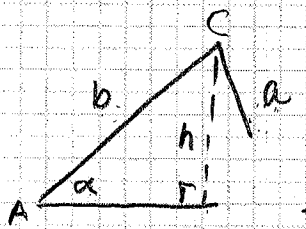
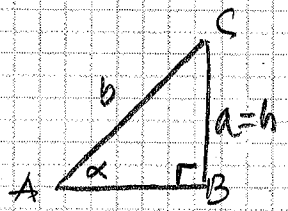
# THE AMBIGUOUS CASE: SSA



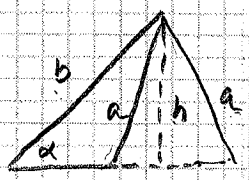

$a < h$

No Triangle




$a = h$

One Right Triangle



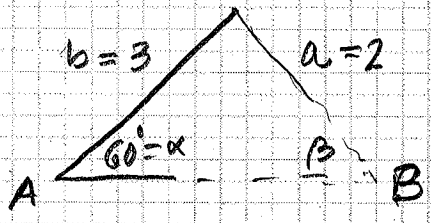

$a > h$ but $a < b$

Two Triangles


$a \geq b$

Only one Triangle

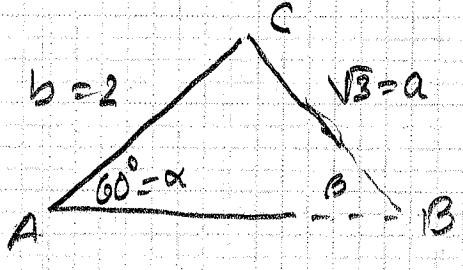
Ex 1: $a = 2 \quad b = 3 \quad \alpha = 60^\circ$

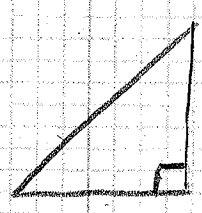



$$\frac{\sin 60^\circ}{2} = \frac{\sin\beta}{3} \Rightarrow \frac{3 \times \sin 60^\circ}{2} = \sin\beta \approx 1.3$$

ABSURD! NO triangle.

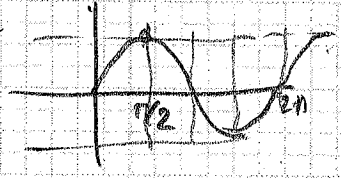
Ex 2: $a = \sqrt{3} \quad b = 2 \quad \alpha = 60^\circ$



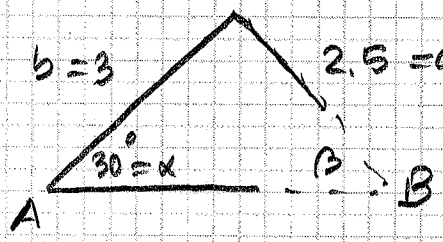



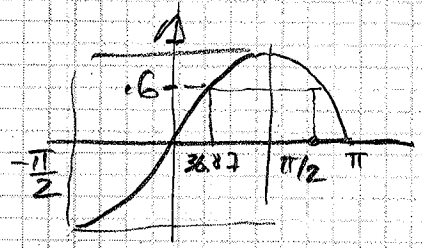
One Right triangle

$$\frac{\sin 60^\circ}{\sqrt{3}} = \frac{\sin\beta}{2} \Rightarrow \frac{2 \times \sin 60^\circ}{\sqrt{3}} = \sin\beta = 1 \Rightarrow \beta = 90^\circ$$



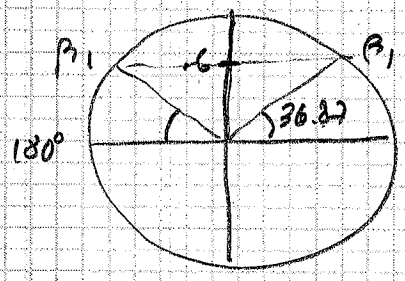
Ex 3: $a = 2.5$ $b = 3$ $\alpha = 30^\circ$



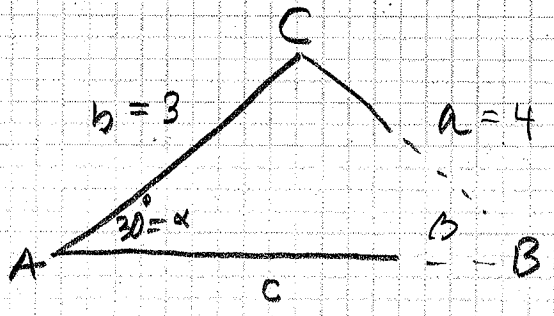




$$\frac{\sin 30^\circ}{2.5} = \frac{\sin B}{3} \Rightarrow \frac{3 \times \sin 30^\circ}{2.5} = \sin B \Rightarrow \sin B = .6 \Rightarrow$$

$$\Rightarrow \begin{cases} B_1 = 36.87 \\ B_2 = 180^\circ - 36.87 = 143.13 \end{cases}$$




Ex 4: $a = 4$ $b = 3$ $\alpha = 30^\circ$




$$\frac{\sin 30^\circ}{4} = \frac{\sin B}{3} \Rightarrow \frac{3 \times \sin 30^\circ}{4} = \sin B$$

$$\sin B = \frac{3}{8} \Rightarrow B = \sin^{-1}\left(\frac{3}{8}\right) \approx 22.08^\circ$$