The University of the State of New York

294TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Tuesday, June 19, 1945 - 9.15 a. m. to 12.15 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 if the opposite sides of a quadrilateral are equal, the figure is a parallelogram. [10]
- 27 In acute triangle ABC, altitudes AD and BE intersect at F.
 - a Name a triangle which is similar to triangle BFD. Prove these triangles are similar. [3,4]
 - b Write a proportion involving the sides BF and FD. [3]
- 28 Prove that if one side of a triangle is greater than a second side, the angle opposite the first side is greater than the angle opposite the second side. [10]

Part III

Answer two questions from part III.

- 29 In triangle ABC, AC and BC are each 13 and AB is 10.
 - a Find the altitude upon AB. [3]
 - b Find the area of triangle ABC. [2]
 - c Find the altitude from B upon AC. [5]
- 30 A circle whose radius is 4 is inscribed in an equilateral triangle.
 - a Find the altitude of the triangle. [2]
 - b Find the side of the triangle. [3]

[Answer may be left in radical form.]

c Show that the difference between the area of the triangle and the area of the circle is approximately 33. [5]

$$[\pi = 3.14 \text{ and } \sqrt{3} = 1.73]$$

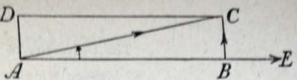


PLANE GEOMETRY

31 A plane is heading due east with an air speed of 200 miles per hour (AB = 200) and a wind is blowing from the south at the rate of 35 miles per hour (AD = BC = 35). Find:

a The wind drift angle $(\angle BAC)$ correct to the nearest degree [4]

b The ground speed (AC) correct to the nearest mile per hour [6]



Part IV Answer one question from part IV.

32 a Each of the following statements contains more information in the hypothesis than is necessary to prove the conclusion. Rewrite each statement, leaving out the unnecessary information.

(1) If a regular polygon is inscribed in a circle, the perpendicular bisectors of the sides

pass through the center of the circle. [2]

(2) If one angle of a right triangle is 30°, the median on the hypotenuse is one half the hypotenuse. [2]

(3) If a polygon inscribed in a circle is equilateral and equiangular, the polygon is regular. [2]

b Tell whether the following argument is sound or unsound. If the argument is unsound, explain why it is unsound. [1,3]

Given: Triangle ABC in which angle A is greater than angle C

Prove: Side BC is greater than side BA.

Side BC can not be equal to side BA for if it were, angle A would be equal to angle C. But this is impossible, since angle A is given greater than angle C. Therefore, BC must be greater than BA.

33 R is a camp situated 240 rods from a straight road. On this road a second camp S is located, 400 rods from R. It is desired to build a supply depot at a point P on the road, which shall be the same distance from the two camps.

a Explain how point P can be located geometrically. [4]

b Find the distance from the supply depot to each of the two camps. [6]



PLANE GEOMETRY

Fill in the following lines:

Answer all questions in this part. Each correct answer will receive 2 credits. Answer all questions in this part. Each correct answer will receive 2 credits. Anobe is a central angle of circle O and chord AB is drawn. If chord AB is equal to a radius, find angle AOB. 2 Find the number of sides of a polygon each of whose exterior angles is equal to 40°. 3 The sides of an angle formed by two secants drawn to a circle from the same point intercept arcs of 144° and 92°. Find the number of degrees in the angle. 4 In triangle ABC, angle C is a right angle and CD is the altitude upon AB. If AC is 6 and AB is 9, find AD. 5 A chord of a circle is perpendicular to a diameter and divides it into segments which are 2 inches and 18 inches in length. Find the length of the whole chord. 6 From point P outside a circle, tangent PD and secant PCA are drawn. If PA = 18 and PC = 8, find PD. 7 Find the altitude of an equilateral triangle whose side is 2. [Answer may be left in radical form.] 8 From a point P, a tangent PA is drawn to a circle whose center is O. Line PO and radius OA are drawn. If angle OPA contains 45 degrees and the radius of the circle is 5, find AP. 9 The perimeter and a side of a polygon are 30 and 6 respectively. Find the corresponding side of a similar polygon whose perimeter is 20. 10 Find the area of a trapezoid is 160 square inches. Its bases are 14 inches and 26 inches. Find the length of its altitude. 12 The area of a regular polygon is 144 and its perimeter is 48. Find its apothem. 13 The legs of a right triangle are in the ratio 3: 4. Find, correct to the neurest degree, one of the acute angles of the triangle. 14 The angle of a sector of a circle is 80° and the radius of the circle is 180° and th	Name of schoolName of pupil	*****************************
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PLANE GEOMETRY

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 in quadrilateral ABCD, AB = BC and CD = DA, then diagonals AC and BD (a) bisect each other (b) are perpendicular to each other (c) are equal 19.....

20 If two tangents are drawn to a circle at the ends of a chord which has an arc of 100°, the triangle formed is (a) acute (b) right (c) obtuse

21 The diagonals of a parallelogram divide it into four triangles whose common vertex is the intersection of the diagonals. These four triangles are always (a) congruent (b) similar (c) equal in area

22 Which of the following statements is false?

a A parallelogram is a quadrilateral.

b A rectangle is a square.

c A rectangle is a parallelogram.

22.....

20

23 If a pupil has received an honor grade in at least four major subjects, his name is placed on the honor roll. Which of the following is a converse of the above statement?

a A pupil's name is placed on the honor roll if he has received an honor grade in at least four major subjects.

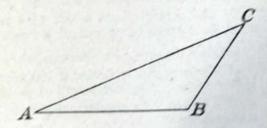
b If a pupil has not received an honor grade in at least four major subjects, his name is not placed on the honor roll.

c If a pupil's name is placed on the honor roll, he has received an honor grade in at least four major subjects.

23....

Directions (questions 24-25) — Leave all construction work on the paper.

24 Construct the altitude of triangle ABC upon side AB.



25 Inscribe a regular hexagon in circle O.

