

PLANE GEOMETRY

Tuesday, June 12, 1906—9.15 a. m. to 12. 15 p. m., only

Answer eight questions, including at least one from each of the three divisions. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted if written by students in class A; those entitled to 60 or more credits will be accepted if written by students in class B.

First division 1 Prove that two triangles are equal if two angles and the included side of one are equal respectively to two angles and the included side of the other.

2 Prove that in the same circle or in equal circles if two chords are unequally distant from the center, they are unequal.

3 Prove that the bisector of an exterior angle of a triangle divides the opposite side externally into segments which are proportional to the adjacent sides.

4 Prove that if two triangles have their sides respectively proportional they are similar.

Second division 5 A chord 24 inches long is 9 inches from the center of a circle; find the length of the tangents drawn from the extremities of the chord and produced till they meet.

6 In the triangle ABC , the angle A is acute and BD is drawn perpendicular to AC . $AB=10$ feet, $BC=12$ feet and $AC=14$ feet; find AD .

7 The bases of a trapezoid are 8 inches and 12 inches, the area 30 square inches; find the length of a line drawn between the legs parallel to the lower base and 2 inches from it.

8 Find the area of the sector of a circle whose radius is 15 inches, the angle of the sector being 32° .

Third division 9 Show how to construct a circle of given radius tangent to two given circles.

10 Show how to draw a line parallel to the base of an isosceles triangle so that in the trapezoid thus formed, each leg shall be equal to the upper base.

11 Prove that the perpendiculars dropped from the middle points of two sides of a triangle to the third side are equal.

12 Two equal chords produced meet outside the circle; prove that the secants thus formed are equal.