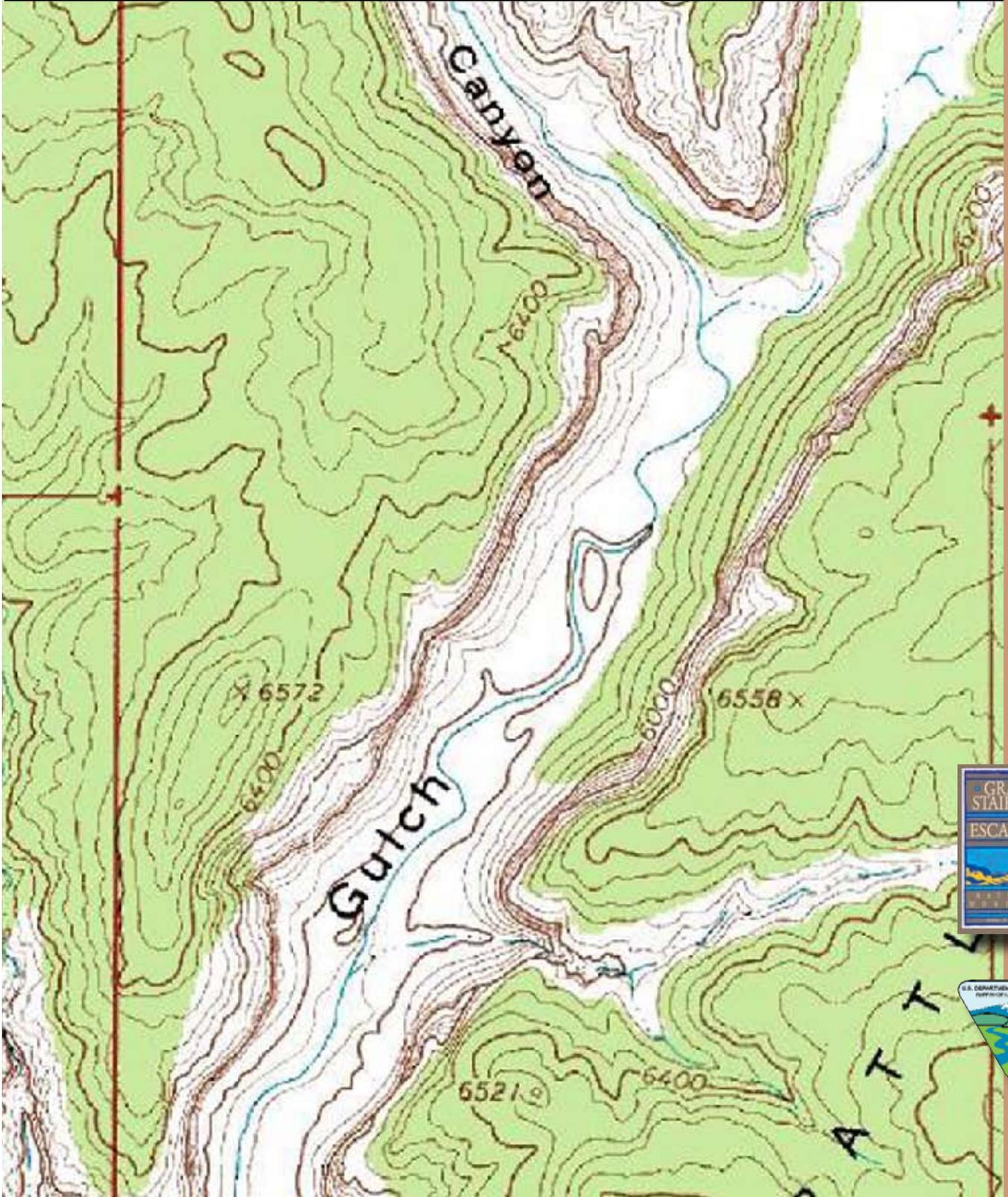


Reading a Topographic Map

Student Activity



Grand Staircase-Escalante National Monument



Reading a Topographic Map

The Legend

Every map has a legend, or key, that explains the meaning of the symbols used on the map. The legend is usually printed right on the map, although some maps, like USGS topographic maps, publish legends separately. Legends tell you what different lines mean, whether they are roads, trails, power lines, streams, or boundaries of some sort. Legends also show different symbols and translate them, like the symbol used for a spring, windmill, or maybe a gravel pit. The legend also provides information about the map including its title, scale, projection, cartographer, publisher, date of compilation, and date of printing.

