# The University of the State of New York 232D HIGH SCHOOL EXAMINATION

## PLANE GEOMETRY

Wednesday, January 21, 1925 - 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 not more than three from group I and at least one from group II.

#### Group I

Do not answer more than three questions from this group.

- 1 Prove that if two right triangles have the hypotenuse and a leg of one respectively equal to the hypotenuse and a leg of the other the triangles are congruent.  $[12\frac{1}{2}]$
- 2 Prove that an angle formed by two secants intersecting without a circle is measured by one half the difference of the intercepted arcs. [12]
- 3 Prove that the bisector of an angle of a triangle divides the opposite side into segments proportional to the adjacent sides.  $[12\frac{1}{2}]$
- 4 Prove that the areas of two similar triangles are to each other as the squares of any two corresponding sides.  $[12\frac{1}{2}]$

### Group II

Answer at least one question from this group.

Problems in this group should be constructed accurately with ruler and compasses. Leave all construction lines on the paper.

- 5 Given angle m, line AB and point P not in AB. Construct a line through P making with AB an angle equal to angle m. [12½]
  - 6 a Find a point that shall be the same distance from sides AB, BC and CD of a given parallelogram ABCD. [8½]

b Prove that there will always be such a point. [4]

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#### Group III

Irrational results may be left in the form of  $\pi$  and radicals unless otherwise stated.

- 7 If D is any point in the base AB of isosceles triangle ABC, prove that DC is less than either AC or BC. [12]
- 8 AB is a diameter of a circle and AC and BD two equal chords drawn on opposite sides of AB. Prove that AC is parallel to BD. [12]
- 9 ABC is a triangle inscribed in a circle and at vertex C a tangent is drawn. A line parallel to this tangent cuts AC at D and BC at E. Prove that triangle DEC is similar to triangle ABC. [12 $\frac{1}{2}$ ]
- 10 Prove that in any triangle the median to one side bisects all lines parallel to that side and terminated by the other two sides.  $[12\frac{1}{2}]$
- 11 The area of a regular hexagon is 54 square inches. Find the area of the circumscribed circle.  $[12\frac{1}{2}]$
- 12 In the parallelogram ABCD the altitude on base AB is 16, angle A is 45° and diagonal DB is 34. Find the area of the parallelogram.  $\begin{bmatrix}12\frac{1}{2}\end{bmatrix}$