

The University of the State of New York

282D HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Friday, August 22, 1941 — 8.30 to 11.30 a. m., only

Instructions

Do not open this sheet until the signal is given.

Part I

This part is to be done first and the maximum time allowed for it is one and one half hours.

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, 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.

Parts II, III and IV

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 1941, (*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 1941 is required.

PLANE GEOMETRY

See instructions for parts II, III and IV on page 1.

Part II

Answer two questions from this part.

- 26 Prove that if the opposite sides of a quadrilateral are equal, the figure is a parallelogram. [10]
- 27 Angle ABC is inscribed in a circle. Chord BD bisects angle ABC and chord DE is drawn parallel to AB . Prove that chord DE equals chord BC . [10]
- 28 Prove that if from a point outside a circle, a tangent and a secant are drawn to the circle, the tangent is the mean proportional between the secant and its external segment. [10]

Part III

Answer two questions from this part.

- 29 The area of an equilateral triangle is $36\sqrt{3}$. Find the radius of the circle inscribed in this triangle. [Answer may be left in radical form.] [10]
- 30 In an isosceles trapezoid $ABCD$, angle $A = 60^\circ$. The shorter base $DC = 10$ and the altitude $= 6\sqrt{3}$.
- a* Find the area of the trapezoid. [Answer may be left in radical form.] [7]
- b* If AD and BC are extended to meet in E , find the length of DE . [3]
- 31 AB is a diameter of a circle whose center is O . On OB extended, a point P is taken 10 inches from O . Through P a secant is drawn intersecting the circle at C and D so that arc $BC = 10^\circ$ and arc $AD = 60^\circ$.
- a* Find the number of degrees in angle APD . [2]
- b* Find, correct to the nearest tenth of an inch, the distance of the secant from the center of the circle. [8]

Part IV

Answer one question from this part.

- 32 From the following statements select those which are *not* good definitions and rewrite them in acceptable form: [10]
- a* An inscribed angle is an angle formed by two chords.
- b* Adjacent angles are angles which have a common vertex and a common side.
- c* Two lines are parallel if they do not meet however far they are extended.
- d* A segment of a circle is the figure bounded by an arc of a circle and its chord.
- e* A rectangle is a quadrilateral whose opposite sides are equal and parallel and whose angles are right angles.
- 33 A trapezoid whose nonparallel sides are equal is circumscribed about a circle. The parallel sides are 18 inches and 6 inches.
- a* Find the length of one of the nonparallel sides. [3]
- b* Find the length of the radius of the circle. [Answer may be left in radical form.] [7]

PLANE GEOMETRY

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 credits. No partial credit will be allowed. Each answer must be reduced to its simplest form.

Directions (questions 1–14) — 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 quadrilateral $ABCD$ is inscribed in a circle O , the sum of angles A and C is ... degrees. 1.....
 - 2 If the line joining the mid-points of two sides of a triangle is 6 inches long, then the length of the third side of the triangle is ... inches. 2.....
 - 3 The area of a regular polygon is equal to $\frac{1}{2}$ the product of its perimeter and its 3.....
 - 4 A circle is inscribed in a square whose side is 6. The area of the circle in terms of π is 4.....
 - 5 The bases of two triangles of equal area are 12 and 18. If the altitude of the first triangle is 6, then the altitude of the second triangle must be 5.....
 - 6 If two tangents to a circle form an angle of 30° , then the minor intercepted arc contains ... degrees. 6.....
 - 7 In the right triangle ABC , angle $C = 90^\circ$, $AB = 40$ and $BC = 25$. Angle A , correct to the nearest degree, contains ... degrees. 7.....
 - 8 The angle of a sector of a circle is 72° and the area of the sector is 5π ; the radius of the circle is 8.....
 - 9 The lines AB and CD intersect in point O and it is known that the points A, B, C and D all lie on a circle. If $AO = 3$, $DO = 6$ and $BO = 8$, then $CO = \dots$ 9.....
 - 10 The sum of the angles of a pentagon is ... degrees. 10.....
 - 11 If one acute angle of a right triangle equals 30° , the ratio of the shorter leg to the hypotenuse is 11.....
 - 12 To circumscribe a circle about a triangle it is necessary to bisect two of the ... of the triangle. 12.....
 - 13 If the circumference of a circle is 88 inches, the radius of the circle is ... inches. [Use $\pi = \frac{22}{7}$] 13.....
 - 14 If one side of a rhombus equals the shorter diagonal, then one of the acute angles of the rhombus contains ... degrees. 14.....
- Directions (questions 15–19) — Indicate whether each statement is true or false by writing the word *true* or *false* on the dotted line at the right.
- 15 Two triangles are congruent if they have a side and any two angles of one equal to the corresponding parts of the other. 15.....
 - 16 Converse statements of definitions are true. 16.....
 - 17 If the three sides of a triangle are unequal, the altitude upon any side is equal to the median on that side. 17.....
 - 18 One of the exterior angles of a right triangle may be an acute angle. 18.....
 - 19 The angles at the ends of the longest side of a triangle are acute angles. 19.....

PLANE GEOMETRY

Directions (questions 20–22) — Indicate the correct answer to each question by writing on the dotted line at the right the letter a , b or c .

20 If the diagonals of a quadrilateral bisect each other, the quadrilateral is always
 (a) a rhombus, (b) a rectangle or (c) a parallelogram. 20.....

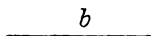
21 If in triangles ABC and $A'B'C'$, $AB = 3 A'B'$, $BC = 3 B'C'$ and angle $B =$ angle B' , then (a) $CA = C'A'$, (b) $CA = \frac{1}{3} C'A'$ or (c) $CA = 3 C'A'$. 21.....

22 The locus of centers of circles which are tangent to a given line segment XY at the point P is (a) a line parallel to XY , (b) a circle drawn on XY as diameter or (c) the perpendicular to XY at the point P . 22.....

23 In New York State, a married man living with his wife and having an income of \$2500 or more per year, and an unmarried man who has an income of \$1000 or more must pay income taxes. Mr Brown paid an income tax for the year 1940. From these data is either of the following conclusions sound? [Answer *yes* or *no*.] Mr Brown must be a married man. Mr Brown's annual income must exceed \$2500. 23.....

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

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



25 Construct the altitude of triangle ABC upon side AB .

