Oblique Angled Triangles

Theorem 1st

In every triangle the sides are as the sines of their opposite angles. — Hence any side is to the sine of its opposite angle, as any other side is to the sine of its opposite angle — And the sine of any angle is to its opposite side, as the sine of any other angle is to its opposite side —

Theorem 2

In every oblique angled triangle, the sum of any two sides is to their difference, as the Tangent of half the sum of the angles at the base, is to half the

is to the tangent of half their difference
— This proportion must be used when two sides and the angle between them are given to find the other parts of the triangle

Problem

The sum and difference of any two quantities being given, to find the quantities

Rule to half the sum add half the difference, the sum is the greater quantity And from half the sum take half the difference, the remainder is the lesser quantity

Example

Bought two horses which together cost 1240 Rupees, and the price of the one exceeds that of the other by 260 Rupees, Req^d the price of each

Theorem 3 —

The base of any triangle is to the sum of the other two sides, as the difference of the sides is to the difference of the segments of the base. — This proportion must be used, when the three sides of a triangle are given to find the three angles
— N.B. The segments of the base are formed by letting fall a perpendicular from the opposite angle, on the base —

Case 1st This is an acute angled Example

In the oblique angled triangle ABC given AB 271, AC 305 and the angle at B 69° 10' required the other parts of the triangle

Construction

Make the ∠ ABC = 69° 10' and AB = 271

From the point A with the distance 305 cut BC in the point C and join AC —

Acute ang^d

Case 2

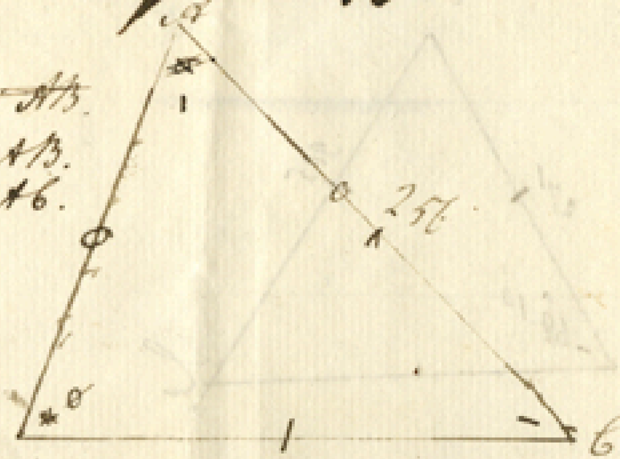
In the oblique angled triangle ABC given the Angle at A 58° 14', the angle at C 74° 31' and side BC 350 — Req^d the other parts of the triangle

Construction

Make BC = 350, the angle at ~~B~~ C = 74,31, ~~the side~~ Then 180° − A+C = 47° 15' the angle at B.

~~S,B : AC :: S,C : AB.~~
S,A : BC :: S,C : AB.
S,A : BC :: S,B : AC.

S,B : S,C :: ~~BA~~ AC : AB.



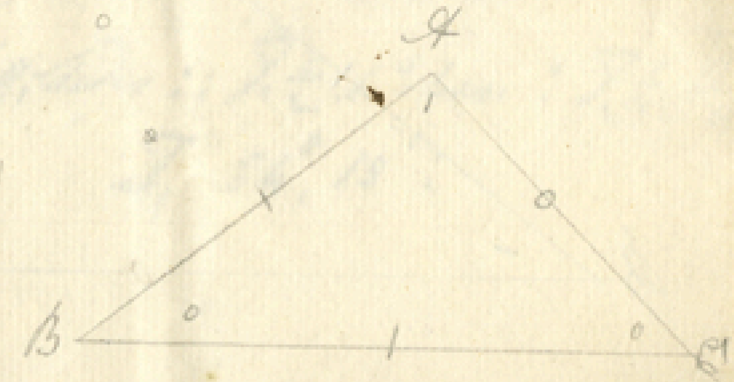
Case 3 — This is an Obtuse ang^d Example

In the oblique angled triangle ABC given the side AB = 256, BC 475 and the angle at A 124° 30' req^d — the other parts

Construction

Draw AB = 256. Make the ∠ at A = 124° 30' and from B with the length BC = 475 cut AC in C —

BC : S,A :: AB : S,C.
S,C : AB :: S,B : AC.
or S,A : BC :: S,B : AC.

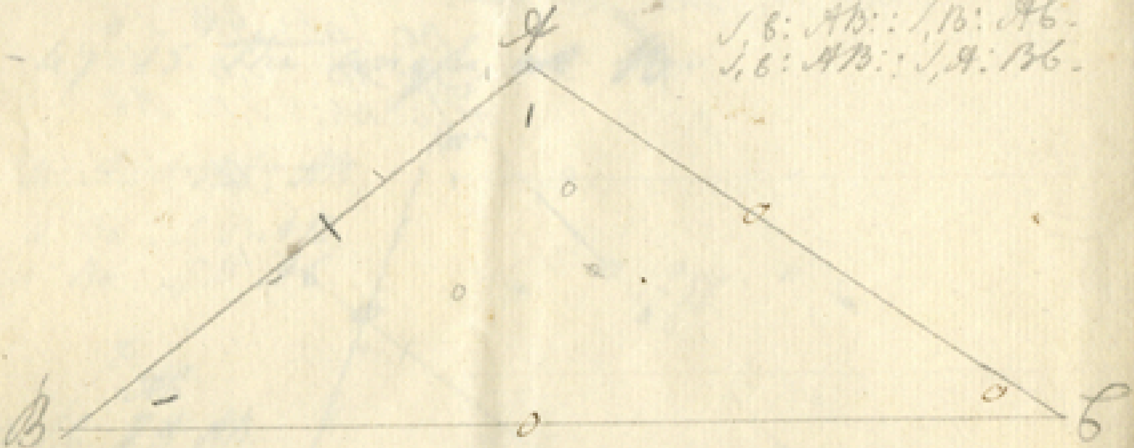


Case 4th — Obtuse angd.

In the oblique angled triangle ABC given the angle at A 99° 40' the angle at B 46° 10' and the side AB 284 Req^d the other parts — When there is no Radius corresponding in the R. A. triangles begin with a Sine instead of R. — and the tang for a Side

Construction

Make ∠ B = 46° 10', the side AB = 284 and the ∠ A = 99° 40' —



S, C : AB :: S, B : AC.
S, C : AB :: S, A : BC.

Case 5th —

In the oblique angled triangle ABC given the sides AB 296, AC 348 and the angle at A 71° 30' req^d. the other parts of the triangle —

Construction

Make AB = 296. the ∠ A = 71° 30' and AC = 348 —

Calculation

Sum sides : Diff. Sides :: T, ½ ∠s bas. : T, ½ Diff

644 : 52 :: T, 54° 15' :

Case 6th

In the ~~acute~~ obtuse angled triangle ABC

Given AB 340, BC 420 and AC 215

Req^d the angles

Construction

Let fall a perpendicular from the ∠A on the base BC

Calculation

Base : Sum sides :: Diff. sides : Diff. of the segts. of the base

		340		
		215		
420	:	555	:	125
		25		
		5		

End of Plane Trigonometry.