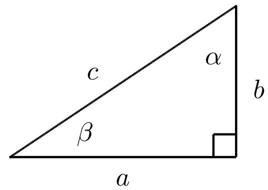
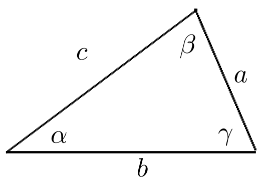
Trig Strategies WS Name: Per:



1. Right Triangles

$$a^2 + b^2 = c^2$$
$$a = c\sin\alpha = c\cos\beta = b\tan\alpha = \frac{b}{\tan\beta}$$
$$\beta = \tan^{-1}\tfrac{b}{a} = \cos^{-1}\tfrac{a}{c} = \sin^{-1}\tfrac{b}{c}$$

2. "Law of Cosines"



(a) Side-Angle-Side (SAS)

$$a^2 = b^2 + c^2 - 2bc\cos\alpha$$
$$b^2 = a^2 + c^2 - 2ac\cos\beta$$
$$c^2 = a^2 + b^2 - 2ab\cos\gamma$$

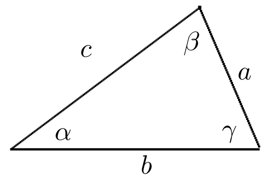
Double the product of the sides you know, then subtract that from the sum of the squares of the two sides, and then take the square-root of the result.

(b) Side-Side-Side (SSS)

$$\alpha = \cos^{-1}\left(\frac{b^2 + c^2 - a^2}{2bc}\right)$$
$$\beta = \cos^{-1}\left(\frac{a^2 + c^2 - b^2}{2ac}\right)$$
$$\gamma = \cos^{-1}\left(\frac{a^2 + b^2 - c^2}{2ab}\right)$$

Answers:
1. $\alpha = 14.852$ $b = 32.976$ $\gamma = 140.148$
2. $\alpha = 3.327$ $\beta = 2.872$ $\gamma = 80$
3. $\beta_1 = 111.178$ $b = 5.803$ $\gamma_1 = 28.822$
4. No solutions
5. $\beta_1 = 85.642$ $b_1 = 6.954$ $\gamma_1 = 59.358$
$\beta_2 = 24.358$ $b_2 = 2.876$ $\gamma_2 = 120.642$

3. If you know 3 of the 6 arranged the other ways (Section 9.2: "Law of Sines")



$$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$$

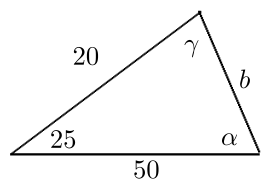
(a) Any 2 angles and the side in between the known angles (ASA)or 2 angles and a side (AAS/ASA/SAA): Only one solution possible.

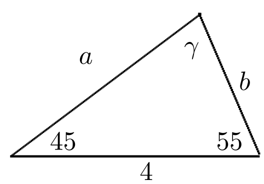
(b) 2 Angles, and NOT the side in between (ASS, SSA)...Zero, one or two solutions possible. Method: Find a β_1, then consider the possible $\beta_2 = 180 - \beta_1$

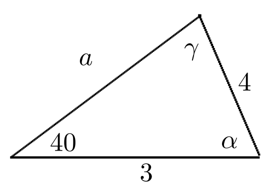
i. No solutions if $\sin\beta > 1$ or $\sin\beta < -1$

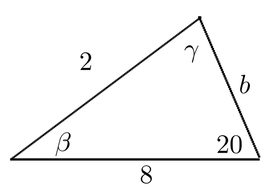
ii. One solution if $180 - \alpha - \beta_2 \leq 0$...use β_1 as the unique solution

iii. Two solutions otherwise (you need to consider β_1 to get c_1 and γ_1 and then consider β_2 to find c_2 and γ_2

1. 

2. 

3. 

4. 

5.