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(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1957.

MATHEMATICS—GEOMETRY.

THURSDAY, 6*th 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. Show, with proof, how to bisect a given angle.

Prove that any point on the bisector is equidistant from the arms of the angle.

[30 marks.]

2. Prove that the area of a triangle is half the area of the rectangle on the same base and of the same altitude.

ABC is a triangle in which AB=AC=5 in., and BC=6 in. Find the area of the triangle (without measurement), and explain your method.

If P is any point on BC, prove that the sum of the perpendiculars from P to AB and AC, respectively, is equal to the perpendicular from B to AC.

[30 marks.]

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

AB is a fixed diameter of a circle, and AP is any other chord through A. If X is the middle point of AP, find the locus of X.

[30 marks.]

4. Prove that equal chords in a circle are equidistant from the centre.

What is the locus of the middle points of equal chords in a circle?

MN is a chord of a circle and P is a point outside the circle. Explain how to draw a straight line through P cutting the circle in Q and R, so that QR may be equal to MN.

[35 marks.]

5. Prove that the angles made by a tangent to a circle with a chord drawn from the point of contact are respectively equal to the angles in the alternate segments of the circle.

Two circles intersect at A and B. P is a point on one of the circles and PA, PB, produced, cut the other circle in C, D respectively. Prove that CD is parallel to the tangent at P.

[35 marks.]

6. (i) If the sides of two triangles taken in order are proportional, prove that the triangles are equiangular.

(ii) A triangle PQR is inscribed in a circle and S is the middle point of the arc PRQ. SR and PQ produced meet at T. Prove that $SR.ST=SQ^2$.

[35 marks.]

7. (i) A ten-foot ladder leaning against the wall of a room makes an angle of 50° with the floor. Calculate how far the bottom of the ladder is out from the wall and how far the top of the ladder is from the floor.

(ii) A man walking at a uniform speed along a straight, horizontal road sees the spire of a church straight ahead, and he observes that the angle of elevation of the top of the spire is 10°. Five minutes later he observes that the angle of elevation is 30°. How many minutes later again, to the nearest minute, does he reach the church?

[35 marks.]