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(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1950.

MATHEMATICS.—GEOMETRY.—PASS.

WEDNESDAY, 7th JUNE.—Morning, 10 to 12.30.

Six questions to be attempted.

All questions are of equal value.

Mathematical Tables may be obtained from the Superintendent.

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1. Show (i) how to inscribe a circle in a given triangle, (ii) how to circumscribe a circle about a given triangle. Give proof in each case.

2. Construct two squares, one equal in area to, and the other three times the area of an equilateral triangle of side *two* inches.

3. If a circle can be inscribed in a quadrilateral, ABCD, prove that $AB+DC=BC+AD$.

State and prove the converse theorem.

4. The bisector AD of the vertical angle of a triangle ABC meets the base BC at D; prove that $AB.AC=AD^2+BD.DC$.

Or,

4. Prove that the rectangle contained by the diagonals of a cyclic quadrilateral is equal to the sum of the rectangles contained by the opposite sides.

5. The internal and external bisectors of the angle A of a triangle ABC meet BC at D and BC produced at D′ respectively. Prove that

$$AB : AC = BD : DC = BD' : D'C.$$

If B, C are fixed points and A moves so that AB : AC is constant, what is the locus of A ?

Or,

5. When are figures said to be "*similar*"?

Prove that the areas of two similar pentagons are proportional to the squares on any pair of their corresponding sides.

[The corresponding Theorem for triangles may be assumed.]

6. Prove that the area of a triangle is equal to half the product of two sides and the sine of the contained angle.

ABC is a triangle in which AB=6 ins., AC=5 ins., $B\hat{A}C=60°$, and AD, the bisector of the angle BAC, meets BC at D: find the length of AD.

Or,

6. Prove that $\cos(A+B)=\cos A\cos B-\sin A\sin B$, when $(A+B)<90°$. Hence deduce that:

(i) $\cos 30°=2\cos^2 15°-1=1-2\sin^2 15°$;

(ii) $\tan 15°=2-\sqrt{3}$.

7. Prove the formula for the cosine of an angle of a triangle in terms of the sides.

The sides of a triangle are 7, 8, 9 inches long respectively. Find the size of the greatest angle.