

## 1. Solving Triangles

2. You should be familiar with the Law of Sines and the Law of Cosines.

In this lesson, we review the six cases of solving triangles, when given three parts.

3. (a) When given all three angles, there is nothing we can do. The triangle's shape has been determined, but not its size,  
(b) the sides of the triangle  
(c) can have any length.
4. When given two angles and one side, find the third angle, then use the Law of Sines to find the missing sides.
5. (a) When given two sides and the included angle, use the Law of Cosines to find the third side. Then use either the Law of Cosines or Law of Sines to find the remaining angles, with one bit of caution.  
(b) If you try to find the angle opposite the longest side, it may be larger than  $90^\circ$ . When you use the inverse sine function, your calculator will give you a first quadrant angle.  
(c) but the actual answer may be in the second quadrant. It is better to find the smaller angles first.
6. When given two sides and an angle that is not between the two sides, there may be two answers. Use the Law of Sines to find both possibilities for the second angle. If you are trying to find the inverse sine of a number larger than 1, you will get no answers. Otherwise, your calculator will give you the first quadrant answer. Subtract the first quadrant angle from  $180^\circ$  to find the second possibility. You can then find the third angle and remaining side. When finding the third angle using the second quadrant possibility, you get a negative answer, then only the first quadrant answer is valid.
7. When given all three sides of a triangle, find any angle by the Law of Cosines. It is best to find the largest angle by the Law of Cosines. If the largest angle is bigger than  $90^\circ$ , the Law of Cosines will give the correct answer. The same warning applies here as it did in the SAS case, if you try to find the largest angle by the Law of Sines, the inverse sine function will give you a first quadrant answer, when the actual angle may be in the second quadrant.