

## LEAVING CERTIFICATE EXAMINATION, 1964.

## MATHEMATICS—GEOMETRY—PASS.

FRIDAY, 5th June—Morning, 10 to 12.30.

Six questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

1. Show how to draw the tangents from an external point to a circle and prove they are equal in length.

Two tangents are drawn from an external point A to touch a given circle at P and Q. On the major arc cut off by PQ a point R is taken. RQ produced meets at B a line through A parallel to PQ. Prove that ABRP is a cyclic quadrilateral.

(30 marks.)

2. If two triangles have an angle of one equal to an angle of the other and the sides about the equal angles in proportion, prove that the triangles are similar.

ABC is a triangle and points P and Q are taken on AB and AC, respectively, such that  $AP = \frac{1}{2}AC$  and  $AQ = \frac{1}{2}AB$ . Prove that  $BQ : PC = AB : AC$ .

(30 marks.)

3. 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.

(30 marks.)

4. Show, with proof, how to divide the base BC of a triangle ABC internally and externally in the ratio of the sides BA, AC.

If D, E, are the points of section, prove that the angle DAE is a right angle, and hence find the locus of the vertex of a triangle ABC in which the base BC is fixed in magnitude and position and the other two sides are in a given ratio.

(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.

ABCD is a cyclic quadrilateral such that  $AC = AB$  and  $BD = AD + DC$ . Prove that the triangle ABC is equilateral.

(35 marks.)

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

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}.$$

If  $BC = 3''$ ,  $\angle ABC = 35^\circ$ ,  $\angle ACB = 115^\circ$  and if the bisector of  $\angle BAC$  meets BC at D, find the length of AD.

(35 marks.)

7. (i) Show that  $\sin 75^\circ = \frac{\sqrt{3} + 1}{2\sqrt{2}}$ .

(ii) In a triangle ABC,  $AB = AC$ ,  $\angle ABC = 75^\circ$  and the radius of the circumcircle is 4 inches. Find the area of the triangle ABC and show that this area is one-quarter of the area of the square on AC.

(35 marks.)