

INTERMEDIATE CERTIFICATE EXAMINATION, 1966

MATHEMATICS - GEOMETRY

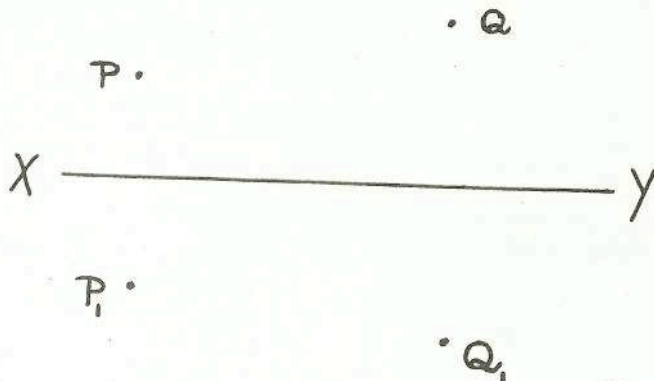
MONDAY, 13th JUNE - Morning, 10 to 12.30

The total number of questions answered should not exceed six.

Mathematical Tables may be obtained from the Superintendent.

1. If A and B are two given points, prove that any point on the perpendicular bisector of the line AB is equidistant from A and B.

P and Q are two points on the same side of a line XY, as in diagram.  $P_1$  and  $Q_1$  are two other points such that the line XY bisects the lines  $PP_1$  and  $QQ_1$  at right angles. Show that  $P_1Q_1 = PQ$ .



(30 marks)

2. Prove that the line which joins the middle points of two sides of a triangle is parallel to the third side.

ABC is a triangle. X is the middle point of AB and Y is the middle point of BC. The perpendicular from B to AC meets AC at R and S is the middle point of AR. Show that the angle SXY is a right angle.

(30 marks)

3. If a rectangle and a triangle are on the same base and between the same parallels, prove that the area of the triangle is half the area of the rectangle.

The diagonals of a quadrilateral ABCD intersect at O. If the angle AOB is a right angle, show that the area of ABCD is  $\frac{1}{2} AC \cdot BD$ .

(30 marks)

4. Show, with proof, how to draw a direct common tangent to two given circles. Two circles touch externally at P and a direct common tangent meets the circles at Q and R, respectively. Show that the tangent at P bisects QR.

(35 marks)

5. If two triangles are equiangular, prove that their corresponding sides are proportional.

The tangent from a point P touches a circle at T and another line through P cuts the circle at R and S. Prove  $PR \cdot PS = PT^2$ .

(35 marks)

6. (a) Using ruler and compass only construct a triangle ABC so that the angle C is a right angle,  $\tan B = \frac{2}{3}$  and BC is equal in length to a given line.

(b) A, B, C are three collinear points on a horizontal plane and D is the highest point of a vertical pole CD. The angles of elevation of D at A and B are  $23^\circ$  and  $31^\circ 17'$ , respectively. If  $AB = 10'$ , find correct to two significant figures the distance between B and C.

(35 marks)

7. AB is a fixed chord of a given circle and P is any point on the major arc AB. If the bisectors of the angles of the triangle PAB meet at X, prove that the angle AXB is constant. What is the locus of X?

If the perpendiculars from A, B to BP, AP, respectively, meet at Y, show that the locus of Y is an arc of a circle which is equal to the minor arc AB.

(35 marks)