Sunday, April 07, 2019
4:49 PM

KEY

6.2 A - Law of Cosines

Homework:

- Homework - pg 443 #3 and 13 only
- Quiz 6.2 + Word PROBLEMS - NEXT FRI

Objective:

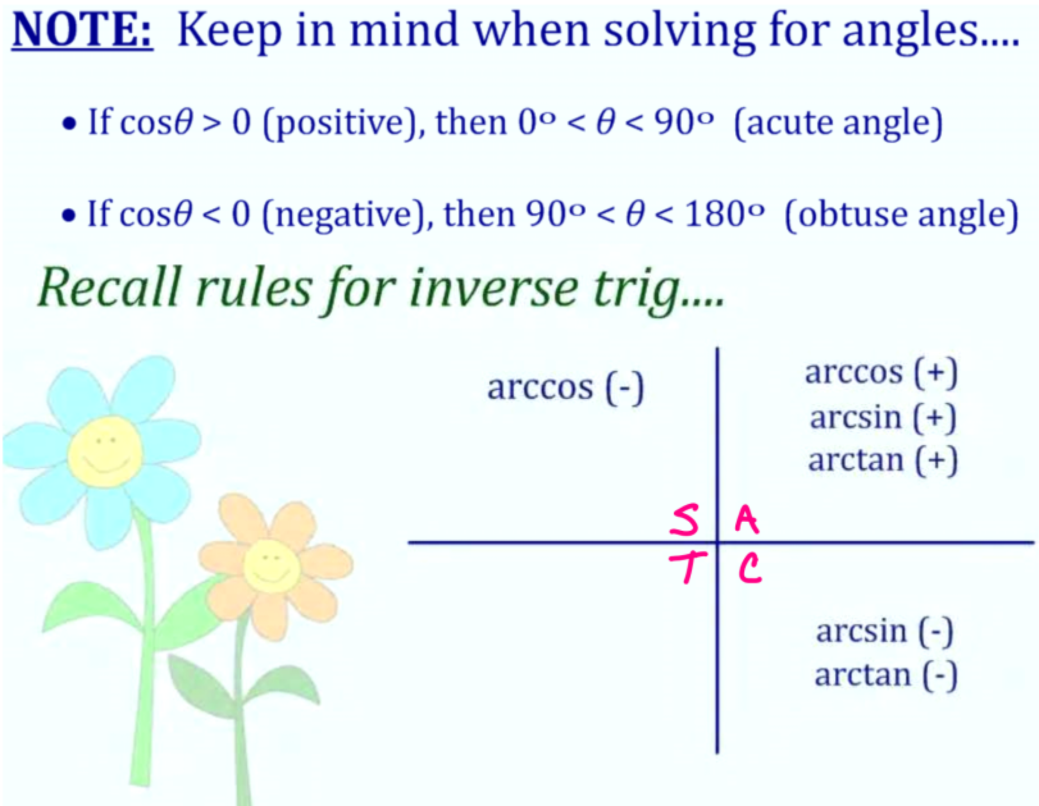
SWBAT: Use the Law of Cosines to solve oblique triangles (SSS & SAS)

In an oblique triangle, when you are given either:

- 2 sides and an included angle (SAS)
- 3 sides (SSS)

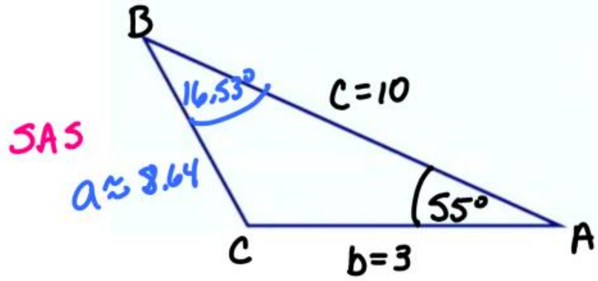
the *__Law of Cosines__* *can be used to solve the triangle.*

Standard Form	Alternative Form
$a^2 = b^2 + c^2 - 2bc\cos A$	$\cos A = \dfrac{b^2+c^2-a^2}{2bc}$
$b^2 = a^2 + c^2 - 2ac\cos B$	$\cos B = \dfrac{a^2+c^2-b^2}{2ac}$
$c^2 = a^2 + b^2 - 2ab\cos C$	$\cos C = \dfrac{a^2+b^2-c^2}{2ab}$


