AN ROINN OIDEACHAIS

(Department of Education)

LEAVING CERTIFICATE EXAMINATION, 1961.

MATHEMATICS—GEOMETRY—PASS.

FRIDAY, 9*th JUNE*.—Morning, 10 to 12.30.

Six questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

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1. Show how to find a point equidistant from three given straight lines, and give proof.

Show that there are 0, 1, 2 or 4 such points depending on how the three straight lines are situated.

[30 marks.]

2. If a straight line is drawn parallel to one side of a triangle, prove that it cuts the other sides proportionally.

Show how to construct a third proportional to two given straight lines.

[30 marks.]

3. When are polygons said to be *similar* ?

Prove that similar polygons can be divided into the same number of similar triangles.

[30 marks.]

4. From a point P outside a circle two straight lines are drawn: one line touches the circle at T, the other cuts the circle at R and S. Prove $PR.PS=PT^2$.

Two circles intersect at A and B. If C is a point on AB produced, prove that the tangents from C to the two circles are equal.

L, M, N are three fixed points on a straight line. If X is the point of contact of a tangent drawn from L to any circle through M and N, find the locus of X.

[35 marks.]

5. If in a triangle ABC the internal bisector of the angle BAC cuts BC in D, prove $AB.AC=BD.DC+AD^2$.

If the lengths of AB, BC, CA are 6″, 7″, 8″, respectively, find the length of AD.

[35 marks.]

6. In a triangle ABC, using the usual notation, prove

$$b^2=c^2+a^2-2ca\cos B.$$

ABCD is a cyclic quadrilateral in which AB=8″, BC=3″, CD=3″, DA=5″ in length. Find the size of the angle ABC and the length of the diagonal AC.

[35 marks.]

7. Prove $\cos(A+B)=\cos A\cos B-\sin A\sin B$ where the angle A+B is acute.

Prove that $\cos(60°+A)+\sin(30°+A)=\cos A$ and that

$$\cos(60°+A)\sin(30°+A)=\tfrac{1}{4}-\sin^2 A.$$

[35 marks.]