AN ROINN OIDEACHAIS

(Department of Education)

INTERMEDIATE CERTIFICATE EXAMINATION, 1961.

MATHEMATICS—GEOMETRY.

FRIDAY, 9th 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 diagonals of a parallelogram bisect each other.

Show how to construct a parallelogram ABCD in which AB=2″, AC=3″, BD=4″. [No proof is required but construction lines should be clearly shown.]

[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 how to draw a perpendicular to a given straight line from a given point outside it using ruler and compass only.

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

[30 marks.]

4. Prove that equal chords of a circle are equidistant from the centre.

Explain how to draw a circle which will cut equal sections from the three sides of a given triangle.

[35 marks.]

5. A and B are two fixed points. What is the locus of a point P such that the angle APB is constant ?

Find the locus of I, the centre of the inscribed circle of the triangle ABP.

[35 marks.]

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

A triangle ABC is inscribed in a circle. CX is the perpendicular drawn from C to AB, and CY is the perpendicular drawn from C to the tangent at A. Prove CX : CY = CB : CA.

[35 marks.]

7. (i) An aeroplane, taking off from a horizontal field, travels at 60 m.p.h. in a straight line making an angle of 13° with the horizontal. What height will the aeroplane be above the ground after 5 seconds ?

(ii) ABCD is a quadrilateral in which $\angle ABC = 90° = \angle BCD$. E is a point on BC such that $\angle AED = 90°$, $\angle DAE = 60°$.

If AD = 1 and $\angle EAB = x$, express the lengths of AB, BE, DC in terms of x.

[35 marks.]