AN ROINN OIDEACHAIS.

(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1956.

MATHEMATICS—GEOMETRY—PASS.

THURSDAY, 7th 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, with proof,

   (*a*) how to construct a mean proportional between two given straight lines,

   (*b*) how to circumscribe about a given circle a triangle equiangular to a given triangle.

[30 marks.]

2. Show that the areas of similar triangles are proportional to the squares on their corresponding sides.

From a given triangle show how to cut off a part which shall be one-ninth of the whole and also similar to it.

[30 marks.]

3. If from the vertex of a triangle a straight line is drawn perpendicular to the base, prove that the rectangle contained by the sides of the triangle shall be equal to the rectangle contained by the perpendicular and the diameter of the circumcircle.

In a triangle ABC a point E is taken on BC. If p, q, are the diameters, respectively, of the circumcircles of the triangles ABE, AEC, prove that $p : q = AB : AC$.

[30 marks.]

4. S is a fixed point outside a given circle, centre O, and P is any point on the circumference. Show that the locus of the middle point of SP is a circle whose centre is the middle point of SO.

[35 marks.]

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

If from any point P on the circumference of a circle a perpendicular PX be drawn to a chord of the circle, prove that the square on PX is equal to the rectangle contained by the perpendiculars drawn from the extremities of the chord to the tangent at P.

[35 marks.]

6. In a triangle ABC, using the usual notation, prove that $a^2=b^2+c^2-2bc\cos A$.

If $b=13$, $c=20$ and the angle A is 65°, find the side a, correct to one place of decimals; find, also, the angle B.

[35 marks.]

7. (*a*) If $\sin A=\frac{1}{2}$, $\sin B=\frac{4}{5}$ and if A and B are acute angles, find, without using the tables, the value of (i) $\sin(A+B)$, (ii) $\cos(A+B)$.

(*b*) Show that $\sin 15° = \frac{\sqrt{3}-1}{2\sqrt{2}}$.

[35 marks.]