The Squares

When you first look at a topo map you'll notice there are lots and lots of squares. Look closer and you'll find letters and numbers written across the top and bottom of the map and inside some of the squares. Let's start with the smallest squares first.

I. Sections

A section is a square tract of land that measures one mile by one mile and contains 640 acres. There are 36 sections in a township, but not all the sections may be numbered on a topo map. Sections are also numbered kind of strangely, starting in the uppermost right corner with the number 1 and then moving to the left six squares, down one square, right six squares. The reason for numbering sections this way is so there will never be two sections with the same number next to each other in adjacent townships.

A picture's worth a thousand words, isn't it?

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Note: Only the **bold numbers (1,6,31,36)** are usually on a BLM 1:100,000 map.

II. Township

Townships are made up of 36 sections. The square Section shown is one Township. Township lines run east and west on a topo map. Township numbers are written in the left and right margins of topo maps.

Example: T42S= Township 42 South

III. Range

Range lines run north and south on a topo map. You can find them in the top and bottom margins of the map.

Example: R9W=Range 9 West

Range lines measure east and west of a “Principal Meridian”. If you want to know more about the Principal Meridian, and Meridians in general, try an internet search.

Contour Lines

We’re going to make an assumption here that you already know how to find roads on maps. They are usually solid or broken lines (---) with numbers designating a highway or interstate. But there are lots more curvy, squiggly lines on a topo map and these are contour lines. To understand more read the **Rules for Contour Lines** and then look at Figure 1 to see how contour lines are constructed.

Rules for Contour Lines

1. A contour line must never divide or split.
2. A contour line must never simply end. Somewhere (usually off the map) the two ends of a contour line must join to enclose an irregularly circular region.
3. A contour line must represent one and only one elevation.
4. A contour line may never intersect other contour lines. Overhanging cliffs are a rare exception, in which case the hidden contours are dashed.
5. Contour lines form a “V” pattern when crossing streams. The “V” points upstream (uphill).
6. Closely spaced contour lines indicate a steep slope, widely spaced lines are gentle slopes.
7. Concentric circles of contour lines indicate a hilltop or mountain peak.
8. Concentric circles of hatched contour lines indicate a hollow or closed depression.

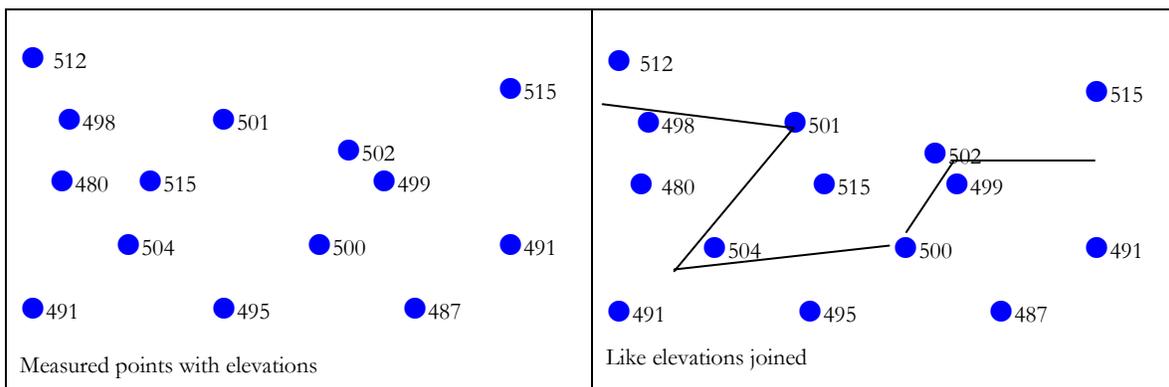


Figure 1

Reading Elevations

Not all contour lines are numbered. If you search closely in the legend area of most topo maps you will find the “Contour Interval.” Topo maps that are 1:24,000 scale have 40 foot (12.19 meter) contour intervals while 1:100,000 scale maps have contour intervals of 50 meters, roughly 150 feet.

If a point lies on a numbered contour line, its elevation is read from that line. If the point lies on an unnumbered contour its elevation can be determined by counting up or down from the nearest numbered line, according to the contour interval, or the distance between each contour line. If a point lies between contour lines, you will have to estimate its elevation. For example, on a map with a 20 foot contour interval (they always tell you the interval) a point might have an elevation of more than 340 feet but less than 360 feet.

