Algebra II

12-6

Law of Cosines

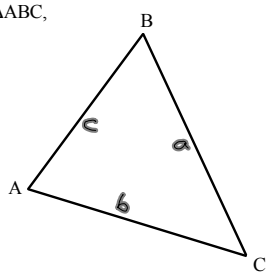
Law of Cosines - Given the general triangle ΔABC,

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

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

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

Works For 2 triangles, SSS and SAS

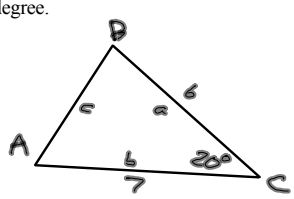


Find lengths to three significant digits and the measures of the angles to the nearest tenth of a degree. (pg 582)

1) $a = 6$
$b = 7$
$C = 20°$

$c =$ _____

SAS



Choose the variation of the Law of Cosines by the information you need to solve for. In this case, find c.

In this sample, and the many to follow, never trust the picture, it won't be drawn to scale. Trust the numbers in the picture.

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

$c^2 = 6^2 + 7^2 - 2(6)(7)\cos(20°)$

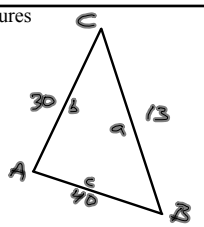
$\sqrt{c^2} = \sqrt{6.065819854\ldots}$

$c = 2.46$

Find lengths to three significant digits and the measures of the angles to the nearest tenth of a degree.

9) $a = 13$
$b = 30$
$c = 40$
smallest angle = $\angle A =$ _____

The smallest angle is always opposite the smallest length side.



Note: the picture is not drawn to scale. It would appear visually that A is the largest angle when it is actually the smallest.

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

$13^2 = 30^2 + 40^2 - 2(30)(40)\cos A$

$169 = 900 + 1600 - 2400\cos A$

$169 = 2500 - 2400\cos A$

$-2500 \quad -2500$

$\frac{-2331}{-2400} = \frac{-2400\cos A}{-2400}$

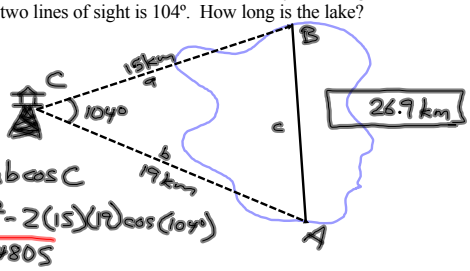
$\cos A = 0.97125$

$A = \cos^{-1}(.97125)$

$A = 13.8°$

Find lengths to three significant digits and the measures of the angles to the nearest tenth of a degree. (pg 583)

1) A ranger in an observation tower can sight the north end of a lake 15 km away and the south end of the same lake 19 km away. The angle between these two lines of sight is 104°. How long is the lake?



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

$c^2 = (15)^2 + (19)^2 - 2(15)(19)\cos(104°)$

$\sqrt{c^2} = \sqrt{723.8954805}$

$c = 26.9$

Pg 582
1-14all
Pg 583
2-8all