

Solving quadrantal spherical triangle :

In case giving a spherical triangle in which one side is 90° , we use the following fundamental rules ,

$$\sin \text{ middle} = \tan(\text{adj.}) \times \tan (\text{adj.})$$

$$\sin \text{ middle} = \cos(\text{opp.}) \times \cos (\text{opp.})$$

Example :

1. Solve the following right angle spherical triangle ABC
given that : $c = 90^\circ$, $a = 115^\circ 25'$, $B = 60^\circ 18'$

Solution :

In the first

$$\sin B = \tan A \cdot \tan (90 - a)$$

$$\therefore \sin B = \tan A \cdot \cot a$$

$$\therefore \tan A = \frac{\sin B}{\cot a} = \sin B \cdot \tan a = -1.827961$$

$$\therefore A = 180^\circ - \tan^{-1} 1.827961 = 118^\circ 40'' 52''$$

In the second

$$\sin (90 - b) = \cos B \cdot \cos (90 - a)$$

$$\therefore \cos b = \cos B \cdot \sin a = 0.4475034$$

$$\therefore b = 63^\circ 24' 59''$$

In the third

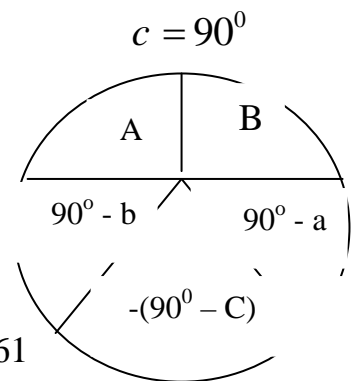
$$\sin (90 - a) = \tan B \cdot \tan [-(90 - C)]$$

$$\therefore \cos a = -\tan B \cdot \tan (90 - C)$$

$$\therefore \cos a = -\tan B \cdot \cot C$$

$$\therefore \tan C = -\frac{\tan B}{\cos a} = 4.0847979$$

$$\therefore C = 76^\circ 14' 38''$$



Sheet (4)

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given that :

$$\sin \text{middle} = \tan(\text{adj.}) \times \tan(\text{adj.})$$

$$\sin \text{middle} = \cos(\text{opp.}) \times \cos(\text{opp.})$$

Lecture

- | | | |
|---------------------|----------------------------|-------------------------|
| 1. $a = 90^\circ$, | $B = 80^\circ 10'$, | $C = 50^\circ 20'$ |
| 2. $A = 45^\circ$, | $c = 72^\circ$, | $b = 90^\circ$ |
| 3. $c = 90^\circ$, | $a = 116^\circ 44' 48''$, | $b = 44^\circ 26' 21''$ |
| 4. $c = 90^\circ$, | $a = 115^\circ 25'$, | $B = 60^\circ 18'$ |

Section

- | | | |
|---------------------|-----------------------|---------------------|
| 1. $a = 90^\circ$, | $c = 49^\circ 23'$, | $b = 76^\circ 41'$ |
| 2. $b = 90^\circ$, | $B = 100^\circ$, | $c = 50^\circ 10'$ |
| 3. $c = 90^\circ$, | $A = 121^\circ 20'$, | $B = 42^\circ 01'$ |
| 4. $a = 90^\circ$, | $c = 60^\circ 35'$, | $B = 122^\circ 18'$ |

Home work

- | | | |
|---------------------|-----------------------|---------------------|
| 1. $c = 90^\circ$, | $a = 60^\circ 10'$, | $b = 80^\circ 20'$ |
| 2. $a = 90^\circ$, | $B = 80^\circ 10'$, | $C = 48^\circ 50'$ |
| 3. $a = 90^\circ$, | $c = 108^\circ$, | $B = 45^\circ$ |
| 4. $a = 90^\circ$, | $C = 60^\circ 20'$, | $A = 115^\circ 40'$ |
| 5. $c = 90^\circ$, | $a = 110^\circ 11'$, | $B = 14^\circ 20'$ |