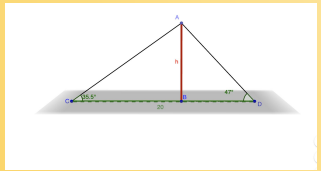
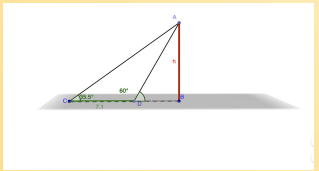
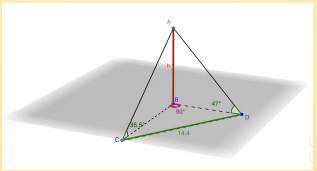
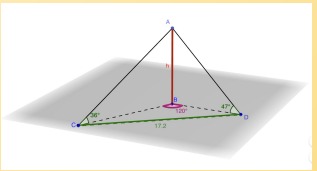
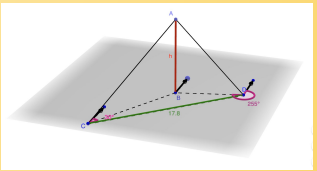
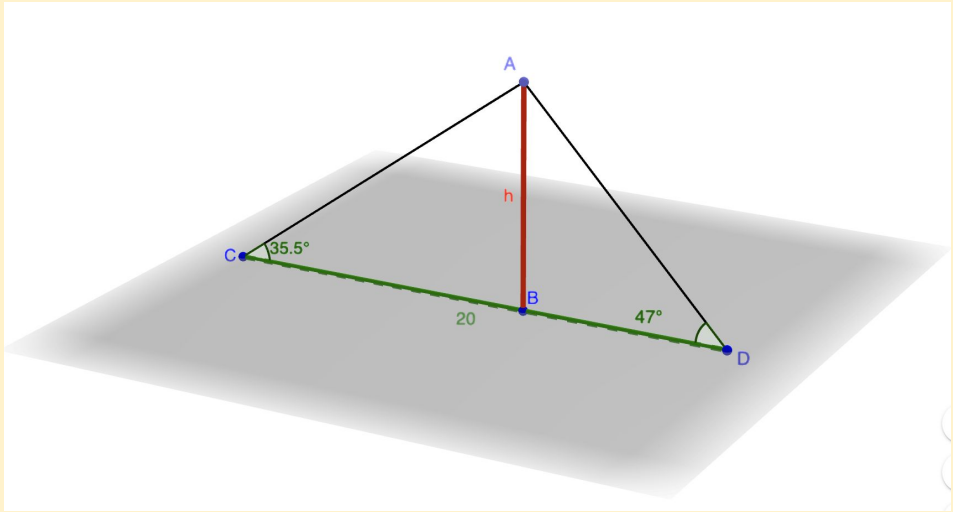
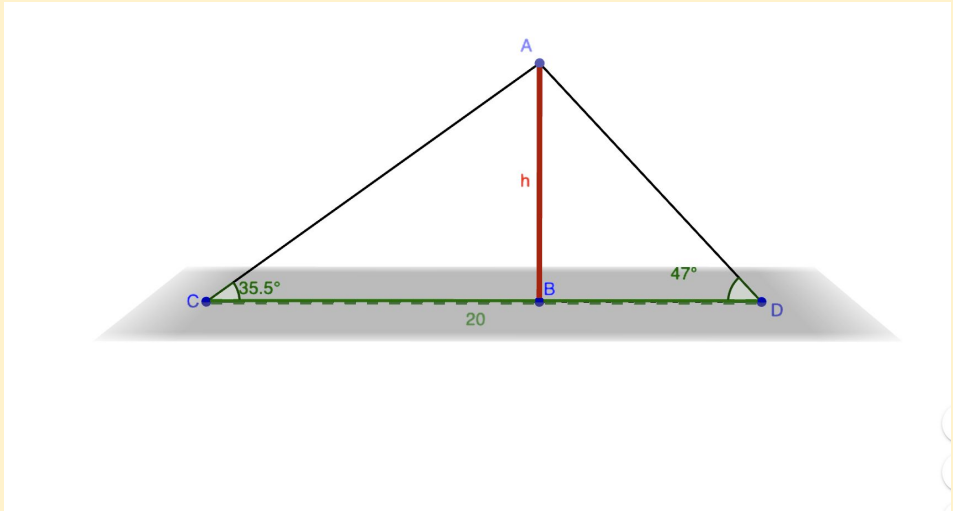
Lighthouse Problems

