Monday, March 25, 2019
4:18 PM

KEY

6.1 A - Law of Sines

Homework:

- Section 6.1A
- Check your answers in the back!!

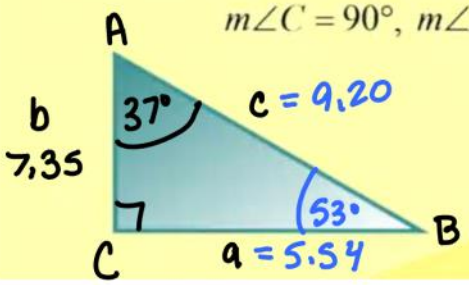
Objective:

SWBAT: Use the law of sines to solve oblique triangles (AAS, ASA); Use the law of sines to model and solve real-life problems

Do Now:

Solve the right triangle given *(round to nearest hundredth):*

$m\angle C = 90°$, $m\angle A = 37°$ and $b = 7.35$



$\tan 37° = \frac{a}{7.35}$

$7.35 \tan 37° = a$

$a = 5.54$

$180° - 37° - 90° = B$

$B = 53°$

$\cos 37° = \frac{7.35}{c}$

$c \cos 37° = 7.35$

$c = \frac{7.35}{\cos 37°}$

$c = 9.20$

Law of Sines & Oblique Triangles

Oblique Triangles: Triangles with no right angles.

When solving oblique triangles, you need one side and any other 2 parts (sides or angles).

4 Cases

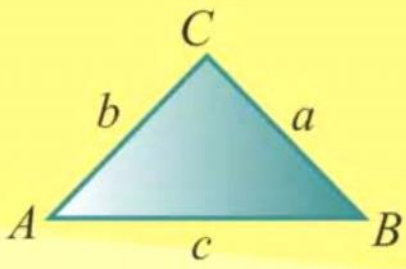
Law of Sines
1. Two angles and any side (AAS or ASA)
2. Two sides and angle opposite (SSA)

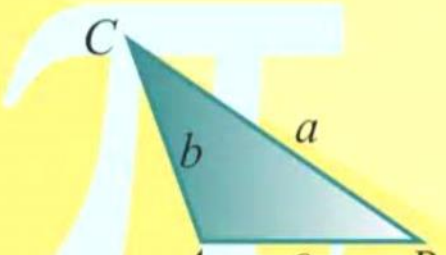
Law of Cosines
3. Three sides (SSS)
4. Two sides and included angle (SAS)

Law of Sines

If ABC is a triangle with sides a, b and c, then

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$





Triangles can be acute or obtuse!

You can use the Law of Sines to solve triangles when Y
you are given two angles and any side (AAS or ASA) y
or two sides and angle opposite one of them (SSA).

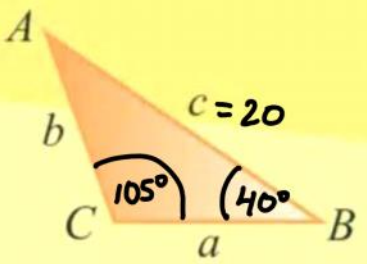
Practice

Law of Sines

If ABC is a triangle with side a, b, and c, then

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Use the Law of Sines to solve the triangle given $B = 40^\circ$, $C = 105^\circ$ and $c = 20$.



$A = 35^\circ$ $a \approx 11.88$

$B = 40^\circ$ $b \approx 13.31$

$C = 105^\circ$ $c = 20$

AAS

* Degree mode

$A = 180^\circ - 105^\circ - 40^\circ$

$A = 35^\circ$

$\frac{c}{\sin C} = \frac{b}{\sin B}$ $\frac{20}{\sin 105^\circ} = \frac{b}{\sin 40^\circ}$

$\frac{20 \sin 40^\circ}{\sin 105^\circ} = \frac{b \sin 105^\circ}{\sin 105^\circ}$ $b \approx 13.31$

$\frac{c}{\sin C} = \frac{a}{\sin A}$ $\frac{20}{\sin 105^\circ} = \frac{a}{\sin 35^\circ}$

$\frac{20 \sin 35^\circ}{\sin 105^\circ} = \frac{a \sin 105^\circ}{\sin 105^\circ}$ $a \approx 11.88$

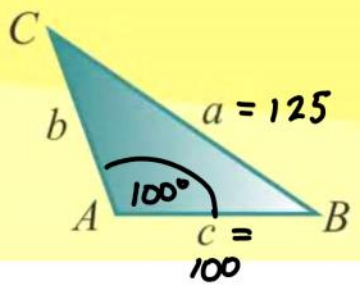
Practice

Law of Sines

If ABC is a triangle with side a, b, and c, then

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Use the Law of Sines to solve the triangle given $A = 100^\circ$, $a = 125$ and $c = 100$.



