

# Topo Maps

Topo (topographical) Maps use contour lines and other symbols to depict terrain features and elevation changes. They are ideal maps for navigating wilderness areas.

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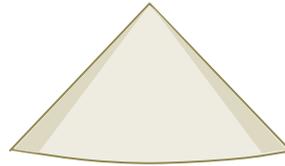
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## Key Terms

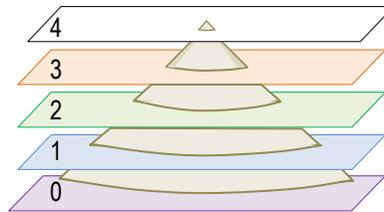
- Topo [TOH-poh]
- Topographical [TAWP-oh-GRAF-ih-kuhl]
- Benchmark
- Contour [KAWN-toor]
- Contour Interval
- Depression
- Draw
- Hill
- Index Line
- Intermediate Line
- Plateau
- Ridge
- Saddle
- Spur
- Valley

## Creating Contour Lines

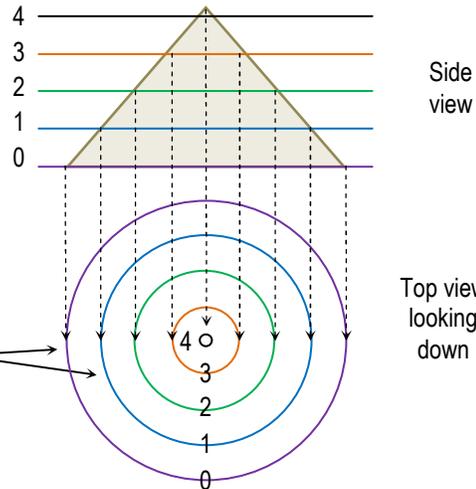
1. Start with a shape



2. Slice it into equal elevations



3. Project each elevation onto a map

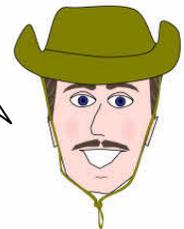


Contour Lines

### Line Colors

On actual Topo maps, contour lines are usually a *single* color, typically **brown** or **black**, which may shift to **blue** for glaciers. In this handout, lines are multicolored solely for illustration purposes.

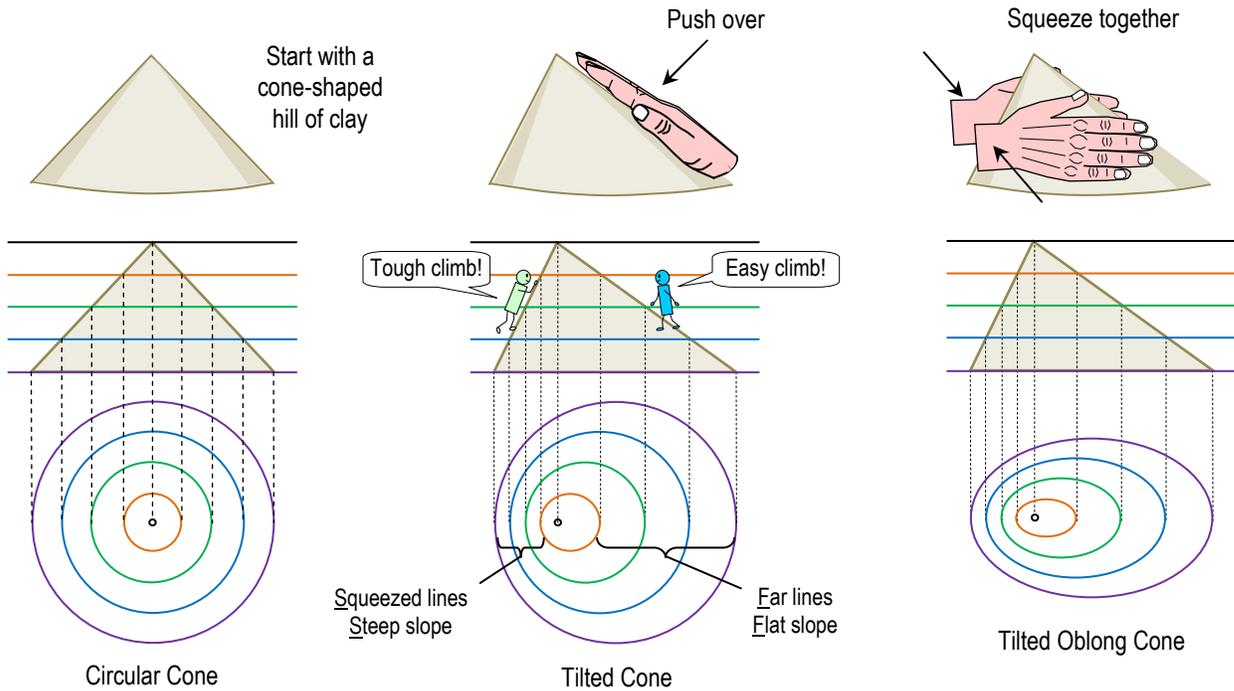
Each line represents the *same* elevation along its entire length.