NOTE: Keep in mind when solving for angles....
• If cosθ > 0 (positive), then 0° < θ < 90° (acute angle)
• If cosθ < 0 (negative), then 90° < θ < 180° (obtuse angle)
Recall rules for inverse trig....
arccos (-)
arccos (+)
arcsin (+)
arctan (+)
S
A
T
C
arcsin (-)
arctan (-)

Example 1: Solve ΔABC given $A = 55°$, $b = 3$, $c = 10$

Round to nearest hundredth.



Important Note:
If you use the ***Law of Cosines*** first, **DO NOT** use the ***Law of Sines*** to solve for an angle that **MIGHT** be the largest angle!

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

$a^2 = (3)^2 + (10)^2 - 2(3)(10) \cos 55°$

$a^2 = 74.58541382$ ← store in CALC.

$\boxed{a \approx 8.64}$

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

$\cos C = \dfrac{(8.636)^2 + 3^2 - 10^2}{2(8.636)(3)}$

$\cos^{-1}(-.3167756) = C$ STO

$\boxed{C \approx 108.47°}$

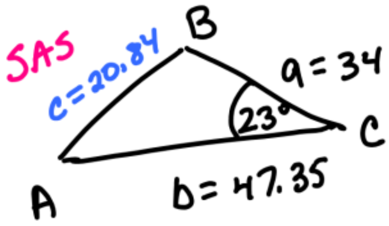
$B = 180° - A - C$

$B = 180° - 55° - 108.47°$

$\boxed{B \approx 16.53°}$

Example 2: Solve ΔABC given $C = 23°$, $a = 34$, $b = 47.35$

Round to nearest hundredth.



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

$c^2 = (34)^2 + (47.35)^2 - 2(34)(47.35)\cos 23°$

$c^2 = 434.1809729$ ← STO

$c = 20.83700969$ ← STO

$\boxed{c \approx 20.84}$ ← STO

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

← STORed

$\cos B = \dfrac{(34)^2 + (20.84)^2 - (47.35)^2}{2(34)(20.84)}$

$\cos^{-1}(-.46004) = B$

← STO

$\boxed{B \approx 117.39°}$

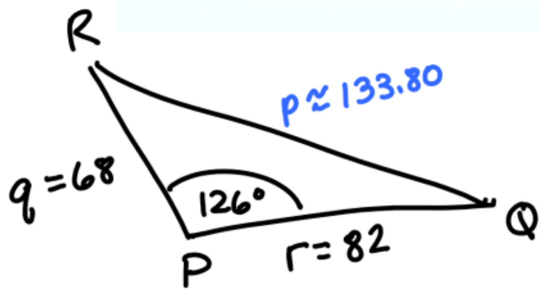
$A = 180° - C - B$

$A = 180° - 23° - 117.39°$

$\boxed{A \approx 39.61°}$

Your turn...

1.) Solve ΔPQR given $P = 126°$, $q = 68$, $r = 82$



$p^2 = r^2 + q^2 - 2rq \cos P$

$p^2 = (82)^2 + (68)^2 - 2(82)(68) \cos 126°$

$p^2 = 17902.98113$ ← STO

$\boxed{p \approx 133.80}$ ← STO

$\cos R = \dfrac{p^2 + q^2 - r^2}{2pq}$

$\cos R = \dfrac{(133.80)^2 + (68)^2 - (82)^2}{2(133.80)(68)}$ ← STO

$\cos^{-1}(.8684) = R$ ← STO

$\boxed{R \approx 29.72°}$

$Q = 180° - R - P$

$Q = 180° - 29.72° - 126°$ $\boxed{Q \approx 24.28°}$

* can use law of sines to find smallest angle

OR

$\dfrac{p}{\sin P} = \dfrac{q}{\sin Q}$

$\dfrac{133.80}{\sin 126°} = \dfrac{68}{\sin Q}$

$\sin Q = \dfrac{68 \sin 126°}{133.8}$

$\boxed{Q \approx 24.28°}$

Closure...

Why is it important to find the ***largest angle*** in a triangle using the Law of Cosines?