The University of the State of New York

292D HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Wednesday, August 23, 1944 — 8.30 to 11.30 a. m., only

Instructions

Part I is to be done first and the maximum time allowed for it is one and one half hours. At the end of that time, this part of the examination must be detached and will be collected by the teacher. If you finish part I before the signal to stop is given, you may begin part II.

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 1944 or number and length in minutes of lessons taken in the summer of 1944 under a tutor licensed in the subject and supervised by the principal of the school you last attended, (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 pupils 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 1944 or an equivalent program of tutoring approved in advance by the Department is required.

Part II
Answer two questions from part II.

26 Prove that the diagonals of a parallelogram bisect each other. [10]

27 In triangle ABC, all of whose angles are acute, altitudes BD and CE intersect at F. Prove that triangles BEF and AEC are similar. [10]

28 Prove that the area of a parallelogram is equal to the product of its base and its altitude. [10]

Part III
Answer two questions from part III.

29 Two secants PDA and PCB are drawn from external point P to a circle. Chords AC and BD intersect in F. If arc $AB = 128°$ and arc $CD = 32°$, find angle P, angle ADB and angle BFC. [10]

30 In right triangle ABC, hypotenuse $AB = 100$ and angle $A = 18°$.
    a Using numerical trigonometry, find AC and BC correct to the *nearest integer*. [8]
    b Show that the results obtained in answer to a are approximately correct by using the relationship $(AB)^2 = (AC)^2 + (BC)^2$ [2]

[1] [OVER]

31 The altitude of a triangle is 15 inches and its base is 30 inches. Find the number of square inches in the area of the trapezoid cut off by a line parallel to the base and 9 inches from the opposite vertex. [10]

Part IV
Answer one question from part IV.

32 For *each* of the following statements, indicate whether you have been given too little information, just enough information or more information than is needed, to justify the conclusion.

    a If the shadow of a yardstick is 4 feet long at the same time and place that the shadow of a flagpole is 36 feet long, then the height of the flagpole can be found. [Assume that the yardstick and pole are on level ground.] [2]

    b If the bases of a trapezoid are 6 and 10 and one of the lower base angles is 45°, then the area of the trapezoid can be found. [2]

    c A ship sailing from London to New York was in distress and the radio operator sent out its location as Lat. 45°, Long. 30°. The position of the ship was determined. [2]

    d X, Y and Z are three countries. If X and Y are allies and X is at war with Z, then Y is also at war with Z. [2]

    e If the apothem and radius of a regular pentagon are known, then the area of the pentagon can be found. [2]

33 Chord AB of a circle intercepts arcs represented by $3x - 40°$ and $2x + 60°$. Two lines are drawn through A; each line makes an angle of 82° with AB. Is one of these lines tangent to the circle? [*All* work must be shown.] [10]

PLANE GEOMETRY

Fill in the following lines:

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

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 Two parallel lines, *AB* and *CD,* are cut at *E* and *F* respectively by transversal *GH*; angle *AEG* = 130°. Find the number of degrees in angle *CFH*.   1................

2 In triangle *ABC,* angle *A* = 74° and angle *B* = 58°. Which is the longest side of the triangle?   2................

3 A diameter of a circle is parallel to a chord that subtends an arc of 100°. How many degrees are there in one of the arcs intercepted between the diameter and the chord?   3................

4 Find the altitude of an equilateral triangle whose side is 8. [Answer may be left in radical form.]   4................

5 From point *P* outside circle *O* tangent *PD* and secant *PCA* are drawn. If tangent *PD* = 8 and *PC* = 4, find secant *PCA*.   5................

6 In right triangle *ABC,* the right angle is at *C* and *CD* is the altitude upon *AB*. If *AD* = 3 and *DB* = 9, find *AC*.   6................

7 The angle of a sector of a circle is 120° and the area of the sector is 27π. Find the radius of the circle.   7................

8 Find the area of an equilateral triangle whose perimeter is 18. [Answer may be left in radical form.]   8................

9 In a right triangle, one acute angle is double the other acute angle. If the shorter leg of the triangle is 3, find the hypotenuse.   9................

10 In any circle, what is the ratio of the circumference to the diameter?   10................

11 Chords *AB* and *CD* intersect within a circle at point *E*. *AE* = 4, *CE* = 3 and *ED* = 8. Find *EB*.   11................

12 Is the apothem of any regular polygon the radius of the circumscribed circle? [Answer *yes* or *no*.]   12................

13 Find the area of a right triangle whose legs are 18 and 30.   13................

14 Two triangles are similar and the area of one is four times the area of the other. One side of the smaller triangle is 12. Find the corresponding side of the larger triangle.   14................

15 Find the sum of the interior angles of a polygon of 7 sides.   15................

Directions (questions 16–23) — If the blank space in each statement is filled by one of the words *always, sometimes* or *never,* the resulting statement will be true. Select the word that will correctly complete *each* statement and write the word on the line at the right.

16 If angle *A* and angle *B* are supplementary and if angle *A* is greater than angle *B*, then angle *A* is ... obtuse.   16................

17 An equilateral polygon inscribed in a circle is ... regular.   17................

18 A rhombus whose side is 8 inches could ... have a diagonal 16 inches long.   18................

19 The locus of points within a circle and equidistant from the ends of a chord is ... a diameter.   19................

[3]   [OVER]

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

21 If the diagonals of a quadrilateral are perpendicular to each other, the quadrilateral is ... a parallelogram.   21................

22 The bisectors of the angles of a triangle meet in a point which is ... equidistant from the three sides of the triangle.   22................

23 If two sides of a triangle are proportional to two sides of another triangle, the triangles are ... similar.   23................

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

24 Construct a circle of radius r tangent to line m at point P.

r _____   _____ m _____ P _____

25 Through point P construct a line parallel to line AB.

•P

A _____ B