Ridge crests and valley bottoms are slope reversals. To visualize this, picture yourself walking along an imaginary trail crossing a ridge or valley (see Figure 2). Every time you change your slope orientation from uphill to downhill, or vice versa, you must recross the contour lines you have previously passed.

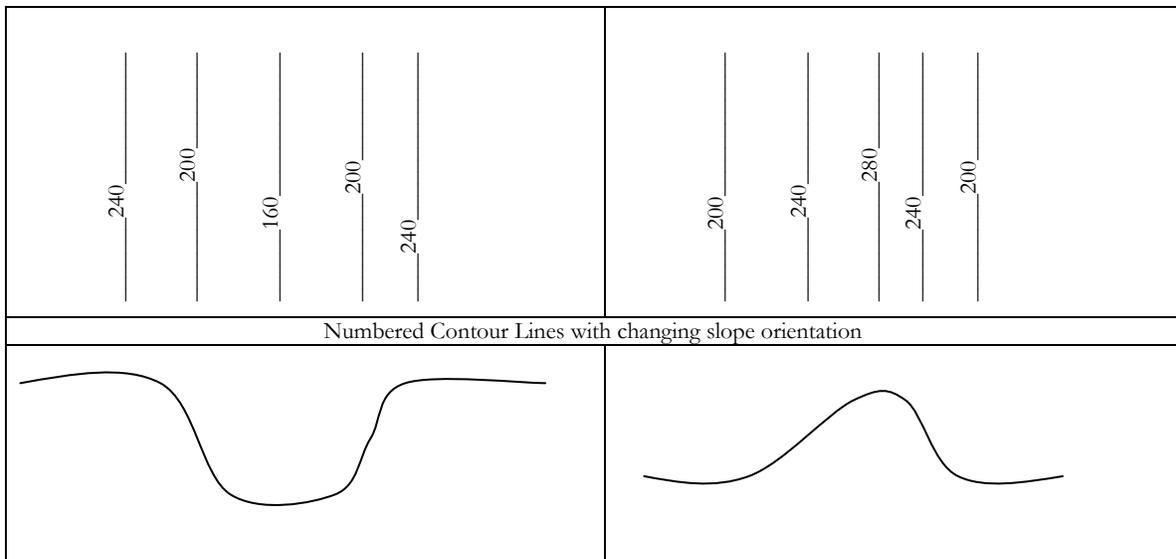


Figure 2

Relief is defined as the difference in elevation between two points on a map. Relief lines include hatch marks that indicate whether a series of concentric contour lines are indicating a hill or a depression. In Figure 3, you'll see that when crosshatches are on the inside of concentric lines, they indicate a depression. When there are no marks, you can assume it's a hill.

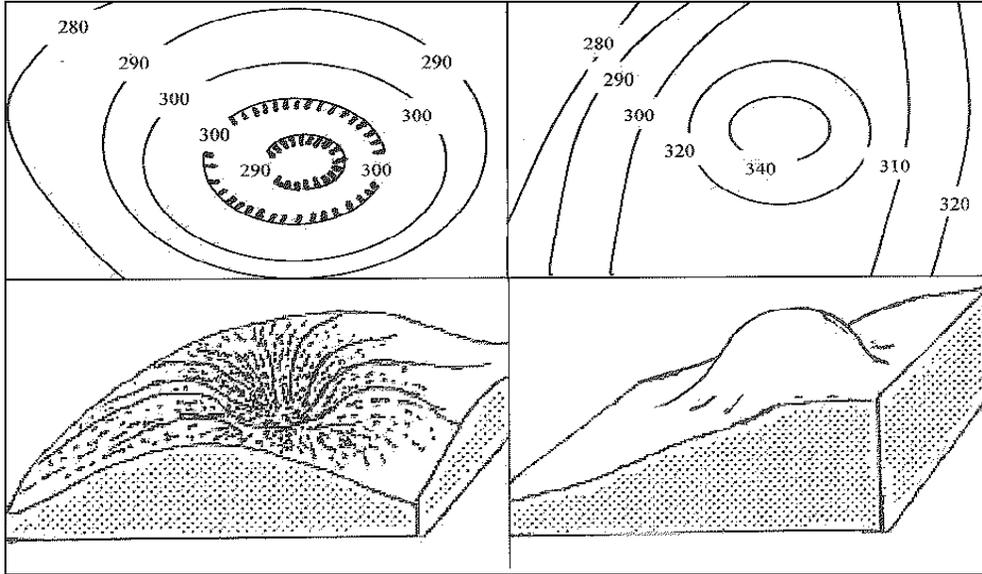


Figure 3

Working with Contour Lines and Elevations

Following are two problems that you will need to solve. Question 1 deals with contour lines and Question 2 deals with elevation, relief, and contour lines.

