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(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1949.

MATHEMATICS—GEOMETRY.

THURSDAY, 9th JUNE.—MORNING, 10 TO 12.30.

The total number of questions answered should not exceed *six*

Mathematical Tables may be obtained from the Superintendent.

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1. Show, with proof, how to draw a perpendicular to a given straight line from a given point without it. Ruler and compass only may be used.

Show that the perpendicular is the shortest line which can be drawn from that point to the given line.

[30 marks.]

2. ABC is a triangle and D, E are the middle points of AB, AC respectively. Prove that DE is parallel to BC and equal to half of it.

[30 marks.]

3. Prove that the sum of the opposite angles of a cyclic quadrilateral is equal to two right angles.

State the converse theorem. [30 marks.]

4. (i) Prove that the area of a triangle is equal to half the area of the rectangle on the same base and between the same parallels.

(ii) From a point within an equilateral triangle perpendiculars are drawn to the three sides: prove that their sum is equal to the height of the triangle.

[30 marks.]

Or,

4. From a point P on the arc of a semi-circle a perpendicular PC is drawn to the diameter AB: prove that PC^2 is equal to AC.CB.

Show how to construct on a given straight line a rectangle equal in area to a given square.

[30 marks.]

5. AB is a fixed straight line and P is a point which moves so that $\hat{APB}=90°$: find the locus of P.

(i) MN is a chord of a circle, where M is fixed and N moves along the circumference. MN is produced to R so that MN=NR. Find the locus of R.

[35 marks.]

Or,

5. What is the locus of the centres of equal circles which touch (i) a given straight line, (ii) a given circle?

A straight line is drawn at a distance of 1·8 ins. from the common centre of two concentric circles whose radii are 1 inch and 2 inches, respectively. Construct a circle which will touch the straight line and also the two concentric circles.

[Explain your construction. Proof not required.]

[35 marks.]

6. Prove that if two triangles are equiangular their corresponding sides are in proportion.

P, Q are two given points outside a given circle X: show how to draw a tangent to X such that the perpendiculars drawn to it from P, Q may be in the ratio of 2 : 1.

[35 marks.]

7. ABC is a triangle in which AC=10 ins., $\tan A=\frac{1}{5}\frac{2}{4}$, $\cos B=\frac{3}{5}$. Find the length of AB.

[35 marks.]

8. A straight pole ALB is leaning on a vertical wall LM with the part LB projecting over the top of the wall and with the end A resting on the horizontal plane through M such that the angle LAM is 45°. When the end A slips a distance of three feet along the plane the other end of the pole is just at the top of the wall and the angle the pole then makes with the plane is 34°. Find the length LB that the pole was projecting over the wall at first.

[35 marks.]