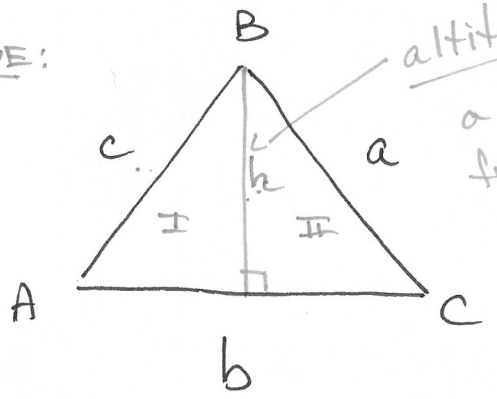
- moving outside right Δ's
- Oblique Triangles: non-right Δ's

Solving oblique Δ's

LAW OF SINES

DERIVE:



altitude: a perpendicular from the angle to oppo side

ΔI: $\sin A = \frac{h}{c}$

ΔII: $\sin C = \frac{h}{a}$

$c \cdot \sin A = h$ $\quad$ $a \cdot \sin C = h$

same, equal

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

Law of Sines $\boxed{\frac{\sin A}{a} = \frac{\sin C}{c} = \frac{\sin B}{b}}$

Law of Sines

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

- proportions (2 sides at a time)

when to use L of S:

A- Angle
S- Side

Given situation: AAS/ASA

2 - angles
1 - angles side

Ex: main part

$A = 41°$ | $B = 83°$ | $C = 56°$ $\quad 180 - 124$

$a = 5.9$ | $b = 9$ | $c = 7.5$

$\frac{\sin 83}{9} = \frac{\sin 41}{a}$ $\quad$ $\frac{\sin 83}{9} = \frac{\sin 56}{c}$

$a \sin 83 = 9 \sin 41$ $\quad$ $c \sin 83 = 9 \sin 56$

$a = \frac{9 \sin 41}{\sin 83}$ calc $\quad$ $c = \frac{9 \sin 56}{\sin 83}$

$a = 5.9$ $\quad$ $c = 7.5$

Law of Sines

Example 2.

$A = 59°$ $B = 100°$ $C = 21°$ $180 - 159$

$a = 38.3$ $b = 44$ $c = 16$

$\frac{\sin 21}{16} = \frac{\sin 59}{a}$ $\frac{\sin 21}{16} = \frac{\sin 100}{b}$

$a \frac{\sin 21}{\sin 21} = \frac{16 \sin 59}{\sin 21}$ ← $b = \frac{16 \sin 100}{\sin 21}$

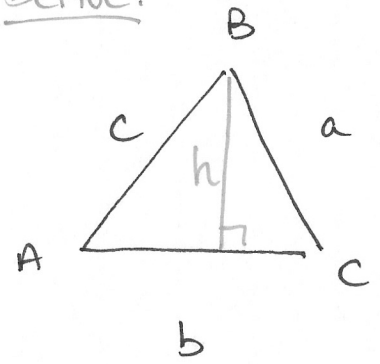
$a = 38.3$ $b = 44$

Area of a Δ:

basic $A = \frac{1}{2}bh$

b = base
h = height

Derive:



$A = \frac{1}{2} b(h)$

$h = \boxed{a \cdot \sin C}$ or $\boxed{c \cdot \sin A}$

$k = \frac{1}{2} ba \cdot \sin C$ $k = \frac{1}{2} bc \cdot \sin A$

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

Given 2 sides

Example: $b = 7$ $c = 10$ $A = 41°$

$k = \frac{1}{2}(7)(10) \sin 41$

$k = 23 \text{ units}^2$

2 set of formulas

1 side

$$K = \frac{1}{2} a^2 \frac{\sin B \sin C}{\sin A}$$

$$K = \frac{1}{2} b^2 \frac{\sin A \sin C}{\sin B}$$

$$K = \frac{1}{2} c^2 \frac{\sin A \sin B}{\sin C}$$

Given: $c = 7$ $A = 30°$ $B = 70°$

$$K = \frac{1}{2}(7)^2 \frac{\sin 30 \sin 70}{\sin 80}$$

180
−100

$$K = 11.7 \text{ u}^2$$