615. $ABCD$ is a quadrilateral inscribed in a circle; the opposite sides AB and DC are produced to meet at F; and the opposite sides BC and AD at E: shew that the circle described on EF as diameter cuts the circle $ABCD$ at right angles.

616. From the vertex of a right-angled triangle a perpendicular is drawn on the hypotenuse, and from the foot of this perpendicular another is drawn on each side of the triangle: shew that the area of the triangle of which these two latter perpendiculars are two of the sides cannot be greater than one-fourth of the area of the original triangle.

617. If the extremities of two intersecting straight lines be joined so as to form two vertically opposite triangles, the figure made by connecting the points of bisection of the given straight lines, will be a parallelogram equal in area to half the difference of the triangles.

618. AB, AC are two tangents to a circle, touching it at B and C; R is any point in the straight line which joins the middle points of AB and AC; shew that AR is equal to the tangent drawn from R to the circle.

619. AB, AC are two tangents to a circle; PQ is a chord of the circle which, produced if necessary, meets the straight line joining the middle points of AB, AC at R; shew that the angles RAP, AQR are equal to one another.

620. Shew that the four circles each of which passes through the middle points of the sides of one of the four triangles formed by two adjacent sides and a diagonal of any quadrilateral all intersect at a point.

621. Perpendiculars are drawn from any point on the three straight lines which bisect the angles of an equilateral triangle: shew that one of them is equal to the sum of the other two.

622. Two circles intersect at A and B, and CBD is drawn through B perpendicular to AB to meet the circles; through A a straight line is drawn bisecting either the interior or exterior angle between AC and AD, and meeting the circumferences at E and F: shew that the tangents to the circumferences at E and F will intersect in AB produced.

623. Divide a triangle by two straight lines into three