

[Sir Thomas L. Heath, *The Thirteen Books of Euclid's Elements* (2nd edition), pp. 199–200 (1925).]

[Heath's commentary on Euclid, *Elements*, Book I, Postulate 2.]

POSTULATE 2.

Καὶ παντὶ κέντρῳ καὶ διαστήματι κύκλον γράψεσθαι.

To describe a circle with any centre and distance.

In this case Euclid's text has the passive of the verb: "a circle can be drawn", Proclus however has the active (γράφει) as Euclid has in the first two Postulates.

Distance, διαστήματι. this word, meaning "distance" quite generally (cf. Arist. *Metaph.* 1055 a 9 "it is between extremities that distance is greatest," *ibid.* 1056 a 36 "things which have something between them, that is, a certain distance"), and also "distance" in the sense of "dimension" (as in "space has three dimensions, length, breadth and depth," Arist. *Physics* IV. 1, 209 a 4), was the regular word used for describing a circle with a certain *radius*, the idea being that each point of the circumference was at that *distance* from the centre (cf. Arist *Meteorologica* III. 5, 376 b 8: "if a circle be drawn... with distance *MP*"). The Greeks had no word corresponding to *radius*: if they had to express it, they said "(straight lines) drawn from the centre" (αἱ ἐκ τοῦ κέντρου, Eucl. III. Def. 1 and Prop. 26; *Meteorologica* II. 5, 362 b 1 has the full phrase αἱ ἐκ τοῦ κέντρου ἀγόμεναι γραμμαί).

Mr Frankland observes that it would be remarkable if, unlike Postulates 1 and 2, this Postulate implied *merely* what it says, that a circle can be drawn with any centre and distance. We may regard it, if we please, as helping to the complete delineation of the Space which Euclid's geometry is to investigate formally. The Postulate has the effect of removing any restriction upon the size of the circle. It may (1) be indefinitely small, and this implies that space is *continuous*, not discrete, with an irreducible minimum distance between contiguous points in it. (2) The circle may be indefinitely large, which implies the fundamental hypothesis of *infinitude* of space. This last assumed characteristic of space is essential to the proof of I. 16, a theorem not universally valid in a space which is unbounded in extent but finite in size. It would however be unsafe to suppose that Euclid foresaw the use to which his Postulate might thus be put, or formulated it with such an intention.