

VI. 1 to D.

579. AB is a diameter, and P any point in the circumference of a circle; AP and BP are joined and produced if necessary; from any point C in AB a straight line is drawn at right angles to AB meeting AP at D and BP at E , and the circumference of the circle at F : shew that CD is a third proportional to CE and CF .

580. A, B, C are three points in a straight line, and D a point at which AB and BC subtend equal angles: shew that the locus of D is the circumference of a circle.

581. If a straight line be drawn from one corner of a square cutting off one-fourth from the diagonal it will cut off one-third from a side. Also if straight lines be drawn similarly from the other corners so as to form a square, this square will be two-fifths of the original square.

582. The sides AB, AC of a given triangle ABC are produced to any points D, E , so that DE is parallel to BC . The straight line DE is divided at F so that DF is to FE as BD is to CE : shew that the locus of F is a straight line.

583. A, B, C are three points in order in a straight line: find a point P in the straight line so that PB may be a mean proportional between PA and PC .

584. A, B are two fixed points on the circumference of a given circle, and P is a moveable point on the circumference; on PB is taken a point D such that PD is to PA in a constant ratio, and on PA is taken a point E such that PE is to PB in the same ratio: shew that DE always touches a fixed circle.

585. ABC is an isosceles triangle, the angle at A being four times either of the others: shew that if BC be bisected at D and E , the triangle ADE is equilateral.

586. Perpendiculars are let fall from two opposite angles of a rectangle on a diagonal: shew that they will divide the diagonal into equal parts, if the square on one side of the rectangle be double that on the other.

587. A straight line AB is divided into any two parts at C , and on the whole straight line and on the two parts of it equilateral triangles ADB, ACE, BCF are described, the two latter being on the same side of the straight