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(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1958.

MATHEMATICS—GEOMETRY—PASS.

THURSDAY, 12th JUNE.—MORNING, 10 TO 12.30.

Six questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

1. In a triangle ABC the bisector of the angle BAC cuts BC in D ;
prove that $BD : DC = BA : AC$.

[30 marks.]

2. Prove that the perpendiculars drawn from the vertices of a triangle to the opposite sides are concurrent.

ABC is a triangle of which O is the orthocentre. L, M, R are the mid-points of AB, BC, AO, respectively. Prove that the angle MLR is a right angle.

[30 marks.]

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

ABC is a triangle in which $AB = AC$. D is a point on CA, or CA produced, such that CD is a third proportional to AB and BC. Prove that $BD = BC$.

[30 marks.]

4. Prove that the vertices of a regular pentagon are concyclic. Prove that the diagonals of a regular pentagon intersect so as to form another regular pentagon.

[35 marks.]

5. A triangle ABC is inscribed in a circle. AD, AE are the perpendiculars drawn from A to BC and to the tangent at B, respectively. Prove that $AE : AD = AB : AC$.

If AF is the perpendicular drawn from A to the tangent at C, prove that $AE \cdot AF = AD^2$.

[35 marks.]

6. (i) Show that $\sin(A+45^\circ) + \cos(A+45^\circ) = \sqrt{2} \cdot \cos A$.
(ii) Prove the formula for the cosine of an angle of a triangle in terms of the sides.

Deduce that, in a triangle ABC,

$$a \cos B - b \cos C = c^2 - b^2.$$

[35 marks.]

7. PQR is a triangle in which $PR=7$, $PQ=4$, $QR=5$. S is a point on PQ produced such that $\angle QRS=40^\circ$. Calculate the size of the angle PQR, correct to the nearest minute, and the length of RS, correct to one decimal place.

[35 marks.]