# Contour Line Features

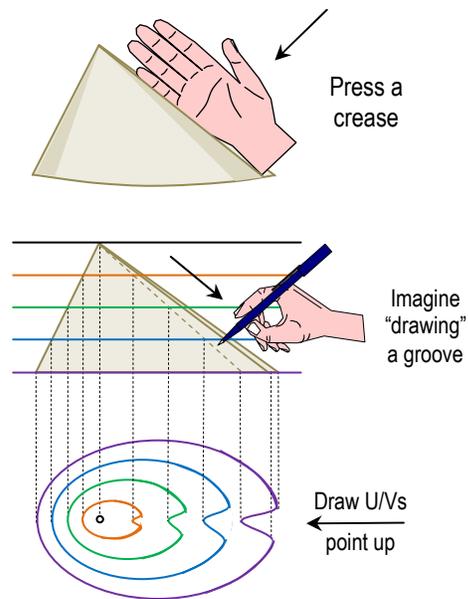
Hill, Draw, Spur, Valley, Ridge

## Hill

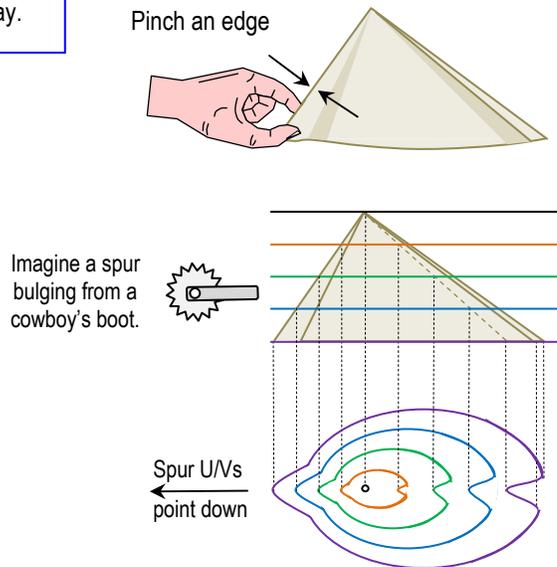


To get a "feel" for terrain features, imagine reshaping a mound of clay.

## Draw



## Spur

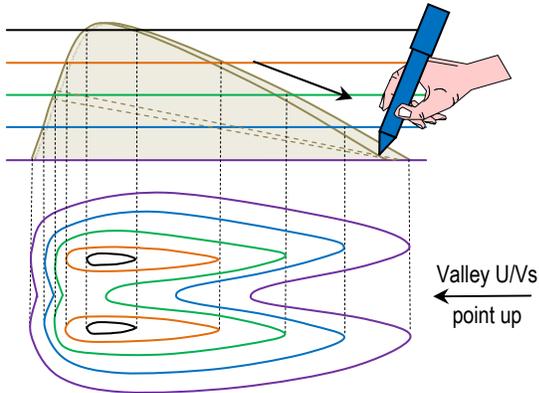


A **draw** is a sloping crease formed by geologic forces, erosion, or water.  
Other names: arroyo, colour, dry creek, gulch, gully, rambla, wadi, wash.

A **spur** is a sloping bulge formed by geologic forces. It can also be carved out by draws on either side.

