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(Department of Education).

BRAINSE AN MHEÁN-OIDEACHAIS  
(Secondary Education Branch).

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INTERMEDIATE CERTIFICATE EXAMINATION, 1933.

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MATHEMATICS (Geometry).

FRIDAY, 16th JUNE.—MORNING, 10 A.M. TO 12.30 P.M.

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The total number of questions answered should not exceed *six*.  
(Candidates should see that answers to questions in excess of *six* are cancelled).

Mathematical Tables may be obtained from the Superintendent.

Candidates should state the text-book used in order to indicate the sequence followed.

1. Give a geometrical construction for trisecting a straight line. Prove your method.

[30 marks.]

2. P is a point 2.9 ins. from the centre of a circle of radius 1.7 ins. Show how to draw from P a tangent to the circle and measure the distance between P and the point of contact.

[Proof need not be given but all lines used in the construction should be clear.]

[30 marks.]

3. ABCD is a square of side  $x$  inches and E is a point on the diagonal DB such that  $DE = DC$ : find the number of degrees in the angles BEC and BCE. [A *protractor* may not be used.]

Assuming that  $BE = 1$  inch, calculate to two places of decimals the value of  $x$ .

[30 marks.]

4. A polygon has  $n$  sides: find, in right angles (i) the sum of its interior angles, (ii) the sum of its exterior angles.

Each of the angles of a polygon contains  $175^\circ$ : how many sides has the polygon?

[33 marks.]

5. A and B are two points 3 inches apart and P is a point such  $PA = 2PB$ . Plot a large number of positions of P and join them by a smooth curve. What geometrical locus does your curve suggest?

[33 marks.]

6. The shadow of a tower standing on level ground is 80 feet longer when the sun's altitude is  $30^\circ$  than when it is  $45^\circ$ . Use a large diagram drawn to scale on squared paper to find the height of the tower and check your result by calculation.

[33 marks.]

7. ABC is a triangle: state the relation between the square on AC and the sum of the squares on AB and BC, (i) when the angle B is acute, (ii) when B is obtuse. Prove the relation in the former case.

In a triangle PQR,  $PQ^2 = QR^2 + RP^2 + QR.RP$ : find the number of degrees in the angle R.

[33 marks.]

8. Two lines BA and YX when produced meet at P, and  $PA.PB = PX.PY$ . Prove that the quadrilateral ABYX is cyclic.

Assuming that  $PA = 2.4$  ins.,  $PB = 4.5$  ins.,  $PX = 3$  ins.,  $PY = 3.6$  ins., angle  $BPY = 40^\circ$ : calculate the length of AX and the number of degrees in the angle  $PBY$ .

[34 marks.]

9. Prove that for any triangle ABC,

$$a/\sin A = b/\sin B = c/\sin C = 2R,$$

where R is the radius of the circumcircle of the triangle.

The angles of a triangle are in the ratio 2 : 3 : 4, and the longest side is  $5.4''$  long: calculate the lengths of the other sides and the radius of the circumcircle.

[34 marks.]