Week 8 Angles, triangles, and trigonometry Continued Lecture Note

Notebook:	Computational Mathematics		
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Cornell Notes	**Topic:** Sequences and Series Continued	Course: BSc Computer Science Class: Computational Mathematics[Lecture] Date: May 14, 2020

Essential Question:

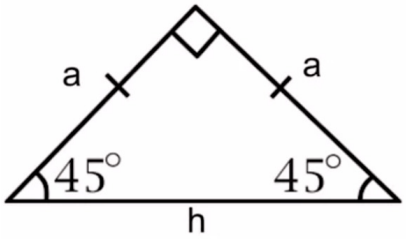
What are angles and what is trigonometry and how are these related to the study of triangles?

Questions/Cues:

- What is an example of Pythagoras theorem applied?
- What is an example of the Law of Sines applied?
- What is an example of the Law of Cosines applied?

Notes

Examples: Triangle Rectangle Isosceles



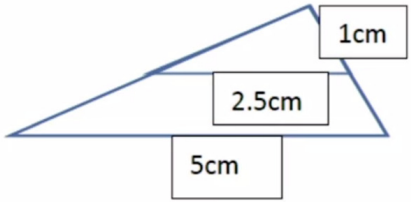
$a^2+b^2=2a^2=h^2$ Pithagora's theorem

$\rightarrow a=h/\sqrt{2}$

$a/h=1/\sqrt{2}=\text{Sin}(45^\circ)$

$\rightarrow \text{Sin}(45^\circ)= 1/\sqrt{2}= \sqrt{2}/2$

What is the length of the righthand side of the larger triangle?



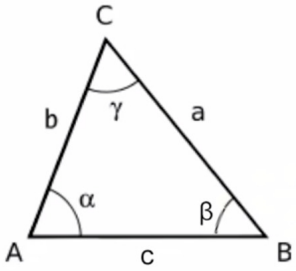
Similar triangles

$\rightarrow$ 1cm/X=2.5cm/5cm

$\rightarrow$ X=2cm

Examples: Generic Triangle

a=8 cm b=3 cm $\alpha=58^\circ$ c? Note: $\sin(58^\circ)= 0.848$



Use sine ratio: $a/\sin(\alpha)= b/\sin(\beta)=c/\sin(\gamma)$

$\rightarrow \sin(\beta)=b\sin(\alpha)/a \rightarrow \sin(\beta)= 3\times0.848/8=0.318$
$\rightarrow \beta= \sin^{-1}(0.318)=18.54^\circ$

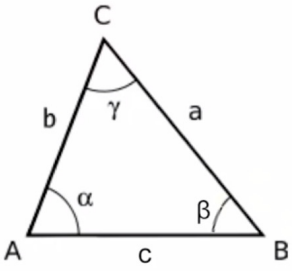
$\rightarrow \gamma=180^\circ-18.54^\circ-58^\circ=103.46^\circ$

but $c/\sin(\gamma)= a/\sin(\alpha)$

$\rightarrow c=a\sin(\gamma)/\sin(\alpha)=8\times0.97/0.848=9.15$cm

Examples: Generic Triangle

a=6 cm b=4 cm c=3cm $\alpha=?$



Use cosine rule: $a^2=b^2+c^2-2bc\cos(\alpha)$

$\rightarrow \cos(\alpha)=\frac{b^2+c^2-a^2}{2bc}= \frac{16+9-36}{24}=-0.458$

$\rightarrow \alpha= \cos^{-1}(-0.458)=117.3^\circ$

Summary

In this week, we learned how apply Pythagoras theorem, Sine law and Cosine law to a triangle.