

MAC 1114 Law of Sines & Cosines

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

Hint: use when ASA, SSA and SAA is given!

Case 1: given ASA $A = 50^\circ, B = 68^\circ, c = 230$.

1. Find C (sum of angles in triangle = 180°)
2. Set up a ratio to solve for one of the missing sides, using c.
3. Continue until you know all the pieces you need.

Case 2: given SAA $B = 10^\circ, C = 100^\circ, c = 115$

1. You have enough information to set up a ratio to find b or a. then continue on.

Case 3: SSA (no solution)

$a = 20, c = 45, A = 125^\circ$

1. Set up the ratio to find C.
2. $\sin(C) = 1.84 > 1$ so no solution.

Case 4: SSA (one solution)

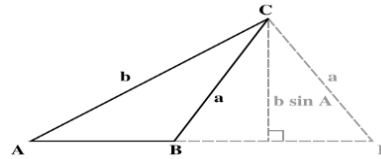
$A = 110^\circ, c = 15, a = 28$

1. Set up the ratio to find C.
2. You get 2 possible angles, $C = 30^\circ$ or 150° .
3. Let's try 30° : $B = 180 - (110 + 30) = 40^\circ$,
let's try 150° : $B = 180 - (110 + 150) = -80^\circ$.
You can't draw a triangle with a negative angle so we reject this one. Thus, there is only one solution to this problem.

Case 5: SSA (2 soln's)

$a = 11, b = 18, A = 26^\circ$

1. Solve for B, this will give you $46^\circ (B_1)$ or $134^\circ (B_2)$.
2. Let's try 46° : $C_1 = 180^\circ - (46^\circ + 26^\circ) = 108^\circ$
3. Let's try 134° : $C_2 = 180^\circ - (134^\circ + 26^\circ) = 20^\circ$
4. Since there are two legitimate values for B, we will have two triangles. Use each B to find the rest of the missing pieces for the two triangles.



Law of Cosines $a^2 = b^2 + c^2 - 2bc \cos(a)$

$$b^2 = a^2 + c^2 - 2ac \cos(b)$$

$$c^2 = a^2 + b^2 - 2ab \cos(c)$$

Hint: use when you know 3 sides or 2 sides and the angle between them.

Case 1: SSS

$a = 21.2 \text{ ft.}, b = 24.6 \text{ ft. and } c = 12 \text{ ft.}$

1. Since you don't know any angle just pick 1 to find first!
2. After you find one angle, you can switch back to law of sines or use the cosine again

Case 2: SAS

$C = 134^\circ, a = 20 \text{ and } b = 8$.

1. Find c first and then you can switch back to law of sines.