AN ROINN OIDEACHAIS
(Department of Education).

BRAINSE AN MHEÁN-OIDEACHAIS
(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1932.

PASS.

MATHEMATICS (II).

THURSDAY, 2nd JUNE.—Morning, 10 a.m. to 12.30 p.m.

Six questions may be answered. All questions carry equal marks.

Mathematical Tables may be obtained from the Superintendent.

Candidates should state the text-book used in order to indicate the sequence followed.

1. Prove that in a circle equal chords subtend equal angles at the circumference.
Prove that every equilateral polygon inscribed in a circle is equiangular.

2. Prove that the square on the hypotenuse of a right-angled triangle is equal to the sum of the squares on the other two sides.
Deduce that the difference between the areas of the inscribed and circumscribed circles of a regular polygon is equal to the area of the circle on a side of the polygon as diameter.

3. The base BC of a triangle ABC is fixed in magnitude and position, and A is such that $AB^2 - AC^2$ is constant. Prove that the locus of A is a straight line perpendicular to BC.
If $AB^2 + AC^2$ is constant, prove that the locus of A is a circle whose centre is the middle point of BC.

4. Show, with proof, how to construct a polygon similar to a given polygon and such that its area will be $\frac{3}{5}$ the area of the given polygon.

5. Prove that equiangular triangles are similar. ABC is a triangle in which $AB=2AC$. BC is produced to D so that the angle CAD is equal to the angle ABC. Prove that $BC=3CD$.

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6. Prove that in a triangle $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

The shortest side of a triangle is 2 inches long and the angles are in the ratio $2 : 3 : 4$. Calculate the lengths of the other two sides.

7. Prove that
$$\tan 22\tfrac{1}{2}° = \sqrt{2} - 1.$$

The side of a regular octagon is 1·5 inches : find the area of the octagon to the nearest tenth of a square inch.

8. Illustrate geometrically the identities :

(i) $(x+y)^2 - y^2 = x(x+2y)$;

(ii) $x^2 - y^2 = 2x(x-y) - (x-y)^2$.

9. In a triangle the sides are 1·44, 1·8, and 2·16 inches long respectively. Calculate the angles.