Cross Sections and Block Diagrams

The geological map: observations and interpretation (incomplete observations)

observed contact,

inferred contact

approximate contact

questionable contact

….

Outcrop map vs. interpretive map

Cross Section

To aid perceiving the structures in three dimensions

Construction:

- Choose a line of the section
- Construct topographic profile
- Add geologic data to the topographic profile. The data include various contacts and attitudes

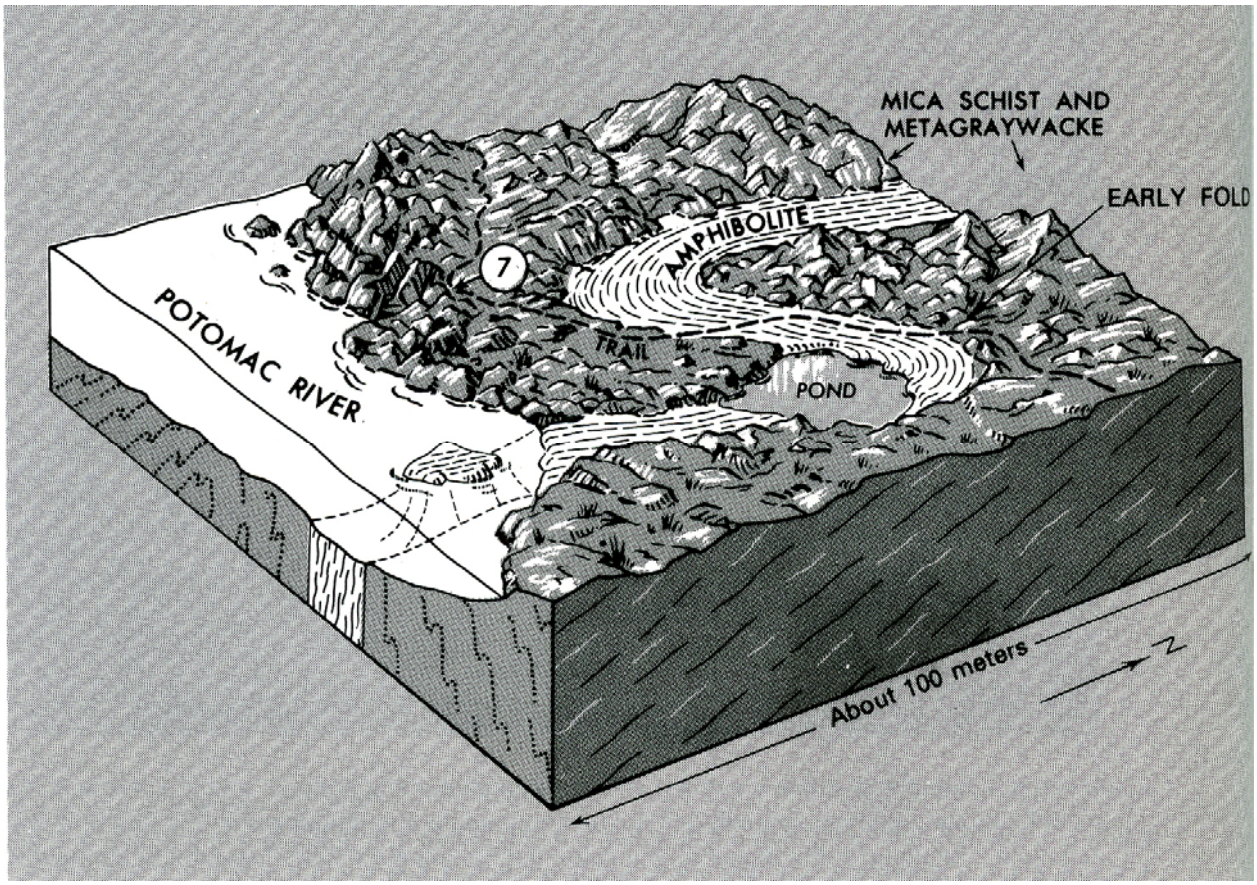
Note: use apparent dips unless the line of section is perpendicular to the local strike.

