

Section 5.6 Law of Cosines

Law of Cosines

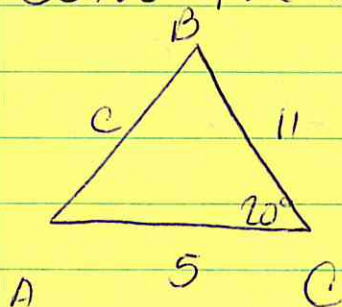
$$a^2 = b^2 + c^2 - 2bc \cos A$$

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

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

Ex 1

Solve the Δ if $a=11$, $b=5$, $C=20^\circ$



SAS $c^2 = \sqrt{5^2 + 11^2 - 2(5)(11)\cos 20}$

$$c \approx 6.529$$

$$\frac{\sin 20}{6.529} = \frac{\sin B}{5}$$

$$6.529 \stackrel{\sin B}{=} 5 \sin 20$$

$$B = \sin^{-1}\left(\frac{5 \sin 20}{6.529}\right) = 15.2^\circ$$

* You must

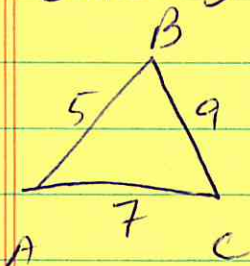
Solve the $\angle$'s

from $S \rightarrow \angle$

$$\angle A = 180 - 20 = 160 - 15.2 = 144.8^\circ$$

Ex 2

Solve given $a=9$, $b=7$, $c=5$



$$5^2 = 7^2 + 9^2 - 2(9)(7)\cos C$$

$$\cos C = \frac{5^2 - 7^2 - 9^2}{-2(9)(7)}$$

$$C = \cos^{-1}\left(\frac{5^2 - 7^2 - 9^2}{-2(9)(7)}\right)$$

$$C \approx 33.6^\circ$$

$$7^2 = 5^2 + 9^2 - 2(5)(9)\cos B$$

$$\cos B = \frac{7^2 - 5^2 - 9^2}{-2(5)(9)}$$

$$\frac{\sin 33.6}{5} = \frac{\sin B}{7}$$

$$\sin B = \frac{7 \sin 33.6}{5}$$

$$B = \sin^{-1}\left(\frac{7 \sin 33.6}{5}\right)$$

$$\angle A = 180 - 33.6 - 50.7$$

$$180 - 84.3 = 95.7$$

$$\cos^{-1}\left(\frac{7^2 - 5^2 - 9^2}{-2(5)(9)}\right)$$

$$B = 50.7^\circ$$