Study Note—Euclid's *Elements*, Book I, Proposition 11

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Proposition 11 of Book I of Euclid's *Elements of Geometry* establishes the feasibility of drawing, at right angles to a given straight line at a given point, a straight line at right angles to the given straight line.

The construction is straightforward.

Let the given straight line be the line AB, and let the given point on that line be the point C. One takes points D and E on the straight line that are equidistant from the point C, constructs an equilateral triangle DEFon the straight line segment DE (applying the construction set out in the discussion of Proposition 1), and joins the apex F of this equilateral triangle to the given point C. The straight line segment CF will then be at right angles to the given line AB.



In order to justify the construction, one notes that the sides DC, CF and DF of the triangle DCF are respectively equal to the sides EC, CF and EF of the triangle ECF. The SSS Congruence Rule (Proposition I.8) then ensures that the angles DCF and ECF are equal to one another. It then follows that CF is at right angles to AB, as required.