

AN ROINN OIDEACHAIS

(Department of Education)

LEAVING CERTIFICATE EXAMINATION, 1960.

MATHEMATICS—GEOMETRY—PASS.

FRIDAY, 10th JUNE.—MORNING, 10 TO 12.30.

Six questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

1. Describe how to construct a common tangent to two circles.
Show how two circles may be situated so as to have 0, 1, 2, 3 or 4 common tangents.

[30 marks.]

2. 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.

Two straight lines AB, CD intersect at O and $AO : OB = CO : OD$.
Prove that AC is parallel to DB.

[30 marks.]

3. Prove that the areas of similar triangles are proportional to the squares on corresponding sides.

Show fully how to construct a straight line parallel to a side of a given triangle such that it divides the triangle into two parts of equal area.

[30 marks.]

4. (i) PQR is a triangle and S is a point on QR. A straight line parallel to QR cuts PQ, PS, PR in X, Y, Z, respectively.
Prove $XY : YZ = QS : SR$.

(ii) H, K are points on the sides DE, EF, respectively, of a triangle DEF. If $DH : HE = 1 : 2$ and $EK : KF = 3 : 2$, show that the triangle DHK is one fifth of the triangle DEF in area.

[35 marks.]

5. Describe, with proof, how to divide a given straight line AB into two parts AX, XB such that $AB \cdot XB = AX^2$.

If X is a point on AB such that $AB \cdot XB = AX^2$ and P is a point, not on AB, such that $PB = PX = AX$, prove that $AP = AB$.

[35 marks.]

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

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

- (ii) If $\tan A = \frac{4}{3}$ and $\tan B = \frac{12}{5}$, A and B being acute angles, find the value of each of the following without using the Tables :
 $\sin A$; $\cos B$; $\sin (A+B)$; $\cos (A+B)$.

[35 marks.]

7. ABC is a triangle in which $AB=6''$, $BC=5''$, $CA=7''$. Calculate the size of each of the angles ABC, BCA.

If O is the point of intersection of the perpendiculars drawn from the vertices to the opposite sides, calculate the length of BO.

[35 marks.]