

AN ROINN OIDEACHAIS

(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1956.

MATHEMATICS—GEOMETRY.

THURSDAY, 7th 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 straight lines which join the extremities of two equal and parallel straight lines towards the same parts are themselves equal and parallel.

In a parallelogram ABCD if X and Y are the middle points of AB and CD, respectively, prove that AXC Y is a parallelogram.

[30 marks.]

2. Prove that in a right-angled triangle the square on the hypotenuse is equal to the sum of the squares on the other two sides.

[30 marks.]

3. Show, with proof, how to draw a direct common tangent to two circles.

PQ and RS are the direct common tangents to two circles. P, Q, R, S are the points of contact. Prove that $PQ = RS$.

[30 marks.]

4. Prove that triangles on the same base and between the same parallels are equal in area.

ABC is a triangle and P is a point on AC. CS is drawn parallel to PB meeting AB produced at S. If Q is the middle point of AS, prove that the area of the triangle AQP is half that of the triangle ABC.

[35 marks.]

5. (a) Show how to inscribe in a given circle a triangle equiangular to a given triangle. Give proof.

(b) Show how to construct a circle to pass through a given point and to touch a given straight line at a given point. Give proof.

[35 marks.]

6. Prove that if two triangles are equiangular their corresponding sides are proportional.

AB is a chord of a circle. Another chord CD, drawn parallel to the tangent at A, intersects AB at E. Prove that $AC^2 = AE \cdot AB$.

[35 marks.]

7. A, B, C and D are four points in that order on a straight line which lies in a horizontal plane and AB is 10 feet long. A pole PA stands vertically at A and another pole QD stands vertically at D. At B the angle of elevation of P is 70° and the angle of elevation of Q is 20° . At C the angle of elevation of P is 45° and the angle of elevation of Q is 35° . Find in feet, correct to one decimal place, the height of each of the poles.

[35 marks.]

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

1. Prove that the straight lines which join the extremities of two equal and parallel straight lines towards the same parts are themselves equal and parallel.
In a parallelogram ABCD, X and Y are the middle points of AB and CD respectively. Prove that AXY is a parallelogram. [30 marks]

2. Prove that in a right-angled triangle the square on the hypotenuse is equal to the sum of the squares on the other two sides. [30 marks]

3. Show, with proof, how to draw a third common tangent to two circles.
Two circles are drawn on the same diameter of a circle. Prove that the points of contact are collinear. [30 marks]

4. Prove that triangles on the same base and between the same parallels are equal in area.
ABC is a triangle and M is a point on AC. MN is drawn parallel to AB meeting AB produced at P. Q is the middle point of AB. Prove that the area of the triangle MPQ is half that of the triangle ABC. [35 marks]