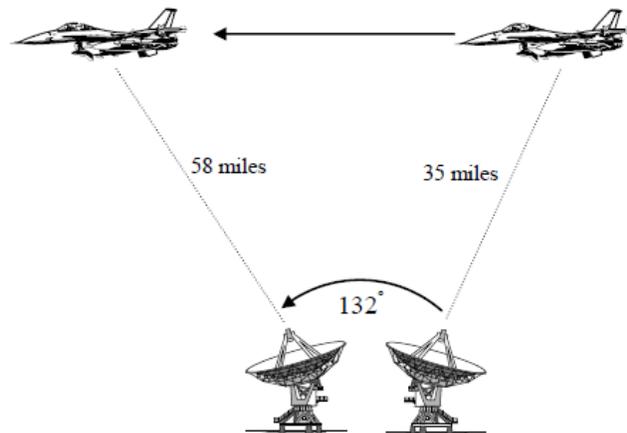


9. The science club just launched a rocket straight up in the air. At the instant that the rocket is 90 meters high, what is the angle of elevation from an observer that is 40 meters from the launch pad?

10. Two sides and a diagonal of a parallelogram are 7, 9, and 15 in respectively. Find the measures of the angles of the parallelogram.

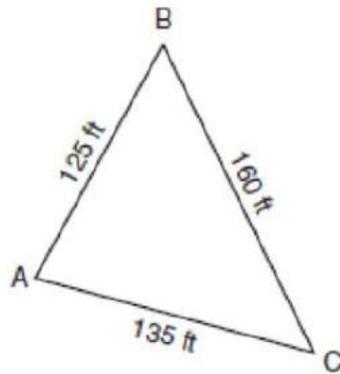
11.

A satellite dish can track the speed of a plane by recording the distance to the plane at two points in time and the angle through which the dish rotates. In the picture below, a satellite measured the distance to a jet at 35 miles. After 0.25 hours (15 minutes), it measured the distance to the jet at 58 miles. If the satellite rotated through an angle that measured 132° , determine the average speed of the plane to the nearest mile per hour.



12.

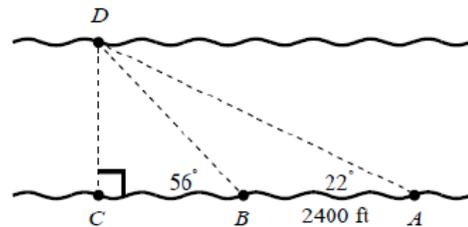
The accompanying diagram shows a triangular plot of land located in Moira's garden.



Find the area of the plot of land, and round your answer to the *nearest hundred square feet*.

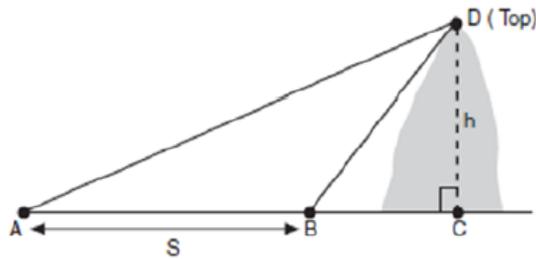
13.

To measure the distance across a wide river surveyors use a technique of measuring angles to a fixed point on the other side of the river. In the diagram below, a survey starts at point A and finds $m\angle DAC = 22^\circ$. The survey then moves 2400 feet to point B and finds $m\angle DBC = 56^\circ$. Using this information, find the length of \overline{DC} , the distance across the river, to the nearest foot. Note, although common, this survey technique assumes the river's sides are relatively parallel and straight.



