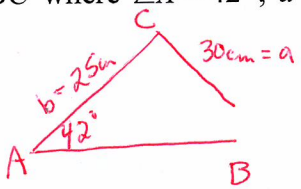
Assignment 2.3 Sine Law Ambiguous Case

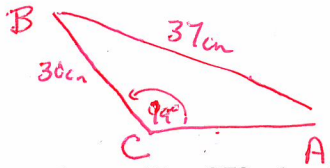
Determine the number of solutions for the given SSA information:

a) ΔABC where $\angle A = 42°$, $a = 30\,\text{cm}$ and $b = 25\,\text{cm}$



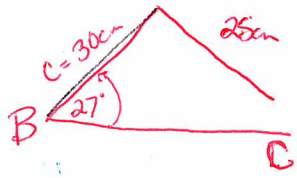
Acute Angle.
Opp > adj
∴ 1 Triangle.

b) ΔABC where $\angle C = 99°$, $a = 30\,\text{cm}$ and $c = 37\,\text{cm}$



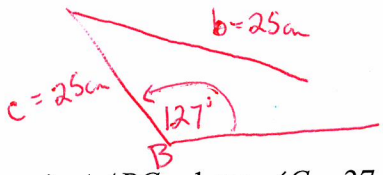
Obtuse Angle
opp > adj
∴ 1 triangle

c) ΔABC where $\angle B = 27°$, $b = 25\,\text{cm}$ and $c = 30\,\text{cm}$



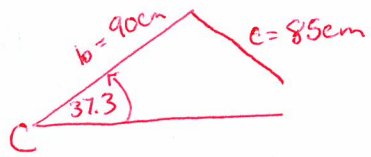
Acute angle
opp < adj check height $h = \sin 27(30)$
$h = 13.6\,\text{cm}$
opp > height
∴ 2 Triangles

d) ΔABC where $\angle B = 127°$, $b = 25\,\text{cm}$ and $c = 25\,\text{cm}$



Obtuse angle
Opp = adj
∴ 0 Triangles

e) ΔABC where $\angle C = 37.3°$, $b = 90\,\text{cm}$ and $c = 85\,\text{cm}$



Acute Angle
opp < adj check height $h = \sin 37.3(90)$
$h = 54.5\,\text{cm}$
opp > height
∴ 2 Triangles

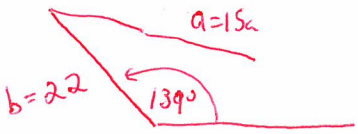
f) ΔABC where $\angle A = 30°$, $a = 25\,\text{cm}$ and $b = 50\,\text{cm}$

Acute Angle
opp < adj check height $h = \sin 30(50)$
$h = 25\,\text{cm}$
opp = height
∴ 1 Triangle (Right triangle)

g) ΔABC where $\angle C = 38.7°$, $a = 25\,\text{cm}$ and $c = 25\,\text{cm}$

Acute Angle
opp = adj
∴ 1 Triangle

h) ΔABC where $\angle A = 139°$, $a = 15\,\text{cm}$ and $b = 22\,\text{cm}$

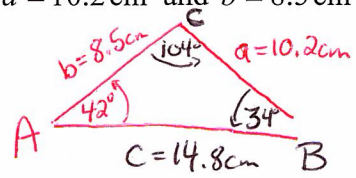


Obtuse Angle
opp < adj
∴ 0 Triangles

Solve the following triangles if possible. Round all angle measures and side lengths to the nearest tenth.

a) ΔABC where $\angle A = 42°$, $a = 10.2\,\text{cm}$ and $b = 8.5\,\text{cm}$

Acute Angle
opp > adj
∴ 1 triangle



① Find $\angle B$

$\frac{(8.5)\sin 42}{10.2} = \frac{\sin B\,(8.5)}{8.5}$

$\sin^{-1}\left[\frac{(8.5)\sin 42}{10.2}\right]$

$\angle B = 34°$

② Find $\angle C$

$180 - 34 - 42$

$\angle C = 104°$

③ Find side "c"

$\frac{(\sin 104)\,10.2}{\sin 42} = \frac{c\,(\sin 104)}{\sin 104}$

$c = 14.8\,\text{cm}$

b) ΔPQR where $\angle P = 56°$, $p = 1.92\,\text{m}$ and $q = 2.35\,\text{m}$

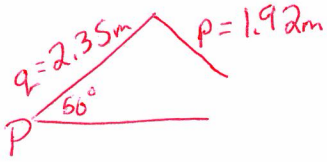
Acute Angle
opp < adj
Check height

$h = \sin 56(2.35)$

$h = 1.95\,\text{m}$

$h > \text{opp}$

∴ NO triangles



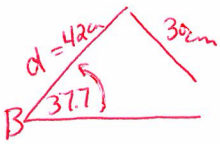
c) ΔBAD where $\angle B = 37.7°$, $b = 30\,\text{cm}$ and $d = 42\,\text{cm}$

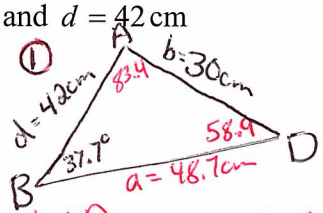
Acute Angle
opp < adj
Check height $h = \sin 37.7(42)$

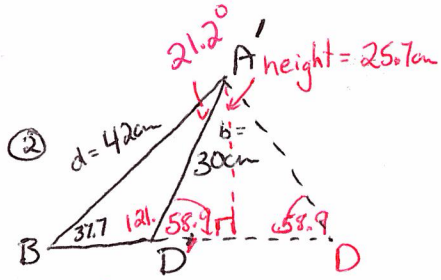
$h = 25.7\,\text{cm}$

opp > h

∴ 2 Triangles







① Find $\angle D$

$\frac{(42)\sin 37.7}{30} = \frac{\sin D\,(42)}{42}$

$\sin^{-1}\left[\frac{(42)(\sin 37.7}{30}\right]$

$\angle D = 58.9°$

② $\angle A = 180 - 37.7 - 58.9$

$\angle A = 83.4°$

③ $\frac{(\sin 83.4)}{30} = \frac{a\,(\sin 83.4)}{\sin 37.7}$

$\frac{(\sin 83.4)(30)}{\sin 37.7} = a$

$a = 48.7\,\text{cm}$

① $\angle D' = 180 - 58.9$

$\angle D' = 121.1°$

② $\angle A' = 180 - 121.1 - 37.7$

$\angle A' = 21.2°$

③ Find side a'

$\frac{30}{\sin 37.7} = \frac{a'\,(\sin 21.2)}{\sin 21.2}$

$a' = 17.7\,\text{cm}$