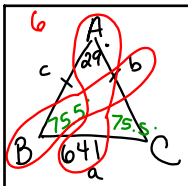
Law of Cosines

Oct 21-2:39 PM



$\frac{\sin 29^\circ}{641} = \frac{\sin 75.5^\circ}{b}$

$b = \frac{641 \sin 75.5^\circ}{\sin 29^\circ}$

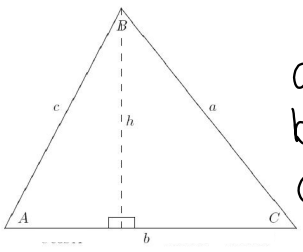
$b = 1280.05$ ft

$180 - 29 = 151 \div 2 = 75.5$

∠A =
a =
∠B =
b =
∠C =
C =

Oct 26-10:33 AM

Copy this triangle in your notes, please. Make it fairly large.
Use for SSS or SAS



Find a side

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

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

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

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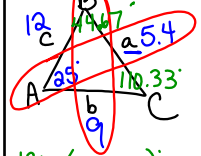
Example

Use the Law of Cosines to solve the triangle given the following constraints:

$b = 9, c = 12, A = 25^0$



$a^2 = \sqrt{9^2 + 12^2 - 2(9)(12)\cos 25^\circ}$

$a = 5.4$

$\frac{\sin 25^\circ}{5.4} = \frac{\sin B}{9}$

$\sin^{-1}\left(\frac{9 \sin 25^\circ}{5.4}\right) = \sin B$

$44.67^\circ = B$

$180 - (25 + 44.67)^\circ = 110.33^\circ$

p. 421: #5 (HW)

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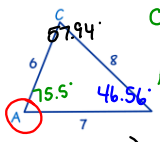
Example

Find the three angles of the following triangle. Hint: always start with angle opposite longest side.

SSS



$\cos A = \frac{6^2+7^2-8^2}{2(6)(7)}$ $A = \cos^{-1}\left(\frac{6^2+7^2-8^2}{2(6)(7)}\right)$ $A = 75.5°$

$\text{Cos}A = \frac{b^2+c^2-a^2}{2bc}$ $\text{Cos}B = \frac{a^2+c^2-b^2}{2ac}$ $\text{Cos}C = \frac{a^2+b^2-c^2}{2ab}$

$180-(75.5+46.56)$

$57.94°$

$B = \cos^{-1}\left(\frac{8^2+7^2-6^2}{2(8)(7)}\right)$

$B = 46.56°$

p. 421: #1 (HW)

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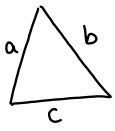
Heron's Area Formula: (proof on p. 470)



$S = \frac{a+b+c}{2}$

$\text{Area} = \sqrt{S(S-a)(S-b)(S-c)}$

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Example

Find the area of a triangle having sides of lengths a=43, b=53, and c=72.

$S = \frac{43+53+72}{2}$

$= 84$

$\text{Area} = \sqrt{84(84-43)(84-53)(84-72)}$

$\text{Area} = 1131.89 \text{ units}^2$

p. 421: #27 (HW)

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3 ways to find the area of a triangle!!

- Standard formula: $\frac{1}{2}bh$
- Oblique triangle: $\frac{1}{2}ac\sin B$
- Heron's formula: $S = \frac{a+b+c}{2}$

$\text{Area} = \sqrt{S(S-a)(S-b)(S-c)}$

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HOMEWORK

...law of cosines

6.2 (p. 421): 1-21 (every other odd), 23, 27-35 (odd), 38

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HAPPY THANKSGIVING!!!

Get ready for a lot of this...

And a lot of this...

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