Exercise in Trigonometry

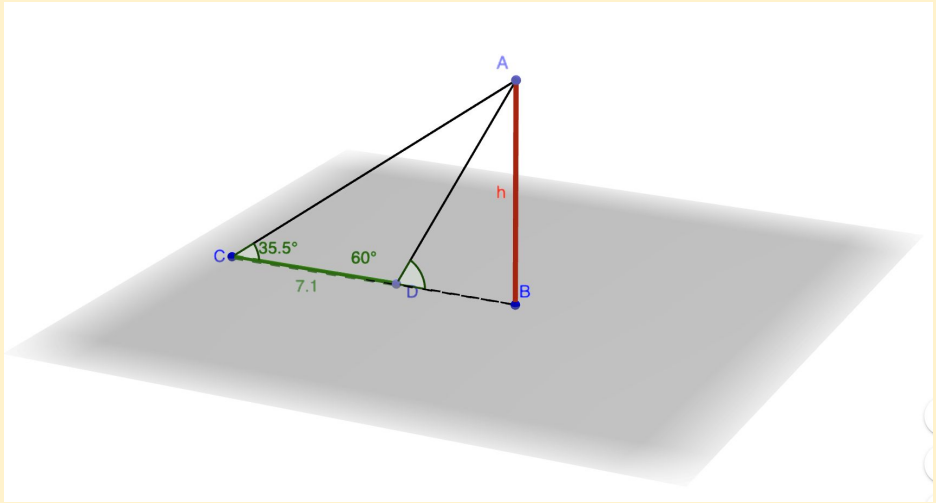


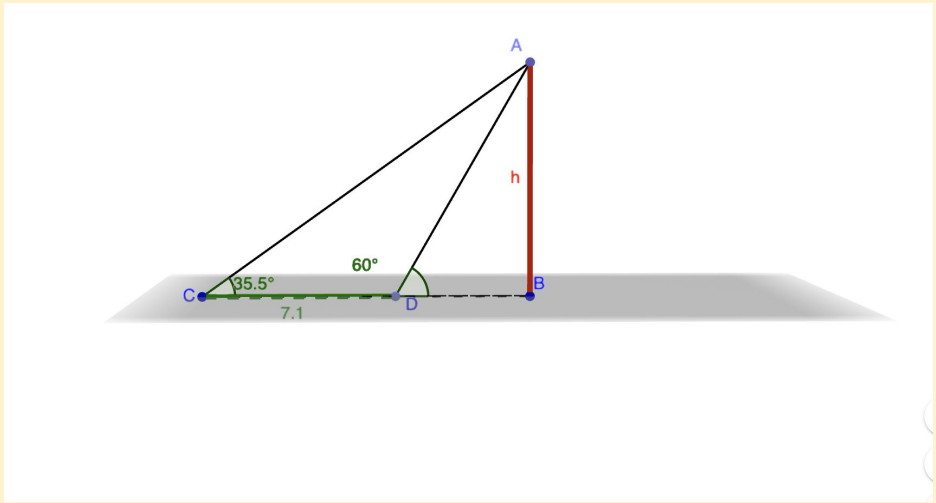


Find the height of the vertical lighthouse (AB).

We assume the base B is not accessible.

