



Math for the people, by the people.

area of a quadrilateral

Canonical name	AreaOfAQuadrilateral
Date of creation	2013-03-22 16:58:22
Last modified on	2013-03-22 16:58:22
Owner	Mathprof (13753)
Last modified by	Mathprof (13753)
Numerical id	7
Author	Mathprof (13753)
Entry type	Theorem
Classification	msc 51N20

Let a, b, c, d be the lengths of the sides of a quadrilateral and K be its area. Let s be the semiperimeter. Then

$$K^2 = (s - a)(s - b)(s - c)(s - d) - abcd \cos^2 \left(\frac{\theta + \phi}{2} \right)$$

where θ and ϕ are of the quadrilateral. Letting $d \rightarrow 0$ we obtain Heron's formula for the area of a triangle.

References

- [1] C.A. Bretschneider, *Untersuchung der trigonometrischen Relationen des geradlinigen Viereckes*. Archiv der Math. 2, (1842), 225-261.
- [2] F. Strehlke, *Zwei neue Sätze vom ebenen und shpärischen Viereck und Umkehrung des Ptolemaischen Lehrsatzes*. Archiv der Math. 2, (1842) 323-326.