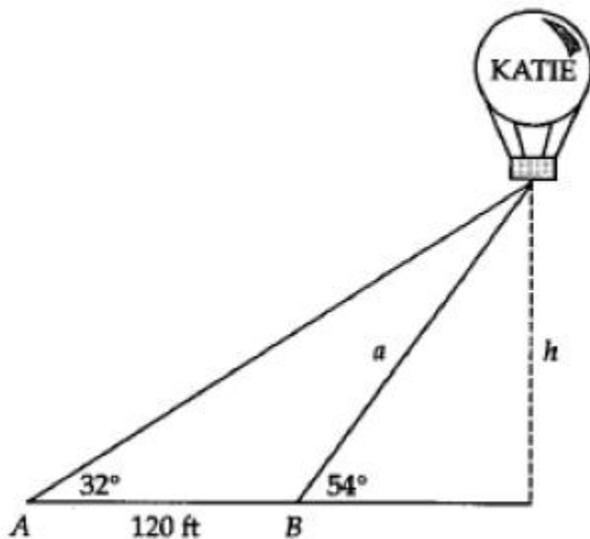
14.

A ship at sea heads directly toward a cliff on the shoreline. The accompanying diagram shows the top of the cliff, D , sighted from two locations, A and B , separated by distance S . If $m\angle DAC = 30$, $m\angle DBC = 45$, and $S = 30$ feet, what is the height of the cliff, to the nearest foot?



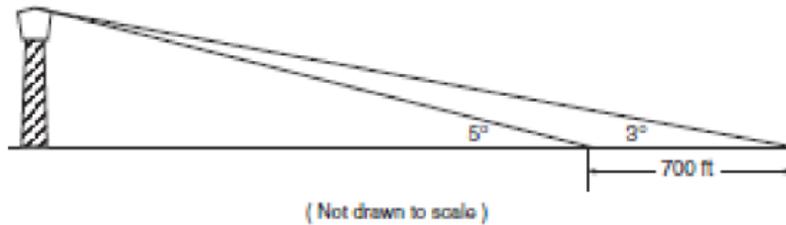
15.

Katie is out with her parents at the Long Island Fair when she sees a large balloon with her name on it. Her dad tells her the angle of elevation from where she is standing to the foot of the balloon is 32° but Katie is in too much of a hurry to get closer to the balloon to listen. She runs 120 feet toward the area where the balloon is hovering before her mom, a math teacher, catches up with her and says that the angle of elevation from where she is now to the foot of the balloon is 54° . But Katie wants to know only one thing. "I want to go up there. How high up is it?" she asks. Answer Katie's question to the nearest tenth of a foot.



16.

While sailing a boat offshore, Donna sees a lighthouse and calculates that the angle of elevation to the top of the lighthouse is 3° , as shown in the accompanying diagram. When she sails her boat 700 feet closer to the lighthouse, she finds that the angle of elevation is now 5° . How tall, to the nearest tenth of a foot, is the lighthouse?

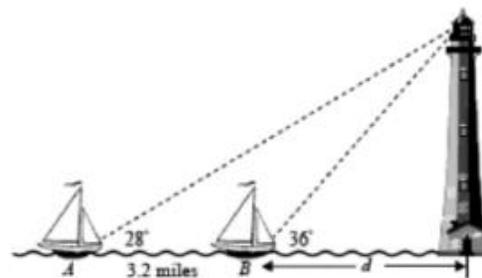


17.

The beam of a searchlight situated at an offshore point W sweeps back and forth between shore points A and B . Point W is located 12 kilometers from A and 25 kilometers from B . The distance between A and B is 29 kilometers. Find the measure of $\angle AWB$ to the nearest ten minutes.

18.

A boat starts at point A and finds the angle of elevation to the lighthouse measures 28° . After traveling 3.2 miles towards the light house, the angle of elevation now measures 36° . Determine the distance, d , from the boat to the lighthouse to the nearest thousandth of a mile. Convert your answer to the nearest hundred feet. (There are 5280 feet in a mile).



MULTI-STEP APPLICATION of TRIANGLES

To determine the distance across a river, a surveyor marked three points on one riverbank: H , G , and F , as shown below. She also marked one point, K , on the opposite bank such that $\overline{KH} \perp \overline{HGF}$, $m\angle KGH = 41$, and $m\angle KFH = 37$. The distance between G and F is 45 meters. Find KH , the width of the river, to the *nearest tenth of a meter*.