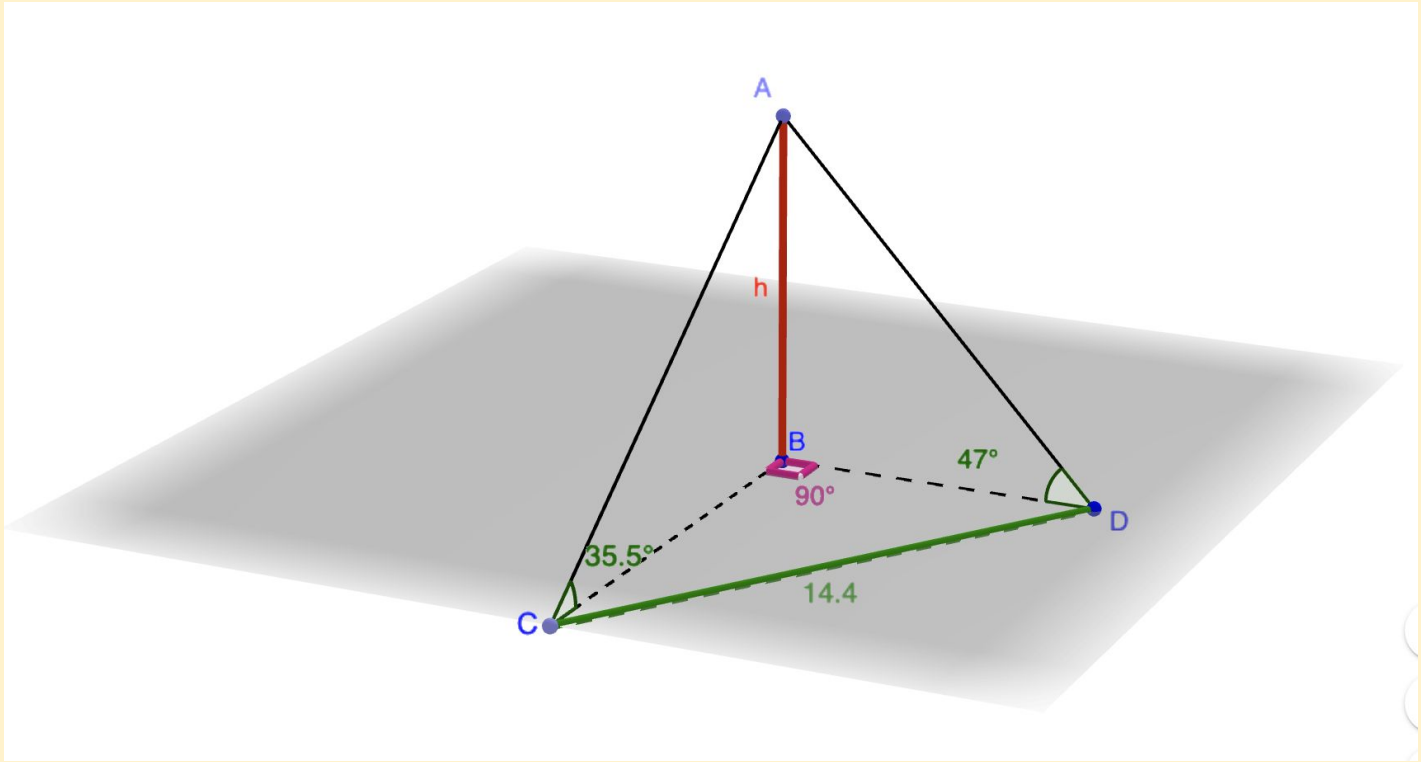
In this first problem, there are two observers C, D on the ground, on opposite sides of B. The distance between C and D, and angles of elevation can be measured.



