The University of the State of New York

225TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Wednesday, June 15, 1921-9.15 a.m. to 12.15 p.m., only

Write at top of first page of answer paper (a) name of school where you have studied, (b) number of weeks and recitations a week in plane geometry. The minimum time requirement is five recitations a week for a school year.

Name the author of the textbook you have used in plane geometry.

Answer eight questions, including at least one from group II.

Group I

- 1 Prove that an angle formed by a tangent and a chord through the point of contact is measured by one half the intercepted arc.
- 2 Prove that if a series of parallel lines cut off equal segments on one transversal, they will cut off equal segments on any other transversal.
- 3 Prove that the area of any parallelogram equals the product of its base and its altitude.
- 4 Prove that regular polygons of the same number of sides are similar.

Group II

Answer at least one question from this group.

Leave all construction lines on the paper.

5 In the acute-angled triangle ABC

- a Construct the altitude from vertex A.
- b Construct the median from vertex B.
- c Construct the bisector of angle C.
- 6 Construct a scalene triangle, given two sides and the altitude to one of these sides. Explain your construction.
- 7 Construct a circle with a given radius, passing through a given point and touching a given line. Explain your construction.

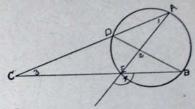
Group III

Irrational results may be left in the form of π and radicals unless otherwise stated.

8 The area of a regular hexagon is $96\sqrt{3}$; find the circumference and the area of its inscribed circle.

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9 Given: arc $AB=100^{\circ}$, arc $DE=50^{\circ}$ Find: number of degrees in $\angle 1$, $\angle 2$, $\angle 3$, $\angle 4$



10 Prove that the median to the hypotenuse of a right triangle is equal to one half the hypotenuse.

11 In a circle whose center is O, AOB is a diameter, CD a chord perpendicular to AB and crossing it at point N, and AE a chord crossing CN at F. Prove that $AB \times AN = AE \times AF$.

12 The base of a triangle is 32 inches and the corresponding altitude is 20 inches. A line is drawn parallel to the base and 15 inches from it. Find the area of the trapezoid formed.