AN ROINN OIDEACHAIS

(Department of Education).

BRAINSE AN MHEADHON-OIDEACHAIS.

(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1925

PASS.

MATHEMATICS (II.)

FRIDAY, 19th JUNE.—MORNING, 10 A.M. *to* 1 P.M.

Eight questions may be answered and the marks will be awarded on the first *eight* answers left uncancelled.

Mathematical Tables may be obtained from the Superintendent.

1. A point P moves inside or outside a given circle so that the rectangle contained by the chord-segments of all lines passing through P and the circle is constant: find the locus of P.

2. Divide a straight line so that the square on one segment may be three times the square on the other.

3. Define '*regular polygon*' and '*similar polygons*.' Prove that regular polygons are cyclic.

4. Given a quadrilateral $ABCD$, show :—

(i) how to describe on a given line as base a triangle equal in area to $ABCD$.

(ii) how to draw through A a straight line which will trisect the quadrilateral.

5. Given the length of two adjacent sides, construct a parallelogram—

(i) so that its area may be a maximum.

(ii) such that one diagonal may be double the other.

Give proofs.

6. Show that lines drawn parallel to one side of a triangle divide the other sides in equal ratios.

ABC is a triangle and P a point in AB: through P draw a line cutting BC in X and AC produced in Y, such that $PX = \frac{1}{3} PY$.

7. Show that a bisector, internal or external, of an angle of a triangle divides the opposite side into segments which are proportional to the adjacent sides.

Hence show how to cut off from a given line a part equal to $\frac{3}{7}$ of the whole line.

8. With the usual notation prove that for a triangle ABC :

$$\tan \tfrac{1}{2}(A - B) = \frac{a - b}{a + b} \cot \tfrac{1}{2} C.$$

In a triangle, $b = 19{\cdot}4$, $c = 27{\cdot}2$, and $A = 79°$; find a, B, and the length of the longest perpendicular.

9. In order to determine the height of a mountain, a horizontal base-line of 2,750 feet was measured. At each extremity of the base-line was taken the angle subtended by the line joining the summit to the other extremity: these angles were 58° 28′ and 111° 53′, and at the extremity from which the latter angle was taken the angular height of the mountain was 11° 19′. Calculate the height of the mountain.

10. A rectangle $ABCD$ has AB greater than BC. Give a geometrical construction for drawing the figure which would result from folding the rectangle, so that B coincides with a given point E on CD.

If $AB = 18$ inches, $BC = 13$ inches, and the crease makes an angle of 27° with AB in its original direction: find the length of the crease.