

Fig. 2.9 Solution of a three-point problem using a combination of graphical and trigonometric techniques. (a) Three coplanar points (A, B, and C) on a topographic map. (b) Location of a fourth point, B', at the same elevation as point B. (c) Line B-B' defines the strike of the plane. (d) Dip-direction line perpendicular to the line B-B'.

Solution 2

Another approach to solving a three-point problem is to convert it into a two-apparent-dip problem, as follows:

- 1 Draw lines from the lowest of the three points to each of the other two points (Fig. 2.10a). These two lines represent apparent-dip directions from B to A and from C to A.
- 2 Measure the bearing and length of lines CA and BA on the map (Fig. 2.10b), and determine their plunges:

$$\theta_1 = 80^\circ, \theta_2 = 107^\circ$$

$$\tan \alpha_1 = \frac{\text{diff. in elevation}}{\text{map distance}} = \frac{60'}{198'} = 0.303$$

$$\tan \alpha_2 = \frac{100'}{204'} = 0.490$$

- 3 Use equation 1.4 to find the true-dip direction, and then use equation 1.3 to find the amount of dip.

Key see ATTACHED

Problem 2.3

Points A, B, and C in Fig. G-4 are oil wells drilled on a level plain, and all of the wells tap the same oil-bearing sandstone. The depth (not the elevation!) of the top of this sandstone in each well is as follows: A = 5115 ft, B = 6135 ft, and C = 5485 ft.

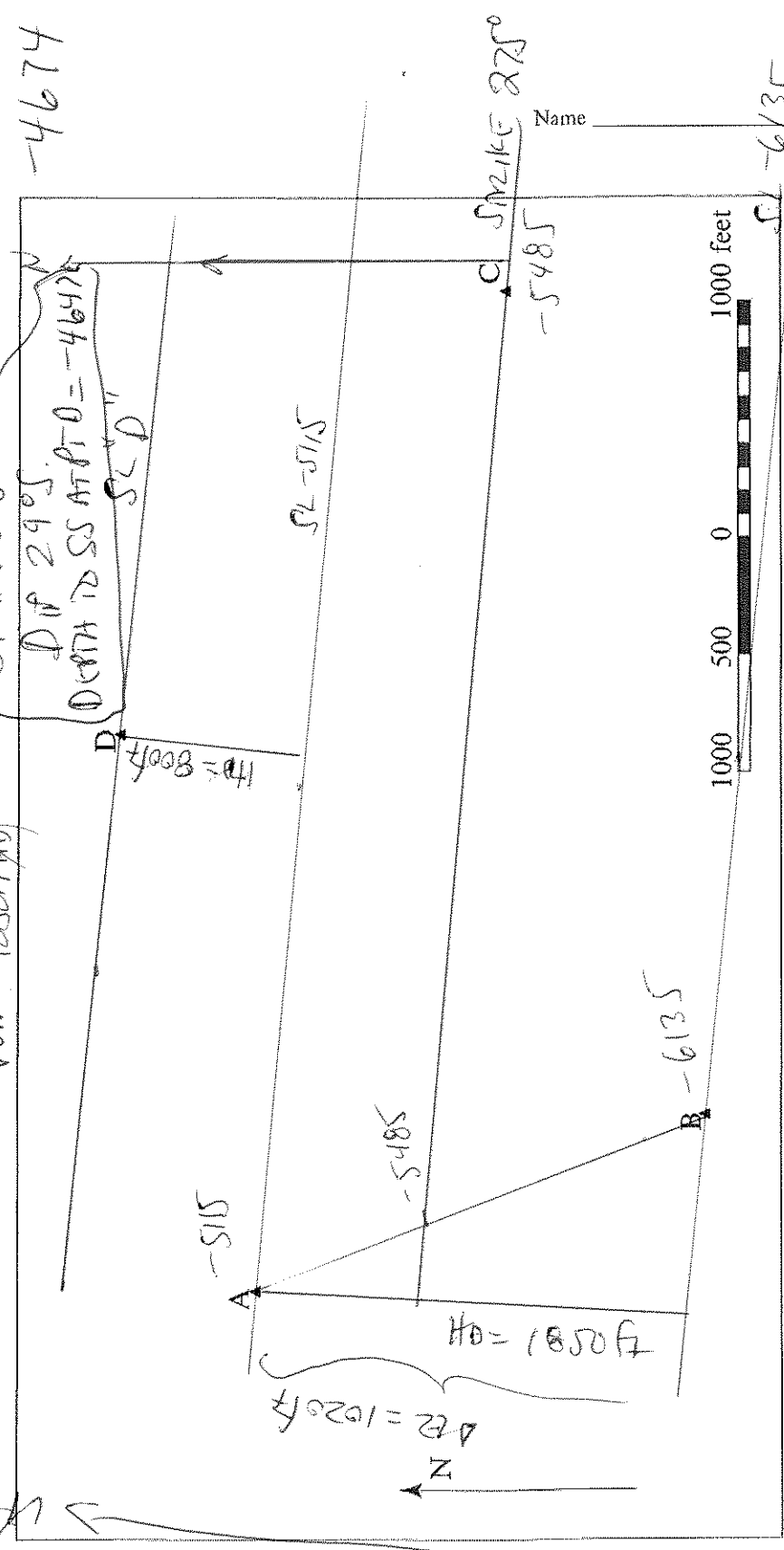
- 1 Determine the attitude of the sandstone.
- 2 If a well is drilled at point D, at what depth would it hit the top of the sandstone?

Determining outcrop patterns with structure contours

Earlier we discussed structure-contour maps derived from drill-hole data. Structure-contour maps may also be constructed from surface data. Suppose, for example, that an important horizon is exposed in three places on a topographic map,

Key Q 2.3

Dip = $\frac{rise}{run} = \frac{1020 \text{ ft} \times (800 \text{ ft})}{1850 \text{ ft}} = +441 \text{ ft up dip from Pt A to Pt D}$
 Strike 275°
 Dip 29°S
 Depth to SS at Pt D = -4647'



Dip = $\frac{rise}{run} = \frac{1020 \text{ ft}}{1850 \text{ ft}} = 0.55$
 $\tan^{-1}(0.55) = \text{Dip} = 29^\circ \text{ to South}$

Strike 275°
 Dip 29°S
 Depth at Pt D = -4647'

Fig. G-4 Map for use in Problem 2.3.

Dip