

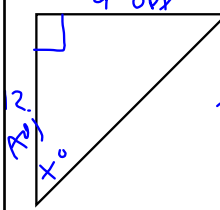
5.2 Quiz Law of Sines

Calendar Math

SOH-CAH-TOA

Solving for an Angle

Example 1:



$$\tan X^\circ = \frac{9}{12}$$

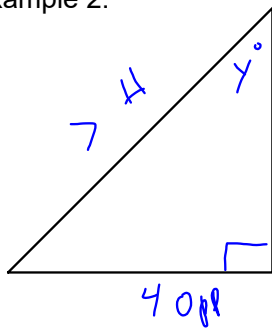
$$\tan^{-1} \frac{9}{12}$$

$$X = 36.87^\circ$$

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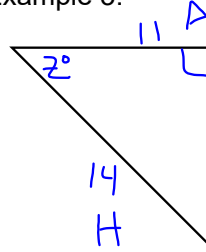
Example 2:



$$\sin Y = \frac{4}{7}$$

$$Y = 34.85^\circ$$

Example 3:



$$\cos Z = \frac{11}{14}$$

$$\cos^{-1} \frac{11}{14}$$

$$Z = 38.21^\circ$$

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Homework Questions 5.2

⑤  $A = 71.292^\circ$   $a = 34.393$   
 $B = 55.708^\circ$   $b = 30$   
 $C = 53^\circ$   $c = 29$

$$\frac{\sin 53}{29} = \frac{\sin B}{30}$$

$$\frac{30 \sin 53}{29} = \sin B$$

$$B = 55.708^\circ \quad \sin^{-1}$$

$A_2 = 2.708^\circ$   $a_2 = 1.716$   
 $B_2 = 124.292^\circ$   $b_2 = 30$   
 $C_2 = 53^\circ$   $c_2 = 29$

$$180 - 55.708$$

$$\frac{\sin 53}{29} = \frac{\sin 2.708}{a}$$

$$a = \frac{29 \sin 2.708}{\sin 53}$$

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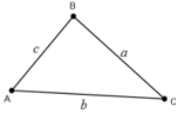
(11)  $\sqrt{-42+13x}^2 = x^2$   
 $-42+13x = x^2$   
 $x^2 - 13x + 42 = 0$   $\frac{42}{-13}$   
 $(x-6)(x-7)$   
 $x=6$   $x=7$   
 $\sqrt{-42+13(7)} = 7$   
 $\sqrt{49} = 7$   
 $6=6 \checkmark$   
 $7=7 \checkmark$

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5.3 Law of Cosines

**Law of Cosines**

For any  $\triangle ABC$ , the Law of Cosines relates the length of a side to the other two sides of a triangle and the cosine of the included angle.



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

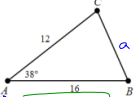
$$b^2 = a^2 + c^2 - 2ac \cos B$$

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

$a^2 = b^2 + c^2 - 2bc \cos A$   
 $b^2 = a^2 + c^2 - 2ac \cos B$   
 $c^2 = a^2 + b^2 - 2ab \cos C$

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Ex 1) SAS



$A = 38^\circ$   $a = 9.869$   
 $B = 48.467^\circ$   $b = 12$   
 $C = 93.583^\circ$   $c = 16$

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

$$a^2 = 12^2 + 16^2 - 2(12)(16) \cos 38^\circ$$

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

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

$$\cos^{-1} \left( \frac{12^2 + 16^2 - 9.869^2}{-2 \cdot 9.869 \cdot 16} \right)$$

$B = 48.467^\circ$

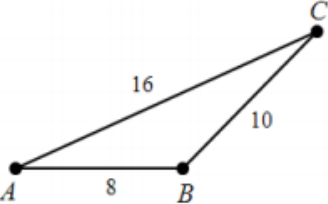
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(1)  $A =$   $a = 5$   
 $B =$   $b = 9$   
 $C = 27^\circ$   $c = 5.080$

$$c^2 = 5^2 + 9^2 - 2(5)(9) \cos 27^\circ$$

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Ex 2)



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Ex 3)  $a = 2, b = 5, c = 4$

(4)  $A = 22.332^\circ$   $a = 2$   
 $B = 108.210^\circ$   $b = 5$   
 $C = 49.458^\circ$   $c = 4$

$$\cos A = \frac{(2^2 + 5^2 - 4^2)}{(-2 \cdot 5 \cdot 4)}$$

$$\cos B = \frac{(5^2 + 2^2 - 4^2)}{(-2 \cdot 2 \cdot 4)}$$

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In the Law of Cosines formula solve for angle A..

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

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

$$\cos A = \frac{a^2 - b^2 - c^2}{-2bc}$$

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

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When do you use the Law of Cosines? *Included angle*  
 A  $\frac{a}{\sin A}$  when you don't have the  
 B  $\frac{b}{\sin B}$  side across from any given  
 C  $\frac{c}{\sin C}$  angle

When do you use the Law of Sines?

A =  $\frac{a}{\sin A}$  When you have an angle  
 B =  $\frac{b}{\sin B}$  and the side opposite  
 C =  $\frac{c}{\sin C}$

Do not change laws in the middle of a problem. Use the same method for the whole problem.

Make sure the biggest angle matches with the biggest side and the smallest angle matches with the smallest side.

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