## Valley

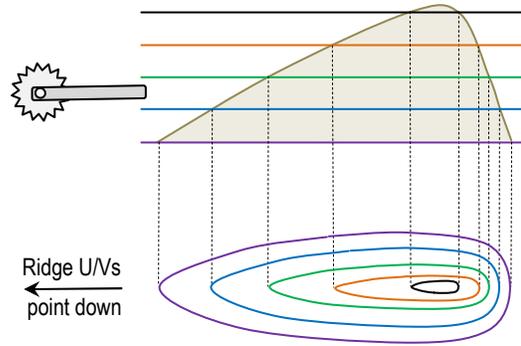
Like a long wide *draw* between hills



A **valley** is a long sloping crease formed by geologic forces, erosion, water, or glaciers. A valley flanked by steep walls or cliffs is a **canyon**.

## Ridge

Like a long wide *spur* coming down a hill



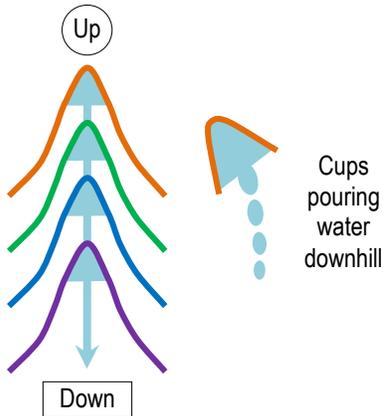
A **ridge** is a long sloping bulge formed by geologic forces. A **ridgeline** consists of a long line of hills, dips, and ridges.

## U/V Shapes

Which way do they go?

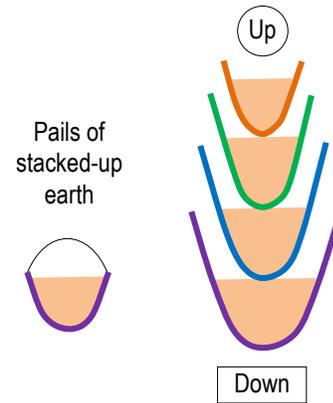
### Draws & Valleys

As they are often shaped by water, imagine the U/V shapes of draws & valleys as cups pouring water downhill.



### Spurs & Ridges

Imagine the U/V shapes of spurs & ridges as pails of earth with larger pails below supporting smaller pails above.



## Between Lines

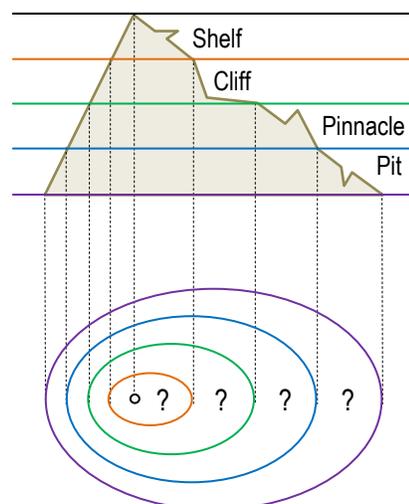
What isn't shown?



Contours don't display features *between* lines!

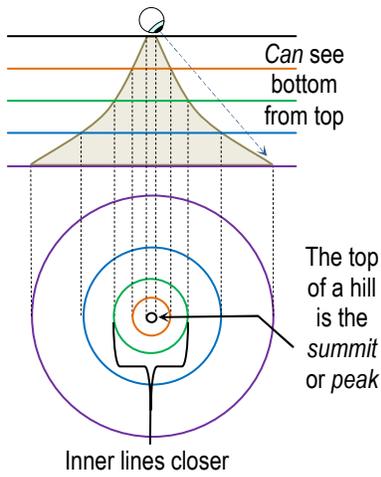
Each contour line represents the same elevation over its entire length. But features that fall *between* contour lines may *not* be displayed on a map! This might pose a real danger when unexpected obstacles are encountered.

If available, a map with closer contour lines will display more terrain details.