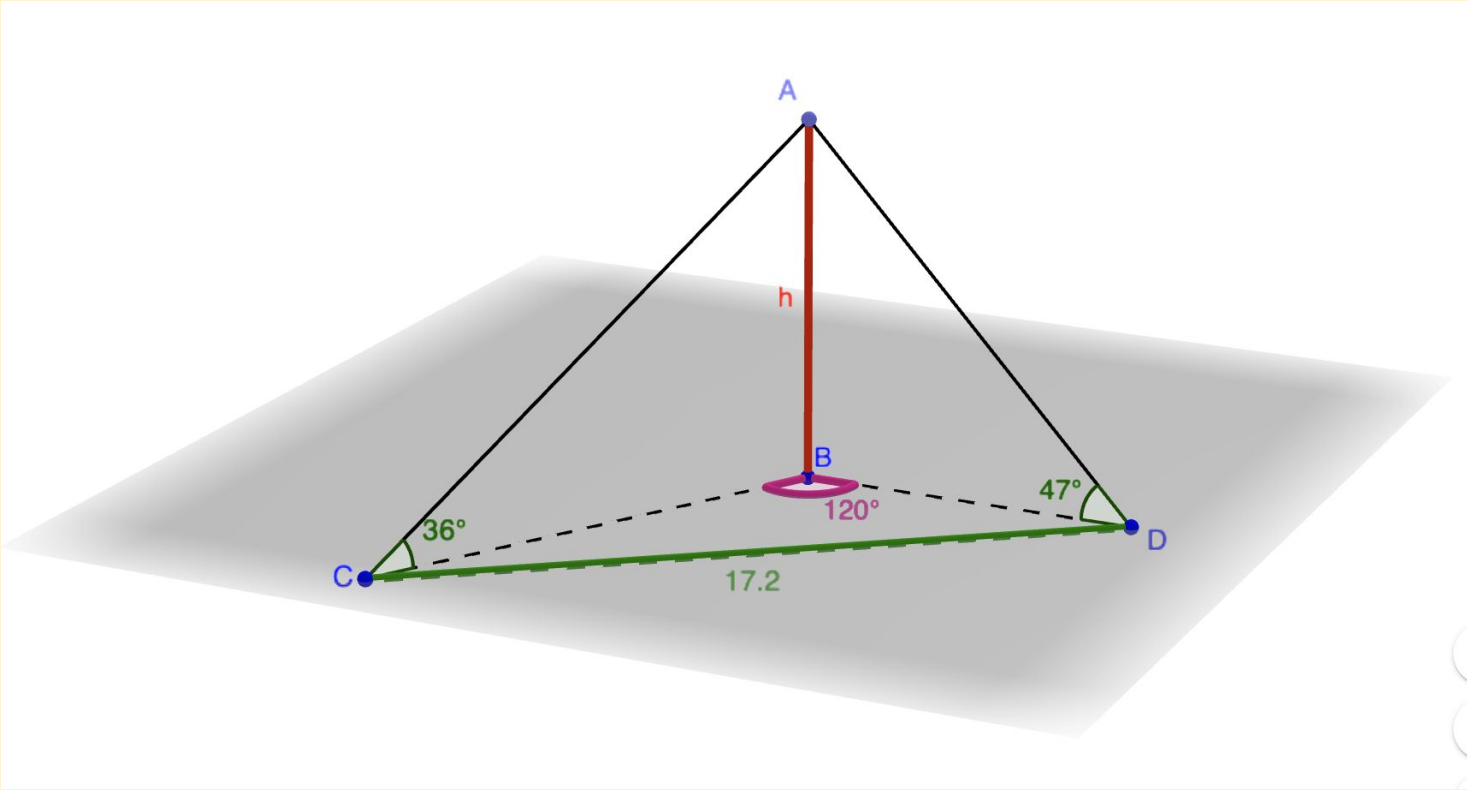


In this second problem, C and D are on the same side of B on the ground. We have the same set of information.

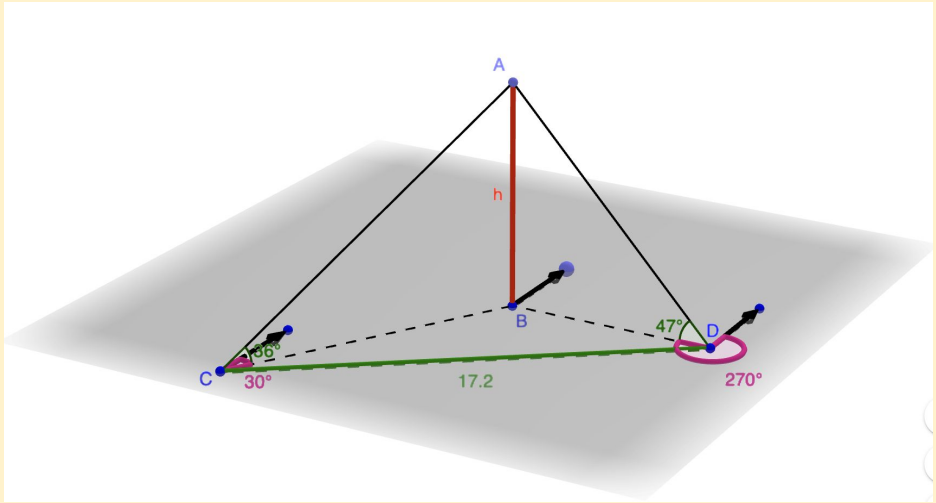
The points A to D are still on the same vertical plane.

