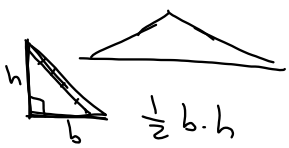
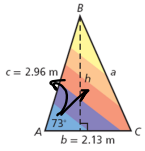
Lesson 13-5: The Law of Sines.....page #

Objectives:
- Determine the area of a triangle given side-angle-side information.
- Use the Law of Sines to find the side lengths and angle measures of a triangle.



Mar 28-11:01 AM

A sailmaker is designing a sail that will have the dimensions shown in the diagram.
Based on these dimensions, the sailmaker can determine the amount of fabric needed.



The sailmaker would determine the amount of fabric needed by finding the area of the triangle.

$A = \frac{1}{2}bh$ $\sin 73 = \frac{h}{2.96}$

However, the value of h is unknown. The sailmaker could use trig to find the value of h.

$\sin A = \frac{h}{c}$

$c \cdot \sin A = h$

$h = c \cdot \sin A$

Area = $\frac{1}{2}bh$ *Write the area formula.*

Area = $\frac{1}{2}bc \sin A$ *Substitute c sin A for h.*

**This formula allows you to determine the area of a triangle if you know the lengths of two sides and the measure of the angle between them.

Apr 23-11:04 AM

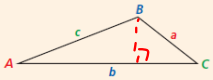
Area of a Triangle

For $\triangle ABC$,

Area = $\frac{1}{2}bc \sin A$

Area = $\frac{1}{2}ac \sin B$

Area = $\frac{1}{2}ab \sin C$

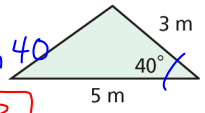


SAS

$Area = \frac{1}{2} side \cdot side \cdot \sin(anglebetween)$

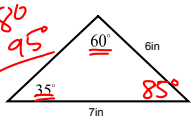
Apr 21-2:00 PM

Find the area of the triangle. Round to the nearest tenth.



$A = \frac{1}{2} \cdot 5 \cdot 3 \cdot \sin 40$

$A = 4.8\ m^2$



$A = \frac{1}{2} \cdot 7 \cdot 6 \cdot \sin 85$

$A = 20.9\ in^2$

Mar 20-10:38 AM

The area of ΔABC is equal to $\frac{1}{2}bc \sin A$ or $\frac{1}{2}ac \sin B$ or $\frac{1}{2}ab \sin C$. By setting these expressions equal to each other, you can derive the Law of Sines.

$\frac{1}{2}bc \sin A = \frac{1}{2}ac \sin B = \frac{1}{2}ab \sin C$ *Multiply each expression by 2.*

$\frac{bc \sin A}{abc} = \frac{ac \sin B}{abc} = \frac{ab \sin C}{abc}$ *Divide each expression by abc.*

$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ *Divide out common factors.*

Law of Sines

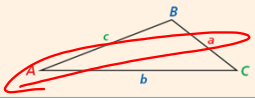
$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Apr 21-2:03 PM

Law of Sines

For $\triangle ABC$, the Law of Sines states that

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



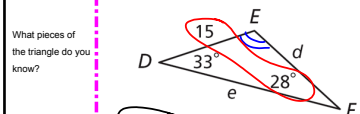
The Law of Sines allows you to solve a triangle as long as you know the following:

1. Angle-Angle-Side (AAS)
2. Angle-Side-Angle (ASA)
3. Side-Side-Angle (SSA)

Apr 21-2:00 PM

Solve each triangle. Round to the nearest tenth.

What pieces of the triangle do you know?



$\frac{\sin 28}{15} = \frac{\sin 33}{d}$

$d \cdot \frac{\sin 28}{\sin 28} = 15 \cdot \frac{\sin(33)}{\sin 28}$

$d = 17.4$

$15 \cdot \frac{\sin 33}{\sin 28}$

$\frac{\sin 28}{15} = \frac{\sin 119}{e}$

$e \cdot \frac{\sin 28}{\sin 28} = 15 \cdot \frac{\sin 119}{\sin 28}$

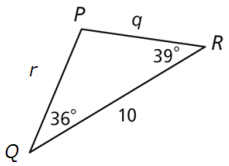
$e \approx 27.9$

$\angle E = 119°$
$d = 17.4$
$e = 27.9$

Apr 21-2:06 PM

Solve each triangle. Round to the nearest tenth.

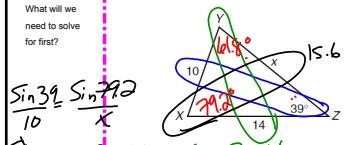
Do you have any angle-side pairs?



Apr 21-2:07 PM

Solve each triangle. Round to the nearest tenth.

What will we need to solve for first?



$\frac{\sin 39}{10} = \frac{\sin 79.2}{x}$

$x \cdot \frac{\sin 39}{\sin 39} = 10 \cdot \frac{\sin 79.2}{\sin 39}$

$x =$

$\frac{\sin 39}{10} = \frac{\sin Y}{14}$

$14 \cdot \frac{\sin Y}{14} = 10 \cdot \frac{\sin(39)}{10}$

$\sin^{-1}(\sin Y) = \sin^{-1}(.88)$

2nd sin 2nd −

$\sin^{-1}(\text{ans})$

$\angle Y = 61.8°$

$\angle Y = 61.8°$
$\angle X = 79.2°$
$x = 15.6$

$180 - 100.8$

Apr 23-3:02 PM

Assignment: Worksheet

Apr 21-1:59 PM