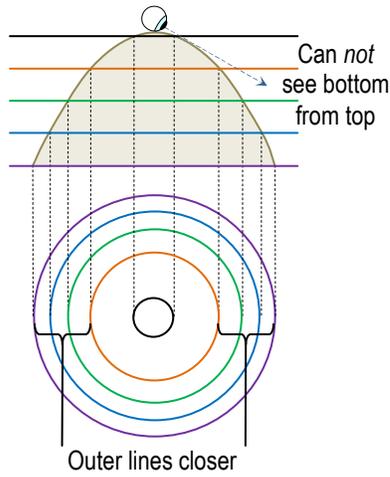


# More Features

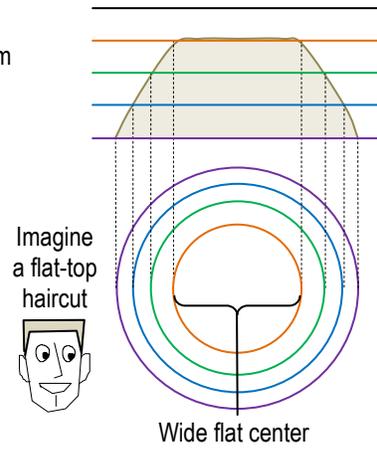
**Hill**  
(Concave)



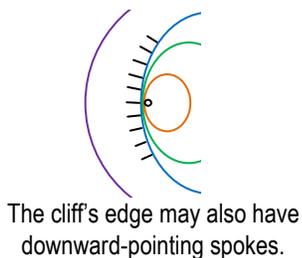
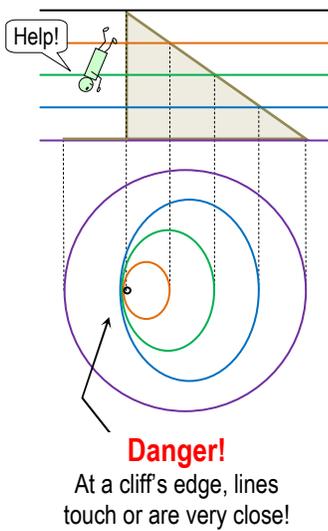
**Dome**  
(Convex)



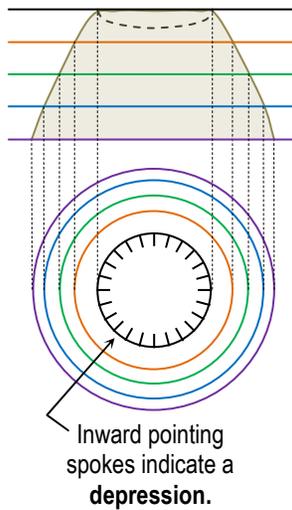
**Plateau**  
(Flat Top)



**Cliff**  
Drop-off

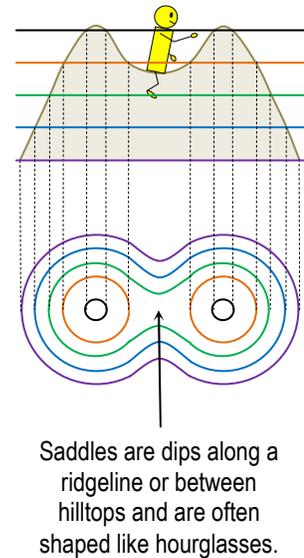


**Depression**  
Bowl, Crater



Imagine pushing a shallow bowl into the terrain.

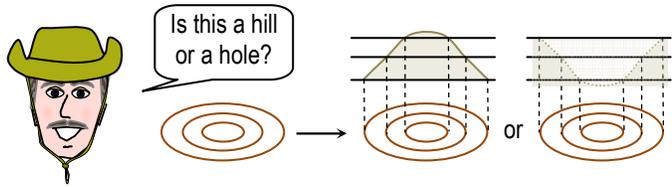
**Saddle**  
Pass, Col



Saddles are typically formed by 2 hills and 2 draws.

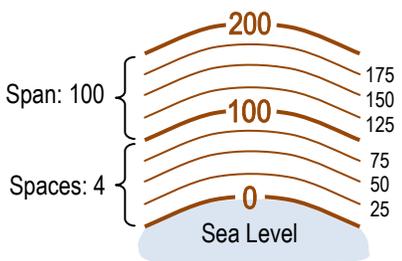
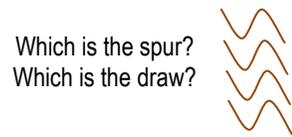
# Contour Elevations

**Problem:** On an actual Topo map, if contour lines are one color, usually black or brown, how do you tell up from down?

