

The University of the State of New York

248TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Wednesday, June 18, 1930 — 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 hour.

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 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 18, 1930

Fill in the following lines:

Name of school.....Name of pupil.....

Detach this sheet and hand it in at the close of the one 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 1-17) — 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 The difference between the supplement and the complement of an angle is always . . . degrees. Ans.....

2 Two triangles are congruent if three . . . of one are equal to the corresponding parts of the other. Ans.....

3 If from any point in the bisector of an angle a line is drawn parallel to one side of the angle and cutting the other side, the triangle thus formed is Ans.....

4 If two parallel chords of a circle are each 24 inches long and the distance between them is 10 inches, the radius of the circle is . . . inches long. Ans.....

5 If each exterior angle of a regular polygon is 72° , then the number of sides of the polygon is Ans.....

6 If two circles touch each other externally, the greatest number of common tangents that can be drawn is Ans.....

7 If the diagonals of a rhombus are 6 inches and 8 inches, then one side of the rhombus is . . . inches long. Ans.....

8 If one side of an equilateral triangle is 8 inches long, its altitude is . . . inches. [Leave answer in radical form.] Ans.....

9 Two isosceles triangles have equal vertex angles. If their bases are 2 inches and 3 inches, then the ratio of their areas is Ans.....

10 The base of a triangle is divided into three equal parts. If the points of division are joined to the opposite vertex, the three triangles thus formed are Ans.....

11 Two sides of a triangle are 3 inches and 6 inches long and the angle between them is 60° . The third side of this triangle is . . . inches long. [Leave answer in radical form.] Ans.....

12 A circle rolls along a straight line; the locus traced by the center of the circle is a Ans.....

13 Two parallel lines are cut by a transversal. If one of the two interior angles on the same side of this transversal is three times the other, the number of degrees in the larger angle is Ans.....

14 In any circle, an angle inscribed in an arc that is less than a semicircle is an . . . angle. Ans.....

15 If base AB of isosceles triangle ABC is extended through B to point D , and D is joined to C , then line AC will be . . . than line DC .

Ans.....

16 Triangle ABC is inscribed in a circle. If angle $A = 42^\circ$ and angle $B = 68^\circ$, then the number of degrees in minor arc AB is

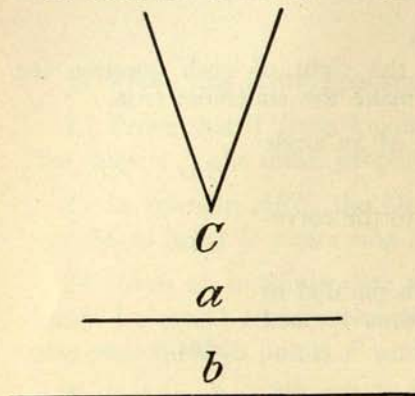
Ans.....

17 In a circle whose radius is 10 inches, the area of a sector whose arc is 18 inches long is . . . square inches.

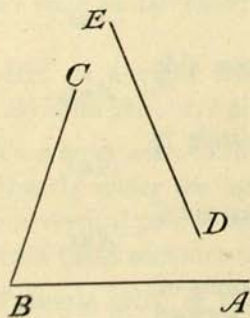
Ans.....

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

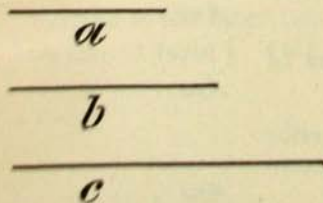
18 Construct a triangle in which a , b and C will be two sides and the included angle.



19 Locate *one* point in line DE that shall be equidistant from the sides of angle ABC .



20 Construct the fourth proportional to lines a , b and c .



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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 the opposite sides of a quadrilateral are equal, the figure is a parallelogram. [12]
- 22 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. [12]
- 23 In triangle ABC , the bisector of angle C meets side AB in D . A line through vertex A parallel to line CD meets side BC produced in point E . Prove that line CE equals line CA . [12]
- 24 Given an indefinite line m , a fixed point P on line m , and a fixed point A not on line m ; locate by actual construction the center of a circle that shall touch line m at point P and shall also pass through points P and A . [No proof required] [12]
- 25 In triangle ABC , P is any point in side AB , and D and E are the mid-points of AC and BC respectively. If P is joined to D and E , prove that quadrilateral $PECD = \frac{1}{2}$ triangle ABC . [12]

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 ABC is a right triangle and CD is the altitude on hypotenuse AB . If $AC = 32$ and $BC = 24$, find AB , AD and CD . [12]
- 27 Two boys wish to find the height of a light suspended above the gymnasium floor. From a point directly under the light they measure out a distance of 18 feet. At that point the shadow cast by a vertical pole 9 feet long is measured and found to be 12 feet long. Find the height of the light from these measurements. [12]
- 28 Triangle ABC is inscribed in a circle and the tangent at C meets in point D the side AB produced through B . If angle $D = 42^\circ$ and arc $ACB = 148^\circ$, find each angle of triangle ABC . [12]
- 29 Three circles, each with a radius of 6 inches, touch each other externally, each circle being tangent to the other two. Find the area contained between the three circles. [Leave answer in irrational form.] [12]