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(Department of Education).

BRAINSE AN MHEÁN-OIDEACHAIS
(Secondary Education Branch).

INTERMEDIATE CERTIFICATE EXAMINATION, 1926.

MATHEMATICS (II).

MONDAY, 21st *JUNE.*—Afternoon, 3.30 to 6 p.m.

Seven questions may be answered. Somewhat higher marks will be awarded to the questions at the end of the paper.

Trigonometrical Tables may be obtained from the Superintendent.

1. The side AB of a triangle ABC is produced : show that the exterior angle is greater than the interior angle A.

Prove that from any point more than two equal straight lines cannot be drawn to a given line.

2. Find the locus of points equidistant from two fixed points A and B.

If P is a point on the same side of the locus as A, show that PA is less than PB.

3. Two triangles have two sides of one equal to two of the other : show that the third side of the one is greater than or less than the third side of the other according as the opposite angle is greater or less.

Given a parallelogram which is not rectangular : show that the greater diagonal passes through the acute angles of the figure.

4. Construct a triangle of sides 3, $4\frac{1}{2}$, 5 inches. Find by geometrical construction a square of equal area and measure the side. (Proof need not be given if the method is clearly shown).

5. AB is a straight line, M is mid-point and P any other point : show that $PA^2 + PB^2$ exceeds $2AM^2$ by $2PM^2$.

Write down the corresponding Algebraic Theorem when P is on AB produced. Also find the position of P for which $PA^2 + PB^2$ is least.

6. A line a inches in length is divided into two parts such that the rectangle contained by the whole line and one part is equal to the square on the other : find the lengths of the segments.

Calculate the value of a when the difference of the segments is 1·37 inches.

7. P is a point outside a circle ; PT is a tangent and PQR a secant cutting the circle at Q and R : prove that $PT^2 = PQ.PR$.

ABC is a triangle in which M is the mid-point of AC. If circles can be found to pass through M and touch AB and BC, indicate their line of centres and common chord. Hence show how to construct the circles.

8. An equilateral triangle of side s units is made of uniform material. The inscribed circle is then removed.

If the weight of the triangle was w grammes, find the weight of the material per unit area and show that the parts left after removal of the circle weigh $w\left(1 - \dfrac{\pi}{3\sqrt{3}}\right)$ grammes.

9. A man starting at a point P walks 150 yards along a line 50° N. of E. to a point Q : from Q he travels 97 yards 10° N. of W. to R and thence 176 yards 65° E. of N. to T : calculate the distance and direction of T from P.