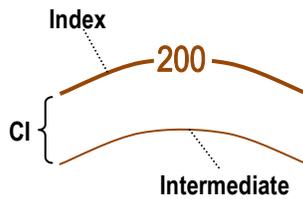


**Solution:** To specify elevation differences, contours use:

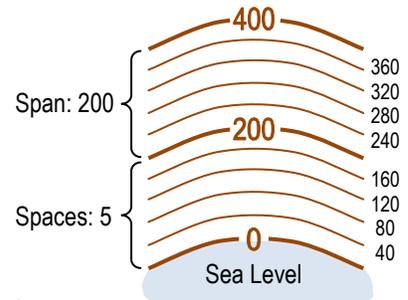
- **Index Lines:** Bold lines labeled with height figures (feet or meters).
- **Intermediate Lines:** Thin lines between Index Lines.
- **Contour Interval (CI):** Elevation between contour lines.  $CI = \text{Span} / \text{Spaces}$ .



$$CI = \frac{\text{Span}}{\text{Spaces}} = \frac{100}{4} = 25$$

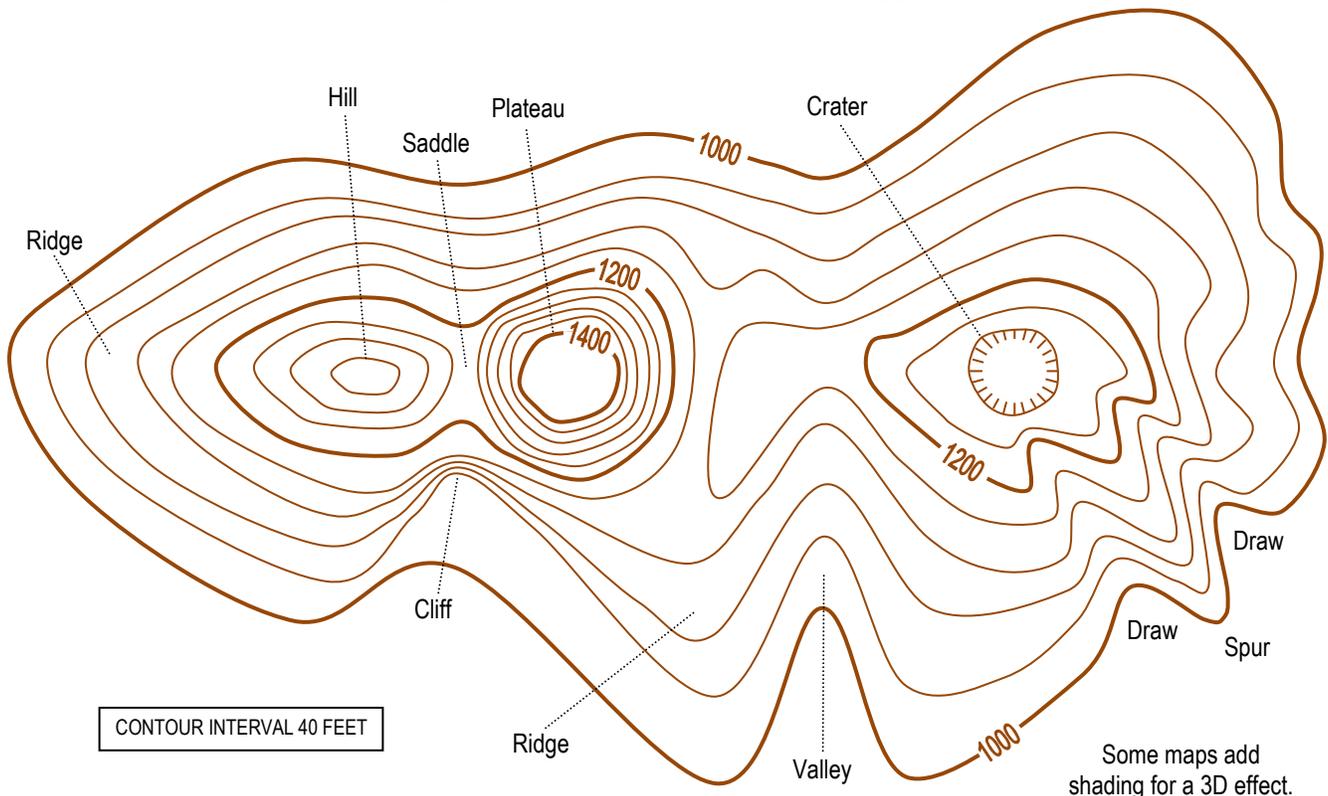


In flat areas, some maps add dashed or dotted **supplementary** lines at *half* the contour interval.



