AN ROINN OIDEACHAIS.

LEAVING CERTIFICATE EXAMINATION, 1962.

MATHEMATICS—GEOMETRY—PASS.

FRIDAY, 8th JUNE—Morning, 10 to 12.30.

Six questions to be answered.
Mathematical Tables may be obtained from the Superintendent.

1. Prove that the perpendiculars drawn from the vertices of a triangle to the opposite sides are concurrent.
(30 marks.)

2. Show, with proof, how to draw a common tangent to two circles.
PQ and RS are the direct common tangents to two circles, the points P, Q, R and S being on the circles. Prove PQ = RS.
(30 marks.)

3. In a triangle ABC the internal bisector of the angle BAC cuts BC at D. Prove BD : DC = BA : AC.
If E is a point on AC such that DE is parallel to BA, prove BA : AE = AC : EC.
(30 marks.)

4. Prove that the areas of similar triangles are proportional to the squares on corresponding sides.
Show how to construct a triangle equal in area to the sum of two given similar triangles, such that the three triangles are similar.
(35 marks.)

5. Prove that the rectangle contained by the diagonals of a cyclic quadrilateral is equal to the sum of the rectangles contained by its opposite sides.
If the diagonals intersect at right angles, prove that the area of the quadrilateral is half the sum of the rectangles contained by its opposite sides.
(35 marks.)

6. In a triangle ABC, AB = 8", BC = 7" and CA = 3". Find the size of the angle CAB.
D is a point on the side AB such that CD = 4". Find the size of the angle ADC and the area of the triangle ADC.
(35 marks.)

7. Write down the expansions of $\sin(A + B)$ and of $\cos(A + B)$.
If $\cos A = \frac{7}{11}$ and $\cos B = \frac{7}{9}$, where A and B are acute angles, find the value of $\cos(A + B)$ without using the tables.
Prove $2\sin(30° + x)\sin(60° + x) = \frac{\sqrt{3}}{2} + \sin 2x$.
(35 marks.)