

# AN ROINN OIDEACHAIS

(Department of Education).

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INTERMEDIATE CERTIFICATE EXAMINATION, 1946.

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## MATHEMATICS—GEOMETRY.

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THURSDAY, 13th JUNE.—AFTERNOON, 3 TO 5.30.

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The total number of questions answered should not exceed *six*.

Mathematical Tables may be obtained from the Superintendent.

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1. In the side BA produced of a triangle ABC a point P is taken such that  $AP=AC$ . Prove that the angle BCP is greater than the angle BPC and hence show that  $BA+AC>BC$ .

[30 marks.]

2. Prove that the straight line joining the middle points of two sides of a triangle is parallel to the third side.

Hence show that the middle points of the sides of a quadrilateral are the vertices of a parallelogram.

[30 marks.]

3. Prove that the angles in the same segment of a circle are equal to one another.

Two circles intersect at A, B. Two straight lines LAM, PAR pass through A, meeting one circle in L, P and the other in M, R. Prove that the angles PBL, RBM are equal.

[30 marks.]

4. Prove that the angles which a tangent to a circle makes with a chord drawn from the point of contact are respectively equal to the angles in the alternate segments of the circle.

Hence, or otherwise, show how to inscribe in a given circle a triangle equiangular to a given triangle.

[30 marks.]

5. Draw geometrical figures to illustrate the identities :

$$(i) (p+q)(x+y) = px + py + qx + qy ;$$

$$(ii) (p+q)^2 = p^2 + 2pq + q^2.$$

Give a short explanation of your diagrams.

[30 marks.]

6. If the base BC of a triangle ABC is fixed in position and the area is constant, what is the locus of A ?

On a straight line 3 inches long as base construct a triangle of area  $1\frac{1}{2}$  sq. inches and with the radius of the circumcircle equal to 2 inches.

[30 marks.]

7. Draw a straight line 7 cm. long and by a geometrical construction divide it into two parts so that the area of the rectangle contained by the parts may be 9 sq. cm.

[35 marks.]

8. From a point X in the side AB of a triangle ABC a parallel is drawn to BC meeting AC at Y : prove that  $AX : XB = AY : YC$ .

ABCD is a trapezium with AB parallel to DC. Through O, the point of intersection of the diagonals, a parallel LOM is drawn to AB meeting AD, BC at L, M, respectively. Prove that  $LO = OM$ .

[35 marks.]

9. A man standing on the bank of a straight river sees two objects beyond the opposite bank and the lines joining his position to them make angles of  $51^\circ$  and  $72^\circ$  respectively with the direction of flow of the river. He walks down stream along the bank until he sees the objects in line with himself and finds that the line joining his position to them now makes an angle of  $90^\circ$  with the direction of the river. He has walked a distance of 120 feet. Calculate the distance between the objects.

[35 marks.]

10. Telegraph posts of equal height are situated on one side of a straight road at distances of 75 yards apart. A man standing on the other side of the road directly opposite one of the posts observes that the angle of elevation of the top of that post is  $50^\circ$  and that the angle of elevation of the top of the next post is  $10^\circ$ . Find the height of the posts.

[35 marks.]