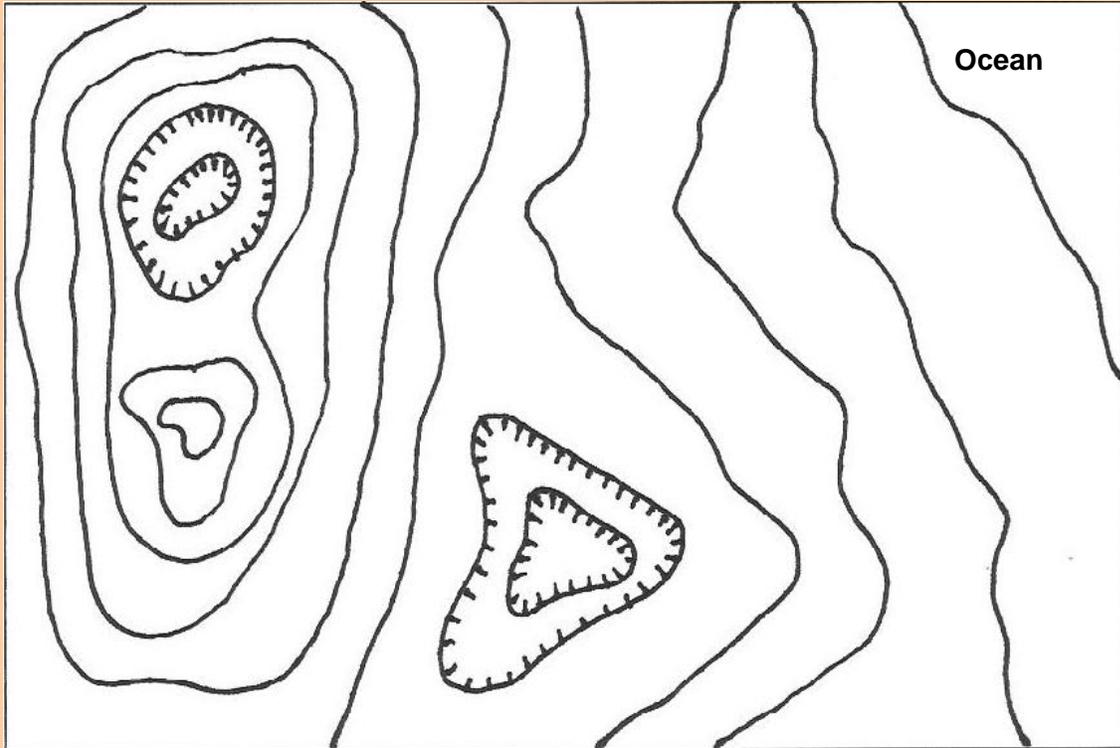
Question 1

The dots below are measured elevations in feet. Draw contour lines using a contour interval of 10 feet. You'll need to estimate elevations between some of the dots.

● 125	● 112	● 100	● 78	● 90	● 106	● 117
● 130	● 115	● 103	● 87	● 110	● 111	● 119
● 133	● 122	● 110	● 98	● 107	● 116	● 130
● 140	● 125	● 118	● 110	● 113	● 123	● 134

Question 2

On the map below mark each contour line with its proper elevation, using contour intervals of 40 feet. Label features you can describe.



Find a Route

Use the King Bench or Escalante topo map to find the following routes from one point to another.

Question 3. King Bench Spring #1

Start: You and three friends are driving down the Burr Trail and you decide to park where the road meets Deer Creek in Section 16, Township 34 South, Range 5 East, and go for a little hike.

Find: You are looking for the most direct route to the spring in Section 2, T35S, R5E.

Figure: If you're traveling light and making about three miles an hour, how long will it take you to get to the spring?

Question 4. King Bench Spring #2

Start: You are at the spring in S2, T35S, R5E, and two of your friends decide to return to the car by retracing their path. You and your other friend decide to take a different route to the road where you can be picked up.

Find: Find the most direct route from the spring to the corral in S13, T34S, R5E.

Figure: Approximately how long will it take you to reach to corral if you are traveling four miles an hour?

Question 5

You know how long it will take your friends to get back to the car (see previous problem), who will reach the road first?
