AN ROINN OIDEACHAIS
(Department of Education).

BRAINSE AN MHEÁN-OIDEACHAIS
(Secondary Education Branch).

INTERMEDIATE CERTIFICATE EXAMINATION, 1928.

MATHEMATICS (II).

MONDAY, 18*th* *JUNE*.—AFTERNOON, 3.30 TO 6 P.M.

Seven questions may be answered.

All questions carry equal marks.

Mathematical Tables may be obtained from the Superintendent.

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

1. Prove that of any two sides of a triangle the sum is greater and the difference less than the third side.

Show that the perimeter of any quadrilateral is greater than the sum of the diagonals.

2. Show that a straight line drawn through the middle point of a side of a triangle parallel to the base bisects the third side.

E is the mid-point of AC in triangle ABC and F the mid-point of BE. EG drawn parallel to AF meets BC in G, and AF produced cuts BC in K.

Show that $CG = \frac{1}{3}BC$ and $FK = \frac{1}{4}AK$.

3. AB is a line 4 inches long. Show separately (i) the locus of all points whose perpendicular distances from AB are one inch, (ii) the region containing all points distant one inch from at least one point in AB.

Two concentric circles are of radii $1\frac{1}{2}$ and $2\frac{1}{2}$ inches. Draw the loci of all points double the distance from one circumference that they are from the other.

4. How many triangles can be formed having as sides three lines out of six whose lengths are 3, 4, 5, 11, 12 and 13 inches? How many of these triangles are (1) obtuse-angled, (2) right-angled, (3) acute-angled. State theorems to justify your answers.

5. Show how to insert in a circle a chord passing through a fixed point and of given length.

Show how to draw through an external point P a secant PAB to a circle of centre O so that the triangle AOB may be the greatest possible.

6. On a straight line of length two inches as base describe accurately with straight-edge and compass a triangle having each of the base angles double the vertical angle. Give proof.

7. AB is a straight line one unit in length and P is a point in AB or in AB produced such that the rectangle AB.BP is twice the square on AP: find the possible positions of P.

Find a geometrical construction for an internal point Q when $AQ^2=2AB.BQ$.

8. For what values of x from 0° to 90° is $\sin x$ equal to (i) $\cos x$, (ii) $\tan x$, (iii) $\operatorname{cosec} x$? If $\sin x=\cot x$, find $\cos x$ and, from the tables, the value of x.

9. Show that the sides of a triangle are proportional to the sines of the opposite angles.

Describe accurately on a large scale a triangle from which a value of x can be found such that $3 \sin x=\sin (60^\circ+x)$.

Hence, or otherwise, find x in degrees and verify the result by means of the tables.