The University of the State of New York

287TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Friday, April 30, 1943 — 1.15 to 4.15 p. 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*) 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.

Part II
Answer two questions from part II.

26 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]

27 A right triangle ABC with right angle at B is inscribed in a circle and a tangent to the circle is drawn at A. The bisector of angle ACB meets AB at D and the tangent at E. Prove that angle AED equals angle ADE. [10]

28 Prove that if two chords intersect within a circle the product of the segments of one is equal to the product of the segments of the other. [10]

Part III
Answer two questions from part III.

29 ABC is an isosceles triangle inscribed in a circle with B, the vertex angle, equal to 40°. Point D bisects the minor arc BC and chord AD intersects chord BC at E. Find the number of degrees in minor arc AC, minor arc AB, angle DAC and angle DEC. [10]

30 The area of an isosceles trapezoid $ABCD$ is 276 square inches. The shorter base CD is 14 inches and the altitude is 12 inches.
    a Find the length of the longer base. [3]
    b Find angle A correct to the *nearest degree*. [7]

31 The perimeters of two similar rectangles are 18 and 12. A side of the larger rectangle is 3.
    a Find the sides of the smaller rectangle. [5]
    b Find a diagonal of the larger rectangle. [Express the result correct to the *nearest tenth.*] [5]

[1]   [OVER]

Part IV
Answer one question from part IV.

32 The mid-point of side AB of triangle ABC is D and P is any point in BC. Parallelogram $ADPQ$ is drawn with AD and DP adjacent sides. Prove that diagonal DQ is parallel to BC. [10]

33 Two camps P and Q are 100 rods apart. P is located on a straight road AB and Q is located 60 rods from the road. How far from P, on the road AB, must a station S be built so that it will be the same distance from the two camps? [10]

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 How many degrees are there in the angle which is *four* times as great as its complement?

1................

2 The sum of angle A and angle B of triangle ABC is $85°$. Name the longest side of this triangle.

2................

3 The adjacent sides of a parallelogram are 8 and 20 and they form an angle of $30°$. What is the altitude of the parallelogram on the longer side?

3................

4 From point P outside a circle, a secant PCA is drawn. PC equals 4 inches and PCA equals 16 inches. Find the length of the tangent drawn to the circle from P.

4................

5 Find the altitude of an equilateral triangle whose side is 2.

5................

6 Find the area of a rhombus whose diagonals are 24 and 30.

6................

7 In triangle ABC, angle $C = 90°$, $AB = 15$ feet and $BC = 9$ feet. Find angle A correct to the *nearest degree*.

7................

8 Find the area of a regular hexagon whose side equals 6. [Answer may be left in radical form.]

8................

9 CD is the altitude to the hypotenuse AB of right triangle ABC; $AD = 9$ and $DB = 16$. Find BC.

9................

10 Find the circumference of a circle whose area is 49π. [Answer may be left in terms of π.]

10................

11 Two triangles whose areas are equal have bases 8 and 10 respectively. If the altitude of the first triangle is 5, what is the altitude of the second triangle?

11................

Directions (questions 12–18) — If the blank in each statement is replaced 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 this word on the line at the right.

12 The sum of the acute angles of an obtuse triangle is ... acute.

12................

13 If two lines are perpendicular to two intersecting lines respectively, then the first two lines are ... parallel.

13................

14 If the number of sides of a polygon is doubled, then the sum of the interior angles of the polygon is ... doubled.

14................

15 The median of a triangle is ... equal to one half the side to which it is drawn.

15................

16 A triangle can ... be constructed using a diameter and two radii of the same circle as sides.

16................

17 Two points each equidistant from the end points of a chord of a circle ... determine a diameter of that circle.

17................

18 In quadrilateral $ABCD$, angle A and angle D are ... supplementary.

18................

[3]

Directions (questions 19–23) — Indicate the correct answer to *each* question by writing on the line at the right the letter *a, b* or *c*.

19 If two chords of a circle are parallel, (*a*) they are equal, (*b*) their arcs are equal, (*c*) they intercept equal arcs on the circle   19......

20 If the angle formed by two tangents drawn to a circle from an external point contains 60°, the triangle formed by the two tangents and chord of contact is (*a*) right, (*b*) equilateral, (*c*) obtuse   20......

21 The sides of a regular inscribed polygon are (*a*) tangent to the circle, (*b*) equidistant from the center of the circle, (*c*) equal to the radius of the circle   21......

22 The locus of points equidistant from two given concentric circles consists of (*a*) one circle, (*b*) two circles, (*c*) a point   22......

23 Polygons of the same number of sides are similar if they are (*a*) mutually equilateral, (*b*) mutually equiangular, (*c*) regular   23......

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

24 Construct the mean proportional between line segments *a* and *b*.

——————— *a* ———————

——————— *b* ———————

25 Find by construction the center of the circle that can be inscribed in triangle *ABC*.