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(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1951.

MATHEMATICS—GEOMETRY.

WEDNESDAY, 6th 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. Construct accurately an acute-angled triangle ABC such that AB=3 ins., AC=$3\frac{1}{2}$ ins., and the perpendicular from A on BC is $2\frac{1}{2}$ ins. Find the area of the triangle.

[30 marks.]

2. Prove that the straight line joining the middle points of two sides of a triangle is parallel to the third side.

Show that the four straight lines which join the middle points of the adjacent sides of any quadrilateral form a parallelogram.

[30 marks.]

3. Prove that the square on the hypotenuse of a right-angled triangle is equal to the sum of the squares on the other two sides.

[30 marks.]

4. Prove that the angles made by a tangent to a circle with a chord drawn from the point of contact are respectively equal to the angles in the alternate segments of the circle.

Hence or otherwise show that the two tangents to a circle from an external point are equal.

[35 marks.]

Or,

4. Two chords of a circle, AB and CD, intersect internally at E. Prove that AE.EB=CE.ED.

Show to divide a given straight line internally so that the rectangle contained by the two parts shall be equal to a given square.

[35 marks.]

5. A and B are two fixed points on the circumference of a given circle and PQ is any diameter. PA and QB, produced if necessary, intersect at X. What is the locus of X?

[35 marks.]

Or,

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

BD : DC = BE : CE.

In the above triangle, if it is assumed that BC is fixed and A moves so that the ratio AB : AC is constant, show that the locus of A is a circle on DE as diameter.

[35 marks.]

6. Construct a triangle ABC such that $\tan A = \frac{2}{3}$, $\cos B = \frac{3}{5}$ and the perpendicular CD from C to AB is 2 inches long. Calculate the lengths of AC and DB, and find the values of (i) sinA, (ii) tanB.

[35 marks.]

7. Travelling at a uniform speed of 15 miles per hour, a boat left A and proceeded in a direction 40° east of north for 12 minutes. It then altered its course and travelled 5 miles in a direction 40° south of east. Then it proceeded in a direction 30° north of east, and reached a point B due east of A. Find the total time taken by the boat to travel from A to B and how far B is from A.

[35 marks.]