

12. What distinctions may be made between definitions in the Science of Geometry and in the Physical Sciences?
13. What is necessary to constitute an exact definition? Are definitions propositions? Are they arbitrary? Are they convertible? Does a Mathematical definition admit of proof on the principles of the Science to which it relates?
14. Enumerate the principles of construction assumed by Euclid.
15. Of what instruments may the use be considered to meet approximately the demands of Euclid's postulates? Why only *approximately*?
16. "A circle may be described from any center, with any straight line as radius." How does this postulate differ from Euclid's, and which of his problems is assumed in it?
17. What principles in the Physical Sciences correspond to axioms in Geometry?
18. Enumerate Euclid's twelve axioms and point out those which have special reference to Geometry. State the converse of those which admit of being so expressed.
19. What two tests of equality are assumed by Euclid? Is the assumption of the principle of superposition (ax. 8.), essential to all Geometrical reasoning? Is it correct to say, that it is "an appeal, though of the most familiar sort, to external observation"?
20. Could any, and if any, which of the axioms of Euclid be turned into definitions; and with what advantages or disadvantages?
21. Define the terms, Problem, Postulate, Axiom and Theorem. Are any of Euclid's axioms improperly so called?
22. Of what two parts does the enunciation of a Problem, and of a Theorem consist? Distinguish them in Euc. 1. 4, 5, 18, 19.
23. When is a problem said to be indeterminate? Give an example.
24. When is one proposition said to be the converse or reciprocal of another? Give examples. Are converse propositions universally true? If not, under what circumstances are they necessarily true? Why is it necessary to demonstrate converse propositions? How are they proved?
25. Explain the meaning of the word *proposition*. Distinguish between *converse* and *contrary* propositions, and give examples.
26. State the grounds as to whether Geometrical reasonings depend for their conclusiveness upon axioms or definitions.
27. Explain the meaning of *enthymeme* and *syllogism*. How is the enthymeme made to assume the form of the syllogism? Give examples.
28. What constitutes a demonstration? State the laws of demonstration.
29. What are the principal parts, in the entire process of establishing a proposition?
30. Distinguish between a *direct* and *indirect* demonstration.
31. What is meant by the term *synthesis*, and what, by the term *analysis*? Which of these modes of reasoning does Euclid adopt in his Elements of Geometry?
32. In what sense is it true that the conclusions of Geometry are necessary truths?
33. Enunciate those Geometrical definitions which are used in the proof of the propositions of the First Book.
34. If in Euclid 1. 1, an equal triangle be described on the other side of the given line, what figure will the two triangles form?
35. In the diagram, Euclid 1. 2, if DB a side of the equilateral triangle DAB be produced both ways and cut the circle whose center is B and radius BC in two points G and H ; shew that either of the dis-

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