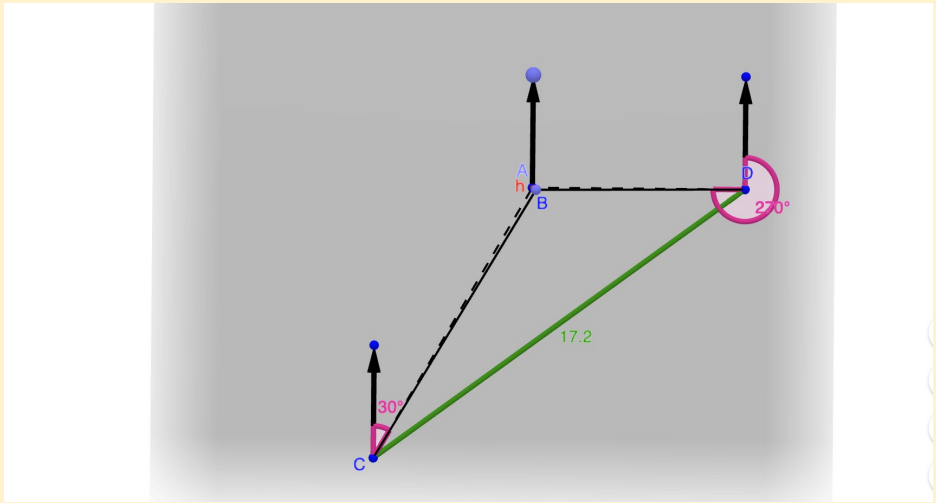


In this problem 3, we now consider C, D on different directions from B. For example, D is on the East of B, while C is on the south of B. In this special case, CBD forms a right angled triangle.



Similar to problem 3, CBD forms a triangle on the ground, but need not be right-angled. Angle CBD is required.

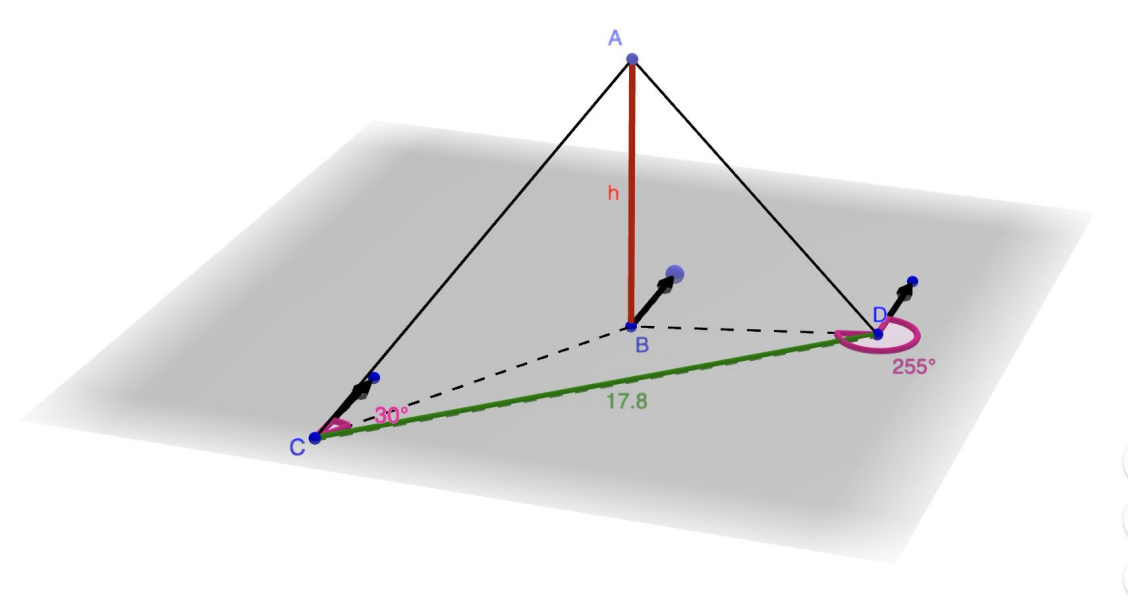




This figure is the same as that in problem 4.

However, as we assume that B is not accessible, we need other ways to find the size of angle CBD.

Let us consider the bearings of B from C and D. The top view is shown in the diagram below, which displays more clearly the bearings.



This is another problem, showing the bearings, angles of elevation and distance CD in 3 diagrams.