4 Sine Law Applications

January 5, 2019   5:31 PM

FOM 11   _Anita and Sebastian_   Ch 3/4 – Day 4: THE SINE LAW Applications

Anita and Sebastian Ate Spaghetti And Strawberry Soup Again
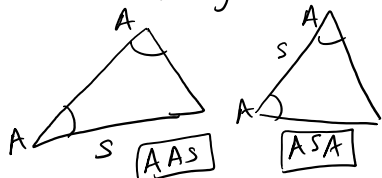
The Sine Law:

To find an **angle**: $\dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$
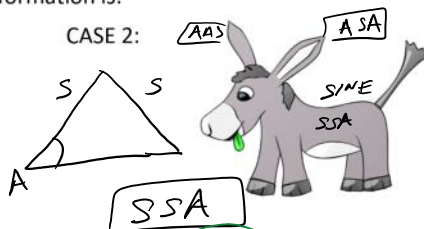
To find a **side**: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

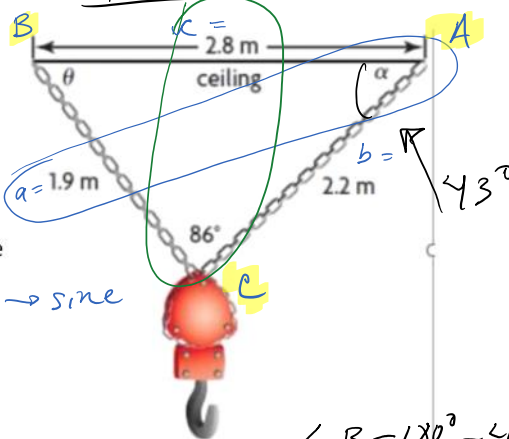The Sine Law can be used when the given information is:

CASE 1: 2 angles & 1 side

[AAS]   [ASA]

CASE 2: [AAS] [ASA] SINE SSA

SSA

Example 1: Toby uses chains attached to hooks on the ceiling and a winch to lift engines at his father's garage. The chains, winch, and ceiling are arranged as shown. Toby solved the triangle using the Sine Law to determine the angle that each chain makes with the ceiling to the nearest degree. He claims that Θ° and α = 54°. Is he right? Explain and make any necessary corrections.

B —— c = 2.8 m ceiling —— A
θ   α
a = 1.9 m   b = 2.2 m
86°
C

43°

[SSA] → sine

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

$1.9 \times \dfrac{\sin A}{1.9} = \dfrac{\sin 86°}{2.8} \times 1.9$

$\sin A = 0.67691$ (Use 4 decimal places)

$A = \sin^{-1}(0.67691)$

$A = 42.6°$

$\boxed{A \simeq 43°}$ $\boxed{\text{He is wrong!}}$

$\angle B = 180° - 43° - 86°$

$\boxed{\angle B = 51°}$

Example 2: A surveyor makes a base line PQ = 440 m long. He takes measurements to location R from location P and Q. He finds that angle QPR = 46° and angle PQR = 75°. → distance along edge
  a) Calculate the perimeter of triangle PQR to the nearest metre.
  b) Calculate the area of triangle PQR to the nearest square metre.

$R = 180° - 46° - 75°$
$= 59°$
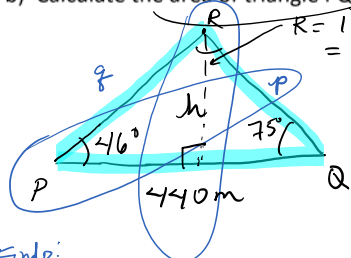
Area of Triangle: $\dfrac{b \times h}{2}$

Perimeter:
__Add all sides__

369.2
+ 495.83
440
‾‾‾‾‾‾‾‾
1305.08

≈ $\boxed{1306 \text{ m}}$

Find p:

$\dfrac{p}{\sin P} = \dfrac{r}{\sin R}$

$\sin 46° \times \dfrac{p}{\sin 46°} = \dfrac{440}{\sin 59°} \sin 46°$

$p = 369.2$

$\boxed{p \approx 369 \text{ m}}$

$\sin 75° \times \dfrac{q}{\sin 75°} = \dfrac{369}{\sin 46°} \times \sin 75°$

$\boxed{\begin{array}{l} q = 495.8 \\ \approx 496 \text{ m} \end{array}}$
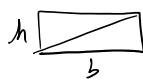
QMIZ (Fri.)
SOH CAH TOA

Sine Law
— 1 △
— 1 word problem

Test: Jan 29
Tues.

Assignment: Sec. 3.2, p. 125, #4, 5, 10, 13, optional: 14, 15, 17, 18.