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(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1951.

MATHEMATICS.—GEOMETRY.—PASS.

WEDNESDAY, 6*th* *JUNE*.—MORNING, 10 TO 12.30.

Seven questions to be answered.

All questions are of equal value.

Mathematical Tables may be obtained from the Superintendent.

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1. If two chords AB, CD of a circle intersect at P (i) inside the circle, (ii) outside the circle, prove in each case that the rectangle AP.PB is equal to the rectangle CP.PD.

2. Show, with proof, how to describe an equilateral triangle about a given circle.
If the radius of the circle be x ins. long, express in terms of x the length of the side of the triangle.

3. Show, with proof, how to construct an isosceles triangle ABC so that $\angle ABC = \angle ACB = 2\angle BAC$.

4. Show, with proof, how to divide a given straight line AB (i) internally at P, (ii) externally at Q so that $AP : PB = AQ : QB = 3 : 2$.
Calculate the length of PQ when $AB = 6$ units.

5. Show how to find a third proportional to two given straight lines. Prove your construction.
If LM is a third proportional to two straight lines AB, CD, and if AB, CD are in the ratio $a : b$, show that AB, LM are in the ratio $a^2 : b^2$.

6. ABC is a triangle in which the angle ABC is *acute* and D is the foot of the perpendicular from A to BC (or to BC produced). Prove that $AC^2 = BA^2 + BC^2 - 2BC.BD$.
State the corresponding theorem when the angle ABC is *obtuse*.
Deduce that in a triangle ABC, $b^2 = c^2 + a^2 - 2ca \cos B$.

or

6. Prove that the vertices of a regular octagon are concyclic.
The side of a regular octagon is 2·4 ins. long: find the area of the octagon.

7. Write down the expansion of $\sin(A+B)$. Give proof for the case when A and B are positive and $(A+B)<90°$.

Find the value of $\sin(A+B)$ when $\sin A=\frac{5}{13}$, $\sin B=\frac{3}{5}$.

8. Two small boats, P, Q, are anchored in a harbour. R,S,T, are three points on the strand such that R, S, P are collinear, and R, T, Q are also collinear. If $\angle PRQ=42°$, $\angle PSQ=55° 18'$, $\angle PTQ=68° 58'$, RS=112 yds., RT=243 yds., find, correct to *two* significant figures, the distance, in yards, between P and Q.