The University of the State of New York

266TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Tuesday, June 16, 1936 — 9.15 a. m. to 12.15 p. m., only

Instructions

Do not open this sheet until the signal is given.

Group I

This group is to be done first and the maximum time allowed for it is one and one half hours.

If you finish group I before the signal to stop is given you may begin group II. However, it is advisable to look your work over carefully before proceeding, since *no credit will be given any answer in group I which is not correct and in its simplest form.*

When the signal to stop is given at the close of the one and one half hour period, work on group I must cease and this sheet of the question paper must be detached. The sheets will then be collected and you should continue with the remainder of the examination.

Groups II and III

Write at top of first page of answer paper to groups II and III (*a*) name of school where you have studied, (*b*) number of weeks and recitations a week in plane geometry, (*c*) author of textbook used.

The minimum time requirement is five recitations a week for a school year.

19

Plane Geometry

Fill in the following lines:

Name of school.....Name of pupil.....

Detach this sheet and hand it in at the close of the one and one half hour period.

Group I

Answer all questions in this group. Each correct answer will receive 2½ credits. No partial credit will be allowed. Each answer must be reduced to its simplest form.

1 The area of a square is 16 square inches. Find the area of the inscribed circle. [Answer may be left in terms of π.] *Ans*.....

2 The area of an equilateral triangle is $25\sqrt{3}$. Find a side of the triangle. *Ans*.....

3 How many degrees are there in each interior angle of a regular octagon (eight-sided polygon)? *Ans*.....

4 Two angles of a triangle are 40° and 60°; how many degrees are there in the obtuse angle formed by the bisectors of these two angles? *Ans*.....

5 In triangle ABC, angle $C = 90°$, $AB = 25$, angle $A = 55°$. Find AC correct to the *nearest tenth*. *Ans*.....

6 In a circle whose radius is 5″, a chord is drawn perpendicular to a diameter and 3″ from the center. What is the length of the chord in inches? *Ans*.....

7 Triangle ABC is inscribed in a circle. Angle $A = 80°$, angle $B = 70°$, angle $C = 30°$. Which side of triangle ABC is nearest the center of the circle? *Ans*.....

8 Given triangle ABC with D a point on AB and E a point on BC such that DE is parallel to AC; if $BD = 8$, $DA = 6$ and $EC = 9$, find BE. *Ans*.....

9 Two sides of a triangle are 10 and 14 and the angle included between these sides is 30°; what is the altitude on side 14? *Ans*.....

10 If the vertices of an inscribed triangle divide the circle into three arcs in the ratio 3: 4: 5, how many degrees are there in the largest angle of the triangle? *Ans*.....

11 In parallelogram $ABCD$, angle B is twice angle A. How many degrees are there in angle A? *Ans*.....

12 The circumference of a circle is 8π. Find the radius of the circle. *Ans*.....

13 Two angles that are both equal and supplementary must be (*a*) adjacent, (*b*) acute or (*c*) right. Which is correct, (*a*), (*b*) or (*c*)? *Ans*.....

14 If a point is equidistant from the sides of a triangle, it must be the intersection of the three (*a*) altitudes, (*b*) medians or (*c*) angle bisectors. Which is correct, (*a*), (*b*) or (*c*)? *Ans*.....

15 If each side of a triangle is multiplied by 2, then its area is multiplied by (*a*) 2, (*b*) 4 or (*c*) 6. Which is correct, (*a*), (*b*) or (*c*)? *Ans*.....

[OVER]

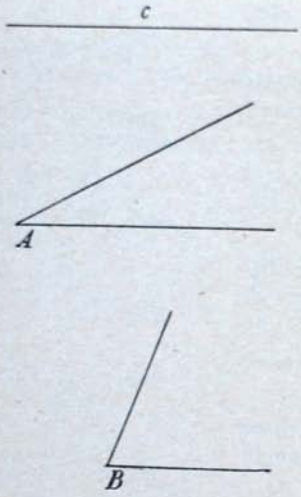
16 AB is one of the bases of trapezoid $ABCD$, and AC and BD are the diagonals; then triangles BCD and ACD are (*a*) similar, (*b*) congruent or (*c*) equal in area. Which is correct, (*a*), (*b*) or (*c*)? Ans.....

17 The vertices of the right angles of all right triangles having a common hypotenuse lie on (*a*) a line parallel to the hypotenuse, (*b*) a circle whose diameter is the hypotenuse or (*c*) a semicircle whose diameter is the hypotenuse. Which is correct, (*a*), (*b*) or (*c*)? Ans.....

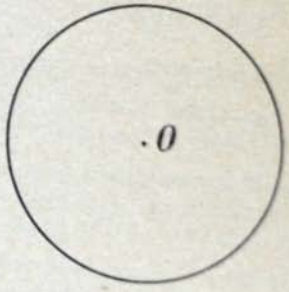
Directions (questions 18–20) — Leave all construction lines on the paper.

18 Construct the locus of points equidistant from the two intersecting lines at the right.

19 Construct triangle ABC, having given angle A, angle B and the included side c.



20 Inscribe an equilateral triangle in circle O.



202

See instructions for groups II and III on page 1.

Group II

Answer three questions from this group.

21 Prove that an angle formed by two chords intersecting within a circle is measured by one half the sum of the intercepted arcs. [10]

22 Prove that two right triangles are congruent if the hypotenuse and a leg of one are equal to the hypotenuse and a leg of the other. [10]

23 Angle ABC is inscribed in a circle. Chord BD bisects angle ABC and chord DE is drawn parallel to AB. Prove that chord DE equals chord BC. [10]

24 Two tangents from the external point A touch circle O at points B and C respectively. Lines OA, OC and BC are drawn. BK is a line from B perpendicular to line CO extended to K. Prove: (*a*) OA is perpendicular to BC [5], (*b*) triangle ACO is similar to triangle BKC [5].

25 At the ends of a diameter of a circle, tangents to the circle are drawn. At any point on the circle a third tangent is drawn terminating in the other two tangents. Prove that the area of the trapezoid thus formed is equal to one half the product of the diameter and this third tangent. [10]

Group III

Answer two questions from this group.

26 In a right triangle whose shortest side is 30, the altitude upon the hypotenuse is 24. Find the segments of the hypotenuse made by the altitude. [10]

27 The perimeter of a regular pentagon is 50 inches. Find its area correct to the *nearest square inch*. [Use numerical trigonometry.] [10]

28 Construct one side of the square whose area will be equal to the area of a given triangle ABC. [Leave all construction lines on the paper.] [10]