

The University of the State of New York

257TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Wednesday, June 21, 1933 — 9.15 a. m. to 12.15 p. m., only

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 21, 1933

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 sides of a triangle remain constant in length, but their included angle increases in size, the third side [Answer increases or decreases.] Ans.....

2 Rectangles having equal bases are to each other as their Ans.....

3 A circle can be circumscribed about a polygon if the polygon is Ans.....

4 Lines perpendicular to the same line are ... to each other. Ans.....

5 If the diagonals of a parallelogram are unequal and are perpendicular to each other, the figure is a Ans.....

6 The locus of points within an angle and equidistant from its sides is the Ans.....

7 Two angles of a triangle are in the ratio 5:3; if their difference is 40° , the smallest angle of the triangle contains ... degrees. Ans.....

8 ABC is a triangle inscribed in a circle with center O . If angle ABC is 50° , then angle AOC contains ... degrees. Ans.....

9 If the area of a circle is 25π square inches, the radius of the circle is ... inches. Ans.....

10 If the radius of a circle is 6 inches, the length of an arc of 30° is ... inches. [Find answer correct to the nearest tenth.] Ans.....

11 If CD is the altitude on the hypotenuse of a right triangle ABC , then angle ACD is equal to angle Ans.....

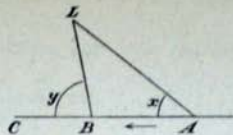
12 From a point C on a circle a perpendicular is drawn to diameter AB , meeting it at point D . If $AD = 9$ and $DB = 16$, then $CD = \dots$ Ans.....

13 The area of a trapezoid whose bases are 8 inches and 20 inches and whose altitude is 10 inches is ... square inches. Ans.....

14 The radius of a circle is 10 feet; the radius of a circle whose area is 4 times that of the given circle is ... feet. Ans.....

15 A balloon ascends from the ground along a line inclined 60° to the horizontal at a velocity of 16 miles an hour. Its altitude after 15 minutes is ... miles. [Answer may be left in radical form.] Ans.....

16 A ship captain at A , sailing in the direction ABC , observes lighthouse L and finds angle x to be 40° . After sailing 4 miles to B , he observes angle y to be 80° ; B is ... miles from lighthouse L .



Ans.....

17 If the median, angle bisector and altitude from the same vertex B of a triangle ABC are all one and the same straight line, then the triangle must be

Ans.....

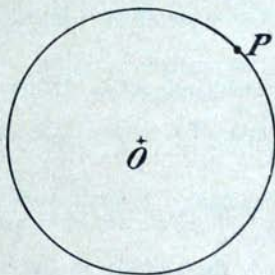
Directions (questions 18–20) — Leave all construction lines on the paper.

18 Through the point P construct a line parallel to AB .

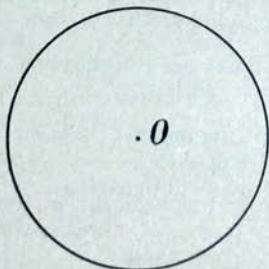
P

A ————— B

19 At the point P on circle O construct a tangent to the circle.



20 Inscribe a regular octagon in circle O .



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PLANE GEOMETRY

Wednesday, June 21, 1933

Write at top of first page of answer paper (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 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]

22 In parallelogram $ABCD$, AC is the longer diagonal. P is a point on AC such that $AP = AB$. Prove that BC is longer than PC . [10]

23 If a quadrilateral $ABCD$ is inscribed in a circle and the diagonals AC and BD meet in E so that BE equals CE , prove that chord AB equals chord CD . [10]

24 Given a line BC ; lines BA and CD are perpendicular to BC and lie on opposite sides of it. If $BA = CD$ and lines BD , AD and AC are drawn, prove that triangles ABD and DCA are congruent. [10]

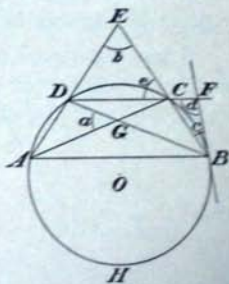
25 If any point in a side of a triangle is joined to the mid-points of the other two sides, a quadrilateral is formed which is equal in area to half the given triangle. [10]

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 π and radicals unless otherwise stated.

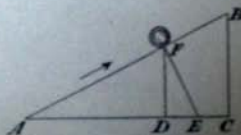
26 $ABCD$ is a trapezoid inscribed in circle O ; the tangent at B meets DC produced at F ; diagonals AC and BD meet at G and AD and BC produced meet at E . If arc $AHB = 200^\circ$ and arc $AD = 50^\circ$, find the number of degrees in each of the angles a, b, c, d and e . [10]



27 The area of an equilateral triangle is $36\sqrt{3}$; find the radius of the circle inscribed in the equilateral triangle. [10]

28 In a regular pentagon the apothem is approximately .8 of the radius. If one side of a regular pentagon is 12, find the area. [10]

29 The force necessary to keep a barrel from rolling down an inclined plank AB is equal to the weight of the barrel multiplied by the sine of the inclination of the plank (angle A). If FD is perpendicular to AC , FE perpendicular to AB , angle $DFE = 25^\circ$ and the barrel weighs 100 pounds, what force is needed to keep the barrel from rolling down? [10]



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