



Explain your answers with neat sketches whenever possible. If not clearly stated, assume that all computations are made on Helmert1906 ($a = 6378.2 \text{ km}$, $f = \frac{1}{298.3}$). Also, the mean radius of the earth is $R = 6371 \text{ km}$.

Assignment 7 - Trigonometric and Precise Leveling

1. Determine the level of point B, where the level of A = 300 m and the horizontal distance between A and B = 450 m, the zenith angle = 115° , the height of the instrument at A = 1.5 m, and the height of signal at B = 1.52 m.
2. The slope distance and zenith angle measured from point P to point Q were 1823.316 m and $84^\circ 23' 16''$, respectively. The instrument and rod target heights were equal. If the elevation of point P is 487.623 m above datum, what is the elevation of point Q?
3. To determine the width of a river, zenith angles (ZT and ZB) were measured from point A on one side of the river, to the top and the base of a tower on the other side of the river. Calculate the width of the river W if height of tower = 47.30m, $ZT = 61^\circ 20' 30''$ and $ZB = 71^\circ 40' 25''$.
4. Two points, A and B, each are distant 1500 m from a third point C, from which the measured vertical angle to A is $+ 04^\circ 21'$ and that to B is $+ 00^\circ 32'$. What is the difference in elevation between A and B?
5. Two points A and B are 1200 ft apart. The elevation of A is 615.03 ft. A level is set up on the line between A and B at a distance 200 ft from A. The rod reading on A is 10.52 ft and that on B is 1.45 ft. What is the elevation of B?
6. Express your views about the following statements:
 - a. The most significant difference between ordinary leveling and precise leveling lies in their respective levels of accuracy.
 - b. In precise leveling the wedge cross hairs are employed.
 - c. Precise leveling incorporates several error correction techniques to enhance accuracy.
 - d. Trigonometric leveling is implemented using an ordinary level instrument.
 - e. Different precautions to consider while precise leveling observations.