*The University of the State of New York*

222D HIGH SCHOOL EXAMINATION

# PLANE GEOMETRY

Thursday, January 22, 1920—1.15 to 4.15 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 four from group I and four from group II.*

## Group I

Answer four questions from this group.

1 Prove that if in a circle two chords are equally distant from the center, they are equal. [12½]

2 State *three* theorems concerning the similarity of triangles. Prove *one* of these theorems. [12½]

3 The sum of the interior angles of a polygon of $n$ sides is . . . Complete and prove. [12½]

4 The area of a regular polygon is equal to . . . Complete and prove. [12½]

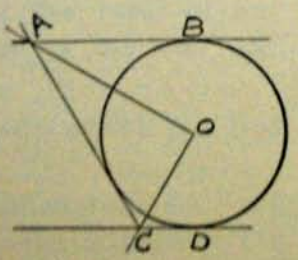
5 Prove that two triangles are equal (congruent) if the three sides of the one are equal respectively to the three sides of the other. [12½]

## Group II

Answer four questions from this group.

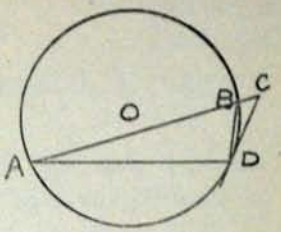
6 Find the number of square inches of tin that would be wasted in cutting the largest possible circular disc of tin from a piece in the form of an equilateral triangle 12 inches on a side. [12½]

7 In the figure, $AB$ and $CD$ are parallel tangents meeting a third tangent at $A$ and $C$. $O$ is the center of the circle. Prove that $AOC$ is a right angle. [12½]






8 In the figure, $CD$ is tangent to the circle, angle $C$=42°, arc $BD$=32°. Find in degrees the value of *each* of the angles of the triangle $ABD$. [12½]




9 The diagonals of an equilateral parallelogram (rhombus) are 24 inches and 70 inches. Find (*a*) the area, (*b*) the perimeter, (*c*) the altitude. [12½]

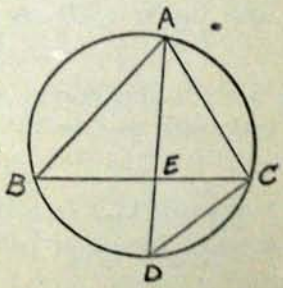
10 Given $a$, $b$ and $c$, lines of unequal length. Construct a fourth line $x$ such that $x=\frac{ac}{b}$. Give proof. [12½]

11 *a* Construct a quadrilateral three of whose angles are 150°, 90° and 60°. [10½]

*b* How many degrees are there in the remaining angle? Why? [2]

12 Given a circle circumscribed about triangle $ABC$. $D$ is the mid point of arc $BC$. $AD$ and $DC$ are drawn.

To prove $AB\times AC=\overline{AE}^2+BE\times EC$




Assign a reason for *each* of the following statements:

1 $\angle BAD$ is measured by ½ arc $BD$
$\angle CAD$ is measured by ½ arc $CD$ [1]

2 $\angle BAD=\angle CAD$ [½]

3 $\angle B=\angle D$ [2]

4 $\triangle BAE$ is similar to $\triangle DAC$ [2]

5 $\frac{AB}{AE+ED}=\frac{AE}{AC}$ [2]

6 $AB\times AC=\overline{AE}^2+AE\times ED$ [1]

7 $AE\times ED=BE\times EC$ [2]

8 $AB\times AC=\overline{AE}^2+BE\times EC$ [2]