

The University of the State of New York

260TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Wednesday, June 20, 1934—9.15 a. m. to 12.15 p. m., only

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Instructions

*Do not open this sheet until the signal is given.*

*Answer all questions in part I; in part II, answer three questions from group I and two questions from group II.*

*Part I is to be done first and the maximum time to be allowed for this part is one and one half hours. Merely place the answer to each question in the space provided; no work need be shown.*

*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 to part II, 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.*

# PLANE GEOMETRY

Wednesday, June 20, 1934

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  $2\frac{1}{2}$  credits. No partial credit will be allowed. Each answer must be reduced to its simplest form.

Directions (questions 1-17) — Write on the dotted line at the right of each question the expression which when inserted in the corresponding blank will make the statement true.

1 If two adjacent angles form a straight angle, then the bisectors of these angles form a ... angle. Ans.....

2 The mid-point of the hypotenuse of a right triangle is equidistant from the three ... of the triangle. Ans.....

3 The bases of a trapezoid are 15 and 20; if the altitude is 8, the area is .... Ans.....

4 If the line joining the mid-points of two sides of a triangle is 8 inches long, then the length of the third side of the triangle is ... inches. Ans.....

5 From a point outside a circle a tangent and a secant are drawn to the circle. If the length of the secant is 9 inches and the length of its external segment is 4 inches, then the length of the tangent is ... inches. Ans.....

6 If one side of an equilateral triangle is 6, then the area, expressed in radical form, is .... Ans.....

7 If two chords of a circle intersect within a circle at right angles, the sum of a pair of opposite intercepted arcs is equal to ... degrees. Ans.....

8 If each side of a square is doubled, then the area is multiplied by .... Ans.....

9 A parallelogram inscribed in a circle must be a .... Ans.....

10 The angle of a sector of a circle is  $72^\circ$  and the area of the sector is  $5\pi$ ; the radius of the circle is .... Ans.....

11 If two adjacent sides of a parallelogram are 12 and 16 and the angle included between these sides is  $30^\circ$ , then the area of the parallelogram is .... Ans.....

12  $ABCD$  is a quadrilateral inscribed in a circle and chords  $BD$  and  $AC$  are drawn, intersecting in  $E$ ; then triangle  $CDE$  is similar to triangle .... Ans.....

13 If the lengths of the diagonals of a rhombus are 10 and 24, the length of a side of the rhombus is .... Ans.....

14 If two sides of a triangle are 12 and 15, then the third side must be greater than 3 and less than ... and may have any value between these limits. Ans.....

15 If the number of sides of a regular polygon is increased, then the number of degrees in each interior angle of the polygon .... [Answer increases or decreases.] Ans.....

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16 A doorway is 3 feet wide and 7 feet high. A circular table top 8 feet in diameter ... be taken through the doorway. [Answer can or can not.]

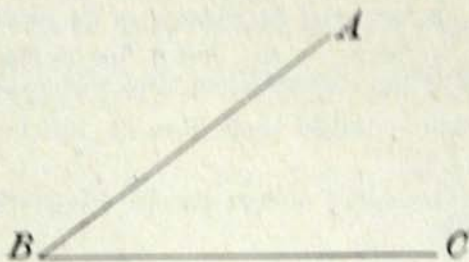
Ans.....

17 If 1 million dollars is represented by the area of a circle of radius 1 inch, then the radius used for a circle representing 4 million dollars should be ... inches.

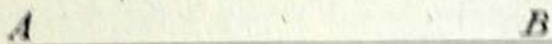
Ans.....

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

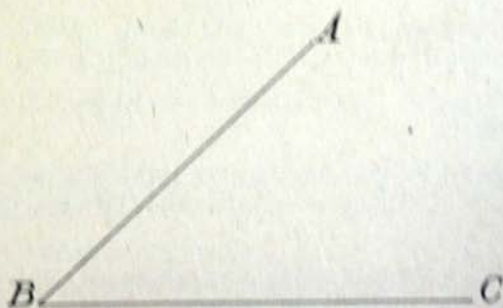
18 Given angle  $ABC$ ; construct its complement.



19 Divide the given line  $AB$  into *three* equal parts.



20 Find by construction the points that are equidistant from the sides of the given angle  $ABC$ .



# PLANE GEOMETRY

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- Write at top of first page of answer paper to part II (a) name of school where you have studied,  
 (b) number of weeks and recitations a week in plane geometry.

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

Name the author of the textbook you have used in plane geometry.

## Part II

Answer five questions from part II, including three questions from group I and two questions from group II.

### Group I

Answer three questions from this group.

21 Prove that if in a right triangle the perpendicular is drawn from the vertex of the right angle to the hypotenuse, the perpendicular is the mean proportional between the segments of the hypotenuse. [10]

22 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]

23 Two parallel chords  $AC$  and  $BD$  are drawn at the ends of a diameter  $AB$  of a circle whose center is  $O$ ; prove that chord  $AC$  equals chord  $BD$ . [10]

24 Prove that two triangles are congruent if two sides and the median to one of these sides in one triangle are equal respectively to the corresponding parts in the other triangle. [10]

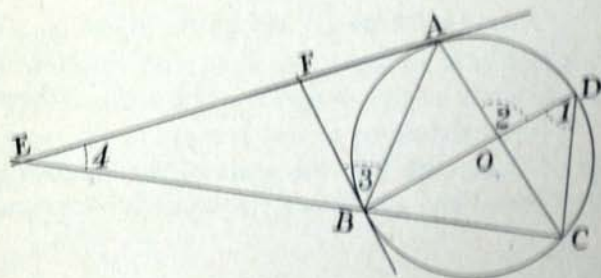
25 If the two vertices  $B$  and  $C$  of a triangle  $ABC$  are joined to any point  $P$  on the median  $AD$ , prove that triangle  $ABP$  is equal in area to triangle  $ACP$ . [10]

### Group II

Answer two questions from this group.

Leave all work on the paper; merely writing the answers is not sufficient. Irrational results may be left in the form of  $\pi$  and radicals unless otherwise stated.

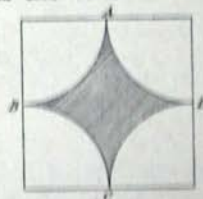
26 Triangles  $ABC$  and  $DBC$  are inscribed in circle  $O$ , side  $BD$  bisecting angle  $ABC$ . The tangent to the circle at  $A$  meets  $CB$  extended in point  $E$ , the tangent at  $B$  meets  $AE$  in  $F$ , angle  $BAC = 56^\circ$  and arc  $DC = 74^\circ$ . Find angles 1, 2, 3 and 4. [10]



27 If the vertices of a square 12 inches on a side are taken as the centers of arcs whose radii are 6 inches, as in the figure, find

a The length of the curve  $ABCD$  correct to the nearest inch. [Use  $\pi = 3.1$ ] [4]

b The area of the shaded portion of the figure correct to the nearest square inch. [Use  $\pi = 3.1$ ] [6]



28 The legs of a right triangle are in the ratio 3:4. If the hypotenuse is 75, find the length of the segments made by the altitude upon the hypotenuse. [10]

29 The side of a regular pentagon is 6 inches.

a Find the length of the apothem correct to the nearest inch. [Suggestion: Use numerical trigonometry.] [7]

b Using the result found in answer to a, find the area of the regular pentagon. [3]

[2]

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