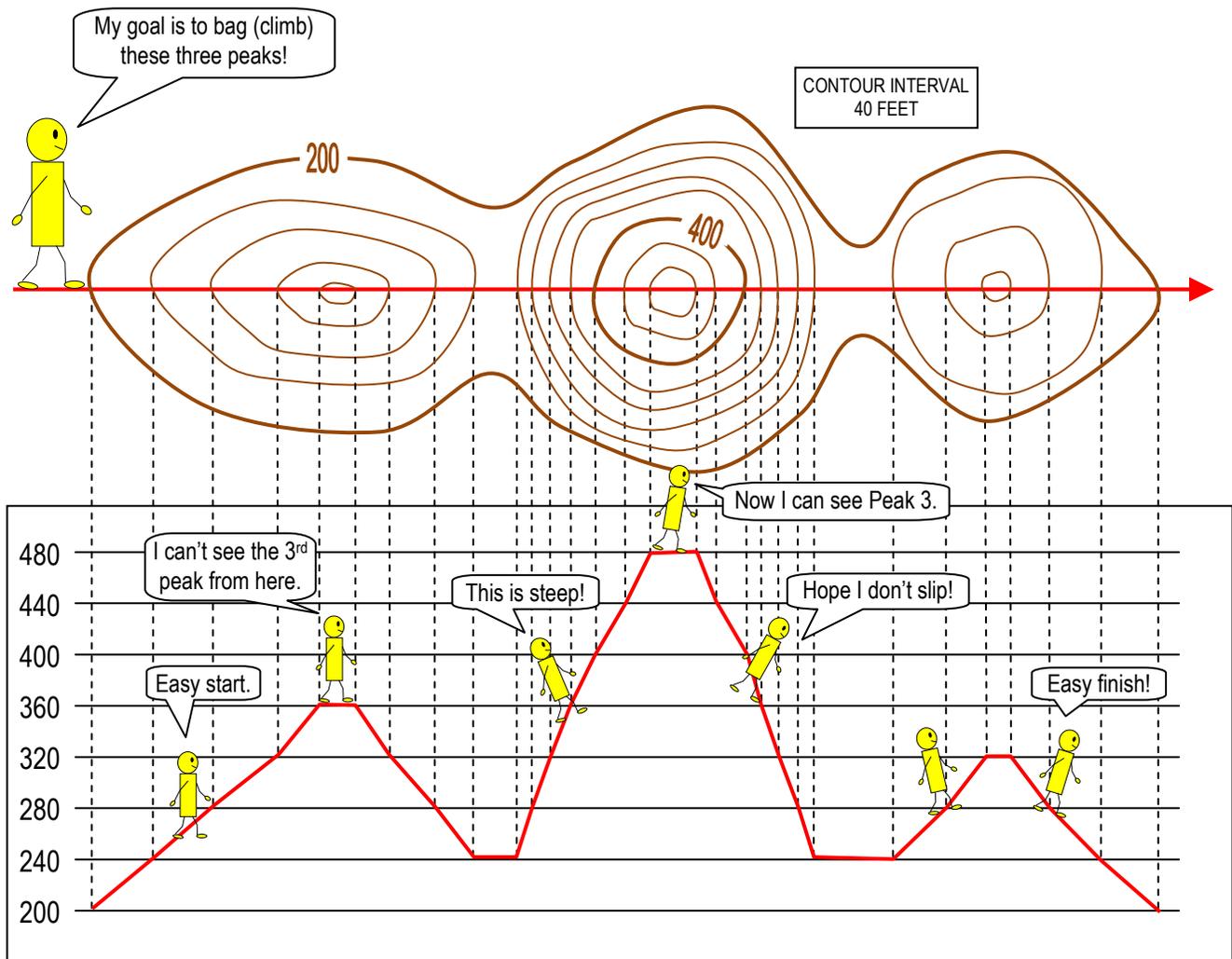
$$CI = \frac{\text{Span}}{\text{Spaces}} = \frac{200}{5} = 40$$

## Contour Elevations and Features



# Elevation Profile

Create an Elevation Profile to see how strenuous your **hike** is going to be.



