The University of the State of New York

285TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Friday, August 21, 1942 — 8.30 to 11.30 a. m., only

Instructions

Do not open this sheet until the signal is given.

Part I

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

If you finish part I before the signal to stop is given you may begin part II. However, it is advisable to look your work over carefully before proceeding, since *no credit will be given any answer in part 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 part 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.

Parts II, III and IV

Write at top of first page of answer paper to parts II, III and IV (*a*) names of schools where you have studied, (*b*) number of weeks and recitations a week in plane geometry previous to entering summer high school, (*c*) number of recitations in this subject attended in summer high school of 1942, (*d*) author of textbook used.

The minimum time requirement is five recitations a week for a school year. The summer school session will be considered the equivalent of one semester's work during the regular session or five recitations a week for half a school year.

For those pils who have met the time requirement the minimum passing mark is 65 credits; for all others 75 credits.

For admission to this examination attendance on at least 30 recitations in this subject in a registered summer high school in 1942 is required.

See instructions for parts II, III and IV on page 1.

Part II

Answer two questions from this part.

26 Prove that tangents drawn to a circle from an external point are equal. [10]

27 AB is a diameter of circle O, AC is any chord and radius OC is drawn. Prove that the bisector of angle BOC is parallel to AC. [10]

28 Prove that the area of a trapezoid is equal to one half the product of its altitude and the sum of its bases. [10]

Part III

Answer two questions from this part.

29 ABC is a right triangle with CD the altitude on the hypotenuse AB. If $AC = 20$ and $CD = 12$, find AD, AB and BC. [10]

30 The sides of a parallelogram are 6.4″ and 8.5″ and the included angle is 40°.

a Find, correct to the *nearest tenth of an inch,* the length of the altitude upon the longer side of the parallelogram. [6]

b Find, correct to the *nearest square inch,* the area of the parallelogram. [4]

31 A circular swimming pool has a circumference of 132 feet. A cement walk 3 feet wide is to be laid around the pool, the inner edge of the walk coinciding with the edge of the pool.

a Find the radius of the inner edge of the walk. [Use $\pi = \frac{22}{7}$] [4]

b Find the area of the walk correct to the *nearest square foot.* [6]

Part IV

Answer one question from this part.

32 The arcs intercepted by the sides of an inscribed pentagon $ABCDE$ are, in order, starting with AB, in the ratios $5:3:1:2:4$.

a Find the number of degrees in angle B. [4]

b Find the number of degrees in the angle between AB and DC extended to meet. [2]

c Which sides, if any, of the pentagon are parallel? [2]

d Which diagonal, if any, is a diameter? [2]

33 Given triangle ABC whose sides are a, b and c no two of which are equal. In a similar triangle twice as large, side x, corresponding to a, is to be determined.

a Express x in terms of a. [4]

b Find x by construction. [6]

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.

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Each answer must be reduced to its simplest form.

1 One acute angle of a right triangle is double the other and the hypotenuse is 10. Find the shorter leg. 1.....

2 In circle O diameter AB is perpendicular to chord FH at C. If FC is 4 inches long, how many inches are there in the length of HC? 2.....

3 In triangle ABC, if angle $A = 60°$ and angle B is less than angle C, which side of the triangle is the longest? 3.....

4 The diagonals of a rhombus are 14 and 48. Find the area of the rhombus. 4.....

5 A line segment 4 inches long joins the mid-points of two sides of a triangle. How many inches are there in the length of the third side of the triangle? 5.....

6 Chords AB and CD of a circle intersect at point E within the circle. If arc $AC = 110°$ and arc $BD = 50°$, how many degrees are there in angle AEC? 6.....

7 If the acute angle of a parallelogram is 68°, how many degrees are there in the obtuse angle of the parallelogram? 7.....

8 In triangle ABC, angle $C = 90°$, $AB = 40$ and $BC = 25$. Find angle A correct to the *nearest degree*. 8.....

9 The segments of one of two intersecting chords of a circle are 4″ and 6″. If one segment of the other chord is 8″, find the number of inches in the length of the other segment. 9.....

10 The altitudes of an equilateral triangle ABC intersect in point O. If O is 4 inches from side AB, how many inches is O from vertex A? 10.....

11 The areas of two similar triangles are in the ratio of 4:9. One side of the smaller triangle is 4; find the corresponding side of the other triangle. 11.....

12 Chords AB, BC and CA are equidistant from the center of a circle. Find the number of degrees in angle ABC. 12.....

13 The area of a regular polygon is 420 and its perimeter is 70; find the apothem of the polygon. 13.....

14 The side of an equilateral triangle is 2; find the area. [Answer may be left in radical form.] 14.....

15 What is the locus of the mid-points of all chords of a given length in a given circle? 15.....

Directions (questions 16–22) — Indicate whether each of the following statements is *always* true, *sometimes* true, or *never* true, by writing the word *always, sometimes,* or *never* on the dotted line at the right.

16 If two isosceles triangles have a leg and the vertex angle of one equal to the corresponding parts of the other, the triangles are congruent. 16.....

17 If the three sides of a triangle are unequal, the altitude upon any side is equal to the median to that side. 17.....

[OVER]

18 A circle can be constructed which will pass through three given points. 18.....

19 Each interior angle of a regular polygon of n sides equals $\frac{n-2}{n}$ straight angles. 19.....

20 If two triangles have the three angles of one equal to the three angles of the other, the triangles are congruent. 20.....

21 At least one of the exterior angles of a right triangle is an acute angle. 21.....

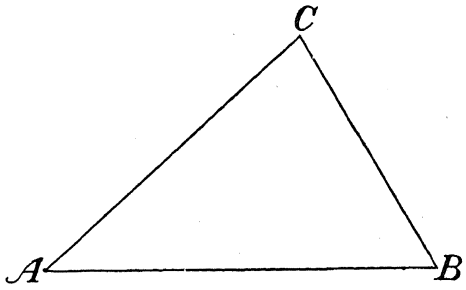
22 If the diagonals of a quadrilateral bisect each other, the quadrilateral is a rhombus. 22.....

23 Is the converse of the following statement true?

If a quadrilateral is a parallelogram, then the sum of the exterior angles made by producing each side of the quadrilateral in succession is equal to two straight angles. 23.....

Directions (questions 24–25) — Leave all construction lines on the paper.

24 Find by construction the center of a circle that can be inscribed in triangle ABC.



25 Divide line segment AB into three equal parts.