Cyclic Quadrilaterals
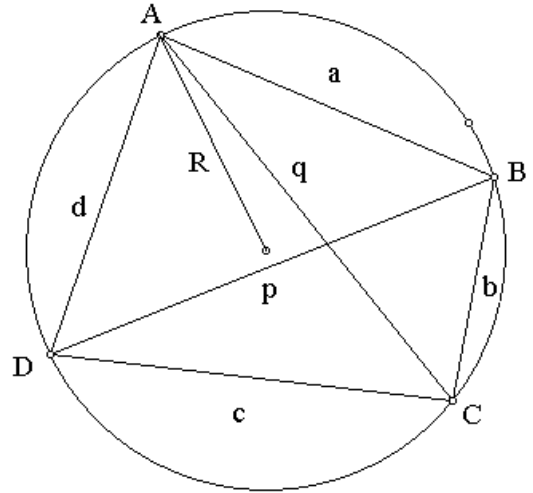
A quadrilateral is cyclic if the quadrilateral can be inscribed in a circle.

$$A + C = B + D = 180°$$

If the quadrilateral has sides a, b, c, d, the semiperimeter $s = \dfrac{a+b+c+d}{2}$. Let R be the radius of the circumscribed circle and let the diagonals be p and q.

Brahmagupta's formula: $K = \sqrt{(s-a)(s-b)(s-c)(s-d)}$

Radius of circumscribed circle: $R = \dfrac{\sqrt{(ac+bd)(ad+bc)(ab+cd)}}{4K}$

Ptolemy's Theorem: A convex quadrilateral with consecutive sides a, b, c, d and diagonals p, q is cyclic if and only if

$$ac + bd = pq.$$