand on discussion associated with the outcrops that we study.


FIELD STATION
WYOMING
BLACK HILLS
Cretaceous
Jurassic
Triassic
Permian
Penn.
Miss.
Devonian
Silurian
Ordovician
Cambrian
Elkhorn Mtn Volcanics
Colorado Gr.
Kootenai
Morrison
Ellis Gr.
Swift
Rierdon
Phosphoria
Quadrant
Amsden
Madison Gr.
Mission Canyon
Lodgepole
Three Forks
Jefferson
Dry Creek
Pilgrim
Park
Meagher
Wolsey
Flathead
Lance
Meeteetse
Mesa Verde
Cody
Frontier
Mowry
Muddy
Thermopolis
Fall River
Cloverly
Morrison
Sundance
Gypsum Springs
Nugget
Chugwater
Phosphoria
Tensleep
Amsden
Madison Gr.
Darby
Big Horn
Gallatin
Gross Ventre
Flathead
Lance
Fox Hills
Pierre
Niobrara
Carlise
Greenhorn
Belle Fouche
Graneros
Mowry
Newcastle
Skull Creek
Fall River
Lakota
Morrison
Sundance
Gypsum Springs
Spearfish
Minnekahta
Opeche
Minnelusa
Pahasapa
Englewood
Whitewood
Deadwood