AN ROINN OIDEACHAIS

(Department of Education)

INTERMEDIATE CERTIFICATE EXAMINATION, 1960.

MATHEMATICS—GEOMETRY.

FRIDAY, 10*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. Prove that the angles at the base of an isosceles triangle are equal.

O is the centre of a circle and A, B, C are three points in that order on one half of the circumference. Prove $\angle ABC = \angle OAB + \angle OCB$.

[30 marks.]

2. Using ruler and compass only and showing all construction lines clearly, construct (i) a quadrilateral ABCD in which $AB = AC = 2''$, $BC = 1''$, $AD = 1\frac{1}{2}''$, $\angle ADC = 90°$, and (ii) a triangle equal in area to ABCD.

[30 marks.]

3. Prove that, in a triangle, the square on a side opposite an acute angle is less than the sum of the squares on the other two sides by twice the rectangle contained by one of those two sides and the projection of the other side upon it.

[30 marks.]

4. Prove that if a straight line be drawn through the middle point of a side of a triangle parallel to another side it will bisect the third side.

P is a point inside a triangle. Show how to construct a straight line through P cutting two of the sides in L, M such that P is the middle point of LM.

[35 marks.]

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

P, Q are two points on the circumference of a circle and the tangents at P, Q meet at R. Prove that the bisector of the angle PQR bisects the arc PQ.

[35 marks.]

6. Prove that if two triangles are equiangular their corresponding sides are proportional.

ABCD is a trapezium. AB is parallel to DC and AD, BC, produced, meet at O. If X is the middle point of AB, prove that OX bisects DC.

[35 marks.]

7. (*a*) A vertical pole is 50 feet in height. If it were tilted sideways to make an angle of 10° with the vertical, what vertical height would the top of the pole then be from the ground ?

(*b*) ABC is a triangle. Draw perpendiculars from A to BC and from C to AB, and hence prove the following, where $\triangle$ denotes the area of ABC :—

(i) AB cos B+AC cos C=BC ;

(ii) AB. BC sin B=$2\triangle$=AB. AC sin A.

[35 marks.]