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LEAVING CERTIFICATE EXAMINATION, 1935.

PASS.

MATHEMATICS
(GEOMETRY)

FRIDAY, 14*th* *JUNE*.—MORNING, 10 A.M. TO 12.30 P.M.

Six questions may be answered.

Mathematical Tables may be obtained from the Superintendent.

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

1. P is a point outside a circle : show how to find points, X and Y on the circle such that PX and PY shall be tangents.

Prove that $PX = PY$.

[33 marks.]

2. M is the mid-point of the side AB of a triangle ABC : prove that $CA^2+CB^2=2(AM^2+MC^2)$.

X and Y are points within a circle : show how to find a point Z on the circumference such that ZX^2+ZY^2 may be as small as possible.

[33 marks.]

3. From a point Q outside a circle lines QAB and QCD are drawn intersecting the circle at A, B, C, D : prove that $QA \cdot QB = QC \cdot QD$.

Two circles intersect at M and N ; prove that tangents drawn to the circles from any point on the line MN produced are equal.

[33 marks.]

4. AB is the diameter of a semicircle ACB ; from any point P on AB a line, PC, is drawn perpendicular to AB : prove that $AP \cdot PB = PC^2$.

If $AB = 12$ ins. and $AP+PC = 14$ ins., calculate the length of AP.

[33 marks.]

5. The bisector of the angle BAC of a triangle ABC meets BC at D: prove that AB : AC = BD : DC.

State and prove the converse theorem.

[33 marks.]

6. Show how to find a point P on a line AB p oduced such that $PA \cdot PB = AB^2$.

Construct accurately a triangle whose angles are in the ratios 1 : 2 : 2 and whose shortest side is 3 ins. long. Explain your construction.

[The use of the *Protractor* is not allowed.]

[33 marks.]

7. Show that a line drawn parallel to one side of a triangle divides the other sides in equal ratios.

EFGH is the inscribed circle of the square ABCD whose side = $2s$; another circle of radius x ins. touches EFGH externally and the sides AB, BC internally. Prove that $x = s(\sqrt{2}-1)^2$.

[33 marks.]

8. Prove that for a triangle ABC, $\dfrac{a}{\sin A} = 2R$, where R = the radius of the circumcircle.

The angles of a triangle are in arithmetical progression and the diameter of the circumcircle is 20 ins. Prove that one of the angles of the triangle contains 60° and show that the opposite side is $10\sqrt{3}$ ins long.

[34 marks.]

9. Two small boats, X and Y, are anchored in a harbour. A, B, C are points on the strand such that A, B, C, X, Y all lie in the same plane ; A, B, X are collinear and A, C, Y are collinear. Calculate the distance between X and Y when AB = 150 yds., AC = 200 yds. angle XBY = 64°53′, angle XAY = 50°, angle XCY = 72°31′.

[34 marks.]