Vertical exaggeration or not

m=vertical scale / horizontal scale

Block Diagrams

- One of the best ways to show structures in 3 dimensions



Principles of Orthographic Projection

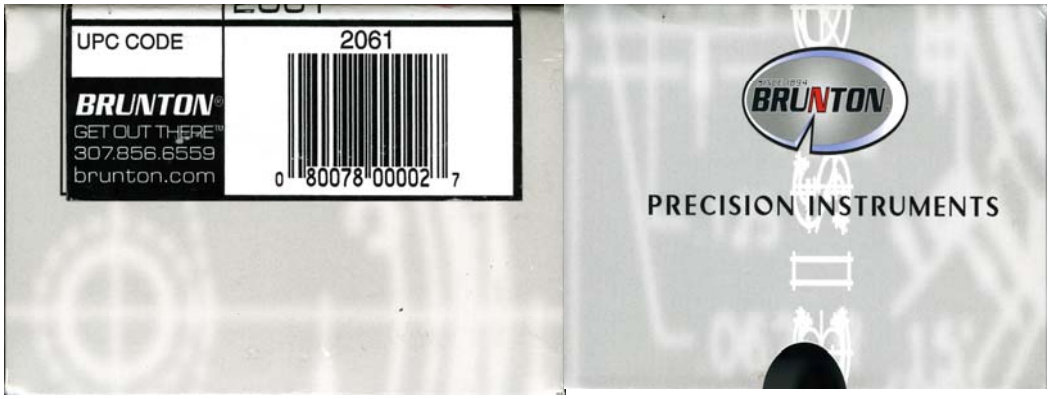
top view

front-side view

right-side view

Front

Front +
right side



Front =
right side

right side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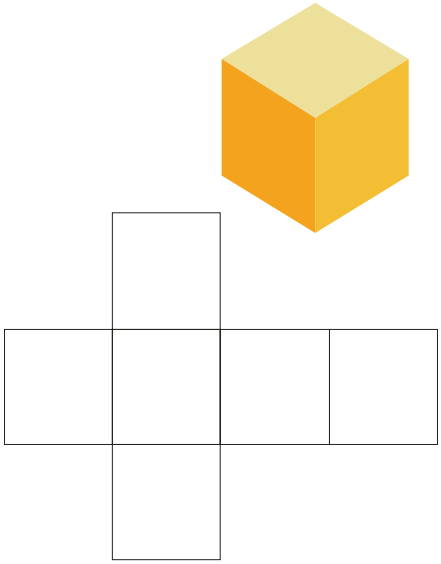
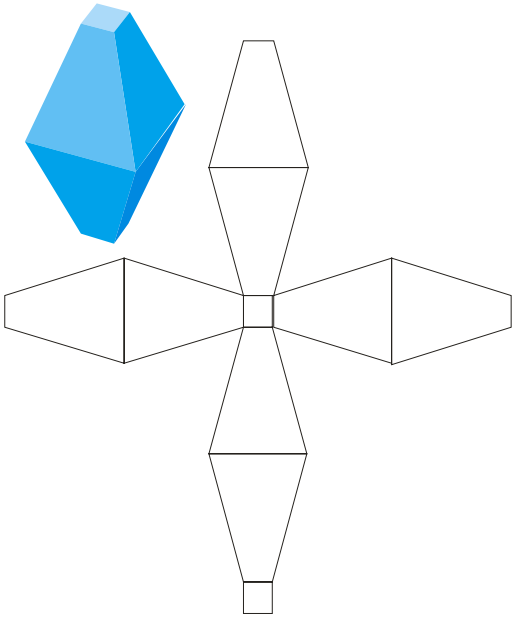
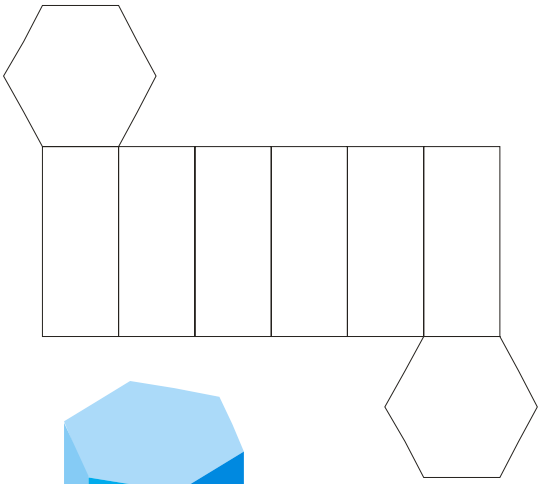
Isometric block diagram:

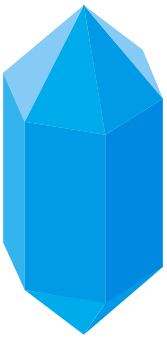
Three edges of the block have the same scale and are 120^{o} from each other.

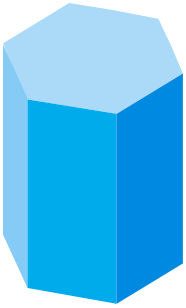
Block diagrams of various geometric objects

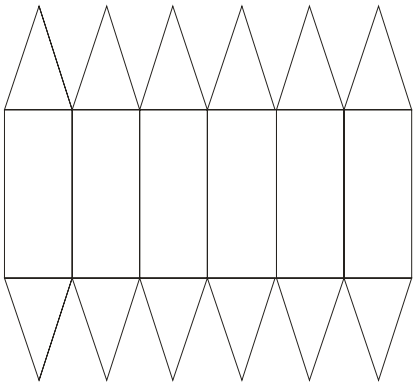












Plotting planes and lines on an isometric block

Plane plotting:

1. Plot strike line on the top surface of the block
2. Calculate apparent dip(s) on the side
3. Convert angles of dip(s) or apparent dip(s) to line ratios using trignometry
4. Complete the plane

Line plotting:

1. Plot a vertical plane striking parallel to the trend (plunge direction) of the line
2. Plot the line on this plane according to the plunge angle.

Note: (1) Use line ratios to plot the angle

(2) Pay attention to different scales of lines in different orientations

- Rule of thumb: covert angles to line segment ratios using trigonometry; pay attention of scale differences of lines

Plotting Planes and Lines onto the Block Diagram

Plane plotting:

- **Plotting strike onto the top surface of the block**
- **Calculating apparent dip(s) on the side**
- **Completing the plane**

Line plotting

- **Plotting a vertical plane with a strike / / to the plunge direction of the line**
- **Plotting the line on the plane**

Use rulers and calculators, not protractors!

Constructing a Geological Block Diagram

- Projecting (deforming) the topographic map onto the top surface of the block
- Constructing the 3D surface using contour lines
- Mapping the geological contacts onto the top 3D surface
- Plotting cross sections
- Plotting structures