## Study Note—Euclid's *Elements*, Book I, Proposition 31

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In the configuration considered in this proposition we are given a point A and a straight line BC in a given plane. It may be presumed that that the point A does not lie on the infinite straight line that passes through the points B and C. The proposition presents a construction for finding a straight line through the point A parallel to the line BC.



To carry through the construction, one first takes a point D on the line BC, joins D to A by a straight line, and then determines a straight line EF through the point A so as to ensure that the alternate angles DAE and ADC are equal to one another. Note that such a straight line can be found by applying the construction described in the proof of Proposition 23 of Book I of the *Elements*. Proposition 27 of Book I of the *Elements* then ensures that the straight lines BC and EF are parallel to one another.

Note that Proposition 29 of Book I of the *Elements* ensures that the infinite straight line that passes through the points E and F is the unique infinite straight line in the given plane that is parallel to the line BC and passes through the point A.