$A = 100^\circ$ $a = 125$

$B \approx 28.02^\circ$ $b \approx 59.63$

$C \approx 51.98^\circ$ $c = 100$

SSA

$\frac{a}{\sin A} = \frac{c}{\sin C}$ $\frac{125}{\sin 100^\circ} = \frac{100}{\sin C}$

$\frac{100 \sin 100^\circ}{125} = \frac{125 \sin C}{125}$

$\sin C = \frac{100 \sin 100^\circ}{125}$

$\sin^{-1}\left(\frac{100 \sin 100^\circ}{125}\right) = C$

$C \approx 51.98^\circ$

$B = 180^\circ - A - C$

$B = 180^\circ - 100^\circ - 51.98^\circ$

$B \approx 28.02^\circ$

$\frac{a}{\sin A} = \frac{b}{\sin B}$ $\frac{125}{\sin 100^\circ} = \frac{b}{\sin 28.02^\circ}$

$\frac{b \sin 100^\circ}{\sin 100^\circ} = \frac{125 \sin 28.02^\circ}{\sin 100^\circ}$

$b \approx 59.63$

And more...

Law of Sines

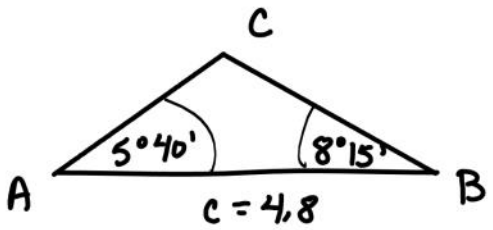
If ABC is a triangle with side a, b, and c, then

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Use the Law of Sines to solve the triangle given $A = 5°40'$, $B = 8°15'$ and $c = 4.8$.

$A = 5°40'$ $a \approx 1.97$
$B = 8°15'$ $b \approx 2.86$
$C = 166.08°$ $c = 4.8$

ASA



$C = 180° - A - B$

$C = 180° - 5°40' - 8°15'$

$C \approx 166.08°$ or $166°5'$

$$\frac{a}{\sin A} = \frac{c}{\sin C}$$

$$\frac{a}{\sin 5°40'} = \frac{4.8}{\sin 166.08°}$$

$$\frac{a \sin 166.08°}{\sin 166.08°} = \frac{4.8 \sin 5°40'}{\sin 166.08°}$$

$a \approx 1.97$

$$\frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{b}{\sin 8°15'} = \frac{4.8}{\sin 166.08°}$$

$$\frac{b \sin 166.08°}{\sin 166.08°} = \frac{4.8 \sin 8°15'}{\sin 166.08°}$$

$b \approx 2.86$

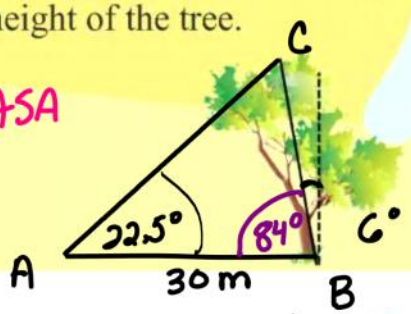
Applications...

Law of Sines

If ABC is a triangle with side a, b, and c, then

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Because of strong winds, a tree grew so that it was leaning 6° from the vertical. At a point 30 meters from the tree, the angle of elevation to the top of the tree is 22.5°. Find the height of the tree.



ASA

A = 22,5° a = 11,97 m

B = 84° b =

C = 73,5° C = 30 m

B = 90° - 6° = 84°

C = 180° - A - C

C = 180° - 22,5° - 84°

C = 73,5°

$\frac{a}{\sin A} = \frac{c}{\sin C}$ $\frac{a}{\sin 22,5°} = \frac{30}{\sin 73,5°}$

$\frac{30 \sin 22,5°}{\sin 73,5°} = \frac{a \sin 73,5°}{\sin 73,5°}$

a ≈ 11.97 meters high