## To create an Elevation Profile

- On a Topo map, draw your intended hiking path.
- Place a ruled piece of notebook paper on the map below your path.
- Label the top line with the highest contour elevation.
- Label lines beneath with decreasing contour interval elevations.
- Use a ruler to draw dashed lines straight down (“drop perpendiculars”) from each intersection of your path and a contour line.
- Connect bottoms of dashed lines to reveal profile.

Observe that this process is the reverse of turning a terrain shape into contour lines.



### Quick Profile

Drop lines *only* from peaks and valleys.

Tip

## Advantages

- Shows slopes so you can gauge path difficulty and your approximate speed.
- Shows features that you won't be able to see as they'll be blocked by peaks.
- On waterways, shows falls or stretches that may be too steep to navigate and may require you to carry your boat around via land paths (portage).

### Approximate Hiking Rates

Terrain	Speed
Level	3 mph
Sloped	2 mph
Steep	1 mph

# Topo Symbols

<http://egsc.usgs.gov/isb/pubs/booklets/symbols/topomapsymbols.pdf>

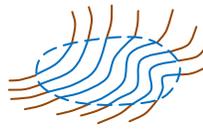
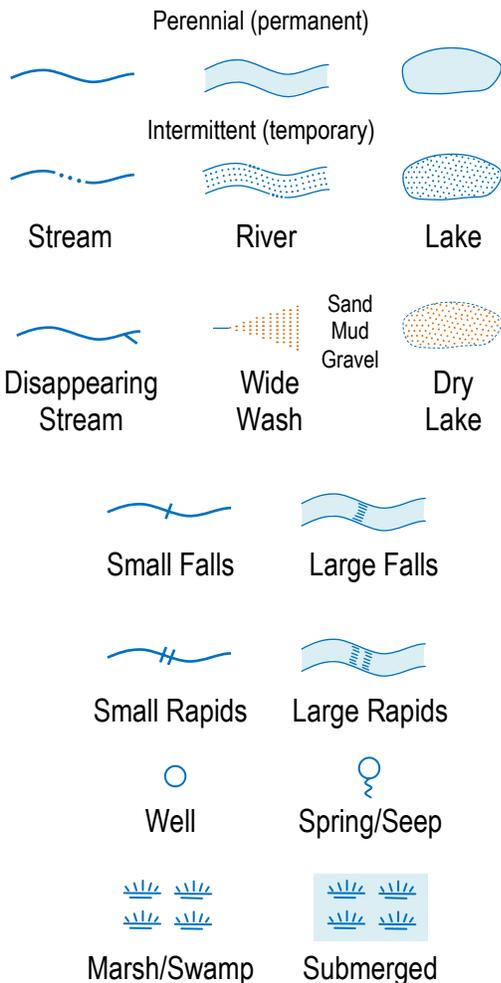
## Color Guidelines

Black - man-made features, roads, buildings...  
 Blue - water, lakes, rivers, streams...  
 Brown - contour lines  
 Green - vegetation  
 White - low vegetation, snowfields, glaciers.  
 Red - major highways; public land boundaries.  
 Purple - aerial photo features not checked on land.

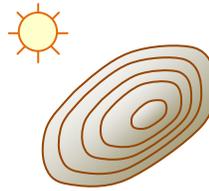
## Vegetation



## Water

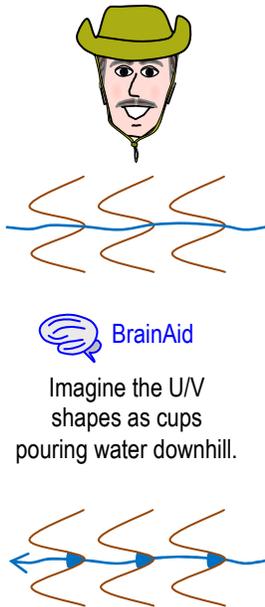


Glacier contour lines and borders may be blue.

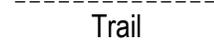
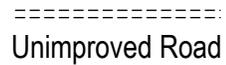


Shading may be added to highlight elevation. Although unrealistic for a Northern Hemisphere map, artistic convention has the light source (sun) upper left.

Which way is this stream flowing?



## Paths



## Elevation

BM × 5280  
 Benchmark  
 (Physical marker; most accurate)

× 6543 • 6543  
 Spot Elevation  
 (No marker; less accurate)

## Structures

