AN ROINN OIDEACHAIS

INTERMEDIATE CERTIFICATE EXAMINATION, 1963.

MATHEMATICS — GEOMETRY.

MONDAY, 10th JUNE. — Morning, 10 to 12.30.

The total number of questions answered should not exceed six.
Mathematical Tables may be obtained from the Superintendent.

1. Prove that the three angles of a triangle are together equal to two right angles.
   ABC is a triangle in which AB = AC and \( \angle BAC = 20^\circ \). P and Q are two points on
   AB and AC, respectively, such that \( \angle DCP = 30^\circ \) and \( \angle CBQ = 20^\circ \). Prove that BP = BC, that
   BC = BQ and that \( \angle PQB = 60^\circ \).

2. If a straight line be drawn through the middle point of a side of a triangle parallel
   to another side, prove that it will bisect the third side.
   In a triangle ABC, X is the middle point of AB and N is the foot of the perpendicular
   from A to BC. Prove that XB = XN.

3. What is the locus of all points equidistant from two intersecting straight lines?
   Give a diagram.
   Show how to find a point inside a triangle ABC such that it is equidistant from the
   three sides. If a circle drawn with that point as centre cuts the sides, show that it
   cuts equal sections from the three sides.

4. Prove that the area of a triangle is half the area of the rectangle on the same base
   and of the same altitude.
   P is a point inside a square ABCD such that \( \angle DPC = 90^\circ \). Prove that the area of the
   triangle ADP is half the area of the square on DP.

5. Prove that the angle at the centre of a circle is double an angle at the circumference
   standing on the same arc.
   A, B, C are three points on the circumference of a circle of centre O and radius r,
   and \( \angle BCA = 60^\circ \). Show that the length of the perpendicular from O to AB is \( \frac{r}{2} \).

6. In a triangle ABC the internal bisector of the angle BAC cuts BC at D. Prove that
   BD : DC = BA : AC.
   ABC is a triangle in which AB = AC and \( \angle BAC = 90^\circ \). E is a point on BC such that
   \( \angle BAE = \frac{1}{2}\angle EAC \). Find in simplest surd form the ratio of BE to EC.

7. A ladder leaning against a vertical wall makes an angle of 60° with the ground, and
   the top of the ladder is 5 feet from the ground. Find how far the bottom of the ladder
   is out from the wall.
   Construct a triangle ABC such that \( \sin A = \frac{1}{2}, \tan C = \frac{12}{5} \) and the perpendicular from
   B to AC is one inch long. (Protractor may not be used.)
   Write down the value of (i) \( \cos A \), (ii) \( \sin C \).

(30 marks.)

(30 marks.)

(30 marks.)

(35 marks.)

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