

cances DG , DH may be taken as the radius of the second circle; and give the proof in each case.

36. Explain how the propositions Euc. i. 2, 3, are rendered necessary by the restriction imposed by the third postulate. Is it necessary for the proof, that the triangle described in Euc. i. 2, should be equilateral? Could we, at this stage of the subject, describe an isosceles triangle on a given base?

37. State how Euc. i. 2, may be extended to the following problem: "From a given point to draw a straight line in a given direction equal to a given straight line."

38. How would you cut off from a straight line unlimited in both directions, a length equal to a given straight line?

39. In the proof of Euclid i. 4, how much depends upon Definition, how much upon Axiom?

40. Draw the figure for the third case of Euc. i. 7, and state why it needs no demonstration.

41. In the construction Euclid i. 9, is it indifferent in all cases on which side of the joining line the equilateral triangle is described?

42. Shew how a given straight line may be bisected by Euc. i. 1.

43. In what cases do the lines which bisect the interior angles of plane triangles, also bisect one, or more than one of the corresponding opposite sides of the triangles?

44. "Two straight lines cannot have a common segment." Has this corollary been tacitly assumed in any preceding proposition?

45. In Euc. i. 12, must the given line necessarily be "of unlimited length"?

46. Shew that (fig. Euc. i. 11) every point without the perpendicular drawn from the middle point of every straight line DE , is at unequal distances from the extremities D , E of that line.

47. From what proposition may it be inferred that a straight line is the shortest distance between two points?

48. Enunciate the propositions you employ in the proof of Euc. i. 16.

49. Is it essential to the truth of Euc. i. 21, that the two straight lines be drawn from the extremities of the base?

50. In the diagram, Euc. i. 21, by how much does the greater angle BDC exceed the less BAC ?

51. To form a triangle with three straight lines, any two of them must be greater than the third: is a similar limitation necessary with respect to the three angles?

52. Is it possible to form a triangle with three lines whose lengths are 1, 2, 3 units: or one with three lines whose lengths are 1, $\sqrt{2}$, $\sqrt{3}$?

53. Is it possible to construct a triangle whose angles shall be as the numbers 1, 2, 3? Prove or disprove your answer.

54. What is the reason of the limitation in the construction of Euc. i. 24. viz. "that DE is that side which is not greater than the other?"

55. Quote the first proposition in which the equality of two areas which cannot be superposed on each other is considered.

56. Is the following proposition universally true? "If two plane triangles have three elements of the one respectively equal to three elements of the other, the triangles are equal in every respect." Enumerate all the cases in which this equality is proved in the First Book.

What case is omitted?

57. What parts of a triangle must be given in order that the triangle may be described?