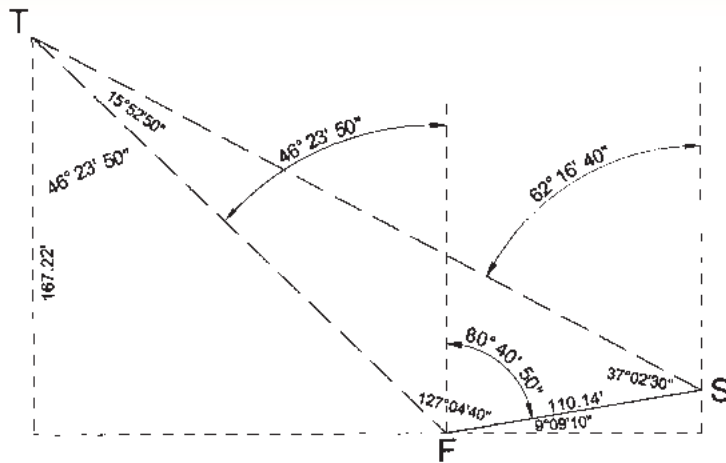
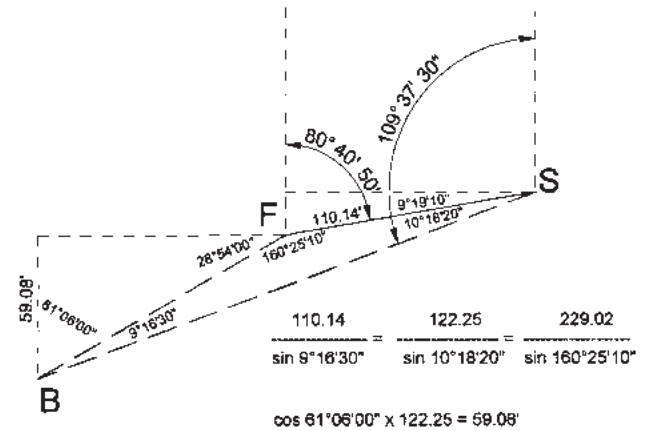


Solution to Problem 103



$$\frac{110.14}{\sin 15^{\circ}52'50''} = \frac{242.47}{\sin 37^{\circ}02'30''} = \frac{321.13}{\sin 127^{\circ}04'40''}$$

$$242.47 \times \cos 46^{\circ}23'50'' = 167.22'$$



$$\cos 61^{\circ}06'00'' \times 122.25 = 59.08'$$

$$\text{TOTAL HEIGHT} = 167.22' + 59.08' = 226.3'$$

The zenith angles $62^{\circ}16'40''$, $80^{\circ}40'50''$ and $46^{\circ}23'50''$ yield all of the angles in the triangle T-S-F:

$$\text{Angle F} = 80^{\circ}40'50'' + 46^{\circ}23'50'' = 127^{\circ}04'40''$$

$$\text{Angle S} = 180^{\circ} - 62^{\circ}16'40'' - 80^{\circ}40'50'' = 37^{\circ}02'30''$$

$$\text{Angle T} = 180^{\circ} - \text{angle F} - \text{angle S} = 52^{\circ}52'50''$$

With known side F-S as 110.14', side T-F is found by the Law of Sines to be 242.47'

Side T-F times the cosine of $46^{\circ}23'50''$ yields 167.22', the height of the top above F.

Likewise, the zenith angles $118^{\circ}54'00''$, $109^{\circ}37'30''$ and $80^{\circ}40'50''$ yield the angles of triangle B-F-S:

$$\text{Angle S} = 109^{\circ}37'30'' - 99^{\circ}19'10'' = 10^{\circ}18'20''$$

$$\text{Angle F} = 360^{\circ} - 118^{\circ}54'00'' - 80^{\circ}40'50'' = 160^{\circ}25'10''$$

$$\text{Angle B} = 180^{\circ} - \text{angle S} - \text{angle F} = 9^{\circ}16'30''$$

With known side F-S being 110.14', side F-B is found by the Law of Sines to be 122.25'

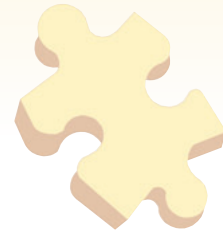
Side B-F times the cosine of $61^{\circ}06'00''$ gives 59.08' as the distance from point F to the bottom of the cliff.

$$\text{The total height is } 167.22' + 59.08' = 226.3'$$





Solution to Problem 104



Again, the zenith angles $62^{\circ}16'40''$, $80^{\circ}40'50''$ and $46^{\circ}23'50''$ yield all of the angles in the triangle T-S-F:

$$\text{Angle F} = 80^{\circ}40'50'' + 46^{\circ}23'50'' = 127^{\circ}04'40''$$

$$\text{Angle S} = 180^{\circ} - 62^{\circ}16'40'' - 80^{\circ}40'50'' = 37^{\circ}02'30''$$

$$\text{Angle T} = 180^{\circ} - \text{angle F} - \text{angle S} = 52^{\circ}52'50''$$

With known side F-S as 110.14', side T-F is found by the Law of Sines to be 242.47'

Side T-F times the cosine of $(90^{\circ} - 46^{\circ}23'50'')$ yields 175.58', the horizontal distance from the top of the cliff to point F.

Again, the zenith angles $118^{\circ}54'00''$, $109^{\circ}37'30''$ and $80^{\circ}40'50''$ yield the angles of triangle B-F-S:

$$\text{Angle S} = 109^{\circ}37'30'' - 99^{\circ}19'10'' = 10^{\circ}18'20''$$

$$\text{Angle F} = 360^{\circ} - 118^{\circ}54'00'' - 80^{\circ}40'50'' = 160^{\circ}25'10''$$

$$\text{Angle B} = 180^{\circ} - \text{angle S} - \text{angle F} = 9^{\circ}16'30''$$

With known side F-S being 110.14', side F-B is found by the Law of Sines to be 122.25'

Side B-F times the cosine of $(90^{\circ} - 61^{\circ}06'00'')$ gives 107.03' as the horizontal distance from point F to the bottom of the cliff.

The difference from F to T and from F to B is $175.58' - 107.03' = 68.55'$, the amount the cliff recedes as it rises.

The slope of the wall is 68.55' to 226.3' or 3.3:1

