Last section we looked at the law of sines. There are two other situations where the law of sines will not work; here we will use the **Law of Cosines:**

Case 3 – Two sides and the angle included between the two sides are known (SAS).
Case 4 – Three sides are known (SSS).

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: SSS

The sides of a triangle are: $a = 3, b = 4, and\ c = 6$. Find the angles of the triangle

SAS: Solve the triangle ABC, where $\angle C = 60°, a = 2, and\ b = 3$

Navigation

A motorized sail boat leaves Naples, Florida found for Key West, 150 miles away. Maintaining a constant speed of 15 mph, but encountering heavy crosswinds and strong currents, the crew finds after 4 hours that the sailboat is off course by 20°.

- a) How far is the sailboat from Key West at this time?
- b) Through what angle should the sailboat turn to correct its course
- c) How much time has been added to the trip because of this? Assume a constant speed of 15 mph.