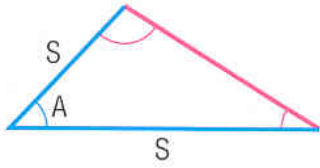
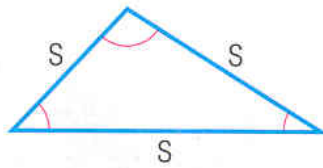


8.3 The Law of Cosines

The law of cosines is used to solve for missing sides or angles of triangles when we have the following two cases:



SAS – Side Angle Side



SSS – Side Side Side

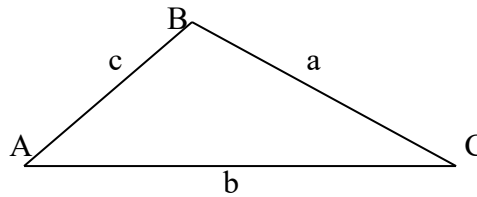
The law of cosines can be written three different ways depending on what you are trying to solve for.

Law of Cosines

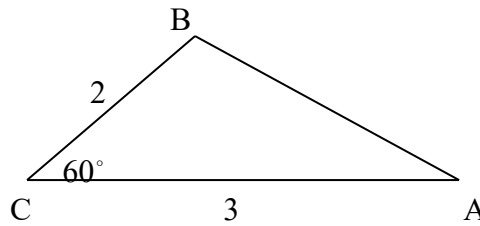
$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

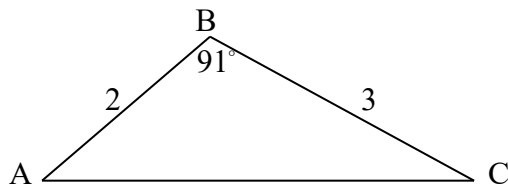
$$c^2 = a^2 + b^2 - 2ab \cos C$$



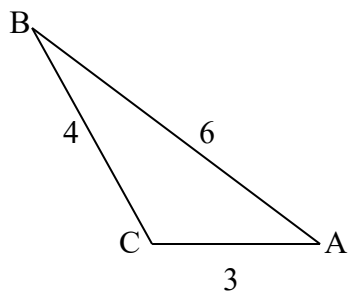
EXAMPLE: Solve the triangle:



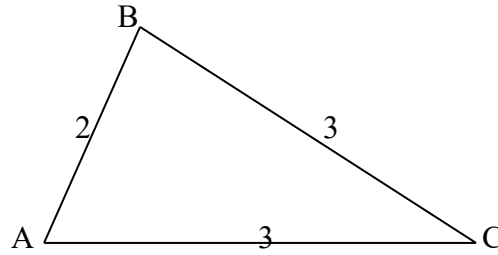
EXAMPLE: Solve the triangle:



EXAMPLE: Solve the triangle:



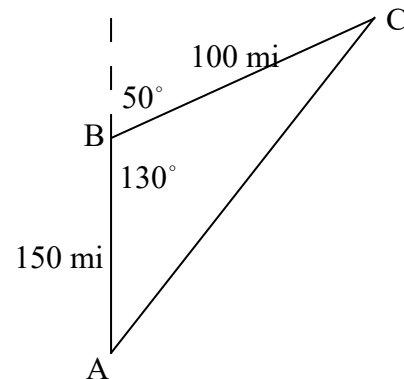
EXAMPLE: Solve the triangle:



EXAMPLE: A plane flies due north from Ft. Myers to Sarasota, a distance of 150 miles. Then the plane flies at a bearing $N50^\circ E$ and flies to Orlando, a distance of 100 miles.

a.) How far is it from Ft. Myers to Orlando?

First we need to draw a picture. I will let point A = Ft. Myers, B = Sarasota, and C = Orlando. Notice that the 50 degrees is measured from the north. Then we know that the angle B inside the triangle is $180^\circ - 50^\circ = 130^\circ$.



b.) What bearing should the pilot use to fly directly from Ft. Myers to Orlando?