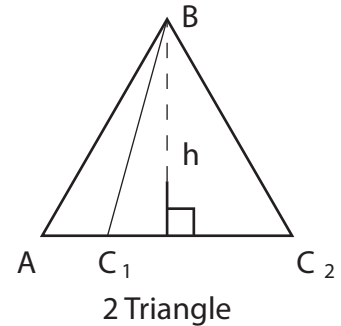
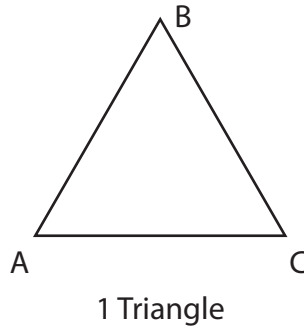
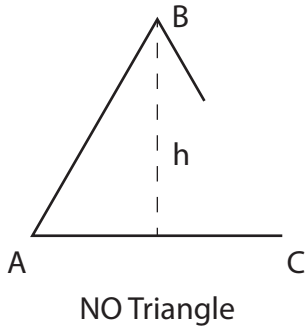


LAW OF SINES AMBIGUOUS CASE

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

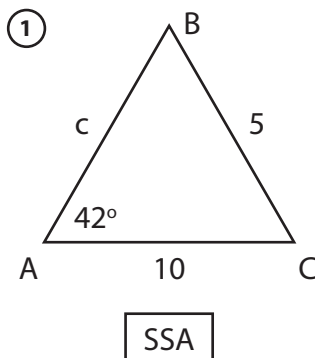


Steps for Solving Law of Sines Ambiguous Case (SSA congruency):

1. Draw a triangle and label with the given data
2. Find your FRUIT angle using the Law of Sines
 Fruit Angle = AOGS = $\frac{\text{Angle Opposite Given Side}}{\text{Apples Oranges Grapes Strawberries}}$
 (i) If you get "error", then you are done - no triangle
 (ii) If you get an answer, then continue to solve for all missing parts of the triangle
3. Find you Supplemental Fruit $\angle = 180^\circ - \text{Fruit } \Delta$
 (i) If Supplemental Fruit + Given Angle $\geq 180^\circ$, then done and you have one triangle solved
 (ii) If Supplemental Fruit + Given Angle $< 180^\circ$, then two triangles and now solve for all missing parts of this triangle

Examples: Solve ΔABC

1. $A = 42^\circ$, $a=5$, $b=10$



② Fruit = $\angle B$

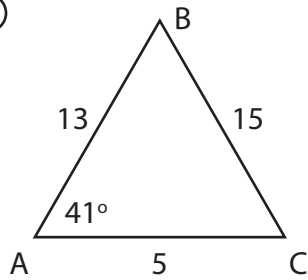
$$\frac{\sin B}{10} = \frac{\sin 42^\circ}{5} \rightarrow \sin B = \frac{10 (\sin 42^\circ)}{5} \rightarrow \sin B = -1.833$$

$$B = \sin^{-1}(-1.833) = \text{Error}$$

NO Triangle

2. $a = 15, C = 13, A = 41^\circ$

①



SSA

②

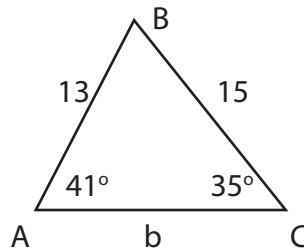
Fruit = $\triangle C$

$$\frac{\sin C}{13} = \frac{\sin 41^\circ}{15}$$

$$\sin C = \frac{13(\sin 41^\circ)}{15}$$

$$\sin C = 0.5686$$

$$C = 35^\circ$$



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

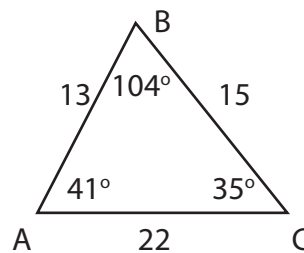
$$41^\circ + B + 35^\circ = 180^\circ$$

$$B = 104^\circ$$

$$\frac{b}{\sin 104^\circ} = \frac{15}{\sin 41^\circ}$$

$$b = \frac{15(\sin 104^\circ)}{\sin 41^\circ}$$

$$b = 22$$



③ Supplemental Fruit (SF)

$$180^\circ - \text{Fruit } \triangle$$

$$180^\circ - \triangle C$$

$$\text{SF} = 180^\circ - 35^\circ = 145^\circ$$

Now check: SF + Given \triangle

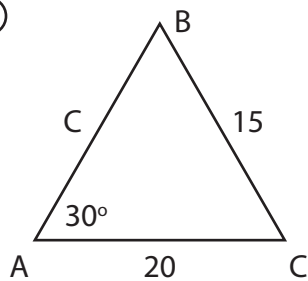
$$145^\circ + 41^\circ = 186^\circ$$

$$186^\circ \geq 180^\circ$$

Only 1 Triangle

1. $A = 30^\circ$, $a = 15$, $b = 20$

①



SSA

②

Fruit = $\triangle B$

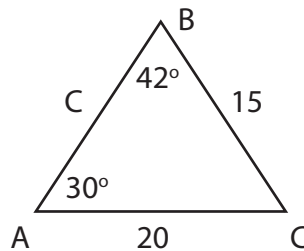
$$\frac{\sin B}{20} = \frac{\sin 30^\circ}{15}$$

$$\sin B = \frac{20(\sin 30^\circ)}{15}$$

$$\sin B = 0.667$$

$$B = \sin^{-1}(0.667)$$

$$B = 42^\circ$$



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

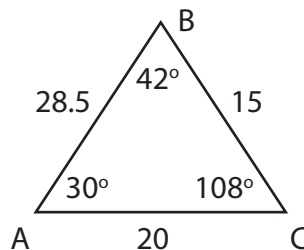
$$30^\circ + 42^\circ + C = 180^\circ$$

$$C = 108^\circ$$

$$\frac{C}{\sin 108^\circ} = \frac{15}{\sin 30^\circ}$$

$$C = \frac{15(\sin 108^\circ)}{\sin 30^\circ}$$

$$C = 28.5$$



③

Supplemental Fruit \triangle (SF)

$$180^\circ - \text{Fruit } \triangle$$

$$180^\circ - \triangle B$$

$$\text{SF} = 180^\circ - 42^\circ = 138^\circ$$

Now check: SF + Given \triangle

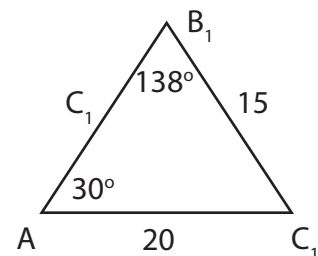
$$138^\circ + 30^\circ = 168^\circ$$

$$168^\circ < 180^\circ$$

Two Triangles so now

solve for 2nd Triangle

with SF = B₁



$$A + B_1 + C_1 = 180^\circ$$

$$30^\circ + 138^\circ + C_1 = 180^\circ$$

$$C_1 = 12^\circ$$

$$\frac{C_1}{\sin 12^\circ} = \frac{15}{\sin 30^\circ}$$

$$C_1 = \frac{15(\sin 12^\circ)}{\sin 30^\circ}$$

$$C_1 = 6.24$$

