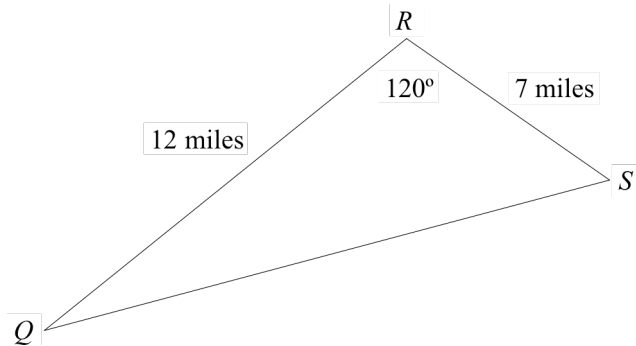


## Applications Involving Law of Sines & Law of Cosines

1. Ronald was traveling from his house to the park to meet his friends. However, he first had to make a stop at the post office. The diagram below shows the distance between Ronald's house,  $Q$ , and the post office,  $R$ . It also shows the distance between the post office and the park,  $S$ .



If  $QR = 12$  miles,  $RS = 7$  miles, and  $m\angle R = 120$ , how far is the park from Ronald's house, to the nearest mile?

2. To measure the distance through a mountain for a proposed tunnel, surveyors chose points  $A$  and  $B$  at each end of the proposed tunnel and a point  $C$  near the mountain. They determined that  $AC = 3,800$  meters,  $BC = 2,900$  meters,  $m\angle ACB = 110$ . Draw a diagram to illustrate this situation and find the length of the tunnel, to the nearest meter.

3. A ship captain at sea uses a sextant to sight an angle of elevation of  $37^\circ$  to the top of a lighthouse. After the ship travels 250 feet directly toward the lighthouse, another sighting is made, and the new angle of elevation is  $50^\circ$ . The ship's charts show that there are dangerous rocks 100 feet from the base of the lighthouse. Find, to the *nearest foot*, how close to the rocks the ship is at the time of the second sighting.
4. A wooden frame is to be constructed in the form of an isosceles trapezoid, with diagonals acting as braces to strengthen the frame. The sides of the frame each measure 5.30 feet, and the longer base measures 12.70 feet. If the angles between the sides and the longer base each measure  $68.4^\circ$ , find the length of one brace to the *nearest tenth of a foot*.
5. A sign 46 feet high is placed on top of an office building. From a point on the sidewalk level with the base of the building, the angle of elevation to the top of the sign and the angle of elevation to the bottom of the sign are  $40^\circ$  and  $32^\circ$ , respectively. Sketch a diagram to represent the building, the sign, and the two angles, and find the height of the building to the *nearest foot*.